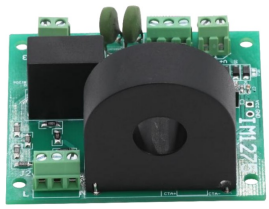

global sources IM1275 Electricity Metering Module User Manual

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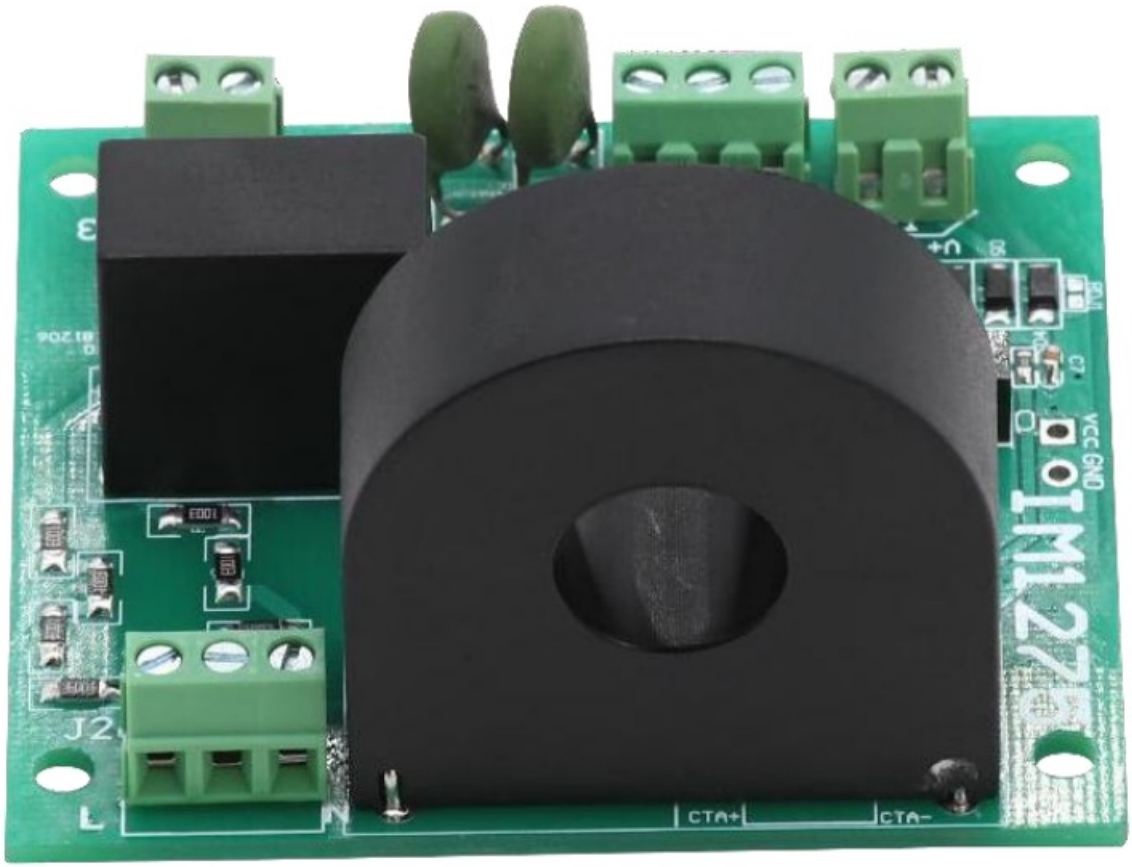
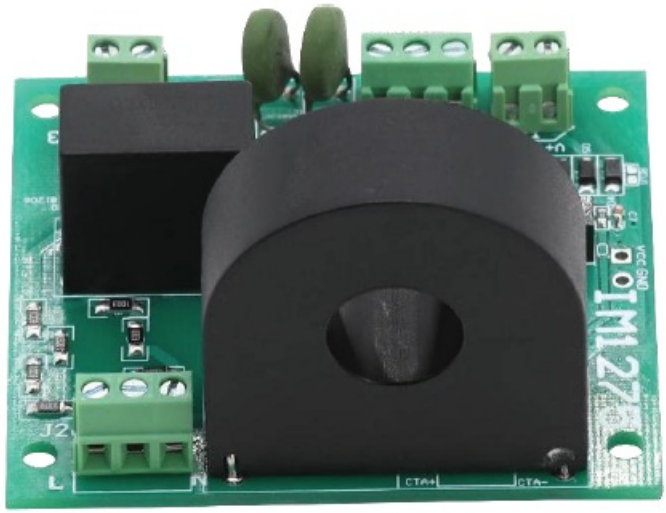


