JSY-MK-238 8-Channels DC Acquisition Module

1. Product Introduction

1.1、 Introduction

JSY-MK-238 DC 8-channel metering module is a multi-channel DC parameter measurement product that can complete power collection, measurement and data transmission . It can accurately measure 8 -channel DC voltage, current , power, electricity and other electrical parameters , and provides 1 RS-485 communication interface and Modbus-RTU protocol, with excellent cost performance.

JSY-MK-238 DC 8-way metering module can be widely used in energy-saving transformation , power, communication, railway, transportation, environmental protection, petrochemical, steel and other industries to monitor the current and power consumption of DC equipment .

1.2、 Features

1.2.1. Collect 8 channels of DC parameters, including voltage, current, power, electric energy and other electrical parameters.

1.2.2. Adopting special measurement chip and effective value measurement method, the measurement accuracy is high.

1.2.3. With 1 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. RS-485 communication interface with ESD protection circuit .

1.2.6. Wide operating voltage DC 9～28V .

1.2.7. High isolation voltage, withstand voltage up to DC1000V.

1.3、 Technical Parameters

1.3.1 DC 8-channel input

1) Voltage range: 0 ～ 1000V .
2) Current range: 10mA~30A .
3) Signal processing: using a dedicated 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. current channel ≤ 10mΩ.

1.3.2 Communication Interface

1) Interface type: 1 RS-485 interface.
2) Communication protocol: Modbus-RTU protocol.
3) Data format: software-settable, "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 9600bps , 19200bps , 38400bps . the baud rate defaults to 9600bps , and the communication format defaults to "8,n,1".

1.3.3 Measurement output data

Voltage, current, power, electric energy and other electrical parameters, see the Modbus data register list.

1.3.4 Measurement accuracy

Voltage , current , power : ± 1.0 % . Active energy level 1 .

1.3.5 Isolation

RS-485 interface, isolated from the power supply and each power supply under

test. isolation withstand voltage 1000VDC.

1.3.6 power supply

1) DC 9～28 V wide range power supply .
2) Typical power consumption: 165mA (12V).

1.3.7 working environment

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

1.3.8 Temperature drift: ≤100ppm/ ℃ .

1.3.9 Installation method: 35mm guide rail installation or screw fixed installation, the screw hole spacing is 135x70mm.

2. Application

2.1、 Appearance and installation

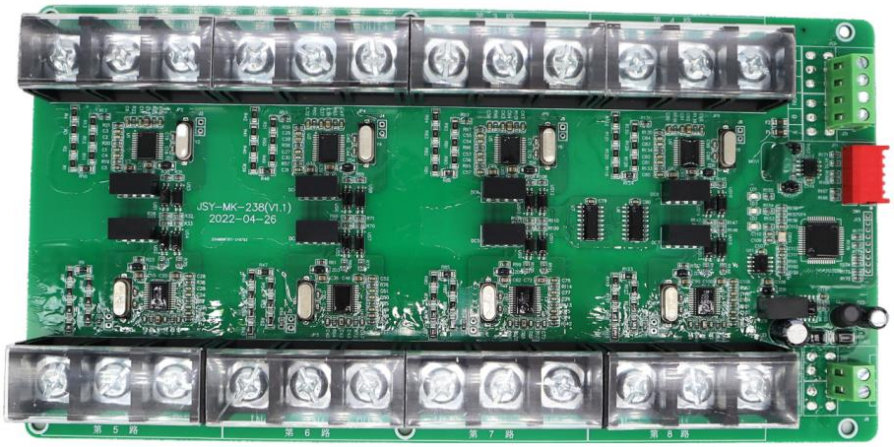


Figure 2.1 Outline

2.2、 Interface definition

2.2.1 + (positive pole) , - (negative pole) are the DC power supply input ports of the module, DC9~ 28 V .

2.2.2 IN- (negative input of the power supply under test), IN+ (positive input of the power supply under test), OUT+ (positive output of the power supply under test).

