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健思研科技
嵌入式电能计量行业开创者

JSY-MK-333

Three-phase embedded metering module

Installation Instructions V1.0

Shenzhen Jiansiyan Technology Co., Ltd.

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Please contact our sales representative or local agent to learn the current specifications of this product before purchasing.

Manual Revision Record

date	Old version	New version	author	Modifications
2024.02.21		V1.0	HCC	1. New

Table of contents

1Introduction

JSY-MK-333 three-phase embedded metering module is a module that uses microelectronics technology and dedicated large-scale integrated circuits to convert analog signals into Digital output is a three-phase power quality inspection module independently developed and produced by our company with complete independent intellectual property rights. It complies with the relevant technical requirements of the 1S-level three-phase active energy meter in the IEC 62053-21 national standard, and can directly and accurately measure the rated frequency of 50Hz Or 60Hz three-phase AC power grid voltage, current, power, power factor, phase angle, power, harmonics and other electrical parameters. 1 RS485 communication interface, 1 TTL communication interface. You can freely choose the communication interface according to actual needs. The module adopts standard MODBUS-RTU The communication protocol facilitates communication with various monitoring systems. It has the characteristics of high reliability, small size, light weight and easy installation.

JSY-MK-333 three-phase embedded metering module can be widely used in energy-saving transformation, power, communication, railway, transportation, environmental protection, petrochemical, steel In industries such as iron and steel, it is used to monitor the current and power consumption of AC equipment.

2 Features List

surface1Function Description List

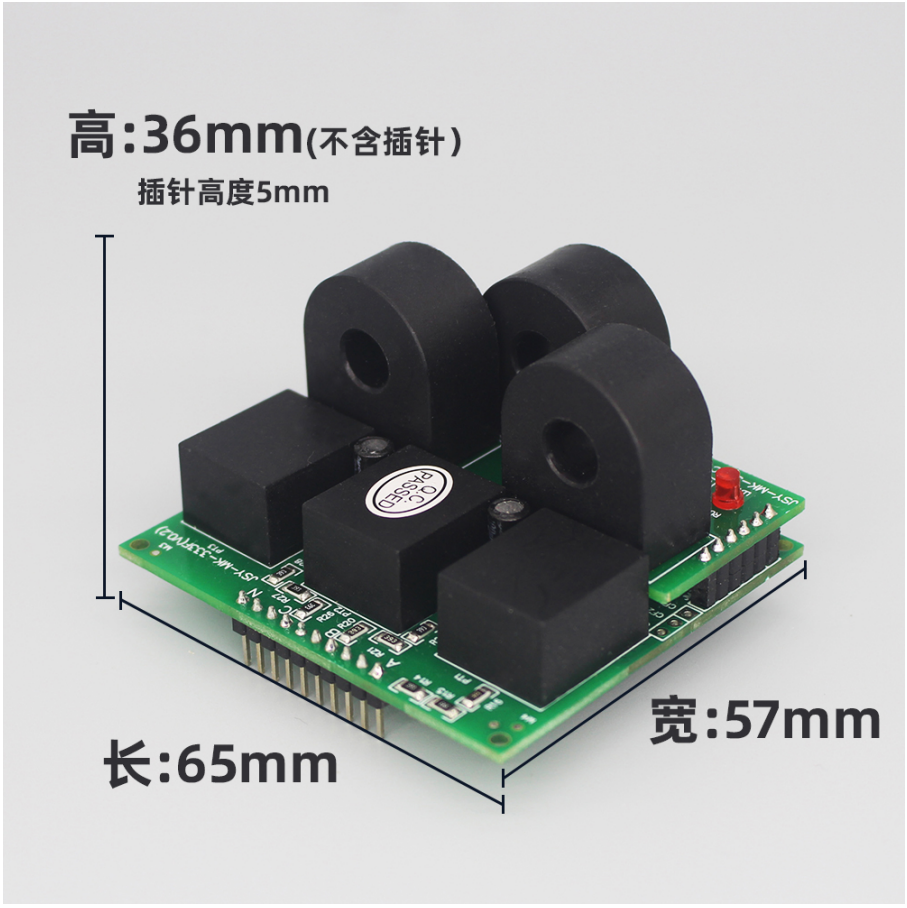
Function	Functional Description	Remark
Energy Metering	Active energy measurement (total, forward, reverse of A/B/C/combined phases)	
	Reactive energy measurement (total, forward, reverse of A/B/C/combined phases)	
	Apparent energy measurement (A/B/C/combined phase)	
Electrical parameter measurement	U (line voltage, phase voltage), I	
	P, Q, S, PF, F	
	Measurement of 2nd to 21st harmonics of A/B/C three-phase voltage and current	
	Voltage and current phase difference	
Pulse output	Active and reactive pulse output	
communication	1 RS485 interface 1 TTL interface Support Modbus and DL/T645 protocols	
Indicator Lights	RUN: Running indicator light ALARM: always on when overvoltage or overcurrent occurs, flashes when data is being communicated	
Expanded functionality	Support customization	

