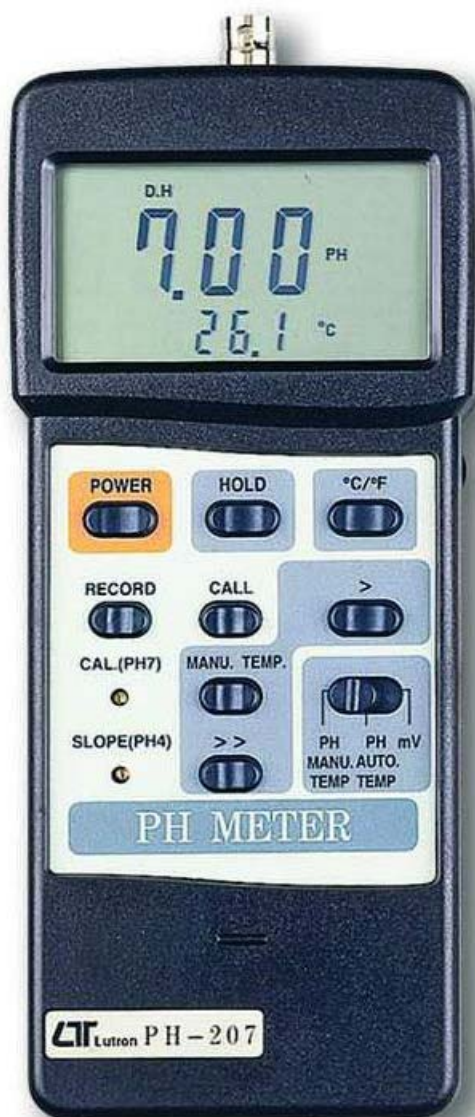


# PH METER

Model : PH-207



Your purchase of this pH METER marks a step forward for you into the field of precision measurement. Although this pH 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

- \* Microprocessor circuit assures high accuracy and provides special functions and features.
- \* Super large LCD display with contrast adjustment for best viewing angle.
- \* Dual function meter's display.
- \* Heavy duty & compact housing case.
- \* Records Maximum, Minimum and Average readings with RECALL.
- \* Data hold.
- \* Auto shut off saves battery life.
- \* Operates from 006P DC 9V battery.
- \* RS 232 PC serial interface.
- \* Used the durable, long-lasting components, including a strong, light weight ABS-plastic housing case.
- \* Multi-measurement : PH, mV, Temperature.
- \* Temperature function for 蛭 or 蚌 be selected by push button on front panel easily.
- \* Show the PH & temperature values on the same LCD display at the same time.
- \* High input impedance avoid measuring error.
- \* Wide manual temperature compensation range from 0 蛭 to 100 蛭, high accuracy.
- \* Auto temperature compensation range via. the external optional temp. probe.
- \* The values of "Manual temp. compensation" are reading from the LCD display directly, no errors & easy operation .
- \* With the optional temp. probe for automatic temp. compensation of PH function or temp. measurement.
- \* The instrument build in mV(milli volt) measuring function, letting you make ion-selective, ORP, and other precise mV measurement.

\* 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	Dual function meter's display, 13 mm(0.5") Super large LCD display with contrast adjustment for best viewing angle.	
Measurement	PH	0 to 14 PH
	mV	0 to 1999 mV
	Temperature	0 to 65 蛎 32 to 150 蚌
Input Impedance	10 12ohms.	
Temperature Compensation For PH Range	Manual	0 to 100 蛎, adjusting by push button on front panel.
	Automatic	With the optional TEMP. probe, 0 to 65 蛎.
Calibration For PH Range	Built in SLOPE(PH 4) & CAL.(PH 7) calibration VR ( multi-turns potentiometers ) on front panel, high reliability.	
Data hold	To hold the reading values on display.	
Memory Recall	Records Maximum, Minimum and Average readings with RECALL.	
Power off	Auto shut off saves battery life, or manual off by push button.	
Data Output	RS 232 PC serial interface.	

