JXCT®

JXBS-3001-PH-RS

Liquid PH Sensor User Manual

RS485 Modbus
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Chapter I General Introduction

1.1 Product Description

PH tester is one of the intelligent online chemical analysis instruments. It is widely used in continuous monitoring of PH value and temperature in solutions such as thermal power, chemical fertilizer, metallurgy, environmental protection, pharmaceutical, biochemical, food and tap water.

This product cooperates with the waterproof shell to digitally adjust and analyze the signal of the aqueous solution and convert it into a standard 485 / 4-20mA / 0-10V signal. No calibration is required for one-time molding, and it can be used immediately.

1.2 Features

The probe of this product is composed of PH glass electrode and silver silver chloride reference electrode. The signal is stable and the precision is high. It has wide measuring range, good linearity, good waterproof performance, easy to use and easy to install.

It can carry out PH measurement, temperature measurement, upper and lower limit control, transmission output, RS485 communication, configurable temperature manual and automatic compensation functions.

1.3 Main Specs

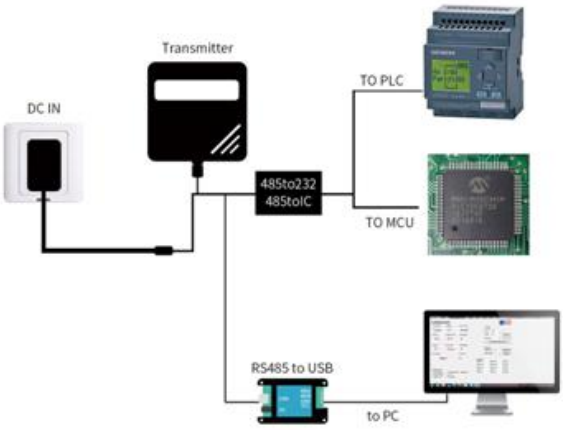
Specs	Content
Power Supply	12-24V DC
Power Consumption	≤0.15W（@12V DC , 25℃）
Accuracy	±0.5pH
PH Range	0-14pH
PH Resolution	0.01pH（默认）
Output Transmit	485/4-20mA/0-10V
Temperature compensation	-20℃-80℃（Hand/Automatic）
Response Speed	≤15s

1.4 System Frame

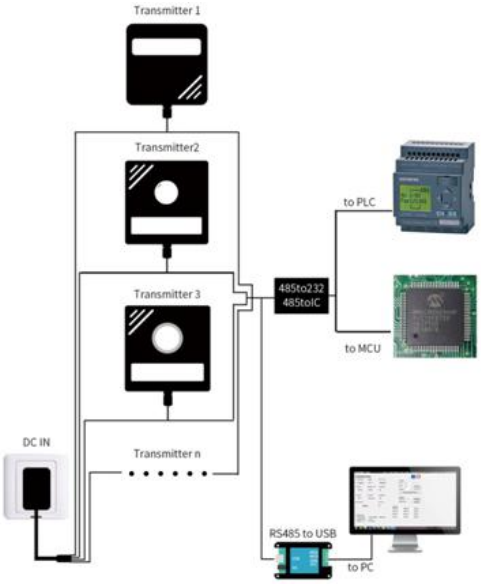
1.4.1 485 Port Frame

This sensor can be connected to be used alone, firstly using 12V DC power supply, the device can be directly connected to the PLC with 485 interface, and can be connected to the single chip through the 485 interface chip. The microcontroller and PLC can be

used with the sensor by programming the modbus protocol specified later. At the same time, use USB to 485 to connect to the computer, and use the sensor configuration tool provided by our company to configure and test.



This product can also be used by combining multiple sensors on one 485 bus. Please observe the "485 Bus Field Wiring Code" (see appendix) when performing 485 bus combination. In theory, a bus can connect more than 16 485 sensors. If you need to connect more 485 sensors, you can use a 485 repeater to expand more 485 devices. The other end is connected to a PLC with a 485 interface through a 485 interface chip Connect the single chip microcomputer, or use USB to 485 to connect to the computer, use the sensor configuration tool provided by our company to configure and test.



Chapter II Hardware Connection

2.1 Check Product List In Advance

Please check the equipment list before installing the equipment:

Name	Qty
Liquid PH Sensor	1Pc
12VWater-proof Battery	1Pc(Optional)
Warranty Paper	1Pc

2.2 Port Guidance

The power interface can be 12-24V for wide voltage power input. The product pays attention to the positive and negative of the signal line, do not reverse the positive and negative of the signal line.

