KEHUA TECH

Power Conversion System

BCS-B-HM X2 Series (75K-200K)

User Manual

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Foreword

Summaries

Thank you for choosing the Kehua's power conversion system (hereinafter referred to as PCS)!

This document gives a description of the PCS, including appearance, features, working principles, installation, electrical connection, operation, maintenance and storage, etc.

Please save the manual after reading, in order to consult in the future.

NOTE
The figures in this manual are just for reference, for details please see the actual product.

Applicable Model

- IEC model
  - BCS75K-B-HM, BCS100K-B-HM, BCS150K-B-HM, BCS175K-B-HM, BCS187K-B-HM, BCS200K-B-HM
  - BCS75K-B-HM X2, BCS100K-B-HM X2, BCS150K-B-HM X2, BCS175K-B-HM X2, BCS187K-B-HM X2, BCS200K-B-HM X2
- UL model
  - BCS75K-B-HM-US X2, BCS100K-B-HM-US X2, BCS125K-B-HM-US X2, BCS150K-B-HM-US X2, BCS175K-B-HM-US X2

Symbol Conventions

The manual quotes the safety symbols, these symbols used to prompt users to comply with safety matters during installation, operation and maintenance. Safety symbol meaning as follows.

Symbol	Description
DANGER	Alerts you to a high risk hazard that will, if not avoided, result in serious injury or death.

Symbol	Description
	Alerts you to a medium low risk hazard that could, if not avoided, result in moderate or minor injury.
	Alerts you to a low risk hazard that could, if not avoided, result in minor injury.
	Anti-static prompting.
	Be care electric shock prompting.
TIP	Provides a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points in the main text.

Contents

1 Safety Description

This chapter mainly describes the safety announcements. Prior to performing any work on the device, please read the user manual carefully, follow the operation and installation instructions and observe all danger, warning and safety information.

1.1 Safety Announcements

This section mainly describes the safety announcements when operating and maintaining. For details, please refer to safety description in relevant chapters.

CAUTION

Before operation, please read the announcements and operation instructions in this section carefully to avoid accident.

The promptings in the user manual, such as "Danger", "Warning", "Caution", etc. don't include all safety announcements. They are just only the supplement of safety announcements when operation.

NOTE

Any device damage caused by violating the general safety operation requirements or safety standards of design, production, and usage will be out of Kehua's guarantee range.

1.1.1 Use Announcements

DANGER

Don't touch terminals or conductors that connected with grid to avoid lethal risk!

DANGER

There is no operational part inside the device. Please do not open the crust by yourself, or it may cause electric shock. The device damage caused by illegal operation is out of the guarantee range.

DANGER

After disconnect the input and output of the PCS, there still has residual energy in the storage capacitor, which may cause electric shock. Do not perform the maintenance until all power sources are switched off for 20 minutes.

WARNING

Please do not put fingers or tools into the rotating fans to avoid human injury or device damage.

WARNING

The surface temperature of the PCS may reach to 75℃. During running, please don't touch the surface to avoid scald.

WARNING

In case of fire, please use dry power fire extinguisher. If using liquid fire extinguisher, it may cause electric shock.

CAUTION

If the test of safety requirements on the PCS needs to be performed, please contact the manufacturer, or it may cause the device damage.

CAUTION

No liquid or other objects are allowed to enter the PCS, or it may cause device damage.

1.1.2 Energy Storage Battery Protection

There exists dangerous high voltage between the positive and negative of energy storage battery! If touching by accident, it may cause electric shock or human injury!

DANGER

When maintaining the device, make sure that the connection between the PCS and energy storage battery has been disconnected completely. And set warning mark in the disconnected position to avoid reconnecting by accident.

1.1.3 ESD Protection

CAUTION

To prevent human electrostatic damaging sensitive components (such as circuit board), make sure that you wear an anti-static wrist strap before touching sensitive components, and the other end is well grounded.

1.1.4 Grounding Requirements

WARNING

High leakage risk! The PCS must be grounded before wiring. The grounding terminal must be connected to ground, or there will be the risk of electric shock when touching the PCS.

- When installing, the PCS must be grounded first. When dismantling, the grounding wire must be removed at last.
- Don't damage the grounding conductor.
- The PCS must be connected to protection grounding permanently.
- Before operation, check the electrical connection to ensure the PCS is grounded reliably.

1.1.5 Moistureproof Protection

CAUTION

Moisture invasion may cause the device damage!

Observe the following items to ensure the PCS works normally.

- When the air humidity is more than 95%, don't open the cover of the PCS.
- In the wet or damp weather, don't open the cover of the PCS to maintain or repair.

1.1.6 Warning Mark Setting

In order to avoid accident for unwanted person gets close to the PCS or makes improper operation, observe the following requirements while installing, maintaining or repairing.

- Set warning marks where the switches are to avoid closing them improperly.
- Set warning signs or safety warning belt in the operation area, which is to avoid human injury or device damage.

1.1.7 Electrical Connection

Electrical connection must be performed according to the description and the electrical circuit schematic in the user manual.

WARNING

The configuration of battery, grid level, grid frequency, etc. must meet the technical requirements of the PCS.

Grid-tied operation should be allowed by the local power supply department and the related operation should be performed by professionals.

All electrical connection must meet the electrical standards of the country or local region where the project located.

1.1.8 Live Line Measurement

CAUTION

There exists high voltage in the device. If touching the device accidently, it may cause electric shock. So, when perform measurement under operation, it must take protection measure (such as wear insulated gloves, etc.)

The measuring device must meet the following requirements:

- The range and operation requirements of measuring device meets the site requirements;
- The connections for measuring device should be correct and standard to avoid arcing.

1.2 Operator Requirements

CAUTION

The operation and wiring for the PCS should be performed by qualified professional technicist, which is to ensure that the electrical connection meets the related standards.

The professional technicist must meet the following requirements:

- Be trained strictly and understand all safety announcements and master correct operations.
- Fully familiar with the structure and working principle of the whole energy storage system.
- Know well about the related standards of local country and district.

1.3 Announcements for Maintenance

WARNING

After the connection at AC side and DC side of the PCS disconnected, it is necessary to wait at least 20 minutes, and then the maintenance can be done.

After the PCS power off and stop running, while maintenance, pay attention to following items.

- Ensure that the PCS cannot reconnected by accident.
- Ensure that the inner PCS has no electricity by multimeter.
- Perform necessary grounding connection.
- Cover the part that may with electricity by insulation material.
- During maintenance, keep the escape way unblocked.

1.4 Others

WARNING

All operation for the PCS must meet the relevant standards of the country or local region where the project located.

WARNING

When the PCS is electrified, it is strictly prohibited to carry out the maintenance.

It is necessary to keep at least two people be present while maintenance.

After the PCS power off and completely discharged, the maintenance operation can be done.

Besides, it is necessary to take following safeguard or emergency according to the actual situation.

- The operator should take proper safeguard procedures according to needs, such as wear noise-proof earplugs, insulated shoes, etc.
- Generally, the PCS is installed far away from downtown, so, it is necessary to prepare relevant emergency rescue facility to use in emergency.
- Take any necessary auxiliary measures to ensure the safety of human and device.

2 Overview

This chapter mainly describes the appearance, structure, working principle and communication method, etc. of the PCS.

2.1 Product Intro

BCS-B-HM series power conversion system is independently researched and developed by Kehua Company. It can be used in energy storage link. The basic characteristic is bidirection (rectification, inverter), and also, it has a series of special performance. It can be used in condition of grid-tied and off-grid. The energy storage link in smart grid can effectively regulate the electric resources and well balance the power consumption differences between day and night and different seasons, adjust the surplus and shortage and guarantee the grid security. It is an important premise for renewable energy application and an effective means to realize intelligent management. The PCS is a necessary link to realize smart grid. The energy storage system is made up of energy storage batteries, PCS, transformer, grid and load, as shown Figure2-1.

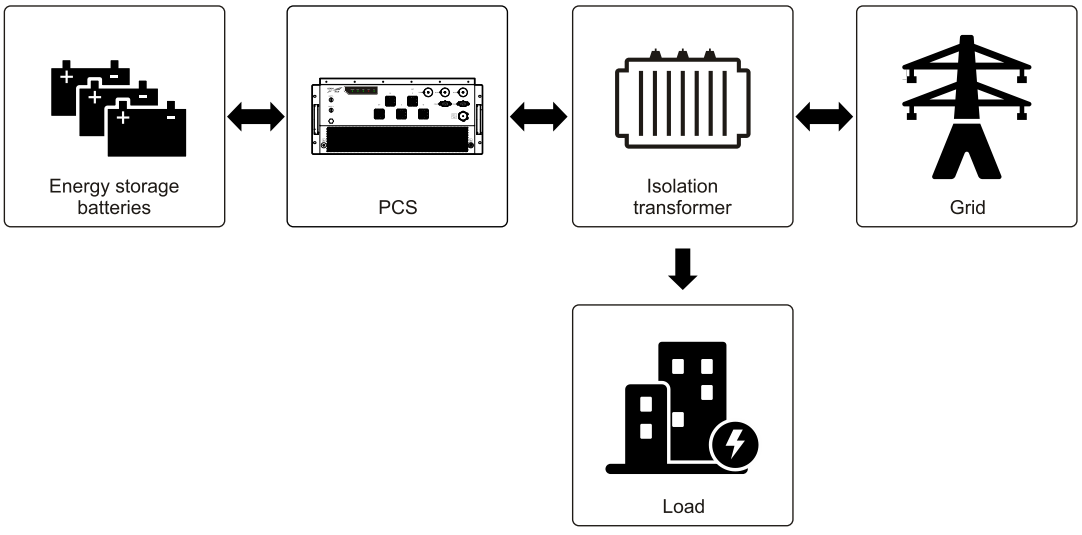


Figure2-1 Constitution of energy storage system

CAUTION

Grid-tied operation of the PCS needs to obtain the permission of local power supply department and performed by professionals.

NOTE

The supported grid form of PCS is as shown in Figure2-2.

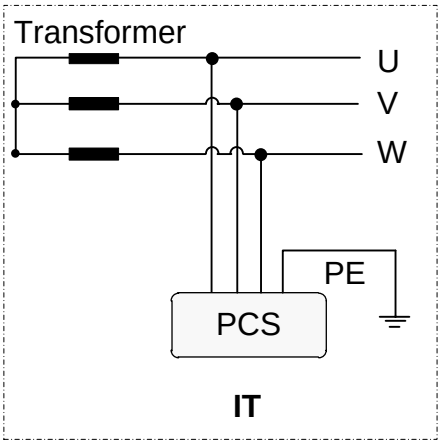


Figure2-2 Supported grid form of PCS

2.1.1 Features

Integrated system

- Modular design, and can be matched and integrated with battery system conveniently and flexibly.
- With built-in DC pre-charge function, for user's battery, it no needs to configure independent buffer circuit, and can be used immediately after inserting, which is safe and reliable.

Efficient and smart

- Efficient three level design, the max. efficiency ＞99%.
- Advanced midpoint potential balance control technology, effectively reduce the ripple voltage and improve the service life of bus capacitors.
- With the function of fault wave capture / remote online update.

Flexible and conveniently

- Convenient modular design, which makes the installation more easily, and decrease the maintenance costing.
- Support the AC parallel operation of several PCS. The system scheme configuration is flexible.
- With independent design of fan module to realize the quick installation and maintenance.
- With IP66 design, can adapt various wicked environment.

2.1.2 Model Meaning

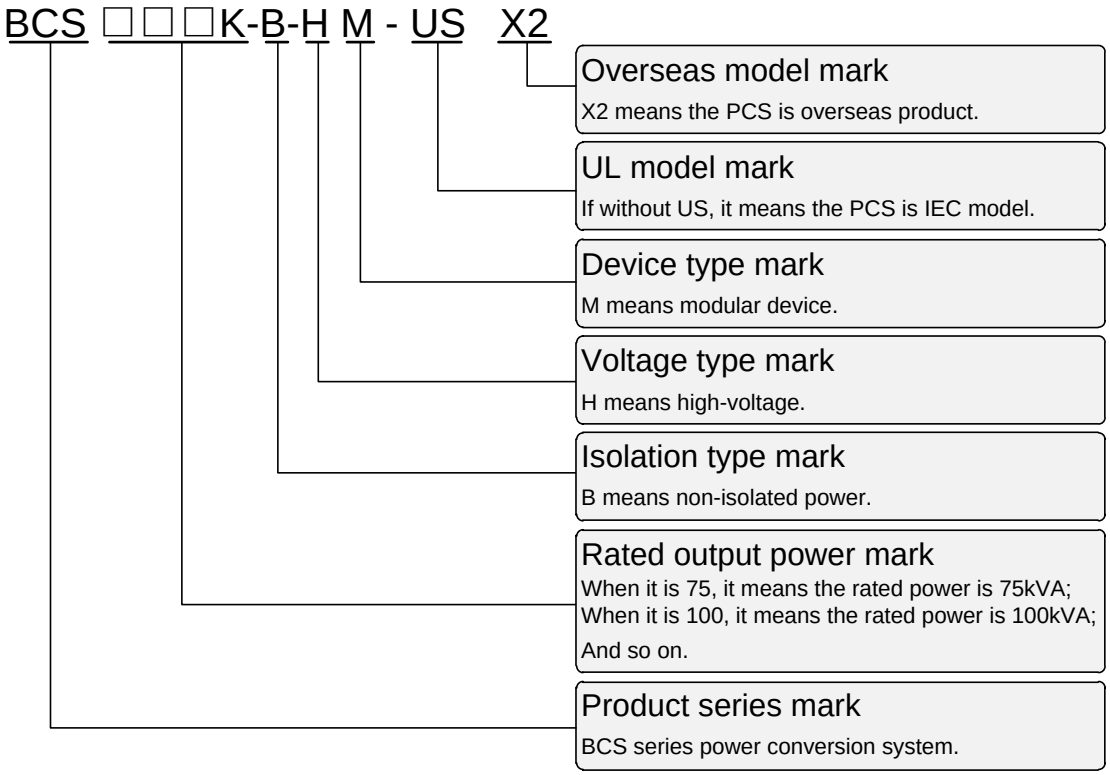


Figure2-3 Model meaning

2.2 Apperance and Structure

2.2.1 Apperance

The appearance of the PCS is as shown in Figure2-4.

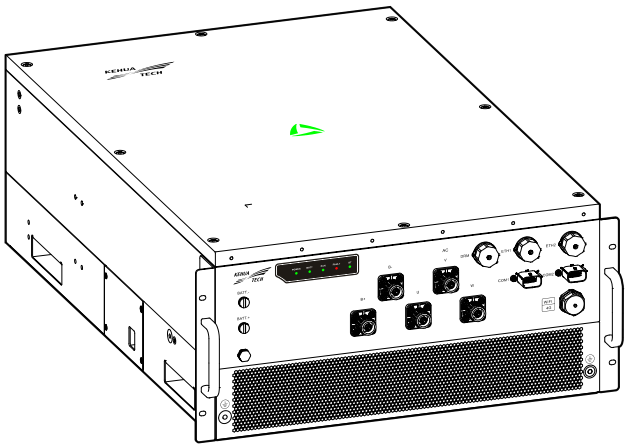


Figure2-4 Appearance

The PCS designs front indicator and strip indicator panel. The illustration for front indicator and strip indicator panel please see Table2-2, Table2-3.

2.2.2 Structure Layout

The structure layout of PCS is as shown in Figure2-5, corresponding components illustration please see Table2-1.

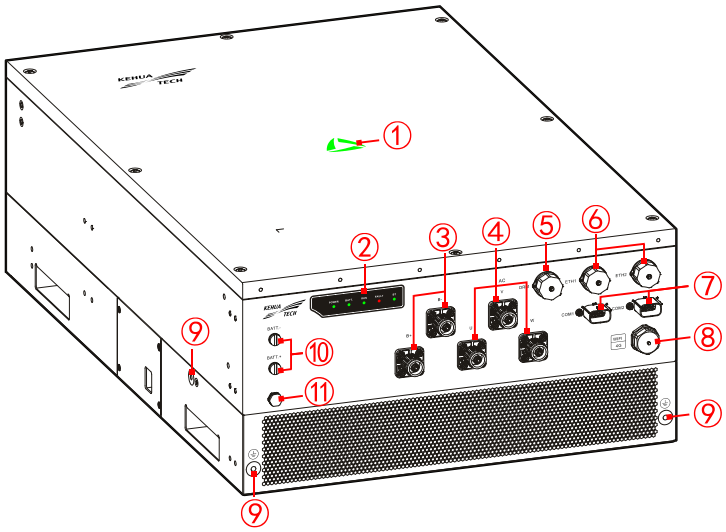


Figure2-5 Structure layout diagram

Table2-1 Component illustration

No.	Mark	Name	Illustration
①	-	Front indicator	Indicate the work status of PCS.
②	-	Strip indicator panel	Indicate the work status of PCS.

No.	Mark	Name	Illustration
③	B+/B-	DC terminals	Wiring terminals of DC side.
④	AC U/V/W	AC terminals	Wiring terminals of AC side.
⑤	DRM	DRM port	Reserved port for DRM function.
⑥	ETH1/ETH2	Ethernet port	Used to connect with upper-computer. Ethernet is manly used for LAN monitor, and realize remote monitor.
⑦	COM1/COM2	Communication port	COM2: Used for BMS communication. COM1: Reserved port for communication.
⑧	WIFI/4G	Wireless communication port	Used for wireless communication.
⑨	⏚	Grounding terminal of wiring side	Used to connect the PCS with ground.
⑩	BAT.+/BAT.-	Waterproof plug	Reserved port for battery voltage sampling (optional).
⑪	-	Breather valve	Used to balance the pressure difference between inside and outside of the PCS.

Front indicator

The illustration of front indicator is as shown in Table2-2.

Table2-2 Illustration of front indicator

Indicator	Status	Meaning
	Green indicator on	PCS is normally operating.
	Flickers in green and yellow alternately	PCS has minor alarm while running.
	Flickers in green	PCS standby or OFF.

Indicator	Status	Meaning
	Flickers in red	PCS standby or OFF and with minor alarm.
	Red indicator on	PCS abnormal and with major alarm.
	Off	Power disconnected.

Strip indicator panel

The strip indicator panel has five indicator lights (as shown in Figure2-6), which can indicate the current operating status of the PCS. The description of these five indicator lights is shown in Table2-3.

