

# pH, ORP, CD, TDS, DO, SALT METER

Model : YK-2001PHA



Your purchase of this pH, ORP, CD, TDS, DO, SALT METER marks a step forward for you into the field of precision measurement. Although this meter a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

## OPERATION MANUAL

# TABLE OF CONTENTS

|  |    |
|--|----|
| 1. FEATURES.....   | 1  |
| 2. SPECIFICATIONS.....   | 3  |
| 2-1 General Specifications.....  | 3  |
| 2-2 Electrical Specifications.....                                     | 5  |
| 3. FRONT PANEL DESCRIPTION.....  | 10 |
| 4. FUNCTION SELECTION.....   | 12 |
| 5. PH/mV MEASURING and CALIBRATION<br>PROCEDURE.....                   | 13 |
| 6. CONDUCTIVITY/TDS MEASURING and<br>CALIBRATION PROCEDURE.....        | 19 |
| 7. SALT MEASURING and calibration PROCEDURE.....                       | 23 |
| 8. DO ( Dissolved Oxygen ) MEASURING<br>and CALIBRATION PROCEDURE..... | 25 |
| 9. OTHER FUNCTION.....   | 31 |
| 9-1 Data Hold.....   | 31 |
| 9-2 Record ( Max./ Min. reading ).....                                 | 31 |
| 9-3 LCD Backlight ON/OFF.....  | 32 |
| 10. ADVANCED SETTING.....  | 32 |
| 11. POWER SUPPLY from DC ADAPTER.....                                  | 37 |
| 12. BATTERY REPLACEMENT.....   | 37 |
| 13. SYSTEM RESET.....  | 37 |
| 14. RS232 PC SERIAL INTERFACE.....                                     | 38 |
| 15. OPTIONAL ACCESSORIES.....  | 39 |

# 1. FEATURES

- \* One meter for multi purpose operation :  
PH/ORP, CD/TDS, Dissolved Oxygen, Salt measurement.
- \* pH : 0 to 14.00 pH, ORP :  $\pm 1999$  mV.
- \* Conductivity : 200  $\mu$ S/2 mS/20 mS/200 mS.
- \* Dissolved oxygen : 0 to 20.0 mg/L.
- \* Salt : 0 to 12 % salt ( % weight ).
- \* Optional PH, ORP, CD/TDS/Salt, Dissolved Oxygen and ATC probe.
- \* PH meter function can select PH or ORP.
- \* PH measurement can select ATC or manual temperature adjustment.
- \* PH measurement can make the auto calibration for pH 7, pH 4 and pH 10 or other value.
- \* Conductivity measurement can select  $\mu$ S/mS or TDS
- \* Conductivity measurement can select Temp. Coefficient of measurement solution.
- \* ATC for the conductivity measurement.
- \* Dissolved oxygen meter use the polar graphic type oxygen probe with temperature sensor, high precision measurement for Dissolved Oxygen ( DO ) and temperature measurement.
- \* Heavy duty dissolved oxygen probe, probe head can connect with BOD bottle.
- \* DO use the automatic Temp. compensation.
- \* DO meter build in " % SALT " & " Mountain Height " compensation value adjustment.
- \* Separate probe, easy for operation of different measurement environment.

- \* Wide applications: water conditioning, aquariums, beverage, fish hatcheries, food processing, photography, laboratory, paper industry, plating industry, quality control, school & college, water conditioning.
- \* LCD with green light backlight, easy reading.
- \* Can default auto power off or manual power off.
- \* Data hold, record max. and min. reading.
- \* Microcomputer circuit, high accuracy.
- \* Power by DC 9 V (006 P) batteries or DC 9V adapter.
- \* RS232/USB PC COMPUTER interface.

## 2. SPECIFICATIONS

### 2-1 General Specifications

|                      |   |
|----------------------|---|
| Circuit              | Custom one-chip of microprocessor LSI circuit.  |
| Display              | LCD size : 52 mm x 38 mm<br>LCD with green backlight ( ON/OFF ).  |
| Measurement Function | PH/ORP<br>Conductivity/TDS(Total Dissolved Solids)<br>Dissolved Oxygen<br>Salt  |
| Advanced setting     | <ul style="list-style-type: none"><li>* Auto power OFF management</li><li>* Set beep Sound ON/OFF</li><li>* Set temperature unit to °C or °F</li><li>* Set DO salt% compensation value</li><li>* Set DO height ( meter ) compensation value</li><li>* Set DO height ( feet ) compensation value</li><li>* Set CD temperature compensation factor</li><li>* Set CD to TDS or TDS to CD, CD only</li><li>* Set pH manual Temp. compensation value</li></ul> |
| Data Hold            | Freeze the display reading.   |
| Memory Recall        | Maximum & Minimum value.  |

|                          |  |
|--------------------------|--|
| Sampling Time of Display | Approx. 1 second.  |
| Data Output              | RS 232/USB PC computer interface.<br>* <i>Connect the optional RS232 cable UPCB-02 will get the RS232 plug.</i><br>* <i>Connect the optional USB cable USB-01 will get the USB plug.</i> |
| Operating Temperature    | 0 to 50 °C.  |
| Operating Humidity       | Less than 85% R.H.   |
| Power Supply             | Alkaline or heavy duty DC 9 V (006 P) battery or equivalent.   |
|                          | DC 9V adapter input. ( AC/DC power adapter is optional ).  |
| Power Current            | Normal operation ( LCD Backlight is OFF) :<br>Approx. DC 14 mA.  |
|                          | * <i>If LCD backlight on, the power consumption will increase approx. 12 mA.</i>   |
| Weight                   | 489 g/1.08 LB.   |
| Dimension                | 177 x 68 x 45 mm<br>(7.0 x 2.7x 1.9 inch)  |
| Accessories Included     | * Instruction manual..... 1 PC<br>* Conductivity/TDS probe,<br>Salt probe.....CDPB-03..... 1 PC  |

|  |  |
|--|--|
| Optional Accessories   | * PH electrode.....<br>PE-03, PE-11, PE-01, PE06HD<br>PE-04HD, PE-05T, PE-03K7 |
|  | * ATC probe ( Automatic Temperature Probe )..... TP-07                         |
|  | * pH 7 buffer solution..... PH-07  |
|  | * pH 4 buffer solution..... PH-04  |
|  | * Pt Conductivity probe..... CDPB-04   |
|  | * 1.413 mS Conductivity Standard Solution..... CD-14                           |
|  | * Oxygen probe..... OXPB-11  |
|  | * Spare Probe head with Diaphragm set<br>..... OXHD-04                         |
| * Probe-filling Electrolyte..... OXEL-03   |  |
| * ORP Electrode..... ORP-14  |  |
| AC to DC 9V adapter.<br>USB cable, USB-01.<br>RS232 cable, UPCB-02.<br>Data Acquisition software, SW-U801-WIN.<br>Hard carrying case ( CA-06 )..... 1 PC |  |

