# CCT－8301A Series

Conductivity/TDS/Resistivity/Temp.

Configuration transmitting controller

IRSANAT .com
ایران صنعت
Tel : 09106978820

Instruction Manual

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# Introduction

Thanks for choosing Conductivity Controller CCT-8301A!

Please read the operation manual carefully before installation. Proper sensor installation and parameter setting would give maximum performance and advantage of this instrument for your good usage. So please carefully read this manual before installation.

This instrument is a precise electrochemical analysis Dosing &Control Integration System, which should be operated by technicians with relevant professional knowledge.

Please contact technical backup when you meet any problems during installation and usage.

Check the actual product with complete set after you receive the package, and contact us if any missing or damage.

Our serious promise:

1. The meter's quality guarantee is one year from the date of purchasing. During this period, if the meter has quality problems, manufacturer is responsible for maintenance for free or replacement.

2. We provide lifelong maintenance service for the product whatever you purchase from us or distributors.

3. If the damage of the meter is caused by the following reasons, it is out of the maintenance service:

A).The meter is burned caused by misconnection with high voltage power supply or soggy.

B).The meter is refitted or misused without permission.

C).The meter is damaged under the condition out of use environment.

D).The relevant damage caused by choosing the wrong type.

E).The physical damage caused by ultimate load

F).The meter is out of operation caused by improper storage and transportation (refer to SJ/T10463-93 standard)

G).Consumable material is out of maintenance service.

⚠ Please take care of the items which with this sign. !

*Without the influence on the operation, any small change or improvement on the products by the manufacturer will not be notified separately. Please make the object as the standard.

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# Catalogue

I. FUNCTION AND APPLICATION.....1
1.1 DEFINATION.....1
1.2 FUNCTION AND APPLICATION.....1
1.3 MAIN TECHNICAL INDEX.....2
II. DIMENSION AND WIRE CONNECTION.....3
2.1 OUTLINE DIMENSION.....3
2.2 TERMINALS.....3
2.3 MA TRANSFER WIRE CONNECTION .....4
2.4 ELECTRICITY WIRE CONNECTION DIAGRAM.....5
2.5 CONDUCTIVITY HIGH LIMIT AND WINDOW CONTROL DIAGRAM.....5
2.6 RESISTIVITY LOW LIMIT AND WINDOW CONTROL DIAGRAM.....7
III. FRONT PANEL AND KEY FUNCTIONS.....7
3.1 FRONT PANEL AND MAIN INTERFACE DIAGRAM.....7
3.2 KEYBOARD FUNCTION INTRODUCTION.....8
IV. SETTING AND OPERATION.....8
4.1 MENU FUNCTION INTRODUCTION.....8
4.2 PARAMETER INQUIRY INTERFACE.....10
V. SENSOR INSTALLATION.....11
5.1 SENSOR CONSTANT SELECTION.....11
5.2 INSTALLATION AND MAINTENANCE.....11
5.3 MODEL AND OUTLINE DIMENSION.....11
5.4 INSTALLATION METHOD.....13
VI. FAULT JUDGEMENT.....14
VII. PRODUCT SYSTEMATIC.....15
VIII. ORDERING DIRECTORY.....15
IX. APPROVED CERTIFICATES.....17
APPENDIX I.....18

## I. FUNCTION AND APPLICATION

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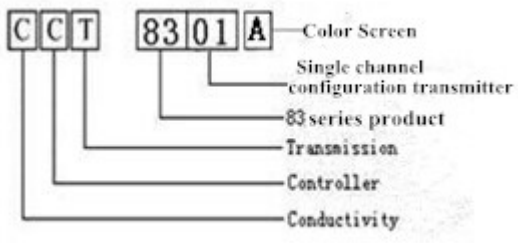
1.1 Definition




1.2 Function and application

- **Design Concept**

1) Automatic manufacturing equipment integration, quality and control zero defect.
2) With 32 bit processor as the core of the powerful kernel and operating system，make products to IT new era.
3) Using advanced modulus hybrid technology
4) Intelligent measure range automatically measurement switch；
5) Language man-machine interface，Guided operation menu，Humanized design process
6) TFT320×240 color LCD，Chinese/English language，multi parameter display in one screen；
7) Grading permission password protect function，prevent noncertified person freely revise the engineering parameter when log in.
8) LCD background lighting can select long time lighten or delay sleep，fit low carbon fashion.
9) Touch inductive operational keyboard, and handled easily.

- **Characteristic feature**

1) New conductivity measurement technology，which integrates conductivity/ resistivity/ TDS/ temperature multi parameters measurement.
2) Meet ultra pure water(0.054μS/cm)~ Condensed water (100mS/cm) wide range measurement；
3) Conductivity、resistivity、TDS can selected arbitrary, set and operate senior link，Simplified setting process
4) Professional temperature measurement/temperature control, replace temperature instruments directly
5) The virtual instrument technology compensate the nonlinearity relationship between resistivity and temperature, Compensation of high precision and good repeatability
6) Double channel、full isolated current loop，conductivity/TDS/resistivity/temperature signal configuration freely
7) double mode current loop output，Compatible with all types of signal disposal, set up high-end system integration
8) Configurable photoelectric switch control (Choose to conductivity/ resistivity/ temperature/time),drive pulse metering pump or expand control directly;
9) For regular cleaning and maintenance, and water treatment technology of time associated provides time function (cycle timing/appointed timing)；

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10) 1Power supply DC24V，fit high humidity site safety code，Port polarity internal identify automatically
11) Calendar function，time setting, and making an appointment，provide time tags for recording data;
12) SMT，AOI,ICT，computerized whole machine inspection，Strict quality control；
13) Product batch electrical aging，Surface three protective treatment，Perfect electronic production process management, high level quality;
14) Facing the quality supervision opening measure inspection function，Any authorized verification institutions can use legal measure for verification;
15) Complete electromagnetic compatibility design，Good anti-disturbance performances，Can satisfy most of electromagnetic environment operate safely；
16) Electric meter and conductivity cell mark and inspect respectively, Package and storage respectively；According to the purchasing to choose international order process。
17) 0.1;1.0;10.0;(cm-1) conductivity sensor constant, support 90℃ temperature compensation model.

