

# JSY-MK-194T single-phase two-way electric energy metering module

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## 1. Product introduction

### 1.1. Introduction

JSY-MK-194T single-phase two-way electric energy metering module is a single-phase AC parameter measurement product that can complete electric energy measurement, collection and transmission with highly integrated measurement and digital communication technology, and can accurately measure two single-phase AC voltage, current, power, power factor, Frequency, power and other electrical parameters, 1 channel TTL interface, completely isolated circuit, small size, simple interface, can be easily embedded in various equipment that needs to measure power consumption, it has excellent cost performance.

JSY-MK-194T single-phase two-way electric energy metering module can be widely used in energy-saving transformation, new energy charging pile, electric power, communication, railway, transportation, environmental protection, petrochemical, steel and other industries to monitor the current and power consumption of AC equipment.

### 1.2. Functional characteristics

- 1.2.1. Collect single-phase two-way AC electrical parameters, including voltage, current, power, factor, frequency, electrical energy and other electrical parameters;
- 1.2.2. Use special measuring chip, effective value measurement method, high measurement accuracy;
- 1.2.3. With 1 TTL communication interface, compatible with 5V/3.3V interface;
- 1.2.4. The communication protocol is Modbus-RTU, with good compatibility and convenient programming;
- 1.2.5. High isolation voltage, withstand voltage up to 3000V;

## 1.3. technical parameters

### 1.3.1 Single-phase AC input

- 1) Voltage range: 1~400V (customizable);
- 2) Current range: 10mA ~ 80A (customizable);
- 3) Signal processing: using a special measuring chip, 24-bit AD sampling;
- 4) Overload capacity: 1.2 times the current range is sustainable, and 1.5 times the voltage range is not damaged;
- 5) input impedance: voltage channel > 1 k $\Omega$ /V;

### 1.3.2 Communication Interface

- 1) Interface type: 1 TTL communication interface, compatible with 5V/3.3V;
- 2) Communication protocol: MODBUS-RTU;
- 3) Data format: default to "n, 8, 1", "e, 8, 1", "o, 8, 1", "n, 8, 2" can be set;
- 4) Communication rate: the default is 4800bps, 9600bps, 19200bps can be set;

### 1.3.3 Measurement output data

Voltage, current, power, electric energy, power factor, frequency and other electrical parameters, see Modbus data register list;

### 1.3.4 Measurement accuracy

Voltage, current, power and energy: less than  $\pm 1.0\%$ ;

### 1.3.5 Isolation

The tested power supply and the power supply are isolated from each other; the isolation withstand voltage is 3000V;

### 1.3.6 Power Supply

1) DC single power supply 3.3~5V power supply, power consumption 10mA.

### 1.3.7 Working environment

- 1) Operating temperature: -40 ~ +80 °C;
- 2) Relative humidity: 5 ~ 95%, no condensation (below 40 °C);
- 3) altitude: 0~3000 meters;
- 4) Environment: no explosion, corrosive gas and conductive dust, no significant shaking, vibration and impact;