## 2-2 Electrical Specifications (23±5 °C)

### A. PH/mV

|                 |   |                     |
|-----------------|---|---------------------|
| PH Electrode    | Optional,<br>Any PH electrode with BNC connector. |                     |
| Measurement     | PH  | 0 to 14 PH          |
|                 | mV  | -1999 mV to 1999 mV |
| Input Impedance | 10 <sup>12</sup> ohm                              |                     |

|   |  |  |
|---|--|--|
| Temperature Compensation for pH measurement | Manual   | 0 to 100 °C, be adjusted by push button on front panel.      |
|   | Automatic ( ATC )  | With the optional temperature probe ( TP-07 )<br>0 to 65 °C. |
| pH Calibration                              | PH7, PH4, and PH10, 3 points calibration ensure the best linearity and accuracy.   |  |
| Optional probe and accessories              | * PH electrode..... PE-03, PE-11, PE-01, PE06HD<br>PE-04HD, PE-05T, PE-03K7<br>* ATC ( automatic temperature probe )..... TP-07<br>* pH 7 buffer solution..... PH-07<br>* pH 4 buffer solution..... PH-04<br>* ORP electrode..... ORP-14 |  |

| Measurement   | Range            | Resolution | Accuracy         |
|---|------------------|------------|------------------|
| PH  | 0 to 14 PH       | 0.01 PH    | ±(0.02 PH + 2 d) |
| mV  | -1999 to 1999 mV | 1 mV       | ±(0.5% + 2 d)    |
| * <i>PH accuracy is based on calibrated meter only.</i> |                  |            |                  |

## **B. Conductivity**

|                                |   |
|--------------------------------|---|
| Conductivity probe             | Optional, Carbon rod electrode for long life.   |
| Function                       | * Conductivity ( uS, mS )<br>* TDS ( Total Dissolved Solids, PPM )<br>* Temperature ( °C, °F)                                     |
| Temperature Compensation       | Automatic from 0 to 60 °C (32 - 140 °F), with temperature compensation factor variable between 0 to 5.0% per C.                   |
| Probe Operating Temp.          | 0 to 60 °C.   |
| Probe Dimension                | Round, 22 mm Dia. x 120 mm length.  |
| Optional probe and accessories | * Conductivity probe..... CDPB-03<br>* Pt Conductivity probe..... CDPB-04<br>* 1.413 mS Conductivity Standard Solution..... CD-14 |



**C. Salt**

|                                |   |
|--------------------------------|---|
| Conductivity probe             | Optional,<br>Carbon rod electrode for long life.  |
| Measurement Range              | 0 to 12 % salt ( % weight ).  |
| Resolution                     | 0.01 % salt.  |
| Accuracy                       | 0.5 % salt value<br>* <i>F.S.</i> : full scale.   |
| Temperature Compensation       | Automatic from 0 to 60 °C (32 - 140 °F),<br>with temperature compensation factor<br>variable between 0 to 5.0% per C. |
| Probe Operating Temperature    | 0 to 60 °C .  |
| Probe Dimension                | Round, 22 mm Dia. x 120 mm length.  |
| Optional probe and accessories | * Pt Conductivity probe..... CDPB-04  |

**D. Dissolved oxygen**

|                           |   |                           |
|---------------------------|---|---------------------------|
| Oxygen Probe              | Optional, OXPB-11<br>The polarographic type oxygen probe with |                           |
| Measurement & Range       | Dissolved Oxygen  | 0 to 20.0 mg/L ( liter ). |
|                           | Oxygen in Air   | 0 to 100.0 %.             |
|                           | Temperature   | 0 to 50 °C.               |
| Resolution                | Dissolved Oxygen  | 0.1 mg/L.                 |
|                           | Oxygen in Air   | 0.1 % O <sub>2</sub> .    |
|                           | Temperature   | 0.1 °C.                   |
| Accuracy<br>(23±5 °C)     | Dissolved Oxygen  | ±0.4 mg/L.                |
|                           | Oxygen in Air   | ±0.7% O <sub>2</sub> .    |
|                           | Temperature   | ±0.8 °C/1.5 °F.           |
| Probe Compensation & Adj. | Temperature   | 0 to 50 °C,<br>Automatic  |
|                           | Salt  | 0 to 50 % Salt            |
|                           | Height ( M. T.)   | 0 to 8900 meter           |
| Probe Weight              | 335 g/0.74 LB ( batteries & probe included )                  |                           |
| Probe Size                | 190 mm x 28 mm Dia. ( 7.5" x 1.1" Dia. )                      |                           |
| Optional Accessories      | * Oxygen probe.....   | OXPB-11                   |
|                           | * Spare Probe head with Diaphragm set<br>.....                | OXHD-04                   |
|                           | * Probe-filling Electrolyte.....                              | OXEL-03                   |

@ Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.