## ● Instrument application

1) High end water quality management，high automatic level selection；
2) high pure water/ ultra pure water measure control，service to electron、electric power、pharmaceutical、fine Chemicals、clinical medicine and Life Science Research；
3) Industry process solution salinity analysis，service to water treatment、seawater desalination、concentrate management，cooling water circulation industrial coating and large water treatment equipment
4) used for inline monitoring in metallurgy、petrifaction and industry cleaning etc

## ● Main Technical index

| Model | CCT－8301A | | | |
|---|---|---|---|---|
| Description | Single-channel / double channel conductivity/TDS / resistivity/ temperature Configuration transmitting controller | | | |
| Conductivity cell model | CON2126Y-13 | CON2124Y-13 | CON3123Y-13 CON3223B-55(high temp, high pressure) | CON5121Y-13 |
| Conductivity Temp | （0～50）℃ | （0～50）℃ | 0~50）℃/ （0~150）℃ | （0～50）℃ |
| Conductivity cell type | 10.00cm-1 | 1.000cm-1 | 0.100$cm^{-1}$ | 0.010$cm^{-1}$ |
| Conductivity cell constant scope | ±20% Normal Constant | | | |
| Measurement range | 10μS/cm~100mS/cm | 1μS/cm~10mS/cm | (0.1~200)μS/cm | (0.05~18.25)MΩ·cm |

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| | | |
|---|---|---|
| Measurement range | Conductivity | 0.1μS/cm~100.0mS/cm |
| | resistivity | 50KΩ·cm~18.25MΩ·cm |
| | TDS | 0.25ppm~50ppt |
| | temperature | (0~170)℃ |
| Resolution | Conductivity | 0.01μS/cm |
| | | 0.01MΩ·cm |
| | TDS | 0.01ppm |
| | Temperature | 0.1℃ |
| Accuracy | Conductivity | 1.5 level |
| | resistivity | 1.5 level |
| | TDS | 1.5 level |
| | temperature | ≤±0.5℃ |
| Temperature compensation | | Pt1000 |
| Instrument Work condition | | temperature：0~50℃ Relative humidity：≤85%RH |
| Current output | | Double channel, isolated ,configuration 4-20mA output, Maximum loop resistance 500Ω，Accuracy: ±0.1mA |
| Control output | | Triple OC output<br>(Logic output and Pulse output for selection) |
| | | 50mA(Max)AC/DC 30V |
| Communication function | | RS485 communication（Modbus agreement） |
| Power supply | | DC24V±4V |
| Basic power consumption | | ⩽4W |
| Max power consumption | | 5W |
| Protection level | | IP65（with rear cover） |
| Installation mode | | Panel |
| Dimension | | 96 mm ×96 mm ×94mm (H×W×D) |
| Slot dimension | | 91mm×91mm |

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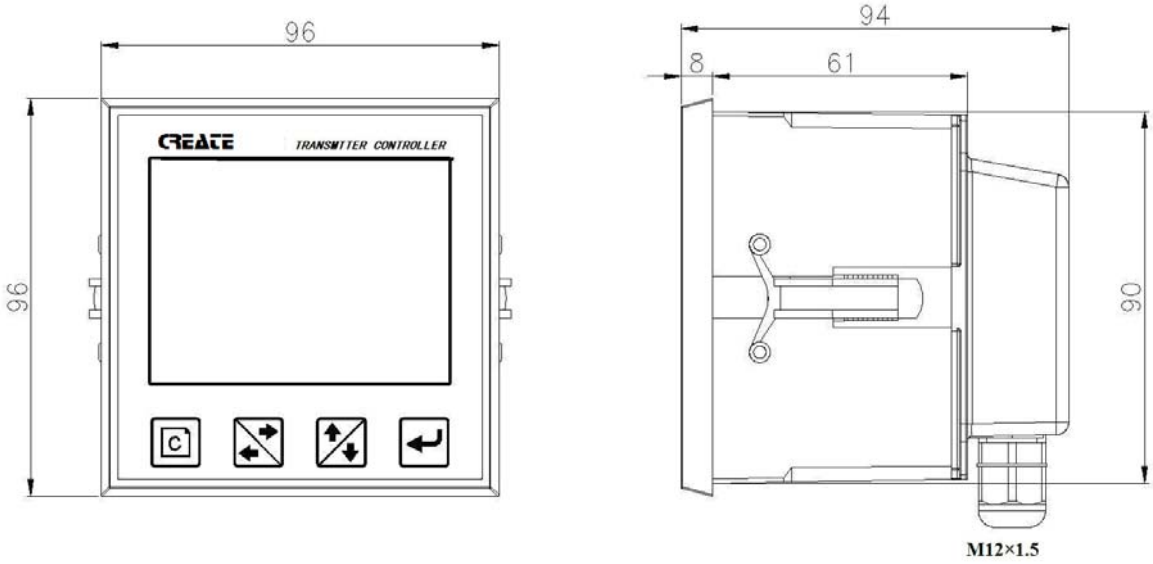
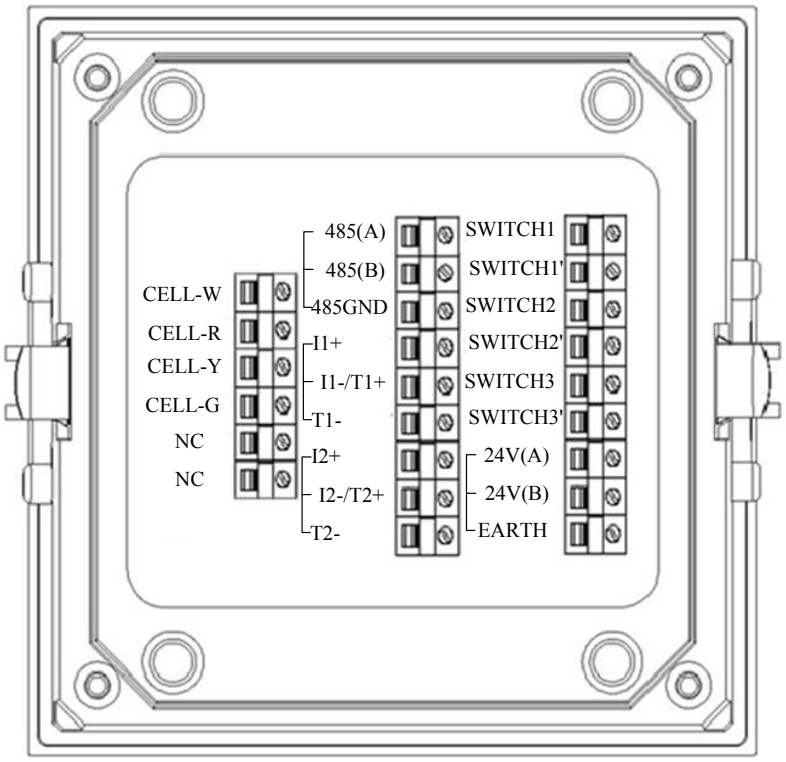
# II. Dimension and wire connection

