Bench type, RS232/USB computer interface

ph Meter

Model : BPH-231



Your purchase of this BENCH TYPE pH METER marks a step forward for you into the field of precision measurement. Although this METER is a complex and delicate instrument, its durable will structure 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 | 2 |
| 2-1 General Specifications | 2 |
| 2-2 Electrical Specifications | 4 |
| 3. FRONT PANEL DESCRIPTION | 5 |
| 4. pH/mV MEASURING and CALIBRATION | |
| PROCEDURE | 7 |
| 4-1 pH measurement (manual Temp. | |
| compensation | 8 |
| 4-2 pH measurement (ATC) | 8 |
| 4-3 mV Measurement | 9 |
| 4-4 pH calibration | 10 |
| 4-5 ORP calibration | 13 |
| 5. DATA HOLD, DATA RECORD, DATA LOGGER | |
| LCD BACKLIGHT ON/OFF | 14 |
| 6. ADVANCED ADJUSTMENT PROCEDURE | 17 |
| 6-1 Check memory space | 17 |
| 6-2 Clear Memory | 18 |
| 6-3 Set Date/Time | 18 |
| 6-4 Set sampling time | 19 |
| 6-5 Auto power OFF management | 20 |
| 6-6 Select the Temp. unit to $^\circ\!\mathrm{C}$ or $^\circ\!\mathrm{F}$ | 20 |
| 6-7 Set pH manual Temp. compensation value | 21 |
| 6-8 ESC | 21 |
| 7. SEND THE DATA OUT FROM THE METER | 22 |
| 8. RS232 PC SERIAL INTERFACE | 24 |
| 9. BATTERY REPLACEMENT | 26 |
| 10. SYSTEM RESET | |
| 11. OPTIONAL ACCESSORIES | 27 |

1. FEATURES

- * Professional bench type meter with large size LCD display with green color back light.
- * One meter for multi purpose operation : pH and mV (ORP).
- * pH : 0 to 14.00 pH, ORP : ± 1999 mV.
- * pH measurement can select ATC or manual temperature adjustment.
- * High input impedance.
- * pH measurement can make the auto calibration for pH 7, pH 4 and pH 10 or other value.
- * Real time data logger (record year, month, date, hour, minute, second), 16,000 data logger.
- * Auto data record, 16,000 Data logger no.
- * Wide sampling time adjustment range from one second to 8 hours 59 minutes 59 seconds.
- * Auto data logger, manual data logger.
- * RS232 computer interface.
- * Max., Min., Data hold.
- * Can default auto power off or manual power off.
- * DC 1.5V (UM-3, AA) x 8 PCs or DC 9V adapter in.
- * Super large LCD display with backlight.
- * 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 : 82 mm x 61 mm. | | |
| | * with green color backlight. | | |
| Measurement | рН | | |
| | mV(ORP) | 1 | |
| рН | Optional, | | |
| Electrode | Any pH ele | ctrode with BNC connector. | |
| Measurement | рН | 0 to 14 pH | |
| | mV | -1999 mV to 1999 mV | |
| Input | 10^12 ohm | | |
| Impedance | | | |
| Temperature | Manual | 0 to 100 $^\circ\!\mathrm{C}$, be adjusted by | |
| Compensation | | push button on front panel. | |
| for pH | Automatic | With the optional temperature | |
| measurement | (ATC) | probe (TP-07) | |
| | | 0 to 65 ℃. | |
| рН | рН7, рН4, а | and pH10, 3 points calibration | |
| Calibration | ensure the best linearity and accuracy. | | |
| Sampling Time | Auto data logger : | | |
| of Data Logger | 1 sec to 8 hour 59 min. 59 sec. | | |
| | Manual data logger : | | |
| | Set samplir | ng time to 0 second. | |
| Data Hold | Freeze the | Freeze the display reading. | |
| Memory Recall | Maximum & Minimum value. | | |

| Power off | Auto shut off saves battery life or |
|----------------|---|
| | manual off by push Button. |
| | @ Can default auto power or manual |
| | power off. |
| | @When default auto power function, |
| | power will off automatically after |
| | 10 MIN, if no Button be pressed. |
| Sampling Time | Approx. 1 second. |
| of display | |
| Data Output | RS 232/USB PC computer interface. |
| | * Connect the optional RS232 cable |
| | UPCB-02 will get the RS232 plug. |
| | * Connect the optional USB cable |
| | USB-01 will get the USB plug. |
| Operating | 0 to 50 $^\circ\!\mathrm{C}$ Main instrument. |
| Temperature | |
| Operating | Less than 80% R.H. |
| Humidity | |
| Power Supply | DC 1.5 V battery (UM3) x 8 PCs, |
| | (Heavy duty type). |
| | DC 9V adapter input. |
| | @ AC/DC power adapter is optional. |
| Power | Operation (LCD backlight ON) : |
| Consumption | Approx. DC 23 mA |
| | Operation (LCD backlight OFF) : |
| | Approx. DC 8 mA |
| | Power OFF (only internal clock running) : |
| | Approx. DC 1.8 uA. |
| Weight * meter | 1049 g/2.3 LB. |
| Dimension | 225 X 125 X 64 mm |
| @ Meter | (8.86 X 4.92 X 2.52 inch) |