# 3. FRONT PANEL DESCRIPTION

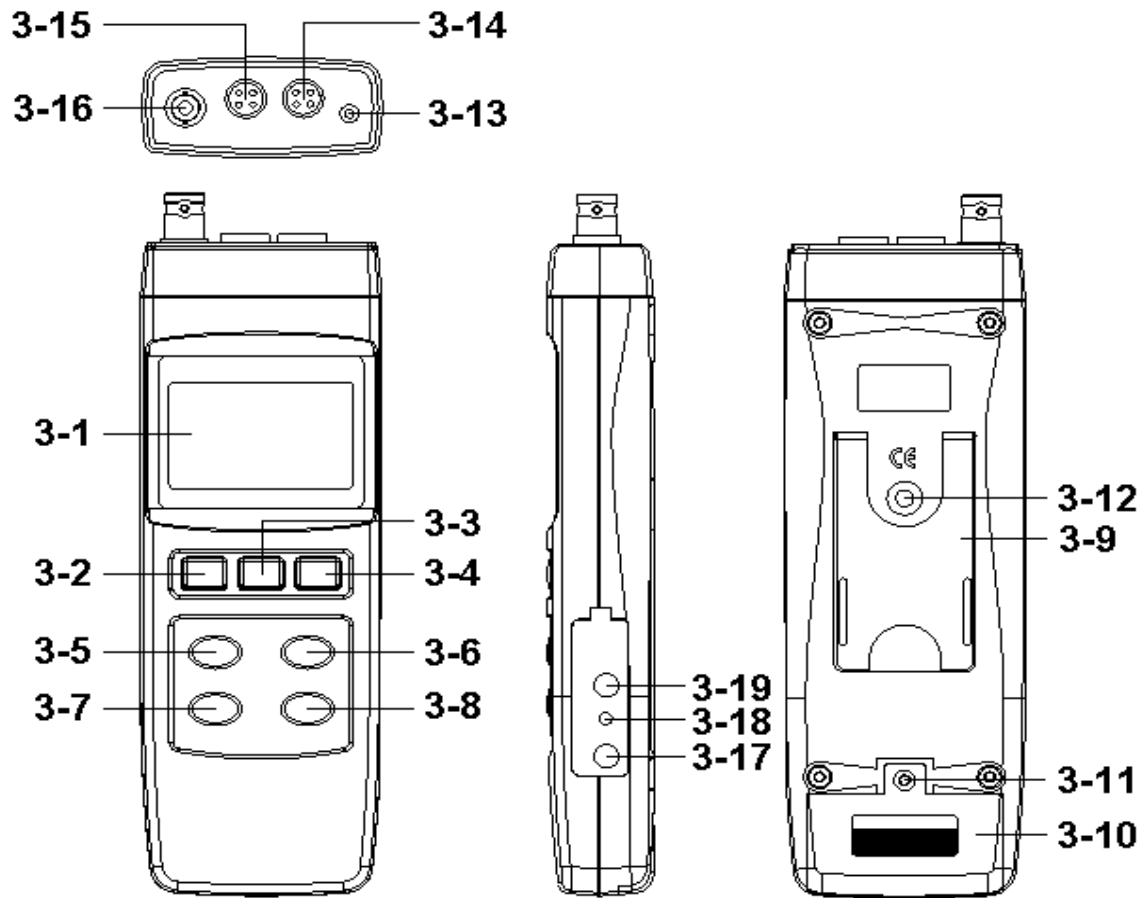


Fig.1

- 3-1 Display
- 3-2 Power Button ( Backlight Button )
- 3-3 Hold Button ( ESC Button )
- 3-4 REC Button
- 3-5 ▲ Button ( Range Button)
- 3-6 ▼ Button (Function Button )
- 3-7 Set Button
- 3-8 Enter Button
- 3-9 Stand
- 3-10 Battery Compartment/Cover
- 3-11 Battery Cover Screw
- 3-12 Tripod Fix Nut
- 3-13 Temp. Socket ( PH ATC Socket )
- 3-14 DO Socket
- 3-15 CD Socket
- 3-16 PH Socket ( BNC Socket )
- 3-17 DC 9V Power Adapter Input Socket
- 3-18 Reset Button
- 3-19 RS-232 Output Terminal

## 4. FUNCTION SELECTION

1) Turn on the meter by pressing the " Power Button "  
( 3-2, Fig. 1 ) momentarily.

\* *Pressing the " Power Button " ( 3-2, Fig. 1 )  
continuously and > 2 seconds again will turn off the  
meter.*

2) The meter can select 7 kind Function as :

- a. **pH measurement**
- b. **mV ( ORP ) measurement**
- c. **Dissolved Oxygen measurement**
- d. **Air Oxygen measurement**
- e. **Conductivity measurement**
- f. **TDS measurement**
- g. **Salt measurement**

Use the " Function Button " ( 3-6, Fig. 1 ) Key to select intent test  
function. Display will show the following text in sequence :

|             |                                     |
|-------------|-------------------------------------|
| <b>PH</b>   | <b>pH measurement</b>               |
| <b>OrP</b>  | <b>mV ( ORP ) measurement</b>       |
| <b>do</b>   | <b>Dissolved Oxygen measurement</b> |
| <b>O2</b>   | <b>Air Oxygen measurement</b>       |
| <b>Cd</b>   | <b>Conductivity measurement</b>     |
| <b>tdS</b>  | <b>TDS measurement</b>              |
| <b>SALt</b> | <b>Salt measurement</b>             |

Until the Display show the desired mode the meter will  
execute this Function with default.

## 5. PH/mV MEASURING and CALIBRATION PROCEDURE

***The meter default function are following :***

- \* The display unit is set to pH.
- \* The temperature unit is set to °C.
- \* Manual ATC ( without connect the ATC probe )
- \* Auto power off.

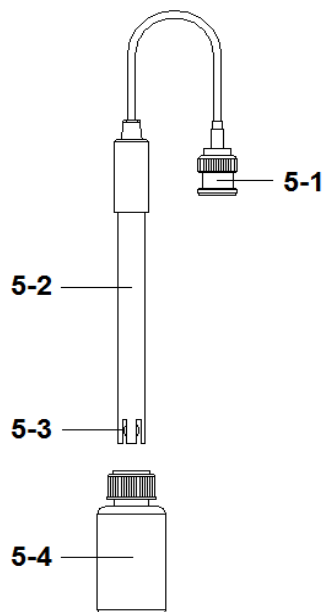


Fig. 2



**If the meter is first time to connect the pH electrode, it should make the calibration before operation, the calibration procedures refer to chapter 5-4, page 15.**

### **5-1 pH measurement ( manual Temp. compensation )**

- 1) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Use the " Function Button " ( 3-6, Fig. 1 ) Key, select to pH measurement Function.  
refer to Chapter 4, page 12.
- 2) Prepare the pH Electrode ( optional ), install the " Probe Plug " ( 5-1, Fig. 2 ) into the " PH Socket/BNC Socket " ( 3-16, Fig. 1 ).
- 3) **Adjust the manual Temp. value same as the solution's temperature exactly, the procedures refer chapter 10-8, page 37.**
- 4) Hold the " Electrode Handle " ( 5-2, Fig. 2 ) by hand and let the " Sensing head " ( 5-3, Fig. 2 ) immersed wholly into the measured solution and little shake the electrode.
- 5) The main display will show the pH value, the bottom display will show the setting manual Temp. value.

### **5-2 PH measurement ( ATC , automatic Temperature )**

- 1) All the procedures are same as  
*5-1 PH measurement ( manual Temp. compensation )*  
but should prepare one temperature probe ( optional, TP-07 ), insert the TP-07's plug into the " Temp. Socket " ( 3-13, Fig. 1 ), immerse the sensing head of temperature probe ( TP-07 ) into the measurement solution.
- 2) The main display will show the pH value, the bottom display will show the sensing Temp. value of the measured solution ( measured from ATC probe, TP-07 ).

**When not use the Electrode, it should immerse the " Electrode sensing head " ( 5-3, Fig. 2 ) into the " Protection bottle " ( 5-4, Fig. 2 )**

### ***5-3 mV Measurement***

The instrument build in mV ( millivolt ) measurement function, which enable you to make ion-selective, ORP (oxidation-reduction potential), and other precise mV measurements.

- 1) Use the " Function Button " ( 3-6, Fig. 1 ) Key, select to mV ( ORP ) measurement Function.  
the Display unit will show " mV "
- 2) Prepare the ORP Electrode ( optional, ORP-14 ), install the " Probe Plug " of ORP electrode into the " PH Socket/BNC Socket " ( 3-16, Fig. 1 ).
- 3) The Display will show the mV value.

### ***5-4 pH calibration***

#### **Calibration Consideration**

The most ideal pH ELECTRODE generates 0 mV at pH 7.00 ( 177.4 mV at PH 4 ) and meter has been always calibrated with signals which simulate the most ideal pH ELECTRODE ( based on 25 °C ambient environment ). However not every pH ELECTRODE is as accurate as the most ideal one, so calibration procedures are necessary to be done before the first time measurement.

