



User Manual

Conductivity Monitor/ Controller

EC-8851



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Content

1. Overview:	3
2. Technical Specifications	4
3. Wiring Diagram.....	5
4.1. Instrument operation.....	6
4.2. Instrument parameter setting description.	6
4.3. User parameter setting menu description.....	6
4. Electrode Installation.....	8
4.1. Electrode constant selection:.....	8
4.2. Electrode installation:.....	8
Conductivity cell installation precautions:.....	11
5. Common Issue & Troubleshooting Tips	12
6. Maintenance.....	13
7. Accessories and spare parts.....	13



1. Overview:

EC-8851 industrial online conductivity/resistivity meter, with an integrated ARM MCU chip inside, the signal measurement is achieved by software automatic real-time tracking, to achieve the intelligent meter, so that the measurement accuracy and stability is further enhanced.

The instrument can be adapted to a variety of specifications of conductivity electrodes: 0.01, 0.02, 0.1, 1.0, 10.0^{cm⁻¹} conductivity electrode, measurement range from 18.25 MΩ (0.05 us) - 100 mS (temperature compensation using NTC10K, can achieve the temperature measurement of 0-120 °C).

Features:

- Chinese & English bilingual UI
- Temperature compensation: Manual and auto mode (PT1000 or NTC10K)
- Isolated 4-20mA outputs, corresponding to Conductivity/Resistance/TDS value and temperature, strong anti-interference ability
- Three groups of high and low relay points, and the hysteresis can be adjusted per flexible business need
- Password management function to better manage daily operation
- User-friendly menu with prompt feedback

This instrument is widely used in water treatment equipment, environmental engineering, pharmaceutical, electronics, chemical, agricultural planting, aquaculture, scientific research institutes, electroplating, metallurgical manufacturing, machining and other industries.



2. Technical Specifications

Measurement Range:

Cell Constant 0.01/0.02: 0.05uS/cm – 10.0uS/cm (0.1-18.25 MΩ·cm)

(0.01 for pipe-inserted electrodes; 0.02 for quick-fit electrodes (1/4 inch tube))

Cell Constant 0.1: 0.2uS/cm – 200uS/cm

Cell Constant 1.0: 2uS/cm – 2000uS/cm (optional: 2uS/cm – 4000uS/cm)

Cell Constant 10.0: 20uS/cm – 20MS/cm (optional: 200uS/cm – 200MS/cm)

Accuracy: ±0.01 uS/cm; ±1ppm

Resolution: 0.01uS/cm; 1ppm

Temp. compensation: Manual or auto mode (PT1000 or NTC 10K) with 25°C as the base

Oper. Conditions:

Temperature: for normal electrode: 0 ~ 60°C; for high temperature electrode: 0 ~ 120°C

Pressure: ≤0.5MPa

Display: Full-view LCD screen showing conductivity, temperature value, mA values

Electrode wire length: customizable

Pipe-inserted type: 5m by default

Quick-fit type: 1.5m by default

Alarm setting: upper and lower limit relay alarm output, alarm prompt HI or LO, and alarm sound.

Contact capacity: Max. 3A/250V AC (resistive load)

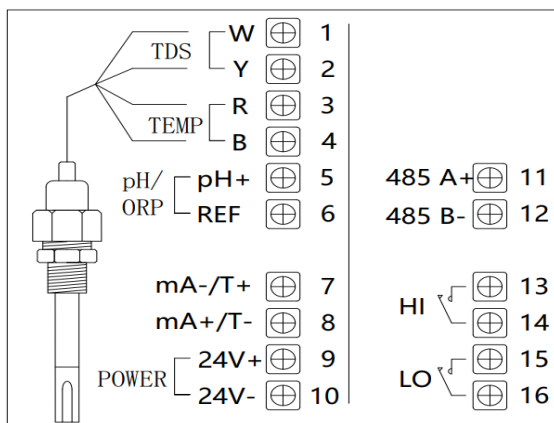
Power supply: standard: DC24V; optional: AC 220V or 110V

Meter dimension: 96×96×72mm (H×W×D)