Over input indication	Indication of "- - - -".
PH Electrode	Any combination PH electrode with BNC connector/
Operating Temperature	0 𐄂 to 50 𐄂(32 蚌 to 122 蚌).
Operating Humidity	Max. 80% RH.
Sampling Time	Approx. 0.8 second.
Power Supply	006P DC 9V battery(Heavy duty type).
Power Current	Approx. DC 5.7 mA.
Weight	270 g/0.59 LB (included batteries)
Size ( meter )	180 x 72 x 32 mm(7.1 x 2.8 x1.3 inch).
Standard Accessories	Instruction manual.....1 PC.
Optional Accessories	Carrying case pH electrode, PE-01, PE-11, PE-03. ATC temp. probe, TP-07. PH 4 buffer solution, PH-04. PH 7 buffer solution, PH-07.

## ***2-2 Electrical Specifications (23 5 𐄂)***

Measurement	Range	Resolution	Accuracy
PH	0 to 14 PH	0.01 PH	0.03 PH + 2 d)
mV	0 to 1999 mV	1 mV	(0.5% + 1 d)
Temp.(𐄂)	0 to 65 𐄂	0.1 𐄂	1 𐄂 ( 0 - 50 𐄂 ) 4 𐄂 ( > 50 𐄂 )
Temp.(蚌)	32 to 150 蚌	0.1 蚌	.8 蚌 (32 - 122蚌) .2 蚌 ( > 122蚌 )

\* PH accuracy are based on after calibration, meter only.

\* Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.

### 3. FRONT PANEL DESCRIPTION

Fig. 1

3-1	Display	3-10	Manual Temp. Button
3-2	Power Off/On button	3-11	Function Select Switch
3-3	Data Hold Button	3-12	SLOP(PH 4) Calibration VR
3-4	蛭/ 蚌 button	3-13	>> Button (Manual Temp. adjust)
3-5	LCD Contrast Adjust VR	3-14	Battery Compartment/ Cover
3-6	Memory "Record" Button	3-15	Input Socket (BNC, for PH & mV)
3-7	Memory "Call" Button	3-16	RS-232 Out Terminal
3-8	> Button (Manual Temp. adjust)	3-17	Temp. Probe Input Socket
3-9	CAL.(PH 7) Calibration VR		

## 4. PH CALIBRATING PROCEDURE

### ***4-1 Calibrating Consideration***

***The PH meter already calibrated by mV signal that simulated from the mV output of the ideal PH ELECTRODE (base on 25 ℃ environment). For an ideal electrode will produce 0 mV at PH 7.00, but most electrodes are slight off.***

It is necessary to make the following calibration procedures (4-2, 4-3), if the user intend to keep instrument along the electrode within high accuracy or the first time use the meter & the electrode.

### ***4-2 Requiring Equipment for Calibration***

- 1) Combination PH ELECTRODE(optional).
- 2) Two buffer solutions (optional) : PH-07 & PH-04.

### ***4-3 Two Points Calibration***

- 1) Power on the instrument using the " Power On/Off Button " (3-2, Fig.1).
- 2) Select the " Function Switch " (3-11, Fig.1) to the " PH MANUAL TEMP. " position.
- 3) Adjust the " Temperature Compensation Values " to be same as the temperature values of the PH-04 buffer solution.

*The adjusting procedures, please refer to 5-1.*

- 4) Connect the combination PH ELECTRODE to the " BNC socket " (3-15, Fig. 1) and place the electrode into the buffer solution PH-07.  
Use the screw to adjust the " PH 7 calibration VR " (3-9, Fig.1) until the display reading reach to 7.00 0.01.