In addition to the first time measurement, users are also recommended to execute the calibration procedures to ensure the high accuracy measurement.

## Required Equipment for Calibration

- 1) pH ELECTRODE ( optional ).
- 2) pH buffer solutions ( optional ).

## Calibration Procedure

- 1) Prepare the pH Electrode ( optional ), install the " Probe Plug " ( 5-1, Fig. 2 ) into the " PH Socket/BNC Socket " ( 3-16, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Select the Meter's measurement Function to " PH ".
- 3) Adjust the " Temperature Compensation Value " to make it same as the temperature value of the pH buffer solution.

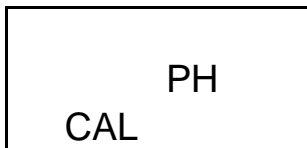
\* **Manual temperature compensation value adjustment procedure, refer to 10-8, page 36.**

\* **Automatic temperature compensation, it should plug in the ATC probe ( optional, TP-07 ).**

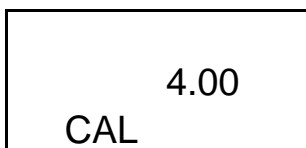
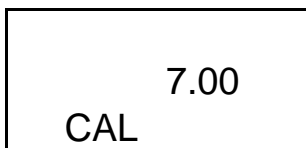
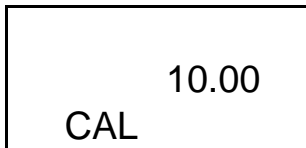
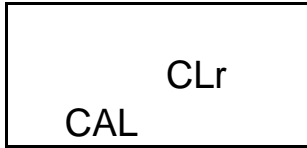
- 4) Hold the " Electrode Handle " ( 5-2, Fig. 2 ) by hand and let the " Sensing head " ( 5-3, Fig. 2 ) immersed wholly into the measured solution and little shake the probe. Display will show the PH value.

\* **If use the ATC probe, should immerse the ATC probe into the solution together.**

- 5) Use the two fingers to press the " ▲ Button " ( 3-5, Fig 1 ) and " ▼ Button " ( 3-6, Fig. 1 ) at the same time. Until Display will show the following screen then release the both fingers.



- 6) Press the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) once in sequence to select the following screen.

- a  For pH 4.00 calibration
- b  For pH 7.00 calibration
- c  For pH 10.00 calibration
- d  Clear the existing calibration data

- \* After the above a, b, c screen is selected, then cooperate the relative standard solution, for example the ***b screen should cooperate the pH 7.00 standard solution.*** ***a screen should cooperate the pH 4.00 standard solution.*** Press the " Enter Button " ( 3-8, Fig. 1 ) will save the calibration data and finish the calibration procedures.
- \* If select the d screen, press the " Enter Button " ( 3-8, Fig. 1 ) will clear existing calibration data.

7) The complete procedures should execute the two calibration points :

**PH7 calibration**

**PH4 calibration ( or PH10 calibration )**

- \* The calibration procedures should execute start from pH7 calibration then follow pH4 ( or pH10 ) calibration.
- \* Rinse the electrode with distilled water again when make each point calibration ( pH7, pH4 or pH10 ).
- \* Repeat above two points procedures two times at least.

## 6. CONDUCTIVITY/TDS MEASURING and CALIBRATION PROCEDURE

***The meter default function are following :***

- \* The display unit is set to conductivity ( uS, mS ).
- \* The temperature unit is set to °C .
- \* Temp. compensation factor is set to 2.0% per C.
- \* Auto range.
- \* Auto power off.

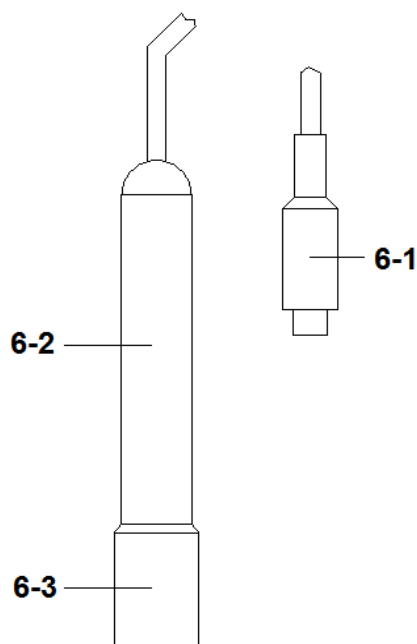


Fig. 3



**If the meter along with the conductivity probe are used for a certain period, then it should execute the calibration procedures, refer chapter 6-3, page 21.**

### **6-1 Conductivity measurement**

- 1) Prepare the Conductivity Probe ( included, CDPB-03 ), install the " Probe Plug " ( 6-1, Fig. 3 ) into the " CD Socket " ( 3-15, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Select the Meter's measurement Function to " Cd " ( Conductivity measurement ), refer to chapter 4, page 12.
- 3) Hold the " Probe Handle " ( 6-2, Fig. 3 ) by hand and let the " Sensing head " ( 6-3, Fig. 3 ) immersed wholly into the measured solution. Shake the probe to let the probe's internal air bubble drift out from the sensing head.  
Display will show the conductivity mS ( uS ) values. at the same time the left bottom display will show the Temp. value of the measured solution.

#### **Manual range operation**

The meter is default to be used for the auto range mode. Push the " Range Button " ( 3-5, Fig. 1 ) once in sequence will change the range from 200 uS, 2 mS, 20 mS, 200 mS and auto range.

#### **Change the Temp. unit to °F**

If intend to change the Temp. unit from °C to °F, please refer to chapter 10-3 page 34.

## **Change the Temp. Coefficient Factor**

The default Temp. compensation factor value of the measurement solution is to 2.0% per °C. If intend to change it, please refer to chapter 10-7, page 35.

## **Zero adjustment**

If the probe not immerse the measurement solution and display not show zero value, pressing the " Zero (RANGE) Button " ( 3-5, Fig. 1 ) continuously at least 10 seconds will let display show zero. The zero function only valid for the 200 uS range and the not zero value is < 2.0 uS.

### **6-2 TDS ( PPM ) measurement**

The measuring procedures are same as above

*6-1 Conductivity ( uS, mS ) measurement.*

Then use Function key select to TDS Function position.

