Huazheng®

DDS-307A
Conductivity Meter

Huazheng Electric Manufacturing (Baoding) Co., Ltd

Dear user:

Thank you for choosing DDS-307A Conductivity Meter.

We hope that this instrument can make your work easier and more enjoyable, so that you can get the feeling of office automation in the test and analysis work.

Before using the instrument, please read this manual, and operate and maintain the instrument according to the manual to prolong its service life. "Just a light press, the test will be completed automatically" is the operating characteristics of this instrument.

If you are satisfied with this instrument, please tell your colleagues; if you are not satisfied with this instrument, please call (0312) 6775656 to tell you to serve you at all times-Baoding Huazheng Electric Manufacturing Co., Ltd., our company will definitely make you satisfied !

Contents

I. INSTALLATION

1.1 Unpack

In the packing box, users can find below parts:

1. DDS-307A conductivity meter 1set
2. DJS-1C Platinum-black electrode 1pc
3. T-818-B-6 Temperature sensor 1pc
4. Electrode holder 1pc

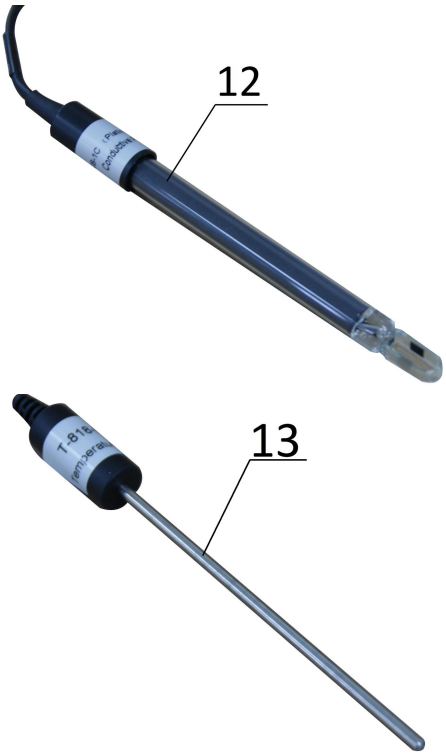
1.2 Installation of the meter

Open the package and take out the conductivity meter, electrode holder and accessories.

(Diag.1) Front view of the instrument

(Diag.2) Rear panel of the meter

1. The electric unit
2. Keypad
3. Screen
4. REX-3 Electrode holder
5. Conductivity probe
6. Cond (Conductive probe socket)
7. Ground socket
8. Temp (ATC probe socket)
9. Fuse wire
10. Switch
11. Power socket
12. DJS-1C Conductivity probe
13. T-818-B-6 ATC probe



1.3 Installation of the electrode

a. Insert the holder (4) in to the electrode stand socket and tighten the set screw under the holder.

b. Install the conductivity probe (12) and temperature sensor (13) onto the electrode holder (4). Insert conductivity probe (12) and temperature sensor plug (13) in COND (6) and Temp (8) respectively.

II.MAIN SPECIFICATIONS AND PERFORMANCE

2.1 Definition of Terms

Cell constant

The cell constant of a pair of platinum sheets is the ratio of distance between the two sheets to the area of each sheet. The ratio is measured in cm-1.

Temperature coefficient

The temp. coefficient is the % change of conductivity with temperature in %/°C.

2.2 Characteristics

DDS-307A conductivity meter (it is called meter for short) is necessary for measuring conductivity in solution. It adopts new design such as LCD segment display and novel

appearance. It is widely used in petrochemical industry, biological medicine, sewage water treatment, environmental monitoring, mining metallurgy, scientific research and university. In addition, with conductivity probe of suitable constant it can be used to measure the conductivity of the pure or ultra pure water in semiconductor plant, nuclear energy industries, and power station.

Features are as followed:

- Adopts large LCD screen
- Double display conductivity and temperature or TDS and temperature
- Compensate cell constant
- Compensate temperature by manually or automatically.

