# Liquid PH Transmitter Manual

## JXBS-3001-PH

## Ver2.0


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# 第 1 章 Product Introduction

## 1.1 Brief Introduction

Ph Tester is one of the intelligent on-line chemical analysis instruments, is a widely used in thermal power, chemical fertilizers, metallurgy, environmental protection, pharmaceutical, biochemical, food and tap water and other solutions Ph and temperature monitoring. The monitoring data can be monitored and recorded remotely by a variable output connection recorder, or it can be connected to a computer via the RS485 interface via the MODBUS-RTU protocol. At the same time the equipment has 2-way relay interface, can set the alarm point output

## 1.2 Function characters

The probe is composed of Ph glass electrode and silver chloride silver reference electrode. The signal is stable and the precision is high. With a wide measuring range, good linear, waterproof performance, easy to use, easy to install, board card Modular design, assembly configuration, using 2.4 inches 128 * 64 lattice screen, isolation transmission output, less interference, isolated RS485 communication, PH measurement, temperature measurement, upper and lower limit control, variable output, RS485 communication, configurable temperature manual, automatic compensation function, high and low alarm function

can be set, and hysteresis, can be set Buzzer, LCD backlight switch function, increase the function of Universal Password.

## 1.3 Main parameters

| Parameter name | Parameter option |
|---|---|
| DC electric | 12-24V DC |
| Electric consumption | ≤0.15W（@12V DC , 25℃） |
| Measurement precision | ±0.5pH |
| PH measurement range | 0-14pH |
| PH Measurement resolution | 0.01pH（default） |
| Output signal | RS485(Mondbus 协议)/4-20mA（choice） |
| Temperature supplyment | -20℃-80℃（manual/automatic） |
| Response speed | ≤15s |
| Relay alarm | Two-way normally open normally closed alarm relay |

• Note: The default length of probe cable is 5 meters

## 1.4 Product usage topology

A typical aqueous solution control system is shown below, including an integrated system with the control box as the core, where the control box is connected to a Ph probe and the output acquisition processing is displayed, at the same time, the device can output RS-485 signal or analog signal to the computer, PLC,

SCM, etc. . At the same time, the back-end of the relay can do a variety of relay control and alarm, can control the pump or valve and other equipment.


# 第 2 章 Hardware connection

## 2.1 Check pre-install equipment

Check pre-install equipment list：

| Name | Quantity |
|---|---|
| **LCD Instrument Control Box** | 1 piece |
| **Electrical rate probe** | 1 piece |
| **12V waterproof power supply** | 1 piece（choice） |
| **USB into 485 equipment** | 1 piece（choice） |
| **Warranty** | 1 piece |

| card/certificate of compliance |
|---|

## 2.2 Interface description（main function）

On the back of the instrument, there are 14 terminals. Next to each terminal is printed the number of terminals. The terminals have different functions, as shown in the following table


Terminal main function:

| Terminal | Main function | Terminal | Main function |
|---|---|---|---|
| **8** | Power supply input plus | **1** | Relay 1-COM |
| **9** | Power supply input minus | **2** | Relay 1-OC |
| **10** | Electrode input 1 | **3** | Relay 2-COM |
| **11** | Electrode public side | **4** | Relay 2-OC |
| **12** | Temperature supply plus | **5** | - |

| | | | |
|---|---|---|---|
| **13** | Analog output plus | **6** | 485-A |
| **14** | Temperature supply minus | **7** | 485-B |

When in use, there will be a label on the probe wire. Please follow the label and connect the warm-up wire to terminals 12 and 14(regardless of polarity) , and connect the electrode to terminal 6 positively, the electrode negative to Terminal 7, the electrode is connected with polarity, so please do not reverse, if there is a shielded line, just need to shield line connected to 14 terminals can be. Please take care not to connect in the wrong order, the wrong wiring will cause the equipment to burn out. Please do not put live products near the signal terminal, may cause failure.