| Accessories Included | Instruction manual1 PC |
|-------------------------|--|
| Optional Accessories | * pH electrode PE-03, PE-11, PE-01, PE06HD PE-04HD, PE-05T, PE-03K7 PE-02, PE-08, PE-21 * ATC (Automatic Temperature Probe)TP-07 * pH 7 buffer solutionpH-07 * pH 4 buffer solutionpH-04 * Carrying caseCA-3K * Carrying caseCA-3K |
| | * pH electrode hoderEH-20 * AC to DC 9V adapter. * RS232 cable, UPCB-02. * USB cable, USB-01 * Data Acquisition software, SW-U801-WIN. * Data Logger software, SW-DL2005. |

2-2 Electrical Specifications (23±5 $^\circ$ C)

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

3. FRONT PANEL DESCRIPTION



Fig. 1-1



- 3-1 Display
- 3-2 Power Button (LCD Backlight Button)
- 3-3 HOLD Button (ESC Button)
- 3-4 REC Button (Enter Button)
- 3-5 Zero Button (For mV/ORP)
- 3-6 Function Button
- 3-7 Send Button (Clock Button)
- 3-8 SET Button (Logger Button)
- 3-9 🛦 Up Button
- 3-10 ▼ Down Button
- 3-11 pH Socket (BNC Socket)
- 3-12 ATC Probe input socket
- 3-13 RS232 socket
- 3-14 Reset button
- 3-15 DC 9V power adapter socket
- 3-16 Stand
- 3-17 Battery Cover/Battery compartment

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 $^\circ\!\mathrm{C}\,.$
- * Manual ATC (without connect the ATC probe)
- * Auto power off.
- * The sampling time of data logger function is 2 seconds.





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 10.

4-1 pH measurement (manual Temp.)

- Prepare the pH Electrode (optional), install the "Probe Plug" (4-1, Fig. 2) into the "pH Socket/BNC Socket" (3-11, Fig. 1).
- 2) Power on the meter by pressing "Power Button" (3-2, Fig. 1) once.

The Display will show " pH " and " Temp. " indicator.

- 3) Adjust the manual Temp. value same as the solution's temperature exactly, the procedures refer chapter 6-7, page 21.
- 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 " (3-12, 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.

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 " (3-11, Fig. 1).
- 2) Power on the meter by pressing "Power Button" (3-2, Fig. 1) once.
 Pressing the "Function Button "(3-6, Fig. 1)

once until the Display show " mV " indicator.

3) The up main display will show the mV value.

Zero adjustment for mV Measurement

If short the BNC Socket " (3-11, Fig. 1), the Display do not show the 0 mV, it can make the Zero adjustemnt for the mV measurement as :

Use a metal pin to short the "Input center and the Ground pin " of the the BNC Socket " (3-11, Fig. 1). Press "Zero Button " (3-5, Fig. 1) > 10 seconds continuously, the Display will show 0 mV, then dssconnect the short pin.

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" (3-11, 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 6-7, page 21.
 - * Automatic temperature compensation, refer to 4-2, page 8.

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.

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

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. Until Display will show the following screen then release the both fingers.



6) Press the " ▲ Button " (3-9, Fig. 1) or " ▼ Button " (3-10, Fig. 1) once in sequence to select the following screen.



7) After the above a, b, c, d is selected, press the "Enter Button" (3-4, Fig. 1) to execute the calibration procedures.

When select the



and press the "Enter Button " will clear the existing calibration data.

7) Fine adjustment of calibration value

During the calibration when the main Display (7.00, 4.00 or 10.00) is flashed, it can use the " \blacktriangle Button " (3-9, Fig. 1) or " \checkmark Button " (3-10, Fig. 1) to make the fine adjust of the calibration value, for example the exact calibration value is 4.01, 4.02, 3.98.... 7.01, 7.02. 6.98....10.01, 10.02, 9.98 After the fine calibration value is adjusted, release the \blacktriangle Button (\checkmark Button), the main Display will be flashed few second then execute the calibration according the new calibration value.

