# Methane transmitter User manual (Type 485)

Document version：V1.0

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# 1.product description

## 1.1product description

The methane transmitter designed by our company adopts the explosion-proof ExdIMb explosion-proof sensor. It has strong safety, fast response speed and strong anti-interference ability. It has passed our unique compensation algorithm and multi-stage standard gas. Calibration also features long life, high precision, high repeatability and high stability. Applicable to underground pipe corridors, underground parking lots, public toilets, garages, workshops, chemical plants, greenhouse farms, etc. where real-time monitoring of methane concentration is required.

The device adopts wide voltage 10-30V DC power supply, 485 signal output, standard Modbus-RTU communication protocol, ModBus address can be set, baud rate can be changed, communication distance is up to 2000 meters.

## 1.2Features

■ The sensor with explosion-proof ExdIMb explosion-proof rating is stable and durable.

■ Range 0-100% LEL, other ranges can also be customized.

■ High measurement accuracy, up to ±5% FS, repeatability up to ±7%.

■ 485 communication interface standard ModBus-RTU communication protocol, address, baud rate can be set, the communication distance is up to 2000 meters.

■Optional high-quality OLED display, the value can be directly viewed on the spot, and the night can be clearly displayed.

■ On-site power supply adopts 10~30V DC wide voltage power supply, which can adapt to various DC power supplies in the field.

■ The product adopts wall-mounted waterproof case, which is easy to install and has high protection level and can be applied to harsh environment.

## 1.3Main Specifications

| Power supply | 10~30V DC |
|---|---|
| output signal | 485 |
| Power consumption | 0.9W |
| Temperature measurement range | -40℃~+80℃ |
| Humidity measurement range | 0~100%RH |
| Temperature accuracy | ±0.5℃ |
| Humidity accuracy | ±3%RH |
| Operating temperature | -20~40℃ |
| Working humidity | 0~95%RH without condensation |
| Pressure range | 80~116Kpa |
| Stability (months) | ≤7% signal value/year |

| Repeatability | ≤2% |
|---|---|
| Response time | ≤15S |
| Methane zero drift | ±0.06% |
| Repeatability | ≤7% signal value/year |
| Service life | ≥24 months |
| Precision | ±5% FS, no less than 5% Vol oxygen environment |
| Resolution | 1% LEL |

All the above specifications are measured under ambient conditions: temperature 20 ° C, relative humidity 50% RH, 1 atmosphere, and the gas concentration to be measured does not exceed the sensor range.

**Note:** The use and storage environment must not contain hydrogen sulfide gas, silicone vapor and paint volatiles, otherwise it will affect the sensitivity of the components. This product should not be used in an oxygen-free environment, and the oxygen concentration should not be lower than 5% VOL.

## 1.4product model

Methane transmitter selection:

| RS | | | | | Company code |
|---|---|---|---|---|---|
| | CH4- | | | | Methane transmitter |
| | | N01- | | | 485 (Modbus protocol) |
| | | | 2- | | Wall-mounted king shell |
| | | | OLED- | | Wall-mounted king shell with OLED display |
| | | | | 100LEL | Corresponding range 0~100% LEL model |

Methane temperature and humidity three-in-one transmitter selection:

| RS | | | Company code |
|---|---|---|---|
| | CH4WS - | | Methane temperature and humidity three-in-one transmitter |

| | | | | |
|---|---|---|---|---|
| | N01- | | | 485 (Modbus protocol) |
| | | 2- | | Wall-mounted king shell |
| | | | 100LEL | Corresponding range 0~100% LEL model |