2.2.3 RS485 communication A connects to positive, B connects to negative.

2.2.4 The wiring diagram is as follows.

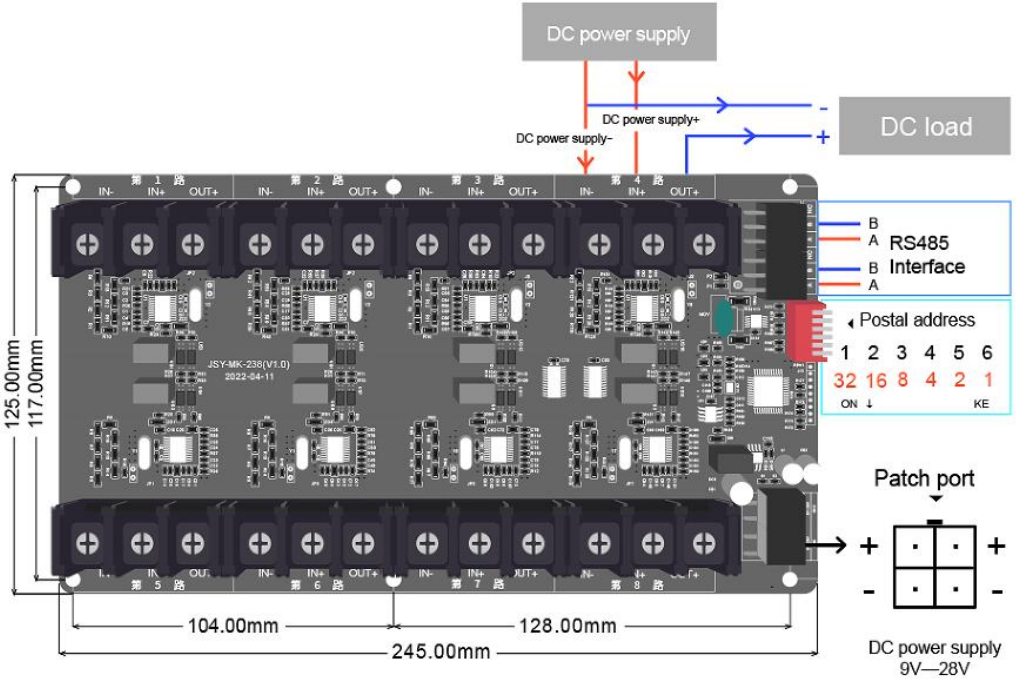


Figure 2.2 Interface Diagram

2.3、 Application Notes

Please wire correctly according to the product specifications and models and refer to the above diagrams. 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 supply for testing.

After the power is turned on, the running indicator light is always on, the receiving indicator light will flash when receiving data, and the sending indicator light will flash when the module sends data.

When the product leaves the factory, it is set to the default configuration: address 1, baud rate 38400bps , data format 8, N, 1, data update rate 1000ms, and ratio 1.

238 test software we provide can be used to change and set product parameters and perform general product tests.

2.4、 RS-485 communication connection

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

The A+ and B- terminals of all devices on a bus are connected in parallel, and they cannot be connected in reverse. 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 shielded twisted pair cables with a wire diameter of not less than 0.5mm2 · When wiring, keep the communication line away from strong electric cables or other strong electric field environments .

The RS - 485 communication line should use shielded twisted pair cable. the communication distance of 485 can reach 1200 meters. When there are many RS485 devices connected to a bus , or a higher baud rate is used, the communication distance will be shortened accordingly. A 485 repeater can be used for expansion.

RS - 485 networking has a variety of topological structures, generally using linear connection, that is, starting from the upper host, multiple devices are connected to the network one by one from near to far. At the farthest end, a 120 ~ 300 Ω / 0.25 watt terminal matching resistor can be connected (depending on the specific communication quality, that is, it does not need to be installed when the communication is very good).

2.5、 Energy metering function

Can provide parameters such as voltage, current, power, active energy, etc. for each channel.

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

三、Protocol

四、3.1 The product adopts MODBUS-RTU communication protocol

3.1.1 Function code 0x03: Read multiple registers

Example: The host wants to read the data of two slave registers with address 01 and starting address 0048H.

Host sends: 01 03 00 48 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 Return Bytes Register Data 1 Register Data 2 CRC Code

3.1.2 Function code 0x10: Write single or multiple registers

Example: The host wants to save 0000,0000 to the slave register at address 000C,000D (the 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 Write Register Quantity Byte Count Save Data 1 2 CRC Code

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

Address function code starting address write register quantity CRC code

3.1.3 illustrate:

The registers in the MODBUS-RTU communication protocol refer to 16 bits (i.e. 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.

3.2 The valid registers are as follows:

Register Address	illustrate
0000H (read only)	Model, value is 0 238 H,
0001H (read only)	Program Version
0002H (read only)	Voltage range: The value is 250, which means 250V
0003H (read only)	Current range: The value is 30 0, which means 30 A
0004H (Readable and writable)	The default value is 010 8 H. the default address is 01H, and the default format is 8, N, 1, 384 00bps Note: The high byte 8 bits are the address, 1~255. 0 is the broadcast address. The lower four bits of the low byte are the baud rate, 6-9600bps, 7-19200bps, 8-38400bps
0040H (read only)	Channel 1 voltage, unsigned number , value = DATA/10, unit V
00 41 H (read only)	Current of the first channel, unsigned number, value = DATA/1000, unit A
00 42 H (read only)	channel 1 , unsigned number, value = DATA , unit is W
00 43 ~00 44 H (read and write)	Total active energy of channel 1, unsigned number, value = DATA/100, unit is kWh
0045H (read only)	The second voltage, unsigned number, value = DATA/10, unit V
00 4 6H (read only)	The second current, unsigned number, value = DATA/1000, unit A
00 4 7H (read only)	Active power of the second channel, unsigned number, value = DATA , unit is W
00 4 8~00 4 9H (read and write)	Total active energy of the second channel, unsigned number, value = DATA/100, unit is kWh
004AH (read only)	The third voltage, unsigned number, value = DATA/10, unit V
00 4 BH (read only)	The third current, unsigned number, value = DATA/1000, unit A
004CH (read only)	Active power of the third channel, unsigned number, value = DATA , unit is W
00 4 D~00 4 EH (read and write)	Total active energy of the second channel, unsigned number, value = DATA/100, unit is kWh
004FH (read only)	The 4th voltage, unsigned number, value = DATA/10, unit V
0050H (read only)	The fourth current, unsigned number, value = DATA/1000, unit A
0051H (read only)	Channel 4 active power, unsigned number, value = DATA , unit is W
0052~0053H (read and write)	Total active energy of the 4th channel, unsigned number, value = DATA/100, unit is kWh
0054H (read only)	The 5th voltage , unsigned number, value = DATA/10, unit V
0055H (read only)	The fifth current, unsigned number, value = DATA/1000, unit A
0056H (read only)	Channel 5 active power, unsigned number, value = DATA , unit is W
0057~0058H (read and write)	Total active energy of channel 5, unsigned number, value = DATA/100, unit is kWh