- 5) Rinse the electrode in the distilled water.  
Place the electrode into the PH-04 ( or PH-10 ) buffer solution. Use the screw to adjust the " PH 4 calibration VR " (3-12, Fig.1) until the display reading reach to 4.00 0.01 ( or 10.00 0.01 for PH-10 ).
- 6) Rinse the electrode in the distilled water again.
- 7) Repeat above (4) to (5) procedures two times at least.
- 8) The instrument and electrode are now finished the " TWO POINTS CALIBRATION " & ready for the measurement.

#### ***4-4 Single Point Calibration***

- 1) Power on the instrument by pushing the " Power On/Off Button " (3-2, Fig.1).
- 2) Select the " Function Switch " (3-11, Fig.1) to the " PH MANUAL TEMP. " position.
- 3) Connect the combination PH ELECTRODE to the " BNC socket " (3-15, Fig. 1) and place the electrode into the PH-07 buffer solution.  
Use the screw to adjust the " PH 7 calibration VR " (3-9, Fig.1) until the display reading reach to 7.00 0.01.
- 4) Repeat above (3) procedures two times at least.
- 5) The instrument and electrode are now finished the " SINGLE POINTS CALIBRATION " & ready for the measurement.

### **5. PH TEMPERATURE COMPENSATION**

Enables the meter to read solutions at various temperatures. The meter corrects for an electrode's temperature dependency. The compensation may be manual with a button adjustment on the meter, or it may be automatic with a optional temperature sensing probe immersed in the test solution.



### ***5-1 Manual temperature compensation***

- 1) Select the " Function Switch " (3-11, Fig.1) to the " PH MANUAL. TEMP. " position.
- 2) Push the " MANUAL Temp. Button " (3-10, Fig.1) first, then the display will show " 25.0 ℃ " for the initial manual setting temp.
- 3) Push the " > Button " (3-8, Fig. 1) once will up 0.1 ℃ to the manual setting temperature.
- 4) Push the " >> Button " (3-13, Fig.1) once will up 1 ℃ to the manual setting temperature.  
Push the " >> Button " continuously will up 1 ℃ to setting temperature for every half seconds.

### ***5-2 Automatic temperature compensation***

- 1) Select the " Function Switch " (3-11, Fig.1) to the " PH AUTO TEMP. " position.
- 2) Plug in the " Optional Temp. Probe, TP-07 " into the " Temp. Socket " (3-17, Fig. 1).
- 3) Place the "Temp. Probe" into the tested solution, then the PH function will be temperature compensated automatically.

## **6. MEASURING PROCEDURE**

### ***6-1 PH Measurement***

After the instrument and PH electrode are calibrated, then the unit is now ready for measuring.

- 1) Connect the combination PH ELECTRODE to the " BNC socket " (3-15, Fig. 1).
- 2) Power on the instrument by pushing the " Power On/Off Button " (3-2, Fig.1).
- 3) If the operating is under the " Manual temperature compensation ", then please according the above 5-1 measuring procedures.

If the operating is under the " Automatic temperature compensation ", then please according the above 5-2 measuring procedures.

- 4) Place the electrode into the measured solution, then the instrument will display the PH value.
- 5) After make the measurement, please rinse the electrode in distilled water.

### ***6-2 mV Measurement***

The instrument build in mV(milli volt) measuring function, letting you make ion-selective, ORP (oxidation-reduction potential), and other precise mV measurements.

Select the "Function Switch"(3-11, Fig.1) to the "mV" position. Then the meter will show the mV values on the display.

### ***6-3 Temp. Measurement***

- 1) Select the "Function Switch"(3-11, Fig.1) to the " PH AUTO TEMP. " position.
- 2) Plug in the " Optional Temp. Probe " into the " Temp. Input Socket " (3-17, Fig. 1).
- 3) \* If intend to measure the " 蛭 ", then push the " 蛭/ 蚌 " button " to select the " 蛭 " unit.  
\* If intend to measure the " 蚌 ", then push the " 蛭/ 蚌 " button " to select the " 蚌 " unit.
- 4) Place the "Temp. Probe" into the tested solution, then the meter will show the temperature value.

