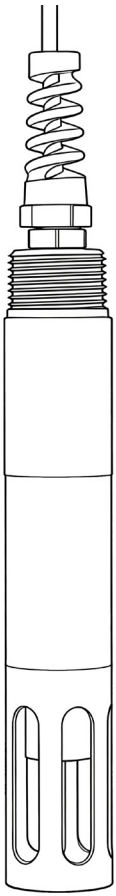
Online Conductivity Sensor



S-EC021

User Manual

USER NOTICE

- Please read this instruction manual carefully before use and keep it for reference.
- Please follow the operating procedures and precautions in this manual.
- When you receive the instrument, please open the package carefully and check whether the instrument and accessories are damaged during transportation. If damage is found, please notify the manufacturer and dealer immediately and keep the packaging for return processing.
- When the instrument fails, please do not repair it by yourself, please contact the manufacturer's maintenance department directly.

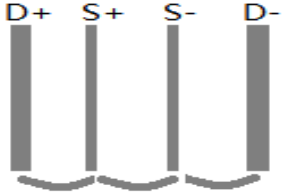
CONTENTS

I. Instrument Introduction

1. Principle of Conductivity Measurement

Electrical conductivity is the ability of a solution to conduct electricity. Since the charge of ions in a solution contributes to conductivity, the conductivity of a solution is directly proportional to its ion concentration. The conductivity electrode with a 4-disc (flat-top) design uses a reference voltage to compensate for the polarization of the disc. This reference voltage ensures that the measured value accurately reflects the conductivity, unaffected by the electrode state, resulting in higher accuracy when measuring pure water.

Salinity is a dimensionless measurement of the weight of dissolved salt in seawater, which can be calculated using electrical conductivity.



picture 1 Schematic diagram of conductivity electrode

Technical parameters

model	S-EC021
measurement parameters	Conductivity, temperature
Measurement method	Four-wire graphite electrode method
range	Conductivity: (0~200mS/cm)
Temperature: (0~60)℃	
accuracy	≤±1%
repetitiveness	≤1%
resolution	Conductivity: 0.01 μS/cm
response time	≤20s
drift	≤±1%FS
Temperature compensation accuracy	≤±1%FS
temperature range	(0~60)℃
Protection level	IP68
contact method	RS485 (Modbus RTU)
Supply voltage/power consumption	(12-24)VDC/<0.3W
material	Titanium alloy/stainless steel, POM
Overall dimensions	162mm×φ28mm

Sensor size

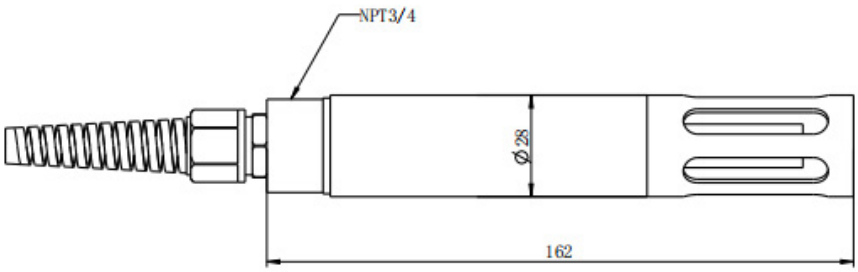


Figure 2 Installation Dimensions

II. Install

1. Unpacking the instrument

After opening the packaging, carefully inspect the instrument for any damage that may have occurred during transportation. If any damage is found, record it and notify the carrier or relevant authorities. Our agents and our customer service department report the extent of the loss.

2. Functional Check

The sensor has undergone detailed testing before leaving the factory, and only a brief functional check needs to be performed before installation.

Connect the sensor to the transmitter and turn on the transmitter 's power. The transmitter will quickly complete its self-test and enter the measurement interface after power-on. If the display indicates that the sensor is operating normally, the function check is complete.

Note: The sensor contains electrochemical electrodes; please ensure that the sensor is not subjected to any strong mechanical impact. There are no internal parts of the sensor that require user repair .

