1.1、Introduction

The JSY-MK-227 module is a highly integrated measurement and digital communication technology, which can complete AC and DC electrical parameter measurement products for electrical energy measurement, collection and transmission. It can accurately measure electrical parameters such as DC voltage, current, power and electricity. It has a 485 communication interface, completely isolated circuit, small volume and simple interface. It can be easily embedded into various equipment that need to measure DC electricity consumption and has extremely excellent cost performance.

JSY-MK-227 single-phase electric energy metering module can be widely used in energy-saving transformation, charging pile, electric power, communication, railway, transportation, environmental protection, petrochemical, steel and other industries to monitor the current and power consumption of DC equipment.

1.2、Functional characteristics

1.2.1 Collecting AC and DC electrical parameters, including voltage, current, power and electrical energy;

1.2.2 Using special measurement chip, effective value measurement method, high measurement accuracy;

1.2.3 One RS485 interface;

1.2.4 Communication protocol using Modbus-RTU, good compatibility, easy programming;

1.2.5 Module with 5VDC power supply;

1.2.6 It can be equipped with different specifications of the shunt.

1.3、Technical parameters

1.3.1 DC input

1) Voltage range: 500V, 750V, 1000V, etc;

2) Current range: 50A, 100A, 150A and other optional;

3) Signal processing: using dedicated measurement chip, 24-bit AD sampling;

4) Overload capacity: 1.2 times the range is sustainable; Instantaneous (<20mS) current 5 times, voltage 1.2 times the range is not damaged;

5) Input impedance: Voltage channel> 1 kΩ/V.

1.3.2 Communication Interface

1) Interface type: 485 interface;

2) Communication Statute: MODBUS-RTU Statute;

3) Data format: software settings, "n,8,1", "e,8,1", "o,8,1", "n,8,2";

4) Communication rate: baud rate can be set to 1200, 2400, 4800, 9600bps; The default is 9600bps.

1.3.3 Measurement output data

For multiple electrical parameters of voltage, current, power and electric energy, see Mdobus data register list.

1.3.4 Measurement accuracy

Voltage, current and power: less than ± 1.0%; electric energy level 1.

1.3.5 Isolation

The tested power supply and the power supply are isolated from each other; the isolation withstand voltage is 4000VDC;

1.3.6 Power

1) DC single power supply 5V power supply, power consumption <80mA.

1.3.7 Working environment

1) Working temperature: -30 ~ +75 ℃; Storage temperature: -40 ~ +85 ℃;

2) The relative humidity: 5 ~ 95%, no condensation (at 40 ℃);

3）Altitude: 0~3000 m;