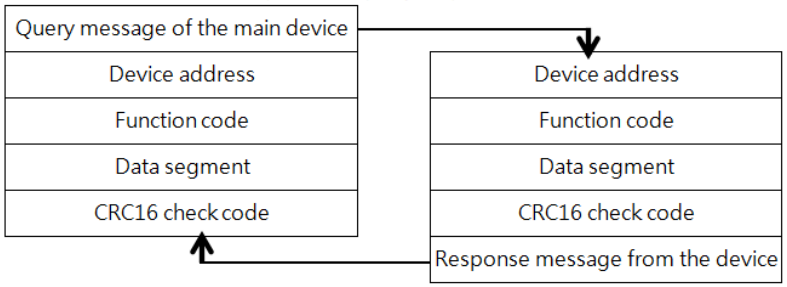
0059H (read only)	The sixth voltage, unsigned number , value = DATA/10, unit V
005AH (read only)	The sixth current, unsigned number, value = DATA/1000, unit A
005BH (read only)	Channel 6 active power, unsigned number, value = DATA , unit is W
005C~005DH (read and write)	Total active energy of channel 6, unsigned number, value = DATA/100, unit is kWh
005EH (read only)	The 7th voltage, unsigned number, value = DATA/10, unit V
005FH (read only)	The 7th current, unsigned number, value = DATA/1000, unit A
0060H (read only)	Channel 7 active power, unsigned number, value = DATA , unit is W
0061~0062H (read and write)	Total active energy of channel 7, unsigned number, value = DATA/100, unit is kWh
0063H (read only)	The 8th voltage, unsigned number, value = DATA/10, unit V
0064H (read only)	The 8th current, unsigned number, value = DATA/1000, unit A
0065H (read only)	The 8th active power, unsigned number, value = DATA , unit is W
0066~0067H (read and write)	Total active energy of the 8th channel, unsigned number, value = DATA/100, unit is kWh
0068H (read only)	Total current of 8 channels, unsigned number, value = DATA/1000, unit A
0069H (read only)	Total active power of 8 channels, unsigned number, value = DATA , unit is W
006A~006BH (read and write)	Total active energy of 8 channels, unsigned number, value = DATA/100, unit is kWh

For example: For module with address No. 1, you can send the command: 01 03 00 40 00 2C 45 C3, and copy back all electrical parameters from 0040H to 006BH at one time .

This instrument provides a serial asynchronous half-duplex RS485 communication interface, using the standard MODBUS-RTU protocol, and all kinds of data information can be transmitted on the communication line. Up to 255 network instruments can be connected on one line at the same time, and each network instrument can set its communication address. The communication connection should use a shielded twisted pair with a copper mesh, with a wire diameter of not less than 0.5mm2 · When wiring, keep the communication line away from strong electric cables or other strong electric field environments.

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 terminal device (slave) with a unique address, and then the response signal sent by the terminal device is transmitted to the host in the opposite direction, that is: on a separate communication line, the signal transmits all communication data streams in two opposite directions (half-duplex working mode). The MODBUS protocol only allows communication between the host (PC, PLC, etc.) and the terminal device, and does not allow data exchange between independent terminal devices, so that each terminal device will not occupy the communication line when they are initialized, but is limited to responding to the query signal that reaches the machine.

Modbus protocol query response data flow



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 for the slave device to perform the function, and 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, which uses the CRC16 calibration rule.

IV. Precautions

1) Pay attention to the power supply information on the product label. The power supply level and polarity of the product must not be connected incorrectly, otherwise the product may be damaged.
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 danger and damage to the equipment. After checking and confirming that the wiring is correct, turn on the power for testing.
3) 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.
4) When installing in a centralized manner, the minimum installation interval should not be less than 10mm.
5) 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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