SP100H series
Energy storage converter

用户手册

V1.0.1

目录

1 Overview

1.1 Target group

The content described in this document can only be operated by professional personnel

Professionals must possess the following skills:

1) Understand how the product works and how to operate it

2) Understand how batteries work and operate

3) After training and understanding how to handle the hazards and risks that

arise during the installation and use of electrical equipment

4) Understand the installation and debugging of electrical equipment and devices

5) Understand all applicable standard operating instructions

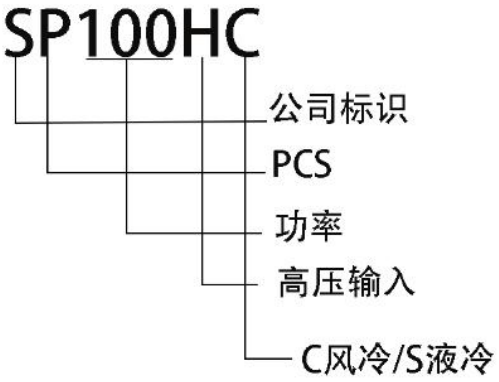
6) Understand and comply with this manual and all safety information

1.2 Application

This document is applicable to the following device models:

- SPH100H series

Model definition



Pic 1.1 Product Model Definition

For example:

SP100HC:Represents a 100kW bidirectional energy storage air-cooled converter

SP110HS: Represents a 110kW bidirectional energy storage liquid-cooled converter

Check the nameplate on the PCS to determine the model

The illustrations in this document are only schematic diagrams, please refer to the actual product for details

1.3 Technical Term

Name	Define
EMS	Energy Manager System
PCS	Bidirectional energy storage converter
BESS	Battery Energy Storage System
STS	static transfer switch

AC	alternating current
DC	direct-current
ESS	energy storage
BMS	Battery Manager System
SLD	single-line diagram
SCR	Silicon Controlled Rectifier
SOC	Remaining power, expressed as a percentage
UI	user interface
EPO	Emergency power outage
SPD	Surge Protective Device

2 Safety instructions

2.1 Sign

Sign	Explain
Dangerous 	Indicates a hazardous situation that, if not avoided, could result in death or serious injury
Warn 	Indicates a hazardous situation that, if not avoided, could result in death or serious injury
Be carefully 	Indicates a hazardous situation that, if not avoided, may result in mild or moderate injury
Notice 	Indicates that if not avoided, it will cause property damage
Instruction	Draw attention to important information, best practices, and suggestions Attention used to address issues related to personal injury, equipment damage, and the environment

2.2 Important safety instructions

This user manual is about the installation and operation of the SP100H series 100kW bidirectional energy storage converter module.

Please read this user manual carefully before installation.

The bidirectional energy storage converter must be debugged and maintained by an engineer designated by the manufacturer or an authorized service partner. Otherwise, it may endanger people

Personal safety and equipment malfunction. The equipment damage caused by this is not covered by the warranty.

The bidirectional energy storage converter cannot be used in any environment or application related to life support equipment.

This manual contains important instructions for the SP100H series model, which should be fol.

Dangerous

Any copper bars, contacts, or terminals connected to the power grid circuit inside the touch device may cause combustion or fatal electric shock!

Do not touch any terminals and wires connected to the power grid circuit.

Pay attention to any instructions and safety documents related to grid connection.

Warn

Large leakage current

Before connecting the input power supply, please ensure a reliable grounding.

The equipment must be grounded and comply with local electrical regulations.

Warn

When the battery is connected to a bidirectional energy storage converter, there may be DC voltage present at the input port. Please pay attention to or check the battery system user manual during operation.

Warn

There may be a risk of electric shock inside the device!

Any operation related to this device must be carried out by professional personnel.

Please pay attention to the safety precautions listed in the safety instructions and

installation documents.

Please pay attention to the safety precautions listed in the operation and installation manual and other documents.

Warn

Do not touch live parts within 5 minutes of power outage!

Internal capacitors store hazardous energy. It is strictly prohibited to touch the terminals, contacts, copper bars, and other live parts of the equipment within 5 minutes after disconnecting all power sources.

Notice

All equipment internal maintenance and upkeep work should be carried out by trained personnel. Internal components that need to be opened with tools cannot be maintained by the user.

Please read this user manual before operation.

3 Product Introduction

3.1 System Introduction

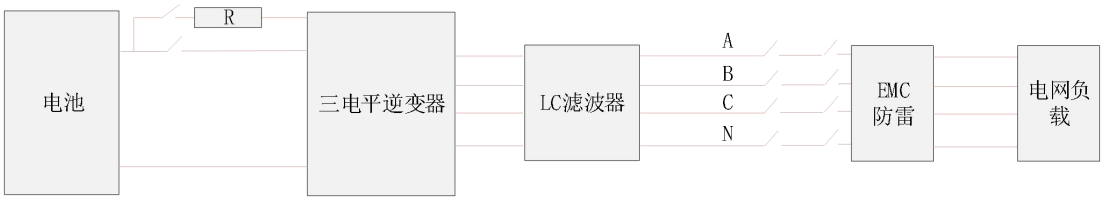
A bidirectional energy storage converter is a conversion device between the power grid and the battery, which can charge and discharge the battery. The direct current from the battery can be inverted into alternating current that can be integrated into the power grid, and the alternating current from the power grid can also be rectified into direct current that can be charged into the battery. The bidirectional energy storage converter can be used in grid connected or off grid mode.

The SP100H series adopts a single-stage topology, with a DC voltage input range of 600-950V.

3.2 System schematic diagram

The internal architecture of the SP100H series bidirectional energy storage converter module is a DC/AC three-level topology. The following figure is the topology

diagram of the system.



Pic 3-1

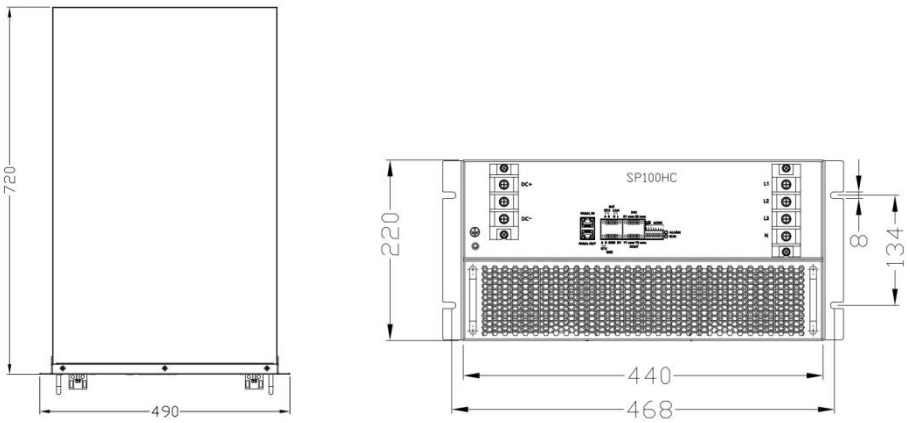
3.3 PCS module appearance and wiring instructions

3.3.1 SP100HC air-cooled series

1) Appearance as shown in the picture 3-2

Pic 3-2

2) The product size is shown in the figure 3-3



Pic 3-3

3.3.2 Electrical interface identification

Pic 3-4

DC+/DC-	Battery input terminal	OT terminal（RNB38-6）,recommend 35mm²cable
L1/L2/L3/N	Ac output terminal	OT terminal（RNB38-6）, recommend 35mm²cable

图 3-5

PARAL IN	Parallel line input		Parallel line
PARAL OUT	Parallel line output		Parallel line
BAT_RTU	Battery_RS485 interface		BAT interface
BAT_CAN	Battery_CAN		

	interface		
RTU(A-B)	Client RS485 interface	protocol	
X1	Dry contact input	reserve	DIN
X1_com	Dry contact input	reserve	
_X2	Dry contact input	reserve	
X2_com	Dry contact input	reserve	
Y1			DOUT
com			
Y2			
com			
R1	Parallel matching resistor	Up for ON	Module 1 and the last module are set to ON.
R2	Parallel matching resistor	Up forON	Module 1 and the last module are set to ON.
ADDR	Module address dialing	Up for ON	Module address 00000 1 with address 1 Module address 000100 with address 4
RUN			Running lights

SP100HC machine LED indicator light representation

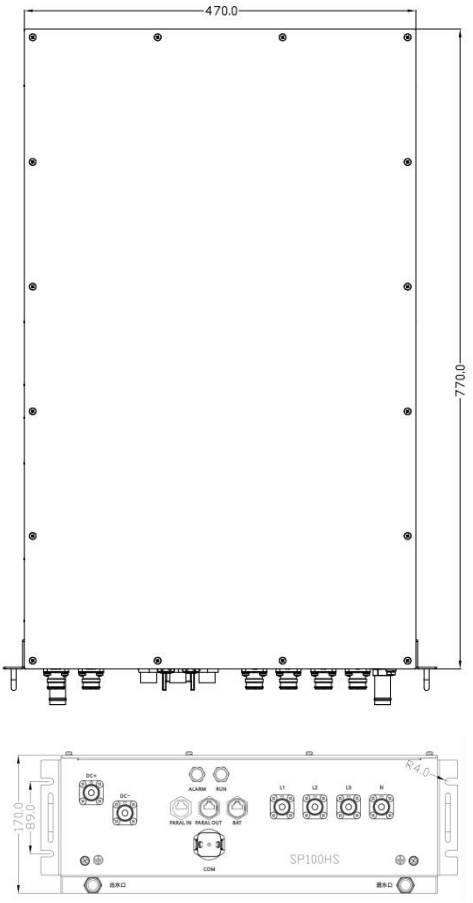
Number	Indicator light	Machine state
1	green light flashing for 1 second, red light off	Machine on ready
2	Green light on for 3s, dark for 100ms, red light off	Machine off-grid running
3	Green light always on, red light off	Machine grid connected running
4	Red light flashes slowly for 1s, green light goes out	DC side fault
5	Red light flashing quickly, green light off	AC side fault
6	Red light always on, green light off	Internal fault of the machine
7	Green light flashing fast	Machine upgrade
8	Slow flashing of traffic lights simultaneously	Duplicate or invalid address
9	Red light always on, green light off	Other machine malfunctions
10	Green light flashing fast or red light flashing fast	Machine CPU1/CPU2 upgrade

