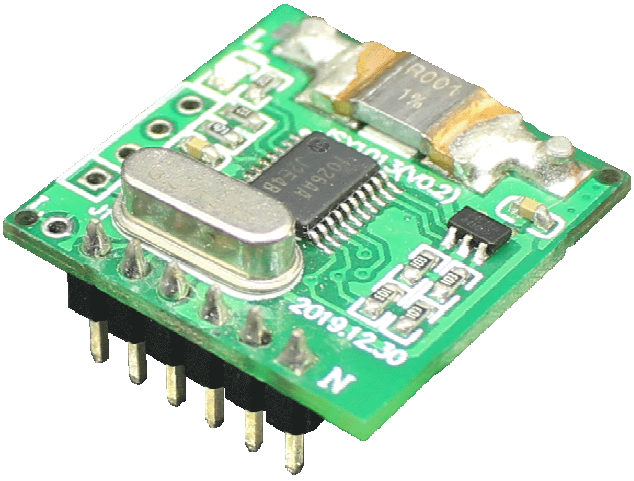
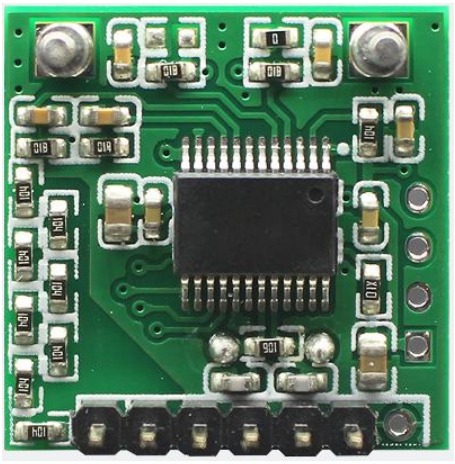
JSY1013

Electrical parameter sensor

Product
User Manual





Shenzhen Jiansiyan Technologies Co., Ltd.

Table of contents

1. Product introduction

JSY1013 AC / DC parameter sensor is a highly integrated measurement sensor . The product performs synchronous sampling through two fully differential 24-bit Σ-Δ ADCs. The sampling rate of each channel is 6.4k/s; it can measure AC/DC Accurately measure voltage and current, and calculate active power and power factor when measuring AC based on synchronous sampling technology; MCU calculates active energy through integration over time ; provides 1 UART interface, using MODBUS -RTU protocol.

The sensor can be easily embedded inside an electrical appliance to measure the voltage , current, power and power consumption information of the electrical appliance in real time. The electrical appliance can evaluate the working status of the electrical appliance by analyzing real-time electrical parameters.

Industry applications: Electric energy metering sockets, smart switches, air conditioners, refrigerators, electric stoves and other electrical products and other electricity monitoring products.

