JSY-MK-229 Single-channel AC and DC collector

1.1、 Introduction

JSY-MK-229 single-channel AC and DC collector is a DC parameter measurement product that highly integrates measurement and digital communication technology and can complete electric energy measurement, collection and transmission. It can accurately measure DC voltage, current, power, electricity and other electrical parameters. 1 channel 485 communication interface, completely isolated circuit, small size, simple interface, can be easily embedded into various devices that need to measure DC power consumption, and has excellent cost performance.

JSY-MK-229 AC and DC collector can be widely used in energy-saving renovation , AC/DC charging piles, electric power, communications, railways, transportation, environmental protection, petrochemical, steel and other industries, and can be used for remote monitoring of the use of AC and DC equipment . Condition .

1.2、 Features

1.2.1. Collect AC/DC electrical parameters, including voltage, current, power, power factor, and electrical energy.
1.2.2. Adopt special measurement chip, effective value measurement method, high measurement accuracy.
1.2.3. 1 channel 485 communication interface.
1.2.4. The communication protocol adopts Modbus-RTU, which has good compatibility and facilitates programming.
1.2.5. Powered by 12 ~ 36V DC.
1.2.6. Different specifications of shunts are optional.

1.3、 Technical Parameters

1.3.1 AC / DC input

1) Voltage range: 100V, 500V, 750V, 1000V, 1200V , etc. optional.
2) Current range: 10A , 50A, 100A, 150A, 200A, etc. optional.
3) Signal processing: using special measurement chip, 24-bit AD sampling.
4) Overload capacity: 1.2 times the range is sustainable. instantaneous (<20mS) current is 5 times, voltage is 1.2 times the range without damage.
5) Input impedance: voltage channel>1 kΩ/V.

1.3.2 Communication Interface

1) Interface type: 1 channel 485 communication interface.
2) Communication protocol: MODBUS-RTU protocol.
3) Data format: can be set by software, "n,8,1", "e,8,1", "o,8,1", "n,8,2".
4) Communication rate: The baud rate can be set to 1200, 2400, 4800, 9600bps. the default is 9600bps.

1.3.3 Measurement output data

For multiple electrical parameters such as voltage, current, power, power factor, and electric energy, see the Mdobus data register list.

1.3.4 measurement accuracy

Voltage, current, power: less than ±1.0%. electrical energy level 1.

1.3.5 isolation

The power supply under test and the power supply are isolated from each other. the isolation withstand voltage is 4000VDC.

1.3.6 power supply

1) DC power supply 12 ~ 36 power supply, power consumption <20mA (12V power supply).

1.3.7 working environment

1) Working temperature: -30～+75℃ . Storage temperature: -40～+85℃ .
2) Relative humidity: 5~95%, no condensation (at 40 ℃) .
3) Altitude: 0~3000 meters.
4) Environment: No explosive, corrosive gases and conductive dust, no significant shaking, vibration and impact.
5)

1.3.8 Installation method: 3 5 mm guide rail type

1.3.9 Housing size : 90. 2 * 36. 3 mm

2.1、 Appearance and installation:

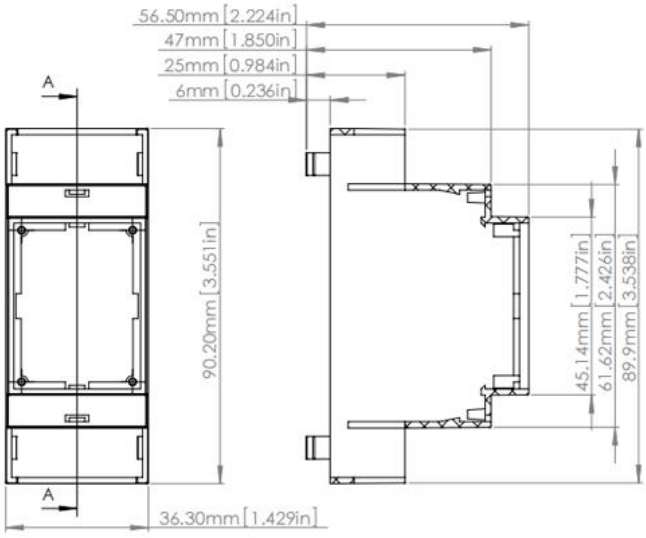
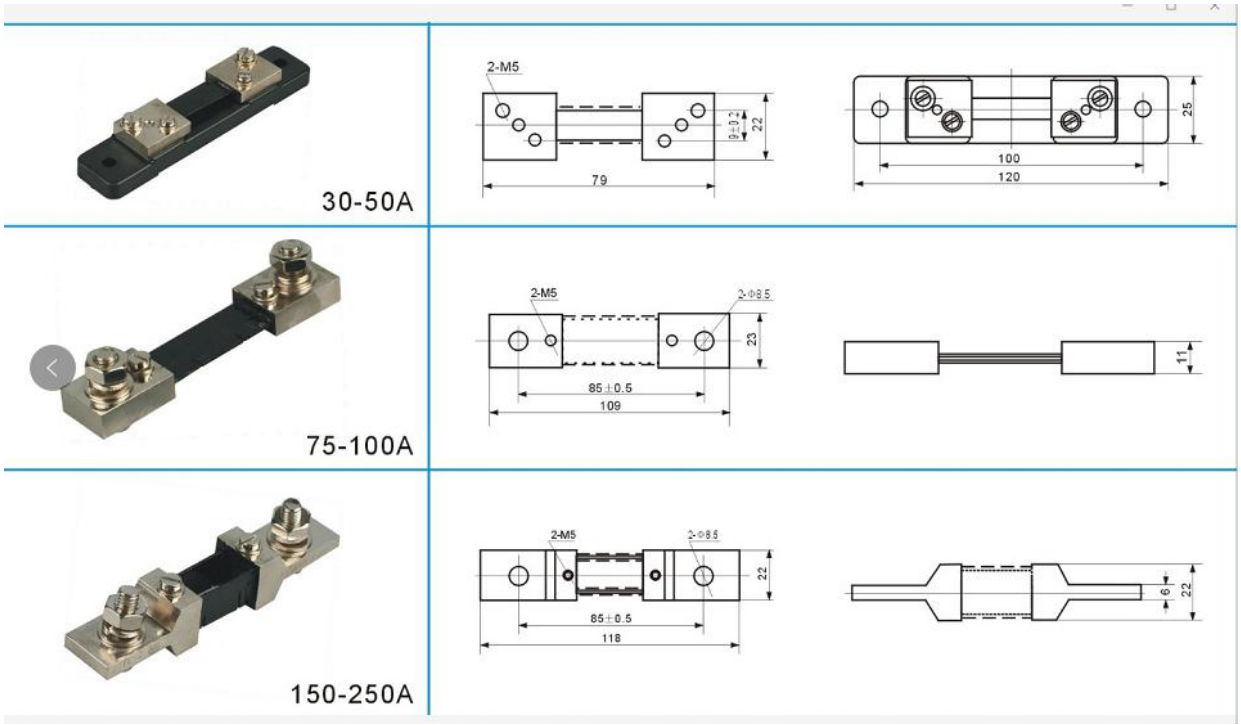
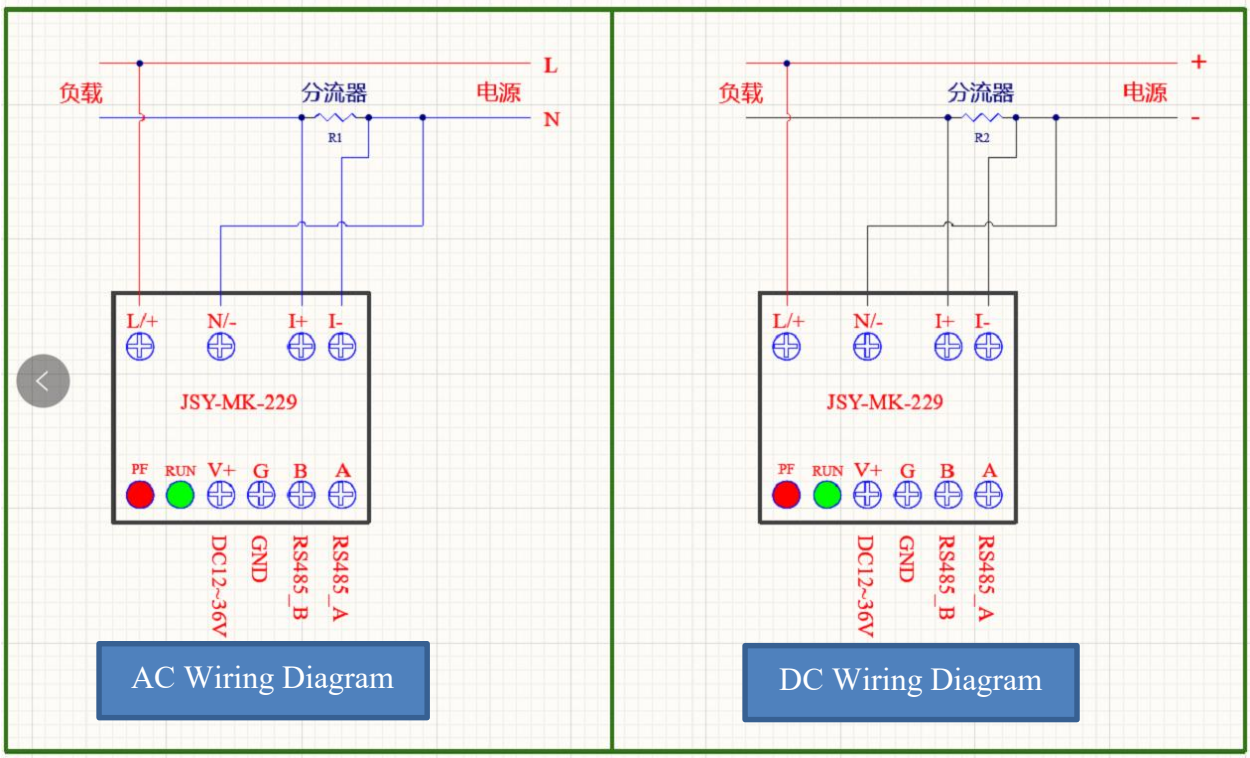


