RS-ORP -N01-2

Industrial ORP Transmitter User Manual

(Type 485)

contents

1. product description

This product is a device for measuring the oxidation-reduction potential of a solution. The ORP composite electrode made of high-purity platinum has strong acid and alkali resistance and oxidation resistance, high measurement accuracy, fast response, and good stability. The electrode can be automatically compensated according to temperature. This product is suitable for online monitoring of oxidation-reduction potential of cyanide and chromium-containing wastewater.

1.1 Features

1. ORP measurement range -1999~1999mV, resolution 1mV.

2. The applicable temperature of the electrode is 0~80℃.

3. The electrode is made of high-purity platinum, which has strong acid and alkali resistance and oxidation resistance, high measurement accuracy, fast response, and good stability.

4. RS485 communication interface: MODBUS RTU communication protocol can be easily connected to the computer for monitoring and communication.

5. The ModBus communication address can be set, and the baud rate can be modified.

6. The equipment adopts wide voltage power supply, DC 10~30V can be used.

1.2 Equipment technical parameters

powered	DC 10~30V
Power consumption	0.6W
Communication Interface	RS485；Standard MODBUS-RTU protocol; communication baud rate: 2400, 4800, 9600 can be set
ORP measuring range	-1999~1999mV ; Resolution：1mV
ORP measurement error	±1mV
Equipment working conditions	Ambient temperature：0-60℃ Relative humidity：<85%
Electrode applicable temperature	0~80℃
Electrode withstand voltage	0.6MPa
Electrode wire length	Default 5m (10m, 15m, 20m can be customized)
Electrode life cycle	1year

1.3 product model

RS-					Company code
	ORP-				Industrial ORP transmitter
		N01-			RS485 (Modbus-RTU protocol)
			2-		Wall-mounted king-shaped shell
				300	ORP electrode

1.4 Product List

1. 1 industrial ORP transmitter

2. 1 ORP electrode

3. 2 expansion plugs, 2 self-tapping screws, certificate of conformity, warranty card, etc.

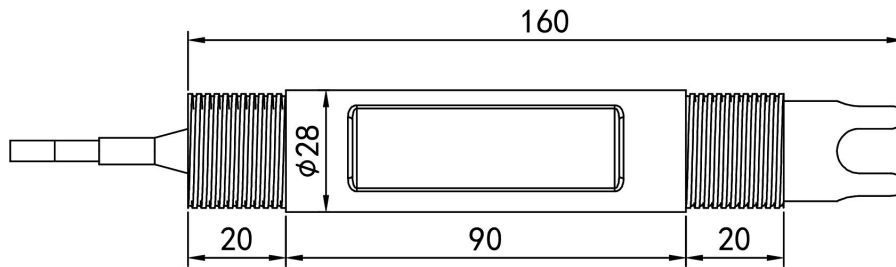## 1.5 Equipment size

壁挂王字壳：110×85×44mm
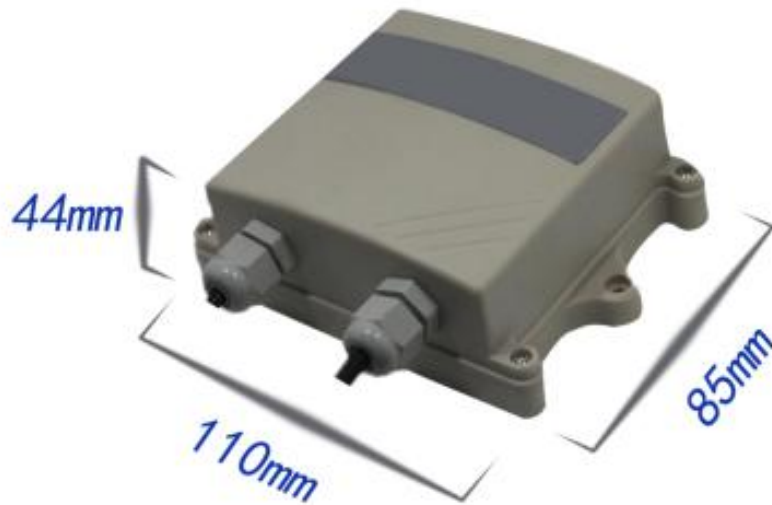
1.6 Electrode size and installation

1.6.1 Electrode type and size

电极上下螺纹为NPT3/4，方便管道安装和沉入式安装等

The ORP composite electrode made of high-purity platinum has strong acid and alkali resistance and oxidation resistance, high measurement accuracy, fast response, and good stability. The electrode can be automatically compensated according to temperature.