3Technical Parameters

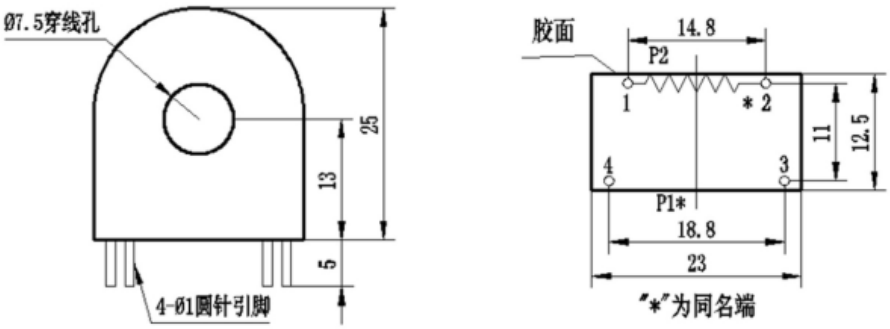
surface2Technical Parameters

project			Performance parameters	
Specification			Three-phase three-wire	Three-line and four-line
Measurement	electricity Pressure	Reference voltage	3×100V, 3×380V	3×57.7/100V, 3×220/380V
		Voltage range	3×100V~3×450V	3×57.7/100V~3×260/450V
		impedance	> 1 kΩ／V	
		Accuracy level	Error ±1.0%	
	electricity flow	Current Specifications	5A (can be used for secondary mutual inductance), 50A, 100A, 150A, 250A, 150A and above are available (GB/T17215.321-2008)	
		Accuracy level	Error ±1.0%	
	power		Active, reactive, apparent power, error ±1.0%	
	Grid frequency		45~65Hz, error ±1.0%	
	Phase Difference		Voltage, current, voltage-current phase difference: error ±1.0%	
Measurement	Active energy accuracy		Class 1s (GB/T 17215.321-2008)	
pulse	Power pulse output		1 active pulse output (CF1), 1 reactive pulse output (CF2)	
	Pulse Width		80±20ms	
	Pulse constant		5A (10000 imp/kWh), 150A (excluding 150A) and above specifications (200 imp/kWh), other specifications 800imp/kWh	
communication	interface		1 channel RS485, 1 channel TTL	
	Communication Protocol		Modbus RTU protocol, DL/T645 protocol	
	Communication address range		Modbus RTU: 1~255	
	Baud rate		Support 600~38400bps	
	Data Format		Software settings, "n,8,1", "e,8,1", "o,8,1", "n,8,2"	
powered by	Independent power supply		When powered by DC5~12V, the peak voltage shall not exceed 15V; typical power consumption: ≤20mA	
environment	Operating temperature		-20～+60℃	
	Storage temperature		- 40～+85℃	
	Relative humidity		≤95%, no condensation (at 40℃)	
	Altitude		0～3000 m	
	Usage Environment		A place without explosion, corrosive gas, conductive dust, significant shaking, vibration and impact	
parameter	Temperature drift		≤100ppm/℃	
	Installation		2.54mm pitch pin header welding	
	Module size		65×57×41mm	

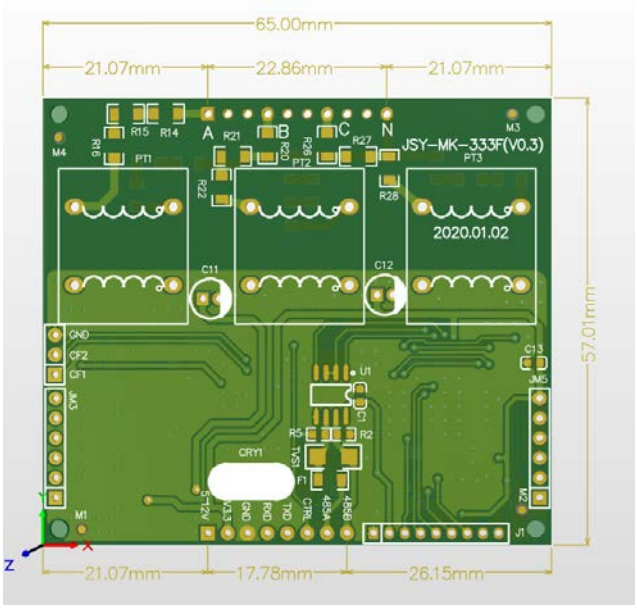
4Product Information



picture1Product appearance



picture2 50ADimensional drawing of through-type current transformer



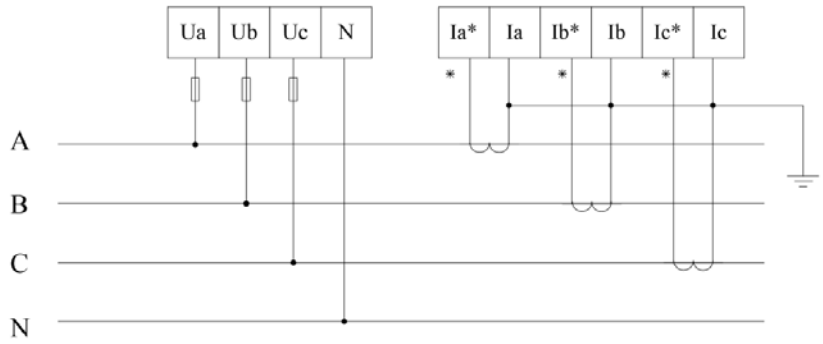
picture3Board frame dimensions and functional pins

surface3Terminal Description

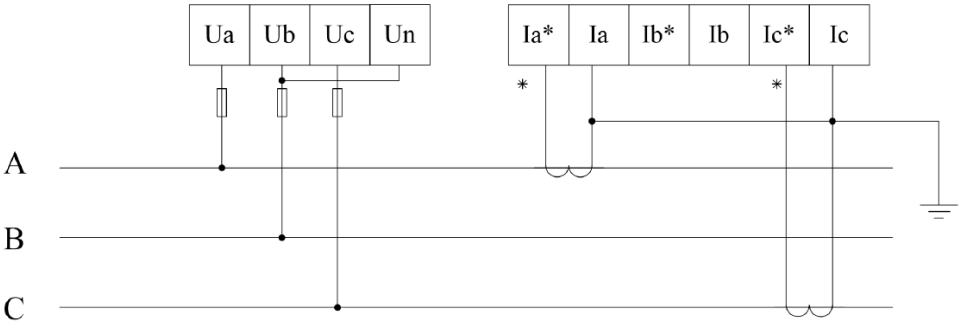
Terminals	illustrate
A	Measured A phase voltage input terminal
B	Measured B phase voltage input terminal
C	Measured C phase voltage input terminal
N	Measured neutral line input terminal
5-12V	Wide voltage power supply input positive pole (5~24VDC)
3.3V	3.3VDC power input positive pole (5-12V/3.3V can only be selected one of the two pins)
GND	Negative power input
RxD	TTL receiving pin (3.3V level)
TXD	TTL sending pin (3.3V level)
IO	Reserved function
485A	485 Communication Port A
485B	485 Communication port B

(Note: Pins not specified are empty)

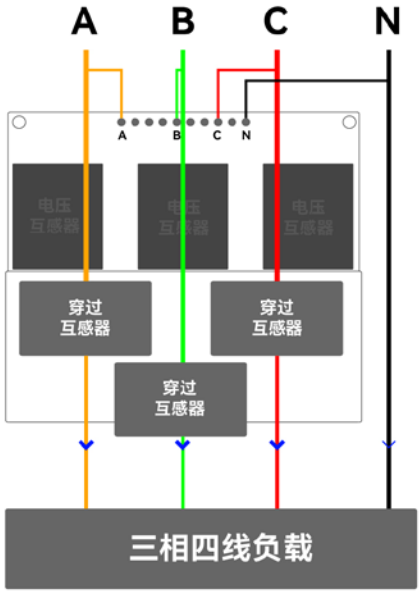
5Wiring and installation



picture4 Three-phase four-wire voltage and current connection method



picture5 Three-phase three-wire voltage and current connection method



picture6Three-phase four-wire wiring example

Note:Ia,Ib,IcIt does not need to be grounded.