Hole size: 92×92mm



3. Wiring Diagram

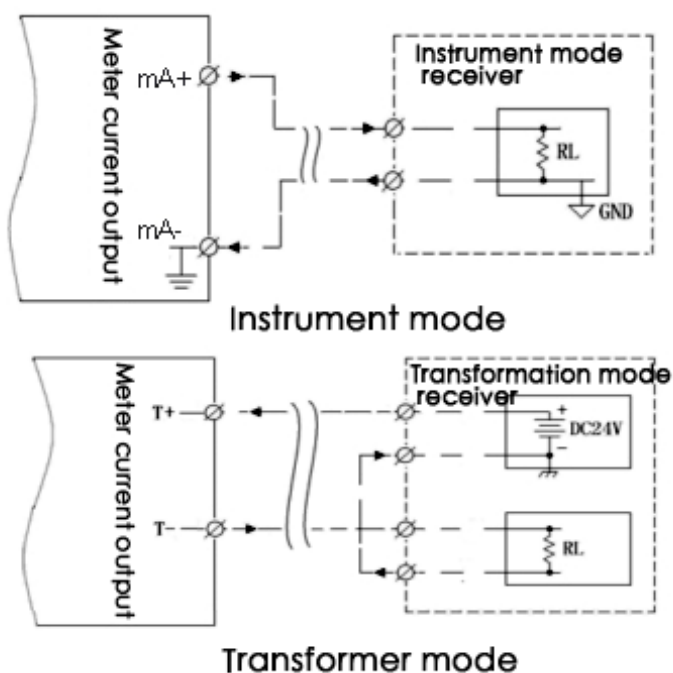


Rear Terminal Board Diagram

Note:

- 1.2 White line W and yellow line Y at the measuring end of conductivity electrode
- 3.4 Red line R and black line B at the measuring end of temperature
- 5.6 PH+ REF (empty)
- 7.8 (T-, T+) 4-20mA output Variable transmission mode
- 7. 8 (mA+, mA-) 4-20mA output Meter mode
- 9. 10 DC24V power input 11.12 RS485 communication port
- 13. 14 Relay High Limit Node (Passive Normally Open)
- 15. 16 Relay Low Limit Node (Passive Normally Open)

Attachment: 4-20mA output transmission connection diagram



4.1. Instrument operation



"↑" numeric increment key

"↓" decreasing digit key

"→" cursor right shift key

"ENTER" to confirm the Enter key

4.2. Instrument parameter setting description.

Measurement interface ---> Press "→" key to switch the display of $\mu\text{S}/\text{M}\Omega$ value.

Measurement interface ---> Press "ENTER" key to enter the "CODE" user password interface, the default value is "1000", then go to parameter setting options one by one.

4.3. User parameter setting menu description

Item 02: CELL: conductivity electrode type settings with choices of 0.01, 0.02, 0.1, 1.0, 10.0

Item 03: CON: electrode constant setting.

Note: Electrode type * electrode constant = actual conductivity cell parameter;

e.g.: electrode type is 0.01, electrode constant is 0.985, then conductivity cell constant = $0.01 * 0.985 = 0.00985$.

Special Case for 10.0 electrode type, it needs to be divided by 10, so the constant is the same with 1.0 electrode type.

Item 04: HI.ON: Conductivity upper limit relay, alarm setpoint

Item 05: HI.OF: Conductivity upper limit relay, alarm reset point

Item 06: LO.ON: Conductivity lower limit relay, alarm setpoint

Item 07: LO.OF: Conductivity upper limit relay, alarm reset point



Upper Limit (High Limit) Alarm Setting Example:

- HI.ON Setpoint: 1000
- HI.OFF Setpoint: 950
- Action: When the current conductivity exceeds 1000, the high-limit relay is activated (pulls in), connecting terminals COM and HI. When the current conductivity falls below 950 (the HI.OFF value), the alarm is deactivated.

Lower Limit (Low Limit) Alarm Setting Example:

(Primarily used for resistivity detection)

- LO.ON Setpoint: 10.00
- LO.OFF Setpoint: 12.00
- Action: When the current resistivity falls below 10.00, the low-limit relay is activated (pulls in), connecting terminals COM and LO. When the current resistivity exceeds 12.00 (the LO.OFF value), the alarm is deactivated.