3.3.3 SP110HS liquid cooled appearance and wiring instructions

1、Appearance as shown in the picture 3-6

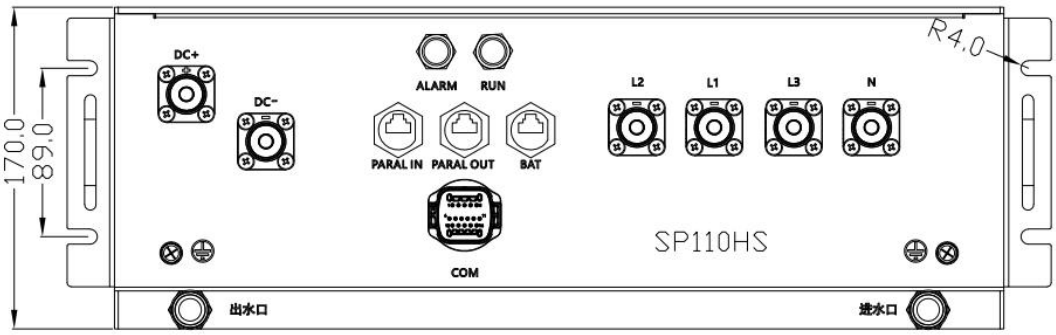
Pic 3-6

2、The product size is shown in the figure 3-7

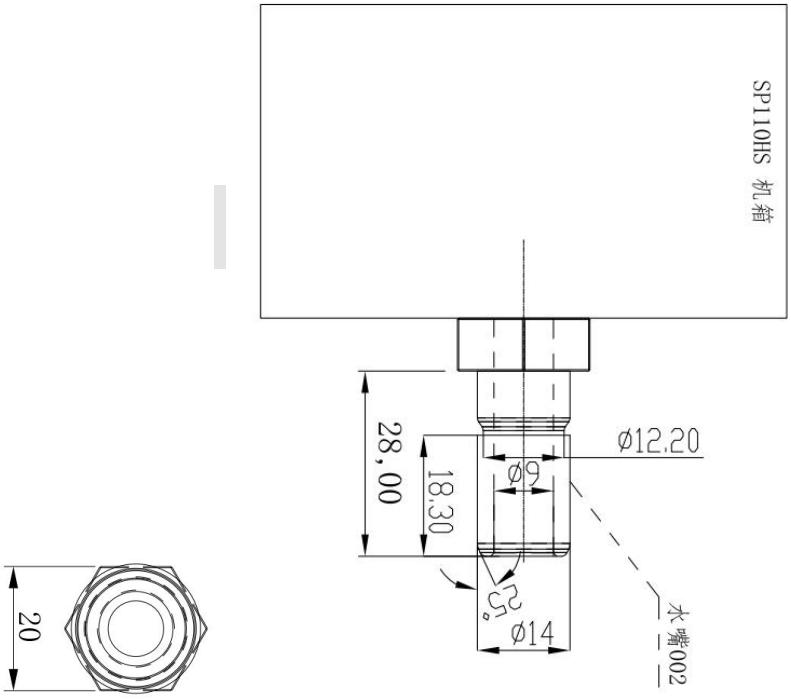


Pic 3-7

3、Electrical interface markings are shown in the figure 3-8



Pic 3-8



Pic 3-9

DC+/DC-	Battery input terminal	Random device accessories (model)
L1/L2/L3/N	AC output terminal	Random device accessories (model)
PE	ground terminal	M6 specification
进水口尺寸	Pic 3-9	Consistent size of inlet and outlet
出水口尺寸	Pic 3-9	

PARAL IN	Parallel line input		Parallel cable (Class 6 and above standard network cable)
PARAL OUT	Parallel line output		Parallel cable (Class 6 and above standard network cable)
BAT_RTU	Battery_RS485 interface		BAT interface
BAT_CAN	Battery_CAN interface		

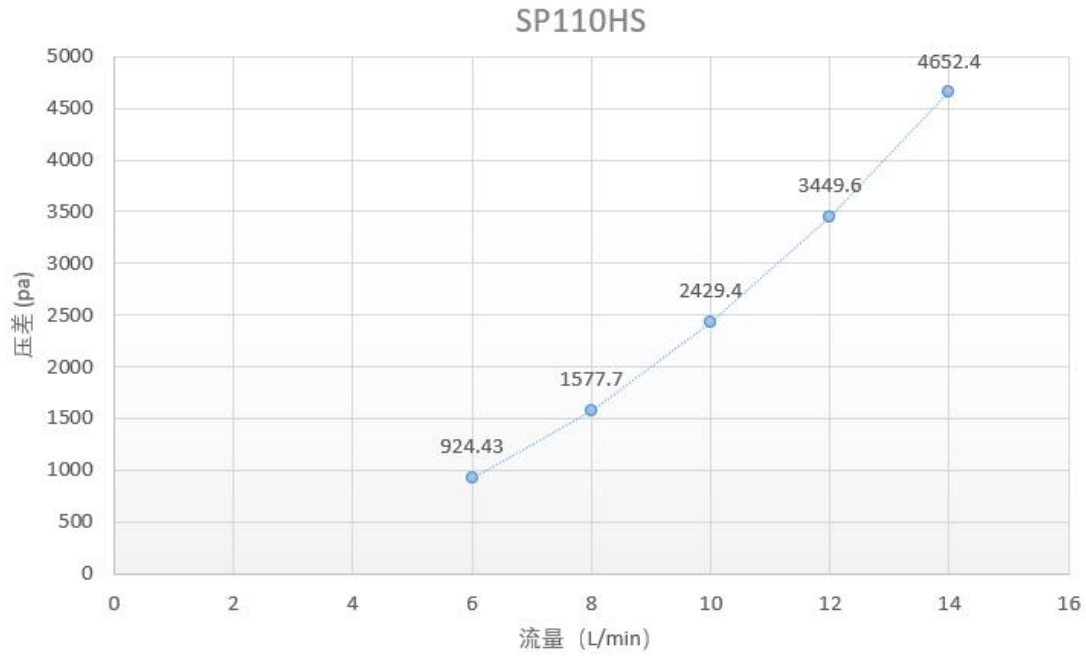
RTU-A	Client RS485 interface	1	EMS(interface)
RTU-B	Client RS485 interfacce	2	
ALARM			Warning light
RUN			Running light (always on: running flashing: upgrading)

SP110HS machine LED indicator light representation

Number	Pilot lamp	Machine State
1	Green light flashes for 1s, red light goes out	Machine ready
2	Green light on for 3s, dark for 100ms, red light off	Machine off grid operation
3	Green light always on, red light off	Machine grid connected operation
4	Red light flashes slowly for 1s, green light goes out	DC side fault
5	Red light flashing quickly, green light off	AC side fault

6	Red light always on, green light off	Internal fault of the machine
7	Green light flashing fast	Machine upgrade
8	Slow flashing of traffic lights simultaneously	Duplicate or invalid address
9	Red light always on, green light off	Other machine malfunctions
10	Green light flashing fast or red light flashing fast	Machine CPU1/CPU2 upgrade

4、Comparison Chart of Pressure and Flow Rate of Liquid Cooler 3-10



Pic 3-10

4 Technical specifications

Parameters	SP100HC	SP110HS
DC		
Max voltage	950 V	
Minimum voltage	600 V	
Rated voltage range	On grid （600V-950V）/off grid（650V-950V)	

Maximum input current	185 A	
AC (Ongrid)		
Output power	110 kVA @ 40° C	110 kVA
	100 kVA @ 45° C	
Maximum output current	152A	160A
Rated voltage	400 V / 230V	
Rated voltage range	-20%~15%	
Frequency range	50Hz / 47Hz~52Hz	
	60Hz / 57Hz~62Hz	
Harmonic	<3% (greater than 30% load)	
Power factor	-100%~100% (As below pic)	
AC (offgrid)		
Rated voltage	400 V / 230V	
Output voltage harmonics	< 1.5 % (Resistive load)	
Imbalance	100%	
Frequency range	50/60Hz	
Output over load	1.25/10S, 1.5/0.1S	
System Parameter		
Communication port	EMS: CAN\RS485 Battery: CAN\RS485	
DIDO	2-circuit	
Maximum efficiency	98.7%(Air cool)/98.9% (Liquid cool)	
Install	subrack	
Waste	Standby<15W no-load power<130W	
Weight kg	48	60
Protection	IP54	IP65
Temperature range	-30--60℃	
Humidity range	0-100%	

Cooling method	Intelligent forced air cooling	Liquid cooling
Altitude m	2000(90%/80% derating for 3000/4000 meters respectively)	
authentication	EN50549, EN 62477, EN IEC 61000	
Power grid support	LVRT, HVRT, SVG	

Application environment limitations:
When the battery energy storage system operates in independent mode (off grid mode), there are some limitations to the application environment.
1. When operating off the grid, do not directly connect the power grid to the power grid suddenly, as there is a risk of damage.
2. Multiple parallel machines require contact with our technical personnel for support
3. The starting impulse current of motor load is 5-8 times, and sufficient power margin needs to be left.
4. Motor load with frequency converter, load power<PCS single machine apparent power * 70%
5. AC power distribution units should have appropriate levels of lightning protection devices
6. PCS output needs to increase air switch

5 Storage, Handling, and Transportation

5.1 Transportation and Storage

Please pay attention to the markings on the packaging box when transporting and storing the converter cabinet. The transportation and storage process should meet the following requirements:
Do not remove the outer packaging of the converter;
There is no corrosive gas around;
Keep the storage temperature at -40 ℃~65 ℃ and the relative humidity at 0% RH~95% RH;
Non dusty environment;
Up to 3 layers of code stack;
During storage, regular inspections are required. If any insects or rodents are found, packaging materials should be replaced in a timely manner;
Comply with fire protection requirements;
If the storage time exceeds six months, the converter needs to be inspected and tested by professional personnel before it can be put into use.

5.2 Unpacking inspection

Each module undergoes strict factory inspection and testing. To prevent damage during transportation, it is necessary to unpack before preparing the energy storage device for installation

The main inspection contents are as follows:

Check whether the quantity of each item on the packing list matches the actual item;

Check if the product nameplate data matches the order contract, such as product model, rated capacity, voltage level, etc;

Check if the factory documents and accessories are complete;

Check if the energy storage converter is deformed or has paint peeled off.

Air Cooled SP100HC Packaging Configuration Table

Name	Mount	Note
SP100HC	1	
Manual	1	
Crimping terminal	6	
Grounding voltage terminal	1	
Quality Assurance Card	1	
Factory certificate	1	

Liquid Cooled SP110HS Packaging Configuration Table

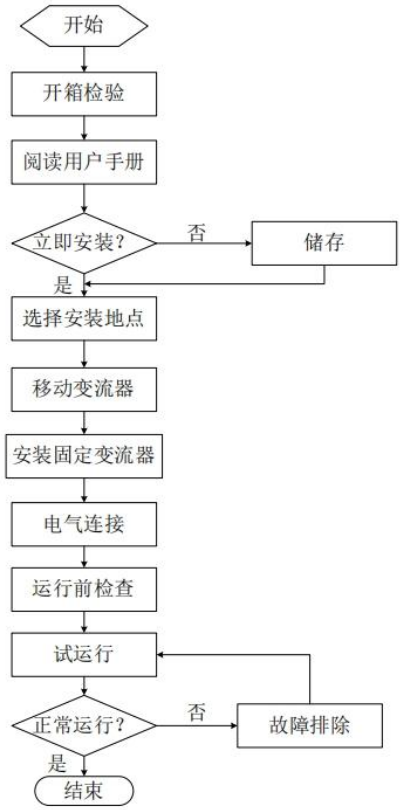
Name	Mount	Note
SP100HC	1	
Manual	1	
Crimping terminal	6	
Grounding voltage terminal	1	
Quality Assurance Card	1	
Factory certificate	1	

6

Installation design

6.1 Installation

Introduction to the installation process is shown in the figure 6-1



Pic 6-1

6.2 Installation precautions

Dangerous

The live parts of the equipment have high voltage, and touching the live parts may cause death or serious electric shock damage.