## i.Outline dimension




## ii.Terminals



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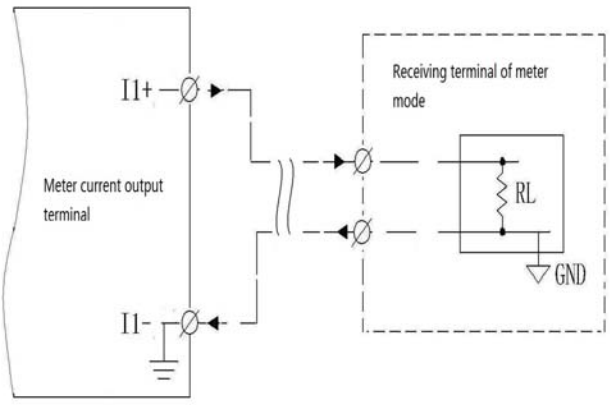
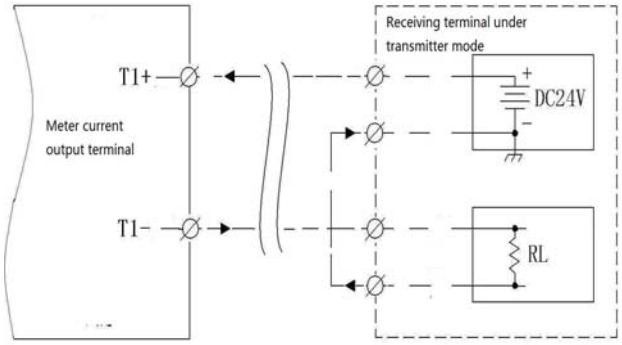
## Wire connection

| | |
|---|---|
| CELL-W | Conductivity cell white wire |
| CELL-R | Conductivity cell red wire |
| CELL-Y | Conductivity cell yellow wire |
| CELL-G | Conductivity cell green wire |
| NC | Empty |
| 485A/485B/485GND | RS485 communication interface |
| I1+/I1- | First channel（4～20）mA Instrument mode output, instrument internal power supply |
| T1+/T1- | First channel （4～20）mA Transmitter mode output，upstream module power supply |
| I2+/I2- | Second channel（4～20）mA Instrument mode output, instrument internal power supply |
| T2+/T2- | Second channel （4～20）mA Transmitter mode output，upstream module power supply |
| SWITCH1/ SWITCH1’ | The first channel photoelectronic Switch controlled contact (Non-polarized) |
| SWITCH2/ SWITCH2’ | The second channel photoelectronic Switch controlled contact (Non-polarized) |
| SWITCH3/ SWITCH3’ | The third channel photoelectric Switch controlled contact (Non-polarized) |
| 24VA | Power input interface，connect DC 24V (Non-polarized) |
| 24VB | |
| EARTH | EMC，Connect with EARTH |

## iii.mA transfer wire connection




**Left: meter mode**




**Right: transmitter mode**

**NOTE:**The second channel mA transfer wire connection is the same as above.

## ⅳ.Electricity wire connection diagram

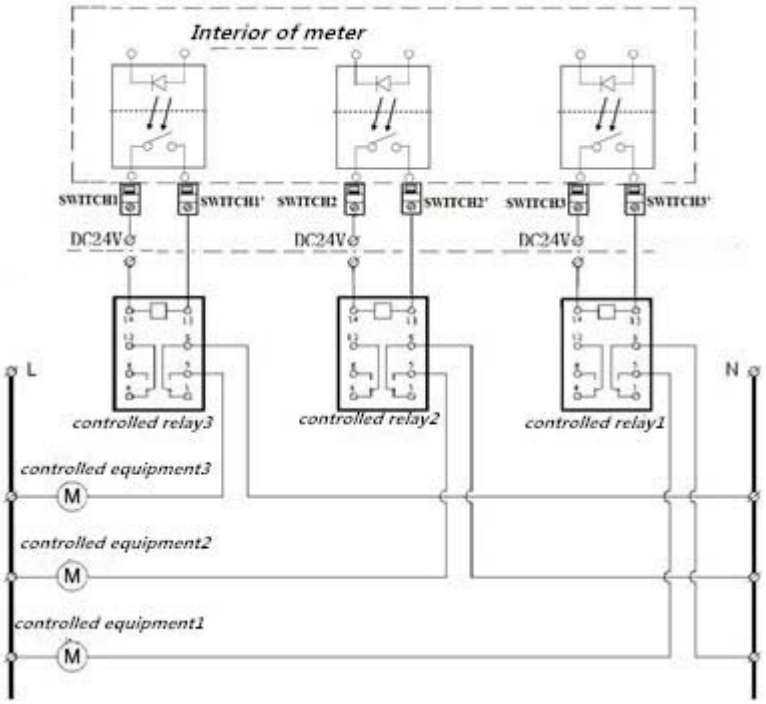



**Diagram 0-1 Please use middle relay to drive and expand high pressure or Dynamic load.**

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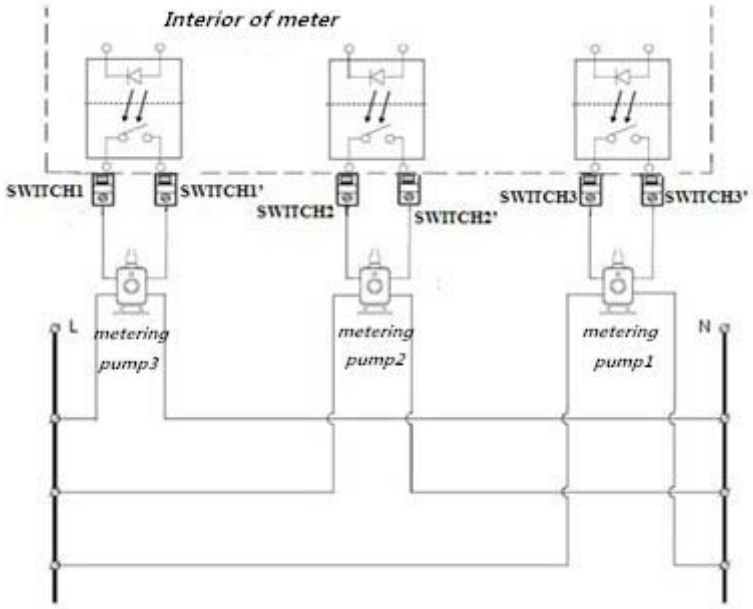
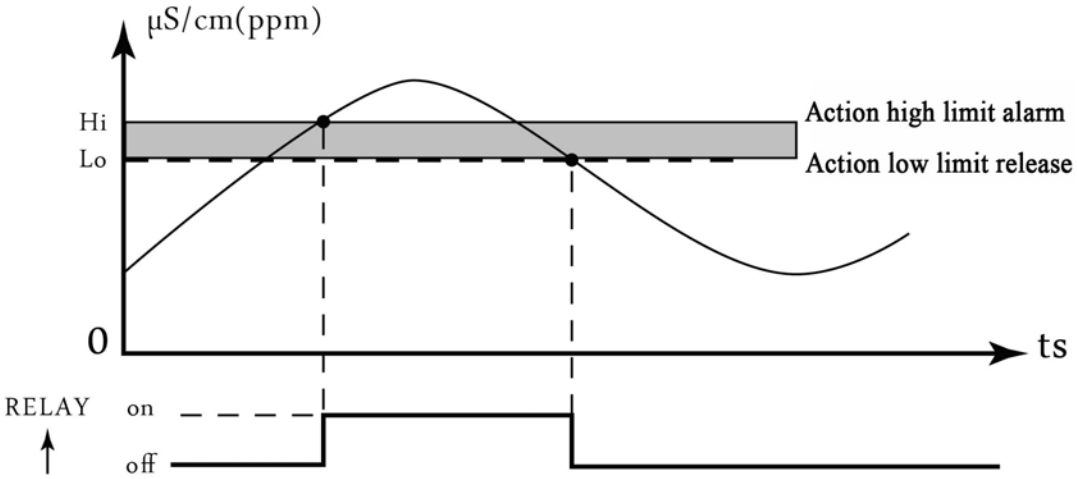