3. Connecting the sensor and transmitter

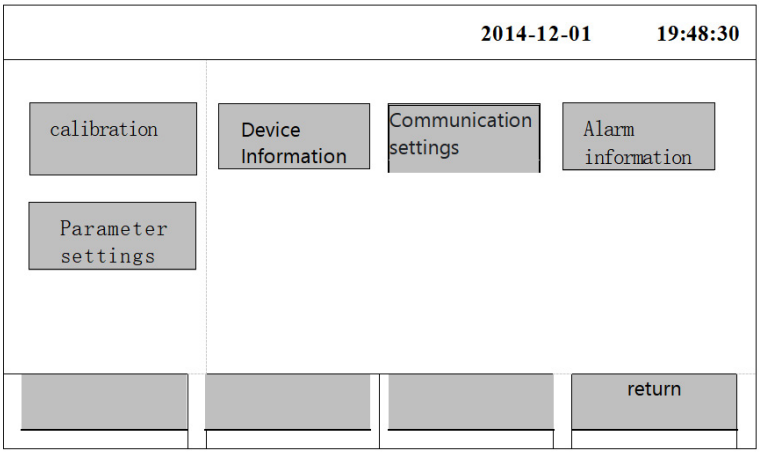
01. Connect the sensor using a quick-connect connector

The sensor cable includes a quick-connect connector for easy connection to the transmitter . The transmitter has four quick-connect interfaces, allowing selection of any... Interface connection. **Sensor standard configuration . 3 Rice cable, If a cable longer than 3 meters is required, Special instructions are required when purchasing. So that we can customize a special long Cables of a certain degree.**

Figure 3 Schematic diagram of the transmitter

III. Sensor Settings

Conductivity sensor settings



picture 4 Conductivity Sensor Settings Menu Interface

Introduction to the menu functions of the conductivity sensor

Conductivity sensor menu	Submenu Function Description
calibration	Sensor calibration is required; salinity calibration is unnecessary. The salinity value is automatically calculated after conductivity calibration.
Equipment Information	Displays sensor-related information , including device model, serial number, production date, hardware version , and software version.
Communication settings	Configure sensor communication baud rate and communication address
Alarm information	Display sensor alarm information
Parameter settings	Set the temperature compensation parameters, the number of moving averages, and the unit. Generally, no modifications are needed.

IV. Maintenance and troubleshooting

1. Routine Maintenance

- Cable inspection: Check all connected signal power cables for breaks. If any are broken, the instrument will not function properly .
- Visual inspection: Inspect the instrument and sensor housings for damage and corrosion;
- Equipment cleaning: Regularly clean transmitters and sensors. The pH glass electrode, dissolved oxygen electrode, and conductivity electrode should be rinsed with clean water.

2. Calibration

01. Conductivity sensor calibration

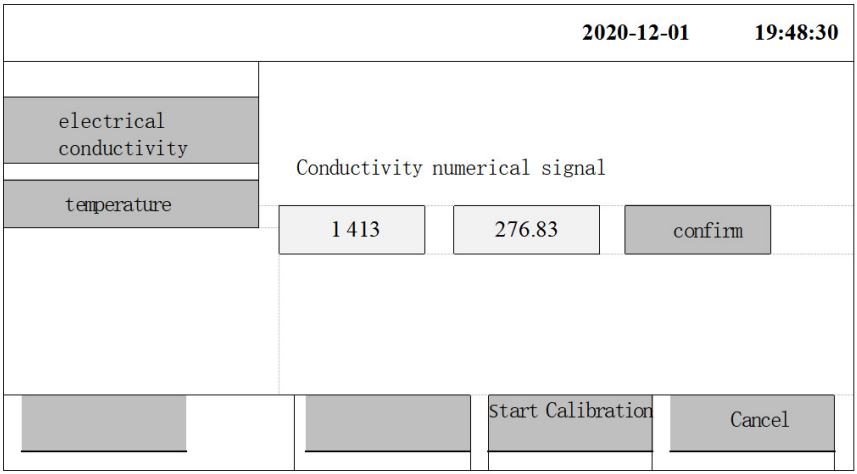
During use, the electrode surface of a conductivity sensor can become contaminated, and the electrode coefficient can change, affecting the measurement results. Therefore, it is necessary to... The sensor is calibrated (the cycle can vary depending on the situation; for surface water, it is generally every 3 months).

Please use a professional conductivity standard solution to immerse the conductivity sensor in the calibration solution. Ensure the signal value stabilizes before proceeding with the calibration process. do .

First, enter the calibration interface.