### **6-3 Calibration**

1) Prepare the standard conductivity solution ( optional )

For example :

2 mS range calibration solution :

**1.413 mS Conductivity Standard Solution, CD-14**

200 uS range calibration solution :

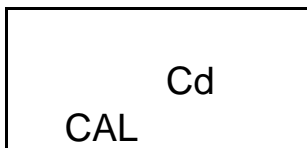
**80 uS Conductivity Standard Solution**

20 mS range calibration solution :

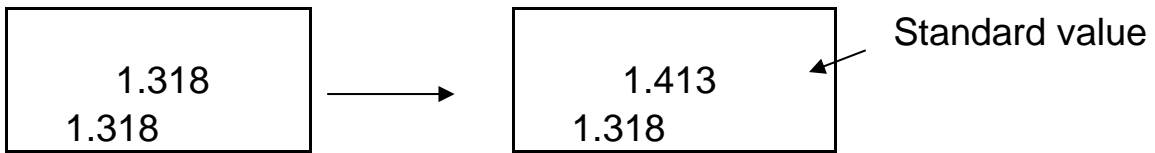
**12.88 mS Conductivity Standard Solution**

or other Conductivity Standard Solution

- 2) Install the " Probe Plug " ( 6-1, Fig. 3 ) into the " CD Socket " ( 3-15, Fig. 1 ).
- 3) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Select the Meter's measurement Function to " Cd " ( Conductivity measurement )
- 4) Hold the " Probe Handle " ( 6-2, Fig. 3 ) by hand and let the " Sensing head " ( 6-3, Fig. 3 ) immersed wholly into the measured solution. Shake the probe to let the probe's internal air bubble drift out from the sensing head.  
Display will show the conductivity mS ( uS ) values.
- 5) Use the two fingers to press the " ▲ Button " ( 3-5, Fig. 1 ) and " ▼ Button " ( 3-6, Fig. 1 ) at the same time. the display will show the following screen as example, release the both fingers.

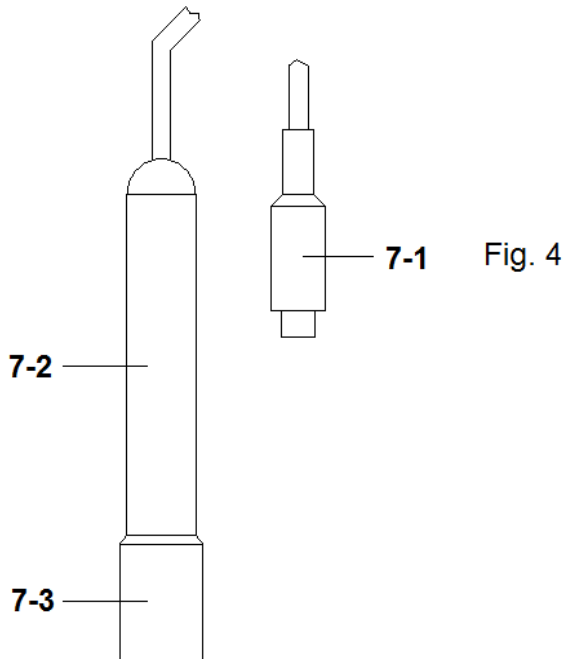


- 6) Press the " Enter Button " ( 3-8, Fig. 1 ), the measuring value will present on both upper and lower Display.  
Use " ▲ Button " ( 3-5, Fig. 1 ), " ▼ Button " ( 3-6, Fig. 1 ) to adjust the up display value exact same as the standard conductivity value. Press the " Enter Button " ( 3-8, Fig. 1 ) will save the calibration data and finish the calibration procedures.



- \* *If only intend to make the one point calibration, just execute the 2 mS range ( 1.413 mS Cal. ) is enough.*
- \* *Multi-points calibration procedures should execute the 2 mS range ( 1.413 mS Cal. ) calibration at first, then make other ranges (20 uS range, 20 mS range or 200 mS range ) calibration procedures following if necessary.*

## 7. SALT MEASURING and CALIBRATION



### **7-1 Salt measurement**

- 1) Prepare the Conductivity Probe ( included, CDPB-03 ), install the " Probe Plug " ( 7-1, Fig. 4 ) into the " CD Socket " ( 3-15, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Select the Meter's measurement Function to " SALt " ( Conductivity measurement )
- 3) Hold the " Probe Handle " ( 7-2, Fig. 4 ) by hand and let the " Sensing head " ( 7-3, Fig. 4 ) immersed wholly into the measured solution. Shake the probe to let the probe's internal air bubble drift out from the sensing head.  
Display will show the Salt values ( % weight ).

### **7-2 Calibration**

If the conductivity range already make the calibration completely then the Salt measurement is not necessary to make the calibration again.

# 8. DO ( Dissolved Oxygen ) MEASURING and CALIBRATION PROCEDURE

## 8-1 Dissolved Oxygen measurement

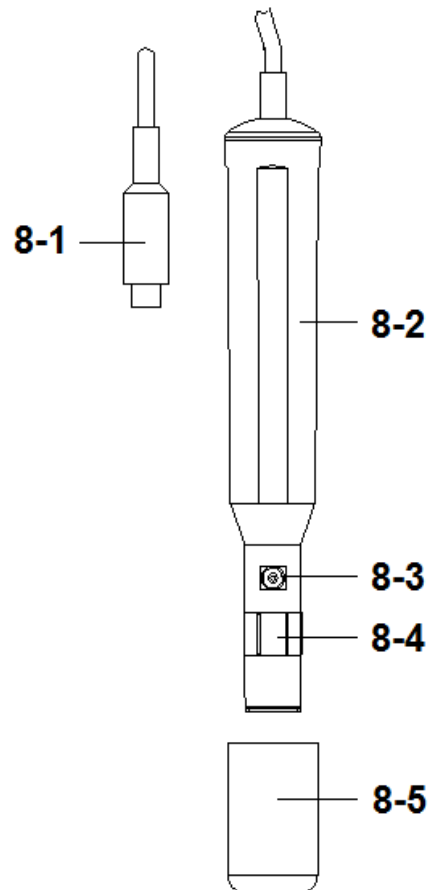


Fig. 5

- 1) Prepare the Oxygen Probe ( optional, DOPB-11 ), install the " Probe Plug " ( 8-1, Fig. 5 ) into the " DO Socket " ( 3-14, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
**Select the Meter's Function to " do " ( Dissolved Oxygen ) measurement, refer to chapter 4, page 12.**



## ***Calibration at first !***

***If it is the first time to use the Dissolved Oxygen meter or after a certain period to use the meter again, then it should to execute the calibration procedures at the first. For the measurement precisely consideration, it recommend to make the calibration before each measurement. Calibration procedure, refer to chapter 8-2, page 28.***

- 4) a. Immersed the probe to a depth at least 10 cm of the measured liquid in order for the probe to be influenced by the temperature & automatic temperature compensation to take place.  
b. As for the thermal equilibrium to occur between the probe & the measurement sample must be allowed to pass, which usually amounts to a few minutes if the Temp. difference between the two is only several Celsius degrees.
- 5) a. In order to measure the dissolved oxygen content in any given liquid, it is sufficient to immerse the tip of the probe in the solution, making sure that velocity of the liquid coming into contact with the probe is at least 0.2 - 0.3 m/s or to shake the probe.  
b. During laboratory measurements, the use of a magnetic agitator to ensure a certain velocity in the fluid is recommended. In this way, errors due to the diffusion of the oxygen present in the air in the solution are reduced to a minimum.

