

WH-M Temperature and Humidity Module

Installation and Operation Instruction V1.0

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1 Overview

WH-M temperature and humidity module is mainly used for testing the internal temperature and humidity of medium and high voltage switch cabinet, terminal box, ring main unit, box substation and other equipment. This module adopts special shell, with good ventilation effect, delicate appearance, can effectively protect internal components, improve service life, and facilitate installation and wiring.

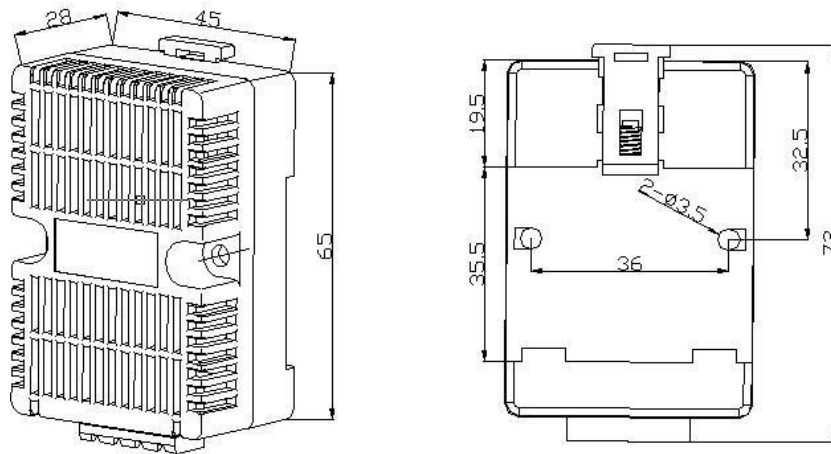
2 Product name

WH-M temperature and humidity module

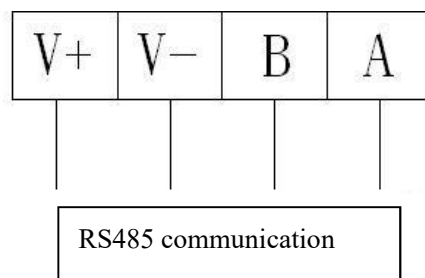
3 Technical parameter

| Technical parameter | | Index |
|----------------------------|-------------|---|
| Measuring range | Temperature | -40.0°C~80.0°C |
| | Humidity | 20%RH~95%RH |
| Accuracy | Temperature | ±1°C |
| | Humidity | ±5%RH |
| Communication | | RS485, (MODBUS-RTU) protocol |
| Auxiliary power supply | Voltage | DC 12~24V |
| | Consumption | ≤0.5W |
| Mean time between failures | | ≥50000 hour |
| Environment | Temperature | -40°C~+80°C |
| | Humidity | ≤95%RH, No condensation, no corrosive gas |
| | Altitude | ≤2500 m |

4 Dimension



5 Wiring



6 Communication instruction

6.1 Communication overview

The meter uses the Modbus-RTU communication protocol, which defines in detail the check codes, data sequences, etc., which are necessary for specific data exchange. The MODBUS protocol USES a master-slave responder connection (half duplex) on one communication line. When the main computer's signal is addressed to a unique terminal (slave), the terminal sends a reply signal for transmission to the host.

MODBUS protocol only allows communication between the host computer (PC, PLC, etc.) and the terminal device, but does not allow data exchange between independent terminal devices, so that each terminal device will not occupy the communication line during their initialization, but only respond to the query signal arriving on the machine.

6.1.1 Transmission mode

Information transmission for asynchronous, in bytes, message communication between host and from machine is 10 word format, consists of a start bit, 8 data bits (least significant bit first send), no parity, 1 stop bit, and the parity bit or as two stop bits, is 11 word format.

6.1.2 Information frame format

| | | | |
|--------------|--------------|-----------|----------------|
| Address code | Address code | Data area | CRC check code |
| 1 byte | 1 byte | n byte | 2 byte |

Address code: the address code consists of a byte (8-bit binary code) at the beginning of the frame, with a decimal value of 0 ~ 255, only 1 ~ 247 is used in wh-m meters, and other addresses are reserved. These bits indicate the address of the user-specified terminal device that will receive the host data from which it is connected. The address of this device is set according to the last three digits of the order stream number (example: the order stream number JYZ17030550007, the address is set as 00007), the universal address is 250 (use 250 address when you do not know the address), the address of each terminal device must be unique, only the terminal addressed to will respond to the query containing the address. When the terminal sends back a response, the slave address data in the response tells the host which terminal is communicating with it.

