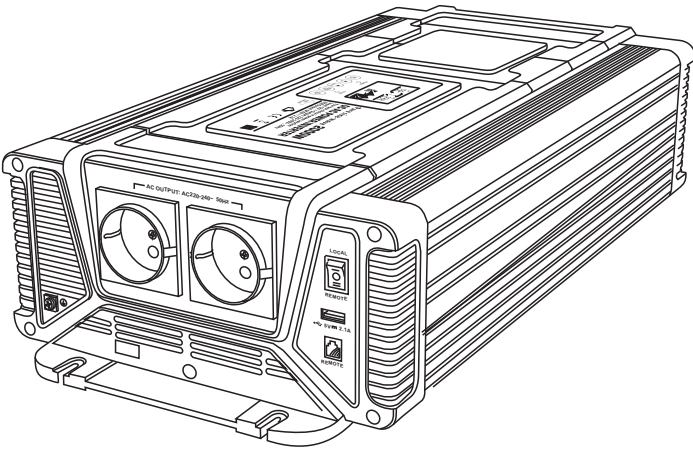# PURE SINE WAVE INVERTER

500W/700W/1200W/2000W/3000W/4000W

USER MANUAL

※ THE IMAGE SHOWN HERE IS INDICATIVE ONLY, PLS REFER TO THE ACTUAL PRODUCT.

1. IMPORTANT SAFETY INFORMATION

⚠ **Warning**

Before installing and using the inverter, you need to read the following safety information carefully.

1-1 General safety precautions

1-1-1. Do not expose the inverter to rain, snow, spray, bilge or dust.

To reduce risk of hazard, do not cover or obstruct the ventilation openings.

Do not install the inverter in a zero-clearance compartment, may result in overheating.

1-1-2.Do avoid a risk of fire and electronic shock. Make sure that existing wiring is in good electrical condition; and that wire size is not undersized. Do not operate the inverter with damaged or substandard wiring.

1-1-3.This equipment contains components which can produce arcs or sparks. To prevent fire or explosion, do not install in compartments containing batteries or flammable materials or in locations where require ignition protected equipment, this includes any space containing gasoline-powered machinery, fuel tanks, or joints, fittings, or other connection between components of the fuel system.

1-2. Precautions when working with batteries

1-2-1. If battery acid contacts skin or clothing, washes immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 20minutes and get medical attention immediately.

1-2-2. Never smoke or allow a spark or flame in vicinity of battery or engine.

1-2-3. Do not drop a metal tool on the battery. The resulting sparks or short-circuits on the battery of other electrical part may cause an explosion.

1-2-4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery produces a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.

2.FEATURES

• Pure sine wave output(THD < 2%)

• Adopts RS485 communication interface, the remote control distance can reach more than 1000m

• Reverse polarity controlled by MOS, without fuse burt

• Parameters can be set according to different usage

• Input & output completely isolated design

• LCD displays operation status, and error condition

• Capable of driving inductive & capacitive loads at the start moment.

• Loading and temperature controlled the cooling fan

• Built in advanced microprocessor to make friendly interface with user

• Flame retardant and environment friendly material

• Protection: input low voltage alarm & shutdown, overload, short circuit, input over voltage, over temperature
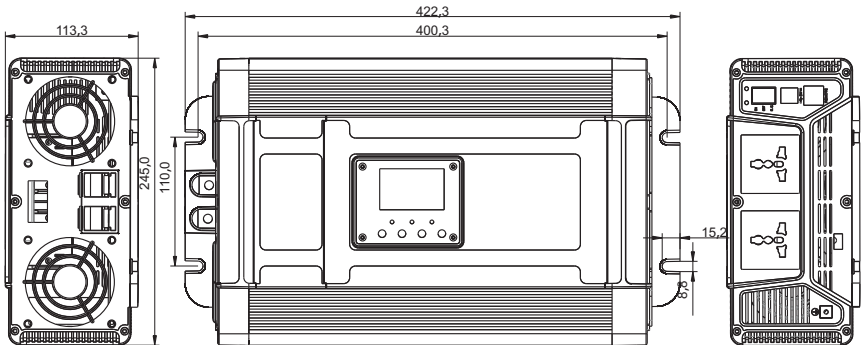
• USB output port 5V2.1A