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

pH7 calibration, pH4 calibration pH7 calibration, 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 9.
- 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.

OrP CAL

- 5) Use "▲ Button " (3-9, Fig. 1), " ▼ Button " (3-10, Fig. 1) to adjust the up display value exact same as the standard ORP buffer solution value. Press the " Enter Button " 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.
 - * If the ORP calibration procedures is less than 100 mV the calibration is not allow.

5. DATA HOLD, DATA RECORD, DATA LOGGER, LCD BACKLIGHT

5-1 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.

5-2 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 > 2 seconds at least. The display will revert to the current reading.

5-3 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.

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, The upper display will show "DATALOGGER " indicator along with " REC " marker.

- * *Pause the data logger function :* Press the " Logger Button " (3-8, Fig. 1) once.
- * *Exit the data logger function :* Press the " REC Button " (3-4, Fig. 1) > 2 seconds.

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. Beeper will sound and the upper display will show "DATALOGGER " indicator along with "REC " marker.

* *Exit the data logger function :* Press the " REC Button " (3-4, Fig. 1) > 2 seconds.

d)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.

e) During execute the Auto Data Logger function, press the Logger Button " (3-8, Fig. 1) once will stop to execute " the data logger function, the " DATALOGGER " indicator will be disappeared.

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

- 1) If intend to change the data logger sampling time, please refer chapter 6-4, page 19.
- 2) If intend to know the space of balance data numbers into the memory IC, please refer chapter 5-1, page 17.
- *3) If intend to clear the saving data from the memory please refer chapter 6-2, page 18.*

5-4 LCD Bcklight 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.

6. ADVANCED ADJUSTMENT PROCEDURES

Under do not execute the Datalogger function, press the "SET Button " (3-8, Fig. 1) continuously at least two seconds will enter the "Advanced Setting " mode, press the "SET Button " (3-8, Fig. 1) once a while in sequence to select the 8 main function, the display will show :

SPACE...Check memory space

Clr..... Clear Memory

- dAtE.....Set clock time (Year/Month/Date, Hour/Minute/ Second)
- SP-t.....Set sampling time (Hour/Minute/Second)

PoFF..... Auto power OFF management

t-CF...... Select the Temp. unit to $^\circ\!\mathrm{C}$ or $^\circ\!\mathrm{F}$

- t-SEt.....Set pH manual Temp. compensation value, pH only
- ESC..... Escape from the advanced setting

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.

6-1 Check memory space

When the display show " SPACE "

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

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

6-2 Clear Memory

When the display show " CLr "

- 1) To delete the existing save data numbers from the memory.
- 2) Push ENTER Button to enter "Memory clear "function. Use the "▲ Button "(3-9, Fig. 1) or "▼ Button "(3-10, Fig. 1) to select the upper value to "yES " or "no ".

yES - Intend to clear the Memory. no - Not to clear the Memory.

3) If select the upper to " yES ", press the "Enter Button " (3-4, Fig. 1) once will clear the Memory, the bottom value will show " 0 ".
Press the ESC Button once to guite and return to

the main measurement screen.

6-3 Set Date/Time (Year/Month/Date, Hour/Minute/ Second)

When the upper display show " dAtE "

 Use the "▲ Button " (3-9, Fig. 1) or "▼ Button " (3-10, Fig. 1) to adjust the value (Setting start from Year value). After the desired value is set, press the "Enter Button " (3-4, Fig. 1) once will going to next value adjustment (for example, first setting value is Year then next to adjust Month, Date, Hour, Minute, Second value).

Remark : The adjusted value will be flashed. 2) After set all the time value (Year, Month, Date, Hour, Minute, Second), press the "SET Button" (3-8, Fig. 1) once will save the time value, then the screen will jump to Sampling time "setting screen (Chapter 9-4).

Remark : After the time value is setting, the internal clock will run precisely even Power off if the battery is under normal condition (No low battery power).

6-4 Set sampling time (Hour/Minute/Second)

When the upper display show " SP-t "

 Use the "▲ Button " (3-9, Fig. 1) or "▼ Button " (3-10, Fig. 1) to adjust the value (Setting start from Hour value). After the desired value is set, press the "Enter Button " (3-4, Fig. 1) once will going to next value adjustment (for example, first setting value is Hour then next to adjust Minute, Second value).

Remark : The adjusted value will be flashed.

2) After set all the sampling time value (Hour, Minute, Second), press the "SET Button" (3-8, Fig. 1) once will save the sampling value with default then the screen will jump to "Auto power OFF" setting screen (Chapter 6-5).

