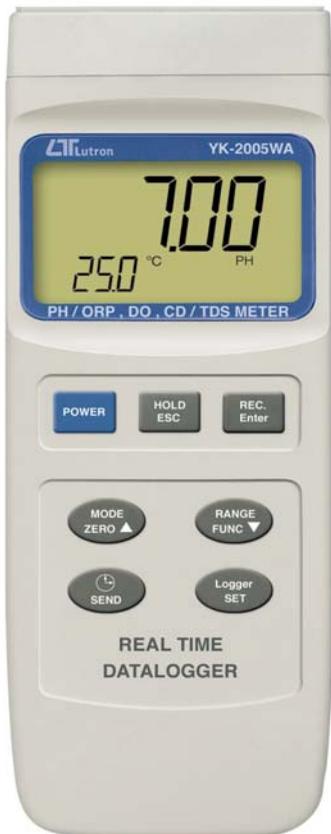


*Real time data logger*

# PH/ORP, DO CD/TDS METER

Model : YK-2005WA



Your purchase of this PH/ORP, DO, CD/TDS METER marks a step forward for you into the field of precision measurement. Although this METER is 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**

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# 1. FEATURES

- \* One meter for multi purpose operation :  
PH/ORP, CD/TDS, Dissolved Oxygen.
- \* 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.
- \* Real time data logger ( record year, month, date,  
hour, minute, second ), 16,000 data logger.
- \* Real time data logger, build in clock ( hour-MIN-sec.,  
year-month-date ).
- \* Auto or manual data record, 16,000 Data logger no.
- \* Wide sampling time adjustment range from one  
second to 8 hours 59 minutes 59 seconds.
- \* RS232 computer interface.
- \* MAX, MIN, Data hold.
- \* RS-232 computer interface
- \* Can default auto power off or manual power off.
- \* Optional PH, ORP, CD/TDS, Dissolved Oxygen and  
ATC probe.
- \* DC 1.5V ( UM-3, AA ) x 4 PCs or DC 9V adapter in.
- \* 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.
- \* Super large LCD display with contrast adjustment for best viewing angle.
- \* 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.

## 2. SPECIFICATIONS

### 2-1 General Specifications

Circuit	Custom one-chip of microprocessor LSI circuit.	
Display	LCD size : 58 mm x 34 mm.	
Measurement	PH/ORP Conductivity/TDS(Total Dissolved Solids) Dissolved Oxygen	
Sampling Time of Data Logger	Manual	Push the data logger Button once will save data one time. <i>@ Set the sampling time to 0 second</i>
	Auto	1 sec to 8 hour 59 min. 59 sec.
Data Hold	Freeze the display reading.	
Memory Recall	Maximum & Minimum value.	
Power off	Auto shut off saves battery life or manual off by push Button. <i>@ Can default auto power or manual power off.</i> <i>@ When default auto power function, power will off automatically after 10 MIN, if no Button be pressed.</i>	
Sampling Time of display	Approx. 1 second.	
Data Output	RS 232 PC serial interface.	
Operating Temperature	0 to 50 °C. - Main instrument.	
Operating Humidity	Less than 80% R.H.	

Power Supply <i>* main instrument</i>	DC 1,5 V battery ( UM3 ) x 4 PCs, ( Heavy duty type ).
	DC 9V adapter input. <i>@ AC/DC power adapter is optional.</i>
Power Current	Operatiron : Approx. DC 28 mA Clock ( power off ) : Approx. DC 1 uA.
Weight	365 g/ 0.8 LB. @ Battery is included.
Dimension	203 x 76 x 38 mm
Accessories Included	Instruction manual.....1 PC Hard arrying case ( CA-06 ).....1 PC
Optional Accessories	<ul style="list-style-type: none"> <li>* PH electrode.....</li> <li>PE-03, PE-11, PE-01, PE06HD</li> <li>PE-04HD, PE-05T, PE-03K7</li> <li>* ATC ( Automatic Temperature Probe ).....TP-07</li> <li>* pH 7 buffer solution.....PH-07</li> <li>* pH 4 buffer solution.....PH-04</li> <li>* Conductivity probe.....CDPB-03</li> <li>* 1.413 mS Conductivity Standard Solution.....CD-14</li> <li>* Oxygen probe.....OXPB-11</li> <li>* Spare Probe head with Diaphragm set .....OXHD-04</li> <li>* Probe-filling Electrolyte.....OXEL-03</li> <li>* AC to DC 9V adapter.</li> <li>* RS232 cable, UPCB-02.</li> <li>* USB cable, USB-01</li> <li>* Data Acquisition software, SW-U801-WIN.</li> <li>* Data Logger software, SW-DL2005.</li> </ul>



## **B. Conductivity**

Conductivity probe	Optional, Carbon rod electrode for long life.
Function	* Conductivity ( uS, mS ) * TDS ( Total Dissolved Solids, PPM ) * 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 Temperature	0 to 60 °C.
Probe Dimension	Round, 22 mm Dia. x 120 mm length.
Optional probe and accessories	* Conductivity probe..... CDPB-03 * 1.413 mS Conductivity Standard Solution.....CD-14

### **1. Conductivity ( uS, mS )**

<b>Range</b>	<b>Measurement</b>	<b>Resolution</b>	<b>Accuracy</b>
200 uS	0 to 200.0 uS	0.1 uS	± (2% F.S.+1d) * F.S. - Full scale
2 mS	0.2 to 2.000 mS	0.001 mS	
20 mS	2 to 20.00 mS	0.01 mS	
200 mS	20 to 200.0 mS	0.1 mS	