## 1.5 System framework
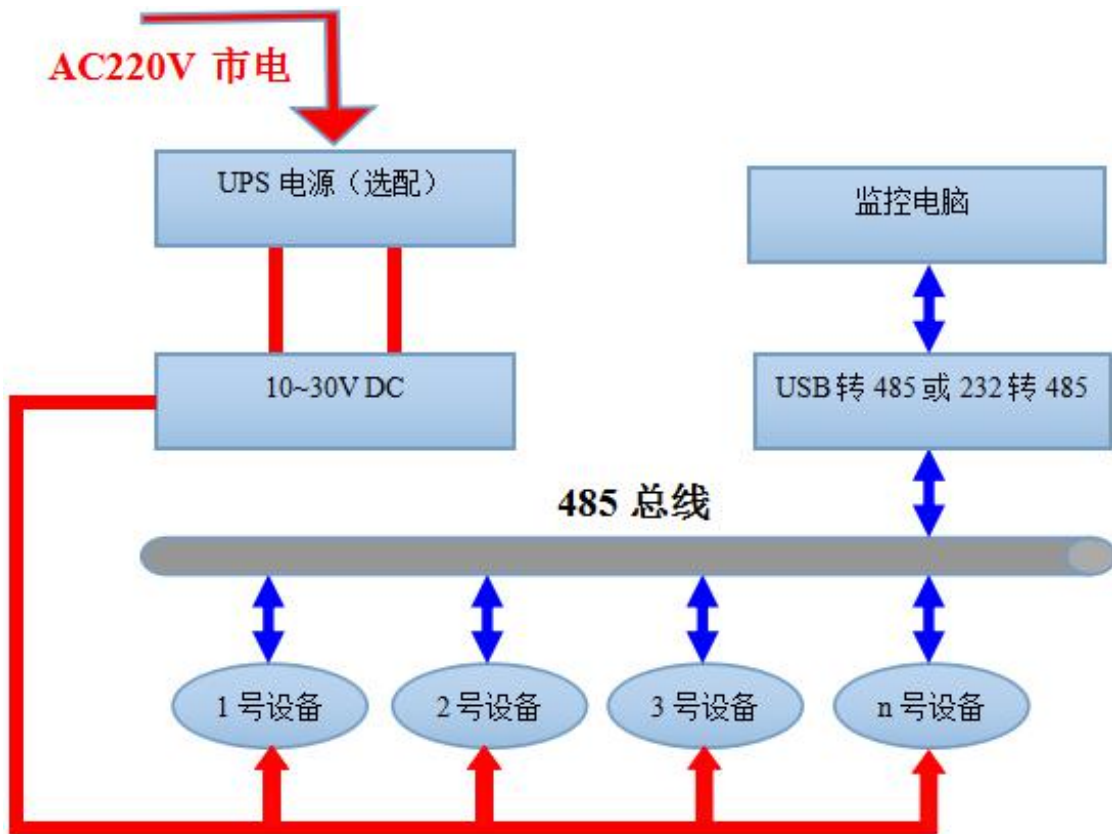
# 2.Equipment installation instructions

## 2.1Equipment inspection before installation

Equipment List:

■Methane transmitter equipment 1

■ Self-tapping screws (2), expansion plugs (2)

■Product certificate, warranty card, wiring instructions, etc.

■USB to 485 (optional)

## 2.2Installation step description



▲钻孔          ▲膨胀塞放入孔内          ▲自攻螺丝旋进膨胀塞
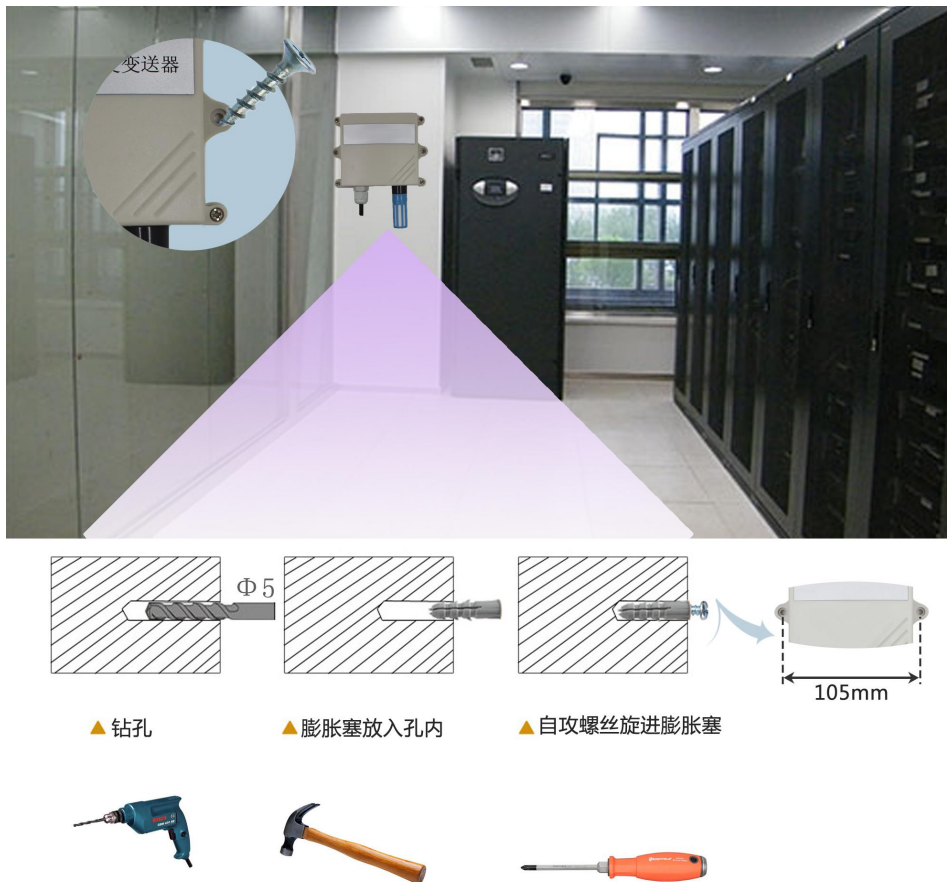
## 2.3Interface Description