IM1275 electricity metering Module

The IM1275 single-phase AC electricity metering module is developed in order to adapt to various manufacturers to monitor the power consumption of their products; The software and hardware are widely used in the smart electricity meter. It is the smallest unit for electricity metering.
The accuracy is better than the national level 1 standard; The 45~65Hz AC
voltage, current, power, power factor, frequency, etc. can be measured. The communication protocol meets the standard of Modbus RTU communication protocol and DL/T645-2007 multi-function electricity meter communication. The automatic data collection and monitoring can be realized through the corresponding



interface, single-chip computers and ARM;

Overview

- A single module can collect single-phase AC parameters, including voltage, current, power, power factor, frequency, electric energy, temperature etc.
- It adopts an industrial-grade dedicated electricity metering SOC chip with high measurement accuracy.
- Standard 485 Communication with ESD protection Port, DL/T 645-2007 & MODBUS-RTU double protocol
- It can be reversed to restart when it is full, and the power data is protected against power failure
- It adopts a current transformer with Φ12.8mm, and the user can wear the wire with a nose, which is convenient.
- When it is overloaded, the PF pin can output the corresponding pulse. This pin can also be used to verify the electricity metering accuracy of the metering module by the calibration station through pulse collection.
- The product has obtained test report of the Metrology Institute

Application

The IM series AC and DC metering modules have been widely used in AC and DC charging piles, smart homes, dynamic environment monitoring FSU, smart security, lighting monitoring, smart parks, digital computer rooms, energy consumption management, battery monitoring etc.And it has been adopted and recognized by bench marking companies in different industries.It is important supporting modules for entering the Internet of Things era.

Notes

- Please refer to the corresponding diagram for correct wiring according to product specifications and models. Be sure to disconnect all signal sources before wiring to avoid danger and damage to the
- device. After checking that the wiring is correct, turn on the power to test.
- After it is powered, the red LED indicator is always on, and during communication, the red LED indicator flashes synchronously during transmission.
- It is set to the default configuration: address No. 1, baud rate 4800bps, data format “n,8,1”.It can be reset through the IM-S11 software.