2. working principle

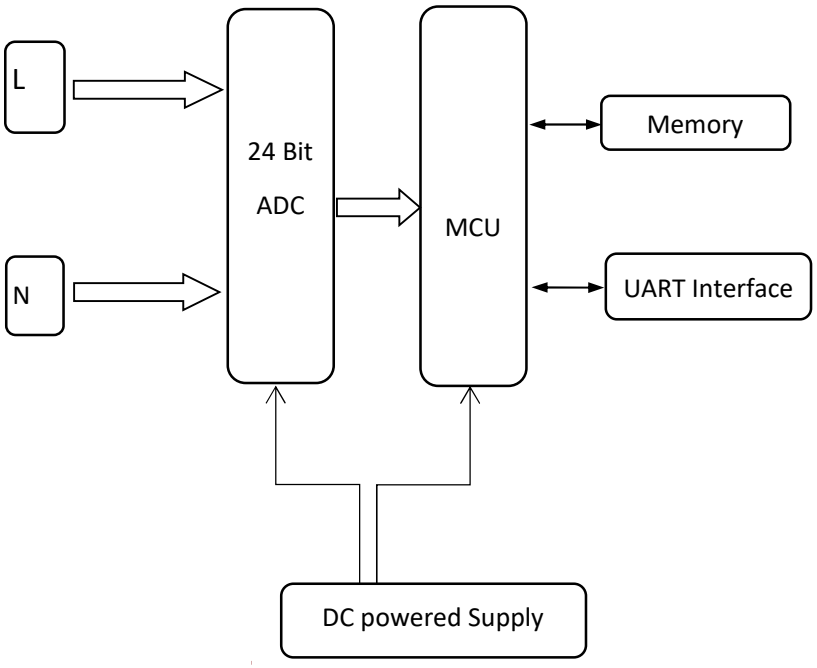


Figure 1 Working principle diagram of JSY1013 electrical parameter sensor

3. Product Features

3.1 AC measurement

3.1.1 AC voltage, current, active power, power factor, frequency, active energy;

3.1.2 Standard current measurement range is 5mA~10A, other ranges can be customized according to user requirements ;

3.1.3 The standard voltage measurement range is 5V~265V, other ranges can be customized according to user requirements ;

3.2 DC measurement

3.2.1 Voltage, current, power and electricity ;

3.2.2 Standard current measurement range is 5mA~10A, other ranges can be customized according to user requirements ;

3.2.3 The standard voltage measurement range is 5V~400V, other ranges can be customized according to user requirements ;

Note: Please select the appropriate product type based on the actual power supply being tested (AC or DC).

4. Technical Parameters

project		Technical Parameters
Measurement quantity	Load type	single intersection/dc
	Voltage range	5-400V, accuracy 1%
	Current range	5mA-10A, accuracy 1%
	Voltage	0.01V
	Current	0.1mA
	Power	0.01W
	Power	0.01kWh
Pass News	Interface Type	UART (1 way)
	communicatio	MODBUS-RTU
	Data Format	Can be set to "n,8,1", "e,8,1", "o,8,1", "n,8,2" ; default is "n,8,1"
	baud rate	Can be set to 2400, 4800, 9600bps, the default baud rate is
	mailing	The default address is 1, which can be set
sex able	Typical power	⩽10mA
	Working	3.3~5VDC
	Overload	1.2Imax sustainable
working environment ring	Operating	-30～+70℃; storage temperature: -40～+85℃
	Relative	5～95%, no condensation (at 40 ℃)
	working	A place free of explosive, corrosive gases and conductive dust, and
size	size	**23*23mm**
Installation method	Installation method	Pins (package available)

5. Function pins and application interface circuit

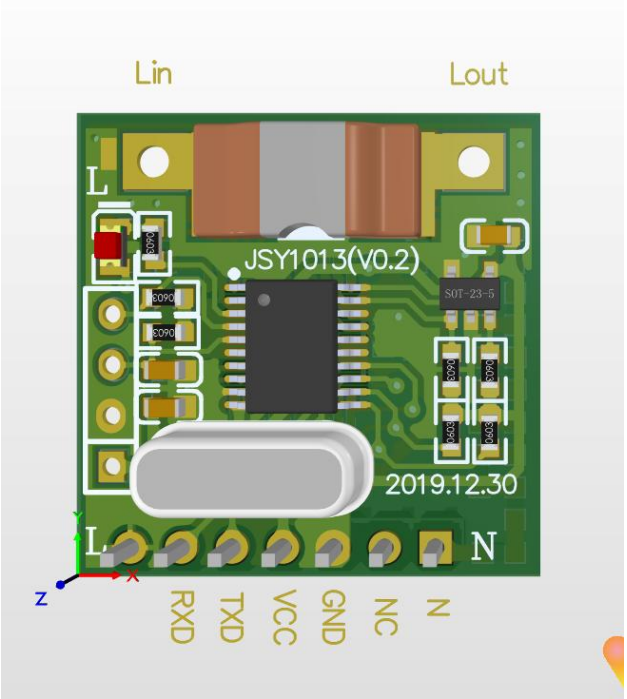


Figure 2 JSY1013 electrical parameter sensor function pin diagram

Pin name	Function definition	
Lin	The AC line under test enters	The DC positive pole under test enters
Lout	The AC live wire under test comes out	The measured DC positive pole output
N	AC neutral line under test	Tested DC negative pole
NC	null	
GND	Module working power supply DC ground (internally connected to Lin)	
VCC	Module working power supply DC3.3V-5V (requires separate isolated power supply)	
TxD	Module data sending pin (requires optocoupler isolation)	
RXD	Module data receiving pin (requires optocoupler isolation)	