6 Application Notes

Please refer to the above diagrams and connect correctly according to the product specifications and models. Make sure to disconnect all signal sources before wiring to avoid danger and damage.

After checking and confirming that the wiring is correct, turn on the power supply for testing.

After the power is turned on, the "Power" indicator light is always on, and the "Communication" indicator light flashes synchronously during communication data transmission.

When the product leaves the factory, it is set to the default configuration: address 1, baud rate 9600bps, data format "n,8,1", data update rate

1000ms, transformation ratio is 1;

The JSY-MK-333 product testing software we provide can be used to change and set product parameters and perform general product tests.

6.1 RS-485Network connection:

It is recommended to use an isolated 485 converter to communicate with the device to improve the reliability of the system;

The A+ and B- terminals of all devices on a bus are connected in parallel. The connections cannot be reversed. Up to 32 network modules can be connected to one line at the same time.

Each network module can set its communication address. The communication connection should use a shielded twisted pair cable with a wire diameter of no less than 0.5mm.. When wiring

Keep communication lines away from strong electric cables or other strong electric field environments.

The RS-485 communication line should use shielded twisted pair; the communication distance of 485 can reach 1200 meters.

If there are more or higher baud rates, the communication distance will be shortened accordingly. In this case, a 485 repeater can be used to extend the communication distance.

RS-485 networking has a variety of topological structures. Generally, linear connection is used, that is, multiple devices are connected one by one from the upper host to the farthest.

Connect to the network. At the farthest end, you can connect a 120~300Ω/0.25W terminal matching resistor (depending on the specific communication quality, that is, when the communication is very good

Installation is not necessary).

6.2 Electric energy metering function:

Can provide three-phase voltage, current, power, power factor, active and reactive energy and other parameters;

The data of electricity is a 4-byte unsigned number, which will not overflow if accumulated for 10 consecutive years and will be saved when power is off.

6.3 MODBUSMessaging apps

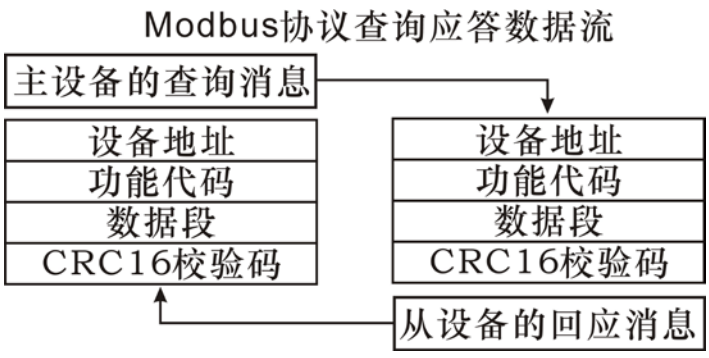
The MODBUS protocol uses a master-slave response communication connection method on a communication line. First, the signal of the host computer is addressed to a unique

Then, the response signal sent by the terminal device is transmitted to the host in the opposite direction, that is, on a single

The communication line signals are transmitted in opposite directions for all communication data streams (half-duplex working mode). MODBUS protocol only allows

The host (PC, PLC, etc.) and terminal devices communicate with each other, but do not allow data exchange between independent terminal devices.

They occupy the communication line while they are initializing and are limited to responding to query signals arriving at the local machine.



Host query: The query message frame includes the device address, function code, data information code, and check code. The address code indicates the slave device to be selected.

The function code tells the selected slave device what function to perform. For example, function code 03 or 04 requires the slave device to read the register and return

Their contents; the data segment contains any additional information that the slave device needs to perform functions, and the checksum is used to verify the correctness of a frame of information.

The device provides a method to verify whether the message content is correct, which adopts the calibration rule of CRC16.

Slave response: If the slave device generates a normal response, the response message contains the slave address code, function code, data information code and CRC16

The data information code includes the data collected from the device: such as register values or status. If an error occurs, we agree that the slave

No response.

We specify the communication data format used in this module: the bits of each byte (1 start bit, 8 data bits, odd or even parity)

or no parity, 1 or 2 stop bits).

The structure of the data frame, that is, the message format:

Device Address	Function Code	Data segment	CRC16 checksum
1 byte	1 byte	N bytes	2 bytes (low byte first)

Device address: It consists of one byte. The address of each terminal device must be unique. Only the addressed terminal will respond to the corresponding

Query.

Function code: tells the addressed terminal what function to perform. The following table lists the function codes supported by this series of modules and their

function.

Function Code	Function
03H	Read the value of one or more registers
10H	Write the value of one or more registers

Data segment: Contains the data required by the terminal to perform specific functions or the data collected when the terminal responds to queries.

It may be a numerical value, a reference address, or a setting value.

Checksum: CRC16 occupies two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmission device and then appended

When the receiving device receives the data frame, it recalculates the CRC value and compares it with the value in the received CRC field.

If the values are not equal, an error occurs.

The process of generating a CRC16 is:

(1) Preset a 16-bit register to 0FFFFH (all 1s), called the CRC register.

(2) Perform an XOR operation on the 8 bits of the first byte in the data frame and the low byte in the CRC register, and store the result back in the CRC register.

(3) Shift the CRC register one bit to the right, fill the highest bit with 0, and shift the lowest bit out and check.

(4) If the lowest bit is 0: repeat step 3 (next shift); if the lowest bit is 1: compare the CRC register with a preset fixed bit.

The fixed value (0A001H) is XORed.

(5) Repeat steps 3 and 4 until 8 shifts are made. This completes the processing of a full eight bits.