2. 3 Main Specifications

1. Measuring range

a. Conductivity: 0.00μS/cm～100.0ｍS/cm

b. TDS: 0.00mg/L～1999mg/L

c. Temperature: (0～99.9)℃

Cell constant(cm-1)	Conductivity range(μS/cm)
0.01	0~2.000
0.1	0.2~20.00
1	2μS/cm~10.00 mS/cm
10	（10~100.0）mS/cm

2. Accuracy of electronic unit

a. Conductivity: ±1.0%(FS)

b. TDS: ±1.0%(FS)

c. Temperature: ±0.4℃

3. Accuracy of meter

a. Conductivity: ±1.5%(FS)

b. Temperature：±0.6℃（0℃≤T≤60℃）

±1℃（60℃＜T≤99.9℃）

4. Dimension 1×b×h: 290×210×95 mm

5. Weight：1.5kg

6． Normal operation conditions

a. Ambient Temperature：(0~40)℃

b. Relative humidity：<=85%

c. Power supply：AC(220±22)V；(50±l)Hz

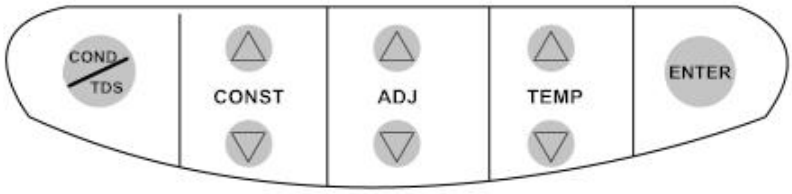
d. No strong electromagnetic interference except the geomagnetic field.

e. No performance-affected vibrations nearby;

f. No corrosive gases in ambient air;

2.4 The keypad

The meter has five operating keys.



Their functions as below:

✧ **'COND/TDS' key:**

Double-function button.

In measuring state, Press the key once, the meter will enter 'Conductivity' measuring state; press it twice, the meter will enter 'TDS' measuring state. When user sets up 'Temperature', 'Cell Constant' and 'Constant Adjustment', press this key to exit from function module and meter returns back to measuring state

✧ **'CONST' key:**

This key is used to select cell constant. The cell constant selection is classified as 0.01, 0.1, 1 and 10. Press '△'of this key to adjust the cell constant value to be increase; Press '▽'of this key downside to adjust the cell constant value to be reduced.

✧ **'ADJ' key:**

This key is used to adjust constant. Press '△'of this key to adjust the cell constant value of this key; Press '▽'of this key downside to adjust the cell constant value to be reduced.

✧ **'TEMP' key:**

This key is used to select temperature. Press '△' of this key upside, adjust the temperature value of this key; Press '▽'of this key downside, the temperature value to be reduce.

✧**'ENTER' key:**

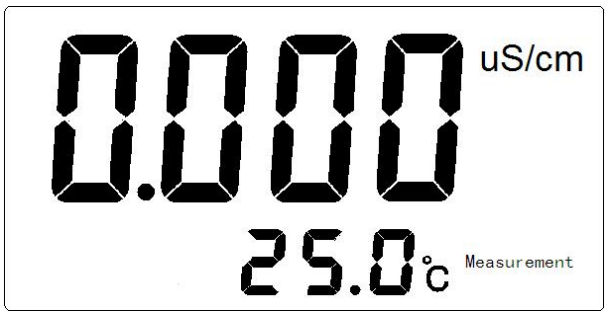
This key is used to confirm the last operation.

III.OPERATION

3.1 Turn on/off

Properly installed and maintained is the first place for successful operation. Before turning on, make sure the meter is well grounded. The probe connection must be reliable to prevent the invasion of corrosive gas.

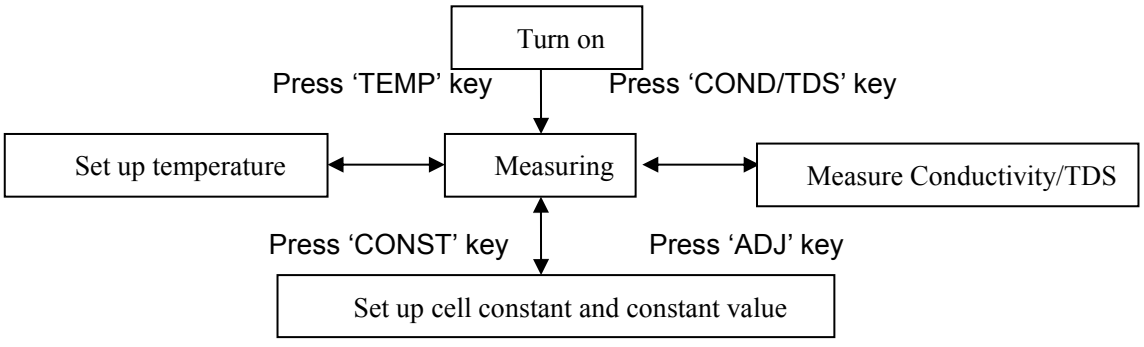
Connect the meter with power line, and turn it on. The meter enters measuring state （shown as below）. Heat up the meter for 30 minutes to do measurement.