Please wear appropriate personal protective equipment for work.

Do not touch any live parts.

Follow all warning messages that appear in the device and documentation.

Comply with all safety information provided by the battery manufacturer.

Dangerous

Touching the DC cable may cause a risk of electric shock.

The DC cable connecting the battery is live, and contact with the live cable may cause electrocution or serious injury. Before connecting the DC cable, please ensure that there is DC power

The cable has no voltage.

Please wear appropriate personal protective equipment for work.

Warn

Entering the storage system poses a risk of electric shock.

Insulation damage in the storage system can cause fatal grounding currents, leading to electric shock. Ensure that the insulation resistance of the storage system exceeds the minimum value.

Minimum insulation resistance: 10k Ω.

The bidirectional energy storage converter must be installed in a closed electrical operating area.

Failure to comply with torque specifications during bolt connections caused a fire.

Not meeting the specified torque will reduce the load-bearing capacity of the bolted connection, thereby reducing the contact resistance value.

May cause components to overheat and catch fire.

Ensure that the torque specified in this document is used to always tighten bolted connections.

When working on the device, only use the correct tools.

Avoid repeatedly tightening the bolts as this may result in unbearable high torque.

6.3 Installation Requirements

6.3.1 Environmental requirements

Installed indoors, avoiding sunlight, rain, and accumulated water;

The installation environment should be clean to avoid a large amount of dust in the air;

Installed in a well ventilated environment, it can ensure good heat dissipation;

Avoid obstructing the air inlet and outlet, and ensure that the air duct is unobstructed;

The ambient temperature should be ensured to be between -20~60 ℃ to ensure the optimal operation of the converter. Excessive or low temperatures will shorten the lifespan.

6.3.2 Carrier requirements

The installation carrier of the converter must have fire resistance performance.

Do not install inverters on flammable building materials.

Please ensure that the installation surface is sturdy and meets the load-bearing

requirements for installing the converter.

6.3.3 Ventilation requirements for air coolers

The cooling method of the bidirectional energy storage converter adopts forced air cooling, and the module has independent cooling air ducts. The cooling method of the module is forward air and rear air,

The required cold air is sucked in through the mesh on the front door of the cabinet, and the hot air that absorbs heat is discharged through the mesh on the back door of the cabinet.

When installing the module in the cabinet, the air intake should be ensured and appropriate space should be left for air inlet and outlet. It is required to install a heat exhaust fan inside the cabinet to ensure that the heat emitted by the bidirectional energy storage converter is discharged outside the machine room.

6.3.4 Requirements for liquid chillers

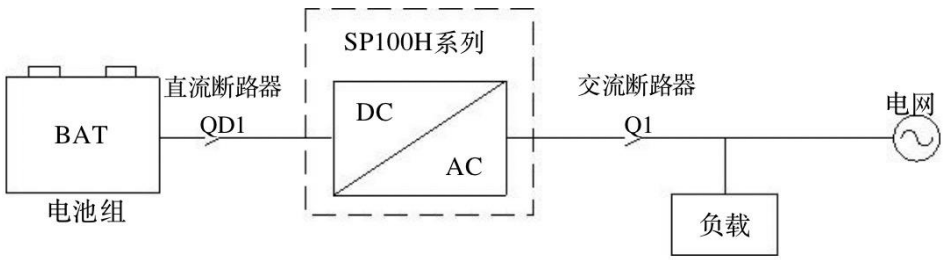
Regularly check the condition of the liquid cooling connection interface. Ensure that the terminal connections are normal and powered on properly.

6.4 Electrical installation

6.4.1Electrical connections

1、Input requirements

The battery DC voltage of the bidirectional energy storage converter is within its required input range, otherwise the bidirectional energy storage converter will not work.
Users are configuring
When determining the number of batteries in series, full consideration should be given to the highest charging voltage and the lowest discharge voltage. You can consult our company's technical service personnel for details.
The battery system used in conjunction with the bidirectional energy storage converter should be equipped with a DC switch. For safer and more standardized use of this converter, it is recommended to store energy
The system configuration is as follow:



Pic 6-2

Notice

Multiple bidirectional energy storage converter modules operate independently on each DC input branch. Standard equipment does not support parallel use of multiple devices on the DC side, and a single set of batteries needs to be connected to separate branch DC ports.

2、Output requirements

The SP100H series is a three-phase four wire bidirectional energy storage converter with an output side of 230V/400V, which can be directly integrated into the low-voltage power grid. However, when PCS is directly integrated into the TN-S distribution system without isolation transformer, attention should be paid to insulation detection and other issues in the energy storage system.

3、Connection

The bidirectional energy storage converter adopts a forward forward out wiring method, and the cables are directly connected to the corresponding copper bars or distribution switches at the front of the module. For the requirements of connecting cables,

Single or multiple cables with appropriate wire diameters should be selected. The wiring method should comply with national electrical regulations or other local standards.

4、System Ground

The bidirectional energy storage converter module has a grounding terminal. When wiring, please refer to the cable diameter in the table below to ground from this terminal. The grounding resistance is required to be less than 4 Ω.

AC output without neutral grounding.

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

5、DC connection

1) Measure the port voltage of the battery with a multimeter to ensure that its voltage is within the input voltage range of the bidirectional energy storage converter;
2) Disconnect the previous level DC switch and use a multimeter to measure and confirm that there is no voltage between the positive and negative poles of the DC input before proceeding with wiring operations.
3) Connect the positive pole of the battery to the "DC+" of the DC input;
4) Connect the negative pole of the battery to the DC input "DC -";

5) Confirm if the wiring is secure.SP100HC

Rate power	Recommended values for copper wire DC section(mm²)
100kW	Recommend 35 mm² Multiple cable, 100kW

SP110HS

Rate power	Recommended values for copper wire DC section(mm²)
100kW	Recommend 35 mm² Multiple cable, 100kW

Warn

Disconnect the external DC distribution isolation switch to ensure that there are no hazardous voltages in the system during wiring.

Notice

The voltage of the battery cannot be reversed, and a multimeter should be used to measure it before wiring.

6、AC connection

1) Measure with a phase sequence meter to ensure that the phase sequence of the connected cable is positive;

2) Disconnect the primary power distribution switch after disconnecting the bidirectional energy storage converter;

3) Measure with a multimeter and confirm that the cable connected to the terminal is not live;

4) The A (L1)/B (L2)/C (L3) phases of the AC output are respectively connected to the A (L1)/B (L2)/C (L3) phases of the power grid, including the connection of the PE line;

5) To achieve the switch function of on/off grid, additional power distribution units and lines (such as STS) need to be added.

6) Confirm that the wiring is secure.

Rate power	Recommended values for copper wire DC

	section(mm²)
100kW Single branch road	Recommend 35 mm² multiple, 100kW

Rate power	Recommended values for copper wire DC section(mm²)
110kW Single branch road	Recommend 35 mm² multiple, 100kW

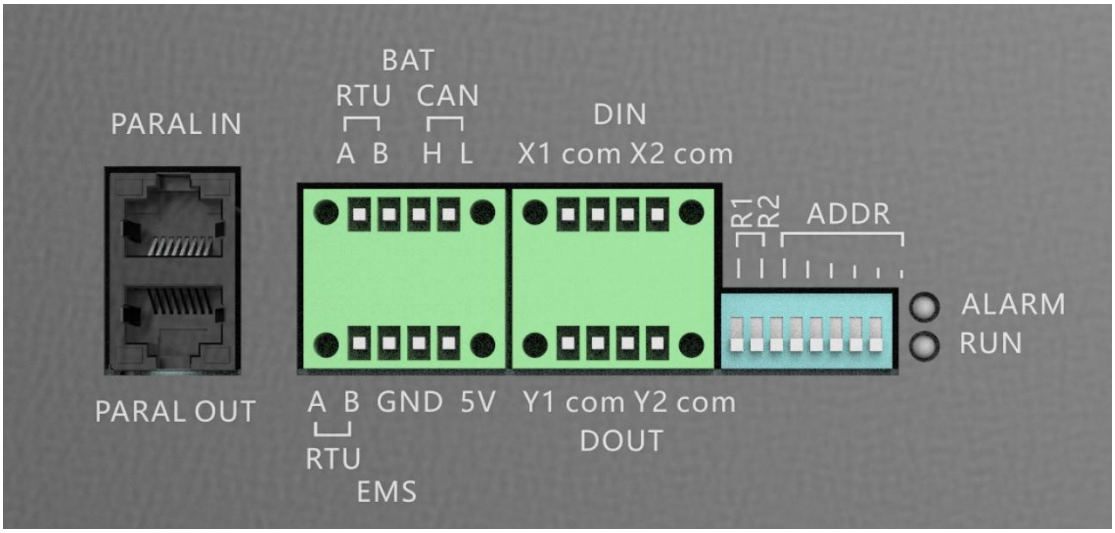
Warn

When wiring, ensure that there is no dangerous voltage present at the connection point.

7、Secondary terminal wiring

In addition to the connection of power cables, the bidirectional energy storage converter module also has connections to external communication signal lines, as well as input and output of some node signals. The port definitions for secondary wiring are shown in the following figure:

Air cooled SP100HC



Pic 6-3

PARAL IN	Parallel line input		Parallel line
PARAL OUT	Parallel line output		Parallel line
BAT_RTU	Battery_RS485 interface		BAT interface

BAT_CAN	Battery_CAN interface		
RTU(A-B)	Client RS485 interface	protocol	
X1	Dry interface input	reserved	DIN
X1_com	Dry interface input	reserved	
_X2	Dry interface input	reserved	
X2_com	Dry interface input	reserved	
Y1			DOUT
com			
Y2			
com			
R1	Parallel matching resistor	Up for ON	Module 1 and the last module are set to ON.
R2	Parallel matching resistor	Up for ON	Module 1 and the last module are set to ON.
ADDR	Module address dialing	Up for ON	Module address 00000 1 with address 1 Module address 000100 with address 4
RUN			Running light

Liquid cooled SP110HS

DC+/DC-	Battery input terminal	Random device accessories
L1/L2/L3/N	AC output terminal	Random device accessories
PE	ground terminal	M6 specifications

PARAL IN	Parallel line input		Parallel cable (Class 6 and above standard network cable)
PARAL OUT	Parallel line output		Parallel cable (Class 6 and above standard network cable)
BAT_RTU	Battery_ RS485 interface		BAT interface
BAT_CAN	Battery_ CAN interface		
RTU-A	Customer RS485 interface	1	EMS(interface）
RTU-B	Customer RS485 interface	2	
ALARM			Warning light
RUN			Running light (always on: running flashing: upgrading)

Device	Connection

EMS	RS485 or Ethernet (Base MODBUS TCP/IP protocol，compatible MODBUS RTU)
BMS	RS485 (Base MODBUS RTU protocol)or CAN （CAN2.0 protocol）
Other PCS	CAN
Solar inverter	By outer EMS
smart meter	By outer EMS
air-conditioning	By outer EMS
Fire Protection System	By outer EMS
Level gauge	By outer EMS
Diesel engine	By outer EMS

6.4.2 Communication interface connection

The bidirectional energy storage converter supports the Modbus protocol, Adopting RS485 and CAN communication interfaces to facilitate users' background monitoring

1、Connect EMS via RS485 or CAN

EMS can be accessed using RS485 or CAN, depending on the specific application of the user.