(6) Repeat steps 2 to 5 to process the next eight bits until all bytes have been processed.

(7) The final value of the CRC register is the value of CRC16.

Code example:

```
uint16_t GetModBusCRC16(uint8_t *aucData, u16 iBytesCount)
{
    uint8_t wHi = 0;
    uint8_t wLo = 0;
    uint16_t wCRC = 0xFFFF;
    u16 i, j;
    uint8_t wCheck = 0;
    for (i = 0; i < iBytesCount; i++)
    {
        Wdt_Feed();
        wCRC = aucData[i];
        for (j = 0; j < 8; j++)
        {
            wCheck = wCRC & 1;
            wCRC = wCRC >> 1;
            wCRC = wCRC & 0x7fff;
            if (wCheck == 1)
                wCRC = wCRC    0xa001;
            wCRC = wCRC & 0xffff;
        }
    }
    wHi = wCRC / 256;
    wLo = wCRC % 256;
    wCRC = (wHi << 8) | wLo;
    return wCRC;
}
```

6.4 MODBUS-RTUCommunication protocol example:

6.4.1 Function code0x03：Read multiple registers

Example: The host wants to read the data of 3 slave registers with address 01 and starting address 0100H.

Host sends: 01	03	01 00	00 03	04 37	
address	Function code	Starting address	Data length	CRC code	
Slave response: 01	03	06	56 11	56 22	56 33	1F 77
address	Function code	Returns the number of bytes	Register data 1	Register 2	Register 3	CRC code

6.4.2 Function code0x10：Write multiple registers

Example: The host wants to save 0104H, 01F4H to the slave register with address 0020H, 0021H (the slave address code is 0x01)

Host sends: 01	10	00 20	00 02	04	01 04	01 F4	B1 9D
address	Function code	Start address write register quantity		Byte Count	Save data 1	2	CRC code
Slave response: 01	10	00 20	00 02	40 02			
Address Function Code Starting Address Number of Registers to Write CRC Code							

6.4.3 illustrate

The register in the MODBUS-RTU communication protocol refers to 16 bits (ie 2 bytes), with the high bit first.

When setting parameters, be careful not to write illegal data (i.e. data values that exceed the data range limit);

The error code format returned by the slave is as follows:

Address code: 1 byte

Function code: 1 byte (the highest bit is 1)

Error code: 1 byte

CRC: 2 bytes

The response returns the following error code:

81: Illegal function code, that is, the received function code is not supported by the module.

82: Read or write an illegal data address, that is, the data location exceeds the module's readable or writable address range.

83: Illegal data value, that is, the data value received by the module from the host exceeds the data range of the corresponding address.

6.4.4 Communication message example

Read data register (function code 03H): Read the 3 register values of the three-phase voltage. The result is: A phase voltage 220.33V, B phase voltage 220.5V, Phase C voltage is 220.67V and the module address is 1.

The host reads the data frame:

address	Order	Starting address (high first)	Register number (high digit first)	Check code (low digit first)
01H	03H	01H,00H	00H,03H	04H,37H

The module responds with a data frame:

address	Order	Data length	Data segment (6 bytes)	Check code
01H	03H	06H	56H,11H,56H,22H,56H,33H	1FH,77H

Write data register (function code 10H): Set the voltage upper limit to 260V, the current upper limit to 50A, and the module address to 1.

The host writes data frame:

address	Order	Starting address	Number of registers	Number of bytes	Data segment	Check code
01H	10H	00H,20H	00H,02H	04H	01H,04H,01H,F4H	B1H,9DH

The module responds with a data frame:

address	Order	Starting address	Number of registers	Check code
01H	10H	00H,20H	00H,02H	40H,02H

Clear all electric energy data (function code 10H, write 2 registers starting from 000CH, the data written is 4 bytes of 00H):

address	Order	Starting address	Number of registers	Number of bytes	Data segment	Check code
01H	10H	00H,0CH	00H,02H	04H	00H,00H,00H,F0H	F3H,FAH

The module responds with a data frame:

address	Order	Starting address	Number of registers	Check code
01H	10H	00H,0CH	00H,02H	81H,CBH

6.5ModbusRegister List

surface4Measurement electrical parameter registers and communication data table (function code03H, read-only)

Serial number	definition	Register Address	Read/Write	Data Type and Calculation Instructions
1	Phase A voltage	0100H	read	Unsigned number, value = DATA/100, unit V
2	Phase B voltage	0101H	read	Unsigned number, value = DATA/100, unit V
3	Phase C voltage	0102H	read	Unsigned number, value = DATA/100, unit V
4	Phase A current	0103H	read	Unsigned number, value = DATA/100, unit A 5A version: unsigned number, value = DATA/1000, unit A
5	Phase B current	0104H	read	Unsigned number, value = DATA/100, unit A 5A version: unsigned number, value = DATA/1000, unit A
6	Phase C current	0105H	read	Unsigned number, value = DATA/100, unit A 5A version: unsigned number, value = DATA/1000, unit A
7	Phase A active power	0106H	read	Unsigned number, value = DATA, unit is W 150A and above version: unsigned number, value = DATA, unit 10W
8	Phase B active power	0107H	read	Unsigned number, value = DATA, unit is W 150A and above version: unsigned number, value = DATA, unit 10W
9	Phase C active power	0108H	read	Unsigned number, value = DATA, unit is W 150A and above version: unsigned number, value = DATA, unit 10W
10	Three-phase total active power	0109H 010AH	read	Unsigned number, value = DATA, unit is W (Register 0109H corresponds to the upper 16 bits)
11	Phase A reactive power	010BH	read	Unsigned number, value = DATA, unit is var Versions above 150A: Unsigned number, value = DATA, unit 10var
12	B phase reactive power	010CH	read	Unsigned number, value = DATA, unit is var Versions above 150A: Unsigned number, value = DATA, unit 10var
13	C phase reactive power	010DH	read	Unsigned number, value = DATA, unit is var Versions above 150A: Unsigned number, value = DATA, unit 10var
14	Three-phase total reactive power	010EH 010FH	read	Unsigned number, value = DATA, unit is var
15	Phase A apparent power	0110H	read	Unsigned number, value = DATA, unit is VA Version above 150A: Unsigned number, value = DATA, unit 10VA
16	B phase apparent power	0111H	read	Unsigned number, value = DATA, unit is VA

