

## Quality Assurance

The company provides after-sale guarantee and maintenance services within one year after the date of delivery. The company provides free maintenance services of internal damages to the instrument (except damages that caused by improper use). Any maintenance or adjustment needed, please send the product back to the company (the freight need to pay) and make sure the packaging condition in order to avoid damage in transit. (Note: Electrode belongs to consumable and is beyond the scope of guarantee. The company will guarantee the quality of electrode before delivery.)

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# Industrial Online Conductivity Meter

Instruction Manual

**Model: BCOT102**

## Notice

- Please carefully read and follow the operation procedures and notes.
- Any abnormal or damaged during use, please contact the deal immediately.
- Calibration often needs the instrument along with electrode to be more precise. If the electrode has been used for nearly one year or has any quality issues, please change it in time.
- Please preheat the instrument for 30 minutes before calibration.
- Any change to this manual due to product upgrading will not further notice.

**Attention: The conductivity electrode wire is for a special use, don't cut it randomly. The manufacturer will not be responsible for any problem including failure to measurement caused by cutting electrode wire.**

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## Chapter 6 Order & Contact

1. Please indicate conductivity cell constant, external diameter of inlet and outlet pipes ( $\phi 8$ 、 $\phi 10$  or  $\phi 12$ ), hosepipe or rigid tube and the distance from conductivity electrode to secondary instrument. If not specified, 0.01 conductivity cell and  $\phi 8$  hosepipe will be equipped with.
2. Any special needs, please inform us.
3. Contact:

## Chapter 5 Notes & Maintenance

1. Generally, secondary instrument needs no daily maintenance. If there is a failure, please contact with us.

2. Conductivity cell needs to be cleaned frequently. Suggest 50% warm detergent and nylon brush to clean it first. Then, pour distilled water on the surface of the clean electrode repeatedly. Attention: do not touch the electrode.

3. After starting power, if no display or display abnormally, should immediately shut off the power, and check whether the power supply is normal or fuse in good condition.

4. Do not wet electrode's lead and secondary instrument's connecting plug.

5. High pure water should be measured as soon as being poured into container.

6. The container should keep clean without ion contamination.

7. When installing the electrode, the electrode should be completely immersed in the solution.

## Chapter 1 Functions & Features

1. High intelligence: online conductivity meter adopts high precision AD conversion and single-chip microprocessor technology, making it diverse functions such as conductivity measurement, temperature measurement, automatic temperature compensation and self-inspection of instrument.

2. High reliability: components are all integrated into a piece of circuit board, overcoming the design defects of complex functional switch and adjusting knob.

3. Strong anti-interference ability: the current output adopting photoelectric coupling isolation technique, can realize remote transmission with strong anti-interference ability and good electromagnetic compatibility.

4. Waterproof & dustproof design: be suitable for outdoor use with the protection degree of IP65.

5. Automatic range conversion: realize the automatic range conversion within the scope of where electrodes cover.

6. RS485 communication interface: be available to computer monitoring and communication (optional).

7. Phase sensitive detection: eliminate the influence of wires on conductivity measurement.

8. Multiple parameters display on one screen: display conductivity, output current, temperature and state on the same screen.

9. Excellent display mode: Use  $192 \times 64$  bitmap LCD to display graphs and characters. Adjustable background light guarantee the stable operation in dark on the condition of outdoor activities.

10. Setting and checking of current output: Manual operation to check and set arbitrary output current value, and easy to detect recorder and lower machine.

When the measuring method is “dynamic”: displayed value=actual value+flow compensation value

When the measuring method is “static”: displayed value=actual value

Specific operation:

Use the same water sample, select “dynamic” method, the measured value will be X; select “static” method, the measured value of online instrument will be Y. The difference between X and Y will be the flow compensation value.