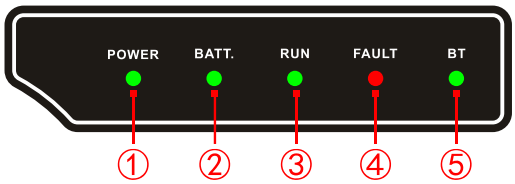


Figure2-6 Strip indicator panel

Table2-3 Indicator status illustration

No.	Mark	Color	Name	Status illustration
①	POWER	Green	Operation power indicator	On: the inner power of the PCS has been established.
				Off: the inner power of the PCS has not been established.
②	BATT.	Green	Battery connection indicator	On: the battery has been connected and meets the work condition.
				Off: the battery voltage does not meet the work condition.
③	RUN	Green	Running status indicator	On: in grid-tied operating status.
				Flicker: standby or OFF
				Off: AC and DC terminals not connected.

No.	Mark	Color	Name	Status illustration
④	FAULT	Red	Fault alarm indicator	On: there is fault on PCS
				Flicker: there is alarm on PCS
				Off: there is no fault or alarm
⑤	BT	Green	Bluetooth indicator	On: the Bluetooth is normally connected
				Flicker: the Bluetooth is ready to connect
				Off: the power of Bluetooth is not established

COM1/COM2

The port COM1, COM2 adopt 18Pin signal connector, as shown in Figure2-7. The port COM1 is only for internal debugging, the definition of each pin in COM2 is as shown in Table2-4.

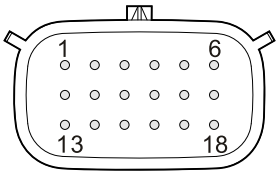


Figure2-7 Port diagram of COM1/COM2

NOTE

The pin1 to pin18 of COM1/COM2 is numbered from left to right and from top to bottom, that is to say, pin7 is the left one of second row.

Table2-4 Pin definition of COM2

Pin	Function definition	Illustration
Pin1	Passive input dry contact port 1	Pin1 and Pin4 is a group of EPO dry contact port for PCS.
Pin2	BMS serial communication port	BMS_RS485_B. It is used with Pin5 (RS485_A) together.
Pin3	BMS CAN communication port	CAN_L. It is used with Pin6 (CAN_H) together.
Pin4	Passive input dry contact port 1	Pin1 and Pin4 is a group of EPO dry contact port for PCS.

Pin	Function definition	Illustration
Pin5	BMS serial communication port	BMS_RS485_A. It is used with Pin2 (RS485_B) together.
Pin6	BMS CAN communication port	CAN_H. It is used with Pin3 (CAN_L) together.
Pin7	Passive input dry contact port 2	Pin7 and Pin8 is a group of EPO dry contact port for PCS. If the ports need to be used, please contact our company
Pin8		
Pin9	Upper-computer serial communication port	PC_ISO_A (RS485)
Pin10		PC_ISO_B (RS485)
Pin11	Reserved external BMS power supply port	+24V_IOS_BMS. If this function needs to be used, please contact our company.
Pin12		0V. If this function needs to be used, please contact our company.
Pin13	Active input dry contact port	Pin13 and Pin14 is a group of active EPO dry contact ports for PCS.
Pin14		
Pin15	Reserved external BMS power supply port	+24V_IOS_BMS. If this function needs to be used, please contact our company.
Pin16		0V. If this function needs to be used, please contact our company.
Pin17	Reserved	-
Pin18	Reserved	-

2.2.3 Size

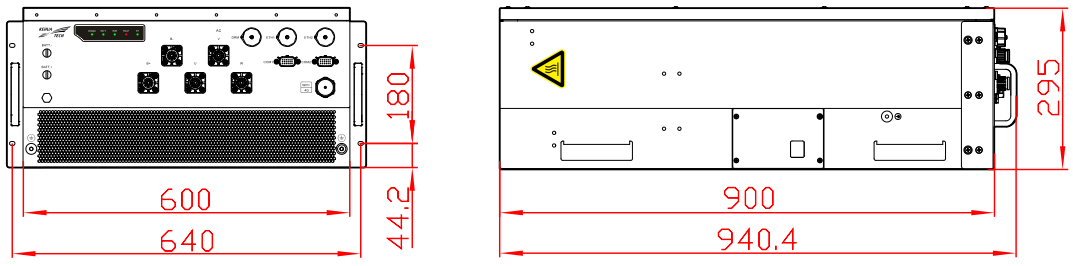


Figure2-8 Size (unit: mm)

2.3 Working Principle

The external connected battery group of the PCS is connected to the DC bus through the external DC switch. During charging, the current flows from the grid through three-phase rectification to the battery. During discharging, the current pass through the DC bus and then through three-phase inverter and output filtering to generate sinusoidal AC. When off-grid, the AC output is supplied to load, and when grid-tied, the output is fed into the grid, as shown in Figure2-9.

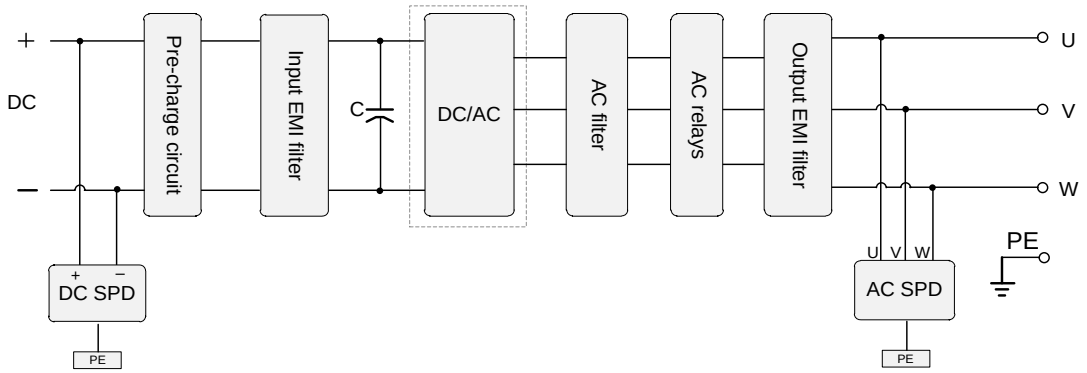


Figure2-9 Working principle diagram

2.4 Work Mode

The PCS includes 2 work modes: grid-tied mode and off-grid mode.

Grid-tied mode

On grid-tied mode, the PCS can realize charge and discharge function.

- Charge includes constant current charging, constant power charging, constant voltage charging.
- Discharge includes constant power discharging.

Besides, on grid-tied mode, user can set the charge and discharge time through upper-computer.

During grid-tied, the PCS can track the grid frequency automatically, and realize the function of smooth power output, peak shaving, system frequency modulation, load balancing, transient active output emergency response, transient voltage emergency support, improving power quality, etc.

Off-grid mode

On off-grid mode, the PCS can output the stabilized voltage and frequency. When the grid power down or the PCS is in independent system, it can supply power for load continuously to ensure the normal production and living electricity consumption. At that time, the PCS stay in off-grid status.

2.5 Communication

The PCS has multiple communication methods, the communication to the upper-computer includes Ethernet, RS485, Bluetooth, WIFI/4G (optional), and users can easily obtain the current operation data of the PCS. The communication to BMS includes CAN and RS485.

2.5.1 Communication with Upper-computer

Ethernet Communication

Ethernet communication (the interface is shown as ⑥ in Figure2-5) is mainly used for local area network monitoring, which can realize the background remote monitoring. The definition of Ethernet communication wire is as shown in Figure3-29. The default IP address of the PCS is 192.168.28.240.

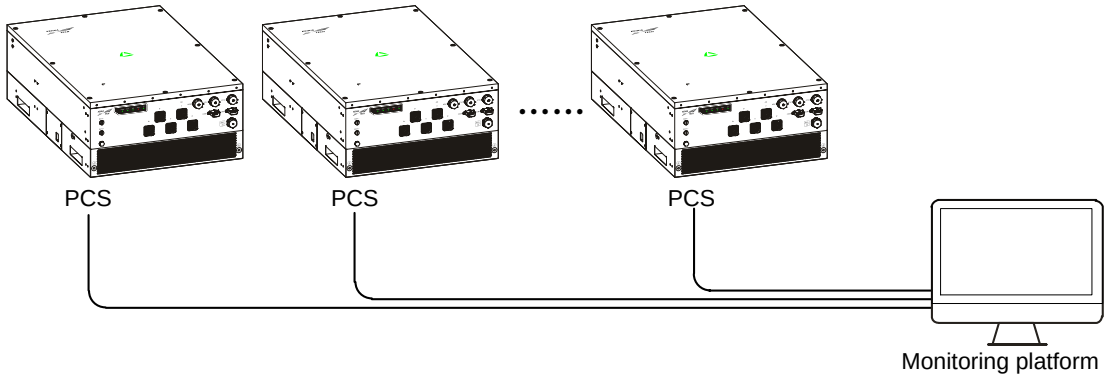


Figure2-10 Monitoring via Ethernet (multiple PCSs)

RS485 Communication

RS485 communication (shown as ⑦ in Figure2-5, detailed pin definition as shown in Table2-4) is mainly used for local area network monitoring, which can realize the remote monitoring.

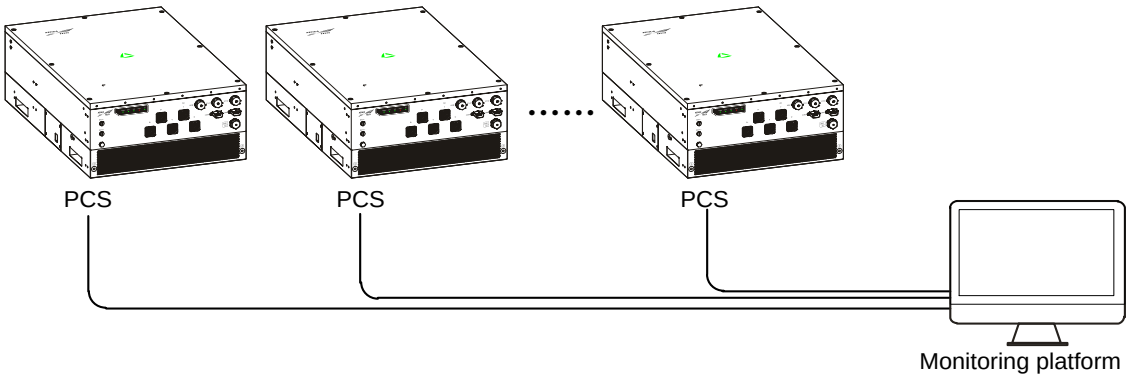


Figure2-11 RS485 communication (multiple PCSs)

NOTE

1. The A, B of RS485 on each PCS should be connected to monitor platform separately, A,B cannot be mixed.
2. If multiple PCS communicate through RS485, please set the communication address of each PCS by WEB, details please see **4.9 Communication Setting**.
3. The wiring of RS485 communication and input/output should be separated to avoid interfering the communication.

Bluetooth Communication

Bluetooth communication mainly used to display monitor, user can maintain and monitor the PCS by Bluetooth on the APP of phone. For the download way of APP, please see the illustration of WIFI communication.

WIFI/4G Communication (Optional)

WIFI communication is mainly used to display monitor, and the running information of the PCS can be monitored through APP on phone. WIFI interface is shown as ⑧ in Figure2-5.

NOTE

For the use of WIFI, please scan the QR code on the WIFI module.

2.5.2 Communication with BMS

The PCS can communicate with battery management system (BMS) through RS485 (pin 5 and pin 2 in COM2) or CAN (pin 6 and pin 3 in COM2) to monitor the real-time battery status, at the same time, it can alarm and protect for the fault according to the battery status, which can enhance the batteries' safety.

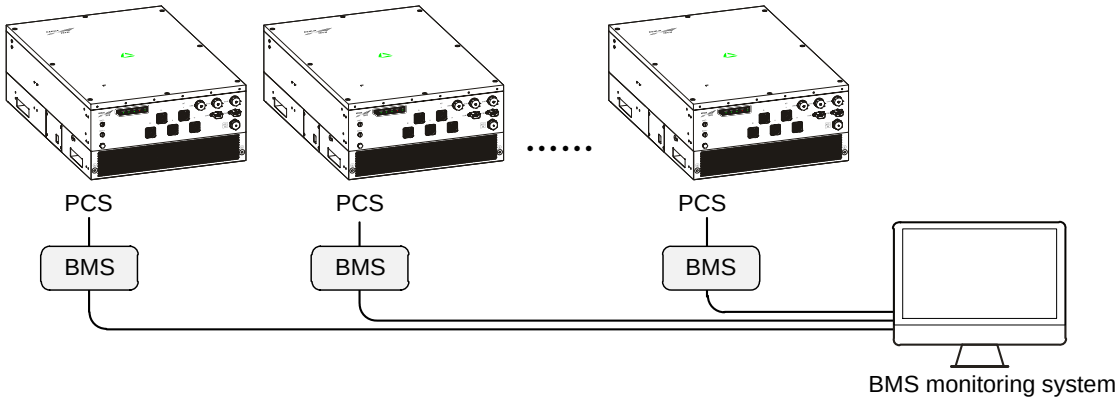


Figure2-12 Communication with BMS (multiple PCSs)

3 Installation

This chapter mainly introduces the PCS's installation, including installation process, installation preparation, transportation, unpacking and checking, installation procedures, electrical connection. check the installation, etc.

3.1 Installation Process

The installation process of the PCS is as shown in Figure3-1.

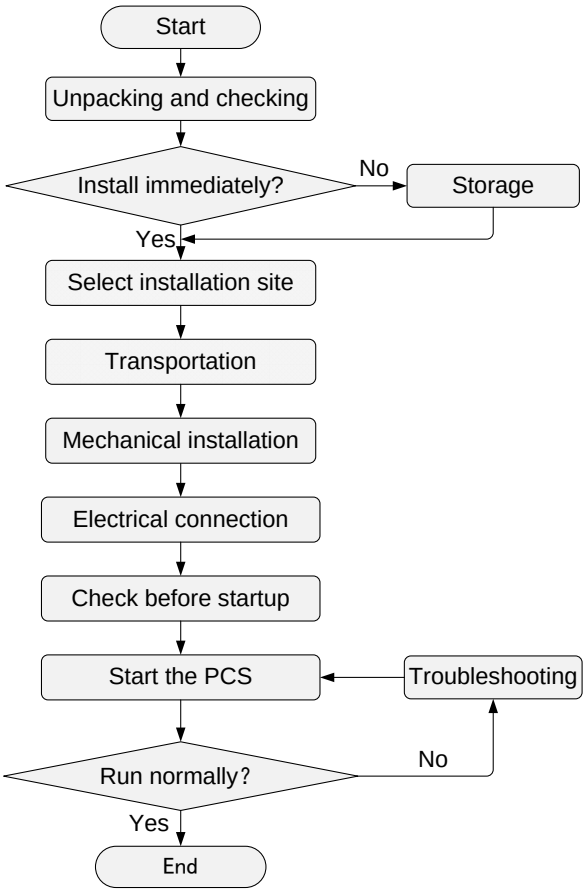


Figure3-1 Installation process

3.2 Unpacking and Checking

NOTE
Determine the unpacking site in advance. Generally, the unpacking site should be as close to installation position as possible.

The PCS has been completely tested and strictly inspected before leaving the factory, but damage may still occur during transporting, so a detailed inspection is required after arrival.

- Inspect the PCS's appearance for shipping damage, if any shipping damage is found, report it to the carrier immediately.
- Check if the types of the accessories are complete and correct. If there is any discrepancy, take notes and contact the distributor immediately.

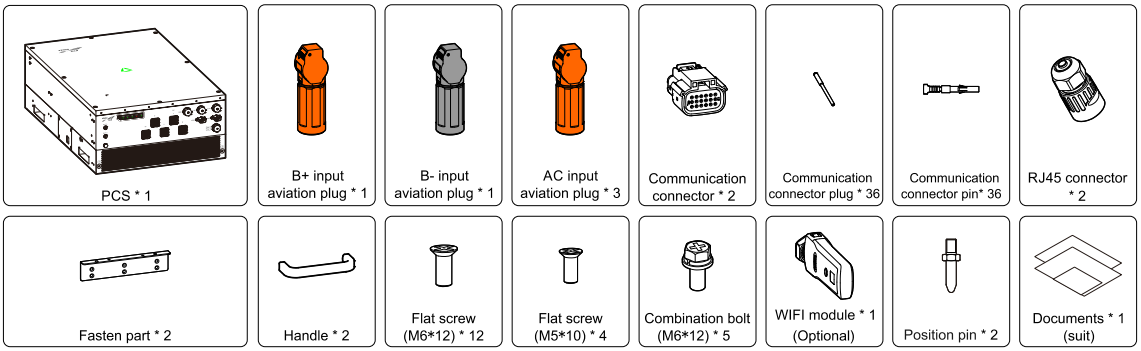


Figure3-2 Packing list

CAUTION

After unpacking, if the PCS will be stored for a long time, it's recommended to pack the PCS by original plastic package.

3.3 Selection of Installation Site

3.3.1 Installation Environment

The use environment has a certain influence on the service life and reliability of the PCS. Therefore, please pay attention to avoid using it in following working environment.

- Do not install the PCS in high or low temperature or humid places that exceed the technical specifications (temperature: -35℃~60℃, relative humidity: 0%~100%).

- Do not install the PCS in closed space, ensure good ventilation around the PCS.
- There must be no flammable or explosive materials or with dust, corrosive substances, or salt in the installation environment.

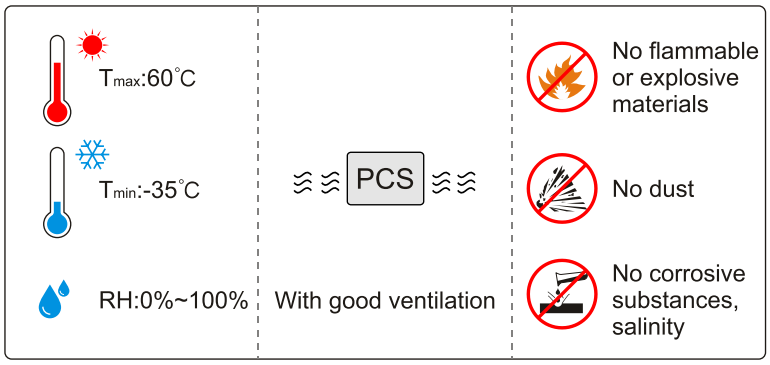


Figure3-3 Installation environment requirements

NOTE

- Choose the best installation location for the PCS, which plays a very important role in its safe operation, service life, performance guarantee, etc. Therefore, it is recommended to choose a place that can avoid direct sunlight, rain, and snow.
- As the operation of the PCS will produce noise pollution, thus avoid installing the PCS near residential areas as far as possible.