**Photoelectronic switch controls metering pump**

## v .Conductivity high limit and window control

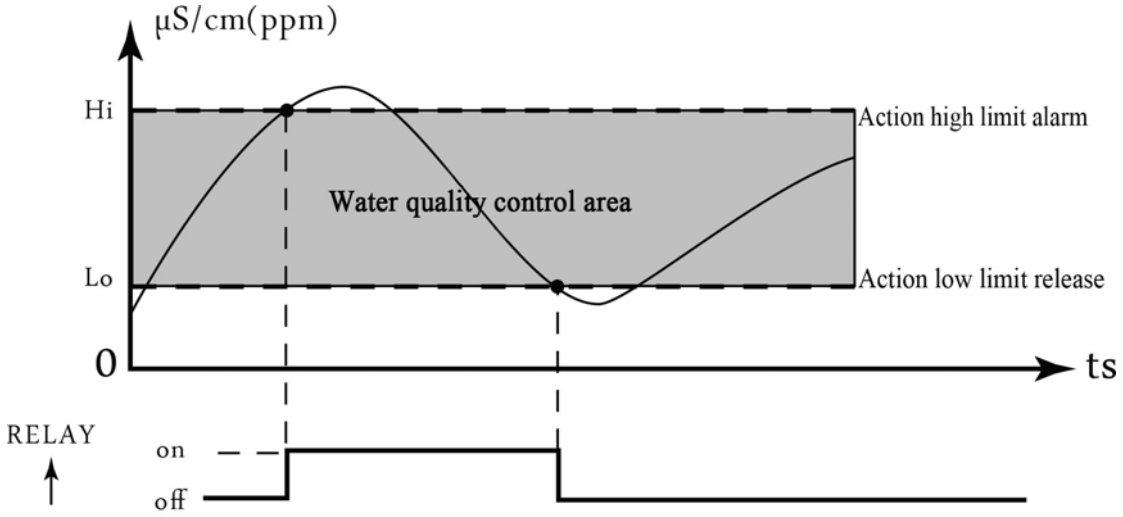



**High limit control application method**

## E.G. 1. Water quality below high limit.

In the fields of pharmaceutical, food, beverage, water purification, precision cleaning, electronics and processing industries, water quality will be limited at high-water limit "Hi", the solenoid valve to switch the direction of flow, in order to ensure the purity

of process water; When the water quality returns to "LO " system back to the original process. The period between " Hi "and " LO " is the delay period. The delay function effectively avoid the solenoid valve shock

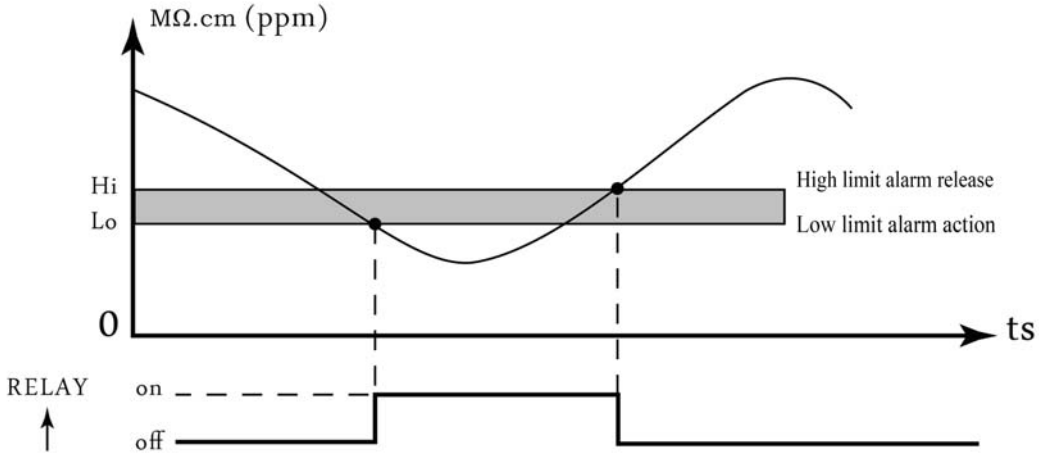



Water quality Control area between high and low

**E.G. 2. Window- Control area between high and low**

In the circulating cooling water, cutting coolants, cleaning fluids and other industrial applications, when the water quality degradation to the high limit "Hi", it will discharge or regeneration, when the water restored to limit "LO", stops to discharge. This is the section type window-control.

## vi.Resistivity low limit and window-control diagram




low limit control application method

Water quality should be controlled above the low limit

17MΩ • cm or more, when the water quality below the Lo setting, the solenoid valve will switch the direction of flow, in order to ensure high purity process water; When the water return to "HI" , system will back to the original process. The period between "LO" and “HI" is the delay period, and the delay function effectively can avoid solenoid valve shocks.

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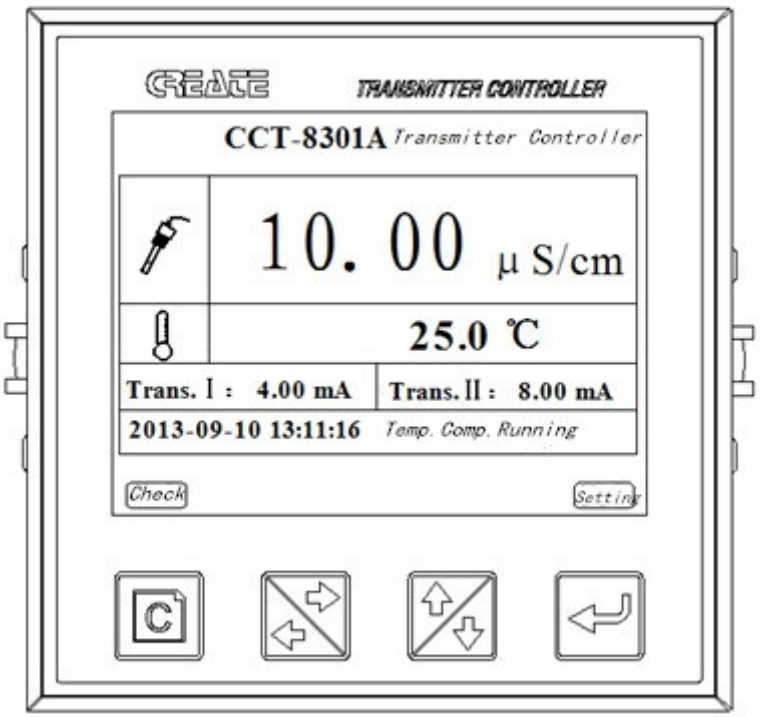
# III. Front panel and key functions