- 6) Display will show the Dissolved Oxygen values ( mg/L ) at the same time the bottom display will show the Temp. value of the measured solution.
- 7) Rinsed the probe accurately with normal tap water after each series of measurement.

### **Oxygen in the air**

Use the " Function Button " ( 3-6, Fig. 1 ) Key, select to O<sub>2</sub> measurement Function.  
the Display unit will show " %O<sub>2</sub> ", and show the air Oxygen value for reference.

### **Change the Temp. unit to °F**

If intend to change the Temp. unit from °C to °F,  
please refer to chapter 10-3, apge 34.

### **"% Salt" compensation value adjustment**

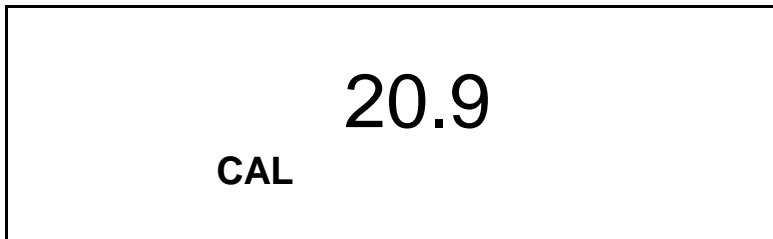
If intend to change the % Salt compensation value,  
refer chapter 10-4, page 34.

### **"Height" compensation value adjustment**

If intend to change the Height compensation value,  
refer to chapter 10-5, 10-6, page 34 page 35.

## **8-2 Calibration**

- 1) Install the " Probe Plug " ( 8-1, Fig. 5 ) into the " DO Socket " ( 3-14, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.
  - \* Select the Meter's Function to " O2 " ( Air Oxygen ) measurement.
- 3) **Wait for approx. 5 minutes at least until the display reading values become stable & no fluctuation.**
- 4) Use the two fingers to press the " ▲ Button " ( 3-5, Fig 1 ) and " ▼ Button " ( 3-6, Fig. 1 ) at the same time, the display will show the following screen as example, release the both fingers.



- 5) Press the " Enter Button " , the Display value will count from 30 to 0, then return to normal measuring screen and finish the calibration procedures. The complete calibration procedures will take 30 seconds approximately.  
**Use the " Function Button " ( 3-6, Fig. 1 ) Key select to " dO" test Function , Display unit will show " mg/L " .**  
**Calibration Consideration :**
  - a. ***As the oxygen in air is 20.9 % typically, so use the environment air O2 value for quick & precise calibration.***
  - b. ***Please process calibration procedures under wide and ventilating environment for best effect.***

### **9-3. Probe maintenance**

#### ***User first time to use the meter***

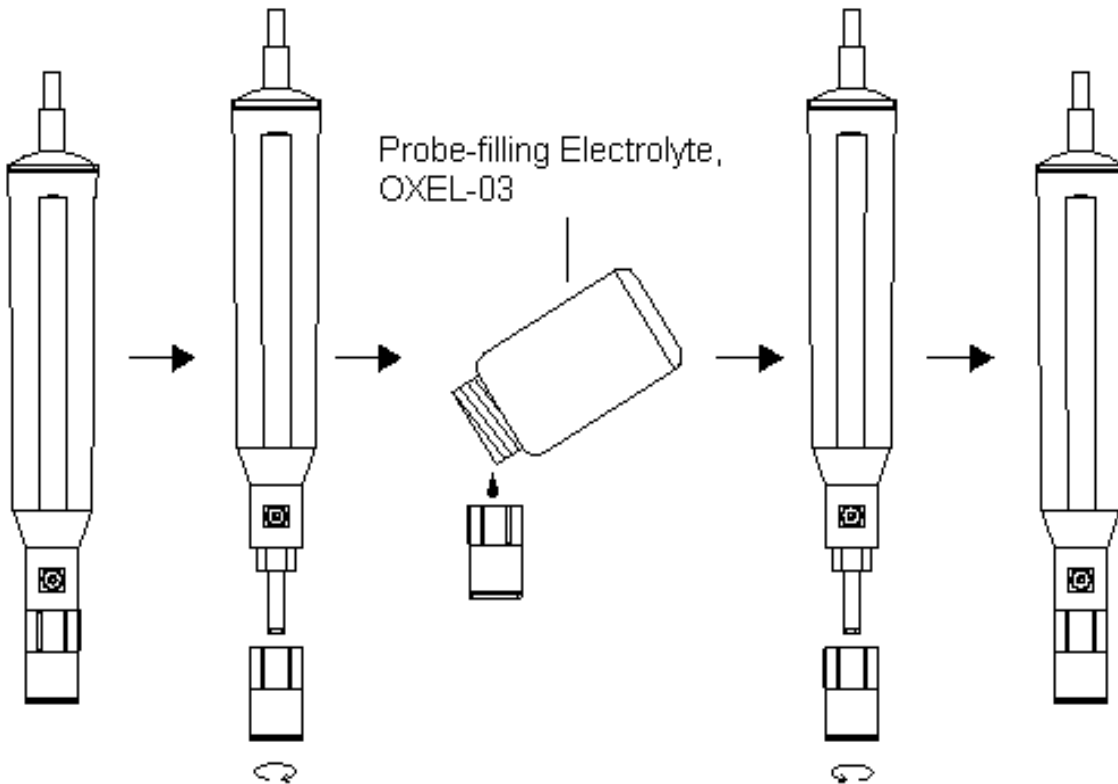
**Intend to let the DO probe keep the best condition, when user receive the Oxygen Probe, it should fill the Probe's Electrolyte at first.**

#### ***User already use the probe for a certain period :***

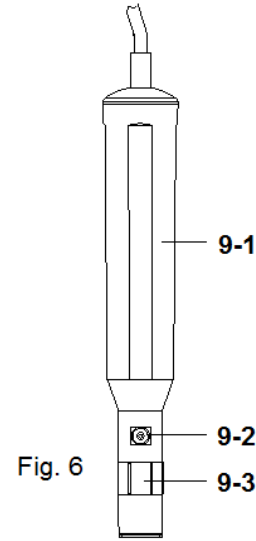
**Whenever user can not calibrate the meter properly or the meter's reading value is not stable, please check the oxygen probe to see if the electrolyte in the probe head container is run out or the diaphragm ( probe head with diaphragm set) exist problem ( dirty ). If yes, please fill the electrolyte or change the " Probe head with diaphragm set " and make the new calibration.**

#### ***The consideration of Diaphragm ( probe head with diaphragm set***

The oxygen probe component is the thin Teflon diaphragm housed in the tip of the probe. The diaphragm is permeable by the oxygen molecules but not by the considerably larger molecules contained in the electrolyte. Due to this characteristic, the oxygen may diffuse throughout the electrolyte solution contained in the probe, and its concentration may be quantified by the measurement circuit.