4）Environment: no explosion, corrosive gas and conductive dust, no significant shaking, vibration and impact of the place;
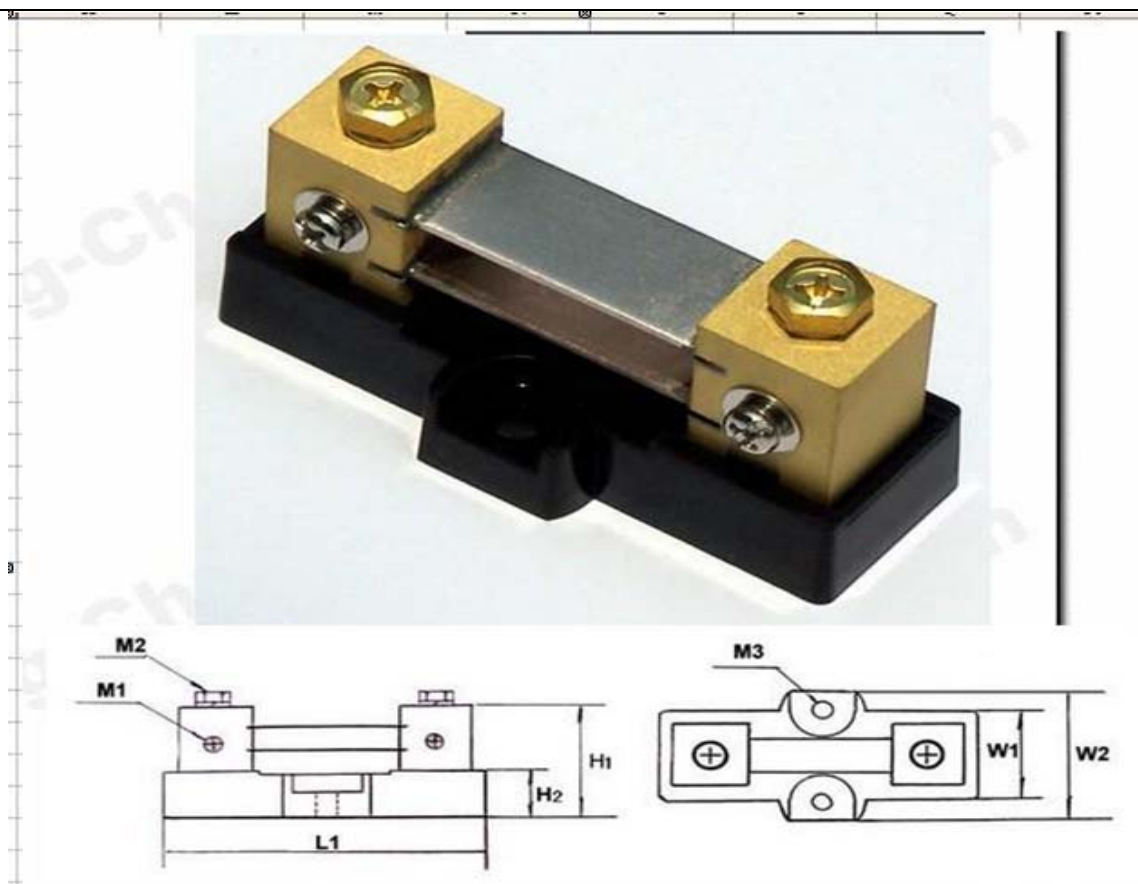
1.3.8 Installation: screw hole fixed;

1.3.9 module size: 68*40*46*mm.

2. application

2.1 Product appearance

kind 50mv/TYPE	total length L1	W	Mounting hole spacing w1	H1	H2	large aperture M3	M1	M2	weight(g)
1A-100a	66	32	22	28	11	4.5	3	5	100
150A	66	32	22	30	11	4.5	3	5	100
200A	66	32	22	33	11	4.5	3	5	100

2.2 Interface Definition
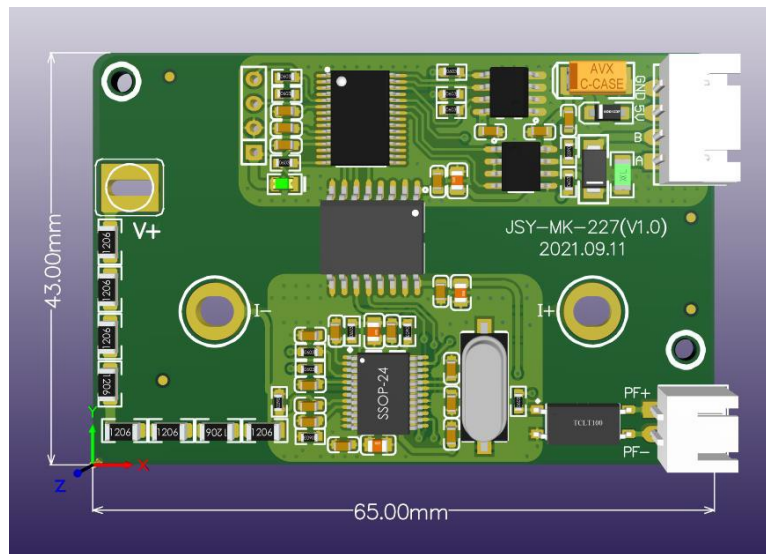
2.2.1 Pin Description　Interface Definition

Identification	Characteristics	Function Description
V+	DC positive	Positive interface of measured DC voltage (AC connected to live wire)
I +	shunt positive end	The shunt positive end input, connected to the load negative (AC connected to the zero line load end)
I-	shunt negative end	The negative end of the shunt is input and connected to the negative end of the power supply (AC is connected to the power supply end of the neutral line)
GND	Negative pole of power supply	Energy metering module 5VDC power supply negative
5V	Positive pole of power supply	Power metering module 5VDC power supply positive
A	485A port	Communication port
B	485B port	Communication port