### 1.3.8: Temperature drift <100ppm/ °C;

### 1.3.9 Installation method: PCB welding;

### 1.3.10 Module size: 60.48\*36.81mm \* 28mm (length \* width \* height)

## 2. Application

### 2.1, Shape and Installation

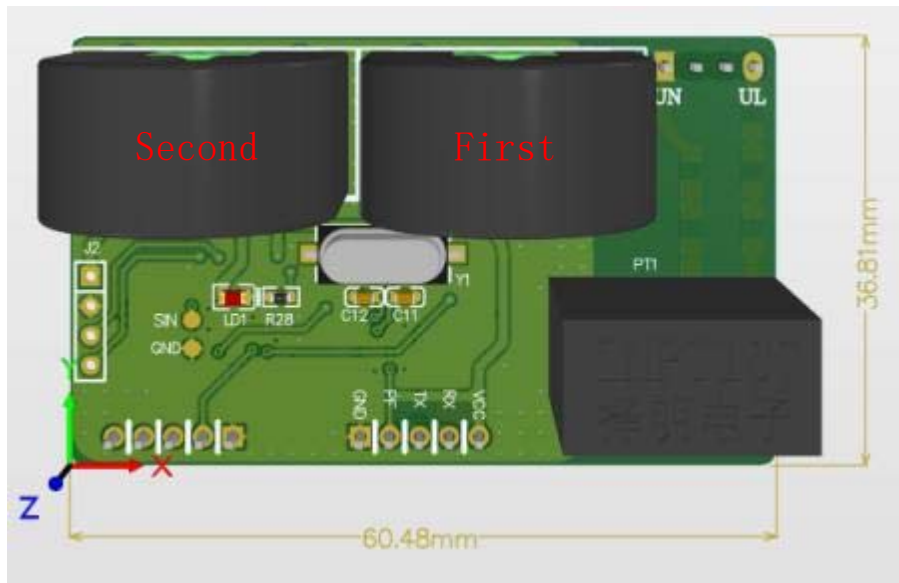


Fig. 2.1 outline and dimension diagram (unit: mm)

## 2.2 Interface definition

Mark	Characteristic	Function description
UL	Live wire	Connect live wire
UN	Neutral wire	Connect neutral wire
VCC	DC+	Power supply:+3.3V~5V
RX	Data input	TTL receive
TX	Data output	TTL send
PF	Output pulse signal	Active power verification pulse output, low level output by default, generally not connected to this pin, but pin position should be reserved
GND	DC-	Power supply ground

### 2.3, application instructions

Please refer to the above diagram for correct wiring according to product specifications and models. Make sure to disconnect all signal sources before wiring to avoid danger and damage to the equipment. After checking and confirming that the wiring is correct, turn on the power test again.

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

When the products leave the factory, they are all set to the default configuration: address 1, baud rate 4800bps, data format "n,8,1", data update rate of 330ms once, and change ratio of 1;

We can change the setting of product parameters and general testing of products through the JSY-MK-194T series product testing software we provide.

### 2.4, electric energy metering function

Can provide single-phase voltage, current, power, power factor, frequency, active energy and other parameters;

The data of energy is an unsigned number of 4 bytes, which will not overflow for 10 consecutive years, and the data will be saved after power failure.

### 3. JSY-MK-194T Modbus register list

**Table 1: System Configuration Read Parameter Register Address and Data Communication Table (Function Code 03H Read, 10H Write)**

Number	Definition	Register address	Read/write	Description
1	ID and baud rate	0004H	Read/write	Default value:0105H (default ID is 01H, default communication format is 8, N, 1, 4800bps) explain: High byte is ID, it can be set as 1 to 255; Low byte is baud rate, 3-1200bps, 4-2400bps, 5-4800bps, 6-9600bps, 7-19200bps, 8-38400bps

**Table 2: System parameter (Function code:03H-read, read only)**

Number	Definition	Register address	Read/write	Description
1	Model 1	0000H	Read	Value is 0194H
2	Model 2	0001H	Read	Reserved
3	Voltage range	0002H	Read	Value is 250(V)
4	Current range	0003H	Read	Value is 800 (800/10=80A)

**Table 3: Measuring electrical parameter register (Function code:03H-read, 10H-write)**

Number	Definition	Register address	Read/write	Byte length	Description
1	First channel voltage	0048H	Read	4	Unsigned, Value=DATA/10000 (V)
2	First channel current	0049H	Read	4	Unsigned, Value=DATA/10000 (A)
3	First channel active power	004AH	Read	4	Unsigned, Value=DATA/10000 (W)
4	Positive active energy of first channel	004BH	Read/Write	4	Unsigned, Value=DATA/10000 (kWh)
5	First channel power factor	004CH	Read	4	Unsigned, Value=DATA/1000
6	Negative active energy of first	004DH	Read/Write	4	Unsigned, Value=DATA/10000 (kWh)

