



RS-EC-N01-2

Industrial EC Transmitter User Manual (Type 485)





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1. product description

This product is a device for measuring the conductivity of a solution, with automatic temperature compensation, which can compensate the current temperature and conductivity to the specified temperature. It can be widely used in continuous monitoring of the conductivity value of aqueous solutions such as section water quality, breeding, sewage treatment, environmental protection, pharmaceuticals, food and tap water.

1.1 Features

1. The maximum range of conductivity measurement is 1~20000 μ s/cm; the measurement range of temperature is -20~100 $^{\circ}$ C, and the resolution is 0.1 $^{\circ}$ C.
2. RS485 communication interface: MODBUS RTU communication protocol can be easily connected to the computer for monitoring and communication.
3. The ModBus communication address can be set, and the baud rate can be modified.
4. The equipment adopts wide voltage power supply, DC 7~30V can be used.
5. The product shell is IP65 protection grade and can be used in outdoor rain and snow environment.

1.2 Equipment technical parameters

powered by	DC 7~30V
Power consumption	0.4W
Communication Interface	RS485; standard MODBUS-RTU protocol; communication baud rate: default 4800 (2400, 4800, 9600 can be set)
Conductivity measurement range	K=1: 1~2000 μ s/cm; resolution: 0.1 μ s/cm K=10: 10~20000 μ s/cm; resolution: 1 μ s/cm
Conductivity measurement error	$\pm 1\%$ FS
Temperature measurement range	-20~100 $^{\circ}$ C; Resolution: 0.1 $^{\circ}$ C
Temperature measurement error	$\pm 0.5^{\circ}$ C
Temperature compensation range	-20~100 $^{\circ}$ C (The default compensation temperature is 25 $^{\circ}$ C)
Temperature compensation coefficient	Default 0.02
Equipment working	Ambient temperature: -20-60 $^{\circ}$ C Relative humidity: <85%



conditions	
Electrode wire length	Default 5m (10m, 15m, 20m can be customized)

1.3 product model

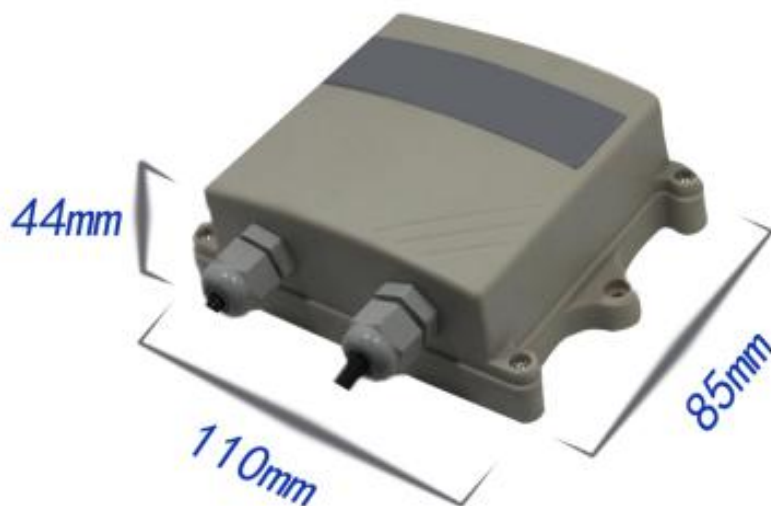
RS-					Company code
	EC-				Industrial EC transmitter
		N01-			RS485 (Modbus-RTU protocol)
			2-		Wall-mounted king-shaped shell
				SUS01	Stainless steel electrode, cell constant k=1
				SUS10	Stainless steel electrode, cell constant k=10
				EP01	Plastic case electrode, cell constant k=1
				EP10	Plastic case electrode, cell constant k=10

1.4 Product List

1. One industrial EC transmitter
2. 1 conductivity electrode
3. Certificate of conformity, warranty card, etc.
4. 2 expansion plugs, 2 self-tapping screws