　　Wide voltage power input can be 10~30V. When wiring the 485 signal line, note that the A\B lines cannot be connected in reverse, and the addresses between multiple devices on the bus cannot conflict.。

|  | Line color | Description |
|---|---|---|
| power supply | brown | Power supply (10~30V DC) |
|  | black | Negative power supply |
| Communicatio n | yellow | 485-A |
|  | blue | 485-B |

## 2.4 485 field wiring instructions

When multiple 485 models are connected to the same bus, there are certain requirements for field wiring. For details, please refer to the 485 Equipment Field Wiring Manual in the data package.

# 3.Configuration software installation and use

## 3.1Software selection

Open the package and select "Debug Software"---"485 Parameter Configuration Software"

to find 485参数配置工具V3.1.exe Open it.

## 3.2parameter settings

1.Select the correct COM port ("My Computer - Properties - Device Manager - Port" to view the COM port). The following figure lists the drive names of several different 485 converters.
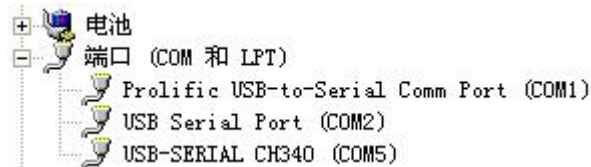


2. Connect only one device and power on separately. Click the test baud rate of the software. The software will test the baud rate and address of the current device. The default baud rate is 4800 bit/s and the default address is 0x01.

3. Modify the address and baud rate according to the needs of use, and query the current functional status of the device.

4. If the test is not successful, please re-check the equipment wiring and 485 driver installation.

5, click on the corresponding gas, you can directly view the current real-time value of the gas