**Consideration :**

*When use the Temp. Probe, As to keep the temp. reading be stable, should plug in the PH electrode into the meter at the same time. If only plug in the temp. probe, then the temperature reading value may exist little deviation.*

**6-4 Data Hold**

- 1) During the measurement, Push the " Hold Button " (3-3, Fig. 1) will hold the display values & LCD will show the " D.H. " marker.
- 2) Push the "Data Hold Button" again will release the data hold function.

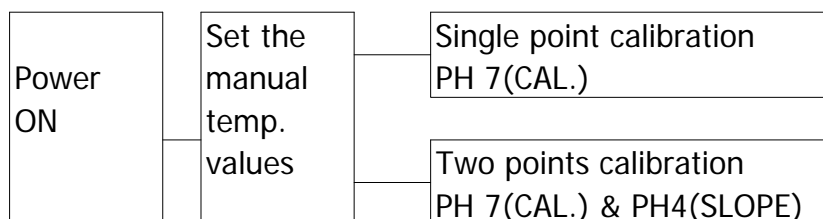
**6-5 Data Record( Max., Min., Average reading)**

- 1) The DATA RECORD function displays the maximum, minimum and average readings. To start the DATA RECORD function, press the " Record Button " (3-6, Fig. 1) once. " REC " symbol will appear on the LCD display.
- 2) With the " REC " marker on the display.
  - (a) Push the " CALL Button " (3-7, Fig. 1) once, then the " Max " symbol along the maximum value will appear on the LCD display.
  - (b) Push the " CALL Button " once, then the " Min " symbol along the minimum value will appear on the LCD display.
  - (c) Push the " CALL Button " once, then the " AVG " symbol along the average value will appear on the LCD display.
  - (d) To exit memory record function, push the " RECORD Button " once again. The display will revert back to current reading.

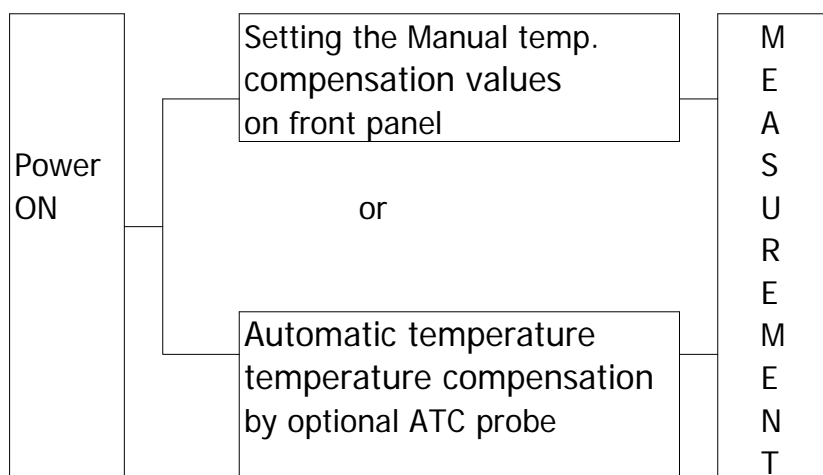
After stop the "Record" function, the symbol of " REC ", " Max ", " Min ", " AVG " will disappear.

***6-6 Following are the block diagrams for quick measuring procedures***

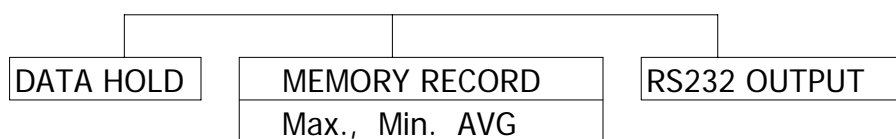
**Calibration**



**PH measuring procedures**



**Optional measuring procedures**



Power management

AUTO POWER OFF or MANUAL POWER OFF

(Not activated during  
Memory Record Selection)