RS485 serial port

The tag numbers of the RS485 communication interface on the monitoring board of the bidirectional energy storage converter are ports 4 and 5 of the COM2 network port. Users can use interface converters

Convert the serial port signal to a signal that can be processed by the PC (such as RS485 to RS232), and use the user software system to separate the bidirectional energy storage converter

Debug, read the operation information and alarm information of the bidirectional energy storage converter, and perform corresponding settings and switch on/off operations. Please refer to Figure 6.7.

Ethernet port

At the same time, the monitoring board has an interface with COM1 port and port number 502, supports Modbus TCP/IP protocol, and has its own IP address

Address. Ethernet connection requires a switch and a fixed IP address. The connecting cable is a network cable or twisted pair. Transforming multiple bidirectional energy storage systems

Connect the Ethernet port to the switch and connect the switch to the remote monitoring computer. By setting the corresponding IP address and port number in the monitoring computer, dual monitoring can be achieved

Real time monitoring and control of the state of the energy storage converter. Please refer to Figure 6.6.

2、Connect BMS communication through RS485 or CAN

When communicating with the BMS system, the bidirectional energy storage converter can

choose RS485 or CAN communication. If the BMS uses an Ethernet communication port,

An Ethernet CAN protocol converter is required. The Ethernet CAN protocol converter is beyond the supply scope of Zhongteng Micronet and must be purchased separately by the customer.

The bidirectional energy storage converter communicates with the battery management unit (BMS), monitors battery status information, issues alarms based on battery status, and provides fault information for the battery

Barrier protection to improve battery safety. The tag numbers of the CAN communication interface are ports 1 and 2 of the COM2 network port. Please refer to Figure 6.7.

3、Fault dry contact with BMS

The bidirectional energy storage converter communicates with the fault dry contact of the BMS system, and terminals 1 and 2 of terminal block P1 can be connected to the total BMS fault dry contact,

BMS input fault dry contact is normally closed. When BMS fault occurs, a PCS disconnection signal is given, and PCS will report a fault shutdown. Please refer to Figure 6.6.

6.5 Installation checklist

After the installation of the bidirectional energy storage converter is completed, it is necessary to inspect:

1) The equipment should be placed reasonably, installed reasonably, and meet the safety distance requirements.

2) The wiring is correct. The grounding wire is well connected to the grounding grid. Require technical personnel to check the grounding resistance.

3) Compare the factory provided main wiring diagram with the on-site wiring diagram. Check for any differences and determine if it will affect the safe operation of the energy storage system

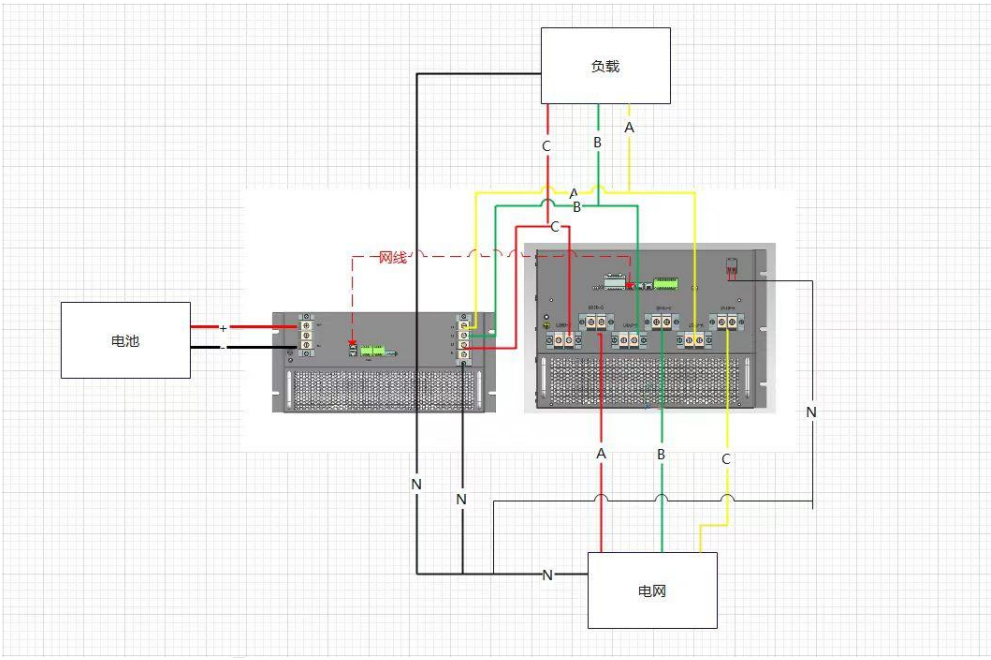
Okay. After installation, check the following list:

Device install	√
There is sufficient free space in front and behind the bidirectional energy storage converter to meet maintenance requirements	☐
The environmental operating conditions are within the specified range	☐
The bidirectional energy storage converter is correctly installed and	☐

fixed	
Ensure that nothing obstructs the heat dissipation duct of the bidirectional energy storage converter, ensuring air circulation. Meet heat dissipation requirements	☐
electrical installation	☐
The bidirectional energy storage converter (including cables) is grounded correctly	☐
The AC line voltage matches the rated output voltage of the bidirectional energy storage converter	☐
Match the parameters of the external medium or low voltage AC transformer with the bidirectional energy storage converter	☐
Ensure that the insulation of the cable is good and meets the requirements of the specifications	☐
The connection and tightening torque of AC power supply phases A, B, and C are appropriate	☐
The tightening torque of the DC power cable connection between DC+and DC - is appropriate	☐
Auxiliary and control cables need to be routed separately from power cables	☐
The external control cable is correctly connected to the port of the bidirectional energy storage converter	☐
The cable connection and tightening torque on the junction box are appropriate	☐
External cable insulation and voltage withstand test	☐
The grounding resistance should be less than 4 Ω	☐

6.6 Installation wiring diagram

6.6.1 Wiring diagram with STS



Pic 6-5

7 Operation and debugging (software operation instructions)

7.1 Application software tutorial

7.1.1、Download and Connect

Download apps

Users can monitor and control SP100H through local debugging software. If users choose to configure a 4G module, they can view the running data through the web or mobile app. SP100H debugging software ZtwCanTest installation package or mobile app download method:

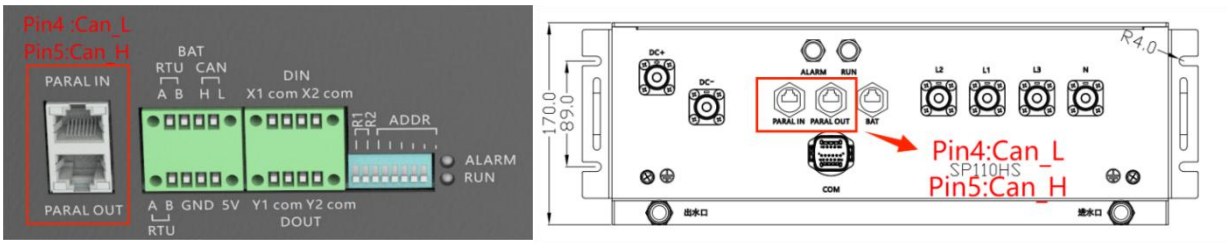
➢ Contact the customer service department of Sino Soar to request the latest debugging tool installation package。

Connection method

The local debugging software provides two communication connection methods: CAN and RS485, and the specific connection interface is selected based on different product interface definitions

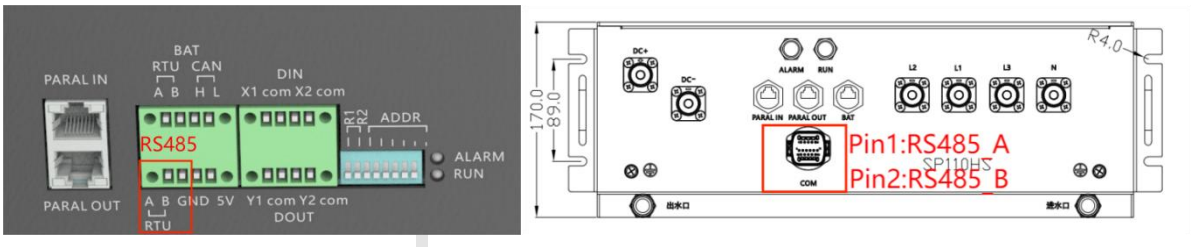
✓ CAN connection: Prepare a standard RJ45 network cable and connect Pin4 (CAN_L) and Pin5 (CAN_H) from any interface of the PARAL IN or PARAL OUT shown in Figure 7-1; The other end corresponds to the CAN connected to the CAN card_ H and CAN_ L two

interfaces. CAN card supports Zhou Ligong's USBCAN or iTek_ BUSBCAN, etc.。



Pic 7-1 SP100HC And SP110HS CAN interface

✓ RTU connection: Prepare RS485 tool and connect one end to RS485 connected to EMS_ A and RS485_ B interface; The other end corresponds to the RTU interface (connected to the PC) T/R+interface and T/R - interface



