# Water PH sensor Digital electrode type

**Type NO.: RD-PH-WE**

## 1. Product Introduce

The RD-PH-WE sensor is an intelligent upgrade product of industrial acidity meter, which can be used for water quality. The pH value is continuously measured and controlled. The device is suitable for urban sewage treatment plants, drinking water, chemical industry, printing and dyeing, papermaking, pharmaceutical, electroplating and environmental protection.

## 2. Product Features

1. Internally use axial capacitance filtering, 100M resistor to increase impedance and enhance stability
2. High integration, small size, low power consumption and convenient carrying;
3. Realize low cost, low price and high performance;
4. High integration, long life, convenience and high reliability;
5.Up to four isolation, can resist the complex interference situation on site, waterproof rating IP68
6.The electrode uses high-quality low-noise cable, can make the signal output length of more than 20 meters
7. Integrated electrode which suitable for a variety of installation environments.

## 3. Product application

Applicable to water-saving agricultural irrigation, drinking water, greenhouses, flowers and vegetables, grassland pastures, rapid water quality testing, plant cultivation, scientific experiments and other fields.

## 4. Product Parameter

1. Technical Parameters

- Measuring range: pH: 0 ~ 14 pH
- Accuracy: ±0.02pH; ±1mV
- Resolution: 0.01pH; 1mV
- Stability: ≤0.02pH/24 hours; ≤3mV/24 hours
- Output signal:

A: Voltage signal (0~2V, 0~2.5V, 0~5V, 0~10V, one of four)

B: 4 to 20 mA (current loop)

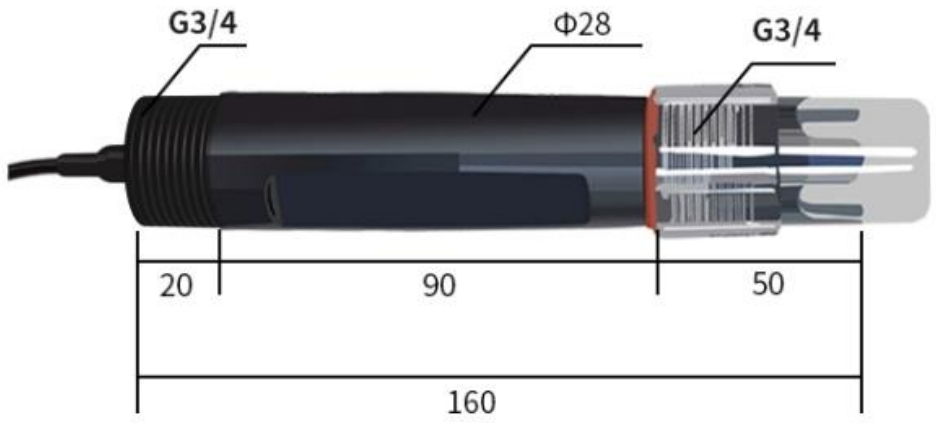
C: RS485 (standard Modbus-RTU protocol, device default address: 01)

- Supply voltage: 5 ~ 24V DC (when the output signal is 0 ~ 2V, 0 ~ 2.5V, RS485)
- 12~24V DC (when the output signal is 0~5V, 0~10V, 4~20mA) (can be customized 3.3 ~ 5V DC)
- Working environment: temperature 0 ~ 60 ° C;
- Humidity ≤ 85% RH
- Power consumption: ≤0.5W

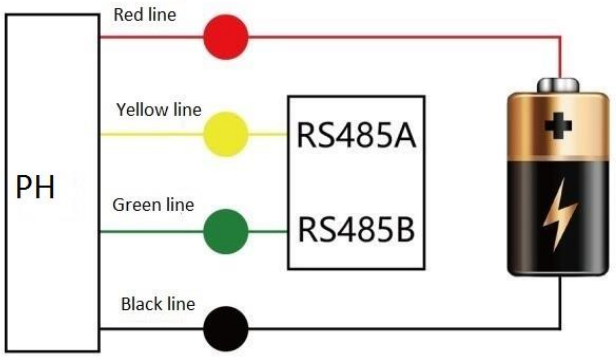
➢ Impedance requirements for current signals

| Supply voltage | 9V | 12V | 20V | 24V |
|---|---|---|---|---|
| Maximum impedance | 125Ω | 250Ω | 500Ω | >500Ω |

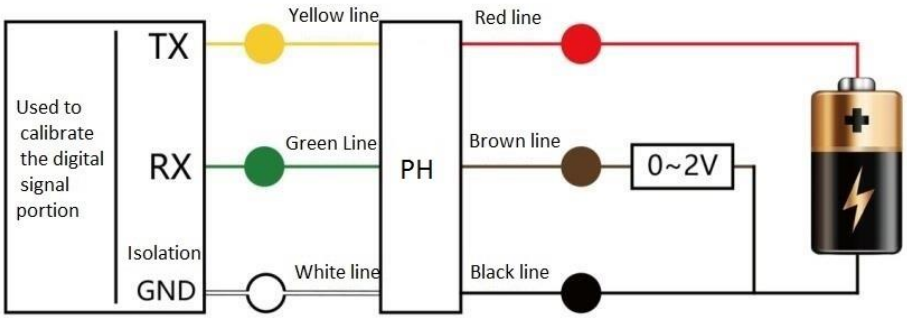
## 5. Product size



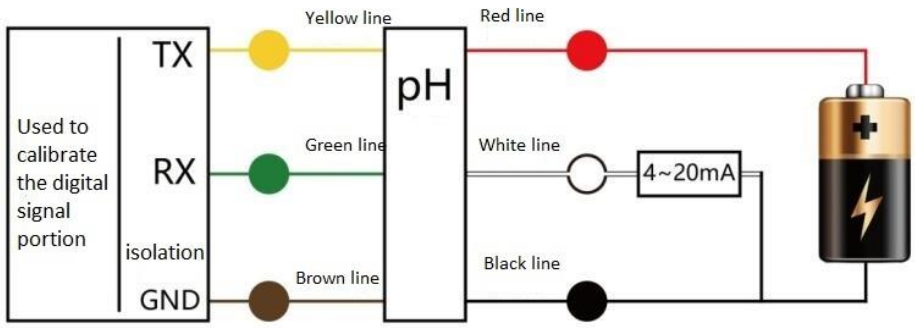

## 6. Line connection diagram




(RS485)