In the measuring state:

- Press 'COND/TDS' key to switch conductivity display and TDS display;
- Press 'TEMP' key to set up current temperature value;
- Press 'CONST' key and 'ADJ' to set up cell constant. The brief operation procedure is listed as below:

DDS-307A conductivity meter operation procedure



Notes: *If the meter uses temperature sensor to have automatic temperature compensation, then the meter does not need setting temperature.*

If the meter is connected with temperature sensor, user can put the temperature sensor into the solution, and the meter will display the temperature value automatically. The

meter will do automatic temperature compensation and users don't need to set up temperature.

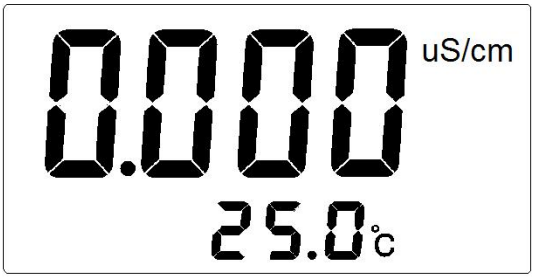
- **Prepare of electrode**

1. Wash the electrode with DI water fully; then rinse the electrode as "4.1 Maintenance". If it is unstable or mistake continuously, please refer to "4 .2 Troubleshooting".
2. Check samples: If the electrode working properly in standard buffer solution but not normal in samples, please check if there is interfering substance in samples or if the conductivity cell has been mechanical damaged.
3. Platinum black series electrode: There is some loose platinum black layer on the surface of platinum slice. It can only be wash with DI water, otherwise the platinum black layer might be damaged and cause inaccuracy.
4. If the performance of the electrode reduces, rinse the platinum slice with absolute alcohol and DI water in proper order.
5. Since the platinum black layer may absorb samples when measuring, must wash the electrode after using.
6. For long-term in use or not in use, the constant cell may change and need to recalibrate.

3.2 Function Setup

- **To Set up Temperature**

In General, the meter doesn't need temperature setting by users. If users need to set up temperature, ensure the meter without temperature sensor and measure the temperature value with thermometer. Display as below:

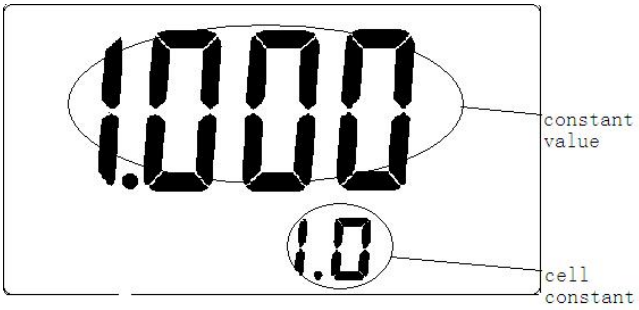


- Press 'Temp △'or 'Temp▽' key to input the temperature of the sample solution;
- Press 'ENTER' key to confirm the setting;
- Press 'COND/TDS' key to return back to measuring state.

- **To Set up Cell Constant and Constant**

Set up cell constant before using. There are four types cell constant of

conductivity probe: 0.01, 0.1, 1.0 and 10. The detailed cell constant value will be labeled on each conductivity probe. User can set up according to cell constant marked. Press 'CONST' key or 'ADJ' key to setup. Display as the below:



1. Set up Cell Constant Value as '1'

- Press 'CONST▽' key or 'CONST△', the cell constant value will be displayed among 10, 1, 0.1 and 0.01.
- If the cell constant is marked as 1.010, Select '1' and press 'ENTER' ;
- Press 'ADJ ▽' or 'ADJ △' key to adjust the reading to 1.010.
- Press 'ENTER' key to finish the setting of cell constant.

