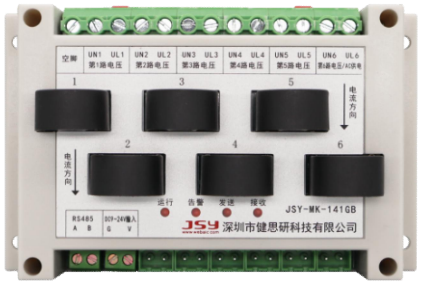
JSY-MK-141G 6-channel AC Energy Meter



1. Product introduction

1.1、 Introduction

JSY-MK-141G 6-channel mutual inductance metering module is the single-phase AC electrical parameter measurement product that can complete electric energy acquisition, measurement and data transmission. It can accurately and separately measure the AC voltage, current, power, power factor, frequency, electricity and other electrical parameters of each channel. It can be used **as 2 three-phase module**s, providing 1-channel RS-485 communication interface, MODBUS-RTU protocol, and has excellent cost performance.

The JSY-MK-141G 6-way mutual inductance metering module can be widely used in energy-saving transformation, electric power, communications, railways, transportation, environmental protection, petrochemical, steel and other industries, used to monitor AC equipment current and power consumption.

1.2、 Functional features

1.2.1. Collect 6 AC electrical parameters, including voltage, current, power, power factor, frequency, electric energy and other electrical parameters.

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

1.2.3. With 1 channel RS-485 communication interface.

1.2.4. The communication protocol adopts standard Modbus-RTU, which has good compatibility and is convenient for programming.

1.2.5. ESD protection circuit with RS-485 communication interface.

1.2.6. Wide working voltage 9-24VDC.

1.2.7. High isolation voltage, withstand voltage up to DC2000V.

1.2.8. Can be equipped with different specifications of single-turn core PCB fixed or open transformer, convenient and easy to use.

1.3、 Technical parameters

1.3.1 **Single-phase AC input**

1) Voltage range: 1-300V and other optional.
2) Current range: 5A, 50A, 100A and other optional. External external opening current transformer model optional.
3) Signal processing: Using dedicated measurement chip, 24 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: 1 channel RS-485 interface.
2) Communication Statute: Modbus-RTU Statute.
3) Data format: "n,8,1", "e,8,1", "o,8,1", "n,8,2".
4) Communication rate: the baud rate of RS-485 communication interface can be set to 1200, 2400, 4800 and 9600Bps. The baud rate defaults to 9600bps.

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 and power: ± 1.0%. active power level 1

1.3.5 Isolation

RS-485 interface, isolated from power supply, voltage input and current input. isolation withstand voltage 2000VDC.

1.3.6 Power

1) DC 9-24V.
2) Typical power consumption: < 2W.

1.3.7 Working environment

1) Working temperature: -20 ~ +60 ℃. Storage temperature: -40 ~ +85 ℃.
2) Relative humidity: 5 ~ 95%, no condensation (at 40 ℃).
3) Altitude: 0~3000 meters.
4) Environment: no explosion, corrosive gas and conductive dust, no significant shaking, vibration and impact of the place.

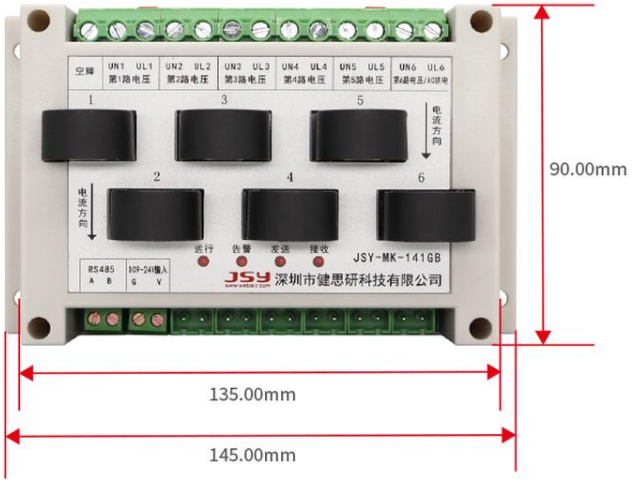
1.3.8 Temperature drift: < 100ppm/ ℃.