6, note: this software can only set 2400bit / s, 4800bit / s, 9600bit / s three baud rate
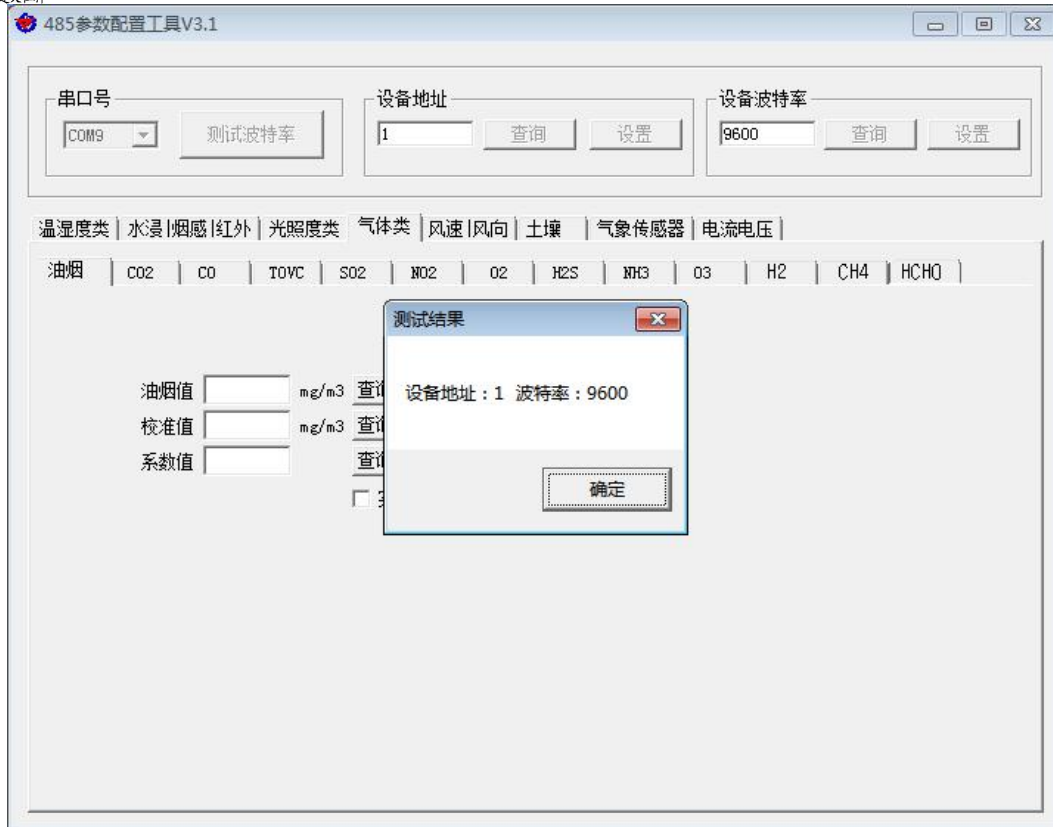
# 4.letter of agreement

## 4.1Basic communication parameters

| Code | 8-bit binary |
|------|--------------|
| Data bit | 8 digits |
| Parity bit | no |
| Stop bit | 1 person |
| Error check | CRC (redundant cyclic code) |
| Baud rate | 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s |

## 4.2Data frame format definition

Adopt Modbus-RTU communication protocol, the format is as follows:

Initial structure ≥ 4 bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure ≥ 4 bytes of time

Address code: the address of the transmitter, which is unique in the communication network (factory default 0x01)。

Function code: The instruction function of the command sent by the host. The transmitter can use function code 0x03 (read register data) 0x06, 0x10 (write register data).

Data area: The data area is the specific communication data. Note that the 16-bit data high byte is in front!

CRC code: Two-byte check code.

Host inquiry frame structure:

| address code | function code | Register start address | Register length | Check code low | Check code high |
|---|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 1 byte | 1 byte |

Slave response frame structure:

| address code | function code | Effective number of bytes | Data area | Second data area | Nth data area | Check code |
|---|---|---|---|---|---|---|
| 1 byte | 1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes | 2 bytes |

## 4.3 Register address

Single methane equipment

| Register address | PLC or configuration address | content | operating | Scope and definition |
|---|---|---|---|---|
| 0000 H | 40001 | Methane concentration value | Read only | 0-100%LEL |
| 0002 H | 40003 | | | |

Methane temperature and humidity integrated equipment

| Register address | PLC or configuration address | content | operating | Scope and definition |
|---|---|---|---|---|
| 0000 H | 40001 | Humidity value | Read only | 0~1000 （The value after expanding 10 times） |
| 0001 H | 40002 | Temperature value | Read only | -400~800 （The value after expanding 10 times） |

| 0002 H | 40003 | Methane concentration value | Read only | 0-100%LEL |
|--------|-------|------------------------------|-----------|-----------|
| 0032 H | 40051 | Temperature calibration value | Read and write | Expand 10 times write |
| 0035 H | 40054 | Humidity calibration value | Read and write | Expand 10 times write |
| 0038 H | 40057 | Methane calibration value | Read and write | Actual value write |
| 07D0 H | 42001 | Device address | Read and write | 1~255 (factory default 1) |
| 07D1H | 42002 | Device baud rate | Read and write | 0 for 2400 1 for 4800 2 represents 9600 |

## 4.4 Communication protocol example and explanation

### 4.4.1 Read the address of the 0x01 device and the baud rate

Inquirer frame (for example: address is 0x01 baud rate is 4800)

| address code | function code | initial address | Data length | Check code low | Check code high |
|--------------|---------------|-----------------|-------------|----------------|-----------------|
| 0x01 | 0x03 | 0x07 0xD0 | 0x00 0x02 | 0xC4 | 0x86 |