Figure 2.1 Dimensional drawing (unit: mm)

2.2 Current shunt appearance and dimension drawing



2. 3- terminal wiring diagram description:



logo	characteristic	Function description
L/ +	AC live wire (DC positive)	The live wire interface of the AC voltage under test (the positive terminal of the DC voltage under test)
N/-	AC neutral line (DC negative pole)	Measured AC voltage neutral interface (measured DC voltage negative interface)
I+	Positive end of shunt	Positive terminal input of manganese-copper shunt (the shunt is connected in series to the neutral line or negative pole of the circuit under test)
I-	Negative terminal of shunt	Manganese-copper shunt negative input (connected to the neutral line or negative pole of the power supply under test)
G	Negative pole of power supply	Collector power supply negative pole
V+	Positive pole of power supply	Collector 12 ~ 36 VDC power supply positive pole
A	484A	Collector 485 communication port A
B	485B	Collector 485 communication port B

2.5 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 to confirm that the wiring is correct, turn on the power and test.

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

When the products leave the factory, they are set to the default configuration: address No. 1, baud rate 9600bps, data format "n,8,1", data update rate 3 times a second, and transformation ratio 1.

2. 6 Electric energy measurement function:

Can provide single-phase voltage, current, power, electric energy and other parameters.

Electricity data is a 4-byte unsigned number, and the data is saved when the power is turned off.