(0~2V、0~5V、0~10V)




(4~20mA)

## 7. Data conversion method

1. For the analog output

The PH sensor has good linear characteristics. The following is a typical calibration formula.

V: voltage value collected by the collector, unit: V;

A: Current value collected by the collector, unit: mA

| output signal | pH conversion method |
|---|---|
| 0 ~ 2V DC | PH = 7*V |
| 0 ~ 5V DC | PH = 2.8*V |
| 0 ~ 10V DC | PH = 1.4*V |
| 4 ~ 20mA | PH = 0.875*A – 3.5 |

2. For the RS485 output

Standard Modbus-RTU protocol, baud rate: 9600; check digit: none; data bit: 8; stop bit: 1

(1) Modify the address, for example: change the address of the transmitter with address 1 to 2, host → slave

| Original address | Function code | Reserved 1 | Reserved 2 | Reserved 3 | new address | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|---|
| 0X01 | 0X06 | 0X00 | 0X00 | 0X00 | 0X02 | 0X08 | 0X0B |

If the transmitter receives correctly, return the following data, slave → host

| Original address | Function code | Data length | Reserved 1 | new address | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|
| 0X01 | 0X06 | 0X02 | 0X00 | 0X02 | 0X39 | 0X49 |

Remark: If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only be connected to one slave, and the return address is still

the original address, which can be used as the address query method.

(2). Query data

Query the data of the transmitter (address 1) (PH value), host → slave

| Address | Function code | Start register address high | Start register address low | Register length high | Register length low | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|---|
| 0X01 | 0X03 | 0X00 | 0X00 | 0X00 | 0X01 | 0X84 | 0X0A |

If the transmitter receives correctly, return the following data, slave → host

| Address | Function code | Data lenght | Register 0 data high | Register 0 data low | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|
| 0X01 | 0X03 | 0X02 | 0X02 | 0XAE | 0x38 | 0X98 |
| | | | PH Value | | | |

Data representation method:

Data representation: Convert data to decimal ÷100

The above data indicates that the pH value is 6.86

3. Calibration method

(1) Three-point calibration

The pH sensor has been rigorously calibrated at the factory, so the user does not have to perform a second calibration. If the sensor has an error due to electrodes or other reasons, the calibration can be performed by the following method.

After connecting the wires according to the wiring diagram, the calibration steps are as follows:

- Put the electrode into the following PH standard calibration solution, and then send the instruction to the sensor:
- PH=9.18 electrode calibration instruction FE 06 00 5A 00 0A 3D D1 , If success return the same.
- PH=6.86 electrode calibration instruction FE 06 00 5B 00 0B AD D1 , If success return the same.
- PH=4.00 electrode calibration instruction FE 06 00 5C 00 0C 5D D2, If success return the same

After the above three steps are completed, the calibration is successful. The advantage of the three-point calibration compared to the two-point calibration is that the electrodes are separately calibrated in the acid and alkali parts to achieve accurate calibration of the full scale, making the measurement data more accurate.

(2) PH value offset calibration

| Data description | Data length | Register address | Type of data | Read and write type | Note |
|---|---|---|---|---|---|
| PH offset value | 1 | 0X0009 | Integer | Read/Write | Numerical accumulation, 0X0000: Restore to the initial value |

For example add 0.1 to the sensors address 01 to the present value, send the following instruction

| Address | Function code | Register data high | Register data low | PH offset value | | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|---|
| 0X01 | 0X06 | 0X00 | 0X09 | 00 | 0A | 0XD9 | 0XCF |

If success, feedback :01 06 00 09 00 0A D9 CF.

## 8. Installation method

Please pay attention that do not put the electrode directly into the HCL . Use an electrode mounting bracket or a flow cup. Be sure to use a raw material tape (3/4 thread) for waterproof sealing before installation to prevent HCL from entering the PH electrode, causing the PH electrode cable to be shorted.


## 9. Instructions

1. Sampling: According to the sampling requirements, take a representative water sample.

2. Determine the pH of the water sample: first rinse the electrode with distilled water, then rinse with water sample, then immerse the electrode in the sample, carefully shake the test cup or stir to accelerate the electrode balance, let stand, and record the pH when the reading is stable. value.

3. If it is not convenient to sample, the electrode can also be placed in the solution to be tested, and the output data can be read. After a period of time, the electrode should be taken out and cleaned.

## 10. Precautions for use

1. In order to ensure that the electrode is correctly measured on the pipeline, the data gap between the measuring cells should be avoided to cause data misalignment;

2. Please check whether the packaging is intact, and check whether the product model is consistent with the selection;

3. Do not electrify the wiring, the wiring is completed, and the power can be turned on after checking.

4. Do not arbitrarily change the components or wires that have been soldered at the time of shipment;

5. The sensor is a precision device, please do not disassemble it yourself, use sharp objects or corrosive liquid to touch the sensor surface to avoid damage to the product;