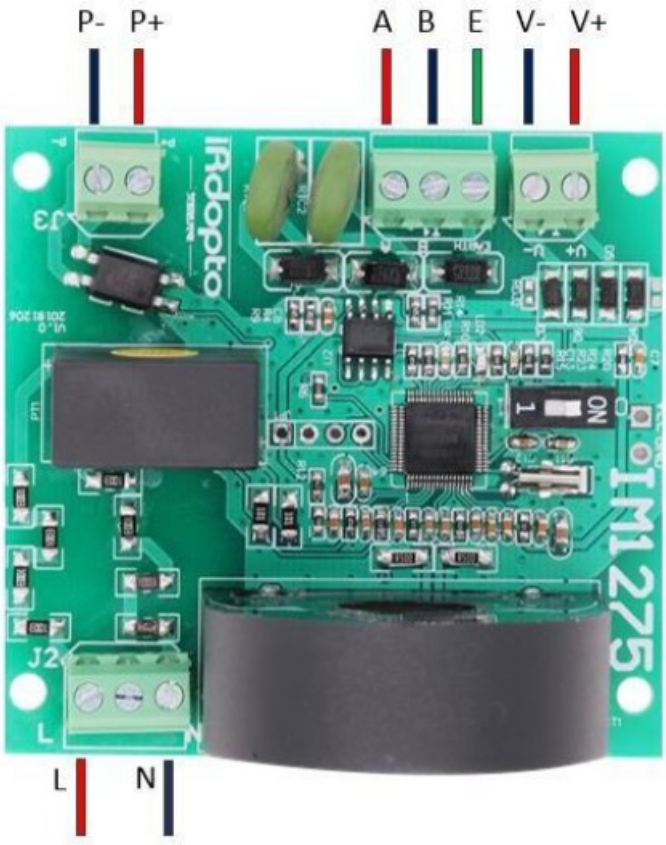
Technical Parameter

Parameter	
Active Accuracy	1.0
Voltage Range	1-380V ±0.5%F.S
Current Range	20mA-50A ±0.5%F.S
Current Range Extension	Extensible Range,Open transformer (Customized)
Frequency	AC45~65Hz
Temperature	Chip Temperature
Min. Power Variable	0.0001kW
Power factor	Measurable
Min. Electric energy variable	0.001kWh
Co2	Co2 National standard formula calculation
Communication	
Interface Type	485 Communication (Built-in ESD protection)
Communication Protocol	Communication Protocol DL/T 645-2007 & MODBUS-RTU
Data Format	“n,8,1”(No check data bits: 8 stop bit :1) by default
Baud rate	2400bps-19200bps 4800bps by default
Data refresh interval	≥250ms
Indicator	Power/Communication Red
Performance	
Typical Power Consumption	≤10mA
Power Supply	DC5.0V
Voltage Level	AC3000Vrms
Overload Capacity	1.2 * Range
Working Environment	

Working Temp.	-40 +80℃
Relative humidity	5 95% No dense under 40℃
Altitude	0 3000 m
Working Environment	place which there is no explosion, corrosive gas and conductive dust, no signi ficant vibration and impact
Dimension	
Dimension	60mmx 65mmx 40mm
Pin interval	3.81mm
Transformer aperture	Φ12.8mm
Installation	Four corner fixing holes (3.5 aperture) for installation

Note 1: Here is the relative error

Definition of Module Pin



Pin	Function
V+	Power Supply positive
V-	Power Supply Negtive
Notes The Voltage is the power supply voltage for the module, which is 5V by default. 3.3V power supply is available when short- circuiting the RDJ1 and RDJ2 point. At this time, the reverse connec tion protection function is invalid. Ensure correct wiring or it will directly burn out.	
EARTH	Ground, idle if no need
B	External 485B
A	External 485A
P+	External pulse P+
P-	External pulse P-
L	For measured fire wire
N	For measured zero wire

Modbus Communication Protocol

Modbus Protocol Electric Parameter Register List 1 4 bytes per address, high byte first

Serial No.	Items	Register Address	Length	Read/ Write	Type and explanation
1	Voltage	0048 H	4	Read	Hexadecimal Unsigned numbers Unit 0.0001W Actual Value= HEX2DEC(Register Value) x Unit
2	Current	0049 H	4	Read	Hexadecimal Unsigned numbers Unit 0.0001A
3	Active Power	004A H	4	Read	Hexadecimal Unsigned numbers Unit 0.0001W
4	Active electric energy	004B H	4	Read/ Write 0	Hexadecimal Unsigned numbers Unit 0.0001KWh
5	Power factor	004C H	4	Read	Hexadecimal Unsigned numbers Unit 0.0001W
6	Co2 Emission	004D H	4	Read	Hexadecimal Unsigned numbers Unit 0.0001Kg
7	Temperature	004E H	4	Read	Hexadecimal Unsigned numbers Unit 0.01℃
8	Frequency	004F H	4	Read	Hexadecimal Unsigned numbers Unit 0.01Hz
9	Address and baud rates	0004 H	2	Read/ Write	Hexadecimal Default Value 0105H (Address 01H 8,N, 1,4800) Default Address 1 High Bytes represent Address range 1~255 0 is Broadcast Address.Low Bytes: High 2 data format (00: 10 bits data “8,N,1″) No check 1 end bit (01: 11 bits data “8,E,1″) Even Parity Check 1 end bit (10: 11 bits data “8,O,1″) Odd Parity Check 1 end bit Low Bytes Low 4 bits represent Baud rates (3 1200bps 4 2400bps)
					(5 4800bps 6 9600bps) (7 19200bps