3.Mechanical drawing
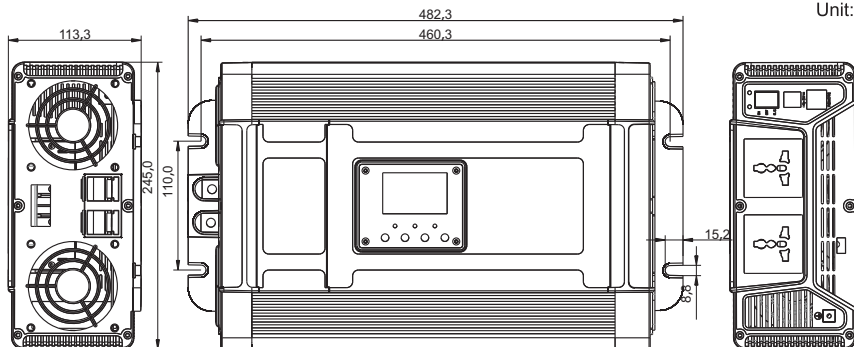
Unit: mm
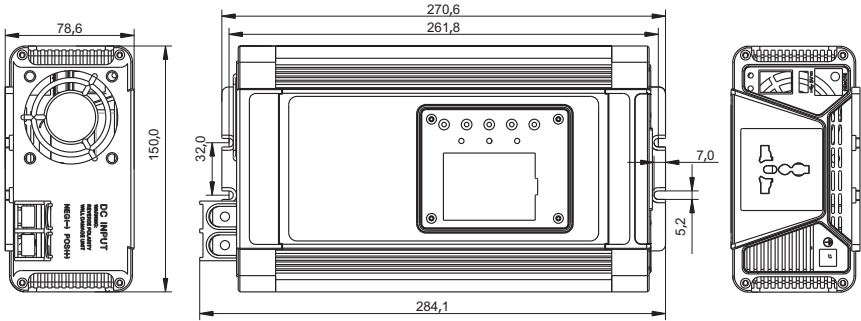
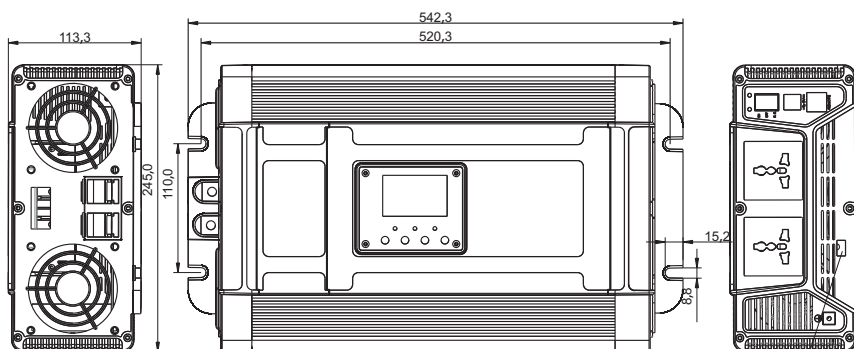**Pure Sine Wave Inverter500W/700W**
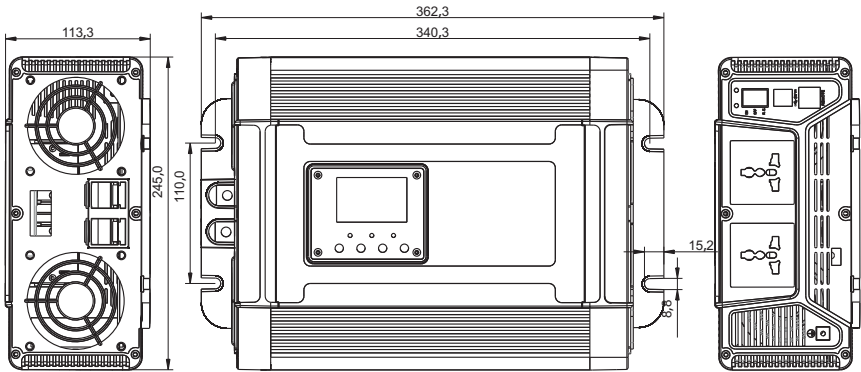
Pure Sine Wave Inverter1200W

Pure Sine Wave Inverter2000W

Unit: mm

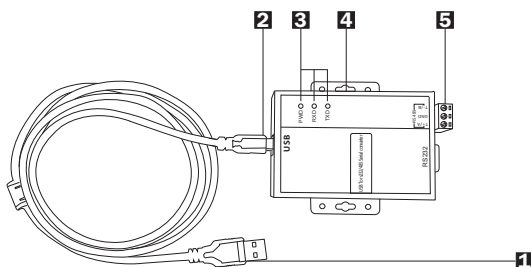**Pure Sine Wave Inverter3000W**

Pure Sine Wave Inverter4000W

Optional function:
RS485 connection, can monitor the real-time data on computer

G A B

1. USB port with PC
2. RS485 Converter USB port
3. Power and Data flow indicator of converter (POWER: power indication RXD: reception indication
   TXD: data transmission indication)
4. Mounting hole
5. Communication port