- 1) Unscrew the " Probe head " ( 9-3, Fig 6 ).
- 2) Pour out the old Electrolyte from the container of the " Probe head ".
- 3) Fill the new Electrolyte ( OXEL-03 ) into the container of the " Probe head " .
- 4) Screw the " Probe head " ( 9-3, Fig 6 ) into the probe body.
- 5) **When not use the probe, should insert the " Probe head " into the " Probe protection cover " ( 8-5, Fig. 5 )**



- 9-1 Probe handle
- 9-2 Temp. sensing metal
- 9-3 Probe head

## 9. OTHER FUNCTION

### 9-1 Data Hold

During the measurement, press the " Hold Button " ( 3-3, Fig. 1 ) once will hold the measured value & the LCD will display a " HOLD " symbol.

Press the " Hold Button " once again will release the data hold function.

### 9-2 Data Record ( Max., Min. reading )

- 1) The data record function records the maximum and minimum readings. Press the " REC Button " ( 3-4, Fig. 1 ) once to start the Data Record function and there will be a " REC. " symbol on the display.
- 2) With the " REC. " symbol on the display :
  - a) Press the " REC Button " ( 3-4, Fig. 1 ) once, the " REC. MAX. " symbol along with the maximum value will appear on the display.

*If intend to delete the maximum value, just press the " Hold Button " ( 3-3, Fig. 1 ) once, then the display will show the " REC. " symbol only & execute the memory function continuously.*
  - b) Press the " REC Button " ( 3-4, Fig. 1 ) again, the " REC. MIN. " symbol along with the minimum value will appear on the display.

*If intend to delete the minimum value, just press the " Hold Button " ( 3-3, Fig. 1 ) once, then the display will show the " REC. " symbol only & execute the memory function continuously.*
  - c) To exit the memory record function, just press the " REC " button for 2 seconds at least. The display will revert to the current reading.

### 9-3 LCD Backlight ON/OFF

After power ON, the " LCD Backlight " will light automatically. During the measurement, press the " Backlight Button " ( 3-2, Fig. 1 ) once will turn OFF the " LCD Backlight " .

Press the " Backlight Button " once again will turn ON the " LCD Backlight " again.

## 10. ADVANCED SETTING

press the " SET Button " ( 3-7, Fig. 1 ) continuously at least two seconds will enter the " Advanced Setting " mode. then press the " SET Button " ( 3-7, Fig. 1 ) once a while in sequence to select the eight main function, the display will show :

|                   |   |
|-------------------|---|
| <b>PoFF.....</b>  | Auto power OFF management                       |
| <b>bBEEP.....</b> | Set beeper sound ON/OFF                         |
| <b>t-CF.....</b>  | Select the Temp. unit to °C or °F               |
| <b>SALt.....</b>  | Set DO salt% compensation, DO only              |
| <b>High-.....</b> | Set DO height (meter) compensation, DO only     |
| <b>Highf.....</b> | Set DO height (feet) compensation, DO only      |
| <b>PEr C.....</b> | Set CD temperature compensation factor, CD only |
| <b>t-SEt.....</b> | Set pH manual Temp. compensation value, pH only |
| <b>ESC.....</b>   | Escape from the advanced setting                |

*Remark :*

- a. *DO - Dissolved oxygen Mode*  
*CD - Conductivity/TDS Mode*  
*pH - pH/mV Mode*
- b. *During execute the " Advanced Setting " function, if press " ESC Button " ( 3-3, Fig. 1 ) will exit the " Advanced Setting " function, the LCD will return to normal screen.*

## **10-1 Auto power OFF management**

When the lower display show " PoFF "

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to " yES " or " no ".

**yES - Auto Power Off management will enable.**

**no - Auto Power Off management will disable.**

- 2) After select the upper text to " yES " or " no ", press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting function with default.

## **10-2 Set beeper sound ON/OFF**

When the lower display show " bEEP "

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to " yES " or " no ".

**yES - Meter's beep sound will be ON with default.**

**no - Meter's beep sound will be OFF with default.  
is power ON.**

- 2) After select the upper text to " yES " or " no ", press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting function with default.

### **10-3 Select the Temp. unit to °C or °F**

When the lower display show " t-CF "

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper Display text to " C " or " F ".

**C - Temperature unit is °C**

**F - Temperature unit is °F**

- 2) After Display unit is selected to " C " or " F ", press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting function with default.

### **10-4 Set DO salt% compensation value**

When the lower display show " SALt "

- 1) This function only for the DO ( Disolved oxygen ) Function of adjusting the probe's salt% compensation value. The default value is 0% salt.
- 2) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to the desired salt% compensation value, then press the " Enter " " Enter Button " ( 3-8, Fig. 1 ) will save the setting value temporally.

### **10-5 Set DO height ( meter ) compensation value**

When the lower display show " High- "

- 1) This function only for the DO ( Disolved oxygen ) Function of adjusting the probe's height compensation value in meter unit. The default value is 0 meter.

- 2) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to the desired height compensation value ( meter ), then press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting value temporarily.

### **10-6 Set DO height ( feet ) compensation value**

When the lower display show " Highf "

- 1) This function only for the DO ( Dissolved oxygen ) Function of adjusting the probe's height compensation value in feet unit. The default value is 0 FEET.
- 2) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to the desired height compensation value ( feet ), then press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting value temporarily.

### **10-7 Set CD temperature compensation factor**

When the lower display show " PEr C "

- 1) This function only for the Conductivity ( TDS ) Function of adjusting the probe's Temp.compensation value in %/per °C unit. The default value is 2 %/ per °C .
- 2) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to the desired Temp. compensation value ( %/per °C ), then press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting value temporarily.

## 10-8 Set pH manual Temp. compensation value

When the lower display show " t-SEt "

- 1) This function only for the pH measurement of adjusting the pH electrode's manual Temp.compensation value. The default value is 25 °C ( 77 °F ).
- 2) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-6, Fig. 1 ) to select the upper value to the desired Temp. compensation value ( °C or °F ), then press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting value with default.

## 10-9 ESC

When the display show " ESC "

When the Display show the text " ESC ", then press the " ESC Button " ( 3-3, Fig. 1 ) will finish the Advanced Setting procedures and return to the normal measuring screen.


*Remark :*

*During execute the " Advanced Setting " function, if press " ESC Button " ( 3-3, Fig. 1 ) will exit the " Advanced Setting " function, the LCD will return to normal screen.*

## 11. POWER SUPPLY from DC ADAPTER

The meter also can supply the power supply from the DC 9V Power Adapter ( optional ). Insert the plug of Power Adapter into " DC 9V Power Adapter Input Socket " ( 3-17, Fig. 1 ). The meter will permanent power ON when use the DC ADAPTER power supply ( The power Button function is disable ).