\* *Temperature Compensation :*

*Automatic from 0 to 60 °C ( 32 - 140 °F ), with temperature compensation factor variable between 0 to 5.0% per C.*

\* *The accuracy is specified under measurement value ≤ 100 mS.*

\* *mS - milli Simens*

\* *@ 23± 5°C*

## 2. TDS ( Total Dissolved Solids )

Range	Measurement	Resolution	Accuracy
200 PPM	0 to 132 PPM	0.1 PPM	± (2% F.S.+1d) * F.S. - Full scale
2,000 PPM	132 to 1,320 PPM	1 PPM	
20,000 PPM	1,320 to 13,200 PPM	10 PPM	
200,000 PPM	13,200 to 132,000 PPM	100 PPM	

\* Temperature Compensation :

Automatic from 0 to 60 °C ( 32 - 140 °F ), with temperature compensation factor variable between 0 to 5.0% per °C.

\* The accuracy is specified under measurement value  $\leq 66,000$  PPM.

\* PPM - parts per million \* @ 23± 5°C

## 3. Temperature

Function	Measuring Range	Resolution	Accuracy
°C	0 °C to 60 °C	0.1 °C	± 0.8 °C
°F	32 °F to 140 °F	0.1 °F	± 1.5 °F
* @ 23± 5°C			

## C. Dissolved oxygen

Oxygen Probe	Optional, 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 % O2 .
	Temperature	0.1 °C.

Accuracy (23± 5 °C)	Dissolved Oxygen	± 0.4 mg/L.
	Oxygen in Air	± 0.7% O2.
	Temperature	± 0.8 °C/1.5 °F.
Probe Compensation & Adj.	Temperature	0 to 50 °C, Automatic
	Salt	0 to 39 % 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 ..... OXHD-04 * Probe-filling Electrolyte..... OXEL-03	