1.6.2 Electrode installation

1. Submerged installation: the lead of the ORP electrode passes through the waterproof tube, and the 3/4 thread on the top of the ORP electrode is connected to the 3/4 thread of the waterproof tube with a raw material tape. Make sure that no water enters the top of the electrode and the electrode wire.

2. Pipeline installation: Connect to the pipeline through the 3/4 thread of the ORP electrode.
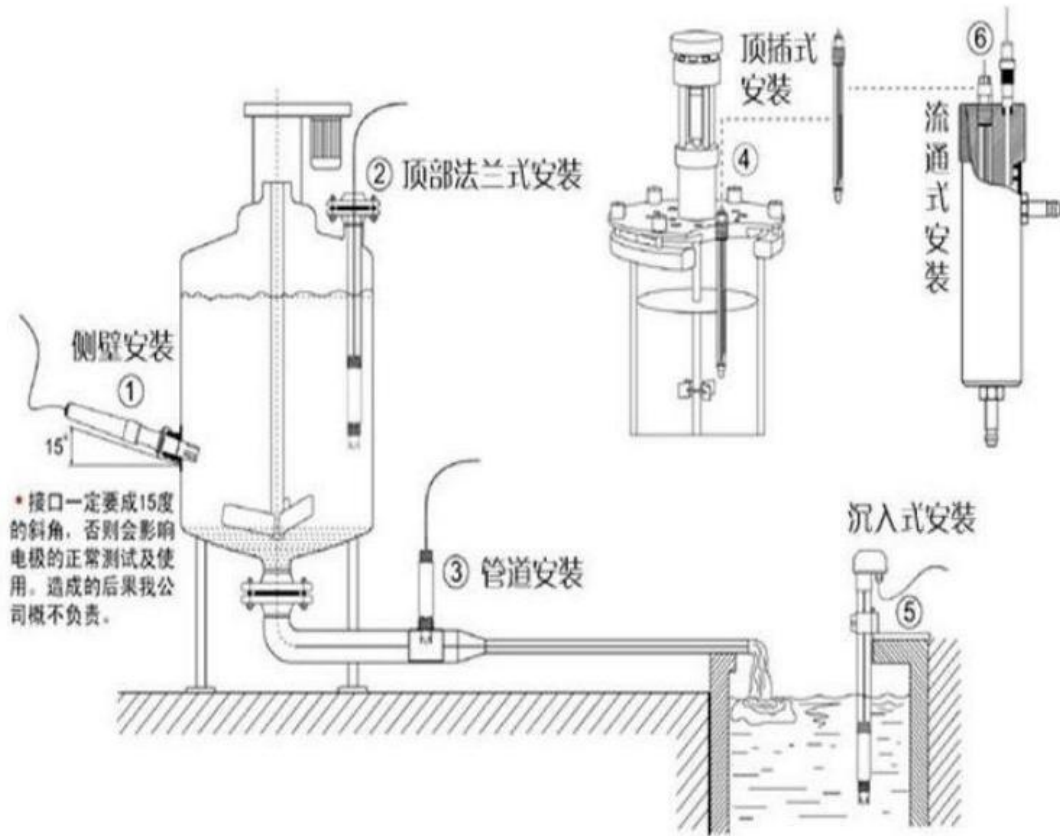
2. Equipment instructions

2.1 Wiring instructions

|	illustrate	illustrate
power supply	Brown	V+（10~30V DC）
	black	V-
communication	green	485-A
	blue	485-B

2.2 Parameter configuration description

Open the data package, select "Debug software" --- "485 parameter configuration software", find


485参数配置工具
485参数配置工具
3.0.0.3

Just open it。

1) Select the correct COM port (check the COM port in "My Computer—Properties—Device Manager—Port"). The following figure lists the driver names of several different 485 converters.
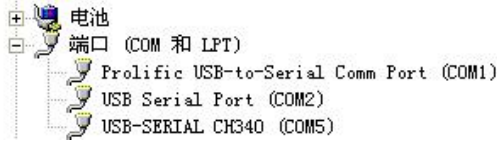
2) Connect only one device alone and power it on, click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.