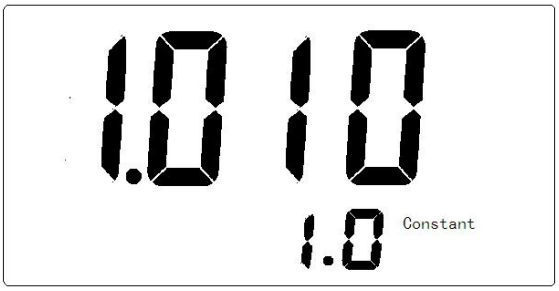
(The electrode constant is that the product of upper group value multiply by following group value)

- Press 'COND/TDS' key to return back in measuring state.

2.Set up Cell Constant Value as '0.1'

- Press 'CONST▽' key or 'CONST△' key, the cell constant value will be displayed among 10, 1, 0.1 and 0.01.
- If the cell constant is marked as 0.1010, Select '0.1' and press 'ENTER' ;
- Press 'ADJ ▽' or 'ADJ △' key to make the reading as 1.010;
- Press 'ENTER' key to finish the setting of cell constant.

(The electrode constant is that the product of upper group value multiply by following group value)

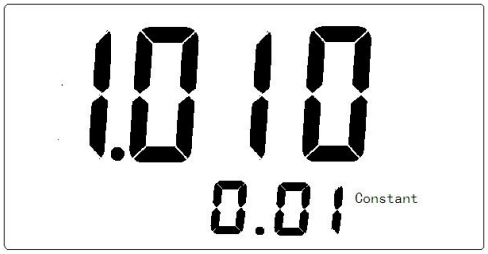


- Press ‘COND/TDS’ key to return back in measuring state.

3.Set up Cell Constant Value as ‘0.01’

- Press ‘CONST▽’ key or ‘CONST△’ key, the cell constant value will be displayed among 10, 1, 0.1 and 0.01.
- If the cell constant is marked as 0.01010, Select ‘0.01’ and press ‘ENTER’ ;
- Press ‘ADJ ▽’ or ‘ADJ △’ key to make the reading as 1.010;
- Press ‘ENTER’ key to finish the setting of cell constant.

(The electrode constant is that the product of upper group value multiply by following group value)

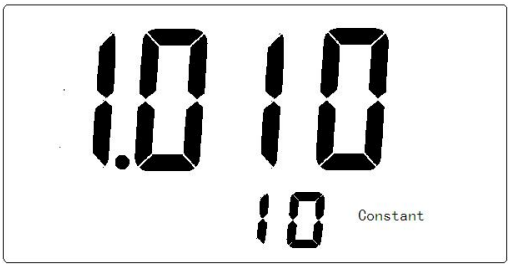


- Press ‘COND/TDS’ key to return back in measuring state.

4.Set up Cell Constant Value as ‘10’

- Press ‘CONST▽’ key or ‘CONST△’ key, the cell constant value will be displayed among 10, 1, 0.1 and 0.01.
- If the cell constant is marked as 10.10, Select ‘0.01’ and press ‘ENTER’ ;
- Press ‘ADJ ▽’ or ‘ADJ △’ key to make the reading as 1.010;
- Press ‘ENTER’ key to finish the setting of cell constant.

(The electrode constant is that the product of upper group value multiply by following group value)



➢ Press ‘COND/TDS’ key to return back in measuring state.

- **Temperature Coefficient**

  In general, users do not need to set temperature coefficient, the default value is 2.00.

- **Calibrate cell constant**

  Every probe is labeled with cell constant before ex-factory. If user suspect cell constant is not correct, recalibrate it according to steps as 3.4:

3.3 To Measure

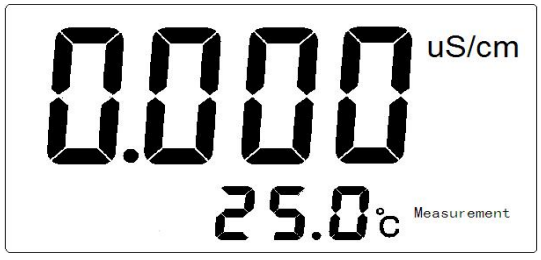
3.3.1 To Measure Conductivity

Before measuring conductivity, user should choose suitable electrode. Conductive probe of constant 1.0 has both “bright” and “platinum black” types; platinum-plating probe is generally called platinum black probe; the better measuring range of bright probe is 2~3000μS/cm, if the measuring range is over 3000μS/cm, platinum black probe should be used, because the error of measurement will be larger.