### 3. FRONT PANEL DESCRIPTION

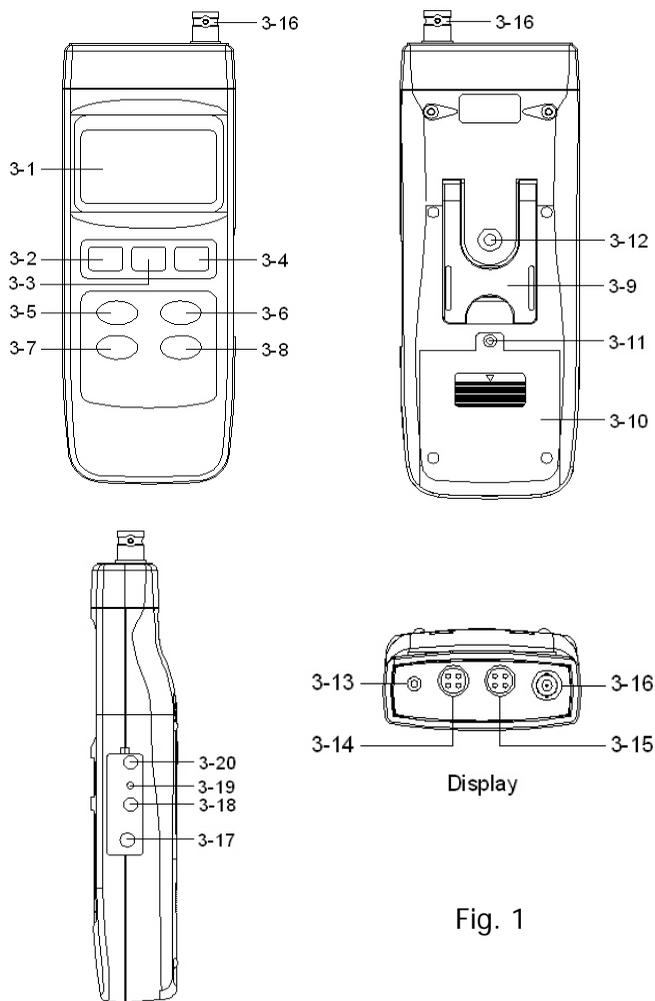


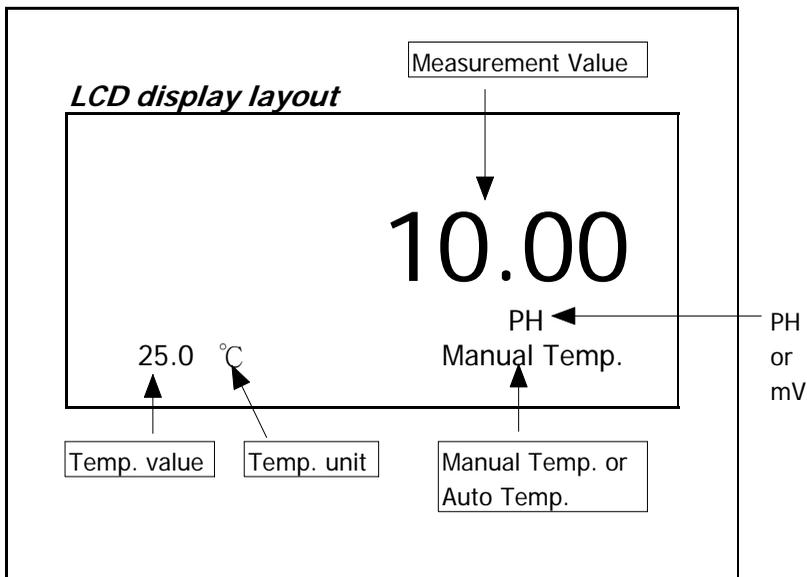
Fig. 1

- 3-1 Display
- 3-2 Power Button
- 3-3 HOLD Button ( ESC Button )
- 3-4 REC Button ( Enter Button )
- 3-5 Mode Button ( ▲ Up Button, Zero Button )
- 3-6 Function Button ( Range Button, ▼ Down Button )
- 3-7 Send Button ( Clock Button )
- 3-8 SET Button ( Logger 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 CD Socket
- 3-15 DO Socket
- 3-16 PH Socket ( BNC Socket )
- 3-17 DC 9V Power Adapter Input Socket
- 3-18 RS-232 Output Terminal
- 3-19 System Reset Switch
- 3-20 LCD Brightness Adjust VR

## 4. 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.
- \* The sampling time of data logger function is 2 seconds.



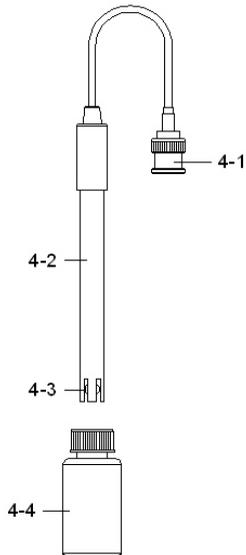


Fig. 2



**If the meter is first time to connect the PH electrode, it should make the calibration before operation, the calibration procedures refer chapter 4-4, page 14.**

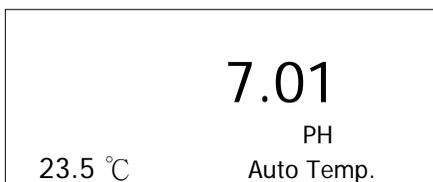
#### ***4-1 PH measurement ( manual ATC )***

- 1) Prepare the PH Electrode ( optional ), install the " Probe Plug " ( 4-1, 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.  
Pressing the " Mode Button " ( 3-5, Fig. 1 ) once until the right bottom display show " PH " and " Manual Temp. " indicator.

- 3) **Adjust the manual Temp. value same as the solution's temperature exactly, the procedures refer chapter 8-7, page 37.**
- 4) Hold the " Electrode Handle " ( 4-2, Fig. 2 ) by hand and let the " Sensing head " ( 4-3, Fig. 2 ) immersed wholly into the measured solution and little shake the probe.
- 5) The up main display will show the PH value, the left bottom display will show the setting manual Temp. value.

#### ***4-2 PH measurement ( ATC , automatic Temperature )***

- 1) All the procedures are same as  
*4-1 PH measurement ( manual ATC )*  
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 up main display will show the PH value, the left bottom display will show the sensing Temp. value of the measured solution, the right bottom display will show " Auto Temp. " as example :



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

### ***4-3 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) Prepare the ORP Electrode ( optional, ORP-14 ), install the " Probe Plug " of ORP electrode into the " PH Socket/BNC Socket " ( 3-16, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Pressing the " Mode Button " ( 3-5, Fig. 1 ) once until the right bottom display show " PH " and " Manual Temp. " indicator.  
**Pressing the " Function Button " ( 3-6, Fig. 1 ) once until the right bottom display show " mV " .**
- 3) The up main display will show the mV value.

### ***4-4 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 " ( 4-1, Fig. 2 ) into the " PH Socket/BNC Socket " ( 3-16, Fig. 1 ).
- 2) Power on the meter, set the mode to the PH measurement, the right bottom display will show " 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 8-7, page 37.**

**\* Automatic temperature compensation, refer to 4-2, page 13.**

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

- 5) Use the two fingers to press the " REC Button " ( 3-4, Fig 1 ) and " HOLD Button " ( 3-3, Fig. 1 ) at the same time. The display will show the following screen as example, then release the both fingers.



- 6) If the buffer solution is PH 7.0 (  $\pm 1$  PH ), the upper display will show 7.00 automatically.  
If the buffer solution is PH 4.0 (  $\pm 1$  PH ), the upper display will show 4.00 automatically.  
If the buffer solution is PH 10.0 (  $\pm 1$  PH ), the upper display will show 10.00 automatically.

If the standard buffer solution value are beyond PH 7.00, PH 4.00, PH 10.00 , for example 7.01, 4.02, 10.03... then Use " ▲ Button " ( 3-5, Fig. 1 ), " ▼ Button " ( 3-6, Fig. 1 ) to adjust the up display value exact same as the standard PH buffer solution value.

Press the " Enter Button " twice will save the calibration the data and finish the calibration procedures.

- 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.

#### **4-5 ORP calibration**

- 1) Prepare the ORP electrode ( optional, ORP-14 ), connect the ORP electrode to the meter.
- 2) Power on the meter, set the mode and the function to " mV ", refer chapter 4-3, page 14.
- 3) Immerse the sensing head of ORP electrode into the ORP standard buffer solution, the up display will show the ORP value in mV.
- 4) Use the two fingers to press the " REC Button " ( 3-4, Fig 1 ) and " HOLD Button " ( 3-3, Fig. 1 ) at the same time. The display will show the following screen as example, then release the both fingers.