4. LCD Display Icons

POWER ○   FAULT ○

SET/OK | ▲ UP | ▼ DOWN | MENU/ESC | ON/OFF
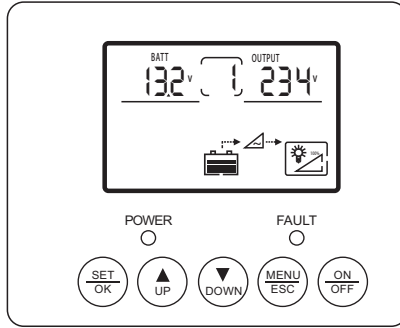
4-1 The button:

1、SET/OK ： Setting button, enter button

2、UP ： Setting button (UP)

3、DOWN ： Setting button (DOWN)

4、MENU/ESC ： Menu button, exit button

5、ON/OFF ： Power on/off switch

4-2 The normal display:
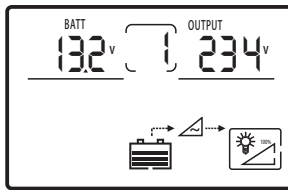
NO	Icon	Function description
1	BATT 13.2ᵛ	Indicate battery output voltage
2		Indicate the setting programs or warning and fault codes (When the product runs normally: the icon rotates clockwise; when the product fails, display the fault codes.)
3	OUTPUT 234ᵛ	Indicate output voltage, current, power, frequency
4		Indicate battery level
5		DC/AC inverter working
6		Indicate the percentage of load level

Noted:

- ➤ Press ''ESC'' to select the indication of the Icon 3 (Output voltage, current, power, frequency)
  Press "Up" to select or set auto switch the data of Icon 3.
- ➤ Press and hold "UP" and "DOWM" button 3S at the same time until the display backlight flashes 3 times and the data parameters are restored to the factory default values;
- ➤ When no fault , the LCD screen backlight automatically turns off when the button is not operated for 30s. When there is a fault or touch the button, the LCD screen automatically lights up.

4-3 The fault diaplay:
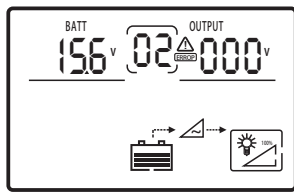
When faults occur : the Icon 2 indicate the corresponding code, and the flashing with warning code, the LCD screen backlight is always lit.

Fault	Code
Battery low voltage	01
Battery over voltage	02
Front-end circuit over temperature	03
Back-end circuit over temperature	04
Front and backend over temperature	05
Output overload	08
Output short circuit	09

4-4 The setting interface:
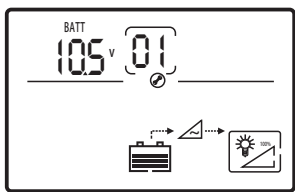
Long press "SET/OK" for 5s, enter the setting interface as shown above, while Icon 1 、 Icon 3 flashing settings parameters, Icon 2 flashing settings interface code;

Press "UP" and "DOWN" to adjust parameters, then press "SET/OK" to confirm the adjustment.

If re-set the parameter,short press "SET" to make Icon 1 flashing;

Pressing the "ESC" to cancel this step and switch to next setting interface directly.

Long press "ESC" for 5s, exit setting interface to the main interface; more than 10s without any operation,the interface will automatically return to the main interface.

Setting interface	Code	Range
Undervoltage protection value	01	12V Default：10.5　Setting：10.0-11.0 24V Default：21.0　Setting：20.0-22.0 48V Default：42.0　Setting：40.0-44.0
Undervoltage recovery value	02	12V Default：12.0　Setting：11.5-12.5 24V Default：24.0　Setting：23.0-25.0 48V Default：48.0　Setting：46.0-50.0
Overvoltage protection value	03	12V Default：15.3　Setting：15.2-16.0 24V Default：30.6　Setting：30.4-32.0 48V Default：61.2　Setting：60.8-64.0
Overvoltage recovery value	04	12V Default：14.7　Setting：14.5-15.0 24V Default：29.4　Setting：29.0-30.0 48V Default：58.8　Setting：58.0-60.0
Overload Short Circuit Mode	05	Default：0　Setting 0: lock　1:restart
Overload setting value	06	Default：110%　Setting：105-120%
Overload Short Circuit Restart Delay Value	07	Default：10　Setting: 5-60S
Alarming mode	08	Default：0　　Setting 0:Open　1:Close
Communication	09	Default：1　　Setting：1-255

Noted：

Undervoltage warning value = undervoltage closing value + 0.5V, overvoltage warning value = overvoltage closing value - 0.5V.