				Version above 150A: Unsigned number, value = DATA, unit 10VA
17	Phase C apparent power	0112H	read	Unsigned number, value = DATA, unit is VA Version above 150A: Unsigned number, value = DATA, unit 10VA
18	Three-phase total apparent power	0113H 0114H	read	Unsigned number, value = DATA, unit is VA (0114H register corresponds to the upper 16 bits)
19	Voltage frequency	0115H	read	Unsigned number, value = DATA/100, unit is Hz
20	Phase A power factor	0116H	read	Unsigned number, value = DATA/1000
twenty one	Phase B power factor	0117H	read	Unsigned number, value = DATA/1000
twenty two	Phase C power factor	0118H	read	Unsigned number, value = DATA/1000
twenty three	Three-phase total power factor	0119H	read	Unsigned number, value = DATA/1000
twenty four	Phase A active energy	011AH 011BH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
25	Phase B active energy	011CH 011DH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
26	Phase C active energy	011EH 011FH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
28	Three-phase total active energy	0120H 0121H	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
29	A phase reactive energy	0122H 0123H	read	Unsigned number, value = DATA/100, unit is kvarh 5A version: unsigned number, value = DATA/1000, unit kvarh
30	B phase reactive energy	0124H 0125H	read	Unsigned number, value = DATA/100, unit is kvarh 5A version: unsigned number, value = DATA/1000, unit kvarh
31	C phase reactive energy	0126H 0127H	read	Unsigned number, value = DATA/100, unit is kvarh 5A version: unsigned number, value = DATA/1000, unit kvarh
32	Three-phase total reactive energy	0128H 0129H	read	Unsigned number, value = DATA/100, unit is kvarh 5A version: unsigned number, value = DATA/1000, unit kvarh
33	A phase apparent energy	012AH 012BH	read	Unsigned number, value = DATA/100, unit is kVAh 5A version: unsigned number, value = DATA/1000, unit kVAh
34	B phase apparent energy	012CH 012DH	read	Unsigned number, value = DATA/100, unit is kVAh 5A version: unsigned number, value = DATA/1000, unit kVAh
35	C phase apparent energy	012EH 012FH	read	Unsigned number, value = DATA/100, unit is kVAh 5A version: unsigned number, value = DATA/1000, unit kVAh
36	Three-phase apparent total energy	0130H 0131H	read	Unsigned number, value = DATA/100, unit is kVAh 5A version: unsigned number, value = DATA/1000, unit kVAh
37	Current power direction	0132H	read	The high byte is not used, and the low byte bit7~bit0 are the total reactive ,

				Phase C has no reactive power, phase B has no reactive power, phase A has no reactive power, total active power, phase C has Active, B phase active, A phase active status corresponding bit (0 is positive direction, 1 for reverse direction), see status word 1
38	Current alarm status	0133H	read	When the high byte bit0 is 1, it means reverse phase sequence, and 0 means normal; The low byte bit6~bit4 indicates that the current of phase C~A exceeds the limit. Bit2~bit0 indicates that the voltage of phase C~A exceeds the limit, see status word 2
39	A phase forward active energy	0134H 0135H	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
40	B phase forward active energy	0136H 0137H	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
41	C phase forward active energy	0138H 0139H	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
42	Three-phase forward total active power able	013AH 013BH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
43	A phase reverse active energy	013CH 013DH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
44	B phase reverse active energy	013EH 013FH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
45	C phase reverse active energy	0140H 0141H	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
46	Three-phase reverse total active power able	0142H 0143H	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kWh
47	A phase forward reactive energy	0144H 0145H	read	Unsigned number, value = DATA/100, unit is kvah 5A version: unsigned number, value = DATA/1000, unit kvah
48	B phase forward reactive energy	0146H 0147H	read	Unsigned number, value = DATA/100, unit is kvah 5A version: unsigned number, value = DATA/1000, unit kvah
49	C phase forward reactive energy	0148H 0149H	read	Unsigned number, value = DATA/100, unit is kvah 5A version: unsigned number, value = DATA/1000, unit kvah
50	Three-phase forward total reactive power able	014AH 014BH	read	Unsigned number, value = DATA/100, unit is kvah 5A version: unsigned number, value = DATA/1000, unit kvah
51	A phase reverse reactive energy	014CH 014DH	read	Unsigned number, value = DATA/100, unit is kvah 5A version: unsigned number, value = DATA/1000, unit kvah
52	B phase reverse reactive energy	014EH 014FH	read	Unsigned number, value = DATA/100, unit is kWh 5A version: unsigned number, value = DATA/1000, unit kvah
53	C phase reverse reactive energy	0150H	read	Unsigned number, value = DATA/100, unit is kvah

		0151H		5A version: unsigned number, value = DATA/1000, unit kvah
54	Three-phase total reactive power	0152H	read	Unsigned number, value = DATA/100, unit is kvah
	able	0153H		5A version: unsigned number, value = DATA/1000, unit kvah
55	Uab line voltage	0154H	read	Unsigned number, value = DATA/100, unit V
56	Ubc line voltage	0155H	read	Unsigned number, value = DATA/100, unit V
57	Uca Line voltage	0156H	read	Unsigned number, value = DATA/100, unit V
58	Y_Uab Voltage phase angle difference	0157H	read	Unsigned number, value = DATA/100, unit °
59	Y_Ubc Voltage phase angle difference	0158H	read	Unsigned number, value = DATA/100, unit °
60	Y_Uca Voltage phase angle difference	0159H	read	Unsigned number, value = DATA/100, unit °
61	Y_Iab Current phase angle difference	015AH	read	Unsigned number, value = DATA/100, unit °
62	Y_Ibc Current phase angle difference	015BH	read	Unsigned number, value = DATA/100, unit °
63	Y_Ica Current phase angle difference	015CH	read	Unsigned number, value = DATA/100, unit °
64	Y_UaIab Voltage and current phase Angle difference	015DH	read	Unsigned number, value = DATA/100, unit °
65	Y_UbIb Voltage and current phase Angle difference	015EH	read	Unsigned number, value = DATA/100, unit °
66	Y_UcIc Voltage and current phase Angle difference	015FH	read	Unsigned number, value = DATA/100, unit °
67	Total harmonics of phase A voltage	0160H	read	Unsigned number, value = DATA/100, unit %
68	Total harmonics of phase B voltage	0161H	read	Unsigned number, value = DATA/100, unit %
69	Total harmonics of phase C voltage	0162H	read	Unsigned number, value = DATA/100, unit %
70	Total harmonics of phase A current	0163H	read	Unsigned number, value = DATA/100, unit %
71	Total harmonics of phase B current	0164H	read	Unsigned number, value = DATA/100, unit %
72	Total harmonics of phase C current	0165H	read	Unsigned number, value = DATA/100, unit %