2.3 Application Description

Please refer to the above figure for correct wiring according to the product specification and model. Make sure to disconnect all signal sources before wiring to avoid danger and damage to equipment. After checking and confirming that the wiring is correct, turn on the power supply for testing.

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

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 3 times a second, change ratio 1.

2.4 Electric energy metering function

It an provide single-phase voltage, current,power, electric energy and other parameters; The data of electric degree is 4 bytes of unsigned number, and the data is saved after power failure.

3. JSY-MK-227 Modbus Register List

3.1 measuring electrical parameter register and communication data sheet (function code 03H read, 10H write)

Serial Number	Definition	register address	Read/Write	Data Type and Calculation Description
1	Voltage	0100H 0101H	Read	Unsigned, value = DATA/10000, unit V
2	Current	0102H 0103H	Read	Unsigned , value = DATA/10000, unit A
3	Active power	0104H 0105H	Read	Unsigned, value = DATA/10000, unit is W
4	Reactive power	0106H 0107H	Read	Unsigned , value = DATA/10000, unit var
5	Apparent power	0108H 0109H	Read	Unsigned, value = DATA/10000, unit VA
6	Power factor	010AH 010BH	Read	Unsigned, value = DATA/1000
7	Frequency	010CH 010DH	Read	Unsigned, value = DATA/100 unit Hz
8	Active energy	010EH 010FH	Read/Write	Unsigned, value = DATA/1000 unit kWh
9	Reactive energy	0110H 0111H	Read/Write	Unsigned, value = DATA/1000 unit kvarh
10	Power Supply Properties	0112H 0113H	Read	Unsigned, value = 1 is AC power, value = 2 is DC power

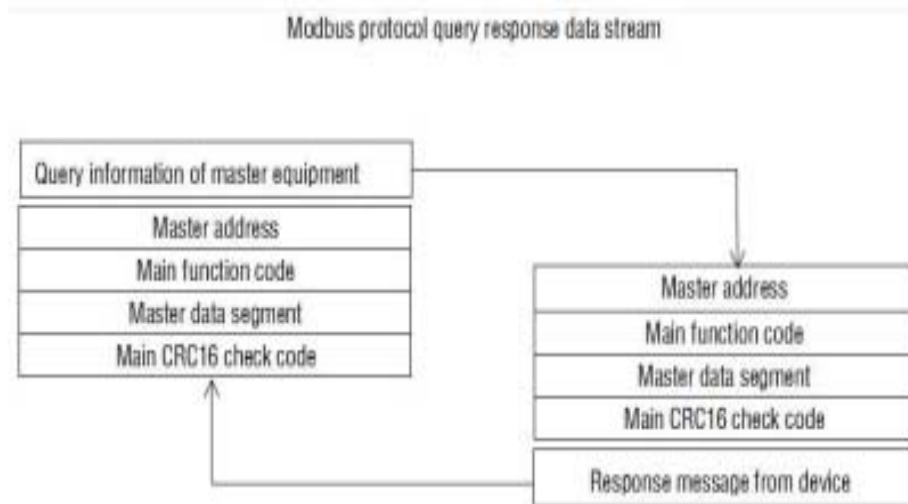| 11	Active power direction	0114H	Read	Unsigned, value = 0x0000（Positive）, value = 0x0001（Negative）
12	Reactive power direction	0115H	Read	Unsigned, value = 0x0000（Positive）, value = 0x0001（Negative）
13	Positive active energy	0116H 0117H	Read	Unsigned, value = DATA/1000 unit kWh
14	Negative active energy	0118H 0119H	Read	Unsigned, value = DATA/1000 unit kWh
15	Positive reactive energy	011AH 011BH	Read	Unsigned, value = DATA/1000 unit kvarh
16	Negative reactive energy	011CH 011DH	Read	Unsigned, value = DATA/1000 unit kvarh