Response frame

| address code | function code | Effective number of bytes | Baud rate | address | Check code low | Check code high |
|--------------|---------------|---------------------------|-----------|---------|----------------|-----------------|
| 0x01 | 0x03 | 0x04 | 0x00 0x01 | 0x00 0x01 | 0x6A | 0x33 |

### 4.4.2 Change address

Inquiry frame (assuming the modified address is 0x02 Note: After the address is modified, the device needs to be powered off to restart the device)

| address code | function code | initial address | Modify value | Check code low | Check code high |
|--------------|---------------|-----------------|--------------|----------------|-----------------|
| 0x01 | 0x06 | 0x07 0xD0 | 0x00 0x02 | 0x08 | 0x86 |

Response frame

| address code | function code | initial address | Modify value | Check code low | Check code high |
|--------------|---------------|-----------------|--------------|----------------|-----------------|
| 0x01 | 0x06 | 0x07 0xD0 | 0x00 0x02 | 0x08 | 0x86 |

### 4.4.3 Modify the baud rate of address 0x01

Inquirer frame (assuming the modified baud rate is 9600. Note: After modifying the address, you need to power off and restart the device)

| address code | function code | initial address | Modify value | Check code low | Check code high |
|---|---|---|---|---|---|
| 0x01 | 0x06 | 0x07 0xD1 | 0x00 0x02 | 0x59 | 0x46 |

Response frame

| address code | function code | initial address | Modify value | Check code low | Check code high |
|---|---|---|---|---|---|
| 0x01 | 0x06 | 0x07 0xD1 | 0x00 0x02 | 0x59 | 0x46 |

### 4.4.4 Read the CH4 value of device address 0x01

Read the CH4 value of device address 0x01

| address code | function code | initial address | Data length | Check code low | Check code high |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x00 0x02 | 0x00 0x01 | 0x25 | 0xCA |

Response frame (for example, read methane value of 100% LEL)

| address code | function code | Returns the number of valid bytes | CH4 value | Check code low | Check code high |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x02 | 0x00 0x64 | 0x9B | 0xAF |

CH4：

**0064 (hexadecimal) =100=> CH4=100%LEL**

### 4.4.5 Read the temperature, humidity and methane value of device address 0x01

Inquiry frame

| address code | function code | initial address | Data length | Check code low | Check code high |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x00 0x00 | 0x00 0x03 | 0x05 | 0xCB |

Response frame (eg read temperature value -7.5 ° C humidity value 35.9% methane value 100% LEL)

| address code | function code | Number of bytes | Humidity value | Temperature value | CH4 | Check code low | Check code high |
|---|---|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x06 | 0x01 0x67 | 0xFF 0xB5 | 0x00 0x64 | 0xD7 | 0x5E |

Temperature: When the temperature is below 0 ° C, the temperature is uploaded in complement form.。

FFB5 H (hex) = -75 => temperature = -7.5°C

humidity:

167 H (hexadecimal) = 359 => humidity = 35.9% RH

Methane:

0064 (hexadecimal) =100 => methane = 100 % LEL

## 4.5 Methane measurement unit %LEL and PPM, VOL conversion relationship

At standard atmospheric pressure, the conversion is based on the following conversion formula, which is only applicable to the calculation of methane (CH4):

10% LEL=5000ppm=0.5%VOL

## 5. Common problems and solutions

**Device cannot connect to PLC or computer**

 possible reason:

 1) The computer has multiple COM ports, and the selected port is incorrect.

 2) The device address is incorrect, or there is a device with a duplicate address (all the factory defaults to 1).

 3) Baud rate, check mode, data bit, stop bit error.

 4) The host polling interval and the waiting response time are too short and need to be set to more than 200ms.

 5) The 485 bus is disconnected, or the A and B lines are reversed.

 6) If the number of devices is too large or the wiring is too long, the power should be supplied nearby, add 485 enhancer, and increase the resistance of 120Ω terminal.

 7) The USB to 485 driver is not installed or damaged.

 send feedback

 history record

## 6. Contact information

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 Fax: (86)0531-67805165

 Website: www.rkckth.com

 Cloud platform address: www.0531yun.cn

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## 7. Document history

V1.0 document creation

## 8. Appendix: Housing dimensions

Overall size: 110 × 85 × 44mm