Item 08: DLY: overrun alarm delay x seconds detection

Item 09: ALA: buzzer alarm sound switch; ON: beep, OFF: mute

Item 10: A4: 4-20mA output, 4mA corresponding value.

Item 11: A20:4-20mA output, 20mA corresponding value.

Item 12: EC-E temperature compensation coefficient, 0.02 by default

Item 13: ->ADDR: RS485 communication, local address setting: 1-255

-> BPS: RS485 communication, baud rate setting.

Item 14: EC0: conductivity zero migration, such as setting 0.05, minimum value is 0.05

Item 15: CODE: User password change, range: 0000-9999

END: exit and save all setting parameters.



4. Electrode Installation

4.1. Electrode constant selection:

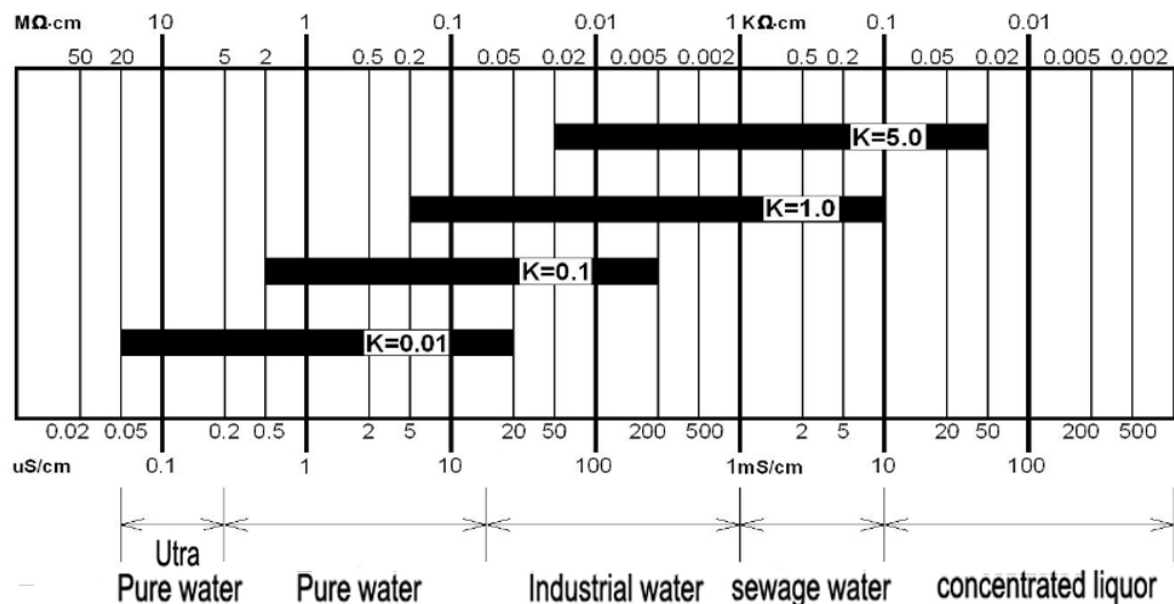


Figure 3 Electrode constant selection

4.2. Electrode installation:

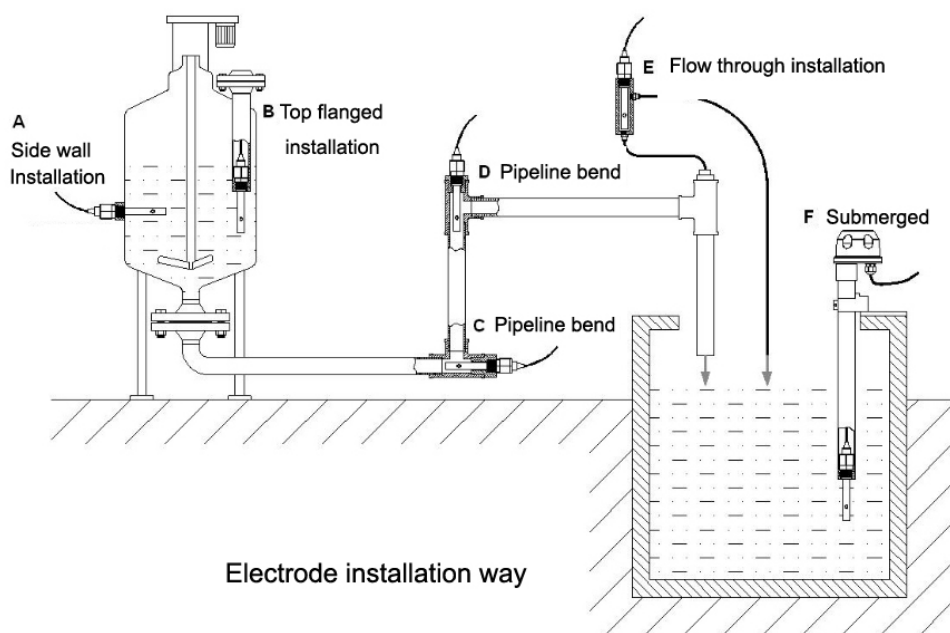


Figure 5 Electrode installation diagram



The installation of sensor needs to be very careful. Any improper installation leads to inaccurate measurement. During installing the sensor, must choose carefully the suitable installation site and installation way to avoid measurement data distortion.