3.3.2 Installation Space

CAUTION

Keep enough clearance around the PCS to ensure good heat dissipation and easy maintenance.

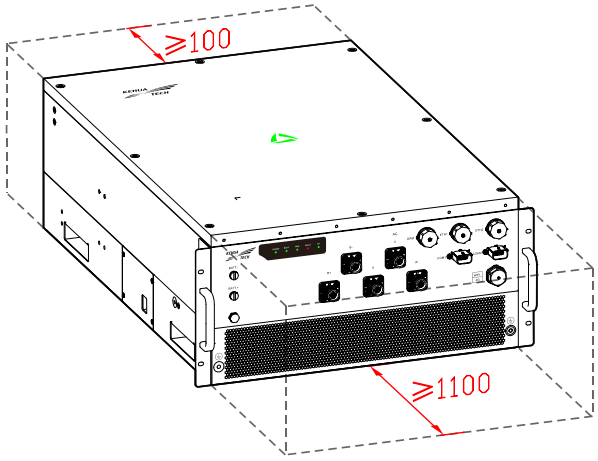


Figure3-4 Installation Space (unit: mm)

If the PCS is installed in the energy storage system, the front of the energy storage system needs to design ventilation holes and the ventilation rate should be not less than 60% of the front area of the PCS, at the back of the energy storage system, it needs to design the ventilation holes to dissipate the heat.

If the back ventilation holes are shutter, the distance between the back of the PCS and shutter should be at least 100mm.

3.4 Transportation

Before installation, the PCS needs to be transported to the selected installation site. When transporting, you can carry the PCS by the handles or the rings according to the scene.

The groove at the side of the PCS (as shown in Figure3-5) can be used to transport the PCS.

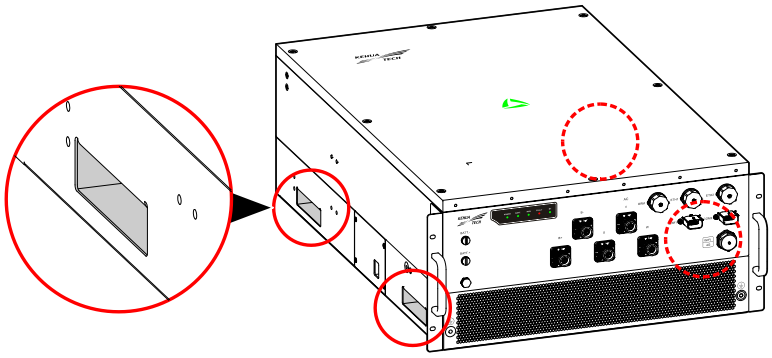
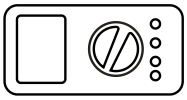
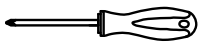
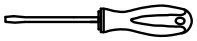
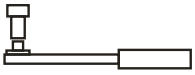
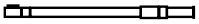
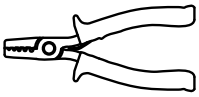
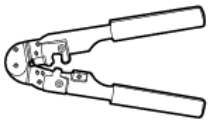
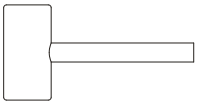
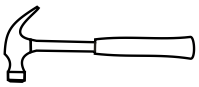
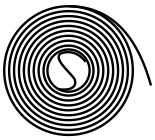
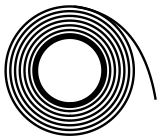
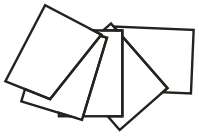
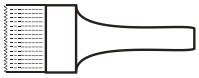
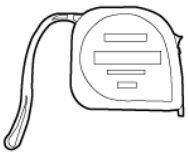
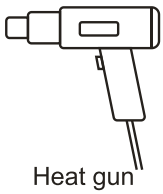
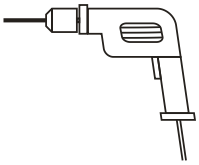
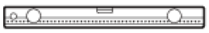


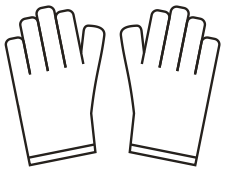
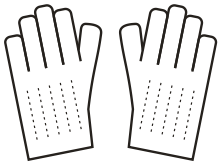
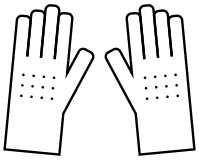
Figure3-5 Groove position

3.5 Installation Tools

The recommended installation tools include but not limited to the following tools, if necessary, you can also use other auxiliary tools according to the site conditions.

Tools			
 Clamp meter	 Multi-meter	 Wrench	 Phillips screwdriver

Tools			
 Flat-headscrewdriver	 Socket wrench	 Adjustable wrench	 Torque wrench
 COAX crimping tool	 Diagonal pliers	 Wire stripper	 Hydraulic pliers
 Clamping plier	 Wire plier	 Rubber hammer	 Claw hammer
 Heat shrink tubing	 Insulation tape	 Cotton cloth	 Brush
 Steel tape	 Heat gun	 Electric drill	 Electrician's knife
 Label paper	 Cable tie	 Levelling instrument	

Tools			
Protection			
 Protective gloves	 ESD gloves	 Insulated gloves	 Insulated shoes
 Protective glasses	 Reflective jacket	 Safety helmet	 Dust mask

CAUTION

The installation tools need to be insulated to avoid electric shock.

NOTE

Multimeter range≥1500Vdc.

Wrench specification: T30.

3.6 Mechanical Installation

Step 1 Install the two fasten parts by six flat screws M6*12 onto the PCS, as shown in Figure3-6.

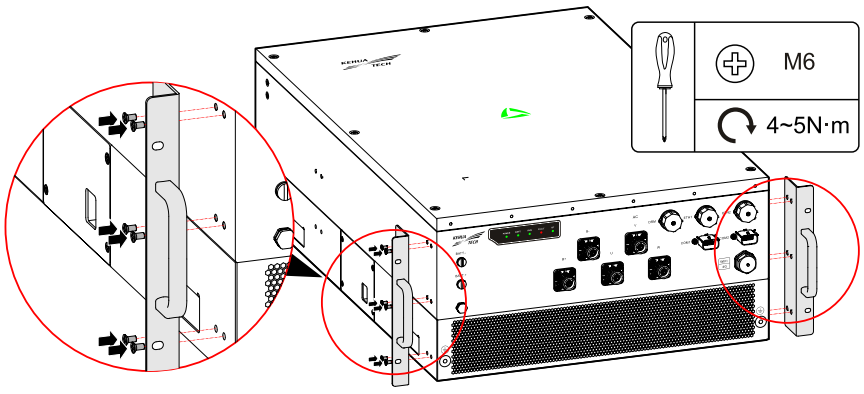


Figure3-6 Install the fasten parts

NOTE

- When the PCS is installed into the energy storage system and needs to be transported with the system together, we suggest to fix the PCS by position pins. The PCS has two holes at the back of the PCS (size as shown in Figure3-7) to fix the position pins. The position pin size please see Figure3-8.
- The position pins are prepared in the accessory.

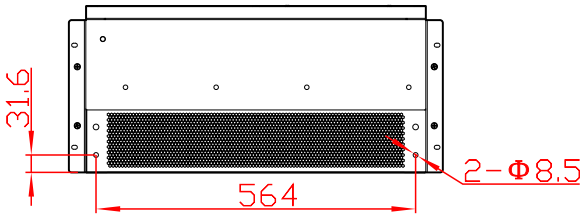


Figure3-7 Rear position hole size

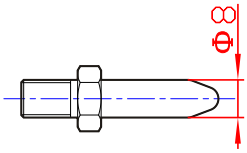


Figure3-8 Position pin size

Step 2 Push the PCS along the guide rail into the cabinet, as shown in Figure3-9.

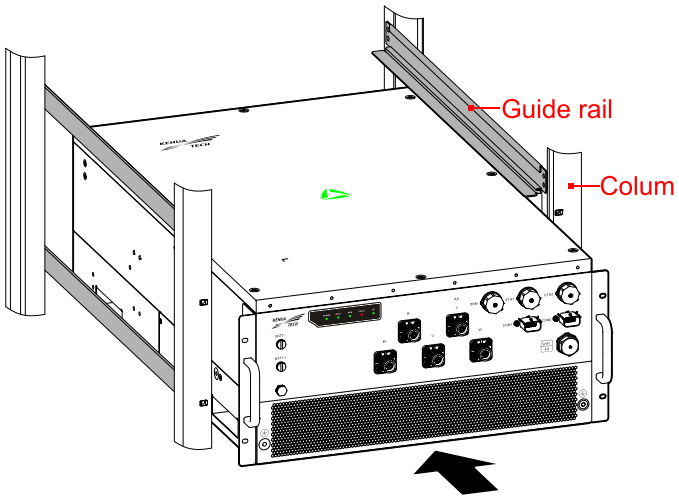


Figure3-9 Push the PCS into the cabinet

Step 3 Fix the PCS onto the column by four M6*12, as shown in Figure3-10.

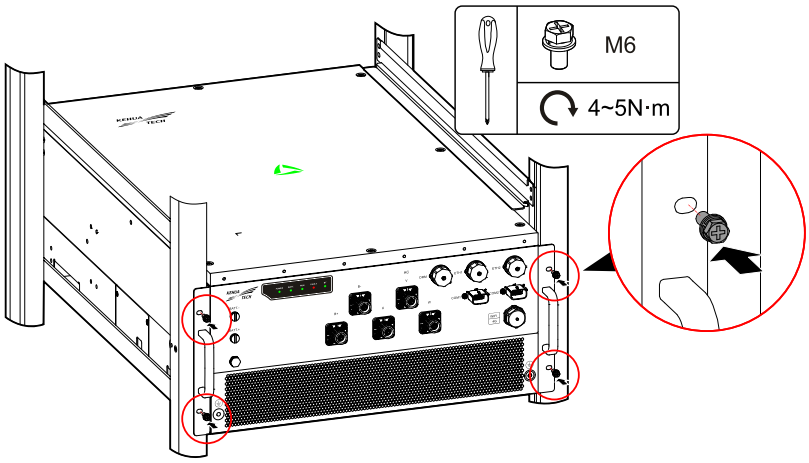


Figure3-10 Fix the PCS

NOTE

The PCS also supports side stand mounting. If the PCS adopts side stand mounting, we suggest to use tray to fix it (as shown in Figure3-11). The rail guide should avoid the fasten parts and the screws at the top of the PCS, the corresponding size is as shown in Figure3-12. The tray must be fixed by four screws M6 at least.

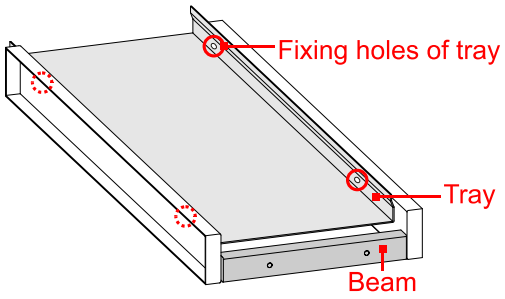


Figure3-11 Tray diagram

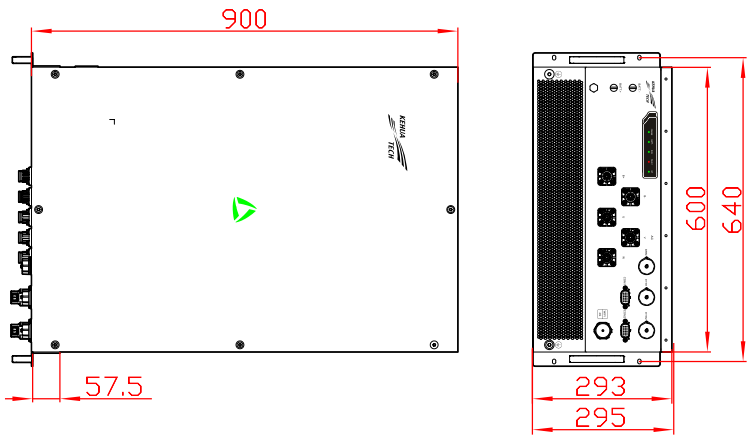


Figure3-12 Installation size of side stand mounting

----End

3.7 Electrical Connection

After the PCS firmly installed, then it can be connected to the energy storage system.

The electrical connection must meet the local laws and regulations and relative electrical standards.

3.7.1 Safety Announcements

During operating, professionals must wear protective equipment.

DANGER

- High voltage may exist inside the PCS.
- Do not close the external DC switch and external AC breaker before completing the electrical connection.
- Make sure that all cables without electricity before wiring.

WARNING

- Any improper operation during wiring may cause device damage or human injury, so, wiring operation must be performed only by professional technicians.
- The cables used in the energy storage system must be firmly connected, well insulated and with proper specifications.

CAUTION

- The wiring process must follow the relevant rules of the local power grid and the relevant safety instructions of the energy storage battery.
- All electrical installations must comply with the electrical standards of the country or local region where the project located.
- The PCS can be integrated into the power grid after obtaining permission from the local power department.

3.7.2 Requirements for Wire

The wiring terminals are located at the bottom of the PCS (as shown in Figure2-5), the recommended wires and terminals are as shown in Table3-1.

Table3-1 Wire and terminal requirements

Name	Type	Recommended wire specification (mm²)
DC input wire	1500V and above outdoor cables	Outdoor single-core cable: 70
AC output wire	690V and above outdoor multi-core cable or single-core cable	Outdoor single-core cable: 70
Ethernet communication wire	8-core network cable	-
RS485/CAN communication wire	Shielded twisted pair	2*0.3 mm² (Max outer diameter < 14mm)
External grounding wire	Outdoor cable	Conductor cross-sectional area≥S/2 (S is the conductor cross-sectional area of AC output wire)

NOTE

- The cables in above table are based on UL copper wire. If other wires are used, please replace them according to the standard. The wire materials selected by our company have passed the national standard certification or UL certification.
- If the recommended terminal model is not adopted, please confirm with our company.
- If aluminum wire is used, it should adopt copper-aluminum transition terminal to avoid the cooper bar come into contact with the aluminum wire directly.
- The cables above should be prepared by user.

3.7.3 External Grounding Connection

The PCS designs 4 external grounding terminals, as ⑨ shown in Figure2-5. Before electrical connection, connect the grounding terminal to the grounding cooper bar on the site reliably.

WARNING

Before connecting the wiring of AC, energy storage battery and communication, please connect the external grounding wire first.

Step 1 Strip the insulation layer of the grounding wire by crimping tool, and press it into the corresponding terminal, and then connect the crimped grounding wire to the external grounding terminal of the PCS, as shown in Figure3-13.

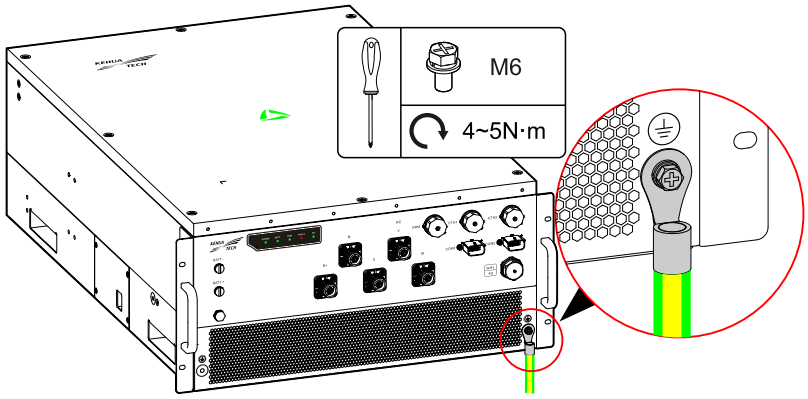


Figure3-13 Grounding connection diagram

NOTE

It is recommended to use DT or OT terminal for the external grounding wire.

In order to improve the anti-corrosion performance of the grounding terminal, it is recommended to paint anti-rust paint on the outside of the grounding terminal for protection after installation.

CAUTION

- The grounding of the PCS and the lightning rod of the building that the PCS installed cannot be the same, the two need to be separated (as shown in Figure3-14), or lightning stroke will damage the PCS.
- The grounding of the PCS should be directly connected to the grounding system, and the impedance should be less than 20mΩ.

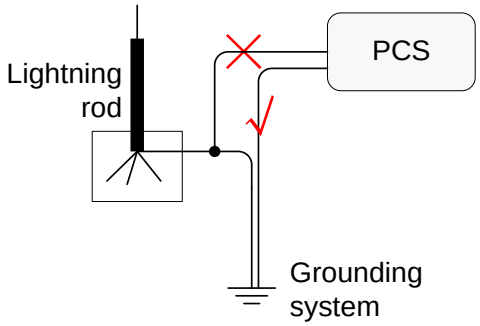


Figure3-14 Grounding diagram

----End

3.7.4 AC Wiring

The output side of the PCS should configure external breaker (as shown in Figure3-15, Figure3-16). To ensure that the PCS can be normally disconnected with grid under abnormal circumstance, please select suitable AC breaker or AC fuse, the recommended specifications please see Table3-2.

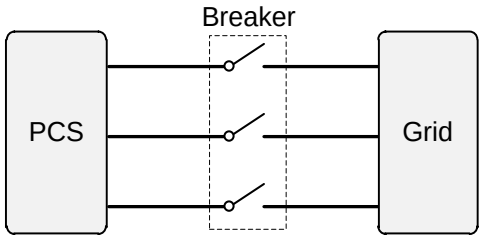


Figure3-15 Connection diagram (grid-tied mode)

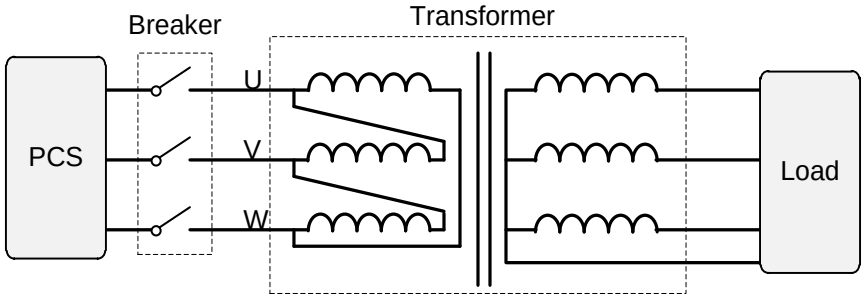


Figure3-16 Connection diagram (off-grid mode)

Table3-2 Recommended specification of AC breaker, AC fuse

Model	AC breaker	AC fuse
BCS200K-B-HM X2, BCS187K-B-HM X2, BCS175K-B-HM X2, BCS150K-B-HM X2,	690VAC/315A	1500V/400A

Model	AC breaker	AC fuse
BCS125K-B-HM X2		
BCS175K-B-HM, BCS175K-B-HM-US X2, BCS150K-B-HM, BCS150K-B-HM-US X2	600VAC/315A	1500V/400A
BCS125K-B-HM-US X2, BCS100K-B-HM-US X2, BCS75K-B-HM-US X2	480VAC/315A	1500V/400A
BCS100K-B-HM, BCS100K-B-HM X2, BCS75K-B-HM, BCS75K-B-HM X2	400VAC/315A	1000V/400A

External AC switch

The AC switch is the connection switch between the PCS and grid/transformer. When necessary, it can safely disconnect the connection of PCS and grid/transformer. In order to ensure the safety of operator, make sure that the AC switch is turned off under following conditions.