### 4.6 Flow Compensation (FLCOMP)

MENUMET		①Meas Mode:
MEASUR	MAINTE	M. S.
CONSET	ADDSET	②Flow Compens:
TRASET	<b>FLCOMP</b>	+0.000uS/cm

The environment of online instrument is dynamic and open, while the environment of lab instrument is static and closed. The environmental differences cause different measure results of these two instruments.

The “Flow Compensation”function is designed to avoid the above measure differences.

11. Software sets current output: Current output of 4~20mA can be set randomly.

## Chapter 2 Technical Index

1. Standard: JB/T 6855-93 *Industrial Conductivity Meter* ;

2. Measurement range:

0.01~30 μ S/cm (0.01 electrode) ;

0.1~300 μ S/cm (0.01 electrode) ;

1.0~3000 μ S/cm (0.01 electrode) ;

10~30000 μ S/cm (0.01 electrode) ;

3. Basic error of electronic unit :

conductivity:  $\pm 0.5\%FS$  temperature:  $\pm 0.2^{\circ}C$ ;

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4. Automatic temperature compensation scope:

0~80.0°C (reference temperature is 25°C);

5. Water sample: 0~80.0°C, 1.6MPa;

6. Basic error of instrument:

conductivity:  $\pm 1.0\%FS$  temperature:  $\pm 0.5^{\circ}C$ ;

7. Automatic temperature compensation error of electronic unit:  $\pm 0.5\%FS$ ;

8. Repeatability error of electronic unit:  $\pm 0.2\%FS \pm 1$  character;

9. Stability of electronic unit:  $\pm 0.2\%FS \pm 1$  character/24h;

10. Current isolation output: 4~20 mA (load $<750\Omega$ ) ;

11. Output current output:  $\leq \pm 1\%FS$ ;

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Press “MENU” first and then press “UP/DOWN”, then move to MAINTE and press “ENTER” to enter ①Enter password.

Press “ENTER” and move to 8888 , press “DOWN” to change the number into 8886 , then press“ENTER”to quit.

#### **4.5 Communication Setting**



MENUMET		
MEASUR	MAINTE	
CONSET	<b>ADDSET</b>	①System Address: 00
TRASET	FLCOMP	

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4~20mA output:  $I=4mA+\{(D-DL) / (DH-DL)\} \times 16mA$   
(I—output current value D—current measured conductivity)

DH—the conductivity corresponding to 20mA ( upper limit of current)

DL—the conductivity corresponding to 4mA ( lower limit of current)

Users can set current between 4mA to 20mA.

When the transmitting method is changed from automatic to manual, the instrument can be used as a constant current source.

#### 4.4 Maintenance Mode

MENUMET		①Enter password
MEASUR	<b>MAINTE</b>	(Ple Press Ent)8888
CONSET	ADDSET	②Modify password
TRASET	FLCOMP	(Ple Press Ent)8888

If users want to alter conductivity constant, they must enter “MAINTEE” to “Enter password”.

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12. Environmental temperature error of electronic unit:  $\leq \pm 0.5\%FS$ ;

13. Power supply voltage error of electronic unit:  $\leq \pm 0.3\%FS$ ;

14. Alarm relay: AC220V, 3A;

15. Communication interface: RS485 (optional)

- 16. Power supply: AC220V  $\pm$  22V , 50Hz  $\pm$  1Hz;
- 17. Level of protection: IP65;
- 18. Boundary dimension: 96 (length)  $\times$  96 (width)  $\times$  120 (depth) mm;     Hole dimension: 92 $\sim$ 92 mm
- 19. Weight: 1.0kg ;
- 20. Working condition: environmental temperature: 0 $\sim$ 60 $^{\circ}$ C     relative humidity<85%;
- 21. Types of electrode: 0.01, 0.1, 1.0, 10.0