5. MAKING DC WIRING CONNECTIONS

Follow this procedure to connect the battery cables to the DC input terminals of the inverter. Your cable should be as short as possible (ideally to use factory spare cables) enough to handle the required current in accordance with the electrical codes or regulations application. Cables are not an adequate gauge(too narrow) or too long will decrease the inverter performances such as poor surge capability and low input voltage warnings frequently and shutdowns. UVP warning presents due to DC voltage drop across the cables from the inverter to the batteries.

The longer or narrower the cables, the greater the voltage drop.

Increasing your DC cable size will help improve the situation.

⚠ **Warning**

The installation of a fuse must be on positive cable. Failure to place a fuse on "+" cables running between the inverter and battery may cause damage to the inverter and will void warranty.

6. TROUBLE SHOOTING

⚠️ **Warning**

Do not open or disassemble the inverter. Attempting to service the unit yourself may result in a risk of electrical shock or fire.

Fault	Code	Solution
Battery low voltage	01	Stop using the inverter and to charge the battery;Replace a thicker connection cable.
Battery over voltage	02	Check the battery voltage is right; Check the charging voltage
Front-end circuit over temperature	03	Improve ventilation;Make sure the environment temperature is between 0~40℃;Reduce or turn off the loads for a while to lower the temperature
Back-end circuit over temperature	04	
Front and backend over temperature	05	
Output overload	08	Make the loads power is smaller than rated power (Inductive or capacitive loads are several times than the rated power when starting, please replace higher power inverter)
Output short circuit	09	Disconnect the loads and check if it is short circuit

7. MAINTENANCE

You should clean the exterior of the unit periodically with a damp cloth to prevent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

8. WARRANTY

We warrant this product against defects in materials and workmanship for a period of 24 months from the date of purchase and will repair or replace any defective power inverter when directly returned, postage paid, to us. This warranty will be considered void if the unit has suffered any obvious physical damage or alteration either internally or externally and does not cover damage arising from improper use such as plugging. The unit into an unsuitable power sources attempts to operate products with excessive power consumption requirements, or use in unsuitable environments. This is the only warranty that the company makes. No other warranties express or imply including warranties of merchantability and fitness for a particular purpose.

Repair and replacement are your sole remedies and the company shall not be liable for damages, whether direct, incidental, and special or consequential, even though caused by negligence or other fault.

Tips: The picture and function description just forreference,and we reserve the right to change it and have no notice.

CE 🗑

Appendix :

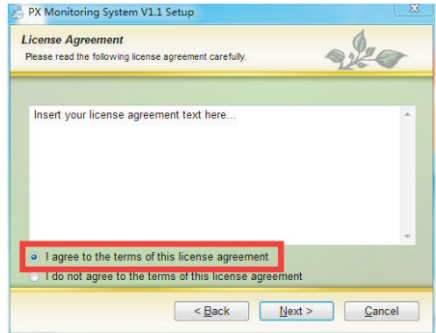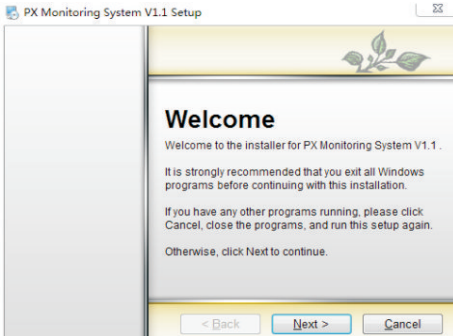## PX series monitoring platform instructions

1 Software installation :

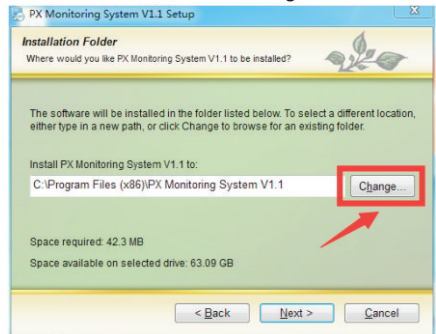Download files from Carspa official website on location www.carspa.cc :