## 12. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show "  ", it is necessary to replace the battery. However, in-spec. measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) Loose the screws of the " Battery Cover " ( 3-11, Fig. 1 ) and take away the " Battery Cover " from the instrument and remove the battery.
- 3) Replace with DC 9 V (006 P) Alkaline/heavy duty , and reinstate the cover.
- 4) Make sure the battery cover is secured after changing batteries.

## 13. SYSTEM RESET

If the meter happen the troubles such as :

*CPU system is hold ( for example, the key button can not be operated... ).*

Then make the system RESET will fix the problem.

The system RESET procedures will be either following method :

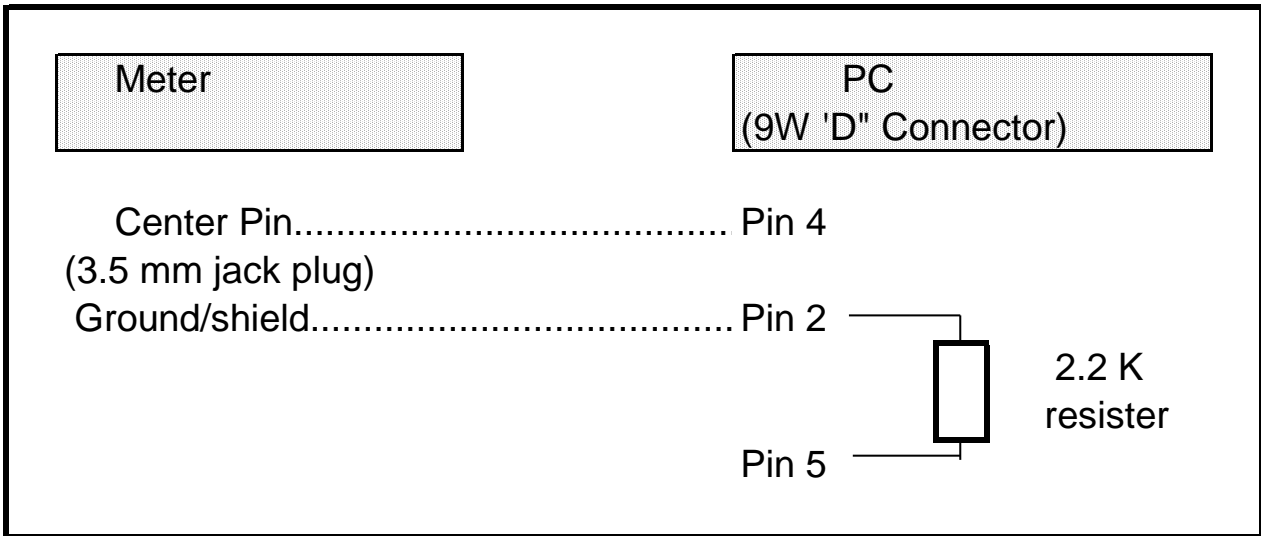
During the power on, use a pin to press the " Reset Button " ( 3-18, Fig. 1 ) once a while will reset the circuit system.

# 14. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal ( 3-19, Fig. 1 ).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

**Each digit indicates the following status :**

|     |  |
|-----|--|
| D15 | Start Word   |
| D14 | 4  |
| D13 | When send the upper display data = 1<br>When send the lower display data = 2 |

|          |   |           |          |         |
|----------|---|-----------|----------|---------|
| D12, D11 | Annunciator for Display   |           |          |         |
|          | uS = 13   | mS = 14   | PPM = 19 |         |
|          | PH = 05   | mV = 18   | % = 03   |         |
|          | mg/L = 07   | % O2 = 06 | °C = 01  | °F = 02 |
| D10      | Polarity<br>0 = Positive          1 = Negative  |           |          |         |
| D9       | Decimal Point(DP), position from right to the left<br>0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP                        |           |          |         |
| D8 to D1 | Display reading, D1 = LSD, D8 = MSD<br>For example :<br>If the display reading is 1234, then D8 to D1 is : 00001234 |           |          |         |
| D0       | End Word  |           |          |         |

## RS232 FORMAT : 9600, N, 8, 1

|              |             |
|--------------|-------------|
| Baud rate    | 9600        |
| Parity       | No parity   |
| Data bit no. | 8 Data bits |
| Stop bit     | 1 Stop bit  |

## 15. OPTIONAL ACCESSORIES

|                        |  |
|------------------------|--|
| RS232 cable<br>UPCB-02 | * Computer interface cable.<br>* Used to connect the meter to the computer ( COM port ). |
| USB cable<br>USB-01    | * Computer interface cable.<br>* Used to connect the meter to the computer ( USB port ). |

|  |   |
|--|---|
| Data Acquisition software<br>SW-U801-WIN | * The SW-U801-WIN is a multi displays ( 1/2/4/6/8 displays ) powerful application software, provides the functions of data logging system, text display, angular display, chart display, data recorder high/low limit, data query, text report, chart report..<br>.xxx.mdb data file can be retrieved for EXCEL, ACES.., wide intelligent applications. |
|--|---|

|               |   |
|---------------|---|
| Power adapter | AC 110V to DC 9V.<br>USA plug.          |
| Power adapter | AC 220V/230V to DC 9V.<br>Germany plug. |

|                         |   |
|-------------------------|---|
| PH optional accessories | * PH Electrode, 1 to 13 pH.<br>Model : PE-11            |
|                         | * PH Electrode, 1 to 13 pH.<br>Model : PE-03            |
|                         | * PH Electrode, 0 to 14 pH.<br>Model : PE-01            |
|                         | * Temperature probe ( ATC probe )<br>Model : TP-07      |
|                         | * SPEAR PH Electrode<br>Model : PH-06HD, PH-04HD        |
|                         | * PH Electrode + Temp. probe, 2 in 1<br>Model : PE-03K7 |
|                         | * PH Electrode + Temp. probe, 2 in 1<br>Model : PE-05HT |
|                         | * PH 7 BUFFER SOLUTION<br>Model : PH-07                 |
|                         | * PH 4 BUFFER SOLUTION<br>Model : PH-04                 |

|   |  |
|---|--|
| Conductivity<br>Salt<br>optional<br>accessories | * Conductivity/Salt probe<br>Model : CDPB-03   |
|   | * 1.413 mS standard solution.<br>Model : CD-14 |

|  |  |
|--|--|
| Dissolved<br>Oxygen<br>optional<br>accessories | * Oxygen probe<br>Model : OXPB-11                        |
|  | * Spare Probe head with Diaphragm set<br>Model : OXHD-04 |
|  | * Probe-filling Electrolyte<br>Model : OXEL-03           |

|     |                                   |
|-----|-----------------------------------|
| ORP | * ORP electrode<br>Model : ORP-14 |
|-----|-----------------------------------|