On the measurement interface, click the conductivity sensor menu button, enter the password "111111" to enter the sensor menu interface, and then click...

To access the calibration interface, click "Calibration," as shown in Figure 5 .



picture 5 Conductivity sensor calibration interface

Note : The conductivity sensor only requires a small calibration.

- **The second step is to calibrate the data acquisition.**

Before collecting data, prepare a conductivity standard solution and then place the sensor into the prepared standard solution.

picture 6 Calibration diagram

Observe the display in "Signal Value" until the value stabilizes (the criterion is that the difference between the maximum and minimum signal values within one minute is less than 1), Click the "Confirm" button to stop data refresh, then enter the standard solution value in the input box corresponding to "Conductivity Value". The conductivity value of the liquid

indicates that data acquisition at this point is complete.

Step 3: Calibration Confirmation

Once you have confirmed that the signal values are normal and all data acquisitions have been completed, click "Start Calibration" to complete the calibration. The calibration values will be saved. The sensor also stores real-time temperature data from the calibration process, so there is no need to pay extra attention to the temperature data during calibration.

The observed signal values correct? 25 When measuring 1413μs/cm When using standard solutions, the conductivity electrode signal value is typically in the range of... 300 about , The lower the temperature, The larger the signal value.

3. Sensor (Electrode) Cleaning and Storage

conductivity electrode

Regularly check the electrodes for contaminants. If contaminants are present, rinse with clean water. Do not wipe the electrodes with your hands or other hard objects.

Extreme side. If not used for an extended period, please rinse thoroughly with clean water, air dry, and then store in an airtight container.

4. Troubleshooting

Problem 1: Communication error, transmitter displays communication failure;

- Possible causes: power supply or cable connection problems, baud rate mismatch.
- Troubleshooting steps : Check the power supply, check if the RS485 connection is correct, and confirm that the baud rate is correct.

Question 2: Numerical instability

- Possible causes: electrode has exceeded its service life, there are air bubbles in the test solution, calibration error, signal interference.
- Handling methods: Ensure there are no air bubbles at the turbidity electrode measurement port, and that the pH , dissolved oxygen, and conductivity electrodes have not exceeded their service life. Does the deoxygenation membrane cap need to be replaced? If the problem persists after recalibration, check for a power supply malfunction or contact customer service.

Question 3: The turbidity value is displayed as 0 and does not change.

- Possible causes : Internal light source malfunction, or contaminants on the electrode surface; or incorrect zero-point calibration.
- Troubleshooting: Inspect the sensor surface, recalibrate, and pay attention to the zero-point signal. If there are no problems, please contact after-sales service.

V. Conductivity reagent formulation

1. Zero-point standard solution

Pure water. Conductivity less than 1 μS/cm.

2. 0100 mol/L KCl standard solution

Weigh 0.7456 g of KCl, dried at 105°C for 2 hours and cooled, and dissolve it in pure water. Make up to 1000 mL at 25°C. The conductivity of the liquid at 25°C is 1413 μS/cm.

The above reagents should be stored in a sealed container at room temperature. Shelf life: 3 Months .

3. Reagent storage

Experiments have shown that at room temperature (28°C) The storage time for 2 NTU standard solutions should not exceed 3 days (°C), and the storage time for 8 NTU and 20 NTU standard solutions should also be limited. The solution should not be stored for more than 10 days. At relatively high temperatures (approximately 37 °C), the turbidity of the low-turbidity standard solution shows a significant decrease within one day of preparation. The turbidity decreases less when stored in glass containers than when stored in plastic containers. Turbidity standard solutions are best stored in glass containers at temperatures below 10 °C. When stored under refrigeration, the lower the turbidity of the standard solution, the greater the decrease in turbidity over a longer period of time; the higher the storage temperature, the faster the turbidity decreases.

warn: Hydrazine sulfate is toxic; please take precautions during handling !