PX Monitoring System V1.1.exe ,

As below : PX Monitoring System V1.1

▼ Double click "°" to install,enter the interface as follows:

▼ Click "Next" to enter following picture,

▼ Double click "°" to install,enter the interface as follows:

▼ Fill in the user name and company name , click "Next" to enter following,
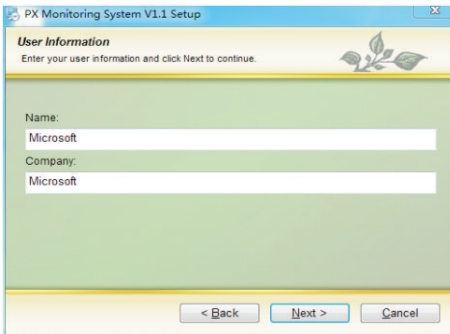
▶ Click "Change..." to confirm the installation path which is recommended to default. Then the following interface will appear. Click "Next" until installation is completed. Click "Finish" to complete the installation.
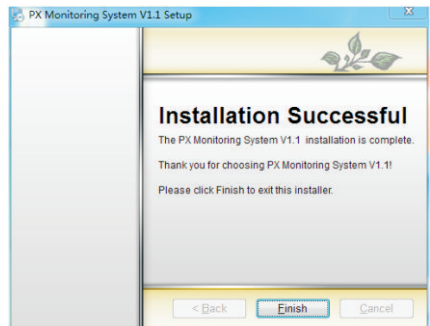
▶ **2 RS485 Isolated converter driver installation (This step can be ignored if it has already installed)** :

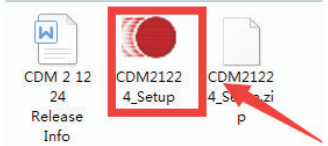If it is a converter with our company, please go to our website to download , Or, find the following figure from RS485 isolation converte : CDM21224_Setup.exe file , double click to install。

▶ **3 Login monitoring platform** :

After confirming that product is connected to the RS485 isolation converter and PC, click: Start - All Programs - PX Monitoring System V1.1, the interface is as follows:
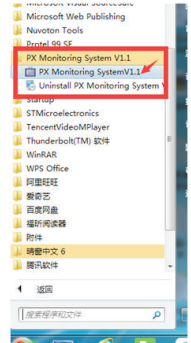
◀ After startup, login monitoring interface is as follows:
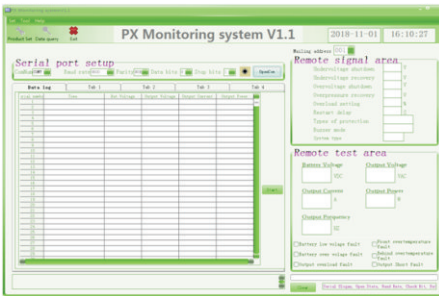
◀ Select the serial port number "ComNum" corresponding to the RS485 converter, click to open the serial port button "OpenCom", exit the system, click "Exit" or the upper right corner "X", the operation monitoring data interface is as shown below:
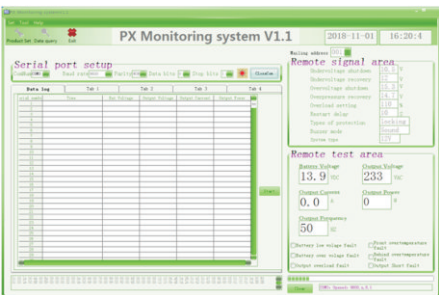
Communication protocol

1-1 Overview

This product uses Modbus-RTU communication protocol, RS485 interface , Modbus protocol defines check code, data sequence, etc. , these are all necessary for specific data exchange。 Modbus protocol uses master-slave acknowledgment connection (half duplex) on one communication line , this means that the signal is transmitted in the opposite direction on a separate communication line。 First, the signal of the host computer is addressed to a unique terminal device (slave) , then, the response signal sent by the terminal device is transmitted to the host in the opposite direction。

Modbus protocol only allows communication between host (PC, etc.) and terminal device, and does not allow data exchange between independent terminal devices , so that each terminal device does not occupy the communication line when they initialize, but only responds to the inquiry signal reaching the local machine

1-1-1. Transfer method

Information transmission is asynchronous, and the communication information transmitted between the master and the slave is in bytes , including 1 start bit, 8 data bits (the smallest valid bit is sent first), no parity, 1 stop bit。

1-1-2.Information frame format

Address code	Function code	Data area	CRC check code
1 byte	1 byte	n bytes	2 bytes