- a. In figure 1A, electrode joint is too long, into the part too short, which is easy to form the die cavity, cause to measurement error, must install the electrode according to the Figure 1B (Face to flow direction and go deep into the flow.)

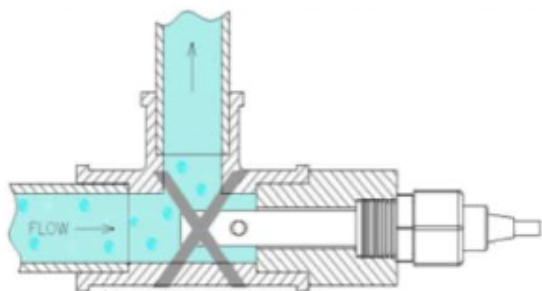


Figure 1A Wrong installation
No active fluid renewal in the conductivity cell, leading to smaller measurement

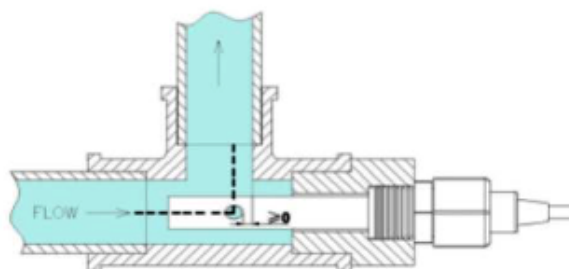


Figure 1B Correct installation
Part of the fluid flow through the conductivity cell, so accurate measurement

- b. Figure 2A installation way will make conductance pool forming air cavity to lead to measurement error and unstable. Must install according to the figure below.

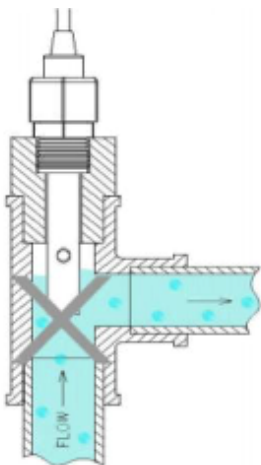


Figure 2A Wrong installation
The formation of an air chamber between conductivity cells results in large and unstable measurement.

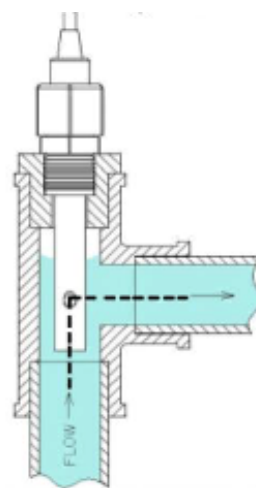


Figure 2B Correct installation
Part of the fluid flow through the conductivity cell, so accurate measurement



- c. Figure 3 installation method is wrong because the water flow can not guarantee the full pipe, the sinking water flow forms the high place to accumulate air, destroying the measurement conditions.