1	Total harmonics of phase A voltage	0200H	read	Unsigned number, value = DATA/100, unit % (same as 0160H)
2	A phase voltage 2nd harmonic	0201H	read	Unsigned number, value = DATA/100, unit %
3	A phase voltage 3rd harmonic	0202H	read	Unsigned number, value = DATA/100, unit %
4	A phase voltage 4th harmonic	0203H	read	Unsigned number, value = DATA/100, unit %
5	A phase voltage 5th harmonic	0204H	read	Unsigned number, value = DATA/100, unit %
6	A phase voltage 6th harmonic	0205H	read	Unsigned number, value = DATA/100, unit %
7	A phase voltage 7th harmonic	0206H	read	Unsigned number, value = DATA/100, unit %
8	A phase voltage 8th harmonic	0207H	read	Unsigned number, value = DATA/100, unit %

9	A phase voltage 9th harmonic	0208H	read	Unsigned number, value = DATA/100, unit %
10	A phase voltage 10th harmonic	0209H	read	Unsigned number, value = DATA/100, unit %
11	A phase voltage 11th harmonic	020AH	read	Unsigned number, value = DATA/100, unit %
12	A phase voltage 12th harmonic	020BH	read	Unsigned number, value = DATA/100, unit %
13	A phase voltage 13th harmonic	020CH	read	Unsigned number, value = DATA/100, unit %
14	A phase voltage 14th harmonic	020DH	read	Unsigned number, value = DATA/100, unit %
15	A phase voltage 15th harmonic	020EH	read	Unsigned number, value = DATA/100, unit %
16	A phase voltage 16th harmonic	020FH	read	Unsigned number, value = DATA/100, unit %
17	A phase voltage 17th harmonic	0210H	read	Unsigned number, value = DATA/100, unit %
18	A phase voltage 18th harmonic	0211H	read	Unsigned number, value = DATA/100, unit %
19	A phase voltage 19th harmonic	0212H	read	Unsigned number, value = DATA/100, unit %
20	A phase voltage 20th harmonic	0213H	read	Unsigned number, value = DATA/100, unit %
twenty one	A phase voltage 21st harmonic	0214H	read	Unsigned number, value = DATA/100, unit %
twenty two	Total harmonics of phase B voltage	0215H	read	Unsigned number, value = DATA/100, unit % (same as 0161H)
twenty three	B phase voltage 2nd harmonic	0216H	read	Unsigned number, value = DATA/100, unit %
twenty four	B phase voltage 3rd harmonic	0217H	read	Unsigned number, value = DATA/100, unit %
25	Phase B voltage 4th harmonic	0218H	read	Unsigned number, value = DATA/100, unit %
26	B phase voltage 5th harmonic	0219H	read	Unsigned number, value = DATA/100, unit %
27	B phase voltage 6th harmonic	021AH	read	Unsigned number, value = DATA/100, unit %
28	B phase voltage 7th harmonic	021BH	read	Unsigned number, value = DATA/100, unit %
29	B phase voltage 8th harmonic	021CH	read	Unsigned number, value = DATA/100, unit %
30	B phase voltage 9th harmonic	021DH	read	Unsigned number, value = DATA/100, unit %
31	B phase voltage 10th harmonic	021EH	read	Unsigned number, value = DATA/100, unit %
32	B phase voltage 11th harmonic	021FH	read	Unsigned number, value = DATA/100, unit %
33	B phase voltage 12th harmonic	0220H	read	Unsigned number, value = DATA/100, unit %
34	B phase voltage 13th harmonic	0221H	read	Unsigned number, value = DATA/100, unit %
35	B phase voltage 14th harmonic	0222H	read	Unsigned number, value = DATA/100, unit %
36	B phase voltage 15th harmonic	0223H	read	Unsigned number, value = DATA/100, unit %
37	B phase voltage 16th harmonic	0224H	read	Unsigned number, value = DATA/100, unit %
38	B phase voltage 17th harmonic	0225H	read	Unsigned number, value = DATA/100, unit %
39	B phase voltage 18th harmonic	0226H	read	Unsigned number, value = DATA/100, unit %
40	B phase voltage 19th harmonic	0227H	read	Unsigned number, value = DATA/100, unit %
41	B phase voltage 20th harmonic	0228H	read	Unsigned number, value = DATA/100, unit %
42	B phase voltage 21st harmonic	0229H	read	Unsigned number, value = DATA/100, unit %