3) Modify the address and baud rate according to the needs of use, and at the same time query the current function status of the device.

4) If the test is unsuccessful, please recheck the equipment wiring and 485 driver installation.
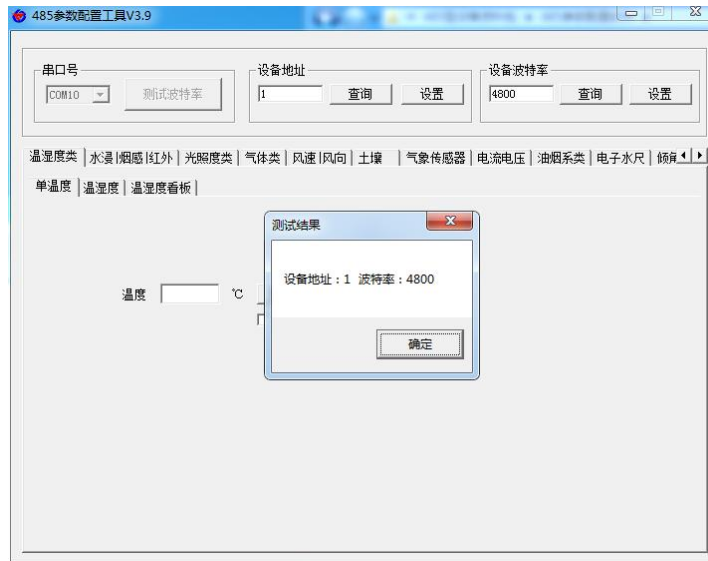
2.3 ModBus Detailed explanation of communication and registers

2.3.1 Basic parameters of device communication

Code	8-bit binary
Data bit	8-bit
Parity bit	NO
Stop bit	1-bit
Error checking	CRC（Redundant cyclic code）
Baud rate	2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s

2.3.2 Data frame format definition

Using 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

Time to end structure ≥ 4 bytes

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

Function code: the command function instruction issued by the host.

Data area: The data area is the specific communication data, pay attention to the high byte of 16bits data first! CRC code: two-byte check code.

2.3.3 Register address

Register address	operate	illustrate
0x0000	0x03/0x04	ORP value (sixteen-bit signed integer)
0x0050	0x03/0x04/0x06	ORP offset (sixteen-bit signed integer)
0x0051、0x0052	0x03/0x04/0x10	Slope (floating point big endian)
0x0120、0x0121	0x10	Electrode calibration (16-digit signed integer)

2.3.4 Communication protocol example and explanation

Example 1: Read the current ORP value of the device with address 01

Send frame:

address code	function code	Register address	Register content	Check code low bit	High bit of check code
0x01	0x03	0x00 0x00	0x00 0x01	0x84	0x0a

Response frame: (for example, read the ORP value of 309mV)

address code	function code	Number of valid bytes	Register content	Check code low bit	High bit of check code
0x01	0x03	0x02	0x01 0x35	0x79	0xc3

ORP calculation: 135H (hexadecimal)=309 =>ORP=309mV

Example 2: Correct the offset of the current ORP value of the device with address 01

Send frame: (If the current device output ORP is 309, the value should be corrected to 293, the difference is 293-309=-16, -16=>0xfff0 (hexadecimal), the register content is written ff f0)

address code	function code	Register address	Register content	Check code low bit	High bit of check code
0x01	0x06	0x00 0x50	0xff 0xf0	0xc8	0x6f

Response frame: (According to the MODBUS standard, the response is a mirrored message of the issued frame)

address code	function code	Register address	Register content	Check code low bit	High bit of check code
0x01	0x06	0x00 0x50	0xff 0xf0	0xc8	0x6f

2.3.5 Electrode calibration

If you need to calibrate the electrode, you can use the 0x10 function code to write parameters to the 0x0120 and 0x0121 registers for calibration.