3.2 system configuration read parameter register address and data communication table (function code 03H read, 10H write)

Serial Number	Definition	register address	Read/ Write	Specific Description
1	Address and Baud Rate	0004H	Read/ Write	The default value is 0106H; the default address is 01H, and the default format is 8,N, 1,9600bps Description: The 8 bits of the high byte are the address, 1~255;0 is the broadcast address; The upper 2 bits of the low byte are the data format bits, "00" means 10 bits: "8, N,1" "01" means 11 bits:"8,E,1"; "10" means 11 bits: "8,O,1"; "11" means 11 bits:"8,N,2"; The low 4 bits of the low byte are baud rate, 3-1200bps,4-2400bps,5-4800bps,6-9600bps

4. MODBUS Communication Protocol

This instrument provides serial asynchronous half duplex RS485 communication interface, using standard MODBUS-RTU protocol, all kinds of data information can be transmitted on the communication line. Up to 255 network meters can be connected on one line at the same time. Each network meter can set its communication address. Shielded twisted pair with copper mesh shall be used for communication connection, and the wire diameter shall not be less than 0.5mm^2. When wiring, the communication line should be kept away from strong electric cables or other strong electric field environment.

The MODBUS protocol uses a master-slave response communication connection on the 1 root communication line. First, the host computer's signal is addressed to a terminal device (slave) with a unique address, and then the reply signal sent by the terminal device is transmitted to the host in the opposite direction, that is, the signal on 1 single communication line transmits all communication data streams in the opposite directions (half-duplex mode of operation). The MODBUS protocol only allows communication between the host (PC,PLC, etc.) and the terminal equipment, and does not allow data exchange between independent terminal equipment, so that the terminal equipment will not occupy the communication line when they are initialized, but only respond to the inquiry signal arriving at the machine.

Modbus protocol query response data stream

Query information of master equipment

| Master address |
| Main function code |
| Master data segment |
| Main CRC16 check code |

| Master address |
| Main function code |
| Master data segment |
| Main CRC16 check code |

Response message from device

Host query: the query message frame includes a device address, a function code, a data information code, and a check code. The address code indicates the slave device to be selected; the function code indicates what function the selected slave device will perform, for example, the function code 03 or 04 requires the slave device to read registers and return their contents; the data segment contains any additional information of the function to be performed by the slave device, the check code is used to check the correctness of the 1 frame information, and the slave device provides a 1 method to verify whether the message content is correct, it uses CRC16 calibration rules.

The slave response: if the slave device generates a normal response, there are the slave address code, function code, data information code and CRC16 check code in the

response message. The data information code includes data collected from the device: like register values or status. If an error occurs, we agree that the slave will not respond.

We specify the communication data format used in this instrument: bits of each byte (1 start bit, 8 data bits, odd check or even check or no check, 1 or 2 stop bits).

The structure of the data frame, I.e. the message format:

Device Address	Function Code	Data Segment	CRC16 check code
1 byte	1 byte	N bytes	2 bytes (low byte first)

Device address: consisting of one byte, the address of each terminal device must be unique, and only the addressed terminal will respond to the corresponding query.

Function code: tells what function the addressed terminal performs. The following table lists the function codes supported by this series of instruments, as well as their functions.

Function Code	Function
03H	Read the value of one or more registers
10h	Write the value of one or more registers
01H	Read 1 relay output status
05h	Write the output status of 1 relay

Data segment: contains data required by the terminal to perform a specific function or data collected when the terminal responds to a query. The contents of these data may be numerical values, reference addresses, or setting values.

Check code: CRC16 takes two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmitting device and then attached 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, an error has occurred.

The process for generating a CRC16 is:

(1) A 16-bit register is preset to 0FFFFH (all 1 s) and is called the CRC register.