	channel				
7	Power direction	004EH	Read	4	First byte(first channel): 00-positive, 01-negative; Second byte(second channel):00-positive, 01-negative
8	Frequency	004FH	Read	4	Unsigned, Value==DATA/100 (Hz)
9	Second channel voltage	0050H	Read	4	Unsigned, Value=DATA/10000 (V)
10	Second channel current	0051H	Read	4	Unsigned, Value=DATA/10000 (A)
11	Second channel active power	0052H	Read	4	Unsigned, Value=DATA/10000 (W)
12	Positive active energy of second channel	0053H	Read/Write	4	Unsigned, Value=DATA/10000 (kWh)
13	Second channel power factor	0054H	Read	4	Unsigned, Value=DATA/1000
14	Negative active energy of first channel	0055H	Read/Write	4	Unsigned, Value=DATA/10000 (kWh)

### 4. MODBUS communication protocol

#### 4.1. Function Code 0x03: Read Multiplex Register

Example: The host needs to read the data of 2 slave registers with address 01 and start address 0048H

```

Host send: 01 03          00 48      00 02          CRC
           Address function code start address data length  CRC code
Slave response: 01 03      04      12 45      56 68          CRC
                Address function code length register 1 register 2  CRC code
    
```

## 4.2, function code 0 x10: write multiple registers

Example: The host needs to save the 0000 0000 to the slave register with address 000C,000D (the slave address code is 0 x01) and

The host sends:

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

slave response:

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

## 4.3, description

The register in the MODBUS-RTU communication protocol refers to 16 bits (I. e. 2 bytes), and the high bit is the first. When setting parameters, be careful not to write illegal data (that is, 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 codes:

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

82: Read or write illegal data addresses, 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 parsing:

4.4.1 Read electrical parameter instruction (take module address 0x01 as an example):

Send data: 01 03 00 48 00 0E 44 18 (14 registers starting from 0048H)

Received data: 01 03 38 00 24 1E F9 00 05 FE A3 05 8D 37 68 00 00 4F 38 00 03 E8 00 00 3D F1 00 00 00 00 00 00 13 89 00 24 1E F9 00 05 FE B9 05 8B 67 18 00 00 4E CA 00 00 03 E8 00 00 3D A2 C1 9E (the red part is the data corresponding to the 0048H start register),

4.4.2 Energy cleaning instruction (take module address 0x01 as an example):

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

Received data: 01 10 00 0C 00 02 81 CB

The screenshot shows the JSY-MK-194T test software interface. It includes a 'Serial port' dropdown set to 'COM6', a 'Baud rate' dropdown set to '4800', and a 'Close port' button. The interface is divided into two channels: 'First channel' and 'Second channel'. Each channel has input fields for Voltage, Current, Power, P\_direct, P\_energy, Factor, N\_energy, and Frequency. There are also buttons for 'Read', 'Write', and 'Clear energy'. A 'Refresh data' button is located at the bottom right. The 'Timing interval' is set to '1000ms' and 'Communication times' is '0'. A 'Timing refresh start' button is also present. At the bottom, a data log shows the received data (RX[61]) and transmitted data (TX[8]). Red arrows point from the 'Refresh data' button to the 'RX[61]' and 'TX[8]' data lines in the log.

## 5. Precautions

- 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 wire correctly according to the product specifications and models and refer to the figure. Make sure to disconnect all signal sources and power supplies before wiring to avoid danger and damage to the equipment. After checking and confirming that the wiring is correct, turn on the power test again.

- 3) The voltage circuit or the secondary circuit of 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 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) During centralized installation, the minimum installation interval should not be less than 10mm.
- 7) There is no lightning protection circuit inside this series of products. When the input and output feeders of the module are exposed to the harsh outdoor climate environment, lightning protection measures should be taken.
- 8) Do not damage or modify the label and logo of the product, do not disassemble or modify the product, otherwise the company will no longer mention the product

**Manufacturer Information:**

Company name: Shenzhen Jiansiyan Technologies Co., Ltd.

Website: [www.webaic.com](http://www.webaic.com)