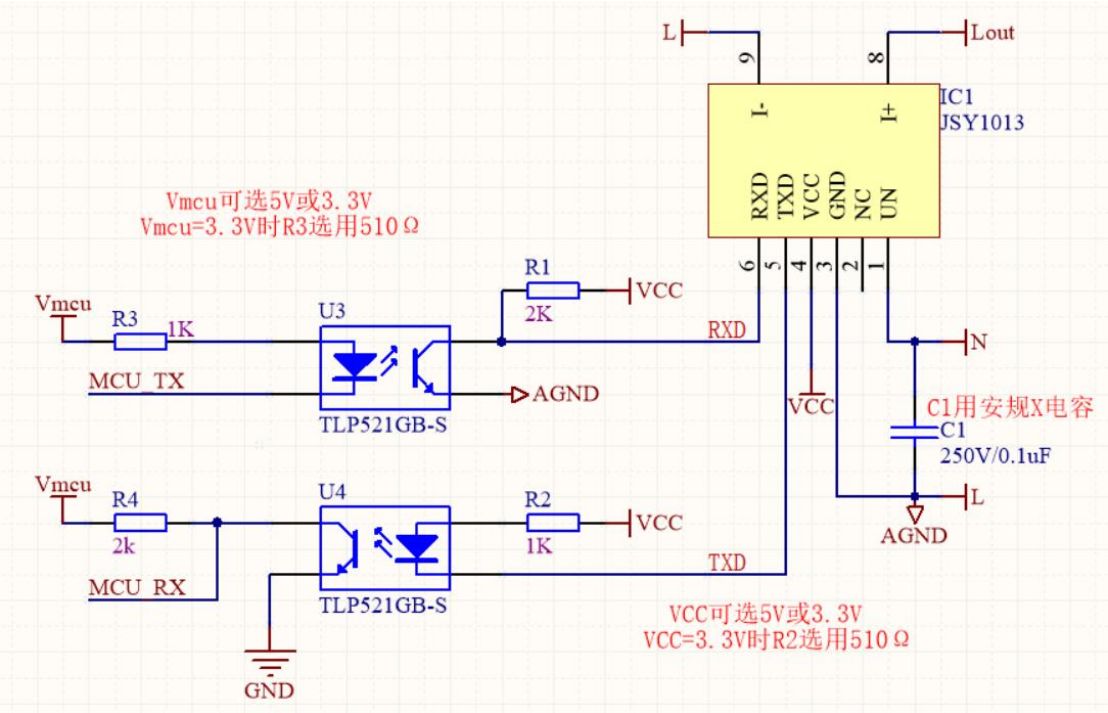


image 3 JSY1013 electrical parameter sensor application interface circuit diagram

Note: The sensor is directly connected to strong electricity and requires a separate power supply. Optocoupler isolation is used to transmit data. If you have any questions, please consult the manufacturer.

6. Dimensions

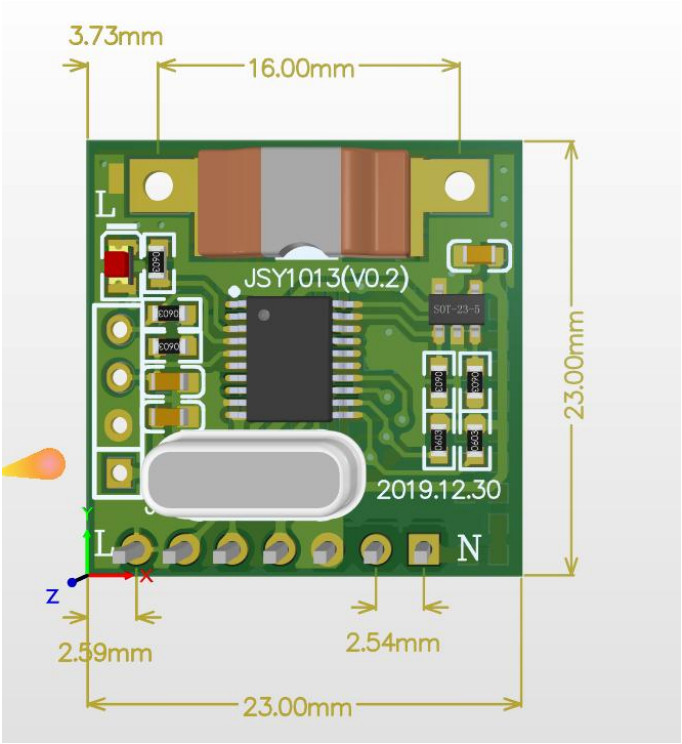


Figure 4 JSY1013 Electrical Parameter Sensor Dimensional Drawing

7.Register description

Table 1: System configuration reading parameter register address and data communication table (function code 03H read, 10H write)

serial number	definitio n	Register address	read/write	Specific instructions
1	Address and baud rate	0004H	read/write	The default value is 010 6 H; the default address is 01H, and the default communication format is 8, N, 1, 96 00bps 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, no check, that is, "8, N, 1"; "01" means 11 bits, even parity, that is, "8, E, 1"; "10" means 11 bits, odd parity, that is, "8, O, 1"; "11" means 11 bits, no parity, 2 stop bits, that is, "8, N, 2"; of the low byte are the baud rate, 4-2400bps , 5-4800bps , 6-9600bps