The range of conductivity and corresponding cell constant

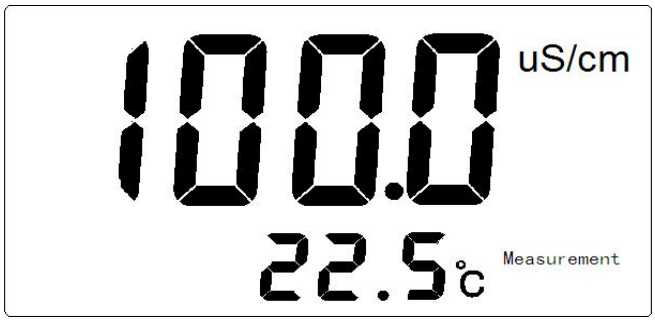
Conductivity Range(uS/cm)	Recommended Cell Constant (cm^{-1})
0.05~2	0.01, 0.1
2~200	0.1, 1.0
200~2X10^5	1.0

➢ Press ‘COND/TDS’ key to enter conductivity measuring state. Adopt temperature sensor to measure temperature (Display as the below)



- Connect the meter with conductivity probe and temperature sensor;
- Rinse the probe tip with distilled water and sample;
- Immerse the temperature sensor and conductivity probe into sample;
- Stir the sample evenly with glass bar and read the conductivity value.

  EG: If the sample temperature is 22.5℃ and conductivity value is 100.0uS/cm. The meter displays as below:



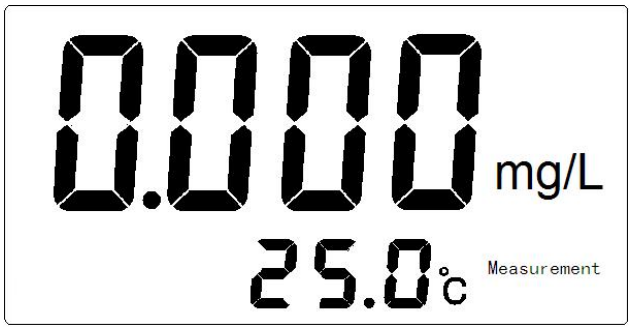
If the meter is not connected with temperature sensor, adopt thermometer to measure the temperature of sample:

- Set up temperature according to operation procedures in the "***3.2***";
- Connect the meter with conductivity probe;
- Rinse the probe tip with distilled water and sample;
- Immerse the conductivity probe into the sample;
- Stir the sample evenly with glass bar and read the conductivity value.

  EG: If the sample temperature is 25.5℃ and conductivity value is 1.010mS/cm. The meter displays as below:

3.3.2 To Measure TDS

- Press 'COND/TDS' to enter TDS measuring state. (Display as below)



- Adopt temperature sensor to measure temperature, Connect the meter with conductivity probe and temperature sensor;
- Rinse the probe tip with distilled water and sample;
- Immerse the temperature sensor and conductivity probe into sample;
- Stir the sample evenly with glass bar and read the TDS value.

  EG: If the sample temperature is 22.5℃ and TDS value is 10.10mg/L. The meter displays as below:

If the meter is not connected with temperature sensor, adopt thermometer to measure the temperature of sample:

- Set up temperature according to operation procedures described in the chapter 3.2;
- Connect the meter with conductivity probe;
- Rinse the probe tip with distilled water and sample;
- Immerse the conductivity probe into the sample;
- Stir the sample evenly with glass bar and read the TDS value.

  EG: If the sample temperature is 25.5℃ and TDS value is 10.10.mg/L. The meter displays as below:

3.4 To calibrate Conductivity Electrode

- **Calibrate Cell constant**

Every probe is marked a constant value when it leaves factory. If it is necessary, user can calibrate probe again to obtain correct measurement.

✧ **Calibrate in Standard Solution**

According to cell constant, select suitable standard solution (see table 1). Preparation of standard solution see table 2, relation of standard solution and conductivity value see table 3.

1. Connect conductive probe to the meter and ATC probe is not connected, the meter considers the temperature of measured solution is 25℃, at this time, the conductivity value displays the absolute conductivity value without compensation;
2. Clean the conductivity probe with DI water; Immerse the conductive probe into standard solution;
3. Set the solution temperature to: (25.0±0.1)℃;
4. Immerse the electrode into the standard buffer solution, and read out the conductivity value Kc.
5. Calculate the cell constant J: **J=K/ Kc**.