This equipment adopts two-point calibration, and two known ORP standard solutions need to be prepared. When calibrating the first point, write 0x0001 to the 0x0120 register and write the standard ORP value of the first point to the 0x0121 register; when calibrating the second point, write 0x0002 to the 0x0120 register and write the standard ORP of the second point to the 0x0121 register value. The calibration is complete.

Example: Select the ORP standard solution of 86mV and calibrate the first point.

Send frame:

address code	function code	Register address	Register length	Byte length	Register content	Check code low bit	High bit of check code
0x01	0x10	0x01 0x20	0x00 0x02	0x04	0x00 0x01 0x00 0x56	0x2d	0xd9

Response frame: (According to the MODBUS standard, the response is a mirrored message of the issued frame)

address code	function code	Register address	Register length	Check code low bit	High bit of check code
0x01	0x10	0x01 0x20	0x00 0x02	0x41	0xfe

Then select the 256mV ORP standard solution to calibrate the second point.

Send frame:

address code	function code	Register address	Register length	Byte length	Register content	Check code low bit	High bit of check code
0x01	0x10	0x01 0x20	0x00 0x02	0x04	0x00 0x02 0x01 0x00	0x5c	0x77

Response frame: (According to the MODBUS standard, the response is a mirrored message of the issued frame)

address code	function code	Register address	Register length	Check code low bit	High bit of check code
0x01	0x10	0x01 0x20	0x00 0x02	0x41	0xfe

3. Precautions and maintenance

3. Precautions and maintenance

◆ The equipment itself generally does not need routine maintenance. When there is an obvious failure, please do not open it to repair it yourself, and contact us as soon as possible!

◆ There is an appropriate amount of soaking solution in the protective bottle at the front of the electrode, and the electrode tip is soaked in it to ensure the activation of the platinum sheet and the liquid junction. When measuring, unscrew the bottle cap, pull out the electrode, and wash it with pure water before use.

◆ Preparation of electrode soaking solution: Dissolve 25 grams of analytically pure potassium chloride in 100 ml of pure water to prepare a 3.3M potassium chloride solution.

◆ Before measurement, the bubbles in the electrode glass bulb should be shaken off, otherwise it will affect the measurement. During measurement, the electrode should be stirred in the solution to be measured and placed at rest to speed up the response.

◆ The electrode should be cleaned with deionized water before and after measurement to ensure accuracy.

◆ The ORP electrode will be passivated after long-term use. The phenomenon is that the sensitive gradient decreases, the response is slow, and the reading is inaccurate. At this time, the platinum plate at the bottom of the electrode can be soaked in 0.1M dilute hydrochloric acid for 24 hours (0.1M dilute hydrochloric acid preparation: 9 ml of hydrochloric acid is diluted to 1000 ml with distilled water), and then soaked in 3.3M potassium chloride solution for 24 hours to restore its performance.

◆ Electrode contamination or blockage of liquid junction will also passivate the electrode. At this time, it should be cleaned with an appropriate solution according to the nature of the contaminant. See the table below (for reference).

Contaminants: Cleaners:

Inorganic metal oxides less than 1M dilute acid

Organic oils and fats Dilute detergent (weak alkaline)

Resin polymer substance Alcohol, acetone, ether

Protein blood precipitate Acid enzyme solution

Pigment substances Dilute bleach, hydrogen peroxide

If the electrode platinum is seriously polluted and an oxide film is formed, you can apply toothpaste on the surface of the platinum, and then gently scrub to restore the luster to the platinum.

◆ The life cycle of electrodes is about one year, and new electrodes should be replaced in time after aging.

◆ The equipment should be calibrated before each use. It is recommended to calibrate every 3 months for long-term use. The calibration frequency should be adjusted according to different application conditions (the degree of dirt in the application, the deposition of chemical substances, etc.).

4. Contact information

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