## i. Front panela and main interface




CCT-8301A front panel and main interface

## ii .Manual operation

| Keyboard | description | Function |
|---|---|---|
| | Backspace | 1. Return to previous menu after parameter preserve.<br>2.Cancel the current setting<br>3. Switchover the main and inquiry interface. |
| | Select | 1. Cursor Movement key<br>2. Under the parameter setting mode, select the items shift left to fight |
| | Add | 1. Digital 0-9 cycle operation keys<br>2. Under the parameter setting mode, select the items shift up to down |
| | enter | 1. Enter the password setting menu<br>2. Save the parameter and enter next menu |

| Soft keyboard（suggestion） | Mark meaning |
|---|---|
| Esc | Cancel the current setting or return to the previous menu |
| ∧ | 1 Up shift menu<br>2. Digital 0-9 cycle operation |
| ∨ | 1 down shift menu<br>2.after enter parameter query, down shift to check the parameter setting |
| > | 1.right shift menu<br>2. after enter parameter query ， enter the parameter display interface |
| OK | save the parameter and enter next menu |

# IV. settings and operation

## i. Menu fuction introduction

Press“↵” under Main monitoring interface enter the log in menu， select engineer Permission and input password 1000 enter the menu setting.

| Number | Menu description | Menu Function introduction |
|---|---|---|
| 1 | Measurement parameter | Electrode constant、temperature compensation、measuring unit、Filter coefficient、data migration、measurement high limit、resistivity display precision and TDS Transform coefficient setting ； menu showing automatic link with the setting |
| 2 | Control parameter | Triple channel photoelectric switch parameter setting， measured parameters any configuration control output |
| 3 | Transmitting parameter | Double channel transmitting parameter setting which can configure and control output the parameter |
| 4 | Communication parameter | RS485 baud rate and address code setting, communication protocol, see Appendix 1 |
| 5 | Password setting | Engineering users、normal users two level permission settings |
| 6 | Time setting | Set and modify the clock in the time zone |
| 7 | Backlighting setting | constant lighting、delay close、lightness control can be select |

| | | |
|---|---|---|
| 8 | Language selection | Under engineering permission setting Chinese and English display |
| 9 | Vender information | Inquire manufacturer information and website， obtain service information |

## ● Measure parameter

| No | Item select | Function Introduce |
|---|---|---|
| 1 | cell constant | 1.select conductivity cell type 0.01cm$^{-1}$、 0.1cm$^{-1}$ 、 1.0cm$^{-1}$、10.0cm$^{-1}$<br>2 check the mark on matched conductivity cell, input the accurate cell constant |
| 2 | Temperature compensation | 1.Conductivity cell constant is 0.1cm-1,1.0cm-1,10.0cm-1 temperature compensation as linearity, under 70℃ choose 25℃ compensation, above 70℃ choose 90℃ compensation.<br>2.If the Conductivity cell constant is 0.01cm-1,temperature compensation select nonlinear compensation |
| 3 | Measure unit | Select conductivity/TDS/resistivity corresponding unit μS/cm 、mS/cm、ppm、ppt、MΩ·cm KΩ·cm |
| 4 | Filter constants | Change filter constant, optimize Measure stability |
| 5 | Data transfer | When measured value and standard value error bigger, modify data migration achieve its accuracy |
| 8 | TDS conversion coefficient | Measurement unit select TDS，can modify the Conversion relation of ppm and μS/cm |

## ● Control parameter

| No | Item select | Function Introduce |
|---|---|---|
| 1 | OC I configuration | 1.configuration mode select（conductivity/TDS/resistivity/temperature）<br>2.contoal mode select（Normally on /Normally off /pulse）<br>3. Action value set （on/off） |
| 2 | OC II configuration | 1.configuration select（conductivity/TDS/resistivity/temperature）<br>2.control mode select（ NO /NC /pulse ）<br>3. Action value set （ON/OFF） |
| 3 | OC III configuration | 1. circulate cleaning( cleaning period/cleaning time)<br>2.Time cleaning(start time/ finish time） |

## ● Transmitting parameter

| No | Item select | Function Introduce |
|---|---|---|

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| | | |
|---|---|---|
| 1 | Transmitting I configuration | 1.select measured parameter （ conductivity/ TDS/ resistivity/ temperature）<br>2 set 4mA~20mA corresponding data<br>3. all options and work amount options are advanced connection. |
| 2 | Transmitting II configuration | 1.select measured parameter （ conductivity/ TDS/ resistivity/ temperature）<br>2.set 4mA~20mA corresponding data<br>3. all options and engineer options are advanced connection. |

- **Password setting**

| No | Item select | Function Introduce |
|---|---|---|
| 1 | Normal user | Under normal user permission, only can change the normal user password |
| 2 | Engineer user | Under engineer user permission, can change both engineer user and normal user password. |

## ii. Parameter inquiry interface

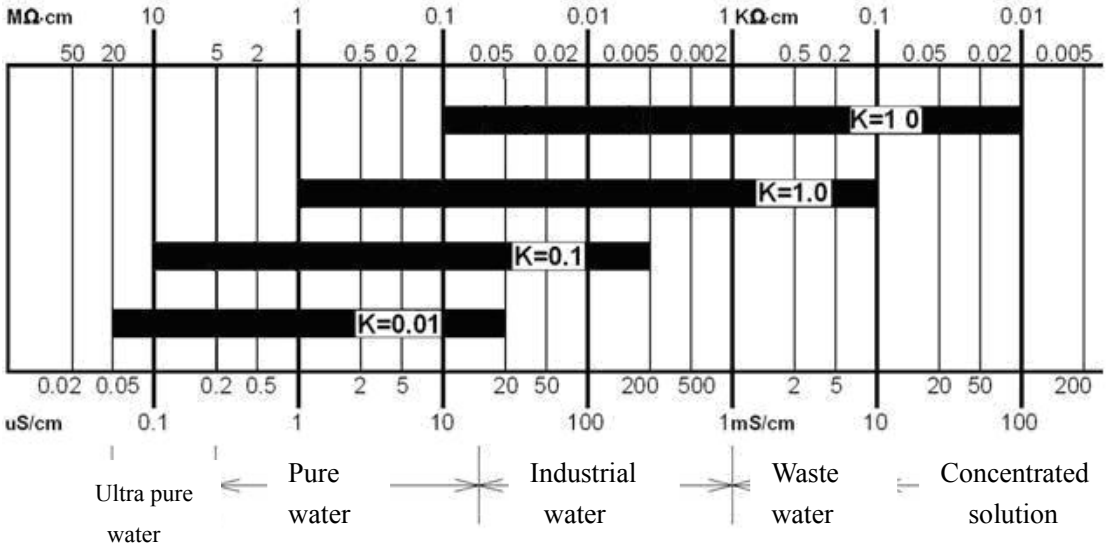
**Under main monitoring status，press C enter parameter seting inquiry interface through instrument panel**