## 2.3 Interface function（Second function）

Because the control box has a wide range of uses and functions, there is a second function definition in some interfaces. Please note that the second function is optional in certain situations.

Terminal second function:

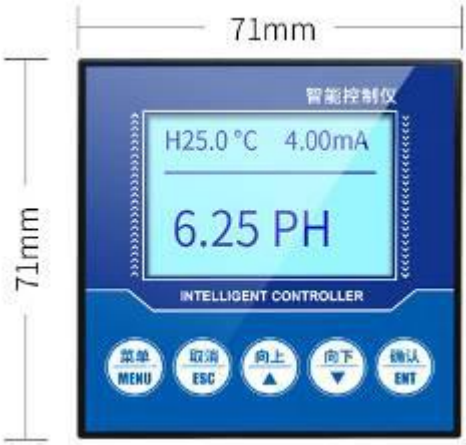
| **Terminal** | 第二功能 | **Terminal** | 首要功能 |
|---|---|---|---|
| **8** | none | **1** | none |
| **9** | none | **2** | none |
| **10** | none | **3** | none |

| | | | |
|---|---|---|---|
| **11** | none | **4** | none |
| **12** | none | **5** | Electrode output 2 |
| **13** | Analog output | **6** | none |
| **14** | none | **7** | Electrode public side |

## 2.4 Control box installation

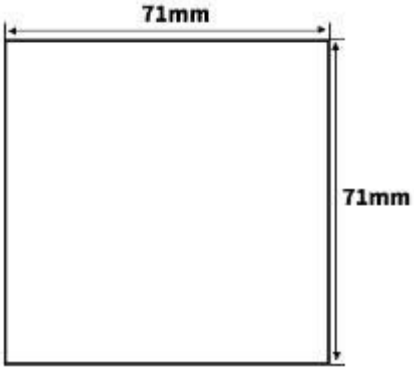
The installation mode of the control box sensor is the embedded installation mode. The dimensions of the product are shown in the figure below.

Transmitter front size




Transmitter side size


Make a rectangular incision in the instrument panel or mounting panel during installation, as shown below. The instrument can be installed by inserting the instrument into the instrument cabinet and fixing it with the mounting frame of the instrument on the back.

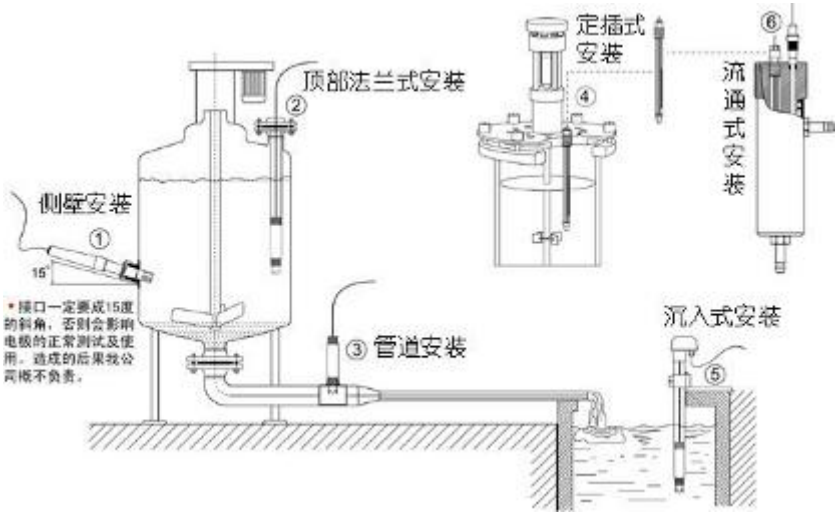


This instrument is disk mounted. Please install it indoors, away from wind, rain and direct sunlight. In order to prevent the instrument internal temperature rise, please install in a well-ventilated place. When installing this instrument, please do not tilt left or right, as far as possible horizontal installation.