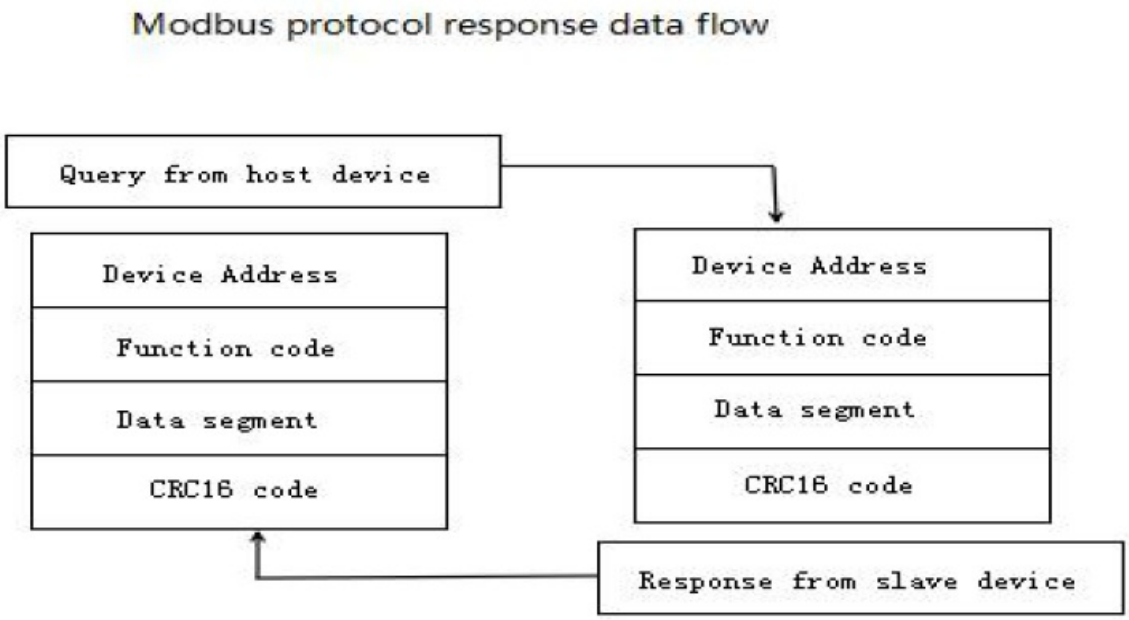
Modbus Protocol Electric Parameter Register List 2 2 bytes per address, high byte first

Serial No.	Defi niti on	Register address	Read /Write	Type and explanation
1	Voltage	0048H	Read	Unsigned number, Value=DATA/100, unit V
2	Current	0049H	Read	Unsigned number, Value=DATA/100, unit A
3	Active Power	004AH	Read	Unsigned number, Value=DATA, unit W
4	Active Total en ergy	004BH	Read	Unsigned number, Value=DATA/3200, Unit kWh
		004CH	Read	
5	Power factor	004DH	Read	Unsigned number, Value=DATA/1000
6	Co2 Emission	004EH	Read	CO2 High emission
		004FH	Read	CO2 Low emission, Value=DATA/1000, Unit Kg
7	Temperature	0050H	Read	Reserve
8	Frequency	0051H	Read	Value=DATA/100, Unit Hz
9	Address and br aud rates	0004H	Read /Writ e	Hexadecimal Default Value 0105H (Address 01H 8,N,1,4800) Def ault Address 1 High Bytes represent Address range 1~255 0 is Broadcast Address.Low Bytes: High 2 data format (00: 10 bits data “8,N,1″) No check 1 end bit
				(01: 11 bits data “8,E,1″) Even Parity Check 1 end bit (10: 11 bits d ata “8,O,1″) Odd Parity Check 1 end bit Low Bytes Low 4 bits repr esent Baud rates (3 1200bps 4 2400bps) (5 4800bps 6 9600bps) (7 19200bps