| No | Parameter | Content |
|---|---|---|
| 1 | OCI configuration | Operate confirmed key to check the first channel photoelectronic switch corresponding channel /measure parameter/ control mode/ action value setting operate backspace key back to main interface |
| 2 | OCII configuration | Operate add key to check the second channel photoelectronic switch corresponding channel/measure parameter/ control mode/ action value setting operate backspace key back to main interface |
| 3 | OCIII configuration | Operate add key to check the third channel photoelectronic switch corresponding Circulation flushing cycle and time setting, operate backspace key back to main interface |
| 4 | Transmitter I configuration | Operate add key to check the first channel transmitting output corresponding channel/measure parameter/ set value, operate backspace key back to main interface |
| 5 | Transmitter II configuration | Operate add key to check the second channel transmitting output corresponding channel/measure parameter/ set value, operate backspace key back to main interface |
| 6 | Sensor constant | Operate add key to check conductivity constant， operate backspace key back to main interface |

**【Note】: Under parameter inquiry interface or parameter set interface, it would back to main interface if without operation over 3 minutes.**

# V. Sensor installation

## i. Sensor constant selection




**NOTE: Please choose the suitable sensor to get accurate reading. If you choose the smaller cell constant, it will cause the bigger measurement value, or if you choose the bigger cell constant, it will sacrifice the controlling and transmitting resolution.**

## ii.installation and maintenance

（1） The electrode should be installed in a place in the pipeline where the stream is steady and air bubbles are hard to generate.

（2） No matter the conductance cell is horizontally or vertically installed, it should be deeply inserted into the moving water and against the flow direction.

（3） The conductivity signal is weak electronic signal and its collecting cable should be separately installed. When threading cable joint or connecting terminal board is used, to avoid wetting interference or breakdown of measurement unit circuit, they should not be connected to the same group of cable joint or terminal board with the power line or control line.

（4） When the measurement cable needs to be lengthened, it’s recommended to make an

agreement with the factory before placing an order.

（5） Please keep the measuring part of electrode clean, and do not directly contact the surface by hands or contact with the oil stain objects

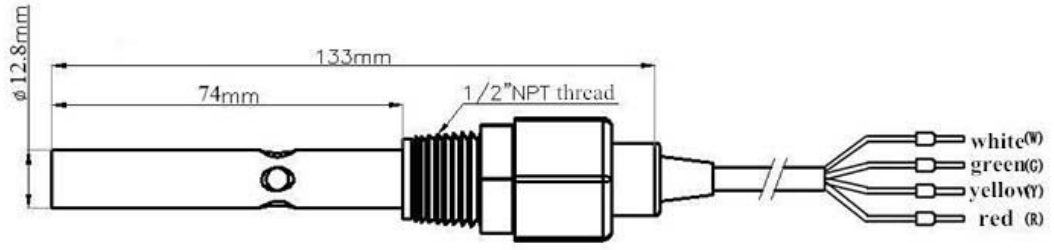
（6） Electrode is a kind of precision components, so please do not change any part of the electrode. The accuracy will be incorrect if the electrode was destroyed by the strong acid, strong alkali, scrape from machine and etc.

（7） The meter is made by precision integrated circuit and electronic components, so it needs to place in case or dry environment.

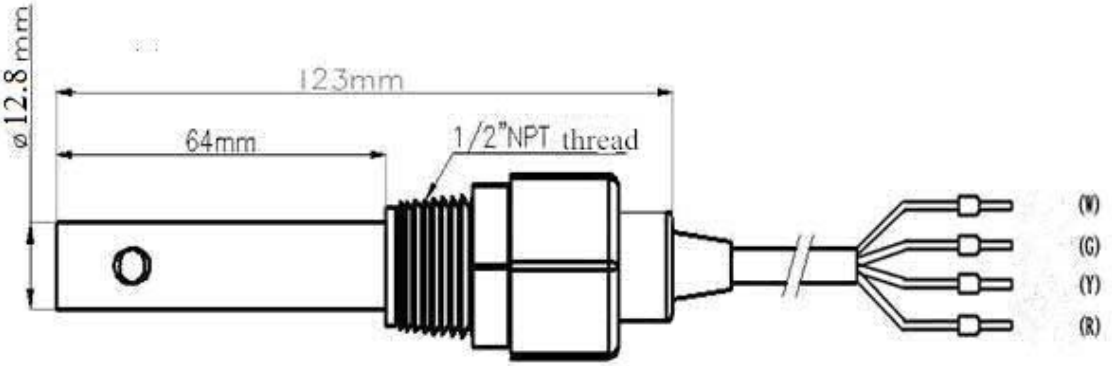
（8） If the strong acid , strong alkali, or mechanical rubs may change the sensor constant.