Address code：The address code is composed of one byte (8-bit binary code) at the beginning of the frame, and the decimal is 1 to 255。These bits indicate the address of the user-specified terminal device that will receive the host data from it。The address of each terminal device must be unique, and only the addressed terminal will respond to the query containing the address。When the terminal sends back a response, the slave address data in the response tells the host which terminal is communicating with it。

Function code：The function code tells the terminal which terminal is performing what function。The following table lists the function codes used in this series of instruments, as well as their meaning and function。

Data area：The data area contains the data required by the terminal to perform a specific function or the data collected by the terminal in response to the query。The content of these data may be numeric, reference address or set value。For example, the function code tells the terminal to read a register, and the data area needs to indicate which register to start and how many data to read. The embedded address and data vary according to the type and the different contents between the slaves。

CRC check code：The error check field (CRC) occupies two bytes and contains a 16-bit binary value。The CRC value is calculated by the transmitting device and then appended to the data frame. The receiving device recalculates the CRC value when receiving the data, and then compares it with the value in the received CRC field. If the two values are not equal, it occurs error。

1-2. Read registers data enumeration

This feature allows the user to obtain data and system parameters collected and recorded by the device。The host can read one or more register values and can read up to 12 register values at a time (cannot exceed the defined address range)。

Slave address	1-255
Function code	0x03
Start register address high	0x00
Start register address low	0-23
Register length high	0x00
Register length low	1-12
CRC Check low	
CRC Check high	

The following example is the basic data collected from machine-readable 3 from the 01 (the data frame takes up 2 bytes per address) output voltage, output current, output frequency, where the output voltage address is 0001H, the output current The address is 0002H, and the address of the output frequency is 0003H。

Host sending:

Slave address	0X01
Function code	0x03
Start register address high	0x00
Start register address low	0x01
Register length high	0x00
Register length low	0x03
CRC Check low	0x54
CRC Check high	0x0B

Slave response：

Slave address	0X01
Function code	0x03
Register length	0x06
Register high	0x00
Register low	0xE3
Register high	0x00
Register low	0xE6
Register high	0x00
Register low	0x32
CRC High length	0x84
CRC Low length	0x81

Indicate：

Output voltage(V)： Convert 0x00+0xE3 to decimal equal to 227

Output current(A)： Convert 0x00+0xE6 to decimal equal to 230/100=2.3

Output frequency(Hz)： Convert 0x00+0x32 to decimal equal to 50

1-3. Address parameter list

Register address	Data content	Data description	Type
0000	Battery voltage	(Register high + register low)/10	Word
0001	Output voltage	Register high + register low	Word
0002	Output current	(Register high + register low)/100	Word
0003	Output frequency	Register high + register low	Word
0004	Restart delay value	Register high + register low	Word
0005	Low voltage protection value	Register high + register low	Word
0006	Low voltage recovery value	Register high + register low	Word
0007	Over voltage protection value	Register high + register low	Word
0008	Over voltage recovery value	Register high + register low	Word
0009	Overload ratio value	Register high + register low	Word
0010	Mode setting value	See the mode setting table for details.	Word
0011	Fault information	See the fault information table for details	Word

1-3-1.Mode setting value register correspondence table

Bit	15	14	13	......	5	4	3	2	1	0
Name	Reserved						MODE1	MODE0	Reserved	

Bit	Detail
0-1	Reserved
2	MODE0: Overload short circuit mode 0：Automatic restart 1：Lock no output, need to restart
3	MODE1: Alarm sound mode 0：Early warning/fault sound 1：Silent
4-15	Reserved

1-3-2 Fault information register correspondence table

Bit	15	14	13	......	9	8	7	6	5	4	3	2	1	0
Name	Reserved						FAULT2	Reserved		FAULT1		FAULT0		

Bit	Detail
0-1	FAULT0: Battery over voltage error 00：Normal　01：Low voltage　10：Over voltage
2-3	FAULT1: Over temperature error　　00：Normal 01：Front-end circuit over temperature　10：Back-end circuit over temperature 11：Both front and backend over temperature
4-5	Reserved
6-7	FAULT3: Output error 00：Normal　01：Over load　10：Shirt circuit
8-15	Reserved

1.4 Communication interface wiring

Please connect product communication interface A to RS485 converter communication interface A; B to RS485 converter communication interface B; be sure to pay attention to the A and B wiring when wiring, otherwise it will not be able to communicate normally. (G is the communication cable shield terminal block, can be connected or not)