Special attention: The function of this instrument is mainly detection and transmission function, not specially used for control instrument, this instrument is equipped with relay switch output, generally used for alarm prompt primarily, if users use this function to participate in loop control, if the instrument failure may lead to major accidents or damage to other equipment, it is necessary to set up an emergency stop circuit and protection circuit complementary, otherwise the consequences, the company will not be responsible.

## 2.5 Electrode installation

The electrode is a very precise assembly and must be installed in the correct way, which can lead to damage or irreversible damage to the electrode. The electrode is installed by pipeline. Immersion. Flange can be installed.




Please do not put the electrode directly into the water, should choose the electrode mounting bracket or flow cup fixed. Before installation, please make sure to use raw material tape (3/4 thread) to do waterproof sealing work, to avoid water into the electrode, resulting in electrode cable short circuit. During the water cut-off period, to ensure that the electrode is immersed in the liquid under test or wear a protective cap with built-in protective liquid, low temperature in winter long-term water cut-off to add anti-freezing device or withdraw indoor water storage. Otherwise, it will shorten the service life.

# 第 3 章 Function and use of instrument

## 3.1 Product menu screen and press button

The first line shows the current temperature and analog current，


| 标识 | 按键名 | 功能描述 |
|---|---|---|
| MENU | Menu | ″monitor interface″ button to enter the menu<br>Menu interface button to exit the menu |
| ESC | Cancel | You can return to the upper layer between the related upper and lower layers under the menu interface |
| ↑ | Up | Scroll data display under ″monitor |

| | | |
|---|---|---|
| | | interface″<br>Under menu interface, select the relevant menu<br>Set status to modify the associated value |
| ↓ | Down | Scroll data display under ″monitor interface″<br>Under menu interface, select the relevant menu<br>Set Status to modify the associated value |
| NET | Confirm | Lock data display under ″monitor interface″<br>″Menu interface″ to enter the sub-menu or confirm the modification |

## 3.2 Setting menu

In the normal display interface, use the [ menu ] key to enter the "password" interface, the default password is four 0. Enter your password correctly, then press the "confirm" button to enter the "menu" interface，

"system settings" : including, Buzzer and backlight settings, password changes and factory settings. "Signal Setting" : including signal one, Signal Two; signal includes: electrode type and temperature compensation. "equipment calibration" includes Ph calibration, PH modification, ORP calibration, ORP modification, EC calibration, EC modification. "Remote Setting" includes RS485 and current transmission; "alarm setting" includes Ph high and low alarm, ORP high and low alarm and EC high and low alarm. "Information Query" includes hardware and software versions.

### 4.2.1 System setting

"BUZZER setting" : set the alarm buzzer switch. "backlight settings" : You can set the background brightness and brightness screen time. "Password Modification" : You can turn your password on or off and change it. Whether factory settings reverts to their pre-factory settings

### 4.2.2 Signal setting

ELECTRODE TYPE: set the type of electrode, Ph electrode and conductivity electrode two types. Temperature compensation: set automatic or manual temperature compensation, temperature RANGE-20-80 °C

### 4.2.3 Online demarcating

Ph calibration: After entering the Ph calibration screen, first put the Ph electrode into the 4.00 PH standard solution, stand still for a moment, wait for the indicator to be stable, press [ confirm key ] , then put the Ph electrode into the 6.86 PH standard solution, stand still for a moment, wait for the indicator to be stable, press [ confirm key ] , finally put the Ph electrode into the 9.18 PH standard solution, rest for a moment, wait for the number to be stable, press [ confirm key ] , show that the calibration is successful, the Ph calibration process is over. Ph Correction: The measured Ph can be corrected.

### 4.2.4 Long pass setting

"Remote Settings" : contains 485 and analog communication mode. RS485: Sets the address and Baud rate of

the 485 communication. Electrorheological transmission: Set 4-20 Ma output to 4 ma and 20 MA output.