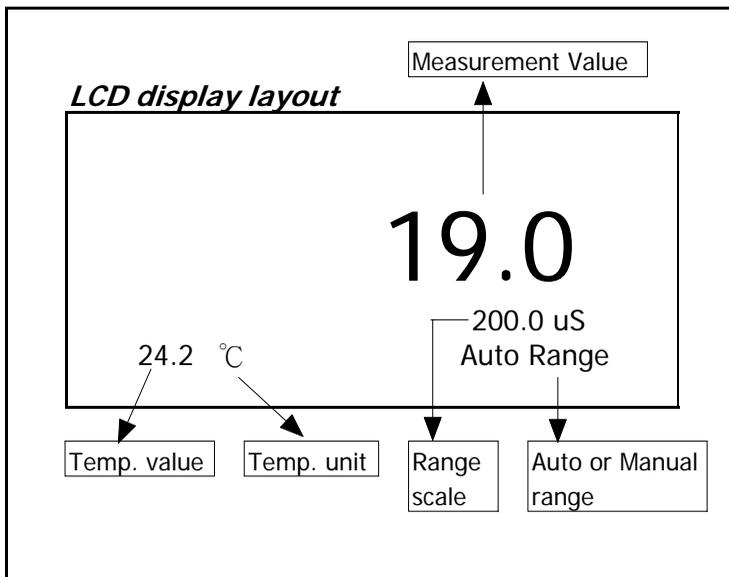


- 5) Use " ▲ Button " ( 3-5, Fig. 1 ), " ▼ Button " ( 3-6, Fig. 1 ) to adjust the up display value exact same as the standard ORP buffer solution value. Press the " Enter Button " twice will save the calibration the data and finish the calibration procedures.
  - \* **The ORP calibration procedures are available only the ORP buffer solution value is > 100 mV.**
  - \* **The ORP calibration procedures is less than 100 mV the calibration is not allow.**

## 5. 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.
- \* The sampling time of data logger function is 2 seconds.



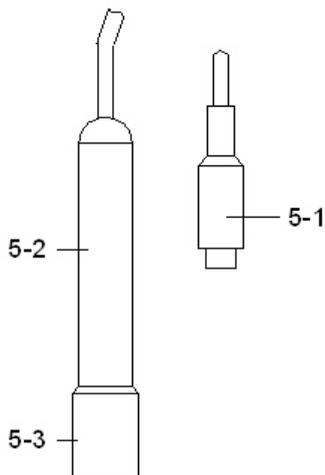


Fig. 3



**If the meter is first time to connect the conductivity probe, it should execute the calibration procedures before operation, the calibration procedures refer chapter 5-3, page 21.**

### ***5-1 $\mu\text{S}$ , $\text{mS}$ measurement***

- 1) Prepare the Conductivity Probe ( optional, CDPB-03 ), install the " Probe Plug " ( 5-1, Fig. 3 ) into the " CD Socket " ( 3-14, Fig. 1 ).
- 2) \* Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
\* Pressing the " Mode Button " ( 3-5, Fig. 1 ) once until the right bottom display show " 200  $\mu\text{S}$  " and " Auto Range " indicator.  
\* Hold the " Probe Handle " ( 5-2, Fig. 3 ) by hand and let the " Sensing head " ( 5-3, 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.

Under the auto range measurement, the bottom right display will show the " Auto Range " indicator.

If intend to let the meter be used under the manual range mode, the procedures are following :

- \* Press the " Range Button " ( 3-6, Fig. 1 )  
continuously at least two seconds until the bottom  
right display show the " Manual Range " indicator,  
release the " Range Button ", now the meter is  
ready for the manual range operation.
- \* Push the " Range Button " once a while, it can  
change the range, the range name ( 200 uS, 2 mS,  
20 mS, 200 mS ) will show under the measurement  
value.
- \* If the display shows " ----- ", it indicates an  
overload condition, select the next higher range.
- \* If the display shows " - - - - - ", it indicates an  
out-of-range, select the next lower range.
- \* If intend to change the operation mode from Manual  
range back to Auto Range, press the " Range  
Button " ( 3-6, Fig. 1 ) continuously at least two  
seconds until the bottom right display show the "  
Auto Range " Indicator, release the " Range Button ".  
Now the meter is ready for the Auto range mode  
again.

### **Change the Temp. unit to °F**

If intend to change the Temp. unit from °C to °F, please refer page 36, chapter 8-6 ( Temp. Unit Default Setting )

### **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 page 37, chapter 8-8 ( Temp. Compensation Factor Setting ).

### **Zero adjustement**

If the probe not immerse the measurement solution and display not show zero value, pressing the " Zero Button " ( 3-5, Fig. 1 ) will let display show zero. The zero function only valid when the no zero value less than 1.0 uS.

### ***5-2 TDS ( PPM ) measurement***

The measuring procedures are same as above

#### ***5-1 Conductivity ( uS, mS ) measurement,***

except to change the display unit from uS, mS to PPM.

The detail procedures please refer page 37, chapter 8-9 CD ( uS, mS ), TDS ( PPM ) Setting.

### ***5-3 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 " ( 5-1, Fig. 3 ) into the " CD Socket " ( 3-14, Fig. 1 ).
- 3) Power on the meter, set the mode to the conductivity measurement ( uS, mS ).
- 4) Hold the " Probe Handle " ( 5-2, Fig. 3 ) by hand and let the " Sensing head " ( 5-3, 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 " REC Button " ( 3-4, Fig 1 ) and " HOLD Button " ( 3-3, Fig. 1 ) at the same time. the display will show the following screen as example, release the both fingers.