Pic 7-2 SP100HC and SP110HS RS485 connect interface

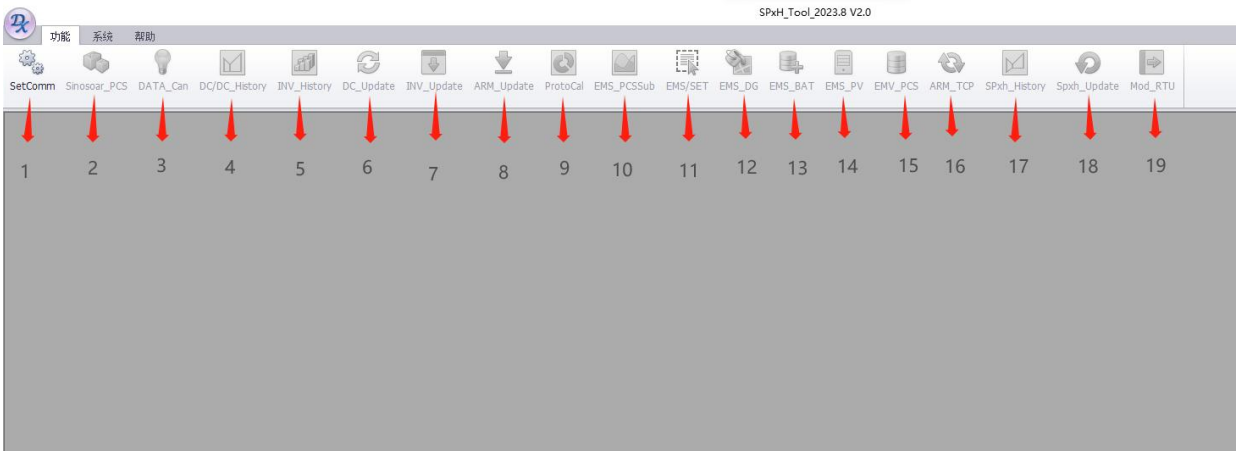
Driver installation and debugging tool installation

Using USBCAN or USB_ The RS485 tool first requires a corresponding driver. For USBCAN cards, Beijing Aitai should pay attention to the Win10 or above system when installing drivers. It is important to disable and prohibit unknown driver signatures before installing. The iTek USBCAN driver can be viewed in the computer manager, and the software can also support Zhou Ligong's USB_ CAN_ 2E_ U or the same model drive

7.1.2、 Introduction to Software Functions

Introduction to functional modules

Using local debugging software, users can perform different operations related to the controller. As shown in Figure 7-3.



Pic 7-3 Debugging software functional module diagram

1. (1) Select communication method (CAN communication, RTU communication, TCP communication)
2. (3) Viewing and setting of CAN data and RTU data (SP100HC or SP110HS)
3. (8) Upgrade module firmware ARM_ CPU1
4. (17) Export historical data or fault point data (for internal use)
5. (18) DSP upgrade program_ CPU2
6. (19) RTU communication test

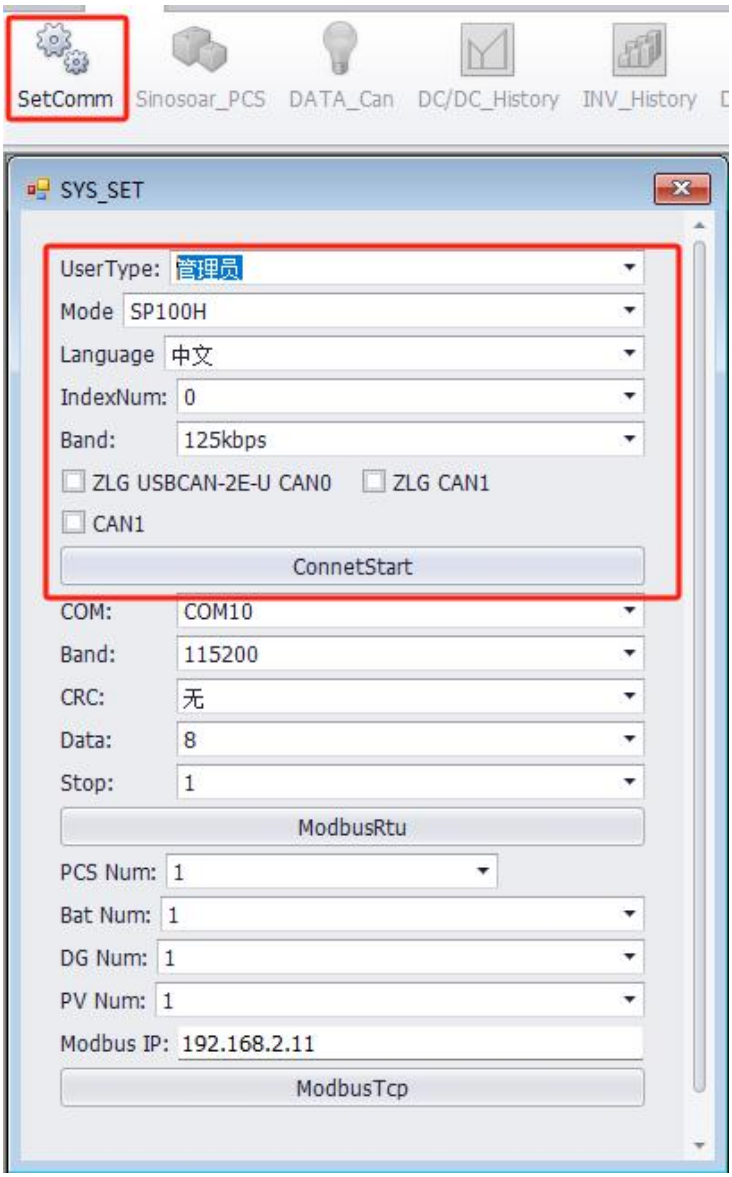
7.1.3、 CAN connection mode function

（1）、CAN Connection Start

The local debugging software can be compatible with Beijing Aitai USBCan card or Zhou Ligong ZLgUSBCan card (default to using Beijing Aitai USBCan card). The PC needs to pre install the corresponding underlying driver (driver download link: http://www.itekon.com/teamview_3362914.html ）.

If you choose the Beijing Aitai USBCan card, users can directly click on the "Connect Start" button to connect to CAN communication; If you choose the Zhou Ligong ZLgUSBCan card, users need to check ZLG USBCAN-2E-U CAN0 or ZLG CAN1, and then click the "Link and Start" button to connect to CAN communication.

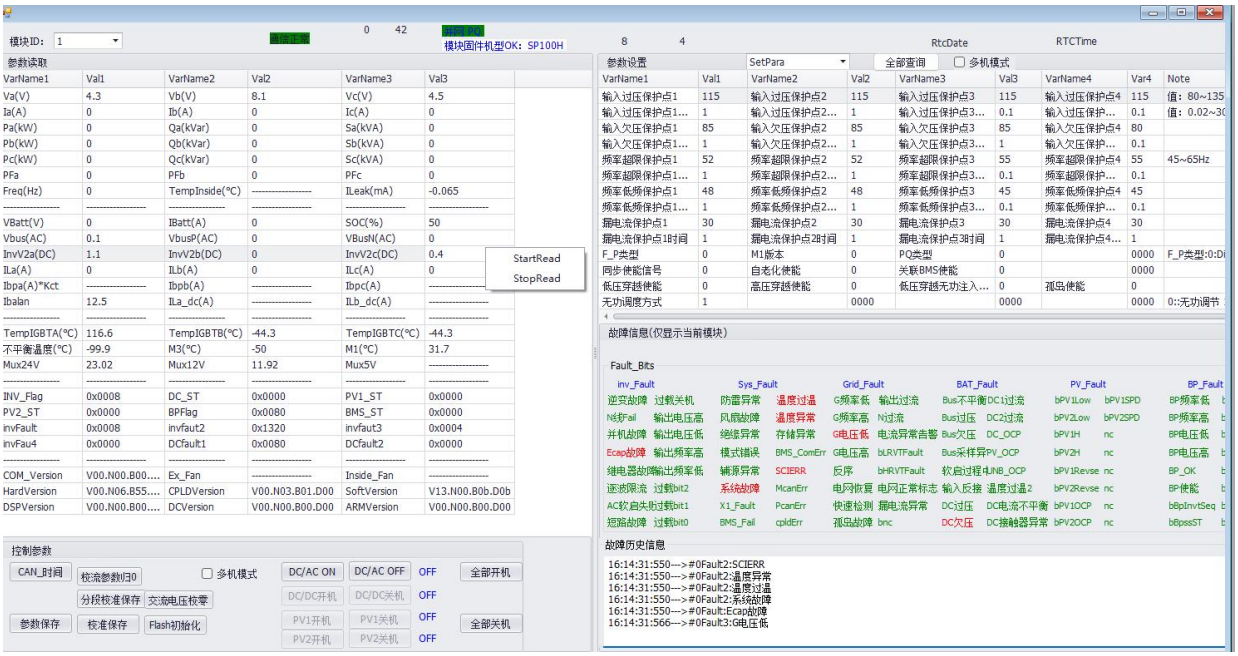
The connection interface is shown in Figure7-4.



Pic 7-4 CAN Configuration and Connection Page

（2）、UI

The CAN display interface includes a parameter reading page on the left, a parameter setting page on the upper right, and a fault display page on the lower right. The data on the parameter reading page can only be read, while the data on the parameter setting page can be modified. The fault column displays system fault information. As shown in Figures 7-5



Pic 7-5 CAN Display Page

（3）、Query data

Parameter reading page, real-time refreshing of device parameters, such as voltage, current, temperature, and device version information. On the parameter query page, right-click the mouse to pop up a selection dialog box, select "Start Read", and you can query the corresponding variable information of the module in real-time; Select 'StopRead' to stop real-time querying of the module's corresponding variable information. As shown in Figures 7-6。

参数读取

VarName1	Val1	VarName2	Val2	VarName3	Val3
Va(V)	0	Vb(V)	0	Vc(V)	0
Ia(A)	0	Ib(A)	0	Ic(A)	0
Pa(kW)	0	Qa(kVar)	0	Sa(kVA)	0
Pb(kW)	0	Qb(kVar)	0	Sb(kVA)	0
Pc(kW)	0	Qc(kVar)	0	Sc(kVA)	0
PFa	0	PFb	0	PFc	0
Freq(Hz)	0	TempInside(℃)	----------	ILeak(mA)	0
----------	----------	----------	----------	----------	----------
VBatt(V)	0	IBatt(A)	0	SOC(%)	0
Vbus(AC)	0	VbusP(AC)	0	VBusN(AC)	0
InvV2a(DC)	0	InvV2b(DC)	0	InvV2c(DC)	0
ILa(A)	0	ILb(A)	0	ILc(A)	0
Ibpa(A)*Kct	----------	Ibpb(A)	----------	Ibpc(A)	----------
Ibalan	0	ILa_dc(A)	----------	ILb_dc(A)	----------
----------	----------	----------	----------	----------	----------
TempIGBTA(℃)	0	TempIGBTB(℃)	0	TempIGBTC(℃)	0
不平衡温度(℃)	0	M3(℃)	0	M1(℃)	0
Mux24V	0	Mux12V	0	Mux5V	----------
----------	----------	----------	----------	----------	----------
INV_Flag	0x0000	DC_ST	0x0000	PV1_ST	0x0000
PV2_ST	0x0000	BPFlag	0x0000	BMS_ST	0x0000
invFault	0x0000	invfaut2	0x0000	invfaut3	0x0000
invFau4	0x0000	DCfault1	0x0000	DCfault2	0x0000
----------	----------	----------	----------	----------	----------
COM_Version	V00.N00.B00....	Ex_Fan	----------	Inside_Fan	----------
HardVersion	V00.N00.B00....	CPLDVersion	V00.N00.B00.D00	SoftVersion	V00.N00.B00.D00
DSPVersion	V00.N00.B00....	DCVersion	V00.N00.B00.D00	ARMVersion	V00.N00.B00.D00