Modbus Communication Protocol

This instrument provides Uart TTL communication interface, which adopts standard Modbus-RTU protocol. All kinds of data information can be transmitted on the communication line. Each network instrument can set its communication address. And the communication connection should use shielded twisted-pair wire with copper net, whose diameter is no less than 0.5mm2. When wiring, keep the communication line away from strong electric cables or other strong electric field Environment.
The Modbus protocol uses a master-slave response communication connection method on a communication line. First, the signal of the host computer is
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: All communication data streams are transmitted in the opposite two directions along a communication line (half-

duplex Working mode). The Modbus protocol only allows communication between the host (PC, PLC, etc.) and terminal devices, 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 response Inquiry signal to the machine.



Host device 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 be performed, for example, the function code 03 or 04 requires the slave device to Read registers and return their contents; the data segment contains the slave device's requirements for any additional information of the execution function, the check code is used to check the correctness of a frame of information. The slave device provides a method to verify whether the message content is correct. It uses the CRC16 calibration rule.
Slave device response: If the slave device generates a normal response, the response message contains the address code, function code, data information code and CRC16 check code. The data information code includes the data collected from the device: such as register value or status. If an error occurs, we agree that the slave device will not respond.
We stipulate the communication data format used in this instrument: the bits of each byte (1 start bit, 8 data bits, Odd Parity Check or Even Parity Check or No check, 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 byte	2 byte (Low byte first)

- **Device Address:** Consists of one byte. The Address of each terminal device must be unique, and only the addressed terminal will respond to the corresponding query.
- **Function code:** tells what function the addressed terminal performs. The following table lists the function codes supported by this series of instruments and their functions.

Function Code	Function
03H	Read one or more register value
10H	Write one or more register value

Contains the data required by the terminal to perform a specific function or the data collected when the terminal responds to a query. The content of these data may be numerical values, reference addresses, or set 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, mistake will happens.
Process of generating a CRC16

- Preset a 16-bit register as 0FFFFH (all 1s), which is called CRC register.
- XOR the 8 bits of the first byte in the data frame with the low byte in the CRC register, and store the result back to the CRC register.
- Shift the CRC register one bit to the right, fill the highest bit with 0, and shift the lowest bit out and check.
- If the lowest bit is 0: repeat the third step (the next shift); if the lowest bit is 1: XOR the CRC register with a preset fixed value (0A001H).
- Repeat the third and fourth steps until 8 shifts. A complete eight bits have been processed in this way.
- Repeat steps 2 to 5 to process the next eight bits until all bytes are processed.
- The final value of the CRC register is the value of CRC16.

Modbus RTU Communication Protocol cases
Function code 0x03 Read multi-port register
Eg The host device needs to read Address as 01, and start sending data from the 2 slave registers with Address as 0048H: 0103 00 4800 02CRC
Address Function code Start Address Length CRC code
Slave device responds 010308HH HH HH HH CRC
Address Function code Return bytes No.
Register Data 1 Register Data 2 CRC code Function Code 0*10 :

Write multi port register

E.g The host device need save 0000,0000 to the slave Register whose Address is 000C,000D (the address code of the slave is 0x01)

Notes: When setting parameters, do not write illegal data (that is, the data value that exceeds the limit of the data range);

Communication Messages Case

Read Data Register (Function code 03H) Read 8 Register value which starts with 48H Host device Read
Data frame 01 03 00 48 00 08 C4

Address	Command	Start Address (High byte first)	Register number (High byte first)	Check code (Low byte first)
01H	03H	00H,48H	00H,08H	C4H,1AH

nt responds Data frame 01 03 20 00 21 8D D8 00 01 38 75 01 0C 63 08 00 00 00 5A 00 00 03 E8 00 00 00 59 00 00 0C CB 00 00 13 88 1B C2
It is Address 01Voltage 219.9000VCurrent 7.9989APower 1758.9000W
Electric Energy 0.0090kWhPower
Factor 1.000Co2 0.0089Kg
Frequency 50.00Hz