Function code: the function code tells the terminal being addressed what function to perform. The following table lists the function codes used in this series of instruments, as well as their meanings and functions.

| Function | Definition | Operation |
|----------|----------------|--|
| 03H/04H | Read register | Gets the current binary value of one or more registers |
| 10H | write register | Set binary values to a series of multiple registers |

Data area: the data area contains the data required by the terminal to perform a specific function or the data collected by the terminal in response to a query. The contents of this data may be numeric values, reference addresses, or set values. For example, the function code tells the terminal to read a register, the data area needs to indicate which register to start from and how many data to read, and the embedded address and data vary according to the type and content of the slave.

CRC validation code: the error check (CRC) field takes two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmission device and then attached to the data frame. The receiving device recalculates the CRC value when it receives the data, and then compares it with the value in the received CRC field. If the two values are not equal, an error occurs.

The process of generating a CRC is:

- a、
preset 16-bit register of 0FFFFH (full 1) is called a CRC register.
- b、
The 8 bits of the first byte in the data frame are xor with the low bytes in the CRC register, and the result is stored back in the CRC register.
- c、
Move the CRC register one bit to the right, fill in the highest bit with 0, and check the lowest displacement.
- d、
If the lowest position is 0, repeat step 3 (next shift); If the lowest point is 1, the CRC register is xor with a preset fixed value (0A001H).
- e、
Repeat steps 3 and 4 until you have 8 shifts. That completes a complete eight.
- f、
Repeat steps 2 through 5 to process the next eight bits until all byte processing is complete.
- g、
The value of the final CRC register is the value of the CRC.

In addition, there is another method to calculate CRC using a preset table, which is characterized by fast computation speed, but requires large storage space. This method is not described here, please refer to the relevant information.

6.2 Communication address list

| Address | Parameter | Read-write property | Numeric range | Data type |
|---------|------------|---------------------|-----------------------------|------------|
| 0000H | Temp value | R | -4000-8000, 2 decimal point | signed int |
| 0001H | Humidity | R | | signed int |

| | | | | |
|-------|----------------------------|-----|--|--------------|
| | value | | 0-9500,percentage, two decimal point (0% ~ 90%), | |
| 0002H | Reserve | R | | signed int |
| 0003H | Communication address | R/W | 1-247 | signed int |
| | | | | |
| 0004H | Humidity original AD value | R | | signed int |
| 0005H | Temperature offset value | R/W | Display temperature = measured temperature + set value | signed int |
| 0006H | Humidity offset value | R/W | Display humidity = measured humidity * set value /100 | signed int |
| 0007H | Offset enable | R/W | 0xace1== -21279 | signed int |
| ... | ... | ... | | |
| 0200H | Communication address | R/W | 1-247 | unsigned int |
| 0201H | Communication baud rate | R/W | 0-5: 1200、2400、4800、9600、19200、38400bps | unsigned int |
| 0202H | Communication protocol | R/W | 0: Modbus RTU | unsigned int |
| 0203H | Communication check bit | R/W | 0-2: no check, even check and odd check | unsigned int |
| 0204H | Communication data bit | R/W | 1:8 data bits | unsigned int |
| 0205H | Communication | R/W | 0-1:1 stop bits, 2 stop bits | unsigned int |

| | stop bit | | | |
|-------|--------------------------------------|-----|---|--------------|
| 0206H | Communication time delay response | R/W | The delay time is set to a value of *10 milliseconds | unsigned int |
| 0207H | Communication active output interval | R/W | The time interval is set to a value of *10 milliseconds | unsigned int |

6.3 Communication parameter instruction

1) Temperature value (0000H)

If the measured temperature value is 0702H and the temperature offset value (address: 0005H) is 0064H, then the return value of address 0000H is $0702H+0064H$, then the temperature value = $(0702H+0064H) / 100 = 18.94^{\circ}\text{C}$

2) Humidity value (0001H)

If the humidity measurement value is 071DH and the humidity offset value (address: 0006H) is 005AH, then the return value of address 0001H is $071DH*005AH/100$, then the humidity value = $(071DH*005AH/100) / 10000 = 16.3$.