In which: In the formula, “K” is the standard conductivity of solution (Refer to table 3)

✧ **Calibrate Standard Probe**

Choose appropriate standard solution (see Table 1), preparation method (see Table 2), the relationship form of standard solution and conductivity (see Table 3) according to cell constant:

1.Choose a standard probe with known constant. (Set its constant as Jstandard);

2.Choose appropriate standard solution (see Table 1), preparation method (see Table 2), the relationship form of standard solution and conductivity (see Table 3)

3.Rinse probe with unknown constant (Set it as J1) and standard probe with distilled water,

immerse these two probes in the solution with same depth;

4.Connect the probe with conductivity meter in order and measure K1 and Kstandard;

5.Calculate the cell constant J1 with the following formula. : $J_1 = J_{standard} \times K_{standard} / K_1$

In which: K1 is conductivity value of unknown constant $K_{standard}$ is conductivity value of standard probe.

Table 1: KCL Standard Solution for Conductivity Probe Constant

Cell Constant(l/cm)	0.01	0.1	1	10
Approximate concentration Of KCL solution (mol/L)	0.001	0.01	0.01 or 0.1	0.1 or 1

Table 2: Composition of Standard Solution

Approximate concentration(mol/L)	Capacity concentration KCL (g/L) solution (20℃ in air)
1	74.2650
0.1	7.4365
0.01	0.7440
0.001	Dilute 100mL solution of 0.01mol/L to 1L.

Table 3: Approximate Concentration of KCL Solution and Relationship with Conductivity Value

Temp. Approximate concentration (mol/L)	15.0℃	18.0℃	20.0℃	25.0℃	30.0℃
1	12120	97800	101700	111310	131100
0.1	10455	11163	11644	12852	15353
0.01	1141.4	1220.0	1273.7	1408.3	1687.6
0.001	118.5	126.7	132.2	146.6	176.5

CAUTION: Only choose one method from these two methods. If the current cell constant is obtained through calibration and user inputs a new cell constant manually, the meter will delete the last calibration data. Pay attention to this.

IV.MAINTENANCE AND SERVICE

4.1 Maintenance

1. The conductivity probe must be immersed into distilled water for several hours

before using. Store conductivity probes in the distilled water.

2. To guarantee the measuring accuracy of the meter, recalibrate the cell constant before using. Calibrate cell constant at regular intervals.
3. To avoid pollution, when measuring ultra pure water user had better measure with sealing, flowing method and ensure chosen correct conductivity probe
4. TDS of the meter will be displayed with the formula 'TDS: Conductivity=1:2'
5. To guarantee measuring accuracy, probes should be rinsed with DI water (or distilled water) of 0.5μS/cm for two times.
6. Probe sockets must be prevented from moisture, to avoid any unnecessary error.
7. Connection of the probe should be reliable and prevent the meter from corrosive gas;
8. For short-term not in use, immerse the probe platinum in DI water. If the operating interval more than 6 hours or for long-term storage, wash the probe and store it in a empty protective bottle.

4.2 Troubleshooting

	Trouble	**Reasons**	**Solutions**
1	The screen doesn't light	1. Screen is damaged; 2. Poor connect between sockets.	1. Ensure a good contact. 2. Contact Vendors.
2	When measuring, the value jumps severely, or the meter doesn't work	1. The electrode is damaged, or out of warranty; 2. There are strong interference signal nearby.	1. Change electrode. 2. Separate the disturbance source. E.g. To raise the measuring breaker.
3	When measuring conductivity, the value drifts severely.	There are some impurities on the surface of the electrode	Rinse the electrode

4.3 The clearance and storage of conductivity electrode

- **Clearance of Conductivity Probe**
  a. Wash polycyclic pollutant on the electrode with warm detergent or alcohol;
  b. Wash calcium or magnesium deposit on the electrode with 10%citric acid;
  c. For bright probe, wash it with soft brush. But there should not be scratch on the electrode surface. It is forbidden to clean the surface of electrode with any hard ware, etc. Be carefully even in washing it with soft brush.

d. For platinum black electrode, only wash it with chemistry method, or it will change platinum on electrode surface.

- **Storage of Conductivity Probe**

a. Store the probe (out of service for a long time) in dry place;

b. Immerse the probe in distilled water for several hours before using;

c. Store the probe (often used) in distilled water.

V .Packing List

No.	Item	Qty
1	Platinum-black Electrode	1
2	Temperature Sensor	1
3	Power Line	1
4	Electrode Holder	1
5	Protective Cover	1
6	Fuse	2