E.g Voltage actual value= HEX2DEC(00 21 8D D8) Hexadecimal to Decimal x 0.0001V Unit = 219.9000V

Address	Command	Data length	Data segment (4 bytes/32 bytes),hexadecimal Check code	Check code
01H	03	20H	00 21 8D D8 00 01 38 75 01 0C 63 08 00 00 00	1BH,C2H
	H		5A	
			00 00 03 E8 00 00 00 59 00 00 0C CB 00 00 13 88	

Write Data Register (Function code 10H): Clear
Host device Write Data frame 01 10 00 4B 00 02 04 00 00 00 00 B6 2C

Address	Command	start address	Register	Bytes number	Data segment	Check code
01	10H	00H,4BH	00H,02H	04H	01H 10H 00H,4BH	B6H,2CH
H					00H,02H 2BH,F0H	

Instrument responds Data frame 01 10 00 4B 00 02 2B F0

Address	Command	start address	Register	Check code
01H	10H	00H,4BH	00H,02H	2BH,F0H

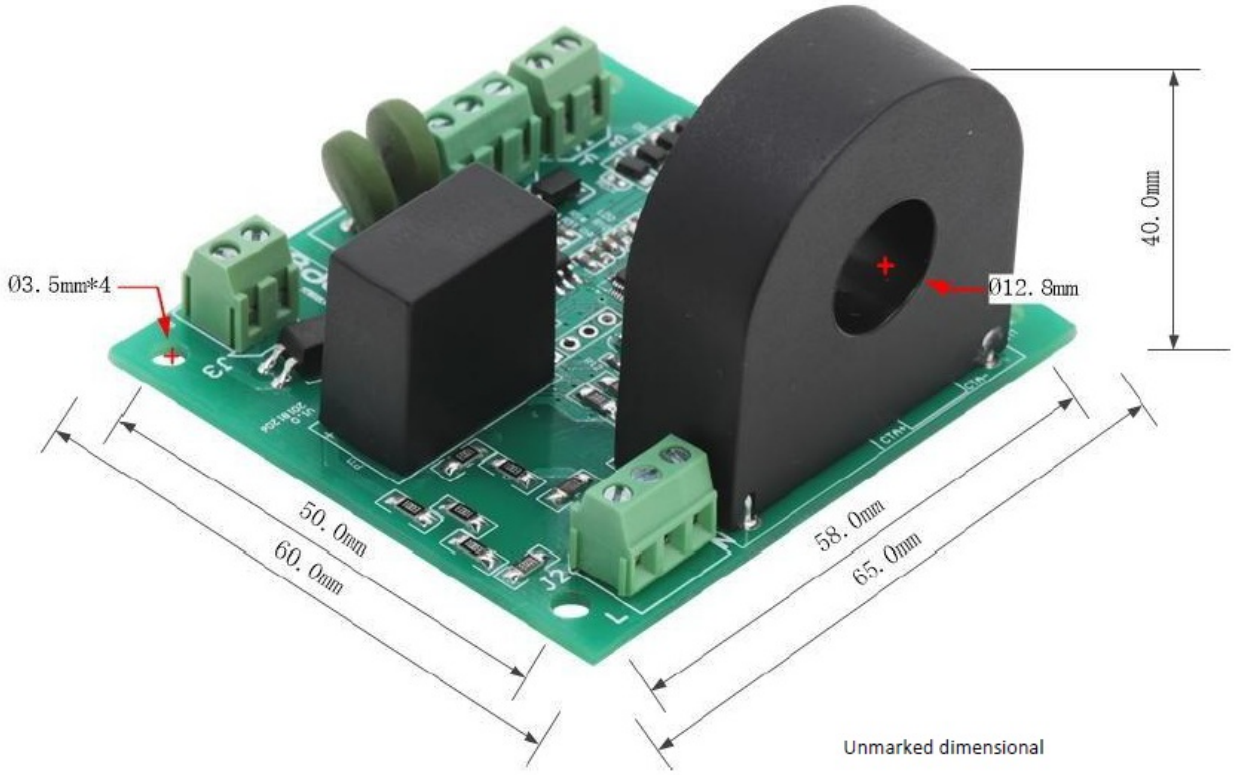
DL/T 645-2007 electricity meter Communication Protocol