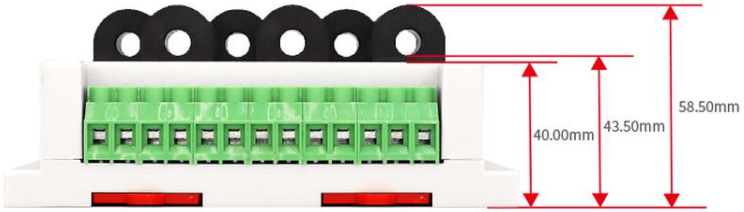
1.3.9 Installation method: screw fixed installation hole distance is 105*58.5MM

2. Application

2.1、 Appearance and installation

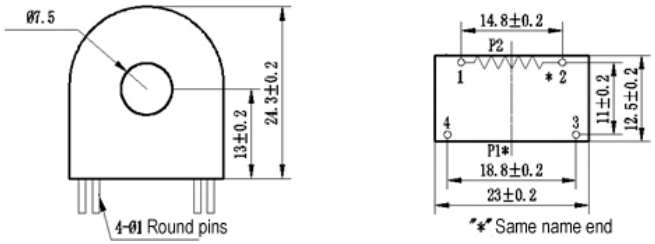
Figure 2.1 Outline and Dimension (Unit: mm)



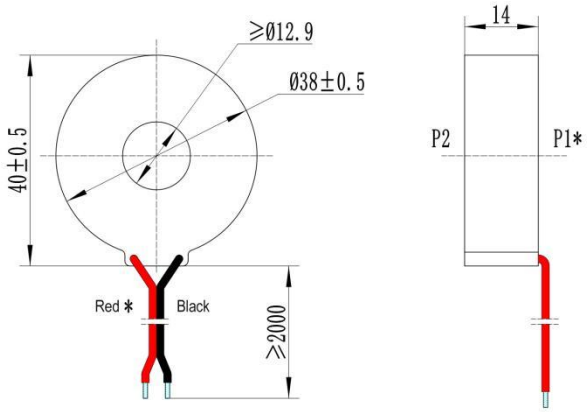


Outline drawing of current transformer

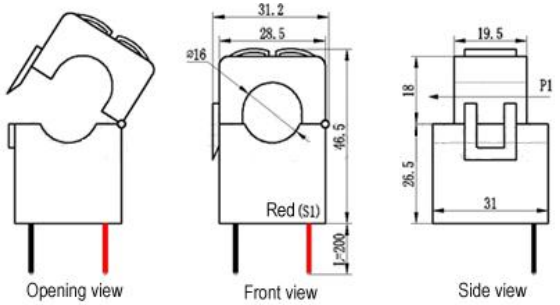
Current transformer appearance and size chart