<p>1.413</p> <p>CD CAL.</p> <p>23.5 °C      ^, v ENTER: Y</p>
---

- 6) 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 " twice 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.***

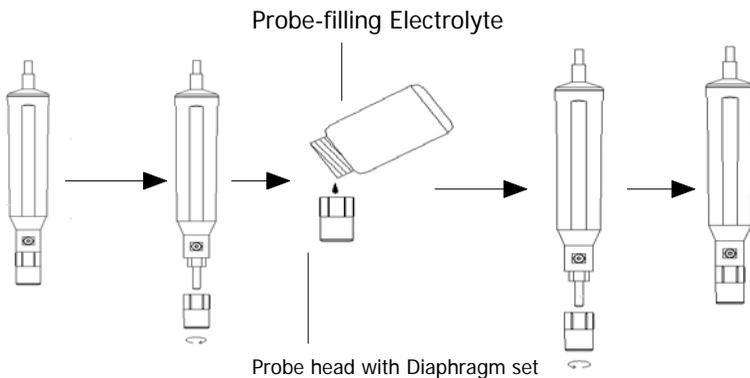
## 6. DO (Dissolved Oxygen) MEASURING and CALIBRATION PROCEDURE

1) Prepare the Oxygen Probe ( optional, OXPB-11 )

**ATTENTION :** 

***Fill the Probe's Electrolyte at first.***

**Intend to keep the DO probe under the best condition, it should fill the Probe's Electrolyte at first.**

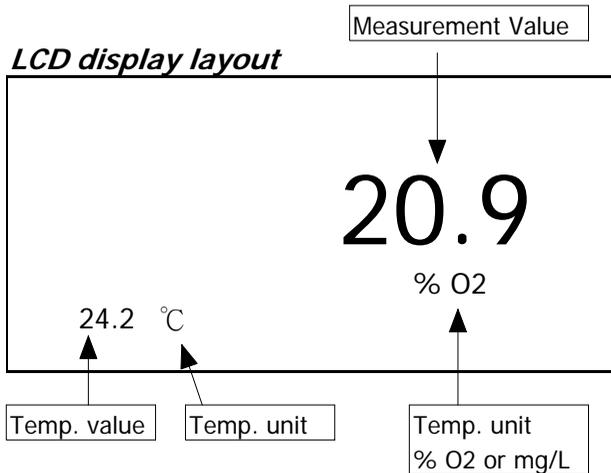


***The procedures that to fill the Probe's Electrolyte, refer the chapter 6-3 " Probe maintenance ", page 29 .***

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

- \* The display unit is set to % O2.
- \* The temperature unit is set to °C .
- \* Auto power off.
- \* The sampling time of data logger function is 2 seconds.

***LCD display layout***



## ***6-1 Dissolved Oxygen measurement***

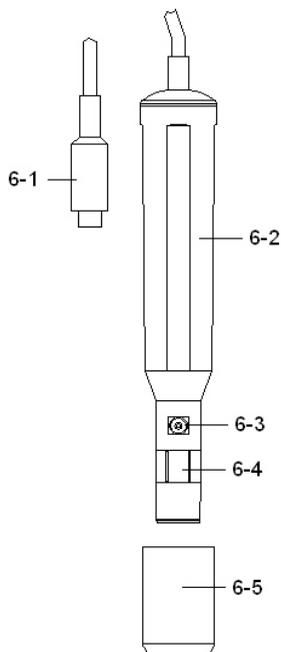


Fig. 4

- 1) Prepare the Oxygen Probe ( optional, DOPB-11 ), install the " Probe Plug " ( 6-1, Fig. 4 ) into the " DO Socket " ( 3-15, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Pressing the " Mode Button " ( 3-5, Fig. 1 ) once until the right bottom display show " %O<sub>2</sub> ".



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

**Wait approx. 2 minute until the reading value reach stable, if the reading value not within 20.7 to 21.1 (  $20.9 \pm 0.2$  ), then should be processed the calibration procedures first. The calibration procedures, please refer chapter 6-2, page 28.**

**After execute the calibration procedures, the display should show the value near 20.9 ( 20.8 to 21.0 ).**

- 3) Press the " Function Button " ( 3-6, Fig. 7 ) once, the right low display will show the " mg/L " unit, now the meter is ready for the Dissolved Oxygen measurement.
- 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 left 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**

When the display unit show " %O<sub>2</sub> ", it show the air Oxygen value approximately.

### **Change the Temp. unit to °F**

If intend to change the Temp. unit from °C to °F, please refer page 36, chapter 8-6 ( Temp. Unit Default Setting )

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

If intend to change the % Salt compensation value, refer page 38, chapter 8-10 ( % Salt Compensation value Setting ).

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

If intend to change the Height compensation value, refer page 38, chapter 8-11 ( Height Compensation value Setting ).

## **6-2 Calibration**

- 1) Install the " Probe Plug " ( 6-1, Fig. 4 ) into the " DO Socket " ( 3-15, Fig. 1 ).
- 2) Power on the meter by pressing " Power Button " ( 3-2, Fig. 1 ) once.  
Pressing the " Mode Button " ( 3-5, Fig. 1 ) once until the right bottom display show " %O2 " .
- 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 " REC Button " ( 3-4, Fig 1 ) and HOLD Button " ( 3-3, Fig. 1 ) at the same time, the display will show the following screen as example, release the both fingers.