(2) The 8 bits of the first byte in the data frame are XORed with the lower byte in the CRC register, and the result is stored back in the CRC register.

(3) The CRC register is shifted to the right by 1 bit, the most significant bit is filled with 0, and the least significant bit is shifted out and detected.

(4) If the lowest bit is 0: repeat the third step (next shift); if the lowest bit is 1: XOR the CRC register with a preset fixed value (0A001H).

(5) Repeat the third and fourth steps until 8 shifts. This completes a complete eight. (6) Steps 2 to 5 are repeated to

process the next eight bits until all bytes are processed. (7) The
value of the final CRC register is the value of CRC16.

MODBUS-RTU Communication Protocol Example:

4.1. Function Code 0x 03: Read Multiway Register

Example: The host wants to read 2 slave register data with
address 01 and start address 0000H.

The host sends: 01   03   00 00   00 02   CRC
            Address   function   start   data   CRC
                       code   address   length code

slave response: 01   03   04   12 45 56 68   CRC
            Address function returns   register data   CRC
                   Code   byte number   code

4.2, function code 0x 10: write multiplex register

Example: The host should save 0000 and 0000 to the slave register with address
000C,000D (the slave address code is 0x 01)

Host Sent: 01   10   00 0C   00 02   04   00 00 00 00   F3 FA
           Address function   start write register byte   save   CRC
                    code   address number   count   data   code

slave response:

01   10   00 0C   00 02   81 CB
Address   function start address register   CRC
          code   quantity   code

4.3, description

The register in the MODBUS-RTU communication protocol refers to 16
bits (I. e., 2 bytes), and the high bits preceded. When setting
parameters, be careful not to write illegal data (that is, data values
that exceed the data range limit);
The format of the error
code 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 module does not support it.
82: Read or write illegal data address, that is, the data location exceeds the readable or
writable address range of the module.
83: Illegal data value, that is, the data value sent by the host received by the module
exceeds the data range of the corresponding address.

4.4. Example of instruction analysis:

4.4.1 Read electrical parameter instruction (for example, the module address is 0x 01):

Send data: 01 03 01 00 00 14 44 39 (read 20 registers at the beginning of 0100H)

Data Received: 01 03 28 00 3C FC C8 00 03 0D DB 04 C6 89 50 00 00 00 00 04 C6 89 50 00 00 03 E8 00 00 00 00 00 00 00 00 00 00 28 00 00 00 00 00 00 00 00 00 00 02 47 F8

The red part is the relevant electrical parameters, and the decomposed results are as follows:

Red data 00 3C FC C8 corresponds to 0100H ~ 0101H register, voltage: 0x003CFCC8=3996872, divided by 10000,399.6872V, each parameter corresponds to 2 registers, and the data is 4 bytes. Other data are obtained according to the calculation formula.

4.4.2 Total clear power instruction, clear active and reactive power at the same time, write 4 bytes of 00, or clear active or reactive power separately, refer to the 3.1 table register (take the module address as 0x 01 for example):

Send data: 01 10 00 0C 00 02 04 00 00 00 00 F3 FA

Receiving Data: 01 10 00 0C 00 02 81 CB

5. Considerations

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

2) Please refer to the correct wiring according to the product specifications and models. Make sure to disconnect all signal sources and power supplies before wiring to avoid danger and damage to equipment. 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 PT shall not be short-circuited.

4) When there is current on the primary side of CT, the secondary circuit of CT is strictly prohibited to open circuit; it is strictly prohibited to wire or unplug the terminal;

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 centralized installation, the minimum installation interval shall not be less than 10mm.

7) There is no lightning protection circuit in this series of products. When the input and output feeders of the module are exposed to outdoor harsh weather environment, lightning protection measures should be taken.

8) Do not damage or modify the product label, logo, do not disassemble or modify the product, otherwise the company will no longer provide the product "three guarantees" (replacement, return, repair) service.

Company Name: Shenzhen Jiansiyan Technologies Co., Ltd.

Address:901, Building 1, Taijiale Technology Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, China

Contact:(0755)86524536
Fax:(0755)26628850
Postal Code: 518055