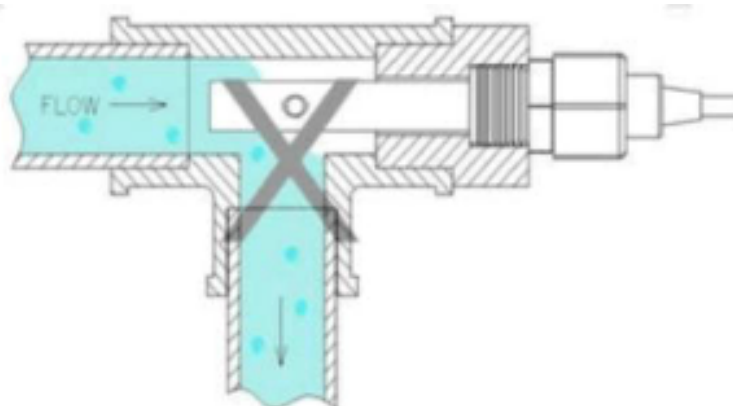


Figure 3 Downward flow forms gas chamber at high places
measurement is biased and unstable

- d. In Figure 4A a corner installation of the conductivity cell water can not flow through the measurement hole, resulting in large and unstable measurement values, should be installed in accordance with Figure 4B method.

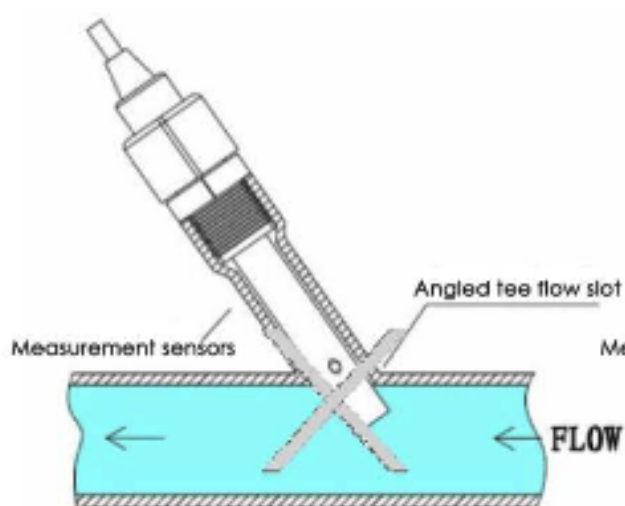


Figure 4A Wrong installation

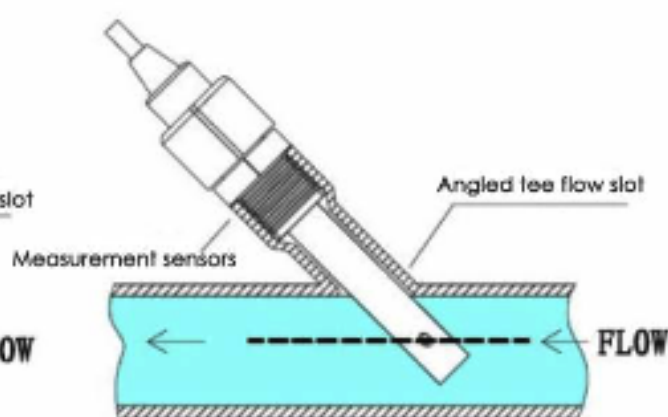


Figure 4B Correct installation



Conductivity cell installation precautions:

- 1) The conductivity cell should be installed in the circulation of the closed pipeline in a stable flow rate and not easy to produce bubbles, not recommended in the open box or pipeline, so as not to affect the measurement.
- 2) Concentric tubular conductivity cell flush, diagonally or vertically installed to make its front end installed in the direction of FLOW, and deep into the flowing water; other structural shapes of conductivity cell to prevent lateral installation in the measurement chamber due to turbulence generated by the evacuation pressure caused by measurement data disorder.
- 3) The measurement signal is a weak electrical signal, the collection cable must be wired independently, forbidden to connect with power and control lines in the same group of cable glands or terminal blocks, forbidden to wear tubes and ties with power and control lines to avoid interference with the measurement or breakage of the instrument measuring unit.
- 4) The conductivity cable is specifically made per relevant standard. Do not cut or extend the conductivity cable.
- 5) Please keep the measuring part of the conductivity cell clean during installation, do not touch the surface directly with hands or unclean objects, contact with oil, grease and gum will not be able to measure the accurate value for a long time.
- 6) The conductivity cell is a precision measuring part. Do not decompose or change the shape or the size of the conductivity cell. Avoid using strong acid, alkali to clean or soak the probe. Any mechanical scraping, operations may cause changes in the conductivity cell constant and affect the measurement accuracy of the system.
- 7) The instrument is assembled with precision integrated circuits and electronic components, do not install in direct sunlight. The instrument should be placed in a dry place, or in the control box to avoid leakage or measurement errors of the instrument caused by water droplets splashing or humidity.
- 8) To ensure the safety of the installation operation, check that the installation is complete before turning on the power.



5. Common Issue & Troubleshooting Tips

Issue	Possible Cause	Troubleshooting Tips
No display with powered on	A: Double check on the power supply B: Instrument failure	A: Check the presence of voltage between the instrument power terminals. B: Contact aftersales personnel.
Unstable display	A: The wiring of the conductivity cell is wrong. B: Bubbles in the pipeline. C: Unstable water quality.	A: Check and reconnect per the wiring diagram. B: Rectify the pipeline or choose another measurement point. C: Change a more stable water source.
Large discrepancy in readings	A: The constant is not set correctly. B: The conductivity probe needs to be changed. C: Measurement point is not perfect. D: Wrong installation of the conductivity cell	A: Reset the conductivity constant in the meter. B: Replace the conductivity cell with a new one or recalibrate the current cell. C: Install the conductivity cell in accordance with above instructions. D: Same as C.
Large deviation in measurement data	A: Meter of conductivity cell failure. B: Incorrect instrument setting.	A: for conductivity cell failure, check whether the resistance between the red line and the white line of the conductivity cell is about 1 MΩ, and that between yellow line and white line is 10KΩ, and the conductivity of the battery between white line and black line insulation >100 MΩ@100V. If above conductions all correct, it means the conductivity cell is normal with no problem. B: Instrument failure, check whether the instrument's parameter are all set correctly.
Displays of the two points mA do not match.	A: Receiver migration error. B: Not reaching 20mA. C: Improper sending setting. D: The sending of mA might be not matching.	A: Reset the amount of receiving migration. B: Loop resistance is too large, increasing the cable cross-sectional area. C: Reset the meter mA to indicate corresponding value. D: Connect the meter directly in series in the mA loop to verify the current value.

Note:

- Highly purified, ultrapure water cannot choose open or sampling measurement of comparison, high purity water in the moment of exposure to air, immediately a large number of carbon dioxide re-dissolved rapidly into the water, while the vessel wall unclean and airborne dust will also be re-dissolved in the water, resulting in exponential errors, high purity water is only allowed to use closed, flowing, side-stream flow tank verification, with laboratory Instruments open measurement form of measurement of high-purity water is a perception of the error, but also cannot have comparable.
- Water regeneration can easily lead to contamination of the conductivity cell, which can be restored after cleaning with alcohol cotton balls.



6. Maintenance.

- 6.1. The measuring electrode is a precision part, which cannot be disassembled, and the shape and size of the electrode cannot be changed; it cannot be cleaned with strong acid or alkali, which changes the electrode constants and affects the accuracy of measurement.
- 6.2. The measurement cable is a special cable and cannot be cut or extended.
- 6.3. The instrument should be placed in a dry environment or control box to avoid splashing water droplets or moisture. Otherwise the meter does not measure correctly or leaks.

7. Accessories and spare parts

Item	QTY (pcs)
Meter	1 (with a pair of instrument mainframe fixing clips)
Sensor	1 (electrode specifications determined before ordering)
User Manual	1



For other question, feel free to contact us.

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