Outline and size of 50A Through-core Current Transformer

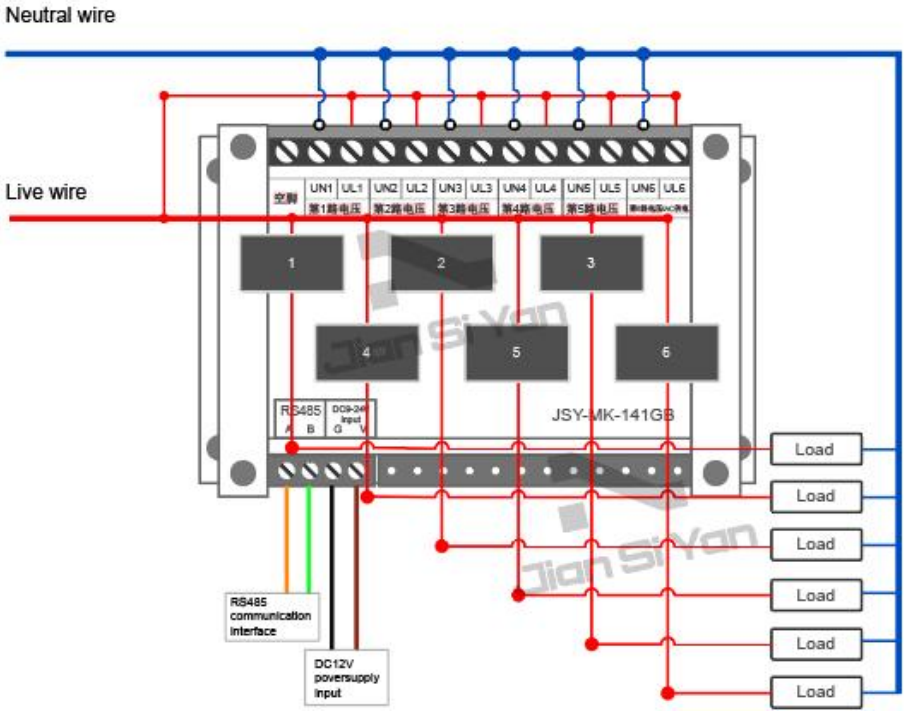


Outline and size of 80A Round Through-core Current Transformer



Outline and Size of 100A Split-core Current Transformer

2.2、 Interface Definition



2.2.1 The working power supply is DC 9-24V.

2.2.2 This product defaults to a fixed transformer. Large current (according to current intensity) can be customized. External transformer is required. The empty position below is 1-6 external current transformer interfaces (external open transformer can be used)

2.2.3 RS-485 communication interfaces are wiring sockets, 485A and 485B from left to right.

2.2.4 The upper part is a voltage interface, which can be made into 6 channels to measure each voltage separately or used 2 a three-phase module, or can be made into a voltage interface.

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 for testing.

After the power is turned on, the power indicator L1 is always on, the indicator L2 will flash when receiving data, and the indicator L3 will flash when the module sends data.

When the product leaves the factory, it is set to the default configuration: address 1, baud rate 9600bps, data format 8,N,1 data update rate 1000ms, change ratio 1.

You can change the set product parameters and the general test of the product through our JSY-MK-141 series product test software.

2.4、 RS-485 communication connection

The host generally only has RS-232 interface, at this time can be connected to the 485 network through the RS-232/RS-485 converter. it is recommended to use an isolated 485 converter to improve the reliability of the system.

The A + terminals of all equipment on a bus are connected in parallel, and the B- terminals are connected in parallel, and cannot be connected in reverse. Up to 255 network meters can be connected on a line at the same time. Each network meter can set its communication address. The communication connection shall use shielded twisted pair with a wire diameter of not less than 0.5mm ^{2}. When wiring, the communication line should be kept away from strong electric cables or other strong electric field environment.

RS-485 communication lines should use shielded twisted pair. 485 communication distance of up to 1200 meters, when a bus connected to a lot of RS485 equipment, or use a higher baud rate when the communication distance will be shortened accordingly, at this time can be extended using 485 repeater.

RS-485 networking has a variety of topologies, and linear connections are generally used, I .e. multiple devices are connected to the network one by one from near and far from the upper host. A terminal matching resistor of 120~300 &Omega./0.25W can be connected at the farthest end (it depends on the specific communication quality, I .e. it is not necessary to install it when the communication is good).

2.5、 Electric energy metering function

Can provide each voltage, current, power, power factor, frequency, active energy, carbon emissions and other parameters.

The data of the power degree 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.List of registers of JSY-MK-141G Modbus

Registers are used to MODBUS-RTU communication protocols. Valid registers are as follows:

register address	Description
0000H (Read Only)	Model number, value 0141H,
0001H (Read Only)	Reserved
0002H (Read Only)	Voltage range: value of 250, representing 250V
0003H (Read Only)	Current range: value is 400, representing 40A
0004H (readable and writable)	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 low 4 bits of the low byte is the baud rate, 6-9600bps,7-19200bps,8-38400bps
0040H (Read Only)	1st voltage, unsigned data, value = DATA/100, unit is V
0041H (Read Only)	1st current, unsigned data, value = DATA/100, unit is A
0042H (Read Only)	1st active power, unsigned data, value = DATA, unit is W
0043 ~ 0044H (read and write)	1st active total electric energy, unsigned data, value = DATA/100, unit is kWh
0045H (Read Only)	1st power factor, unsigned data, value = DATA/1000
0046H (Read	1st frequency, unsigned data, value = DATA/100,unit is Hz