- While installing and wiring, the AC switch must be turned off.
- Before maintenance, turn off the AC switch and wait for 20 minutes, and measure the AC voltage inside the PCS by multimeter, only when the voltage is lower than 10V, you can perform the maintenance.

Wire requirements

To prevent the connection of PCS and grid interrupting accidently caused by high impedance of AC wires, please select suitable wire specification according to Table3-1.

CAUTION

Before wiring, add marks for AC output cables to avoid wrong connection.

Wiring procedure

CAUTION

Before connecting with grid, please make sure that the grid voltage and frequency are all meet the requirements of the PCS (details please see **A Technical Specifications**), or please contact the electric power company to solve it.

DANGER

The inner PCS may exist dangerous high voltage!

Before connecting, ensure all wires all without electricity.

Do not close the AC breaker before the electrical connection finished.

Step 1 Turn the external DC switch and external AC breaker to OFF.

Step 2 Crimp the AC cables (U, V, W) into the aviation plugs, as shown in Figure3-17.

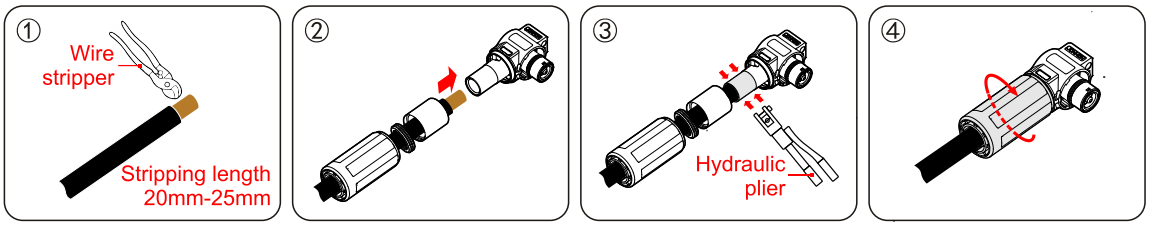


Figure3-17 Crimp AC cables

NOTE

The figure above just shows the crimping process, corresponding color of AC cables should be selected according to related specifications.

18-inch American style wire plier is recommended to strip the outer insulation layer of cable, and use hydraulic plier YQK-240 to crimp the terminal.

Step 3 Connect the crimped AC cables to the AC ports (U, V, W) of the PCS, as shown in Figure3-18.

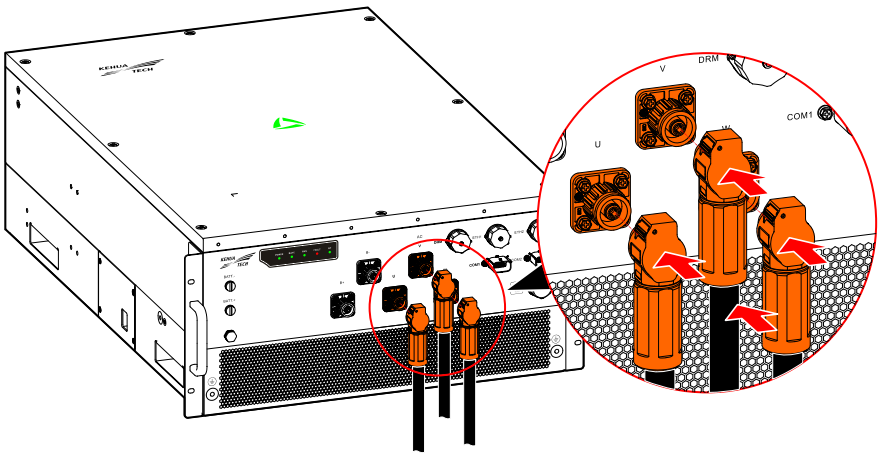


Figure3-18 AC connection diagram

NOTE

You can distinguish the aviation plug AC U/V/W via the mark on the plug, as shown in Figure3-19.

When connecting, a click will sound to indicate well connection of aviation plug.

If the AC cables need to be disconnected, please press the button at the side of aviation plug (as shown in Figure3-20) first to pull it out.

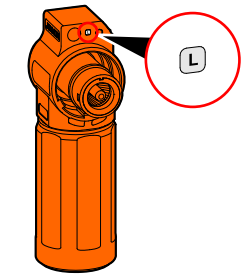


Figure3-19 Mark of aviation plug AC U/V/W

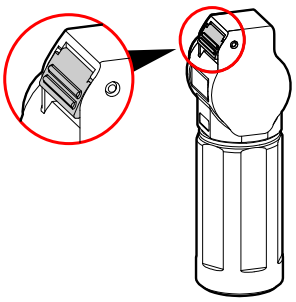


Figure3-20 Press position

CAUTION

Avoid pressing the insulation layer of the cables. Improper connecting operation may cause the PCS fail to operate normally.

----End

3.7.5 DC Wiring

External DC switch

The DC switch is the connection switch between the PCS and battery. When necessary, it can safely disconnect the connection of PCS and battery. In order to ensure the safety of operator, make sure that the DC switch is turned off under following conditions.

- While installing and wiring, the external DC switch must be turned off.
- Before maintenance, turn off the external DC switch and wait for 20 minutes, and measure the DC voltage at the PCS side by multimeter, only when the voltage is lower than 10V, you can perform the maintenance.

CAUTION

If the PCS will not operate for long time, the DC switch must be OFF.

Table3-3 Recommended specification of DC breaker

Model	DC breaker
BCS100K-B-HM, BCS100K-B-HM X2, BCS75K-B-HM, BCS75K-B-HM X2	1000VDC/315A
BCS200K-B-HM, BCS200K-B-HM X2, BCS187K-B-HM, BCS187K-B-HM X2, BCS175K-B-HM, BCS175K-B-HM X2, BCS175K-B-HM-US X2, BCS150K-B-HM, BCS150K-B-HM X2, BCS150K-B-HM-US X2, BCS125K-B-HM-US X2, BCS100K-B-HM-US X2, BCS75K-B-HM-US X2	1500VAC/315A

Wiring procedure

Step 1 Check whether the polarity of the energy storage batteries is correct.

Step 2 Crimp the battery +, - wires into the aviation plugs, as shown in Figure3-21.

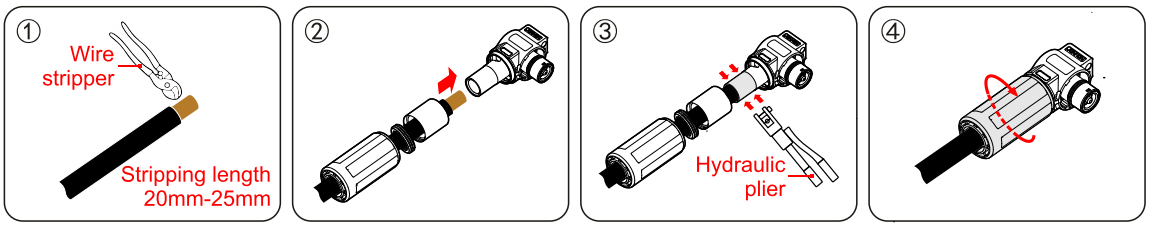


Figure3-21 Crimp DC cables

NOTE

The figure above just shows the crimping process, corresponding color of battery cables should be selected according to related specifications.

18-inch American style wire plier is recommended to strip the outer insulation layer of cable, and use hydraulic plier YQK-240 to crimp the terminal.

Step 3 Connect the crimped battery cables to the DC ports (B+, B-) of the PCS, as shown in Figure3-22.

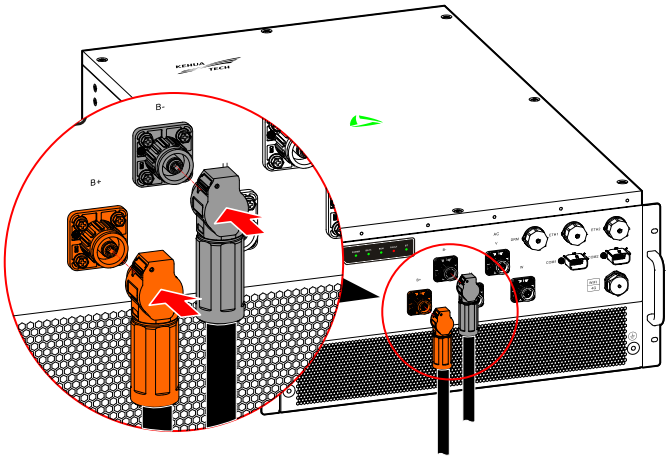


Figure3-22 DC connection diagram

NOTE

You can distinguish the AC U/V/W aviation plug via the mark on the plug, as shown in Figure3-23.

When connecting, a click will sound to indicate well connection of aviation plug.

If the AC cables need to be disconnected, please press the button at the side of aviation plug (as shown in Figure3-24) first to pull it out.

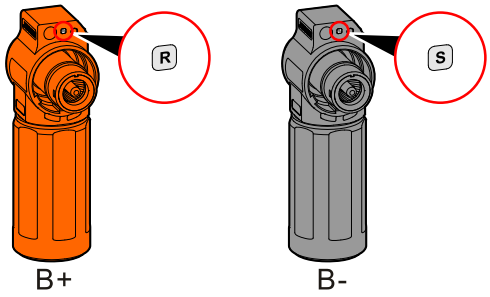


Figure3-23 Mark position of aviation plug B+/B-

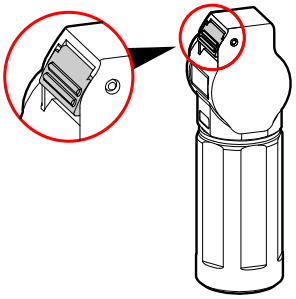


Figure3-24 Press position

CAUTION

When wiring, ensure that the insulation between positive cables and negative cables is well. Once the positive and negative short, it will cause the PCS permanent damage. Kehua Company does not undertake the loss caused by illegal operation.

NOTE

Please connect the DC cables according to related requirements of different country.

----End

3.7.6 COM Communication Connection

Step 1 Crimp the communication wires to the contact pin of connector, as shown in Figure3-25.

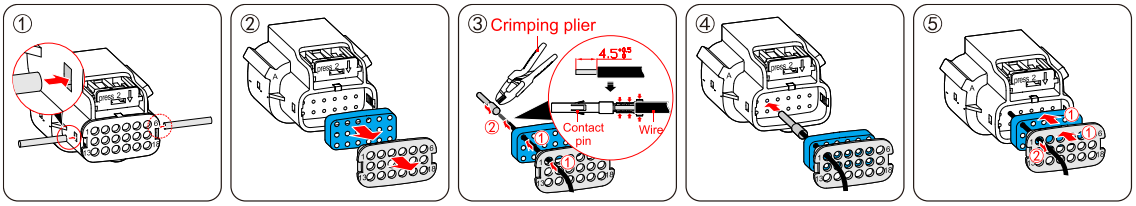


Figure3-25 Crimp COM terminal

NOTE

The figure above just shows the crimping procedure of single wire, detailed connection position and quantity please determine according to actual use.

Electrician special wire stripping plier is recommended to strip the insulation layer, and use crimping plier SN-58B to crimp the wire.

Step 2 Connect the crimped connector to corresponding port of PCS (as shown Figure3-26), and press the buckle (as shown Figure3-27) to avoid loosening.

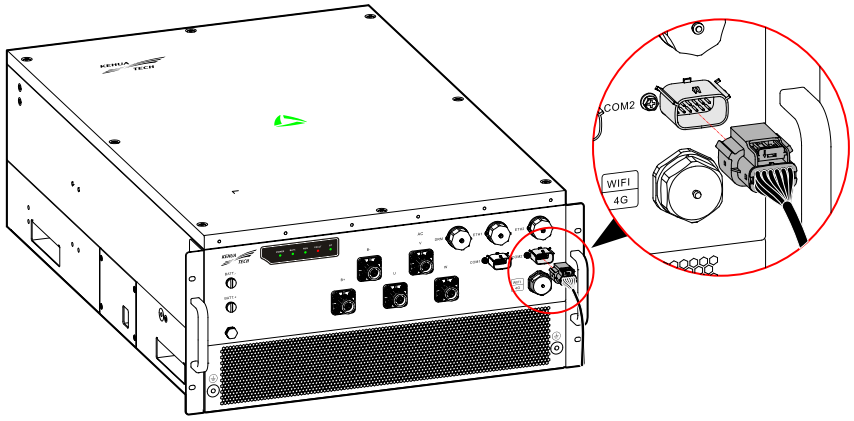


Figure3-26 COM connection diagram

NOTE

The pin definition of COM port please see Table2-4.

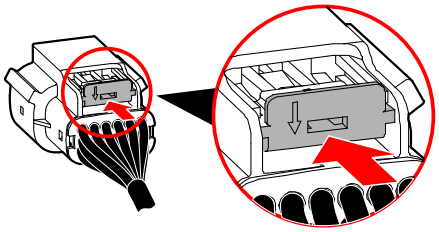


Figure3-27 Buckle position

CAUTION

- While connecting the terminals, avoid crimping the insulation layer, or that may cause bad contact.
- The communication wires should be separated from input and output cables to avoid communication interference.
- The holes not used in COM port must be blocked by plugs.

----End

3.7.7 Ethernet Communication Connection

Step 1 Loosen the external forced cable fixing head of "COM.", and then lead the communication cable go through the external forced cable fixing head. Crimp the communication wire to corresponding terminal, as shown in Figure3-28, Figure3-29.

CAUTION

- When connecting, do not press the insulation layer of the communication cable into terminal, otherwise it may cause poor contact.
- The communication wire must be routed separately from the input and output wires to avoid interference with communication.

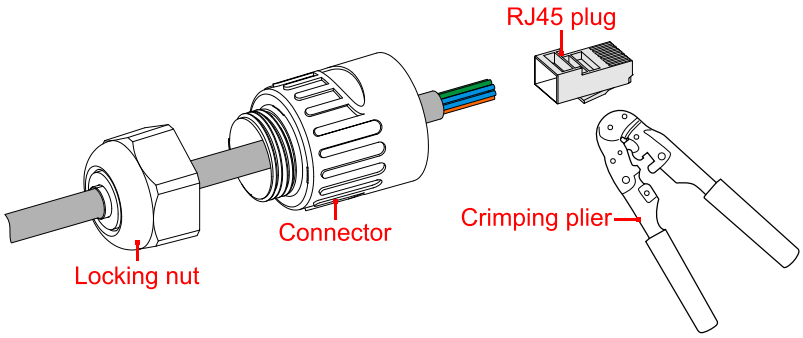
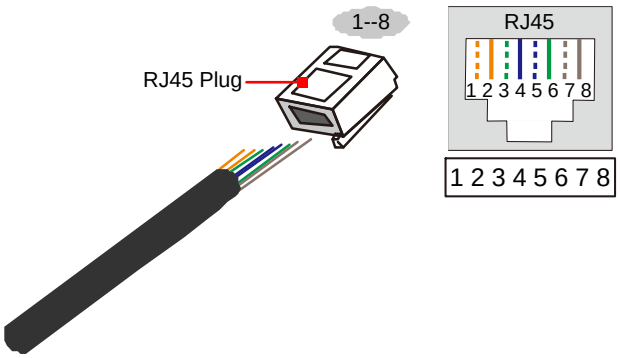


Figure3-28 Crimping diagram of Ethernet communication wire



Relationship between wire and pin

Pin 1: White & orange; Pin 2: Orange
Pin 3: White & green; Pin 4: Blue
Pin 5: White & blue; Pin 6: Green
Pin 7: White & brown; Pin 8: Brown

Figure3-29 Relationship between Ethernet communication wire and pin

Step 2 After crimping, insert the RJ45 plug into the buckle (as shown in Figure3-30), and then screw the RJ45 port.

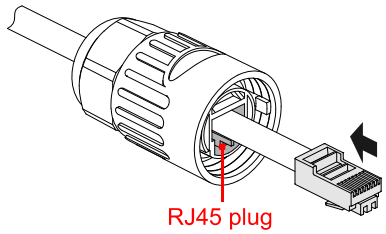


Figure3-30 Fix RJ45 plug

Step 3 Connect the crimped Ethernet communication wire to the ETH port of PCS, as shown in Figure3-31.

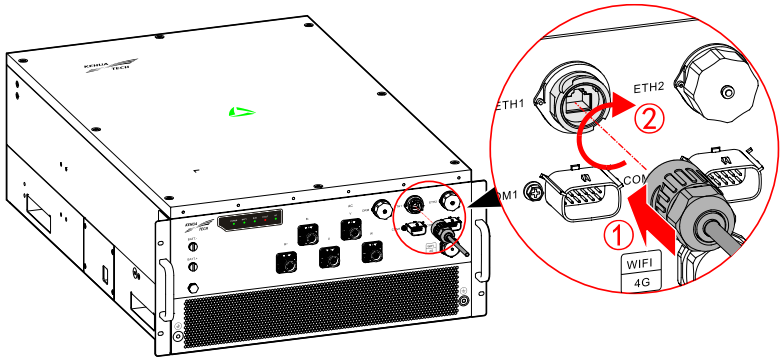


Figure3-31 ETH port connection diagram

NOTE

The default IP of ETH1 port on the PCS is 192.168.28.240.

The default IP of ETH2 port on the PCS is 192.168.28.241.

The communication of Multiple PCS to upper-computer please see Figure2-10.

CAUTION

Ensure that the cover of unused ETH port is screwed on tightly.