Pic 7-6 CAN Parameter reading page

（4）、Setting data

The internal parameters of the module are set on the right side of the interface. Right click on the row where the parameters are located in the upper right interface, and a selection dialog box will pop up. Select "Set Parameter" to set the parameter values for that row; Select 'Read Parameter' to read the parameter information of the row. Users can save parameters that have been modified by controlling the parameter saving of the operation module. As shown in Figures 7-7。

VarName1	Val1	VarName2	Val2	VarName3	Val3	VarName4	Var4	Note
输入过压保护点1	115	输入过压保护点2	115	输入过压保护点3	115	输入过压保护点4	115	值：80~135
输入过压保护点1...	1	输入过压保护点2...	1	输入过压保护点3...	0.1	输入过压保护...	0.1	值：0.02~300 S
输入欠压保护点1	85	输入欠压保护点2	85	输入欠压保护点3	85	输入欠压保护点4	80	
输入欠压保护点1...	1	输入欠压保护点2...	1	输入欠压保护点3...	1	输入欠压保护...	0.1	
频率超限保护点1	52	频率超限保护点2	52	频率超限保护点3	55	频率超限保护点4	55	45~65Hz
频率超限保护点1...	1	频率超限保护点2...		保护点3...	0.1	频率超限保护...	0.1	
频率低频保护点1	48	频率低频保护点2		保护点3	45	频率低频保护点4	45	
频率低频保护点1...	1	频率低频保护点2...		保护点3...	0.1	频率低频保护...	0.1	
漏电流保护点1	30	漏电流保护点2	30	漏电流保护点3	30	漏电流保护点4	30	
漏电流保护点1时间	1	漏电流保护点2时间	1	漏电流保护点3时间	1	漏电流保护点4...	1	
F_P类型	0	M1版本	0	PQ类型	0		0000	F_P类型:0:Disable ,1: 4105, 2:...
同步使能信号	0	自老化使能	0	关联BMS使能	0		0000	
低压穿越使能	0	高压穿越使能	0	低压穿越无功注入...	0	孤岛使能	0	
无功调度方式	1		0000		0000		0000	0::无功调节 1：功率因数调节 2...

Pic 7-7 CAN Parameter Setting Page

（5）、Control operation

The control operation has many functions, including remote scheduling on/off, parameter saving (which can save the modified parameter values on the right interface), time calibration, initialization of Flash, and other functions. As shown in Figures 7-8

Pic 7-8 CAN Control operation page

（6）、Fault information

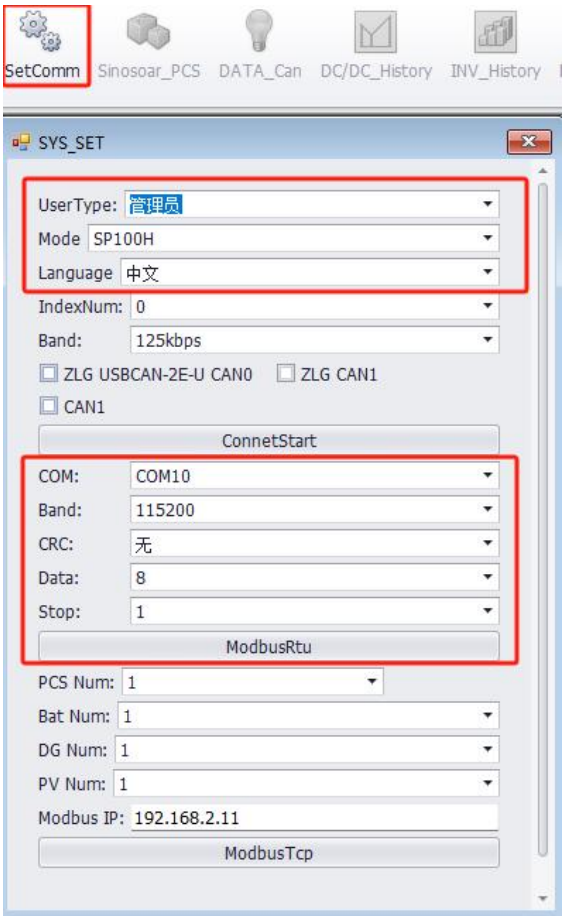
This page can display real-time system fault or alarm information. When a fault occurs, the corresponding fault information is displayed in red. Fault history information displays all fault information in the system, and double clicking the mouse can clear the historical fault information. As shown in Figures 7-9.

Pic 7-9 CAN Fault information page

7.1.4 RTU Connection method function

1、RTU Configuration and Connection

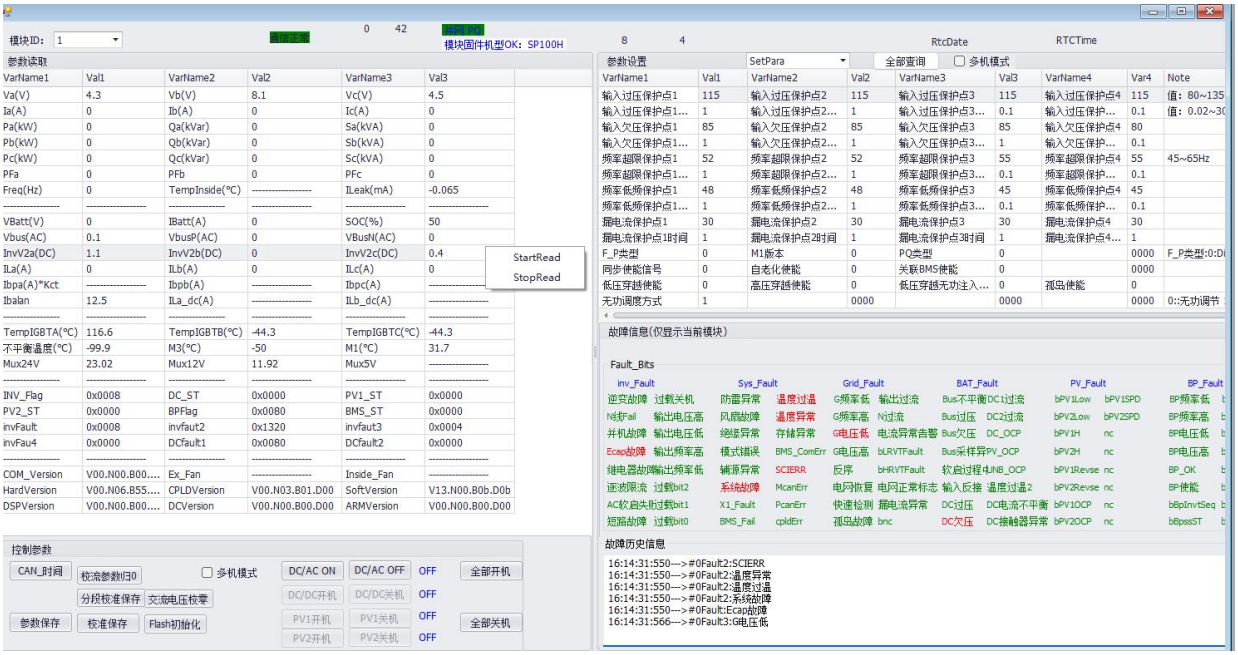
Users can choose the appropriate model and language. When connecting to an RTU, users need to configure configuration information such as port number, baud rate, CRC verification, data bits, and stop bits. As shown in Figures 7-10.



Pic 7-10 RTU Configuration and Connection Page

2、RTU display interface

The RTU display interface includes a parameter reading page on the left, a parameter setting page on the upper right, and a fault display page on the lower right. The data on the parameter reading page can only be read, while the data on the parameter setting page can be modified. The fault column displays system fault information. As shown in Figures 7-11.



Pic 7-11 RTU Display Page

3、Query data

Parameter reading page, real-time refreshing of device parameters, such as voltage, current, temperature, and device version information. On the parameter query page, right-click the mouse to pop up a selection dialog box, select "Start Read", and you can query the corresponding variable information of the module in real-time; Select 'StopRead' to stop real-time querying of the module's corresponding variable information. As shown in Figures 7-12.

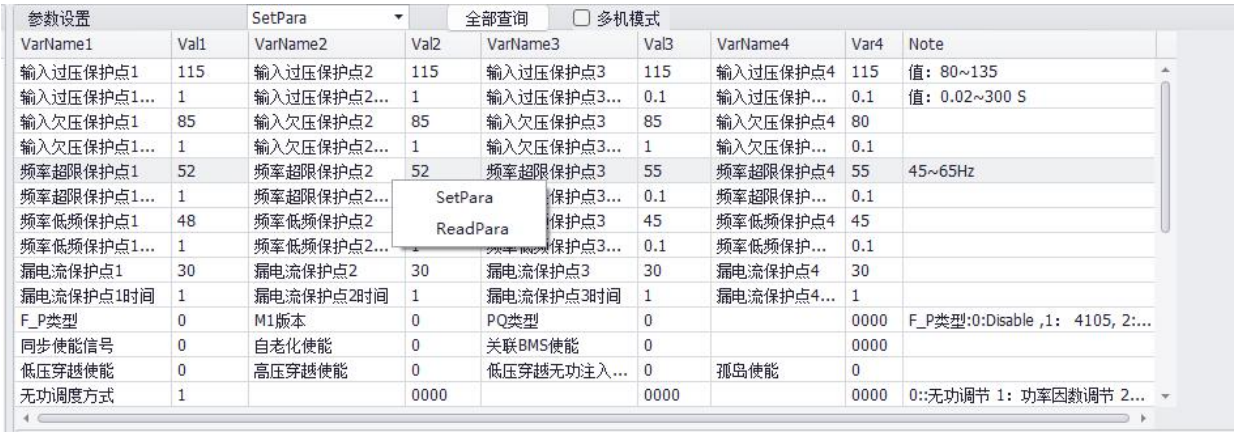
参数读取

VarName1	Val1	VarName2	Val2	VarName3	Val3
Va(V)	0	Vb(V)	0	Vc(V)	0
Ia(A)	0	Ib(A)	0	Ic(A)	0
Pa(kW)	0	Qa(kVar)	0	Sa(kVA)	0
Pb(kW)	0	Qb(kVar)	0	Sb(kVA)	0
Pc(kW)	0	Qc(kVar)	0	Sc(kVA)	0
PFa	0	PFb	0	PFc	0
Freq(Hz)	0	TempInside(℃)	----------	ILeak(mA)	0
----------	----------	----------	----------	----------	----------
VBatt(V)	0	IBatt(A)	0	SOC(%)	0
Vbus(AC)	0	VbusP(AC)	0	VBusN(AC)	0
InvV2a(DC)	0	InvV2b(DC)	0	InvV2c(DC)	0
ILa(A)	0	ILb(A)	0	ILc(A)	0
Ibpa(A)*Kct	----------	Ibpb(A)	----------	Ibpc(A)	----------
Ibalan	0	ILa_dc(A)	----------	ILb_dc(A)	----------
----------	----------	----------	----------	----------	----------
TempIGBTA(℃)	0	TempIGBTB(℃)	0	TempIGBTC(℃)	0
不平衡温度(℃)	0	M3(℃)	0	M1(℃)	0
Mux24V	0	Mux12V	0	Mux5V	----------
----------	----------	----------	----------	----------	----------
INV_Flag	0x0000	DC_ST	0x0000	PV1_ST	0x0000
PV2_ST	0x0000	BPFlag	0x0000	BMS_ST	0x0000
invFault	0x0000	invfaut2	0x0000	invfaut3	0x0000
invFau4	0x0000	DCfault1	0x0000	DCfault2	0x0000
----------	----------	----------	----------	----------	----------
COM_Version	V00.N00.B00....	Ex_Fan	----------	Inside_Fan	----------
HardVersion	V00.N00.B00....	CPLDVersion	V00.N00.B00.D00	SoftVersion	V00.N00.B00.D00
DSPVersion	V00.N00.B00....	DCVersion	V00.N00.B00.D00	ARMVersion	V00.N00.B00.D00