（9） The sensor cable can't be cut or extended by clients, or the

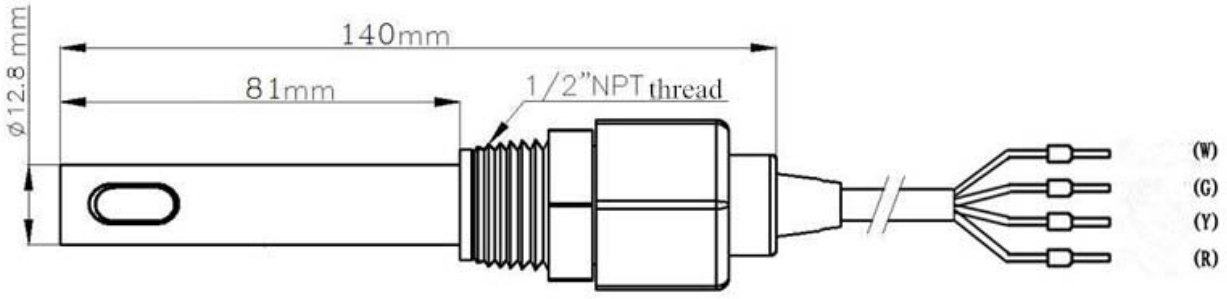
## iii.Model and outline diemension




CON5121Y-13 (C=0.01cm$^{-1}$) sensor outline dimension




CON3123Y-13 (C=0.1cm$^{-1}$) sensor outline dimension




CON2124Y-13 (C=1.0cm-1)outline dimension

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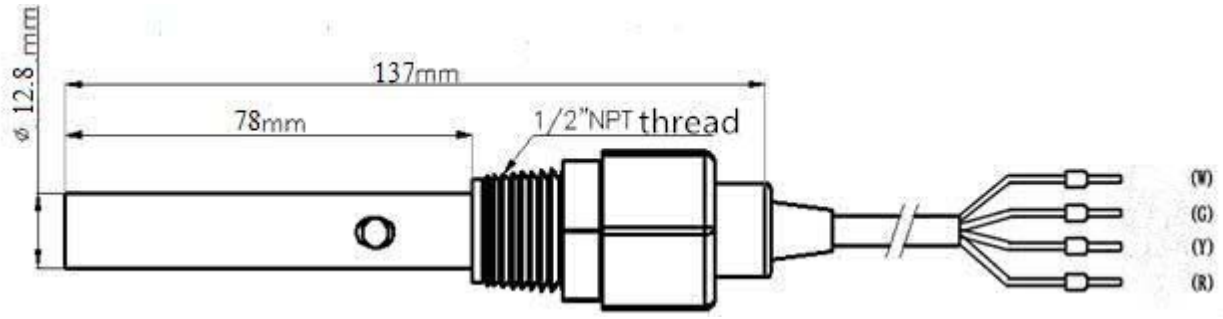
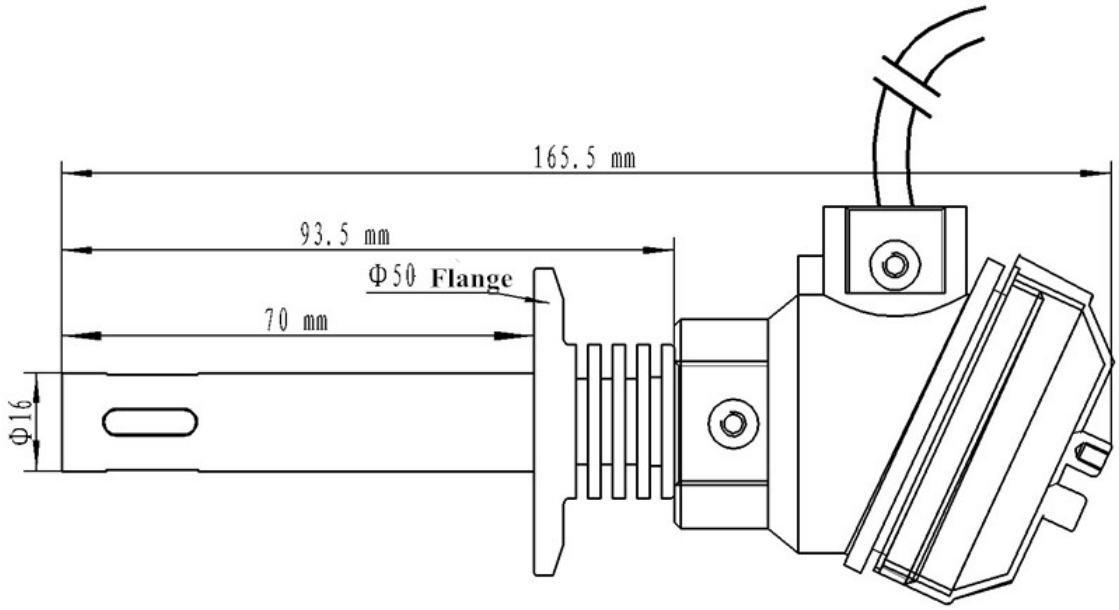



CON2126Y-13 (C=10.0cm$^{-1}$) sensor outline dimension

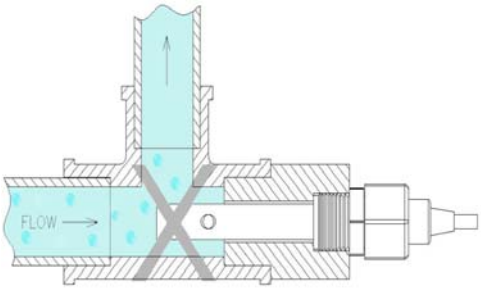



CON3323B-55 (C=0.1cm-1)high temperature and high pressure flange sensor outline dimension

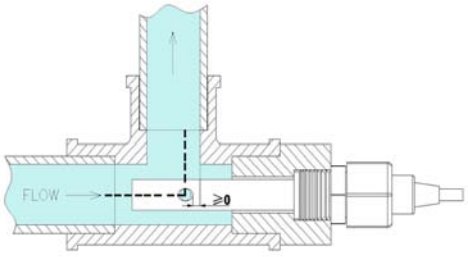
## iv.Installation method

Please follow the correct installation method to install the electrode strictly. The incorrect installation will cause the reading error.

1） **Picture 1**a the fitting is too long and the stretched parts is too short, which will
lead to the dead space in electrode and incorrect measurement. please follow the picture **1b (FLOW=stretch into flow direction deeply).**