43	Total harmonics of phase C voltage	022AH	read	Unsigned number, value = DATA/100, unit % (same as 0162H)
44	C phase voltage 2nd harmonic	022BH	read	Unsigned number, value = DATA/100, unit %
45	C phase voltage 3rd harmonic	022CH	read	Unsigned number, value = DATA/100, unit %
46	C phase voltage 4th harmonic	022DH	read	Unsigned number, value = DATA/100, unit %
47	C phase voltage 5th harmonic	022EH	read	Unsigned number, value = DATA/100, unit %
48	C phase voltage 6th harmonic	022FH	read	Unsigned number, value = DATA/100, unit %
49	C phase voltage 7th harmonic	0230H	read	Unsigned number, value = DATA/100, unit %
50	C phase voltage 8th harmonic	0231H	read	Unsigned number, value = DATA/100, unit %
51	C phase voltage 9th harmonic	0232H	read	Unsigned number, value = DATA/100, unit %
52	C phase voltage 10th harmonic	0233H	read	Unsigned number, value = DATA/100, unit %
53	C phase voltage 11th harmonic	0234H	read	Unsigned number, value = DATA/100, unit %
54	C phase voltage 12th harmonic	0235H	read	Unsigned number, value = DATA/100, unit %
55	C phase voltage 13th harmonic	0236H	read	Unsigned number, value = DATA/100, unit %
56	C phase voltage 14th harmonic	0237H	read	Unsigned number, value = DATA/100, unit %
57	C phase voltage 15th harmonic	0238H	read	Unsigned number, value = DATA/100, unit %
58	C phase voltage 16th harmonic	0239H	read	Unsigned number, value = DATA/100, unit %
59	C phase voltage 17th harmonic	023AH	read	Unsigned number, value = DATA/100, unit %
60	C phase voltage 18th harmonic	023BH	read	Unsigned number, value = DATA/100, unit %
61	C phase voltage 19th harmonic	023CH	read	Unsigned number, value = DATA/100, unit %
62	C phase voltage 20th harmonic	023DH	read	Unsigned number, value = DATA/100, unit %
63	C phase voltage 21st harmonic	023EH	read	Unsigned number, value = DATA/100, unit %
64	Total harmonics of phase A current	023FH	read	Unsigned number, value = DATA/100, unit % (same as 0163H)
65	A phase current 2nd harmonic	0240H	read	Unsigned number, value = DATA/100, unit %
66	A phase current 3rd harmonic	0241H	read	Unsigned number, value = DATA/100, unit %
67	A phase current 4th harmonic	0242H	read	Unsigned number, value = DATA/100, unit %
68	A phase current 5th harmonic	0243H	read	Unsigned number, value = DATA/100, unit %
69	A phase current 6th harmonic	0244H	read	Unsigned number, value = DATA/100, unit %
70	A phase current 7th harmonic	0245H	read	Unsigned number, value = DATA/100, unit %
71	A phase current 8th harmonic	0246H	read	Unsigned number, value = DATA/100, unit %
72	A phase current 9th harmonic	0247H	read	Unsigned number, value = DATA/100, unit %
73	A phase current 10th harmonic	0248H	read	Unsigned number, value = DATA/100, unit %
74	A phase current 11th harmonic	0249H	read	Unsigned number, value = DATA/100, unit %
75	A phase current 12th harmonic	024AH	read	Unsigned number, value = DATA/100, unit %
76	A phase current 13th harmonic	024BH	read	Unsigned number, value = DATA/100, unit %

77	A phase current 14th harmonic	024CH	read	Unsigned number, value = DATA/100, unit %
78	A phase current 15th harmonic	024DH	read	Unsigned number, value = DATA/100, unit %
79	A phase current 16th harmonic	024EH	read	Unsigned number, value = DATA/100, unit %
80	A phase current 17th harmonic	024FH	read	Unsigned number, value = DATA/100, unit %
81	A phase current 18th harmonic	0250H	read	Unsigned number, value = DATA/100, unit %
82	A phase current 19th harmonic	0251H	read	Unsigned number, value = DATA/100, unit %
83	A phase current 20th harmonic	0252H	read	Unsigned number, value = DATA/100, unit %
84	A phase current 21st harmonic	0253H	read	Unsigned number, value = DATA/100, unit %
85	Total harmonics of phase B current	0254H	read	Unsigned number, value = DATA/100, unit % (same as 0164H)
86	B phase current 2nd harmonic	0255H	read	Unsigned number, value = DATA/100, unit %
87	B phase current 3rd harmonic	0256H	read	Unsigned number, value = DATA/100, unit %
88	4th harmonic of phase B current	0257H	read	Unsigned number, value = DATA/100, unit %
89	B phase current 5th harmonic	0258H	read	Unsigned number, value = DATA/100, unit %
90	B phase current 6th harmonic	0259H	read	Unsigned number, value = DATA/100, unit %
91	B phase current 7th harmonic	025AH	read	Unsigned number, value = DATA/100, unit %
92	B phase current 8th harmonic	025BH	read	Unsigned number, value = DATA/100, unit %
93	9th harmonic of phase B current	025CH	read	Unsigned number, value = DATA/100, unit %
94	B phase current 10th harmonic	025DH	read	Unsigned number, value = DATA/100, unit %
95	B phase current 11th harmonic	025EH	read	Unsigned number, value = DATA/100, unit %
96	B phase current 12th harmonic	025FH	read	Unsigned number, value = DATA/100, unit %
97	B phase current 13th harmonic	0260H	read	Unsigned number, value = DATA/100, unit %
98	B phase current 14th harmonic	0261H	read	Unsigned number, value = DATA/100, unit %
99	B phase current 15th harmonic	0262H	read	Unsigned number, value = DATA/100, unit %
100	B phase current 16th harmonic	0263H	read	Unsigned number, value = DATA/100, unit %
101	B phase current 17th harmonic	0264H	read	Unsigned number, value = DATA/100, unit %
102	B phase current 18th harmonic	0265H	read	Unsigned number, value = DATA/100, unit %
103	B phase current 19th harmonic	0266H	read	Unsigned number, value = DATA/100, unit %
104	B phase current 20th harmonic	0267H	read	Unsigned number, value = DATA/100, unit %
105	B phase current 21st harmonic	0268H	read	Unsigned number, value = DATA/100, unit %
106	Total harmonics of phase C current	0269H	read	Unsigned number, value = DATA/100, unit % (same as 0165H)
107	C phase current 2nd harmonic	026AH	read	Unsigned number, value = DATA/100, unit %
108	C phase current 3rd harmonic	026BH	read	Unsigned number, value = DATA/100, unit %
109	C phase current 4th harmonic	026CH	read	Unsigned number, value = DATA/100, unit %
110	C phase current 5th harmonic	026DH	read	Unsigned number, value = DATA/100, unit %