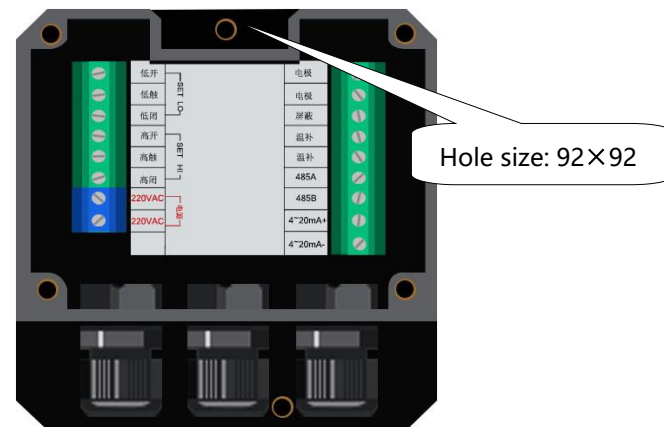
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### Chapter 3 Installation Steps

1. Cut a rectangular incision in any panel with thickness of 1/16 inch (1.5 mm) between 3/8 inch (9.5 mm). The hole size is 92 $\times$ 92.

(See Pic 1, rear view)

2. Insert the back part of the instrument into the hole.



Pic 1

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### 4.3 Transmitting parameters (TRASET)

MENUSET	
MEASUR	MAINTE
CONSET	ADDSET
<b>TRASET</b>	FLCOMP

①Output-20mA:	2.000mS/cm
②Output-4mA:	0.0uS/cm

③Trans Mode:	Ma	Au
④Manu I Source:	12.00mA	

The relation between electric current and electric conductivity

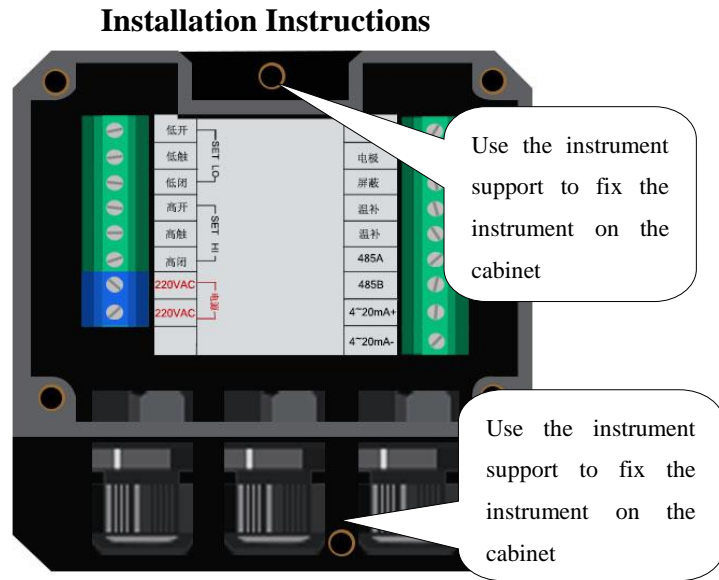
Notes: 【DELAY value: 0~ (HIGH value- LOW value) 】

To prevent relay from keeping beating or to control the conductivity value of solution, the instrument has 【DELAY】 function, specific operations are as follows: Press **DOWN**、**UP** to change DELAY value (the initial value is 0).

High relay: act when the actual measured value is higher than Alarm HIGH value, release when the actual measured value is lower than (HIGH value-DELAY value)

Low relay: act when the actual measured value is lower than Alarm LOW value, release when the actual measured value is higher than (LOW value+DELAY value)

The setting is beneficial to extend the service life of relay or contactor. Users should set high, low and delay value according to actual situations.



Pic 2

### 3. Wiring of the instrument

1. The length of cable should have a surplus, so as to avoid influence caused by external pulling on wiring.

2. The distance between measuring cell and secondary instrument should be close, generally no more than 30 meters, so as to avoid adverse impact on the signal. It is better to fix secondary instrument on the best eye level line to guarantee good grounding.

3. In order to avoid adverse impact on the signal, the cable connected to secondary instrument should not parallel to or close to power line.