### 4.2.5 Alarm setting

Ph overstatement: When the measurement value is greater than the overstatement suction value, overstatement relay suction, when the measurement value is less than the overstatement disconnection value, the overstatement relay disconnects. Ph Low report: When the measured value is less than the low report value, the low report relay suction, when the measured value is greater than the low report value, the low report relay disconnect。

### 4.2.6 Information found


Version Information: Query the current version of hardware and software, strong traceability.

# 第 4 章 第 5 章 485 Interface communication protocol

## 4.1 Communication primary parameter

| Parameter | Option |
|---|---|
| **Cod** | 8 bit binary system |
| **Data** | 8 bit |
| **Parity bit** | none |
| **Stop bit** | 1 bit |
| **Wrong correction** | CRC long cycle code |
| **Baud rate** | 2400bps/4800bps/9600 bps built, Default output is 9600bps |
| **Cod** | 8 bit binary system |

## 4.2 Data frame definition

use Modbus-RTU communication rule，following：
Primary instruction >=4 byte
Address code= 1byte
Function code= 1byte
Data area= N byte

Wrong correction= 16 bit CRC code

Final instruction>=4 byte

Address code： Transmitter address， Only data in communication（Default output 0x01）。

Function code： Monitor send message function，transmitter connect with Function code 0x03 （read data of save）。

Data area： Data area is exact communication area，Special： 16bits data higher than byte

CRC code：2 byte Check code。

Query frame

| Address code | Function code | Register Starting position | Register length | Check low bit code | Check code high bit |
|---|---|---|---|---|---|
| 1byte | 1byte | 2byte | 2byte | 1byte | 1byte |

Reply frame

| Address code | Function code | Efficient byte | Data area | 1st Data | 2nd area Data | Nth area |
|---|---|---|---|---|---|---|
| 1byte | 1byte | 1byte | 2byte | 2byte | 2byte | |

## 4.3 Register address

| Register position | PLC configuration position | Option | Manufacture |
|---|---|---|---|
| 0001H | 40002 | Temperature(single bit0.1℃) | Read |
| 0002H | 40003 | pH（single bit0.01pH） | Read |

| | | | |
|---|---|---|---|
| 0100H | 40101 | Equipment address(0-252) | Read and write |
| 0101H | 40102 | Baud rate(2400/4800/9600) | Read and write |

## 4.4 Examples and explanations of communication protocol.

### 4.4.1 Read equipment position 0x01 pH

Query frame

| Address code | Function code | Starting position | Data length | Check code low bit | Check code high bit |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x00,0x02 | 0x00,0x01 | 0x25 | 0xCA |

Reply frame(example: catch pH is 189NTU)

| Address code | Function code | Efficient byte | pH | Check code Low bit | Check code high bit |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x02 | 0x00 0xBD | 0x78 | 0x35 |

pH：

00BD H(hexadecimal)=189=>pH=1.89pH

### 4.4.2 Read equipment position 0x01 temperature

Query frame

| Address code | Function code | Starting position | Data length | Check code low bit | Check code high bit |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x00,0x01 | 0x00,0x01 | 0xd5 | 0xca |

Reply frame

| Address code | Function code | Efficient byte | Temperature | Check code low bit | Check code high bit |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x02 | 0x00 0xAF | 0xDB | 0xBF |

Temperature：

00AF H(hexadecimal)=175=>Temperature=17.5℃

### 4.4.3 Read equipment position 0x01 temperature、pH concentration

Query frame

| Address code | Function code | Starting position | Data length | Check code low bit | Check code high bit |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x00,0x01 | 0x00,0x02 | 0x95 | 0xCB |

Reply frame

| Address code | Function code | Efficient byte | Temperature | pH | Check code low bit | Check code high bit |
|---|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x04 | 0x01 0x1b | 0x00 0x28 | 0xDB | 0xBF |

Temperature：

011B H(hexadecimal)=283=>Temperature=28.3℃

pH：

0028 H(hexadecimal)=40=>pH=0.40pH