VI. conductivity sensor Modbus Communication Protocol

1. Agreement Description

Register address	Message address	Data types	Reading and writing	length	describe
40001	0x0000	Unsigned int	R	1	alarm code
40002	0x0001	float	R	2	Electrical conductivity data (μS / cm)
40004	0x0003	----	R	2	Salinity (PPT or PSU), TDS
40006	0x0005	float	R	2	Temperature data
40008	0x0007	float	R	2	Conductivity signal value (resistance)

Register address	Message address	Data types	Reading and writing	length	describe
4 0010	0x0009	Unsigned int	R / W	1	Unit of measurement 0 x 0000: μ S / cm 0 x 00 01: mS/cm 0 x 00 02: mS/m
4 0011	0 x 00 0A	float t	R / W	2	Temperature compensation coefficient
400 13	0 x 00 0C	float at	R / W	2	Electrode coefficient
400 15	0 x 00 0E	Unsigned int	R / W	1	Auxiliary parameter selection 0 x 0000: Salinity PPT 0 x 00 01: Salinity PSU 0 x 0002 :TDS mg/L
4 0016	0 x 00 0A	--- -	-	1	NC
4 0017	0 x0010	St ring	R	8	Product Name (16 Bytes)
4 0025	0 x0018	St ring	R	8	Serial number (16 bytes)
4 0033	0 x0020	St ring	R	1	Hardware version (1 Byte)
4 0034	0x0021	St ring	R	2	Software version (4 bytes)
400 36	0 x0023	Unsigned int	R / W	1	Communication address (initial value: 4)
4 0037	0x0024	Unsigned int	R / W	1	Baud rate (initial value: 9600)
4 0038	0x0025	Unsigned int	R	1	Equipment type
400 39	0 x0026	F loat	R / W	2	TDS coefficient
4 0049	0 x0030	--- -	-	1	NC
4 0050	0x0031	F loat	R / W	2	First point signal value
4 0052	0x0033	F loat	R / W	2	First calibration value
4 0054	0 x0035	--- -	-	2	NC
4 0058	0 x0039	Unsigned int	R / W	1	Initiate conductivity calibration flag (0 x 0001: Initiate one-point calibration)
4 0059	0 x 00 3A	F loat	R / W	2	Temperature calibration parameters
4 0061	0 x 00 3C	Unsigned int	R / W	1	Start temperature calibration (0 x 0001: Start temperature calibration)
4 0065	0x0040	F loat	R / W	2	Temperature signal value
4 0067	0x0042	Unsigned int	R / W	1	Temperature compensation flag (0x0000: self-) (Manual compensation 0 x 00 01)
4 0068	0 x0043	F loat	R / W	2	temperature compensation data

Agreement Description

The alarm code consists of 16 bits, with each bit representing an alarm type. When the corresponding bit is 0, it indicates that there is no alarm of that type; when the corresponding bit is 0, it indicates that there is no alarm of that type. A bit value of 1 indicates that this type of alarm has occurred.

Bit Bit	Alarm Description	Alarm Types
Bit 0	Temperature out of range	Warning alarm
Bit1	Conductivity data out of range	Warning alarm
Bit8	Temperature sensor malfunction	Fault alarm

Baud rate

Refer to the “ pH sensor Modbus protocol”.

2. Modbus calibration operation

Conductivity one-point calibration

- Step 1: Place the sensor in a conductivity standard solution.
- Step 2: Obtain the signal value of the electrode (40008 Float).

4 0008	0x0007	float at	R	2	Conductivity signal value (resistance)

- Step 3: Write the obtained electrode signal value into the calibration signal value register (40050 Float).

400 50	0x0031	F loat	R / W	2	First point signal value

- Step 4: Enter the conductivity value of the standard solution into the calibration value register (40052 Float).

4 0052	0x0033	F loat	R / W	2	First calibration value

- Step 5: Initiate a point calibration by rewriting register 40058 to 0x0001.

4 0058	0x0039	Unsigned int	R / W	1	Write it as 0x0001 : Initiate a point calibration

Temperature one-point calibration

- Step 1: Write the accurate temperature of the current solution into the temperature calibration parameter register (40059 Float).

4 0059	0 x 00 3A	F loat	R / W	2	Temperature calibration parameters

- temperature calibration and rewrite register 40061 to 0x0001 .

4 0061	0 x 00 3C	Unsigned int	R / W	1	Write it as 0x0001 to start temperature calibration .

Linksens

LINKSENS LIMITED

Tel: 085270107898

Website: www.linksens-hk.com

Email : sales@linksens-hk.com

Address: Room 22, 15/F, Beverley Commercial Centre, 87-105 Cnatham Road South, Tsim Sha Tsui, Hong Kong