----End

3.7.8 Bluetooth Communication

Bluetooth communication is manly used to display and monitor the PCS. User can connect the Bluetooth signal of PCS via APP on phone, and perform the maintenance and monitor for the PCS. The APP download please see "**3.7.9 WIFI/4G Communication Connection (Optional)**".

3.7.9 WIFI/4G Communication Connection (Optional)

If WIFI module is configured, insert it into the WIFI port to realize monitor in LAN, as shown in Figure3-32.

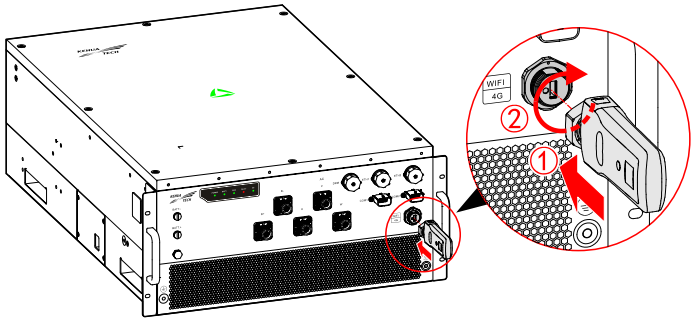


Figure3-32 WIFI communication connection

CAUTION

When connecting, pay attention to the limiting position, and don't wrongly insert it. When tightening, do not use excessive force (torque: 1.5~2.0N·m), so as not to damage the interface.

NOTE

The APP can build communication between Bluetooth, WIFI wireless communication module and the PCS and make the near-end maintenance and monitor of the PCS come true. User can query the information, alarm, and event and set the parameters of the PCS by the APP.

Download and installation:

- Method 1: download the APP via following application market.
  1. Application market (for Android user).
  2. APP store (iOS).
- Method 2: scan the QR code below to download and install the APP in accordance with the prompting.

Figure3-33 QR code of APP

3.8 Check the Installation

After installation, check the following items:

- Check if the PCS is installed firmly.
- Check if all the screws on the surface of the PCS are tightened.
- Check if the connection of energy storage battery, AC output and communication wire are right.

4 WEB Operation Illustration

This chapter mainly introduces the WEB operation of the PCS, including wiring of communication, communication setting, local setting, event record, record management and change password, etc.

4.1 Communication Wire Connection

Connect ETH1 or ETH2 of PCS (as ⑧ shown in, Figure2-5) to the network port of computer to build the communication connection between PCS and computer.

Power on the system (details see 5.2 Start the PCS), make sure that the auxiliary power of PCS worked normally (if the front indicator or POWER indicator on the strip indicator panel light on, that means the auxiliary power works normally), wait for about 1 minute:

- If the indicator on the network port of computer flickers, that means the communication between PCS and computer has been built.
- If the indicator does not light on, please check the network wire.

4.2 Communication Setting

Change the network configuration of the computer. Open the Internet protocol version 4 (TCP/IPv4) properties page, select “Use the following IP address”, and set the IP address to 192.168.28.200, set subnet mask to 255.255.255.0, other settings keep default, and then click “OK” to complete the setting, as shown in Figure4-1.

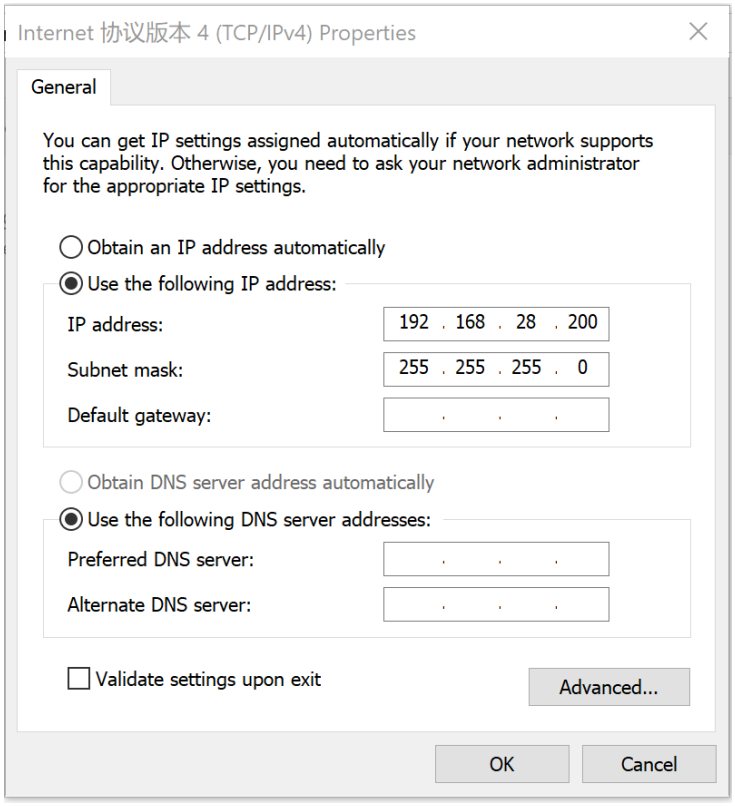


Figure4-1 Set IP address of computer

4.3 Login

Step 1 Open the browser (Google Chrome browser is recommended to use), enter the IP address 192.168.28.240 into the search box (as shown in Figure4-2), click Enter button to enter login page (as shown in Figure4-3.

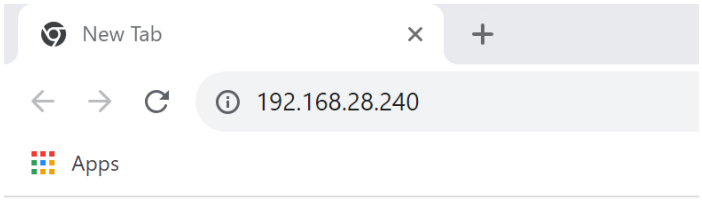


Figure4-2 Visit the IP of PCS

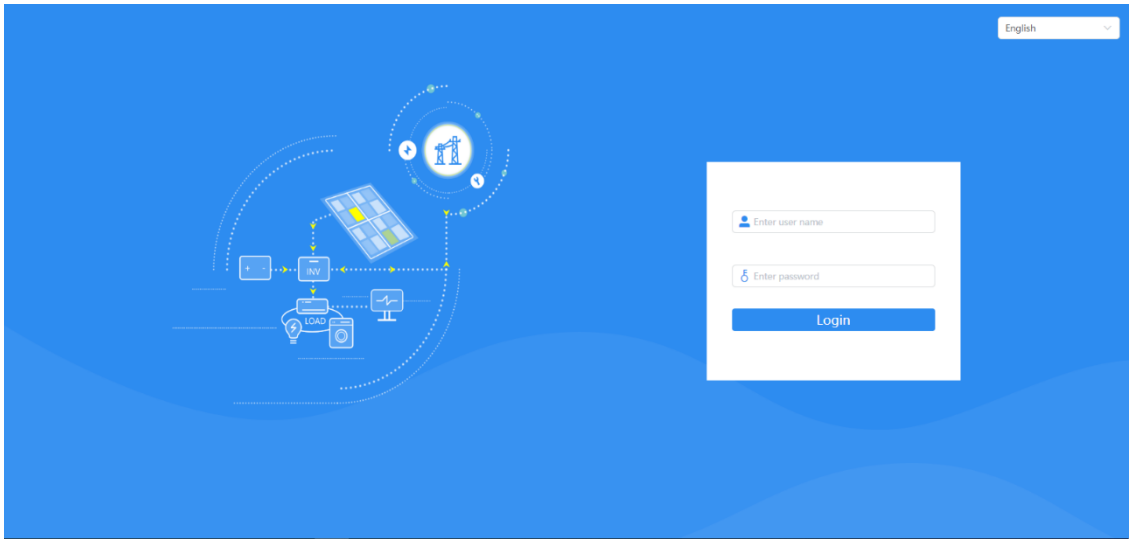


Figure4-3 Login page

NOTE

The language can be changed at the right top corner.

Step 2 Enter user name and password, and then click Login button, the page will enter the system info page of running info, as shown in Figure4-4.

NOTE

Initial user name is **user**, corresponding password is **111**.

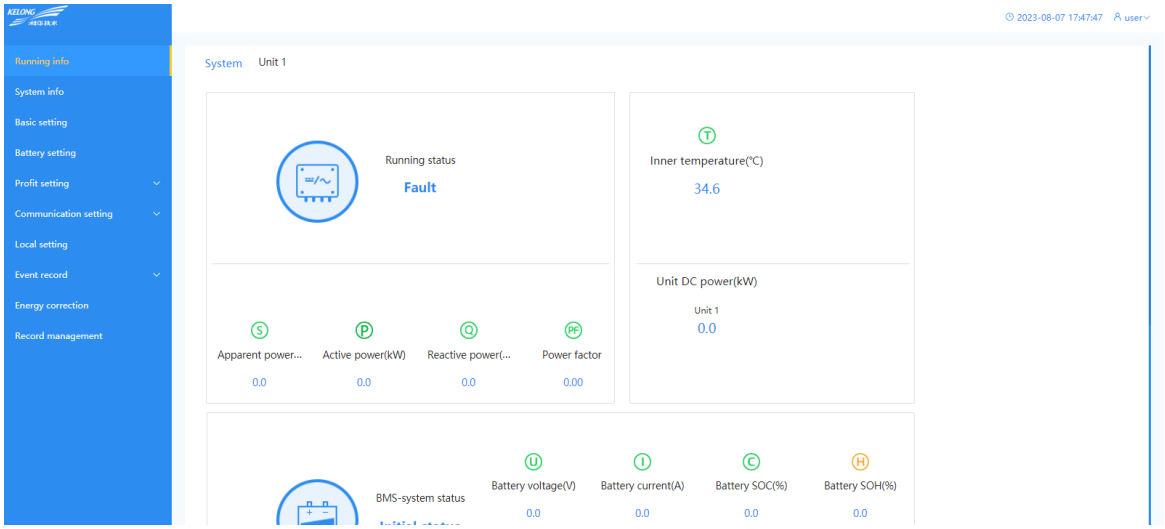


Figure4-4 Running info page

The function status of running info page is as follows.

- Running status: shows current operation status, as shown in Table4-1.

Table4-1 Running status illustration

Running status	Meaning
Charge	PCS power on and charging
Discharge	PCS power on and discharging
Charge derating	PCS power on and charge derating for temperature.
Discharge derating	PCS power on and discharge derating for temperature.
Standby	PCS power on and without fault, without charge and discharge power
Halt	PCS power off and stop operating
Fault	There is fault on the PCS, click current fault, it will shows the fault details.

- Showa total output apparent power (kVA), total output active power (kVA), total output reactive power (kVar) and power factor of whole energy storage system at that time.
- Unit DC power: shows the DC power of each unit.
- Inner temperature: shows the max. inner temperature of each unit.

Move the page down, it will show the battery running info, as shown in Figure4-5.

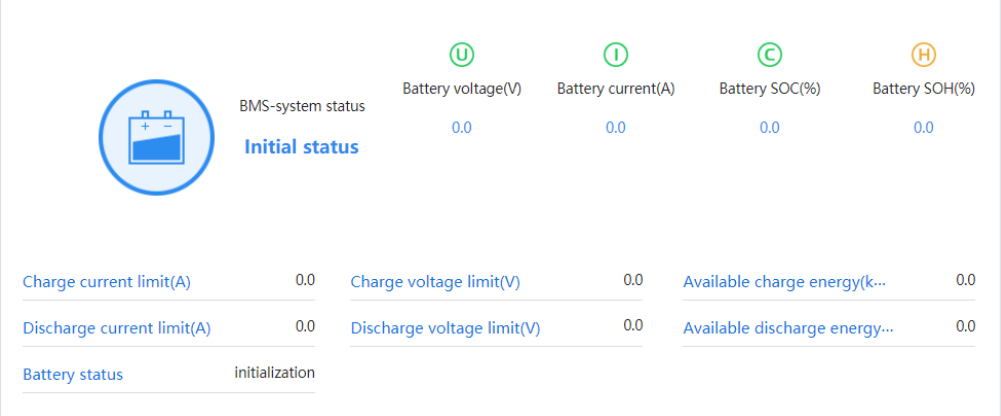


Figure4-5 Unit battery running info page

WARNING

The page contains many parameters that related with the operation of PCS. All the modification for the parameters should be done by specified professional. For the parameters that not clear with the meaning, please see the user manual or consult related engineer of our company, please do not change the setting at will.

4.4 Unit Running Info

In the running info page, click the Unit 1 icon of System Unit 1 , as shown in Figure4-6.

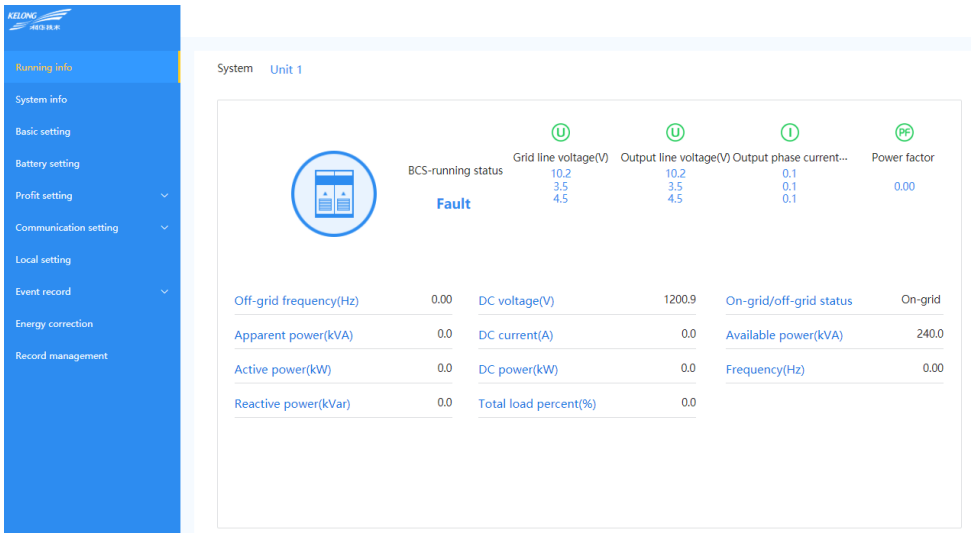


Figure4-6 Unit running info page

4.5 Systey Info

Click **System info** at left function menu bar (as shown in Figure4-7), it will enter the system info page, as shown in Figure4-8.

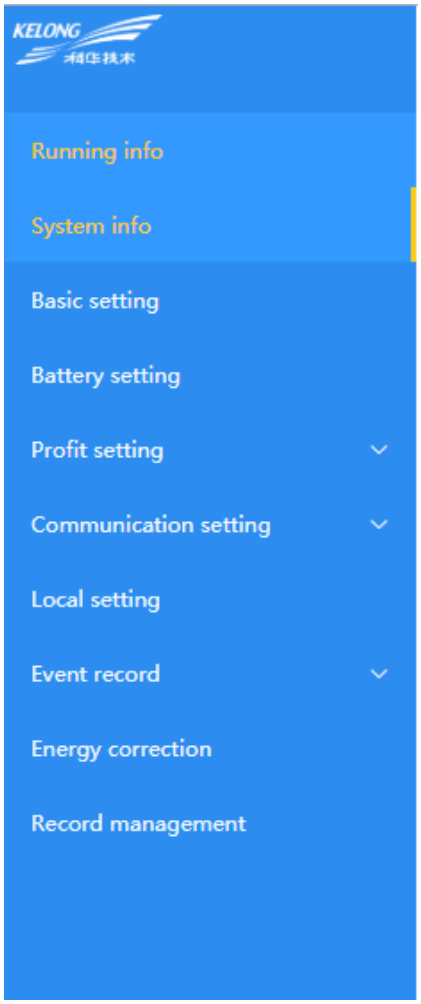


Figure4-7 Function menu bar

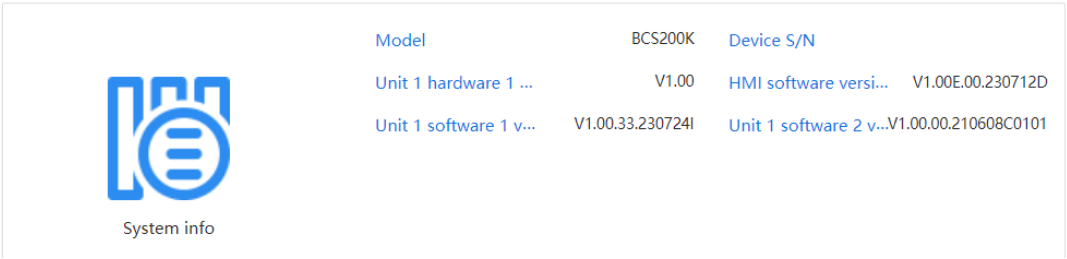


Figure4-8 System info page

In the system info page, you can get the model, S/N, unit 1 hardware version, HMI software version, unit 1 control software 1 version, unit 1 control software 2 version, etc.

4.6 Basic Setting

Click **Basic setting** at left function menu bar, it will enter the basic setting page, as shown in Figure4-9, Figure4-10.

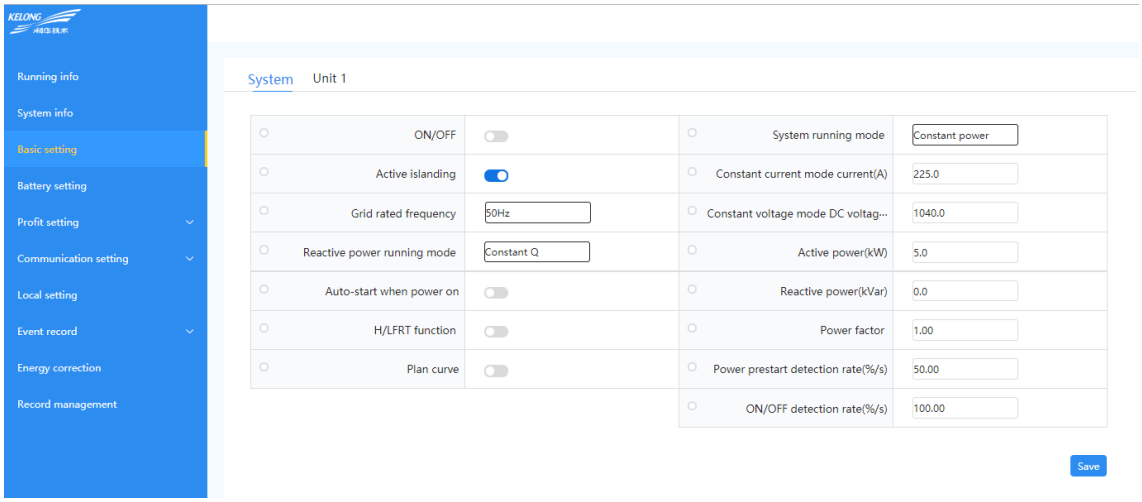


Figure4-9 System basic setting page

In the page, you can set the related function items, such as active islanding, H/LVRT function, auto-start when power on, plan curve, reactive power running mode, system running mode, current of constant current mode, DC voltage of constant voltage, power factor, ON/OFF detection rate, power slow-start rate and active power, reactive power.