3.1. Measure electrical parameter register and communication data table (read function code 03H)

serial number	definition	Register address	read/write	Data types and calculation instructions
1	Voltage	0100H 0101H	read	Unsigned number, value=DATA/10000, unit V
2	current	0102H 0103H	read	Unsigned number, value=DATA/10000, unit A
3	Active power	0104H 0105H	read	Unsigned number, value=DATA/10000, unit is W
4	Active electrical energy	0106H 0107H	read	Unsigned number, value=DATA/1000, unit is kWh
5	power factor	0108H 0109H	read	Unsigned number, value=DATA/1000
6	Reactive power	010AH 010BH	read	Unsigned number, value=DATA/10000, unit is var
7	Reactive energy	010CH 010DH	read	Unsigned number, value=DATA/1000, unit is kvarh
8	frequency	010EH 010FH	read	Unsigned number, value=DATA/100, unit is Hz
9	Tested power supply properties	0110H 0111H	read	Unsigned number, value=1 is AC power supply, value=2 is DC power supply

Custom version register and communication data table

0040H (read only)	No. 1 voltage, unsigned number, value = DATA/1, unit V
00 41 H (read only)	Current No. 1, unsigned number, value=DATA/1 0 , unit A
00 42 H (read only)	Channel 1 active power, unsigned number, value = DATA , unit is W
00 43 ~00 44 H (read and write)	The total active energy of channel 1, unsigned number, value = DATA/100, unit is kWh

3.2. System configuration reads parameter register address and data communication table (function code 03H reads, 10H writes)

serial number	definition	Register address	read/write	Specific instructions
1	Address and baud rate	0004H	read/write	The default value is 0106H. the default address is 01H, the default format is 8, N, 1,9600bps illustrate: The 8-bit high byte is 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, that is, "8, N, 1" "01" means 11 bits, even parity, that is, "8, E, 1". "10" means 11 digits, which is "8, O, 1". "11" means 11 bits, no validation, 2 stop bits, that is, "8, N, 2". The lower four bits of the low byte are the baud rate, 3-1200bps, 4-2400bps, 5-4800bps, 6-9600bps

3.3. System read-only parameter register address and communication data table (function code 03H, read-only)

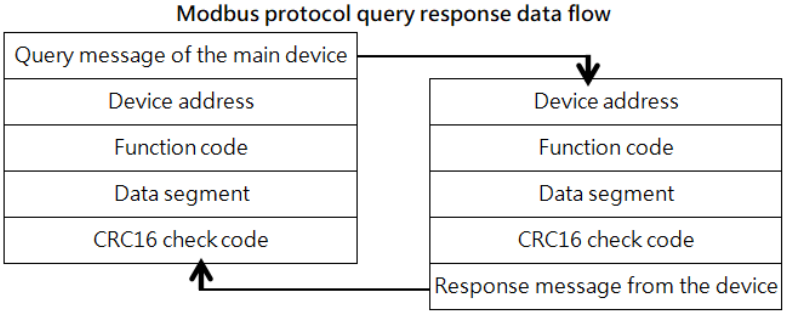
serial number	definition	Register address	read/write	Specific instructions
1	Model 1	0000H	read	The value is 0229H
2	Model 2	0001H	read	The low byte is the program version number
3	Voltage range	0002H	read	The default is 700V and the value is 02BCH
4	Current range	0003H	read	The default is 150A, the value is 05DCH (10 times relationship)

MODBUS communication protocol

This instrument provides a serial asynchronous half-duplex RS485 communication interface, using the standard MODBUS-RTU protocol, and various data information can be transmitted on the communication line. Up to 255 network instruments can be connected to one line at the same time. Each network instrument can set its communication address. The communication connection should use a shielded twisted pair with a copper mesh, and the wire diameter should not be less than 0.5mm ^{2}. When wiring, communication lines should be kept away from strong current cables or other strong electric field environments.

The MODBUS protocol adopts the master-slave response communication connection method on one communication line. First, the signal from the host computer is addressed to a terminal device (slave) with a unique address. Then, the response signal from the terminal device is transmitted to the host in the opposite direction, that is, the signal is transmitted along a separate communication line. All communication data streams are transmitted in opposite directions (half-duplex operating mode). The MODBUS protocol only allows communication between the

host (PC, PLC, etc.) and terminal devices, but does not allow data exchange between independent terminal devices. In this way, each terminal device will not occupy the communication line when they are initialized, but is limited to responding. Query signal arriving at this machine.