Pic 7-12 RTU Parameter reading page

4、Setting data

The internal parameters of the module are set on the right side of the interface. Right click on the row where the parameters are located in the upper right interface, and a selection dialog box will pop up. Select "Set Parameter" to set the parameter values for that row; Select 'Read Parameter' to read the parameter information of the row. Users can save parameters that have been modified by controlling the parameter saving of the operation module. As shown in Figures 7-13.



VarName1	Val1	VarName2	Val2	VarName3	Val3	VarName4	Var4	Note
输入过压保护点1	115	输入过压保护点2	115	输入过压保护点3	115	输入过压保护点4	115	值：80~135
输入过压保护点1...	1	输入过压保护点2...	1	输入过压保护点3...	0.1	输入过压保护...	0.1	值：0.02~300 S
输入欠压保护点1	85	输入欠压保护点2	85	输入欠压保护点3	85	输入欠压保护点4	80	
输入欠压保护点1...	1	输入欠压保护点2...	1	输入欠压保护点3...	1	输入欠压保护...	0.1	
频率超限保护点1	52	频率超限保护点2	52	频率超限保护点3	55	频率超限保护点4	55	45~65Hz
频率超限保护点1...	1	频率超限保护点2...		保护点3...	0.1	频率超限保护...	0.1	
频率低频保护点1	48	频率低频保护点2		保护点3	45	频率低频保护点4	45	
频率低频保护点1...	1	频率低频保护点2...		保护点3...	0.1	频率低频保护...	0.1	
漏电流保护点1	30	漏电流保护点2	30	漏电流保护点3	30	漏电流保护点4	30	
漏电流保护点1时间	1	漏电流保护点2时间	1	漏电流保护点3时间	1	漏电流保护点4...	1	
F_P类型	0	M1版本	0	PQ类型	0		0000	F_P类型:0:Disable ,1: 4105, 2:...
同步使能信号	0	自老化使能	0	关联BMS使能	0		0000	
低压穿越使能	0	高压穿越使能	0	低压穿越无功注入...	0	孤岛使能	0	
无功调度方式	1		0000		0000		0000	0::无功调节 1：功率因数调节 2...

Pic 7-13 RTU Parameter Setting Page

5、Control operation

The control operation has many functions, including remote scheduling on/off, parameter saving (which can save the modified parameter values on the right interface), time calibration, initialization of Flash, and other functions. As shown in Figures 3-15.

Pic 7-14 RTU Operation control page

6、Fault information

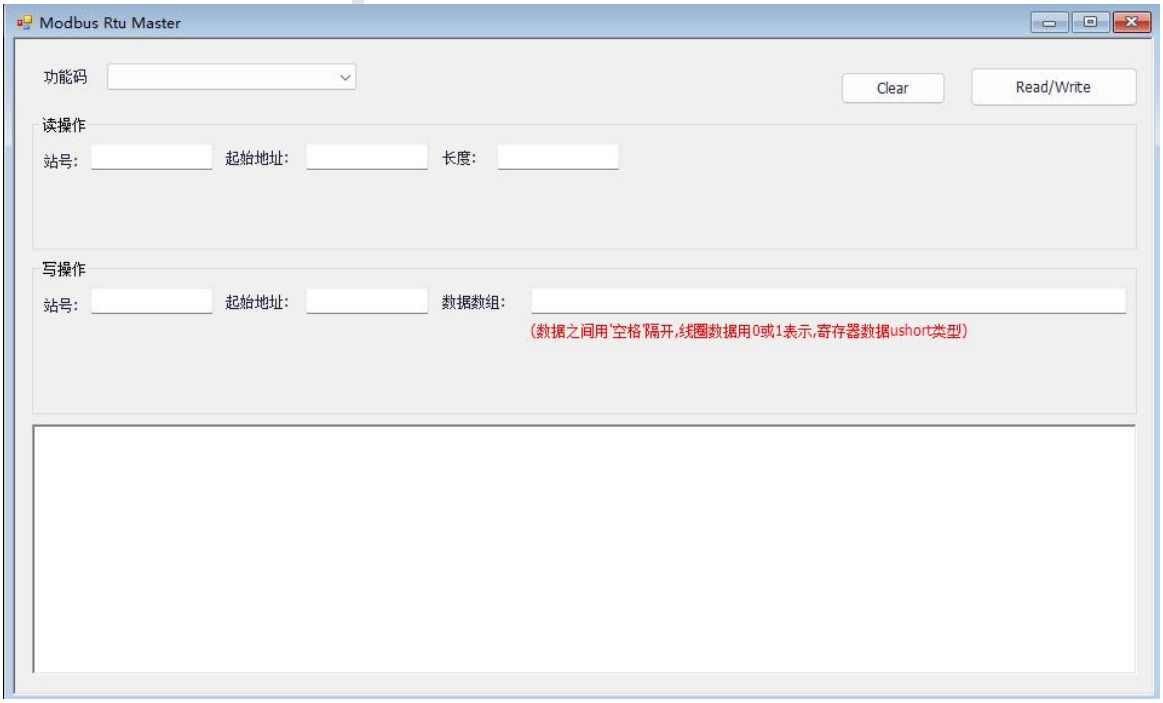
This page can display real-time system fault or alarm information. When a fault occurs, the corresponding fault information is displayed in red. Fault history information displays all fault information in the system, and double clicking the mouse can clear the historical fault information.

As shown in Figures 7-15.

Pic 7-15 RTU Fault display page

7、RTU Communications Test

Users can send messages to test whether the RTU is connected correctly or whether the messages can be replied correctly. As shown in Figures 7-16.



Pic 7-16 RTU test page

8、EMS System Function Configuration

9、EMS Other information display

10、EMS UPGRADE

7.1.5 Use cellphone APP

If users choose to use 4G communication module accessories as a complete set. You can apply for site configuration information and register and log in to an account based on the SN

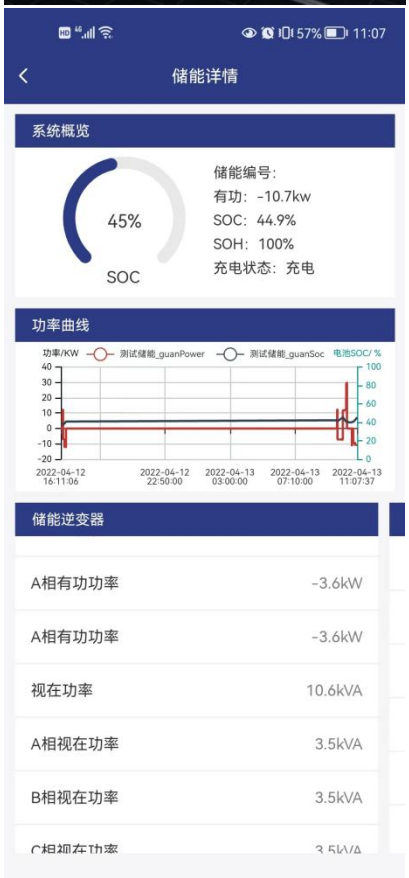
codes of each site and module from Zhongteng Micronet. Users can view site related information through the web or app

The APP interface is shown in Figures 7-17

Please refer to the official website or contact customer service for the download address of the app


中腾微网
SINOSOAR
请输入用户名
请输入密码
下次自动登录
登录


单线图
电网
负载
柴发


储能详情
系统概览
45%
SOC
储能编号:
有功：-10.7kw
SOC：44.9%
SOH：100%
充电状态：充电
功率曲线
储能逆变器
A相有功功率 -3.6kW
A相有功功率 -3.6kW
视在功率 10.6kVA
A相视在功率 3.5kVA
B相视在功率 3.5kVA

Pic 7-17 APP Page

7.1.3 RS485 connection

7.2 Turn on/off

The energy storage device must be installed and debugged by an engineer to be normal, and the external power switch must be closed before the startup steps can be carried out.

7.2.1 Pre startup inspection

Before starting up, the equipment should be inspected as follows:

1) Visually check that there are no signs of damage outside the module, and confirm that both the external DC circuit breaker and AC circuit breaker are in the "OFF" state;

2) According to the inspection items after installation in Chapter 6.8, check whether the DC input wiring and AC output wiring of the energy storage device are normal and whether the grounding is good;

3) Check if the battery voltage is normal;

4) Check whether the phase voltage and line voltage on the power grid side are within the normal range, and record the voltage values.

7.2.2 Startup steps

1) Close the output circuit breaker of the battery cabinet, power on the DC port of the device, and you will see the power indicator light on the panel illuminated.

2)

First, open the browser on the computer desktop (preferably Google Chrome), and then enter the default IP of the machine in the browser's URL bar

(192.168.1.10), the login interface shown in Figure 7.1 appears.

Enter "admin" in the Name input box,

Enter the initial password "123456" in the Password input box,

Click "Log in" to enter the backend operation interface of PWS1-100M, as shown in Figure 7.1.

At this time, the "Current Alarm" in the "Event Record" will display information such as "AC # 01 AC Bus Under Voltage" and "AC # 01 AC Bus Under Frequency".

The first startup requires setting battery DC protection parameters and communication configuration.

3) The converter operates in grid connected mode by default, closes the external AC circuit breaker, and powers up the AC side port of the machine. At this time, the "Current Alarm" displays

The information such as "AC # 01 AC Bus Under Voltage" and "AC # 01 AC Bus Under Frequency" will be automatically eliminated.

4) Click on the "Control Scheduling" tab on the left side of the webpage, and set the startup command in the "Control Command" to start the grid connection operation of the inverter.