- 5) Press the " Enter Button " twice will save the calibration data and finish the calibration procedures. Finally the low display will show " O2 CAL. OK " then return the normal screen. The complete calibration procedures will take 30 seconds approximately.

### **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.*

### **6-3. 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.**

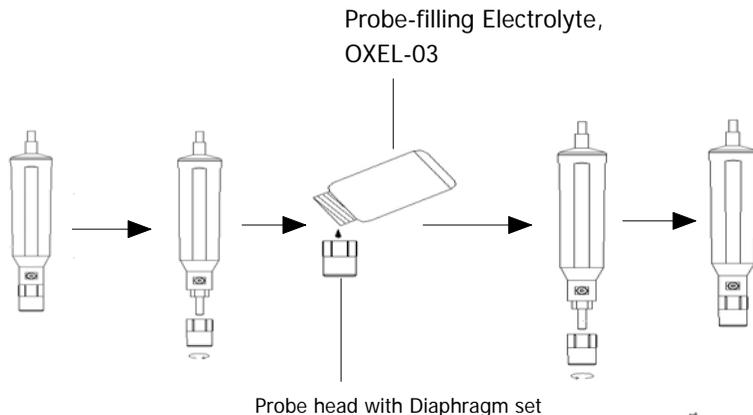
#### ***User already use the probe for a certain period :***

**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.

This sensitive diaphragm is rather delicate & is easily damaged if it comes into contact with solid objects or is subjected to blows. If the diaphragm is damaged or the electrolyte is run out, it must be replaced in the following way :



- 1) Unscrew the " Probe head " ( 7-3, Fig 5 ).
- 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 " ( 7-3, Fig 5 ) into the probe body.

**5)When not use the probe, should insert the " Probe head " into the " Probe protection cover " ( 6-5, Fig. 4 )**

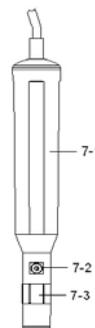


Fig. 5

- 7-1 Probe handle
- 7-2 Temp. sensing metal
- 7-3 Probe head

## **7. DATA LOAD, DATA RECORD, DATA LOGGER**

### ***7-1 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.

### ***7-2 Data Record ( MAX, MIN reading )***

\* 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.

\* 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.

### ***7-3 Data Logger***

The data logger function can save 16,000 measuring data with the clock time ( Real time data logger, build in clock ( hour-MIN-sec., year-month-date )).

The data logger procedures are as following :

- a) If push the " Logger Button " ( 3-8, Fig. 1 ) once will show the sampling time value on the bottom left display then disappeared.
- b) 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.
- c) **Auto Data Logger ( Sampling time set from 1 second to 8 hours 59 minutes 59 seconds )**  
Press the " Logger Button " ( 3-8, Fig. 1 ) once to start the Auto Data Logger function, at the same the bottom right display will show the indicator " Recording.... ", now the Data Logger function is executed. The upper display will show " DATA " indicator along with " REC " marker.
- d) **Manual Data Logger ( Sampling time set to 0 second )**  
Press the " Logger Button " ( 3-8, Fig. 1 ) once will save the data one time into the memory, at the same time the bottom right display will show the indicator " Recording.... " a while. Now the Data logger function is executed. The upper display will show " DATA " indicator along with " REC " marker.

e) **Memory full**

Under execute the data logger, if the bottom right display show the " Full ", it indicate the memory data already over 16,000 no. and the memory is full.

f) During the Data Logger function is executed, press the Logger Button " ( 3-8, Fig. 1 ) once will stop to execute " the data logger function, the " DATA " indicator will be disappeared.

If press the " Logger Button " ( 3-8, Fig. 1 ) once again will continuous the Data Logger function.

*Remark :*

- 1) *If intend to change the data logger sampling time, please refer chapter 8-4, page 36.*
- 2) *If intend to know the space of balance data numbers into the memory IC, please refer chapter 8-1, page 35.*
- 3) *If intend to clear the saving data from the memory please refer chapter 8-2, page 35.*

## **8. ADVANCED ADJUSTMENT PROCEDURES**

When execute the following Advanced Adjustment Procedures should exit the " Hold function " and the " Record function " first. The display will not show the " HOLD " and the " REC " marker.

- a. Press the " SET Button " ( 3-8, Fig. 1 ) at least two seconds until the lower display show

XXXXX      Memory Space
-------------------------

\* If push the " ESC Button " ( 3-3, Fig. 1 ) will escape the selecting function and return to the normal measuring display.

- b. One by one to press the " Set Button " ( 3-8, Fig. 1 ) once a while to the select the following advance setting function, at the same time right bottom display will show the text as :

**Memory Space**

**Clear Memory**

**Date/Time Set**

**Sample Time**

**Auto Power Off**

**Temp. Unit**

**M. TEMP. SET** ←—— PH model only

**Temp. Comp.** ←—— CD mode only

**CD, TDS Select** ←—— CD mode only

**% Salt SET** ←—— DO mode only

**Height Value** ←—— DO mode only

**ESC→Finish**

c. When make Advanced Adjustment Procedure will use the following key Buttons :

ESC Button ( 3-3, Fig. 1 ), Enter Button ( 3-4, Fig. 1 )

▲ Up Button ( 3-5, Fig. 1 ), ▼ Down Button ( 3-6, Fig. 1 )

SET Button ( 3-8, Fig. 1 ).