## 4.2 Controls parameters (CONSET)

MENUSET		①Alarm High:
MEASUR	MAINTE	30.00mS/cm
<b>CONSET</b>	ADDSET	②Alarm Low:
TRASET	FLCOMP	0.0uS/cm

③Alarm Delay:
0.0uS/cm

It contains three options: Alarm High, Alarm Low and Alarm Delay.

## 4.1.5 Manual temperature

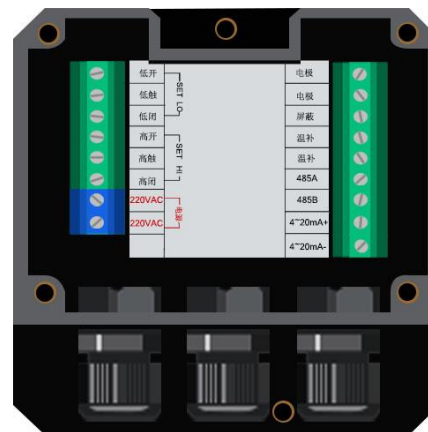
If you want to set temperature manually, please choose “Temp comp” and then choose “Au”. Then quit and enter “Manu Temp” to set temperature.

## 4.1.6 Salt Coefficient

The instrument can measure salt coefficient. Users can set different salt coefficient according to different measured medium.

### Writing Diagram of Rear Panel

1 pin: NOL	9 pin: C1
2 pin: COML	10 pin: C2
3 pin: NCL	11 pin: REF
4 pin: NOH	12 pin: TEMP1
5 pin: COMH	13 pin: TEMP2
6 pin: NCH	14 pin: RS485 A
7 pin: Live wire 220VAC	15 pin: RS485 B
8 pin: Neutral wire 220VAC	16 pin: Current + 4~20mA
	17 pin: Current - 4~20mA



### Attention!

**Do not connect power supply with wrong place.  
Disconnect power supply when wiring.  
Cover the plate after wiring.**

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#### 4.1.4 Temperature parameters (Temp Coef)

The conductivity value of solution sample is greatly influenced by the temperature change, so temperature compensation is needed for accurate measurement. As the benchmark temperature 25°C is of practical significance, the instrument automatically convert the conductivity value into 25°C.

There are two options below “WQ” (water quality): “UPW” (ultrapure water) and “OW” (ordinary water). In “UPW” mode, the instrument will compensate temperature according to the already set temperature coefficient of conductivity; in “OW”

mode, the temperature coefficient of conductivity is also needed to set manually in “Temp Coef” mode.

Notes: The initial setting is “OW” and the “Temp Coef” of “OW” is 2.00%.

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Press “ENTER” and move to 8888, press “DOWN” to change the number into 8886, then press “ENTER”. Quit

press “MENUSET” and then press “UP/DOWN”, then move to **MEASUR** and press “ENTER” **① Elec constant** to alter the value.

#### 4.1.2 Temperature compensation

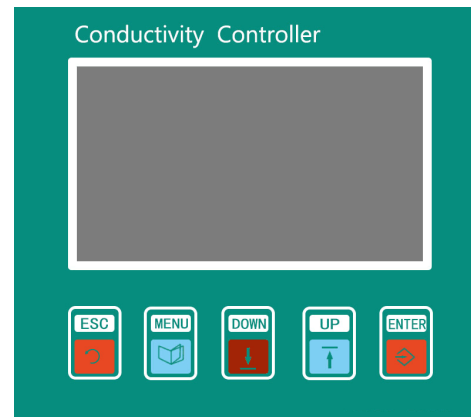
There are two models in “Temp comp”: “Au”(Auto) and

“Ma”(Manual). In “Au” model, the temperature shown on the screen is the actual temperature measured by electrode and the instrument will compensate temperature automatically. In “Ma” model, the temperature shown on the screen is the set temperature instead of the actual temperature and the temperature compensation will be realized manually.