6-5 Auto power OFF management

When the lower display show " PoFF "

 Use the "▲ Button " (3-9, Fig. 1) or "▼ Button " (3-10, 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 " (3-4, Fig. 1) will save the setting function with default.

6-6 Select the Temp. unit to ${}^\circ\!\!C$ or ${}^\circ\!\!F$

When the lower display show " t-CF "

- 1) Use the "▲ Button " (3-9, Fig. 1) or "▼ Button "
 (3-10, Fig. 1) to select the upper Display text to " C " or " F ".
 - C Temperature unit is $^{\circ}\!\!\!{\rm C}$ F Temperature unit is $^{\circ}\!\!{\rm F}$
- 2) After Display unit is selected to " C " or " F ", press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

6-7 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 $^\circ\!C$ (77 $^\circ\!F$).
- 2) Use the "▲ Button " (3-9, Fig. 1) or "▼ Button "
 (3-10, Fig. 1) to select the upper value to the desired Temp. compensation value (°C or °F), then press the "Enter Button " (3-4, Fig. 1) will save the setting value with default.

6-8 ESC

When the display show " ESC "

When the Display show the text " ESC ", then press the " Enter Button " (3-4, Fig. 1) will finish the Advanced Setting procedures and return to the normal measuring screen.

7. SEND THE DATA OUT FROM THE METER

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

LCD display will show the following screen :



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 blocks max..

- * " One " Memory Block " means : Execute the Data logger function (Push " REC " Button, following push the " Logger " Button to save the data.......) will generate the first Memory block
- * Exit the Data logger function and execute the Data logger function again will generate the second Memory " Block " again.



- 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 display will show the "SEend " indicator, the upper value (Data no. that saved into the Block) will count down until zero.
- 4) 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.

8. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via the RS-232 Out Terminal " (3-13, 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 | |
| | pH = 05 mV = 18 | |
| 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 |

9. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show " , it is necessary to replace the batteries (UM3/1.5 V x 8 PCs).
- 2) Slide the "Battery Cover " (3-17, Fig. 1) away from the instrument and remove the batteries.
- 3) Replace with batteries (UM3/1.5 V x 8 PCs) and reinstate the cover.
- 4) Make sure the battery cover is secured after changing the battery.

10. 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 "(3-14, Fig. 1) once a while then power on again will fix the problem.

11. OPTIONAL ACCESSORIES

| DC222 apple | * Computer interface cable |
|------------------|---|
| | |
| UPCB-02 | * Used to connect the meter to |
| | the computer (COM port). |
| USB cable | Computer interface cable. |
| USB-01 | * Used to connect the meter to |
| | the computer (USB port). |
| Data Logger | * Software the used to download |
| software | the data logger (data recorder) |
| SW-DL2005 | from the meter to computer. |
| Data Acquisition | * The SW-U801-WIN is a multi |
| software | displays (1/2/4/6/8 displays) |
| SW-U801-WIN | 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, ACESS, |
| | wide intelligent applications. |

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

| Carrying case | Soft carrying case Model : CA-3K | |
|---------------|-------------------------------------|--|
|---------------|-------------------------------------|--|

| Electrode holder | Electrode holder for all pH |
|------------------|-------------------------------------|
| | electrodes and the ATC Temp. probe. |
| | Model : EH-20 |

| рН | * pH Electrode, 1 to 13 pH. |
|-------------|--|
| optional | Model : PE-11 |
| accessories | * pH Electrode, 1 to 13 pH. |
| | Model : PE-03 |
| | * pH Electrode, 0 to 14 pH. |
| | Model : PE-01 |
| | * Glass body heavy duty pH Electrode, |
| | 0 to 14 pH. |
| | Model : PE-02 |
| | * Glass body plane pH Electrode, |
| | 0 to 14 pH. |
| | Model : PE-08 |
| | * Industrial in line pH Electrode, |
| | 0 to 14 pH. |
| | Model : PE-21 |
| | * SPEAR pH Electrode |
| | Model : pH-06HD, pH-04HD |
| | ^A PH Electrode + Temp. probe, 2 in T Medal - DE 02K7 |
| | MODEL: PE-USK/ |
| | PH Electrode + Temp. probe, 2 m T |
| | |
| | * pH 7 BUFFER SOLUTION |
| | Model : pH-07 |
| | * pH 4 BUFFER SOLUTION |
| | Model : pH-04 |
| | * Temperature probe (ATC probe) |
| | Model · TP-07 |
| | |

| mV (ORP) | ORP Electrode |
|------------|----------------|
| optional | Model : ORP-14 |
| accessory | |