The DL/T645 protocol is an industry communication protocol for meter communication. If you are not familiar with it, it is not recommended

645 protocol electric parameter Register List

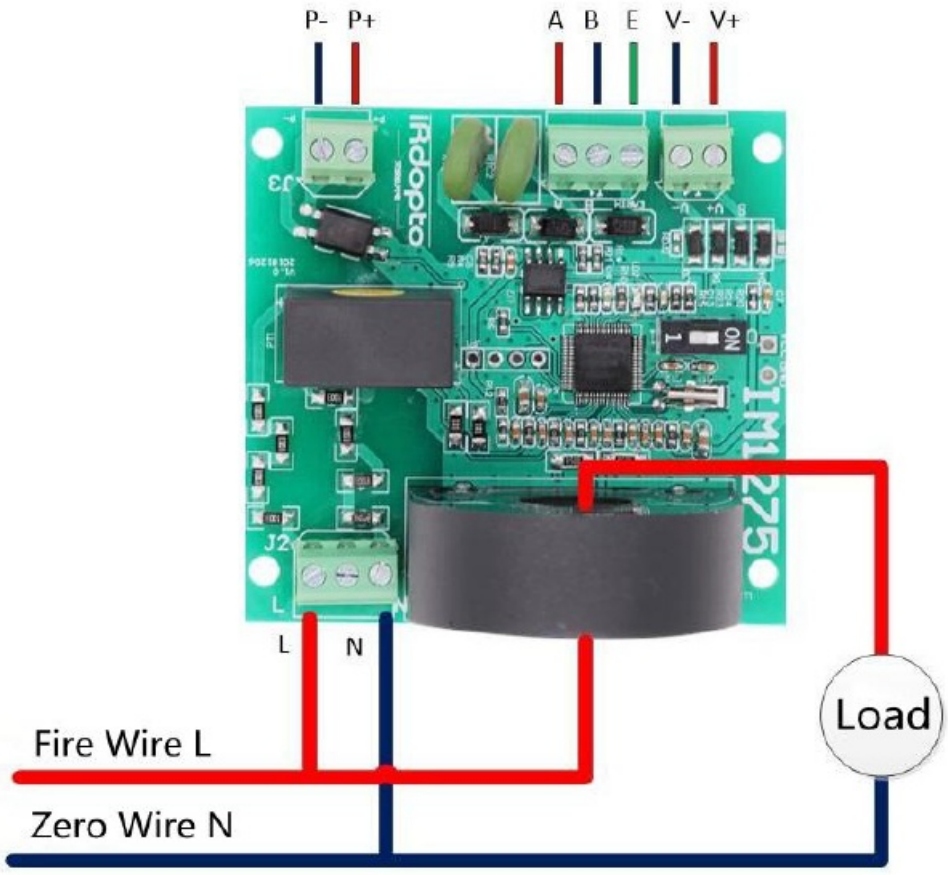
Serial No.	Definition	Register address	Length	Read/Write	Type and explanation
1	Voltage	02010100	2	Read	XXX.X unit 0.1V
2	Current	02020100	3	Read	XXX.XXX unit 0.001A
3	Active Power	02030000	3	Read	XX.XXXX unit 0.0001kW
4	Active Total energy	00000000	4	Read/Write 0	XXXXXX.XX unit 0.01KWh
5	Entensive total energy	80800001	4	Read/Write 0	Hexadecimal Unsigned numbers Unit 0.0001 W
6	Power factor	02060000	2	Read	X.XXX unit 0.001
7	Temperature	02800007	2	Read	XXX.X unit 0.1℃
8	Frequency	02800002	2	Read	XX.XX unit 0.01Hz
9	Address	04000401	6	Read/Write	NNNNNNNNNNNN default 111111111111
10	Baud rate	04000703	1	Read/Write	16 unsigned numbers (04 1200bps 08 2400bps) (10 4800bps 20 9600bps)
					(40 19200bps