### 4.1.3 Water quality

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## **Instruction to Front Panel**



**1: MENU            2: DOWN**

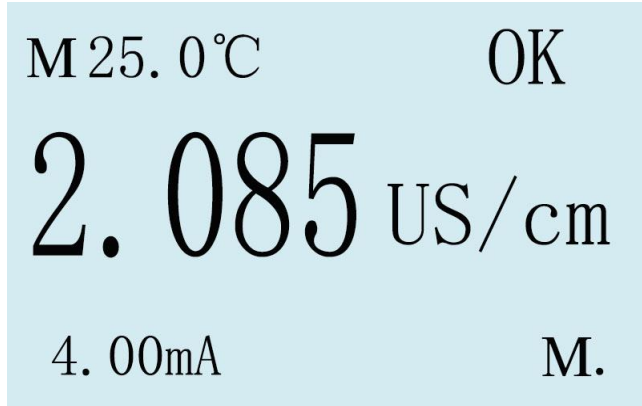
**3: UP                4: ENTER**

**5: ESC**

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Display format:



M 25.0°C                      OK  
2.085 US/cm  
4.00mA                      M.

Electrode constant set on the instrument should be consistent with electrode constant labeled on the electrode. For example, if electrode is labeled constant 0.108, the electrode constant set on the instrument must be 0.108.

Select **①Elec constant** and press “ENTER”, then move to number and alter the constant value, making it consistent with that of the electrode.

Notes: Alter the constant value must press “MENUSET” first and then press “UP/DOWN”, then move to **MAINTE** and press “ENTER” to enter **①Enter password**.



MENUSET	
MEASUR	<b>MAINTE</b>
CONSET	ADDSET
TRASET	FLCOMP

Measurement range	Electrode constant	Electrode model	Notes
0.01~30 $\mu$ S/cm	0.01	DDJ - 0.01	Add measuring slot to do flow airtight measurement
0.1~300 $\mu$ S/cm	0.1	DDJ - 0.10	
1~3000 $\mu$ S/cm	1.0	DDJ - 1.00	
10~30000 $\mu$ S/cm	10	DDJ - 10.0	

### Measurement range

Error will be greatly increased if beyond the above measurement range. When the conductivity of the medium > 100  $\mu$ S/cm, platinum black electrode with constant 1.0 or 10 should be used to increase the effective area, make a significant reduction in the current density on the surface of the electrode, so as to effectively weaken the electrode polarization effect

when the medium is concentrated solution.

## Chapter 4 Basic Operation

### 4.1 Measure

Press “MENU”, then select “MEASUR” and press “ENTER”, six options will appear as follows:

#### 4.1.1 Electrode constant

MENUSET		①Elec constant:
MEASUR	MAINTE	01.0000
CONSET	ADDSET	②Temp comp: <span style="background-color: black; color: white;">Ma</span> Au
TRASET	FLCOMP	③W-Q: <span style="background-color: black; color: white;">UPW</span> OW

④Temp Coef:

2.00%

⑤Manu Temp: 25.0°C

⑥Salt Coeffi: 0.0

Choosing right electrode constant according to the scope of water sample's conductivity is the key to accurate measurement, especially for measurement of pure water ( $<3\mu\text{S}/\text{cm}$ ) and ultrapure water ( $<1\mu\text{S}/\text{cm}$ ). 0.1 or 0.01 electrode should be applied when measure these two kinds of water, if necessary, add an airtight measuring slot.

### Basic principles of selecting electrode

Select electrode with suitable constant according to the scope of water sample's conductivity.

When selecting electrode, the most common mistake is selecting a electrode with big constant to measure low conductivity. For example, using an electrode with 1.0 constant to measure pure water ( $<3\mu\text{S}/\text{cm}$ ) will not get accurate results. Because the conductivity of low conductive medium is very poor, if we use electrodes with big constant to measure, will only get more weak and unstable signals, which is bound to greatly increase the measurement error.