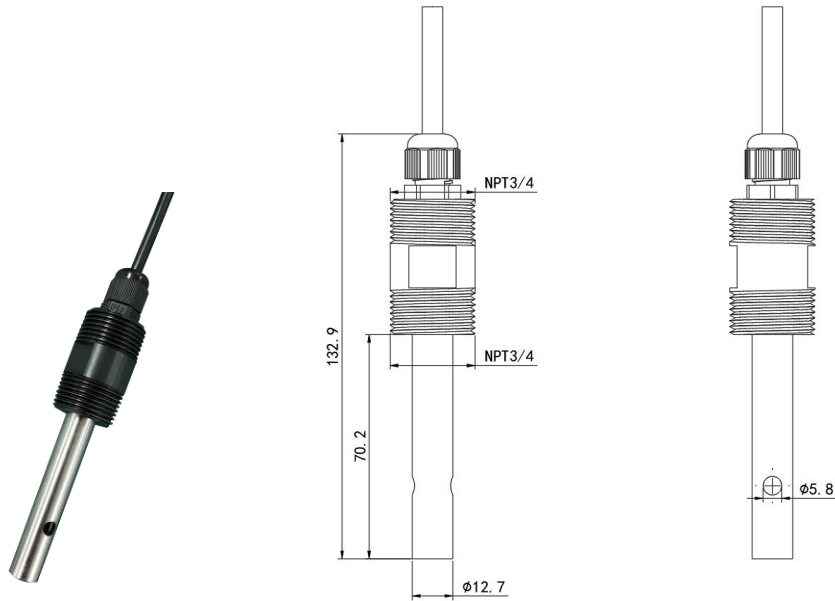
1.5 Equipment size

壁挂王字壳：110×85×44mm

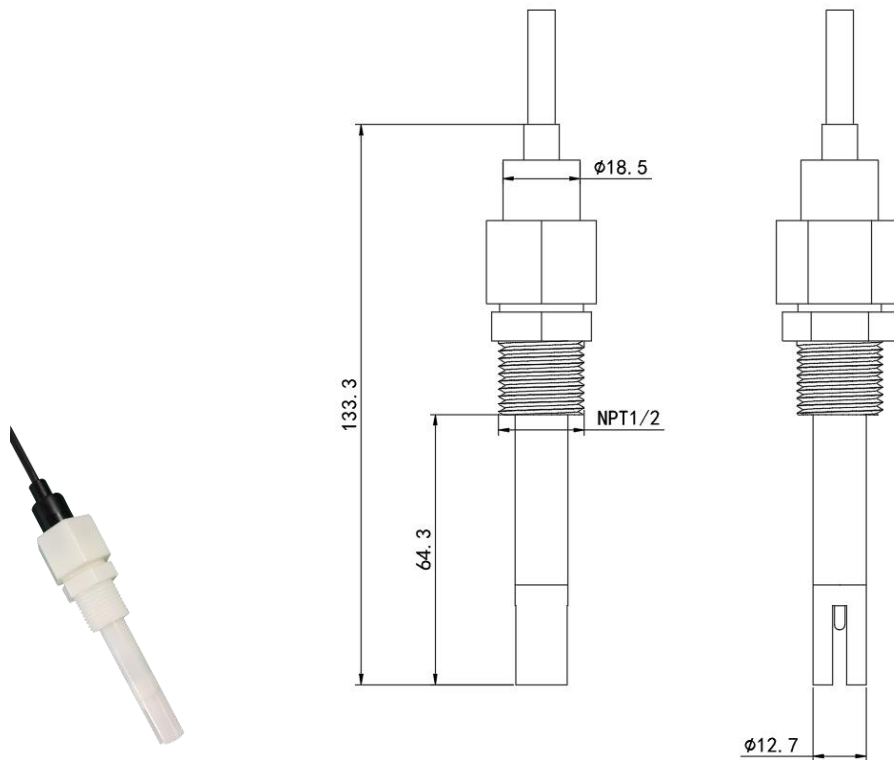


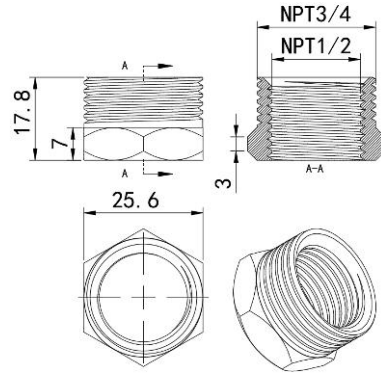
1.6 Electrode size and installation

1.6.1 Electrode type and size



Stainless steel electrode, up and down 3/4 thread for easy installation

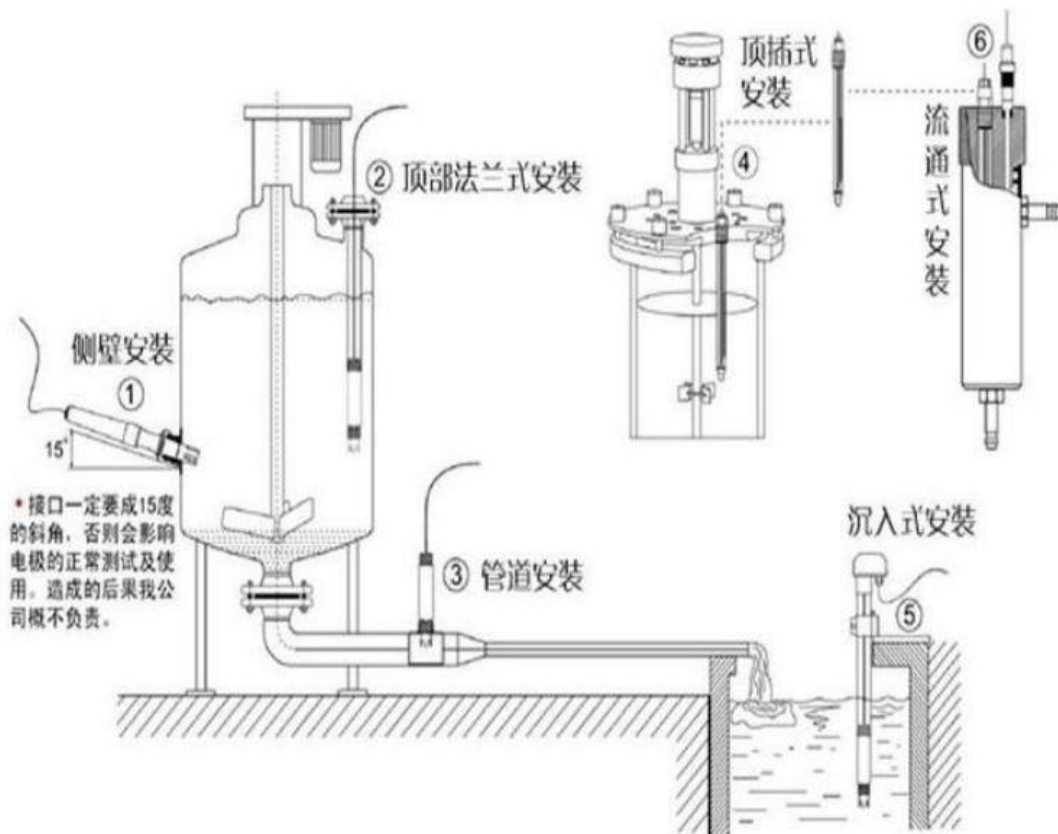




For plastic case electrodes, our company provides 3/4 to 1/2 cores for installation.

1.6.2 Electrode installation

1. Submerged installation: the lead wire of the electrode passes through the stainless steel tube, and the 3/4 thread on the top of the electrode is connected with the stainless steel 3/4 thread with a raw material tape. Make sure that no water enters the top of the electrode and the electrode wire.
2. Side wall installation: The manufacturer provides a 316L all-stainless steel sheath with a bevel, and the electrode can be screwed into the sheath.
3. Pipeline installation: connect with the pipeline through the electrode 3/4 thread.



2. Equipment instructions

2.1 Wiring instructions

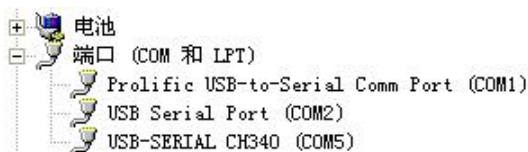
	illustrate	illustrate
power supply	Brown	V+ (7~30V DC)
	black	V-
communication	green	485-A
	blue	485-B