Module Pin Dimension

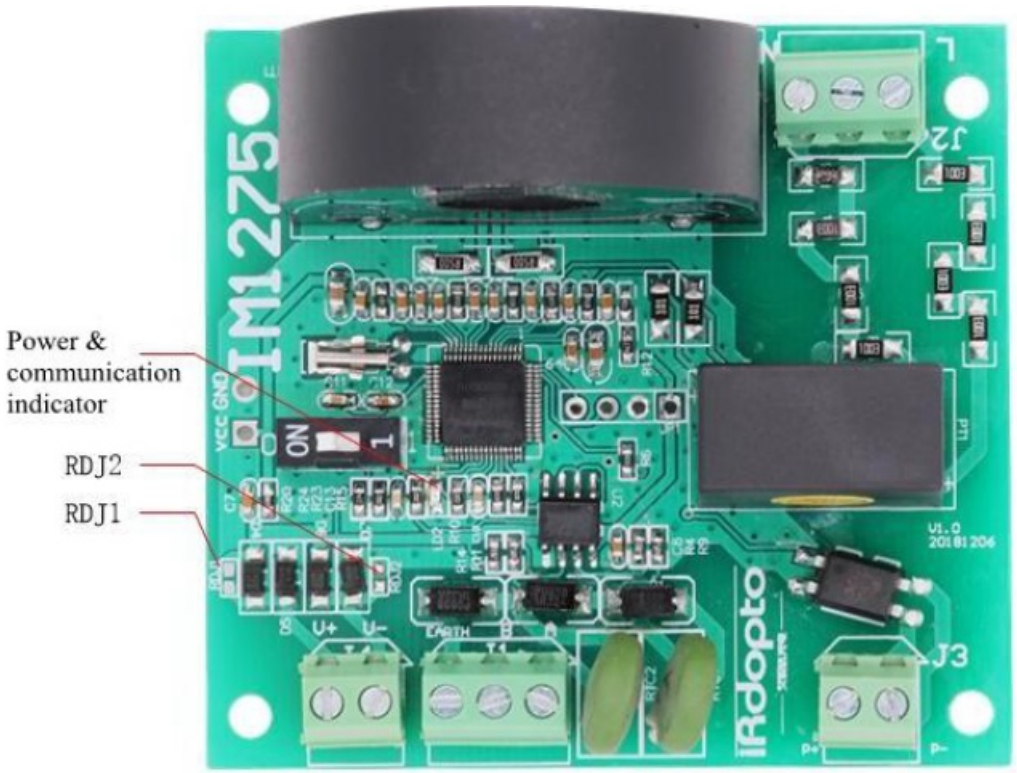


Wiring diagram

IM1275 Standard wiring diagram



IM1275 short-circuit point indication diagram



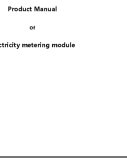
Notes

- This product contains quartz crystal, so ultrasonic cleaning is strictly prohibited.
- The surface of this product is sprayed with three-proof paint for protection, and it is strictly forbidden to clean the surface of the product

Precautions

1. Please refer to the diagram for correct wiring according to the product specifications and models. Be sure to disconnect all signal sources and power before wiring to avoid danger and damage to the equipment. After checking that the wiring is correct, turn on the power to test.
2. The voltage circuit or the secondary circuit of the PT cannot be short-circuited.
3. When there is a 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 connect live wires or unplug the terminals.
4. 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.
5. For centralized installation, the Min. installation interval should not be less than 10mm.
6. There is no lightning protection circuit in this series of products. When the input and output feeders of the module are exposed to a harsh outdoor environment, lightning protection is a must.

Documents / Resources

	**global sources IM1275 Electricity Metering Module** [pdf] User Manual IM1275 Electricity Metering Module, IM1275, Electricity Metering Module, Metering Module, Electricity Module, Electricity

References