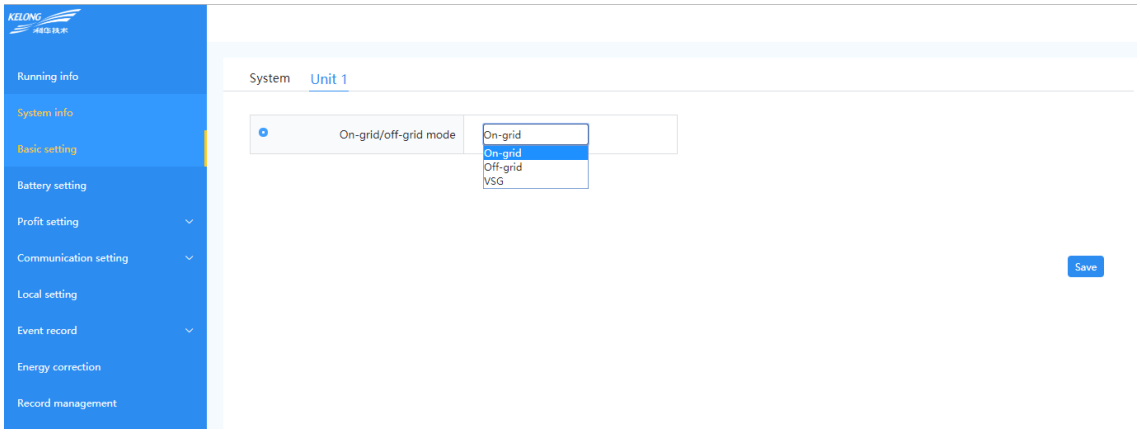


Figure4-10 Basic setting page of unit 1

Also, the switch among grid-tied, off-grid, VSG of VSG function can be set in this page.

4.6.1 ON Setting

In basic setting page, click the gray button of **Power on/off** to blue, and click the small circle to , and then, click **Save** button, it will popup the confirmation window, as shown in Figure4-11,

click **Confirm** button, it will show green prompting Set success at the top of page, that means the setting is successful.

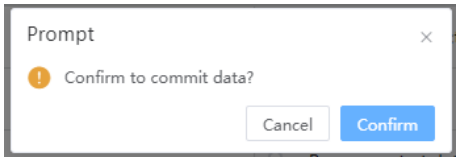


Figure4-11 Save confirmation window

4.6.2 OFF Setting

In the basic setting page, click the blue button of **Power on/off** to gray , and click the small circle to , and then, click **Save** button, it will popup the confirmation window, as shown in Figure4-12, click **Confirm** button, it will show green prompting Set success at the top of page, that means the setting is successful.

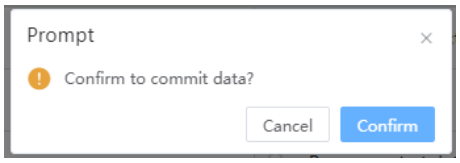


Figure4-12 Save confirmation window

4.7 Battery Setting

Click **Battery setting** at left function menu bar, it will enter the battery setting page, as shown in Figure4-13.

In the page, you can set the related protection info of battery, such as equalized charge voltage, discharge ending voltage, battery over-voltage protection, battery under-voltage alarm, battery under-voltage protection, battery under-voltage protection (heavy load), battery over-voltage return difference, battery under-voltage return difference (heavy load), discharge ending return difference.

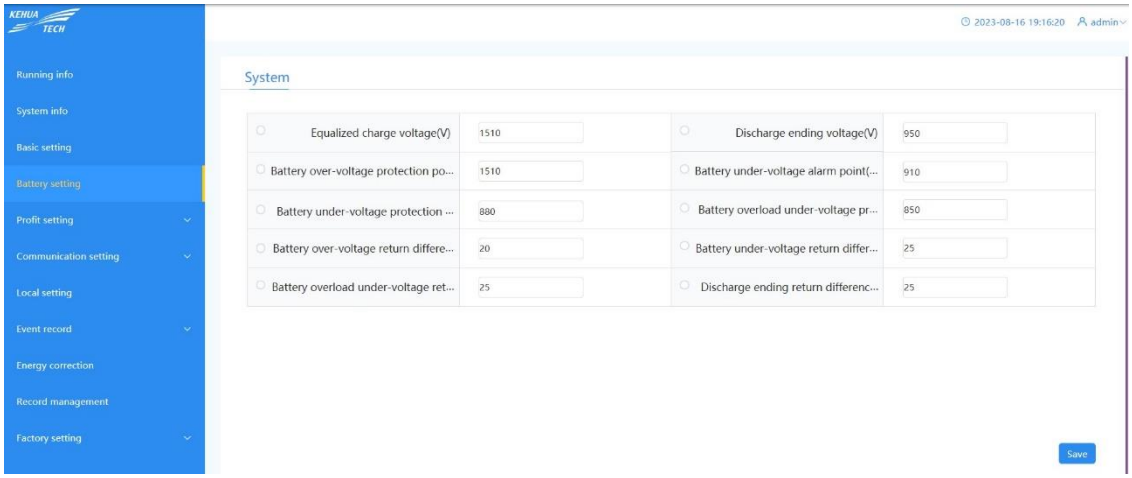


Figure4-13 Battery setting page

After setting, click **Save** button, it will popup the confirmation window, as shown in Figure4-14, click **Confirm** button, it will show green prompting Set success at the top of page, that means the setting is successful.

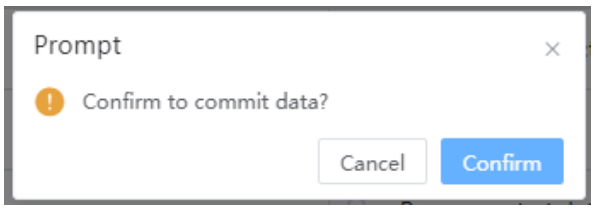


Figure4-14 Save confirmation window

4.8 Profit Setting

Click **profit setting** at left function menu bar, it will enter the plan curve page, as shown in Figure4-15.

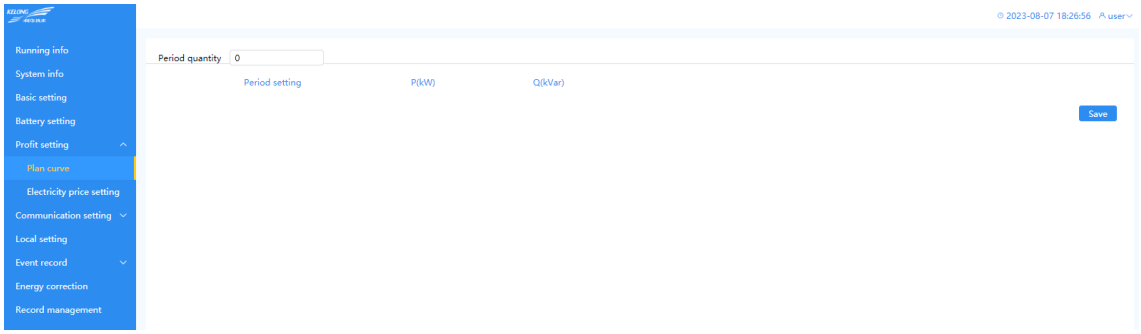


Figure4-15 Plan curve page

4.8.1 Plan Curve Setting

User can set the period quantity and the page will show corresponding plan period setting items.

For example, if set the period quantity to 4, click the Save button at right bottom corner, the page will show 4 plan period bars, as shown in Figure4-16.

Figure4-16 4 plan periods page

Then, click the **Save** button at the right bottom corner, it will show green prompting Success at the top of page, that means the setting is saved successfully.

4.8.2 Electricity Price Setting

Click Electricity price setting button under profit setting (as shown in Figure4-17), it will enter electricity price setting page, as shown in Figure4-18.

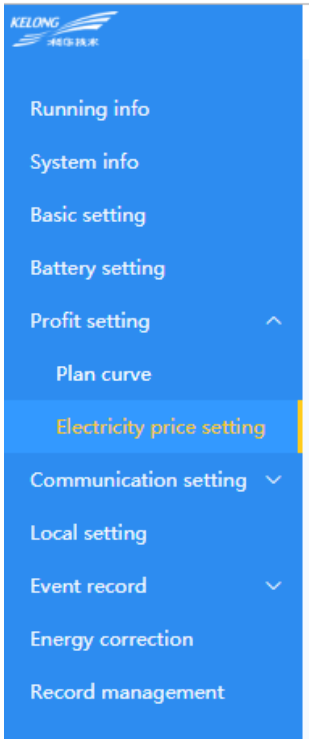


Figure4-17 Electricity price setting button

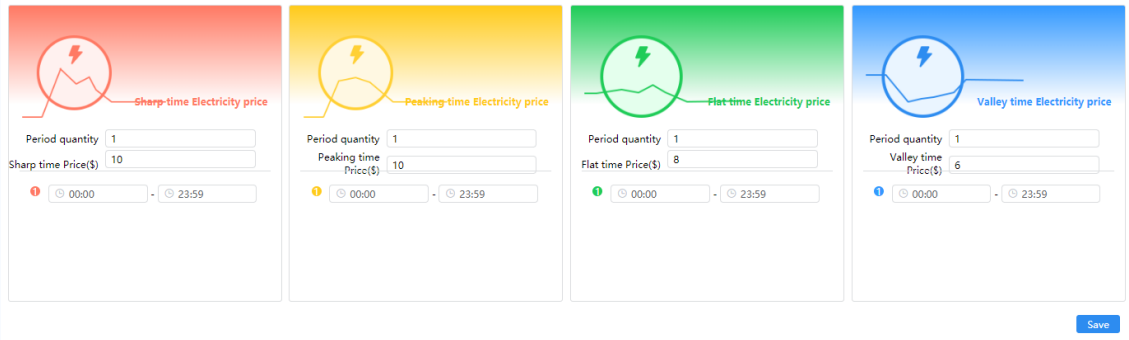


Figure4-18 Electricity price setting page

In the page, the electricity price of sharp time, peaking time, flat time and valley time can be set. Enter the period quantity, it will popup corresponding period setting, as shown in Figure4-19.

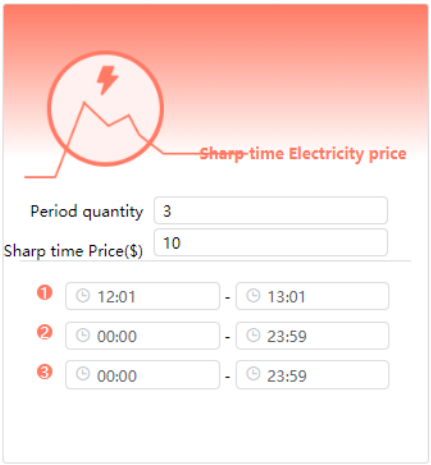


Figure4-19 Sharp time price setting page

Then, click the **Save** button at the right bottom corner, it will show green prompting Success, that means the setting is successful.

NOTE

The period cannot cross or overlap.

If the period overlaps, it will popup the wrong prompting window.

4.9 Communication Setting

Click **Communication setting** at the left function menu bar, it will enter the communication setting page. In the page, user can modify the local network (as shown in Figure4-20), Modbus communication parameters (as shown in Figure4-21), 61850 communication parameters (as shown in Figure4-22), 104 communication parameters (as shown in Figure4-23).

NOTE

In Modbus communication setting, enabling Modbus RTU1 will monitor via RS485, and Modbus RTU2 as the optional function, enabling Modbus TCP will monitor via Ethernet.

If multiple PCS communicate with monitor platform via RS485, the communication address of each PCS needs to be set. The RS485 communication address is set by the RTU address of Modbus RTU1 in Figure4-21.

Figure4-20 Local network setting page

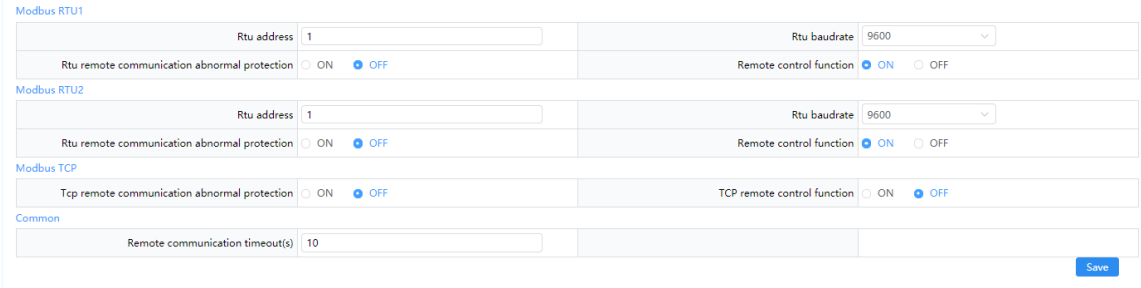


Figure4-21 Modbus setting page

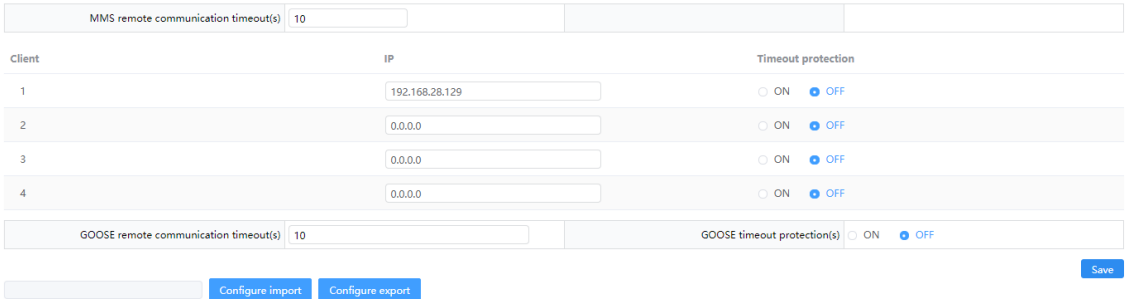


Figure4-22 61850 setting page

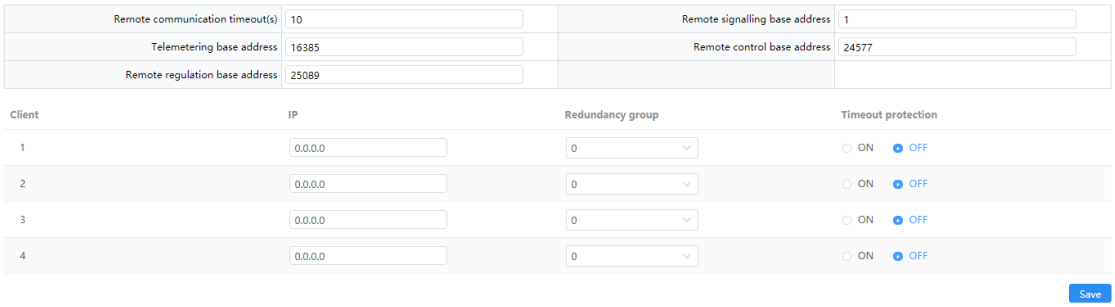


Figure4-23 104 setting page

4.10 Local Setting

Click **Local setting** at the left function menu bar, it will enter the local setting page. The page includes NTP time synchronize, time synchronize cycle, NTF server, date setting, time setting, time zone setting. When the NTP time synchronize is set to OFF, the time can be set, user can adjust the time according to this mode, as shown in Figure4-24. When the NTP time synchronize is set to ON, the NTP server can be set, as shown in Figure4-25.

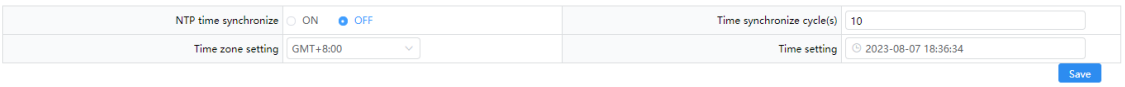


Figure4-24 Local setting page 1

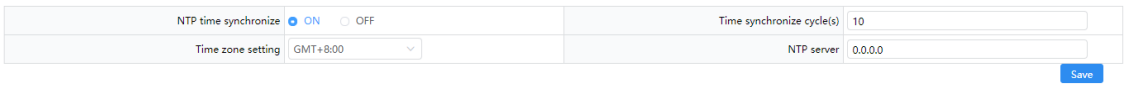


Figure4-25 Local setting page 2

4.11 Event Record

Click **Event record** at the left function menu bar, it will enter the current fault page. User can check the current fault, history fault, user log, power scheduling log.

- Current fault page shows the fault of all units at current moment.
- History fault shows the history fault of all units.
- User log shows all content and time of setting that performed on WEB.
- Power scheduling log shows the active power, reactive power and power factor that set on WEB.

4.12 Energy Correction

Click **Energy correction** at the left function menu bar, it will enter the energy correction page, as shown in Figure4-26. User can correct the total charged energy, total discharged energy of PCS.

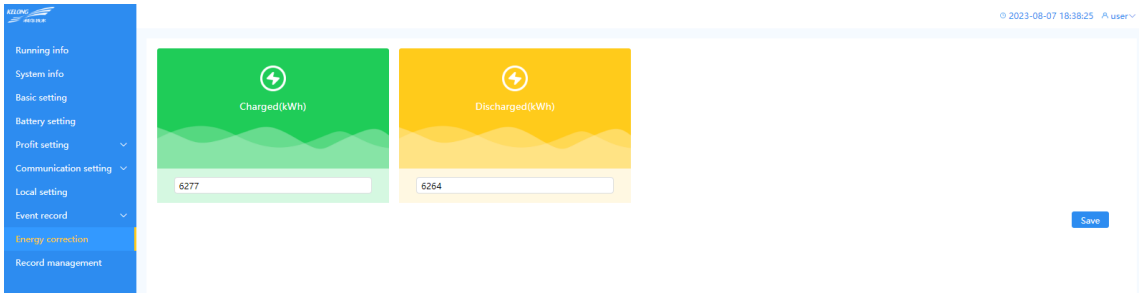


Figure4-26 Energy correction page

4.13 Record Management

Click **Record Management** at the left function menu bar, it will enter the record management page, as shown in Figure4-27. In the page, user can export the history fault, user log, power scheduling log, energy data and fault wave capture. Select the item that needs to be exported, the left box shows as , then click the Export button at right bottom corner, the corresponding record will be exported.