5) If the inverter needs to work in off grid mode, please reset the command after step (2) and set the working mode to off grid mode. After successful reset

The "AC # 01 AC Bus Undervoltage" displayed in the "Current Alarm",

The information such as "AC # 01 AC bus underfrequency" will be eliminated and automatically cleared;

After setting the startup command, check the "Operation Information" on the webpage to see if the AC bus voltage is 400V. After confirming it is correct, close the external switch to supply power to the load.

7.2.3 Shutdown steps

1) Click on the "Control Scheduling" tab on the left side of the webpage, and set the shutdown command in the "Control Command";

2) Confirm whether the inverter is in a shutdown state;

3) Disconnect the AC circuit breaker;

4) Disconnect the DC circuit breaker of the battery pack.

8 Troubleshooting

8.1 Safety precautions

Warn

There may be a risk of electric shock due to high voltage

Under fault conditions, the product may have high voltage. Touching live parts of the device may cause danger or death

Serious injury may occur due to electric shock.

Please comply with all safety information when operating the product.

When performing product maintenance, appropriate personal protective equipment must be worn.

If you are still unable to solve the problem through this document, please contact the manufacturer.

8.2 Export device operation data

8.3 Common Fault Description

The following table shows the faults caused by incorrect parameter settings. Users can reset parameters according to the instructions in the appendix, and the fault can be automatically resolved

Table 8-1 Common Fault Table

Alarm or fault name	Fault code	Shutdown or not	Fault recovery method	Troubleshooting measures
Soft start failed	1	Shutdown	self-recovery	1. Power down the module and wait for 1-2 minutes before restarting the module; 2. After the above operations, if the fault still exists, please contact Sino Soar customer service for handling
Duplicate/invalid address	3	Shutdown	Pre startup detection, Power down recovery	1. Power down the module and reselect the module address that is inconsistent with the system, with an address range of # 1~# 10; 2. The address range is # 1~# 10, and the dial switch is from left to right. The left side represents the high address and the right side represents the low address. It is valid to dial to the "NO" position and is calculated in binary form. 3. After resetting the address, it needs to be powered off and restarted to take effect.

ECAP fault	4	Off	self-recovery	1. Check if the network cable between parallel machines is not properly connected, and reconnect the parallel machine network cable 2. Replace the parallel network cable
AC Relay short circuit	5	off	Power down recovery	1. Power down the module and check if the intermediate relay of the inverter is damaged
CPLD Wave by wave current limiting fault	6	off	self-recovery	1. If the machine experiences overcurrent, check the load or wiring condition
Inv Short circuit between output lines	8	off	self-recovery	1. Power down the module and check if there is a short circuit between each phase and each wire
Overload protection shutdown	9	off	self-recovery	1. Long term overload status, please check the load

Battery Fault

Alarm or fault name	Fault No	On/Off	Fault recovery method	Troubleshooting measures
Bus imbalance	17	OFF	self-recovery	1. Power down the module and wait for 1-2 minutes before restarting the module 2. Contact customer service for resolution
Bus overvoltage	18	OFF	self-recovery	1. Check if the P and N of the busbar are overvoltage, and wait for 1 minute after powering down before

				powering on again
Bus undervoltage	19	OFF	self-recovery	1. Check if the P and N of the busbar are under voltage and if the input voltage is too low 2. Contact customer service for resolution
Bus sampling error	20	OFF	self-recovery	1. Bus voltage not equal to P+N, sampling error
DC soft start failed	21	OFF	self-recovery	1. Wait for the bus voltage to rise before restarting
Battery reverse connection	22	OFF	self-recovery	1. Check if the positive and negative poles of the battery are connected in the opposite direction
Battery overvoltage	23	OFF	self-recovery	1. Check if the input of the battery is overvoltage, and wait for 1 minute before powering it on again
Battery undervoltage	24	OFF	self-recovery	1. Check if the input of the battery is under voltage
Discharge overcurrent	25	OFF	self-recovery	1. Check for overcurrent during discharge
Charging overcurrent	26	OFF	self-recovery	1. Check if there is overcurrent during charging
DC Contactor failure	32	OFF	self-recovery	1. PTC abnormal or DC contactor abnormal

Grid fault

Alarm or fault name	Fault No	On/OFF	Fault recovery method	Troubleshooting measures
Low grid frequency	33	OFF	self-recovery	1. Check if the low-frequency protection point of the power grid is set too high 2. Check if the low-frequency protection point time of the power grid is too short
High grid frequency	34	OFF	self-recovery	1. Check if the high-frequency protection

				point of the power grid is set too low 2. Check if the high-frequency protection point time of the power grid is too short
Low grid voltage	35	OFF	self-recovery	1. Check if the undervoltage protection point of the power grid is set too high 2. Check if the power grid undervoltage protection point time is too short
High grid voltage	36	OFF	self-recovery	1. Check if the overvoltage protection point of the power grid is set too low 2. Check if the power grid overvoltage protection point time is too short
Reverse phase sequence connection	37	OFF	self-recovery	1. Check if the phase sequence is reversed
Islanding fault	40	OFF	self-recovery	
Abnormal output current	41	OFF	self-recovery	1. Check if the current output is overcurrent 2. Check for short circuits
Abnormal inverter overcurrent current	43	Can't OFF	Warn, self-recovery	Inconsistency between machine inductance current and output current
Abnormal leakage current	47	Can't OFF	Warn, self-recovery	1. Check if the leakage current protection point is set too low 2. Check if the leakage current protection point time is too short

System Fault Type

Alarm or fault name	Fault No	Off/On	Fault recovery method	Troubleshooting measures
fan failure	50	Can't Off	Alarm, self recovery	1. Check if the fan is

				damaged
mode error	52	Off	self-recovery	1.VF Phase lock failure in mode
Auxiliary source abnormality	53	Off	self-recovery	1. Check if the auxiliary source voltage is too low
Sys Fault	54	Off	self-recovery	1. Other faults are reported, causing shutdown. To eliminate this fault, other faults need to be eliminated first
Arm Fault	55	Off	self-recovery	1. Check if there is an address dialing error, communication interruption, emergency stop fault, etc
High temperature fault	57	Off	self-recovery	1. Check if the machine environment is too high and strengthen ventilation
IGBT Abnormal temperature	58	Off	self-recovery	1. Check if the temperature difference between the

				three IGBTs is too large
Flash initialization error	59	Off	self-recovery	1.EEPROM Chip initializati on failed
Internal communication failure	61	Off	self-recovery	1. Check if the wiring between DSP and ARM is unstable or disconnected 2. Is there no program for DSP or ARM
CPLD abnormal	64	Off	self-recovery	1.CPLD Abnormal hardware version number

8.4 Detailed troubleshooting

Please consult our technical personnel for detailed troubleshooting.

9 Maintenance

9.1 Safety during maintenance

Dangerous

There is high voltage in the live parts of the product. Touching live electricity may cause death or serious electrical shock damage.

Wear appropriate personal protective equipment during maintenance.

Do not touch any live parts.

View all warning messages in the product and documentation.

Please comply with all safety information provided by the battery manufacturer.

Before performing any work, be sure to disconnect the external power supply device from the bidirectional energy storage converter:

-Grid voltage fed by the grid

-Internal power supply

-DC voltage of the battery

-Additional external voltage, such as control signals from the control room

Ensure that disconnected devices cannot automatically connect.

After turning off the device, wait at least 5 minutes before turning it on to fully discharge the capacitor.

Before operation, please ensure that all components are completely free of voltage.

Cover or isolate any adjacent live components.

9.2 Maintenance plan and spare parts

9.2.1 Operating environment requirements

The installation environment of the equipment must meet the operating environment requirements required by the equipment:

Permissible ambient temperature: -20~60 ℃

Permissible relative humidity: 0-95% (non condensing)

Maximum allowable height: 3000 meters

Note: When the maximum height is exceeded, the PCS will derate the output.

Please consult our technical personnel regarding the specific derating coefficient.

9.2.2 Electrical and fixed connection inspection

After putting into operation, regularly inspect the electrical and fixed component connections of the equipment. This type of examination is best conducted every three months. Should be carried out

Record of each inspection.

Grounding connection;

Module grounding connection;

Electrical connection of DC input;

Electrical connection of AC input;

Connection of communication cables

Fan/liquid cooling device.

Access fault information recorded by monitoring.

9.2.3 Cleaning

Before the equipment is put into operation, dust and debris in its copper bars, terminals, and mesh holes should be cleaned.

After the equipment is put into operation, the dust inside the machine room should be cleaned regularly. Check whether the ventilation and exhaust facilities in the computer room are normal. It is recommended to clean every three months.

9.2.4 Maintenance of liquid cooling

Check if there are any signs of leakage at the chain interface

9.3 Maintenance work

9.3.1 Air cooler maintenance work

In harsh environmental conditions, maintenance intervals should be shortened.
The site location and environmental conditions can affect maintenance intervals.
Pay attention to cleanliness and corrosion prevention.
More frequent maintenance may be required, depending on the on-site conditions.
If DC distribution components are susceptible to harsh environmental conditions, it is recommended to shorten maintenance intervals.
We recommend conducting regular visual inspections to determine if maintenance is required.
Consumables and maintenance materials
Consumables and maintenance materials are usually not included in the standard equipment list;
Only professionals or electrically qualified personnel can carry out operations;
Live maintenance work;
View historical records;
Read error messages and warnings;
Check the fan;
Non live maintenance;
View historical records;
Conduct visual inspection;
Clean the ventilation baffle;
Clean air and ventilation ducts;
Inspect the interior;
Check the bolted connection of the power cord;
Check labels;
Check the latch, door stop, and hinge;

10 Appendix

10.1 Quality assurance

Products that fail during the warranty period will be repaired or replaced with new products free of charge by Zhongteng Micro Network (Shenzhen) Technology Cable Company (hereinafter referred to as our company)

evidence

Our company requires customers to provide invoices and dates for purchasing products during the warranty period. At the same time, the trademark on the product should be clearly visible, otherwise there is a right not to provide quality assurance.

condition

The unqualified products after replacement shall be handled by our company.

Customers should reserve reasonable time for our company to repair faulty products.

Exemption from Liability

Our company has the right not to provide quality assurance in the following situations:

1. The entire machine and components have exceeded the free warranty period.
2. Transportation damage.
3. Incorrect installation, modification, or use.
4. Operating in extremely harsh environments beyond the instructions in this manual.
5. Equipment malfunction or damage caused by installation, repair, modification, or disassembly by non service personnel of our company.
6. Equipment malfunction or damage caused by the use of non-standard or non company components or software.
7. Any installation and use beyond the scope specified in relevant international standards.
8. Damage caused by abnormal natural environment.

If the above situation causes a product malfunction and the customer requests repair services, the paid repair services can be suspended after being determined by our company's service department.

In order to continuously improve customer satisfaction, our company's products and user manuals are constantly being improved and upgraded. If there are differences between the user manual in your hand and the product, which may cause version issues, please refer to the specific product. If you still have any questions, please contact our company.