### **8-1 Check Memory Space**

To check the balance data numbers that exist into the memory ( allow memorize data no. ).



@XXXXX is the balance data numbers, for example  
XXXXX=15417.

### **8-2 Clear Memory**

- \* To delete the existing save data numbers from the memory.
- \* Push ENTER Button two times to confirm.
- \* Press the ESC Button once to quite and return to the main measurement manual.

### **8-3 Date/Time Setting**

- \* Use " ▲ Up Button ", " ▼ Down Button " and " Enter ( → ) Button " to select the expect Date ( year-month-date ) and the time ( HOUR-MIN-SEC. ).
- \* After finish the Date/Time adjustment, Push the " Enter Button " , then press the " ESC Button " save the clock data into the memory and return to normal screen.

### ***8-4 Sample Time Setting***

- \* Use " ▲ Up Button ", " ▼ Down Button " and " Enter ( → ) Button " to select the expect Sample Time ( HOUR-MIN-SEC.).
- \* After finish the Sample Time adjustment, Push the " Enter Button ", then press the " ESC Button " will save the clock data into the memory and return to normal screen.

### ***8-5 Auto Power Off Default Setting***

- \* Use " ▲ Up Button ", " ▼ Down Button " to select " 1 " or " 0 ".

<b>1 = Auto power On.</b> <b>0 = Auto power Off.</b>
---

- \* After finish the Auto Power Off adjustment, push the " Enter Button ", then press the " ESC Button " will save data and return to the normal screen.

### ***8-6 Temp. Unit Default Setting***

- \* Use " ▲ Up Button ", " ▼ Down Button " to select " 1 " or " 0 ".

<b>1 = °F</b> <b>0 = °C</b>
--------------------------------

- \* After finish the Temperature unit adjustment, push the " Enter Button ", then press the " ESC Button " will save data and return to the normal screen.

### **8-7 PH Manual Temp. Setting**

- \* *This setting procedure is only for the PH function to adjust the manual temperature compensation value.*
- \* The low display will show :

M. TEMP. SET ^, v Enter:Y
------------------------------

- \* Use " ▲ Up Button ", " ▼ Down Button " to select the the desired manual Temp. compensation value.
- \* Press " ENTER " once, then press " ESC " will save the data and return to the normal screen.

### **8-8 Temp. Compensation Factor Setting**

- \* *This setting procedure is used for the Conductivity function only.*
- \* Use " ▲ Up Button ", " ▼ Down Button " to select the Temp. Compensation Factor value ( % per C degree ). of the measured solution.
- \* After setting the desired value, push the " Enter Button ", then press the " ESC Button " will save the data and return to the normal screen.
- \* Temp. Compensation Factor is set to 2.0% per C degree typically.

### **8-9 CD ( $\mu$ S, mS ), TDS ( PPM ) Default Setting**

- \* *This setting procedure is used for the Conductivity function only.*
- \* Use " ▲ Up Button ", " ▼ Down Button " to select the " 1 " or " 0 ".

0 = $\mu$ S, mS 1 = PPM
----------------------------

- \* After finish the unit ( uS/mS, PPM ) adjustment, push the " Enter Button " , then press the " ESC Button " will save the data and return to the normal screen.

### **8-10 DO % Salt Compensation Value Setting**

- \* This setting procedure is only available for the DO function to adjust the compensation value of " % Salt "
- \* The low display will show :

% Salt SET ^,v Enter:Y
---------------------------

- \* Use " ▲ Up Button " , " ▼ Down Button " to select the the desired % Salt Compensation Value .
- \* Press " Enter Button " once, then press " ESC Button " will save the data and return to the normal screen.
- \* Set to 0 % Salt typically.

### **8-11 DO Height Compensation Value Setting**

- \* *This setting procedure is only for the DO function to adjust the compensation value of " Height " .*
- \* The low display will show :

Height Value 0:Meter 1: Ft
-------------------------------

- \* Use " ▲ Up Button " , " ▼ Down Button " to select " 0 " or " 1 " .

*Meter unit select " 0 "*

*Ft unit select " 1 "*

- \* Press " ENTER Button " once, the low display will show :

Height Value Meter
-----------------------

- \* Use ▲ Up Button, ▼ Down Button to select the the desired Height value.
- \* Press " Enter Button " once, then press " ESC Button " will save the data and return to the normal screen.
- \* Set to 0 meter ( Feet ) typically.

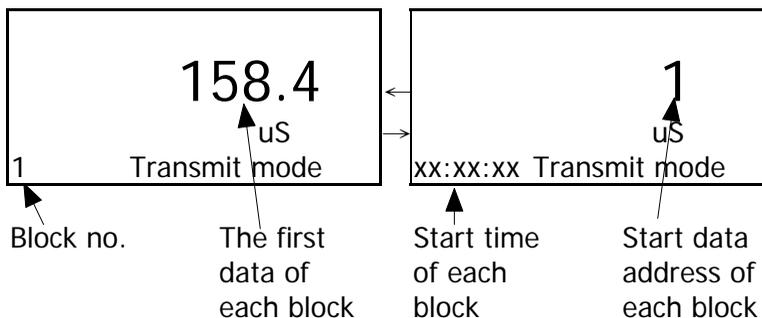
### ***8-12 Escape from the SETTING function***

Press the " ESC Button " once a while will quite and return to the normal measurement display.