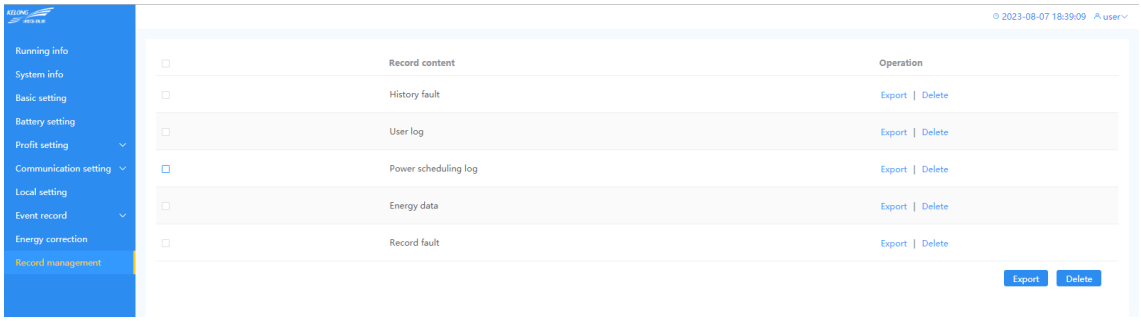


Figure4-27 Record management page

4.14 Modify Password

Click the user icon at right top corner, it will show logout and modify password options, as shown in Figure4-28. Click logout option, it will exit to login page, click modify password option, it will turn to modify password page, as shown in Figure4-29, user can set the password at the page.

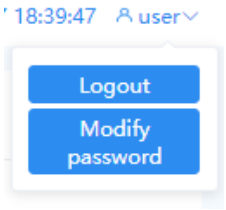


Figure4-28 Logout and modify password options page

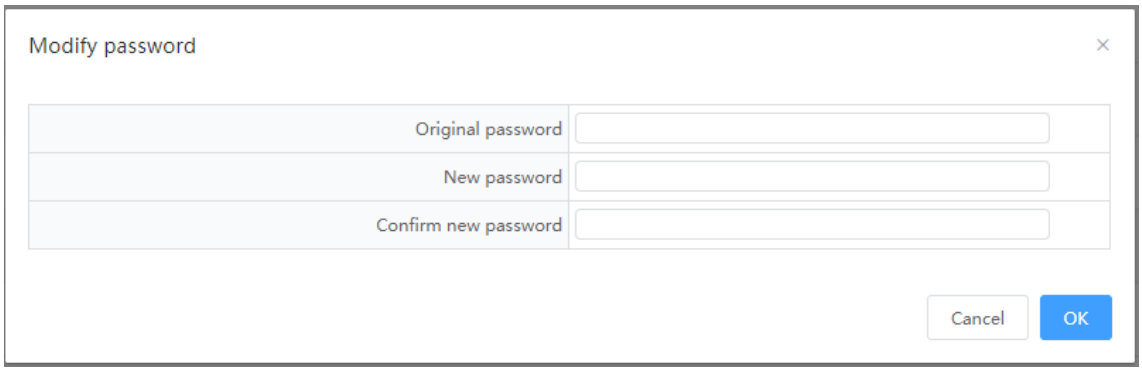


Figure4-29 Modify password page

Enter original password and new password and click OK button, it will popup confirmation window, as shown in Figure4-30, click Confirm to complete the setting.

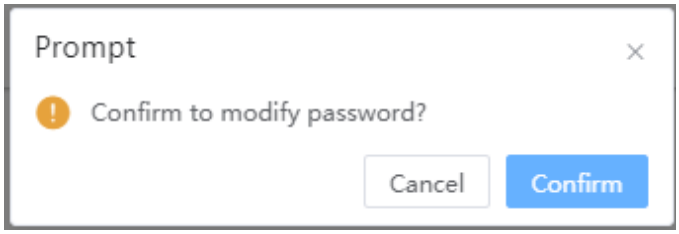


Figure4-30 Confirmation window of password modification

5 Startup and Shutdown

This chapter mainly introduces how to start and shut down the PCS.

5.1 Check Before Startup

Before first startup, please check the following items first.

- Ensure that the PCS is properly installed and fastened.
- Ensure that the ventilation around the PCS is good.
- Ensure that there is no external object or part left on the PCS.
- Ensure that the connection of the PCS and other accessories is right.
- Ensure that the wiring is proper and with good protection.
- Ensure that all safety marks and warning labels are pasted firmly and clear to see.
- Ensure that the external DC switch and AC breaker are all OFF.
- Ensure that the polarity connection of battery is right.
- Ensure that all wires are fastened and the outer cable sheath with no damage.
- Ensure that the gap between connector and wires and unconnected connector has been well sealed up.
- Ensure that the grid voltage is in accordance with the required grid-tied voltage of the PCS.
- Ensure that the wire specification of input meet the current requirement for max load.
- Ensure that the space of AC copper bars meet the requirement of safety provision.

5.2 Start the PCS

DANGER

Damaged device or device fault may cause electric shock or fire!

- Before operation, please check if the PCS is damaged or has other danger.
- Check the external device or circuit connection and see if it is safe.

After ensure the PCS is normal, start the PCS according to following steps.

Step 1 Close the external DC switch of the PCS, 1 minute later, the indicators on strip indicator panel and front panel will light on.

Step 2 Close the external AC breaker between the PCS and grid, the red indicator on strip indicator panel and front panel light off.

Step 3 When the DC and AC power are all normal, set the running condition on the APP monitor platform, click "ON", the PCS will prepare to start.

Step 4 After a period of time, the PCS will be grid-tied normally. The indicators on strip indicator panel and front panel will be on or flicker according to running status.

----End

5.3 Shut Down the PCS

WARNING

When the PCS is operating normally, it is strictly prohibited to disconnect the external switches at DC and AC side with load to avoid the risk of arc damaging the switch. In severe cases, the PCS may be damaged.

Step 1 Set the PCS to OFF through the APP monitor platform upper-computer, the indicators on strip indicator panel and front panel will show as Table2-2, Table2-3.

Step 2 Switch off the external AC breaker between the PCS.

Step 3 Switch off the external DC switches on the PCS, after a while, the indicators on strip indicator panel and front panel light off.

----End

6 Maintenance and Troubleshooting

This chapter mainly describes the maintenance and troubleshooting.

6.1 Maintenance

NOTE

If any maintenance service is needed, please contact the after-sale service centre of Kehua Company, otherwise, Kehua Company will not undertake the responsibility for the loss caused by self-operation.

CAUTION

For human safety, before check and maintenance, disconnect the external AC switch and battery switch firstly, and then switch off the external AC breaker and DC switch on the PCS. Wait for 20 minutes, measure the inner DC bus voltage by multimeter and ensure the voltage below 10V, and then the maintenance can be done.

6.1.1 Maintenance Details and Period

To ensure the PCS works in best condition, we suggest maintaining the PCS regularly.

Table6-1 Check list

Item	Check method	Maintenance period
Cleanness of system	Check if there is dust or sundries on air outlet holes or heat sink. Clean the air outlet holes and heat sink if necessary.	Every 3 to 6 months (it is decided by the dust of the environment)
Electrical connection	Check if the wiring is loose or dropping. Check if there is damage on the cables, especially the surface touching with metal, if damaged, please maintain it in time.	Every half or one year

Item	Check method	Maintenance period
Fan	Check if there is abnormal noise on fan while running. Check if the blade of fan has crack. If necessary, replace the fan (refer to **6.1.2 Maintenance Guide**)	Every year (if the operating environment with lots of sand and wind, short the maintenance period)
LED indicator	If the surface of the LED indicators is too dirty to read, clean it with a damp cloth.	In necessary

CAUTION

Do not clean the PCS with any solvent, abrasive material or corrosive material.

WARNING

During running, please don't touch the surface to avoid scald. Shut down the PCS and wait until it cooling down, then do the maintenance.

NOTE

When the power generation value displayed on the monitoring platform is inconsistent with the external measurement device, user can correct the power generation value of the monitoring platform according to the Kehua communication protocol.

The correction formula is: Total power generation compensation value = Measurement value of measurement instrument - Monitoring platform displayed total power generation value.

6.1.2 Maintenance Guide

Clean wind inlet & outlet holes

During operating, the PCS will generate large heat, so, the PCS designs the forced wind-cooling way. To ensure good ventilation, it is necessary to check the wind inlet & outlet holes and keep them unblocked. If necessary, a soft brush can be used to clean the wind inlet & outlet holes.

Fan maintenance

WARNING

Before maintenance, shut down the PCS and disconnect all power input.

Wait for 20min at least, after the inner capacitor discharge completely, the maintenance can be done.

The maintenance and replacement for fan only can be done by professional electric person.

The inner fans are used for cooling and heat dissipation while operating. If the fans cannot work normally, it will affect the PCS efficiency or cause derating running. So, keep the fans clean and replace the damaged fan in time. The fan's cleanness and replacement procedure as follows.

Step 1 Shut down the PCS (see **5.3 Shut Down the PCS**).

Step 2 Loosen the screws of the fan module, as shown in Figure6-1.

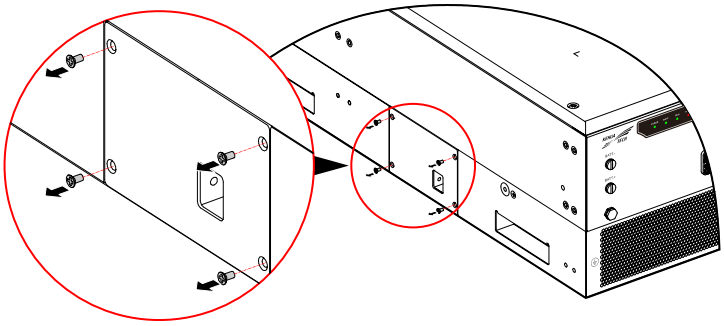


Figure6-1 Loosen the screws of fan cover

Step 3 Pull out the fan module gently and loosen the connectors of fan.

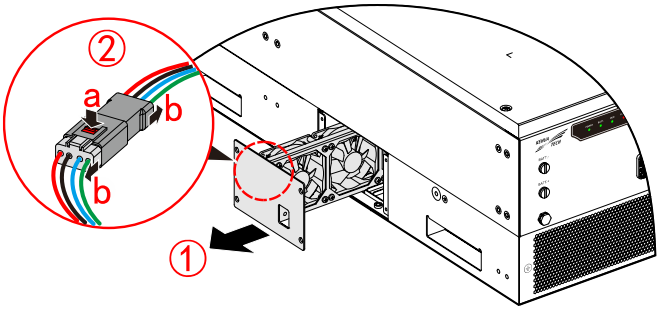


Figure6-2 loosen the wiring of fan module

Step 4 Pull out the fan module, clean the fan by brush or cleaner or replace the damaged fan.

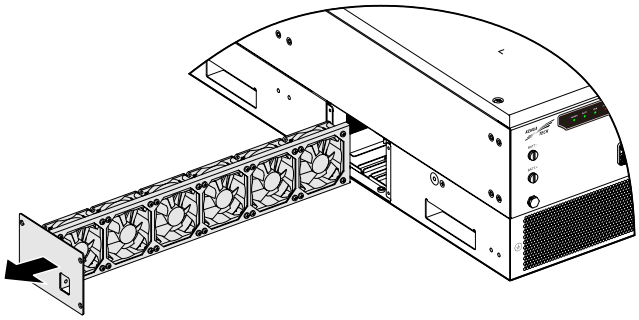


Figure6-3 Pull out fan module

Step 5 Install the fan module in reversed order and lock the screws, restart the PCS.

----End

6.2 Troubleshooting

The PCS is designed on the basis of the grid-tied operation standards and meets the requirements of safety and EMC. Before provided to client, the PCS has been tested for several rigorous tests to ensure reliable and optimizing operation.

If some faults occur, the red indicator on front panel and FAULT indicator on strip indicator panel will light on, you can check the fault details on the upper-computer. Under the circumstances, the PCS may stop running. The fault situation is as shown in Table6-2.

Table6-2 Troubleshooting list

No.	Fault information	Solution
1	Grid over-voltage	Please check the grid, once the grid recover normal, it will recover normal operation.
2	Grid under-voltage	Please check the grid, once the grid recover normal, it will recover normal operation.
3	Over-frequency abnormal	Please check the grid, once the grid recover normal, it will recover normal operation.
4	Under-frequency abnormal	Please check the grid, once the grid recover normal, it will recover normal operation.
5	Phase sequence abnormal	After ensure that the connection of grid and the PCS is disconnected, check if the AC wire is correspond to each phase

No.	Fault information	Solution
		of U/V/W one by one.
6	Phase lock abnormal	Check the grid, if the grid recovers normal, the phase lock abnormal still exist, please contact local dealer or service centre.
7	AC grounding abnormal	Shut down the PCS, wait until the inner PCS discharged completely, check if there is short circuit to ground at AC side.
8	Insulation impedance abnormal	● Check if the insulation resistance of battery group's positive and negative to ground is too low; ● Check if the surrounding environment is too wet; ● Check if the inner grounding is loose. ● If above are all normal, please contact local dealer or service centre.
9	Leakage current abnormal	● Check if the insulation resistance of battery group's positive and negative to ground is too low; ● Check if the surrounding environment is too wet; ● Check if the inner grounding is loose. ● If above are all normal, please contact local dealer or service centre.
10	Temperature control switch fault	● Check if the heat sink of the PCS is blocked; ● Check if the environment of the PCS is too high or too low; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
11	Inner over-temperature	● Check if the heat sink of the PCS is blocked; ● Check if the environment of the PCS is too high or too low; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
12	Heat sink over-temperature	● Check if the heat sink of the PCS is blocked; ● Check if the environment of the PCS is too high or too low; ● If above are all normal and the fault still exist, please contact local dealer or service centre.

No.	Fault information	Solution
13	Power module over-temperature	● Check if the heat sink of the PCS is blocked; ● Check if the environment of the PCS is too high or too low; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
14	Remote communication abnormal	Check if the communication wire is well connected or reverse connected. Please set the address and baud rate correctly.
15	Inner CAN communication abnormal	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
16	Parallel communication wire abnormal	Check if the communication wire is well connected or reverse connected. Please set the address and baud rate correctly.
17	Overload protection	Please set the load properly.
18	Overload alarm	Please set the load or grid-tied power properly.
19	Short circuit protection	Check if the AC wiring is short circuit, if normal, but the fault still exists, please contact local dealer or service centre.
20	Softstart abnormal	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
21	Main contactor abnormal	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
22	Output voltage abnormal	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
23	Output voltage not meet the off-grid condition	Check if the setting of grid-tied/off-grid mode is right. If the setting is right, the fault still exists, please contact local dealer or service centre.
24	Inverter software over-current	● Check if the AC wiring is short circuit; ● Check if the setting of software over-current value is proper; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
25	Inverter hardware	● Check if the AC wiring is short circuit;

No.	Fault information	Solution
	over-current	● If the connection is normal and the fault still exist, please contact local dealer or service centre.
26	Battery over-voltage	● Check if the battery voltage is normal; ● Check if the parameters setting are right; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
27	Battery under-voltage (with light load)	● Check if the battery voltage is normal; ● Check if the parameters setting are right; If above are all normal and the fault still exist, please contact local dealer or service centre.
28	Battery under-voltage (with heavy load)	● Check if the battery voltage is normal; ● Check if the parameters setting are right; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
29	DC bus over-voltage	Check if the battery voltage is normal, if normal, the fault still exist, please contact local dealer or service centre.
30	DC softstart abnormal	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
31	DC main contact abnormal	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
32	Battery reverse connected	Check if the DC wiring is proper.
33	Battery voltage not meet the charge condition	Check if the battery setting of the PCS is right.
34	DC software over-current	Check if the setting of DC over-voltage is proper, if the setting is right, but the fault still exists, please contact local dealer or service centre.
35	DC hardware over-current	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.

No.	Fault information	Solution
36	Bus quick under-voltage	After the PCS restarted, if the fault still exists, please contact local dealer or service centre.
37	SPD abnormal	If the fault always exists, please contact local dealer or service centre.
38	Battery under-voltage alarm	● Check if the battery voltage is normal; ● Check if the parameters setting are right; ● If above are all normal and the fault still exist, please contact local dealer or service centre.
39	Grid voltage unbalance alarm	Check if the grid voltage is unbalance, If the fault still exist, please contact local dealer or service centre.
40	BMS charge disabled	After the inner PCS discharged completely, check the BMS, if the fault still exists, please contact the battery manufacturer.
41	BMS discharge disabled	After the inner PCS discharged completely, check the BMS, if the fault still exists, please contact the battery manufacturer.
42	BMS alarm	After the inner PCS discharged completely, check the BMS, if the fault still exists, please contact the battery manufacturer.
43	BMS standby	After the inner PCS discharged completely, check the BMS, if the fault still exists, please contact the battery manufacturer.
44	BMS system abnormal	After the inner PCS discharged completely, check the BMS, if the fault still exists, please contact the battery manufacturer.
45	BMS communication abnormal	After the inner PCS discharged completely, check the BMS, if the fault still exists, please contact the battery manufacturer.

CAUTION

If the PCS has an alarm mentioned in Table6-2, please shut down PCS (refer to **5.3 Shut Down the PCS**), 5 minutes later, restart the PCS (refer to **5.2 Start the PCS)**. If the alarm status is not removed, please contact our local agency or service center. Before contacting us, please prepare the following information.

1. S/N of the PCS.
2. Distributor/ dealer of the PCS (if has).
3. The date of first use.
4. Problem description.
5. Your detail contact information.

7 Stop Running, Dismantle, Discard

This chapter introduces the dispose way for stop running, dismantling, discarding the PCS.

7.1 Stop Running

Normally, the PCS don't need to be shut down, but when maintenance, it is necessary to shut down the PCS.

CAUTION

Please disconnect the AC and DC connection of the PCS according to following procedure successively, or it may cause human injury or device damage.

Step 1 Shut down the PCS. Turn the external DC switch of the PCS to OFF.

Step 2 Disconnect the connection of external AC and DC power of the PCS. Ensure that the AC and DC cables connected with the PCS with no electricity.