Table 2: 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 1013H
2	Model 2	0001H	read	reserve
3	Voltage range	0002H	read	The value is 250, which represents 250V
4	Current range	0003H	read	The value is 10 0, which represents 10 A

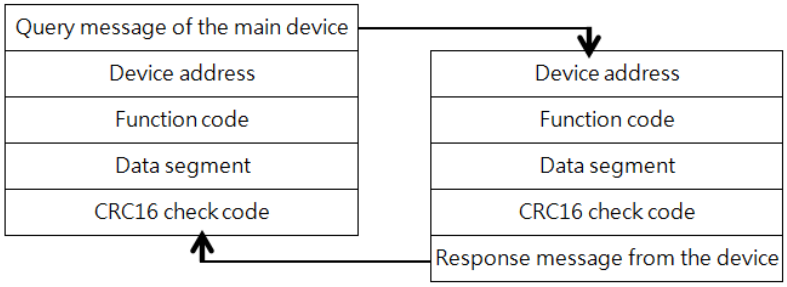
Table 3 : Measuring electrical parameter register and communication data table (function code 03H for reading, 10H for writing)

serial number	definition	Register address	read /write	Data types and calculation instructions
1	Voltage	0048H	read	Unsigned number, value=DATA/100, unit V
2	current	0049H 004AH	read	Unsigned number, value=DATA/100 0 0, unit A
3	Active power	004 B H 004CH	read	Unsigned number, value=DATA /100 , unit is W
4	Total active energy	004 D H 004 E H	Read and write	Unsigned number, value=DATA/ 100 , unit is kWh
5	power factor	004 F H	read	Unsigned number, value=DATA/1000
6	frequency	005 0H	read	Value = DATA/100, unit is Hz

8. Communication protocol

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.

Modbus protocol query response data flow



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.

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

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

Host sends: 01 03 00 48 00 02 44 1D

Address function code starting address data length CRC code

Slave response: 01 03 04 12 45 56 68 D0 D0

The 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 00 48 00 09 05 DA (read 9 registers starting from 0048 H)

Receive data: 01 03 1 2 5A E3 00 00 97 B2 00 01 61 18 00 01 E 0 34 03 E8 13 86 11 6A (The red part is the data corresponding to the 9 registers starting from 0048H)

Voltage=0x5AE3/100=232.67V

Current=0x000097B2/10000=3.8834A

Power=0x00016118/100=903.92W

Electric energy=0x0001E034/100=1229.32kWh

Power factor=0x03E8/1000=1.000

Frequency=0x1386/100=49.98Hz

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

Send data: 01 10 00 4D 00 02 04 00 00 00 00 36 06

Receive data: 01 10 00 4D 00 02 D1 DF

9. Precautions

9.1 Pay attention to the auxiliary power supply information on the product label. The auxiliary power supply level and polarity of the product must not be connected incorrectly, otherwise the product may be damaged.

9.2 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.

9.3 The voltage circuit or the secondary circuit of the PT must not be short-circuited.

9.4 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;

9.5 When using the product in an environment with strong electromagnetic interference, please pay attention to the shielding of the input and output signal lines.

9.6 When installed in a centralized manner, the minimum installation interval should not be less than 10mm.

9.7 Please do not damage or modify the labels and logos of the product, and do not disassemble or modify the product. Otherwise, the company will no longer provide "three guarantees" (guaranteed replacement, guaranteed return, and guaranteed repair) services for the product .

Contact Information:

Shenzhen Jiansiyan Technologies Co., Ltd.

Address: 901, Building 1, Taijiale Technology Industrial Park, Tongguan Road,
Tianliao Community, Yutang Street,Guangming District,Shenzhen,Guangdong,
518100, China.

Tel.: (+86) 0755 86524536 Fax: (+86) 0755 26628850

Web: www.jsypowermeter.com , E-mail: jsykj@outlook.com