2.2 Parameter configuration description

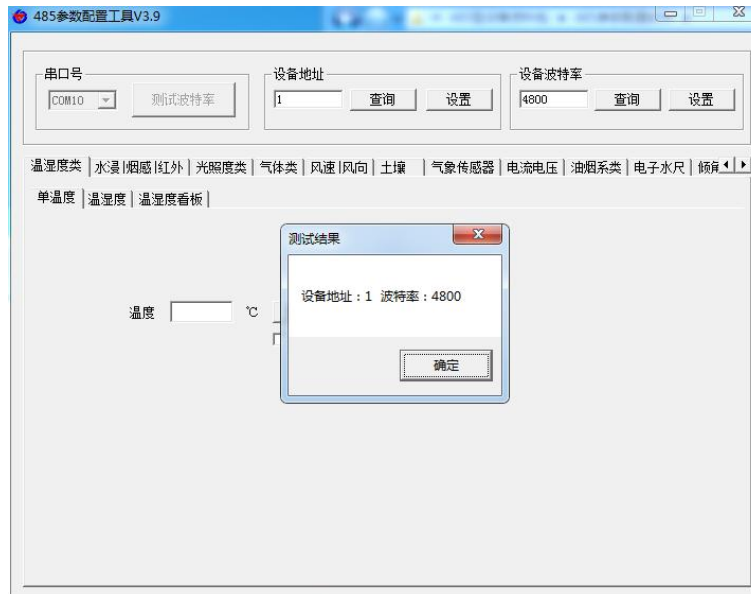
Open the data package, select "Debugging software" --- "485 parameter configuration

software", turn up  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 Calibration instructions

Find the EC tab in the configuration tool.



Select the corresponding conductivity resolution according to the purchased equipment range. If you purchase a device with a cell constant of $k=1$ and a range of $1\sim 2000\ \mu\text{ s/cm}$, select a resolution of 0.1; if you purchase a device with a cell constant of $k=10$ and a range of $10\sim 20000\ \mu\text{ s/cm}$, select a resolution of 1.0. The default resolution is 1.0.

After selecting the resolution, click Query to display the current conductivity and temperature, and check automatic to refresh in real time.

The temperature compensation coefficient can be modified according to the temperature coefficient of the measured solution, and the default is 0.02.

When calibrating, put the electrode in a standard solution of known conductivity value, shake the electrode to speed up the response, and then stand still. After the conductivity value is stable, write the conductivity of this solution into the conductivity solution calibration and click calibration to complete Calibration.



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	without
Stop bit	1 person
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
0000H	03	Conductivity value (10 times the actual value when the range is 1~2000; The actual value is when the range is 10~20000)
0001H	03	Temperature (10 times of actual value)
0050H	03/06	Temperature deviation value (10 times of actual value)
0051H	03/06	Conductivity deviation value (when the range is 1~2000, it is 10 times of the actual value; The actual value is when the range is 10~20000)
0052H,0053H	03/16	Conductivity temperature compensation coefficient (floating point number)
0054H,0055H	03/16	Cell constant (floating point number)

2.3.4 Communication protocol example and explanation

Example 1: Read the current conductivity and temperature of the device with address 01

Send frame:

address code	function code	Register address	Register content	Check code low	High bit of check code
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		ss	nt	w bit	eck code
0x01	0x03	0x00 0x00	0x00 0x02	0xc4	0x0b

Response frame: (For example, a device with a range of 0~2000 μ s/cm reads a conductivity value of 1000 μ s/cm and a temperature of 26.5 $^{\circ}$ C)

address code	function code	Number of valid bytes	Register content	Check code low bit	High bit of check code
0x01	0x03	0x04	0x27 0x10 0x01 0x09	0x30	0xd4

Conductivity calculation: 2710 (hexadecimal) = 10000 \Rightarrow conductivity = 1000.0 μ s/cm

Temperature calculation: 109H (hexadecimal)=265 \Rightarrow temperature=26.5 $^{\circ}$ C

Example 2: Correct the deviation value of the current conductivity value of the device whose address is 01

Sending frame: (If the current range is 0~2000 μ s/cm, the output conductivity value is 990, the value should be corrected to 1000, the difference is 1000-990=10, and the expansion of 10 times is 100 \Rightarrow 64H (ten Hexadecimal), the contents of the register write 00 64)

address code	function code	Register address	Register content	Check code low bit	High bit of check code
0x01	0x06	0x00 0x50	0x00 0x64	0x88	0x30

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	0x00 0x64	0x88	0x30



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!
- ◆ If the electrode is not used for a long time, it can generally be stored in a dry place, but it must be placed (stored) in distilled water for several hours before use to activate the electrode. Electrodes that are frequently used can be placed (stored) in distilled water.
- ◆ Cleaning of conductivity electrodes:
The organic components on the electrode can be cleaned with warm water containing detergent, or with alcohol.
Calcium and magnesium precipitates are best used with 10% citric acid.
Electrode pads or poles should only be cleaned chemically or by shaking them in water. Wiping the electrode pads or posts will damage the coating (platinum black) plated on the electrode surface.
- ◆ 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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5. Document History

V1.0 document creation



V1.1 Register address description correction, temperature measurement range correction