Step 3 Wait for 20min at least, ensure that the inner capacitor discharge completely.

Step 4 Dismantle the AC wires and DC wires.

Step 5 Dismantle the communication wires.

----End

7.2 Dismantle the PCS

WARNING

After the connection between the PCS and grid, battery group is completely disconnected and wait for 10min at least, ensure that the inner capacitor has discharged completely, and then the PCS can be dismantled.

Step 1 Disconnect all connection successively in reversed procedure of **3.7 Electrical Connection**.

Step 2 Dismantle the PCS in reversed procedure of **3.6 Mechanical Installation**.

Step 3 If the PCS will be installed and used in the future, please package and store the PCS properly (see **8.1 Package** and **8.3 Storage**).

----End

7.3 Discard the PCS

For the PCS that certain not to be used, DO NOT dispose it as general waste, user needs to discard the PCS according to related provision.

CAUTION

The battery, module and other components inside the PCS may pollute the environment, please do corresponding dispose on the basis of related provision.

8 Package, Transportation, Storage

This chapter mainly describes the package, transportation and storage.

8.1 Package

The package of product is carton. When packing, pay attention to the placing direction requirements. One side of carton, it should print warning icons, including keep dry, handle with care, up, stacking layer limit, etc. The other side of carton, it should print the device model, etc. Print the logo of Kehua company and device name on the front of carton.

8.2 Transportation

Pay attention to the warnings on the carton. Don't impact severely when transportation. In case of damaging device, it should follow the placing direction that shows on the carton. Don't carry device with the objects that inflammable, explosive, or corrosive. Don't put device in the open-air warehouse when transshipment. Leaching and mechanical damage by rain, snow or liquid objects is prohibited.

8.3 Storage

When storing device, it should follow the placing direction that shows on the carton. The gap is 20cm between the carton and ground and the clearance is at least 50cm from carton to wall, heat source, cold source, windows or air inlet.

The storage environment temperature is -40℃～70℃. If storing or transporting device beyond the working temperature, before startup, set it alone and wait for the temperature reaches to the range of the working temperature and keep the status more than four hours. In warehouse, It's prohibited that there has poisonous gas, objects that inflammable and explosive, corrosive chemical objects. Besides, it shouldn't have too strong mechanical shaking, impact and strong magnetic field. Under the storage conditions above, the storage period is six months. If beyond six months, it has to recheck.

Do not store the PCS in the open air. If it will be stored for long time, please check the tightness of the PCS and see if there is any abnormal inside the PCS.

A Technical Specifications

A.1 BCS75K-B-HM, BCS75K-B-HM X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1000	-
Voltage range with full load (V)	600-1000	-
Max continuous DC operation current (A)	140.3	-
AC side (grid-tied)		
Rated output power (kVA)	75	-
Max continuous output power (kVA)	82.5	-
Rated grid voltage (Vac)	400 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	340-440	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	108.3	-
Max continuous output current (Aac)	119.1	-
Rated frequency (Hz)	50/60	Settable (If the parameter needs to be set, please contact the manufacturer)

Items	Specification	Illustration
Frequency range (Hz)	45~55/55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤541	≤0.5 time of rated current
AC side (off-grid)[1]		
Rated output power (kVA)	75	-
Max continuous output power (kVA)	82.5	-
Rated voltage (Vac)	400V	Voltage deviation is ±3%
Output voltage range (Vac)	340-440	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	50/60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	IP66	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-

Items	Specification	Illustration
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU, Modbus-Sunspec, Modbus-TCP, CAN2.0B	-
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	EN/IEC 62477, EN IEC 61000, EN50549-1, NCRFG, VDE-AR-N 4105, VDE-AR-N 4110	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.2 BCS100K-B-HM, BCS100K-B-HM X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1000	-
Voltage range with full load (V)	600-1000	-
Max continuous DC operation current (A)	187.1	-
AC side (grid-tied)		
Rated output power (kVA)	100	-
Max continuous output power (kVA)	110	-
Rated grid voltage (Vac)	400 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	340-440	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	144.3	-
Max continuous output current (Aac)	158.8	-
Rated frequency (Hz)	50/60	Settable (If the parameter needs to be set, please contact the manufacturer)
Frequency range (Hz)	45~55/55~65	Settable (If the parameter needs to be set, please contact the manufacturer)

Items	Specification	Illustration
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤722	≤0.5 time of rated current
AC side (off-grid)[1]		
Rated output power (kVA)	100	-
Max continuous output power (kVA)	110	-
Rated voltage (Vac)	400V	Voltage deviation is ±3%
Output voltage range (Vac)	340-440	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	50/60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	IP66	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise

Items	Specification	Illustration
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU, Modbus-Sunspec, Modbus-TCP, CAN2.0B	-
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	EN/IEC 62477, EN IEC 61000, EN50549-1, NCRFG, VDE-AR-N 4105, VDE-AR-N 4110	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.3 BCS150K-B-HM, BCS150K-B-HM X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	920-1450	-
Max continuous DC operation current (A)	183.0	-
AC side (grid-tied)		
Rated output power (kVA)	150	-
Max continuous output power (kVA)	165	-
Rated grid voltage (Vac)	600 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	510-660	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	144.3	-
Max continuous output current (Aac)	158.8	-
Rated frequency (Hz)	50/60	Settable (If the parameter needs to be set, please contact the manufacturer)
Frequency range (Hz)	45~55/55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-

Items	Specification	Illustration
Current DC component (mA)	⩽722	⩽0.5 time of rated current
AC side (off-grid)[1]		
Rated output power (kVA)	150	-
Max continuous output power (kVA)	165	-
Rated voltage (Vac)	600V	Voltage deviation is ±3%
Output voltage range (Vac)	510-660	Settable (error is 1%)
Output voltage total harmonic distortion (%)	⩽3%	Resistive balance load
Rated output frequency (Hz)	50/60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	IP66	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-

Items	Specification	Illustration
Communication protocol	Modbus-RTU, Modbus-Sunspec, Modbus-TCP, CAN2.0B	-
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	EN/IEC 62477, EN IEC 61000, EN50549-1, NCRFG, VDE-AR-N 4105, VDE-AR-N 4110	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.4 BCS175K-B-HM, BCS175K-B-HM X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	920-1450	-
Max continuous DC operation current (A)	213.5	-
AC side (grid-tied)		
Rated output power (kVA)	175	-
Max continuous output power (kVA)	192.5	-
Rated grid voltage (Vac)	600 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	510-660	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	168.4	-
Max continuous output current (Aac)	185.2	-
Rated frequency (Hz)	50/60	Settable (If the parameter needs to be set, please contact the manufacturer)
Frequency range (Hz)	45~55/55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	⩾98.8	Laboratory environment
Grid-tied current harmonic	⩽3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-

Items	Specification	Illustration
Current DC component (mA)	≤842	≤0.5 time of rated current
AC side (off-grid)[1]		
Rated output power (kVA)	175	-
Max continuous output power (kVA)	192.5	-
Rated voltage (Vac)	600V	Voltage deviation is ±3%
Output voltage range (Vac)	510-660	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	50/60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	IP66	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-

Items	Specification	Illustration
Communication protocol	Modbus-RTU, Modbus-Sunspec, Modbus-TCP, CAN2.0B	-
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	Ⅱ(DC)/Ⅲ(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	EN/IEC 62477, EN IEC 61000, EN50549-1, NCRFG, VDE-AR-N 4105, VDE-AR-N 4110	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.5 BCS187K-B-HM, BCS187K-B-HM X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	920-1450	-
Max continuous DC operation current (A)	198.0	-
AC side (grid-tied)		
Rated output power (kVA)	187	-
Max continuous output power (kVA)	205.7	-
Rated grid voltage (Vac)	690 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	586.5-759	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	156.5	-
Max continuous output current (Aac)	172.1	-
Rated frequency (Hz)	50/60	Settable (If the parameter needs to be set, please contact the manufacturer)
Frequency range (Hz)	45~55/55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-

Items	Specification	Illustration
Current DC component (mA)	≤782	≤0.5 time of rated current
AC side (off-grid)[1]		
Rated output power (kVA)	187	-
Max continuous output power (kVA)	205.7	-
Rated voltage (Vac)	690V	Voltage deviation is ±3%
Output voltage range (Vac)	586.5-759	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	50/60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	IP66	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-

Items	Specification	Illustration
Communication protocol	Modbus-RTU, Modbus-Sunspec, Modbus-TCP, CAN2.0B	-
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	EN/IEC 62477, EN IEC 61000, EN50549-1, NCRFG, VDE-AR-N 4105, VDE-AR-N 4110	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.6 BCS200K-B-HM, BCS200K-B-HM X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	1060-1450	-
Max continuous DC operation current (A)	211.8	-
AC side (grid-tied)		
Rated output power (kVA)	200	-
Max continuous output power (kVA)	220	-
Rated grid voltage (Vac)	690 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	586.5-759	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	167.4	-
Max continuous output current (Aac)	184.1	-
Rated frequency (Hz)	50/60	Settable (If the parameter needs to be set, please contact the manufacturer)
Frequency range (Hz)	45~55/55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-

Items	Specification	Illustration
Current DC component (mA)	≤837	≤0.5 time of rated current
AC side (off-grid)[1]		
Rated output power (kVA)	200	-
Max continuous output power (kVA)	220	-
Rated voltage (Vac)	690V	Voltage deviation is ±3%
Output voltage range (Vac)	586.5-759	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	50/60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	IP66	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-

Items	Specification	Illustration
Communication protocol	Modbus-RTU, Modbus-Sunspec, Modbus-TCP, CAN2.0B	-
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	Ⅱ(DC)/Ⅲ(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	EN/IEC 62477, EN IEC 61000, EN50549-1, NCRFG, VDE-AR-N 4105, VDE-AR-N 4110	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.7 BCS75K-B-HM-US X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	720-1450	-
Max continuous DC operation current (A)	116.9	-
AC side (grid-tied)		
Rated output power (kVA)	75	-
Max continuous output power (kVA)	82.5	-
Rated grid voltage (Vac)	480 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	408-528	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	90.2	-
Max continuous output current (Aac)	99.2	-
Rated frequency (Hz)	60	-
Frequency range (Hz)	55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤451	≤0.5 time of rated current

Items	Specification	Illustration
AC side (off-grid)[1]		
Rated output power (kVA)	75	-
Max continuous output power (kVA)	82.5	-
Rated voltage (Vac)	480V	Voltage deviation is ±3%
Output voltage range (Vac)	408-528	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	NEMA Type 4X	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU,	-

Items	Specification	Illustration
	Modbus-Sunspec, Modbus-TCP, CAN2.0B	
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	Ⅱ(DC)/Ⅲ(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	UL 1741:2021, CSA C22.2 No 107.1, UL 1741 SB:2020, FCC Part 15 Class A, IEEE 1547:2018, IEEE1547.1:2020	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.8 BCS100K-B-HM-US X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	720-1300	-
Max continuous DC operation current (A)	155.9	-
AC side (grid-tied)		
Rated output power (kVA)	100	-
Max continuous output power (kVA)	110	-
Rated grid voltage (Vac)	480 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	408-528	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	120.3	-
Max continuous output current (Aac)	132.3	-
Rated frequency (Hz)	60	-
Frequency range (Hz)	55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤601	≤0.5 time of rated current

Items	Specification	Illustration
AC side (off-grid)[1]		
Rated output power (kVA)	100	-
Max continuous output power (kVA)	110	-
Rated voltage (Vac)	480V	Voltage deviation is ±3%
Output voltage range (Vac)	408-528	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	NEMA Type 4X	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU,	-

Items	Specification	Illustration
	Modbus-Sunspec, Modbus-TCP, CAN2.0B	
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	Ⅱ(DC)/Ⅲ(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	UL 1741:2021, CSA C22.2 No 107.1, UL 1741 SB:2020, FCC Part 15 Class A, IEEE 1547:2018, IEEE1547.1:2020	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.9 BCS125K-B-HM-US X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	720-1300	-
Max continuous DC operation current (A)	194.9	-
AC side (grid-tied)		
Rated output power (kVA)	125	-
Max continuous output power (kVA)	137.5	-
Rated grid voltage (Vac)	480 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	408-528	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	150.4	-
Max continuous output current (Aac)	165.4	-
Rated frequency (Hz)	60	-
Frequency range (Hz)	55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤752	≤0.5 time of rated current

Items	Specification	Illustration
AC side (off-grid)[1]		
Rated output power (kVA)	125	-
Max continuous output power (kVA)	137.5	-
Rated voltage (Vac)	480V	Voltage deviation is ±3%
Output voltage range (Vac)	408-528	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	NEMA Type 4X	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU,	-

Items	Specification	Illustration
	Modbus-Sunspec, Modbus-TCP, CAN2.0B	
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	UL 1741:2021, CSA C22.2 No 107.1, UL 1741 SB:2020, FCC Part 15 Class A, IEEE 1547:2018, IEEE1547.1:2020	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.10 BCS150K-B-HM-US X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	920-1450	-
Max continuous DC operation current (A)	183.0	-
AC side (grid-tied)		
Rated output power (kVA)	150	-
Max continuous output power (kVA)	165	-
Rated grid voltage (Vac)	600 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	510-660	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	144.3	-
Max continuous output current (Aac)	158.8	-
Rated frequency (Hz)	60	-
Frequency range (Hz)	55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤722	≤0.5 time of rated current

Items	Specification	Illustration
AC side (off-grid)[1]		
Rated output power (kVA)	150	-
Max continuous output power (kVA)	165	-
Rated voltage (Vac)	600V	Voltage deviation is ±3%
Output voltage range (Vac)	510-660	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	NEMA Type 4X	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU,	-

Items	Specification	Illustration
	Modbus-Sunspec, Modbus-TCP, CAN2.0B	
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	UL 1741:2021, CSA C22.2 No 107.1, UL 1741 SB:2020, FCC Part 15 Class A, IEEE 1547:2018, IEEE1547.1:2020	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

A.11 BCS175K-B-HM-US X2

Items	Specification	Illustration
DC side		
Max DC voltage (V)	1500	-
Voltage range with full load (V)	920-1450	-
Max continuous DC operation current (A)	213.5	-
AC side (grid-tied)		
Rated output power (kVA)	175	-
Max continuous output power (kVA)	192.5	-
Rated grid voltage (Vac)	600 (3P3W+PE)	Output without neutral wire
Grid voltage range (Vac)	510-660	Settable (If the parameter needs to be set, please contact the manufacturer)
Rated continuous output current (Aac)	168.4	-
Max continuous output current (Aac)	185.2	-
Rated frequency (Hz)	60	-
Frequency range (Hz)	55~65	Settable (If the parameter needs to be set, please contact the manufacturer)
Max efficiency (%)	≥98.8	Laboratory environment
Grid-tied current harmonic	≤3%	Under rated power
Power factor range	1 (leading) - 1 (lag)	-
Current DC component (mA)	≤842	≤0.5 time of rated current

Items	Specification	Illustration
AC side (off-grid)[1]		
Rated output power (kVA)	175	-
Max continuous output power (kVA)	192.5	-
Rated voltage (Vac)	600V	Voltage deviation is ±3%
Output voltage range (Vac)	510-660	Settable (error is 1%)
Output voltage total harmonic distortion (%)	≤3%	Resistive balance load
Rated output frequency (Hz)	60	Settable
Common parameter		
Size (W*H*D) (mm)	600×295×900	The external terminals size is not included.
Weight (kg)	95	-
Protection grade (IP)	NEMA Type 4X	-
Isolation type	Without isolation	The PCS is with no transformer, the input cannot connect with ground, or the grounding output must be with isolation transformer.
Heat dissipation way	Smart wind-cooling	-
Noise	＜80dBA@1m	Do not install the PCS in the environment where is sensitive for noise
Display way	LED+APP	-
Communication port	RS485/CAN/Ethernet/Bluetooth/WIFI/4G (optional)	-
Communication protocol	Modbus-RTU,	-

Items	Specification	Illustration
	Modbus-Sunspec, Modbus-TCP, CAN2.0B	
Operation temperature range (℃)	-35~60	When the temperature exceeds 40℃, it is necessary to decrease rated power to use.
Storage temperature (℃)	-40~70	-
Relative humidity of operation (%)	0~100	-
Relative humidity of storage (%)	0~95	Without condensation
Altitude (m)	0~4000	When the altitude exceeds 2000m, it is necessary to decrease rated power to use.
Over-voltage category	II(DC)/III(AC)	-
Pollution degree	C3	It can custom the pollution degree of C5 if there is special corrosion resistant requirement.
Standard	UL 1741:2021, CSA C22.2 No 107.1, UL 1741 SB:2020, FCC Part 15 Class A, IEEE 1547:2018, IEEE1547.1:2020	-
Grid support	LVRT, HVRT, active power (reactive power) control	-

- [1] When the PCS connect with electromotor in off-grid status, the power of electromotor cannot exceed 15kW.
- Specifications are subject to change without prior notice.

B Quality Assurance

If the PCS fault in guarantee period, Kehua Company will maintenance it free or replace new product.

Evidence

In guarantee period, user needs to show the purchase invoice of the product, and the trademark on the product must be clearly visible, or Kehua Company have right to refuse the quality assurance.

Condition

- The replaced product must be returned to Kehua Company to dispose.
- Reasonable time should be reserved for Kehua Company to maintain the fault device.

Disclaimer

If any situation below occurs, Kehua Company have right to refuse the quality assurance.

- Beyond the free quality assurance period.
- Damaged by transportation.
- Improper installation, transformation or use.
- Used in the harsh environment that not allowed in the User Manual.
- Damaged by installation, maintenance, transformation or dismantling of other company server.
- Damaged by using component or software of non-standard or other company except Kehua Company.
- Beyond the installation and use range of related national standard.
- Damage caused by abnormal nature environment.

If the fault is caused by above situation and user requires to maintain it, we can provide paid maintenance service after our service organization decided.

To improve users' satisfaction continuously, our product and User Manual is upgrading. If the User Manual has difference with product, it may be caused by the version difference, please take the actual product as standard. If any question, please contact our company.

Software authorization

- It is prohibited to use part or whole data of the hardware or software of Kehua Company in any way for commercial purpose.
- It is prohibited to decompile, decrypt or destroy the original program design of the software developed by Kehua Company.

C Acronyms and Abbreviations

A

AC	Alternating Current

C

CE	Conformite Europeenne

D

DC	Direct Current

I

IEC	International Electrotechnical Commission

L

LED	Light-emitting Diode

P

PE	Protective Earthing

R

RS485	Recommend Standard485

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