## 9. SEND THE DATA OUT FROM THE METER

- 1) If intend to send the data out from the meter, it should exit the " Hold function " and the " Record function " first. The display will not show the " HOLD " and the " REC " marker.
- 2) Press the " SEND Button " ( 3-7, Fig. 1 ) at least 2 seconds until the bottom right display show " Transmit mode ", then release the Button.

**LCD display will show the fowling screen alternately.**

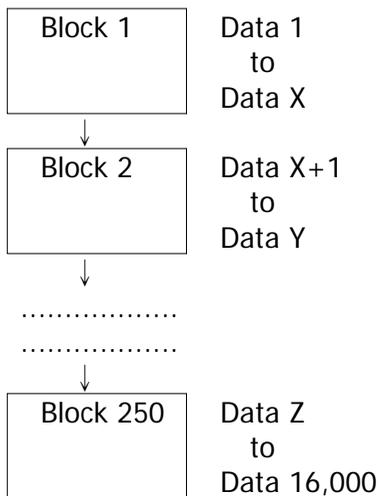


**Use "▲ Up Button", " ▼ Down Button " to select the different data memory block no. ( 1 to 250 ).**

**The meter can save 16,000 data MAX , those data will saved into 250 memory block MAX**

\* One " Memory Block " means :

The data that save into one routine Data Logger procedures ( Push " REC " Button , following push the " Logger " Button to save the data, the display will show the " REC " and " DATA " . After save the data push the " Logger " Button, following push the " REC " Button, will exist the Data Logger function. The " REC " and " DATA " indicator of LCD will be disappeared ). Please refer Chapter 7-3, page 32.



- 3) Until the desired Memory Block no. be selected.  
Push the " Send Button " ( 3-7, Fig. 1 ) once, the data in the Memory Block will send out.  
During the data send out, the bottom right display will show the " Sending Data ! " indicator. When data already send out completely, the bottom right display will show the Transmit mode " indicator again.
- 5) Push the " ESC Button " ( 3-3, Fig. 1 ) will exist the data sending function and return to the normal display.

**Remarks :**

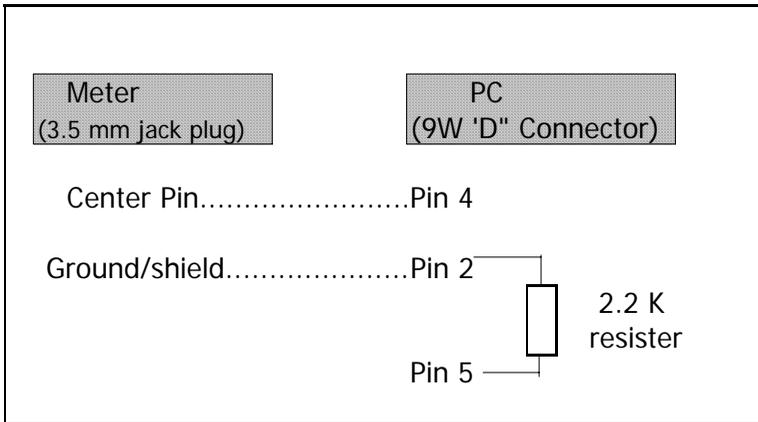
***@ If intend to load the data to the computer, should connect the RS232 cable ( optional, model : UPCB-02 ) or the USB cable ( optional, model : USB-01 ) and apply the Data Logger software ( optional, Model : SW-DL2005 ).***

***@ When sending the data, each time just can send one Memory Block data out. for example block 1 data, block 2 data... or block 250 data.***

# 10. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via the rs-232 Out Terminal " ( 3-18, 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 = 02
D14	4
D13	When send the upper display data = 1 When send the lower display data = 2
D12, D11	Annunciator for Display
	uS = 13      mS = 14      PPM = 19
	PH = 05      mV = 18
	mg/L = 07      % O2 = 06
D10	Polarity 0 = Positive    1 = Negative
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234
D0	End Word = 0D

**RS232 setting**

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

## 11. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show "  ", it is necessary to replace the batteries ( UM3/1.5 V x 4 PCs ).
- 2) Slide the " Battery Cover " ( 3-10, Fig. 1 ) away from the instrument and remove the batteries.
- 3) Replace with batteries ( UM3/1.5 V x 4 PCs ) and reinstate the cover.
- 4) Make sure the battery cover is secured after changing the battery.

## 12. SYSTEM RESET

If the meter happen the troubles such as :

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

Then make the system RESET will fix the problem.  
The system RESET procedures are as following.

**Used a pin tool to push the " System Reset Switch " ( 3-19, Fig. 1 ) once a while then power on again will fix the problem.**

## 13. OPTIONAL ACCESSORIES

RS232 cable UPCB-02	* Computer interface cable. * Used to connect the meter to the computer ( COM port ).
USB cable USB-01	* Computer interface cable. * Used to connect the meter to the computer ( USB port ).
Data Logger software SW-DL2005	* Software the used to download the data logger ( data recorder ) from the meter to computer.
Data Acquisition software 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.. .xxx.mdb data file can be retrieved for EXCEL, ACCESS..., wide intelligent applications.
Power adapter	AC 110V to DC 9V. USA plug.
Power adapter	AC 220V/230V to DC 9V. Germany plug.

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

Conductivity optional accessories	* Conductivity probe Model : CDPB-03
	* 1.413 mS standard solution. Model : CD-14

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