Host query: The query message frame includes 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 it wants to perform. For example, function code 03 or 04 requires the slave device to read registers and return their contents. the data segment contains the requirements of the slave device. Any additional information that performs functions. The check code is used to verify the correctness of a frame of information. The slave device provides a method to verify whether the message content is correct. It uses 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 check code. Data information codes include data collected from the device: like register values or status. If an error occurs, we agree that the slave machine will not respond.

We specify the communication data format used in this instrument: bits per 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 check code
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.

We specify the communication data format used in this instrument: bits per 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 check code
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 instruments and 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 the output status of relay 1
05H	Write the output status of relay 1

Data segment: Contains the data required by the terminal to perform specific functions or the data collected when the terminal responds to queries. The content of these data may be numerical values, reference addresses or setting values.

Check code: CRC16 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, an error occurs. mistake.

The process of generating a CRC16 is:

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

(2) Perform 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 into the CRC register.

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

(4) If the lowest bit is 0: repeat the third step (next shift). if the lowest bit is 1: perform an XOR operation on the CRC register and a preset fixed value (0A001H).

(5) Repeat steps 3 and 4 until 8 shifts. In this way, a complete eight bits are processed.

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

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

MODBUS-RTU communication protocol example:

4.1. Function code 0x03: Read multiple registers (when reading registers starting from 0048H, each register returns 4 bytes, and other registers return 2 bytes)

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

Host sends: 01 03 00 00 00 02 CRC

Address function code starting address data length CRC code

Slave response: 01 03 04 12 45 56 68 CRC

Address function code returns the number of bytes Register data 1 Register data 2 CRC code

4.2. Function code 0x10: Write multiple registers

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

Host sends: 01 10 00 0C 00 02 04 00 00 00 00 F3 FA

Address function code starting address number of write registers byte count saved data 1 2 CRC code

Slave response: 01 10 00 0C 00 02 81 CB

Address function code starting address write register number CRC code

4.3. Description

The register in the MODBUS-RTU communication protocol refers to 16 bits (ie 2 bytes), and the high-order bit is 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 code:

81: Illegal function code, that is, the received function code module does not support it.

82: Reading or writing 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 module received by the host exceeds the data range of the corresponding address.

4.4. Example of command analysis:

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

Send data: 01 03 01 00 00 08 45 F0 (read 8 registers starting from 0100)

Receive data: 01 03 10 00 3C FF 67 00 00 C2 D7 01 30 C6 E0 00 00 00 10 D2 E0

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

The red data 00 3C FF 67 corresponds to the two registers 0100H and 0101H, which is the voltage: 0x003CFF67=3997543. Divided by 10000 is 399.7543V. The data of each parameter item is 4 bytes. The other data are calculated in the same way according to the formula. inferred.

4.4.2 Clear power command (take module address 0x01 as an example):

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

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

5. Things to note

1) Pay attention to the auxiliary power information on the product label. Do not connect the wrong auxiliary power level and polarity of the product, otherwise the product may be damaged.
2) Please refer to the diagram for correct wiring according to product specifications and models. Make sure to disconnect all signal sources and power before wiring to avoid danger and damage to the equipment. After checking to confirm that the wiring is correct, turn on the power and test.
3) The voltage circuit or the secondary circuit of the PT must not 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 make live connections or unplug terminals.
5) When using the product in an environment with strong electromagnetic interference, please pay attention to the shielding of the input and output signal lines.
6) When installed 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 inside. When the input and output feeders of the module are exposed to harsh outdoor weather conditions, lightning protection measures should be taken.
8) Please do not damage or modify the product's label or logo, and do not disassemble or modify the product, otherwise our company will no longer provide "three guarantees" (guaranteed replacement, guaranteed return, and guaranteed repair) service for the product.

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