Only)	
0047H (Read Only)	2nd voltage, unsigned data, value = DATA/100, unit is V
0048H (Read Only)	2nd current, unsigned data, value = DATA/100, unit is A
0049H (Read Only)	2nd active power, unsigned data, value = DATA, unit is W
004A ~ 004BH (read and write)	2nd active total electric energy, unsigned data, value = DATA/100, unit is kWh
004CH (Read Only)	2nd power factor, unsigned data, value = DATA/1000
004DH (Read Only)	2nd frequency, unsigned data, value = DATA/100,unit is Hz
004EH (Read Only)	3rd voltage, unsigned data, value = DATA/100, unit is V
004FH (Read Only)	3rd current, unsigned data, value = DATA/100, unit is A
0050H (Read Only)	3rd active power, unsigned data, value = DATA, unit is W
0051 ~ 0052H (read and write)	3rd active total electric energy, unsigned data, value = DATA/100, unit is kWh
0053H (Read Only)	3rd power factor, unsigned data, value = DATA/1000
0054H (Read Only)	3rd frequency, unsigned data, value = DATA/100,unit is Hz
0055H (Read Only)	4th voltage, unsigned data, value = DATA/100, unit is V
0056H (Read Only)	4th current, unsigned data, value = DATA/100, unit is A
0057H (Read Only)	4th active power, unsigned data, value = DATA, unit is W
0058 ~ 0059H (read and write)	4th active total electric energy, unsigned data, value = DATA/100, unit is kWh
005AH (Read Only)	4th power factor, unsigned data, value = DATA/1000
005BH (Read Only)	4th frequency, unsigned data, value = DATA/100,unit is Hz
005CH (Read Only)	5th voltage, unsigned data, value = DATA/100, unit is V
005DH (Read Only)	5th current, unsigned data, value = DATA/100, unit is A
005EH (Read Only)	5th active power, unsigned data, value = DATA, unit is W
005F ~ 0060H (read and write)	5th active total electric energy, unsigned data, value = DATA/100, unit is kWh
0061H (Read Only)	5th power factor, unsigned data, value = DATA/1000
0062H (Read Only)	5th frequency, unsigned data, value = DATA/100,unit is Hz
0063H (Read Only)	6th voltage, unsigned data, value = DATA/100, unit is V
0064H (Read Only)	6th current, unsigned data, value = DATA/100, unit is A
0065H (Read Only)	6th active power, unsigned data, value = DATA, unit is W
0066 ~ 0067H (read and write)	6th active total electric energy, unsigned data, value = DATA/100, unit is kWh
0068H (Read Only)	6th power factor, unsigned data, value = DATA/1000
0069H (Read Only)	6th Frequency, unsigned data, value = DATA/100,unit is Hz

4. MODBUS Communication Protocol

MODBUS-RTU Protocol Communication Example and Error Description

2.1 Function Code 0x 03: Read Multiway Register

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

Host Sent:

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 Return Bytes Register Data 1 Register Data 2 CRC Code

2.2 Function code 0x 10: write multiway 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 code start address write register number byte count save data 1 2 CRC code

SLOVER RESPONSE: 01 10 00 0C 00 02 81 CB

Address function code start address write register number CRC code

2. Description:

The register in the MODBUS-RTU communication protocol refers to 16 bits (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.

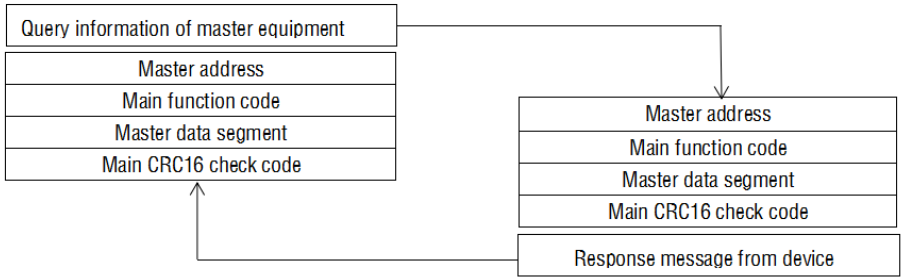
82: Read or write illegal data address, that is, the data location exceeds the readable or writable address range of the module.

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.

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



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.

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 refer to the figure for correct wiring according to the product specification and model. 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 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) 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 provide "three guarantees" (replacement, return, repair) service for the product.

Manufacturer: Shenzhen Jiansiyan Technologies Co., Ltd.

Online Technical Support Staff:

+86 18675534520(Jack Jia)

+86 18665924579(Jimmy Yang)

E-mail: jsy-mk@jsypowermeter.com

Web: www.jsypowermeter.com

Address: 901, Building 1, Taijiale Technology Industrial Park, Tongguan Road, Tianliao Community, Yutang Street,Guangming District,Shenzhen,Guangdong, 518132, China.

official website