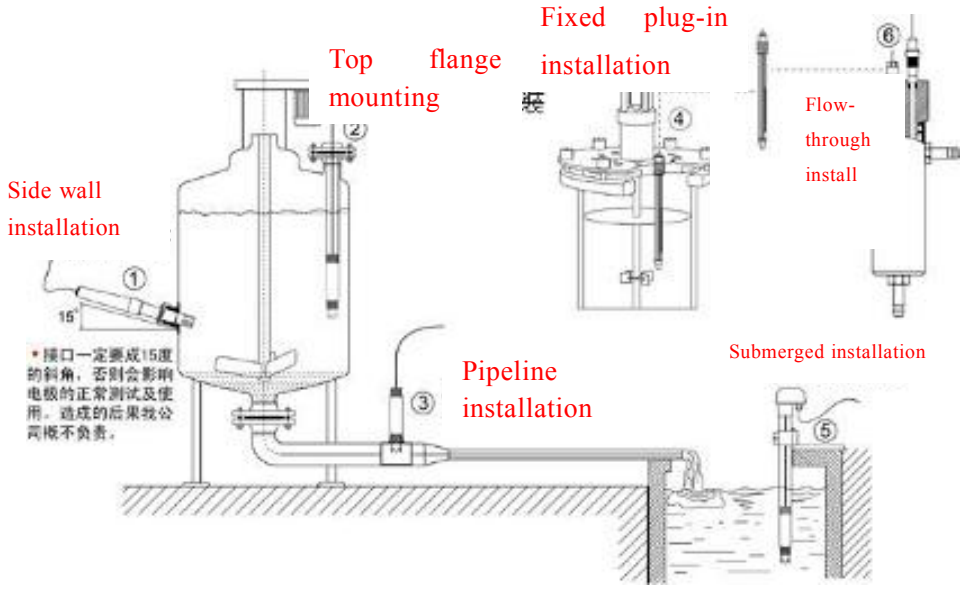
Function	Cable Color	Specs
Power	Brown	Power supply +
	Black	Power supply -
Communication	Yellow (grey)	485-A
	Blue	485-B

The factory default provides 0.6 meters long wire, customers can extend the wire or connect the wires in sequence according to need.。

2.3 Installation

This instrument is wall-mounted. Please install it on the wall, avoid wind and rain and direct sunlight as much as possible. To prevent the internal temperature of the instrument from rising, please install it in a well-ventilated place. When installing this instrument, do not tilt it to the left and right, and try to install it as horizontally as possible.

The electrode is a very precise component, and the correct installation method must be used. Wrong installation will cause electrode damage or irreversible damage. The electrode is installed by pipeline. Immersion type. Flange installation is acceptable.



Please do not put the electrode directly into the water, you should choose the electrode mounting bracket or flow cup to fix it. Before installation, please use the raw material tape (3/4 thread) to do waterproof sealing work to prevent water from entering the electrode and causing short circuit of the electrode cable.

During the water stop, make sure that the electrode is immersed in the liquid to be measured or wear a protective cap with a built-in protection liquid. If the temperature is low in winter and the water is stopped for a long time, an antifreeze device should be added or the room should be withdrawn and stored with water. Otherwise it will shorten the service life.

Chapter III 485Interface Communication Protocol

3.1 Basic Specs

Specs	Content
coding	8-bit binary
Data bit	8-bit
Parity bit	None
Stop bit	1-bit
Error calibration	CRC Long cyclic code
Baud rate	2400bps/4800bps/9600bps Optional. Can Customize. Default is 9600bps

3.2 Data frame format definition

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

Time for initial structure ≥ 4 bytes
Address code = 1 byte
Function code = 1 byte
Data area = N bytes
Error check = 16-bit CRC code
Time to end structure ≥ 4 bytes
Address code: It is the function indication of the transmitter. This transmitter only uses the function code 0x06 (read register data).

Data area: The data area is the specific address, which is unique in the communication network (factory default 0x01).

Function code: Command communication data sent by the host, pay attention to the high byte of 16bits data first!
CRC code: two-byte check code.

Inquiry Frame

address code	function code	Register start address	Register length	Check digit low	Check digit high
1bit	1bit	2bits	2bits	1bit	1bit

Reply Frame

address code	function code	Effective bit number	First data area	Second data area	Nth data area
1bit	1bit	2bits	2bits	2bits	2bits

3.3 **Register Address**

Register address	PLC Configure address	Content	Operation
0001H	40002	Temperature(0.1℃)	Read Only
0002H	40003	PH(0.01ph)	Read Only
0100H	40101	Device Address(0-252)	Read Write
0101H	40102	Baud Rate(2400/4800/9600)	Read Write

3.4 Communication protocol example and explanation

3.4.1 Read the pH value of device address 0x01

Inquiry Frame

address code	function code	starting address	Data Length	Check digit low	Check digit high
0x01	0x03	0x00,0x02	0x00,0x01	0x25	0xCA

Reply Frame (ie. Reading PH Value is 1.89PH)

address code	function code	Effective Bytes	PH Value	Check digit low	Check digit high
0x01	0x03	0x02	0x00 0xBD	0x78	0x35

PH: 00BD H(Hex)=189=>PH=1.89

3.4.2 Read Temperature Value of Device Address 0x01

Inquiry Frame

address code	function code	starting address	Data Length	Check digit low	Check digit high
0x01	0x03	0x00,0x01	0x00,0x01	0xd5	0xca

Reply Frame

address code	function code	Effective Bytes	PH Value	Check digit low	Check digit high
0x01	0x03	0x02	0x00 0xAF	0xDB	0xBF

Temperature: 00AF H(Hex)=175=>Temperature=17.5℃

4.4.2Read Temperature, PH Value of Device Address of 0x01

Inquiry Frame

address code	function code	starting address	Data Length	Check digit low	Check digit high
0x01	0x03	0x00,0x01	0x00,0x02	0x95	0xCB

Reply Frame

address code	function code	Effective Bytes	PH Value	Check digit low	Check digit high	address code
0x01	0x03	0x04	0x01 0x1b	0x00 0x28	0xDB	0xBF

Temperature:

011B H(Hex)=283=>Temperature=28.3℃

PH: 0028 H(Hex)=40=>PH=0.4PH