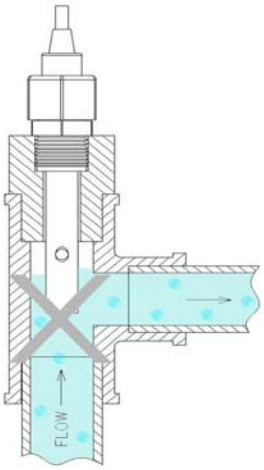

Installation 1a



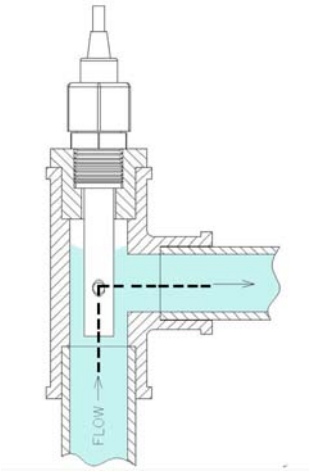

installation 1b

**2） Picture 2a, the installation mode will lead to air space and incorrect measurement**

**3） and instability. Please follow the picture** 2b

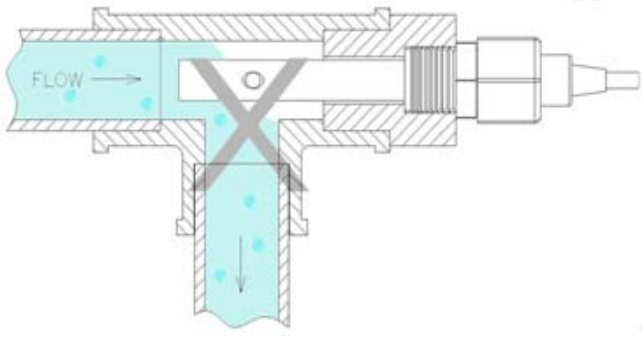



Installation 2a

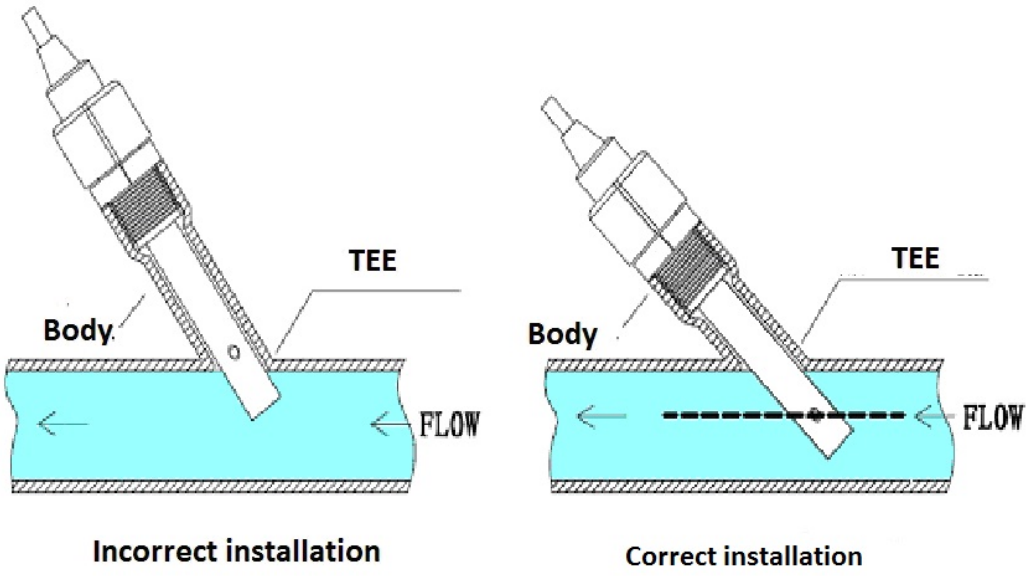



installation 2b

4）**Picture 3 , there will be air space inside the pipeline, the air will cause incorrect reading.**




**5） Picture 4a, the below installation will cause incorrect reading ,because the water can not through the measuring hole of the electrode.**




# VI. Fault judgment

**When the system measurement data is incorrect and unstable，judge fault shall be first to complete the following job:**

**1） Distinguish the problem come from the instrument or sensor**

From the instrument conductivity terminals CELL1 remove White wire， inspect if the instrument conductivity display zero（resistivity is infinite），if display zero and stable then prove instrument normal， Preliminary judge problem come from conductivity cell installation。

**2) Adjudge the interference source come from the instrument or sensor**

Remove all the connect wire of sensor, conductivity meter stability in zero,（resistivity meter is infinite），that is external interference，Through the reasonable wiring or wear tube processing to eliminate the interference.

**3) Distinguish（4~20）mA belong to instrument mode or transmitting mode.**

**Port before the connection condition：**

| mA Mode | Output port | Terminal voltage | Cable voltage |
|---|---|---|---|
| Instrument mode | I+/I- | >12V DC | No |
| Transmitter mode | T+/T- | No | DC24V |

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# Common Fault Analysis

| Phenomenon | Possible factors | Elimination method |
|---|---|---|
| No reading | A. Power not connected<br>B. instrument fault | A. check instrument power input terminal between 24V A and 24V B, if there is 24V power<br>B. please contact with professional maintenance person |
| Display instability | A. Sensor connection error<br>B. bubble in pipeline<br>C. Water quality instability | A. adjust according to the manual<br>B. Rectification of pipeline or choose measuring point<br>C. use stable source of water exclusion of instrument reason |
| Reading larger | A. Constant setting error<br>B. Electrode constant change<br>C. velocity measuring point unsuitable<br>D. Sensor installation error | A. reset electrode constant<br>B. change new sensor or re-calibrate sensor constant<br>C. install conductivity cell in proper position of velocity<br>D. Follow the sensor installation instructions |
| Low resistivity | A. velocity is not enough<br>B. Sensor pollution | A. Improve sensor installation position<br>B. Remove the sensor and clean the body it carefully! |
| Big error on reading | A. Instrument or sensor fault<br>B. Instrument setting error | A Put the sensor off-line inspection, Proof and exclude installation reasons，re-setpoint to make corrections<br>B.If off-line measure result still differ greatly, focus on inspecting instrument parameter settings. |
| Reading low when under high pure water measurement | A. Instrument or sensor fault<br>B. Sensor setting have dead angle | A. Find out the cause of instrument and sensor， take countermeasures.<br>B. Clean the sensor and improve installation position. |
| Transmission data different | A. Instrument fault<br>B. PLC Internal engineering quantity setting is incorrect<br>C.Loop resistance is oversize | A.DC current meter directly connected in series measure loop current，compare with Meter value, Exclude instrument's reason<br>B. Inspect mA loop resistance，reset receiving modules of migration<br>C. The current change is small at the place approach 20mA ,enlarge the sectional area of wirecable. |

**【Note】:**

1) High pure water、 ultra pure water can't choose opening or sampling measurement comparison method， when high pure water exposed in the moment of the air， immediately large amounts of carbon dioxide quickly to dissolved into the water， meanwhile vessel wall not clean and dust in the air will be to dissolve in water， lead to double error，high pure water only allow the sealed、liquidity、side stream circulation slot verification， laboratory apparatus for opening measuring to measure high pure water is a wrong cognition, can not comparable.

2) Resin regeneration can easily to cause the sensor pollution， the installation of conductivity cell should avoid selecting the points near the acid-base entrance.

## VII. Product systematic

- Indicator 1 set（contain one pair of fast clamp）
- Operation manual 1 copy
- Conductivity Sensor 1 piece
- Waterproof rear cover 1 piece

## VIII. Ordering directory

1） The factory cable length is 5 meters(0.01cm-1 conductivity cell cable length 10 meters).Appoint the special conductivity cable length when order the product，it would according to the standard allocation leave factory if there is no special request；

2） Select the suitable conductivity cell according the measured media before leave the factory，obtain the accurate measure data and resolution ratio；

3） Allocate the conductivity cell ’s constant 0.01cm -1 directly when measuring the high pure water,；Allocate the conductivity cell’s constant 0.1cm-1 when measuring KΩ·cm level water.

4） The meter’s power supply should be appointed the stander of AC power supply when select 24V DC power.

5) Conductivity cell fitting introduction：

| Conductivity cell constant | Conductivity cell model | materials | Installation | Suitable Temp. | Others |
|---|---|---|---|---|---|
| 10.0 | CON2126Y-13 | graphite | NPT 1/2″thread | 0-50℃ | Standard |
| 1.0 | CON2124Y-13 | graphite | NPT 1/2″thread | 0-50℃ | Standard |
| 0.1 | CON3123Y-13 | 316L | NPT 1/2″thread | 0-50℃ | Selectable |
| | CON3323B-55 | 316L | Φ50mm flange | 0-150℃ | |
| | CON5323B-55 | 316L+Ti | Φ50mm flange | 0-150℃ | |
| 0.01 | CON5121Y-13 | 316L+Ti | NPT 1/2″thread | 0-50℃ | Standard |

## Ⅸ. APPROVED CERTIFICATE

## Appendix I

### RS485 communication protocol

Set the Baud rate and address in the communication parameters setting menu .Keep the Baud rate and upper computer exactly same otherwise, it can not be connected to the upper computer.

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