111	C phase current 6th harmonic	026EH	read	Unsigned number, value = DATA/100, unit %
112	C phase current 7th harmonic	026FH	read	Unsigned number, value = DATA/100, unit %
113	C phase current 8th harmonic	0270H	read	Unsigned number, value = DATA/100, unit %
114	9th harmonic of phase C current	0271H	read	Unsigned number, value = DATA/100, unit %
115	C phase current 10th harmonic	0272H	read	Unsigned number, value = DATA/100, unit %
116	C phase current 11th harmonic	0273H	read	Unsigned number, value = DATA/100, unit %
117	C phase current 12th harmonic	0274H	read	Unsigned number, value = DATA/100, unit %
118	C phase current 13th harmonic	0275H	read	Unsigned number, value = DATA/100, unit %
119	C phase current 14th harmonic	0276H	read	Unsigned number, value = DATA/100, unit %
120	C phase current 15th harmonic	0277H	read	Unsigned number, value = DATA/100, unit %
121	C phase current 16th harmonic	0278H	read	Unsigned number, value = DATA/100, unit %
122	C phase current 17th harmonic	0279H	read	Unsigned number, value = DATA/100, unit %
123	C phase current 18th harmonic	027AH	read	Unsigned number, value = DATA/100, unit %
124	C phase current 19th harmonic	027BH	read	Unsigned number, value = DATA/100, unit %
125	C phase current 20th harmonic	027CH	read	Unsigned number, value = DATA/100, unit %
126	C phase current 21st harmonic	027DH	read	Unsigned number, value = DATA/100, unit %

The registers Ox0300~0x0322 are the values obtained by multiplying the module measurement value by the voltage-current ratio.

1	Phase A voltage	0300H	read	Floating point number, unit V
2	Phase B voltage	0302H	read	Floating point number, unit V
3	Phase C voltage	0304H	read	Floating point number, unit V
4	Phase A current	0306H	read	Floating point number, unit A
5	Phase B current	0308H	read	Floating point number, unit A
6	Phase C current	030AH	read	Floating point number, unit A
7	Phase A active power	030CH	read	Floating point number, unit is W
8	Phase B active power	030EH	read	Floating point number, unit is W
9	Phase C active power	0310H	read	Floating point number, unit is W
10	Three-phase total active power	0312H	read	Floating point number, unit is W
11	Phase A reactive power	0314H	read	Floating point number, unit is var
12	B phase reactive power	0316H	read	Floating point number, unit is var
13	C phase reactive power	0318H	read	Floating point number, unit is var
14	Three-phase total reactive power	031AH	read	Floating point number, unit is var
15	Phase A apparent power	031CH	read	Floating point number, unit is VA

16	B phase apparent power	031EH	read	Floating point number, unit is VA
17	Phase C apparent power	0320H	read	Floating point number, unit is VA
18	Three-phase total apparent power	0322H	read	Floating point number, unit is VA

surface5System parameter register address and communication data table (function code03Hread,10HWrite)

Serial number	definition	Register Address	Read/Write	Specific instructions
1	Model 1	0000H	read	The value is 333H
2	Hardware version	0001H	read	0x1001->V1.00.1
3	Software Version	0002H	read	0x1001->V1.00.1
4	Protocol Version	0003H	read	0x1001->V1.00.1
5	Address and wave Special rate	0004H	Read/Write	The default value is 0106H; the default address is 01H, the default communication format is 8, N, 1,9600bps illustrate: The high byte 8 bits are the address, 1~255; 0 is the broadcast address; The high 2 bits of the low byte are the data format bits. "00" means 10 bits, no checksum, that is, "8, N, 1"; "01" means 11 bits, even parity, i.e. "8, E, 1"; "10" means 11 bits, odd parity, i.e. "8, 0, 1"; "11" means 11 bits, no parity, 2 stop bits, that is, "8, N , 2"; The lower four bits of the low byte are the baud rate, 2-600bps, 3-1200bps , 4-2400bps, 5-4800bps, 6-9600bps, 7-19200bps , 8—38400bps (The communication baud rates of the 485 port and the TTL port are related to this register, and the two The baud rate of the

surface6Set parameter registers and communication data tables (function code03Hread,10HWrite)

Serial number	definition	Register Address	Read/Write	Specific instructions
1	Voltage upper limit	0020H	Read/Write	Default value 0x104 = 260V
2	Current limit	0021H	Read/Write	Default value 0x1F4, 0x1F4/10=50A
3	Voltage transformer ratio	0022H	Read/Write	Default value 0x0001; ratio 1
4	Current transformer ratio	0023H	Read/Write	Default value 0x0001; ratio 1
5	Current noise	00024H	Read/Write	Default value 0x000A, unit mA
6	Mode Selection	00025H	Read/Write	Default value 0x0001, 0x0001 three-phase three-wire, other values Three-phase four-wire

surface7Power Direction Register (Status Word1）

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Total reactive power: 1—Reverse 0—Positive	CPhase reactive power: 1—Reverse 0—Positive	BPhase reactive power: 1—Reverse 0—Positive	APhase reactive power: 1—Reverse 0—Positive	Total merit: 1—Reverse 0—Positive	CThe phase has merit: 1—Reverse 0—Positive	BXiang Yougong: 1—Reverse 0—Positive	AThe phase has merit: 1—Reverse 0—Positive

surface8Alarm status indicator word meaning (status word2):

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Unused	Phase C current: 1—Overcurrent 0—Normal	BPhase current: 1—Overcurrent 0—normal	APhase current: 1—Overcurrent 0—normal	Unused	Phase C voltage: 1—Overvoltage 0—Normal	BPhase voltage: 1—Overpressure 0—normal	APhase voltage: 1—Overpressure 0—normal

7Precautions

1) Pay attention to the auxiliary power information on the product label. The auxiliary power level and polarity of the product must not be connected incorrectly, otherwise it may be damaged.

product.

2) Please connect correctly according to the product specifications and models and refer to the diagram. Before connecting, make sure to disconnect all signal sources and power to avoid

After checking and confirming that the wiring is correct, turn on the power supply for testing.

3) The voltage circuit or the secondary circuit of the PT cannot be short-circuited.

4) When there is current on the primary side of the CT, it is strictly forbidden to open the secondary circuit of the CT; it is strictly forbidden to connect wires or unplug terminals when there is current on the primary side of the CT;

5) When the product is used in an environment with strong electromagnetic interference, please pay attention to the shielding of the input and output signal lines.

6) When installing in a centralized manner, the minimum installation interval should not be less than 10mm.

7) This series of products does not have a lightning protection circuit. When the input and output feeder lines of the module are exposed to harsh outdoor weather conditions,

When lightning strikes, take lightning protection measures.

8) Please do not damage or modify the product labels or logos, and do not disassemble or modify the product. Otherwise, our company will no longer provide the "Three

Guarantees" (exchange, refund, and repair) service for this product.

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