## 7. CIRCUIT ADJUSTING PROCEDURES WHEN CHANGING THE TEMP. PROBE

- 1) The instrument can connect the optional Temperature Probe be used as a THERMOMETER & making the automatic temperature compensation for PH function.
- 2) When change a new TEMP. PROBE, it need to make following calibrating procedure:

**Plug in the optional Temperature Probe (TP-07) into the " Temp. Input Socket " (3-17, Fig.1). Slide the " Function Switch " (3-11, Fig. 1) to the " PH EXT. TEMP. " position, place probe in water with a mercury thermometer, adjust to the correct temperature with the " VR 6 " ( The VR6 is installed into the battery compartment, Fig. 2)**

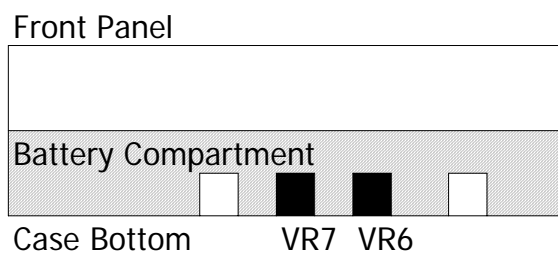


Fig. 2

Remark : VR 6 is for temperature gain adjustment VR.

VR 7 is for temperature zero adjustment VR.

## 8. MEASURING CONSIDERATION

- 1) The meter is built the " Auto power shut off " to save battery life. If not any function button be pushed within approx. 10 minutes, then the power will be off automatically.

***If the user is not intend to execute the " Auto Power off " function, then should take the following procedures :***

**During the measurement, push the " Record Button " (3-6, Fig. 1) to execute the memory record function.**

- (2) It may necessary to change the display contrast by adjust "LCD Contrast adjust VR"(3-5, Fig.1) due to user alter the view angle or battery power voltage drift.

## 9. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3-16, Fig. 1).

*The connector output is a 16 digit data stream which can be utilized to the user's specific application.*

*An RS232 lead with the following connection will be required to link the instrument with the PC serial input.*

Meter (3.5 mm jack plug)	PC (9W 'D" Connector)
Center Pin.....	Pin 2
Ground/shield.....	Pin 5

**The 16 digit 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 indicate the following status :**

D0	End Word		
D1 to D4	Upper Display reading, D1=LSD, D4=MSD		
D5 to D8	Lower Display reading, D5=LSD, D8=MSD		
D9	Decimal Point(DP) for Upper display. 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D10	Decimal Point (DP) for lower display 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D11 & D12	Anunuciator for Upper Display		
	00 =No Symbol	07 = mg/L	14 =mS
	01 =C	08 = m/s	15 =Lux
	02 =F	09 = Knots	16 =Ft-cd
	03 = %	10 = Km/h	17 =dB
	04 = % RH	11 = Ft/min	18 =mV
	05 = % PH	12 = mile/h	
	06 = % O <sub>2</sub>	13 = uS	
D13	Anunuciator for Lower Display		
	0 = No Symbol	1 =C	2 = F
D14	Reading Polarity for the Display		
	0 = Both upper & lower display value are "+".		
	1 = Upper "-", Lower "+".		
	2 = Upper "+", Lower "-".		
	3 = Both upper & lower display value are "-".		
D15	Start Word		

## 10. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show " LBT ", 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) Slide the " Battery Cover " (3-14, Fig. 1) away from the instrument and remove the battery.
- 3) Replace with 9V battery (heavy duty type) and reinstate the cover.
- 4) Make sure the battery cover is secured after change the battery.

## 11. OPTIONAL ACCESSORIES

CARRYING CASE CA-06	Hard carrying case
CARRYING CASE CA-05A	Soft carrying case with sash.
PH ELECTRODE PE-03	General purpose, laboratory & field usage. 12 mm dia. x 120 m. Epoxy body, 1 - 13 pH.
PH ELECTRODE PE-11	General purpose, laboratory & field usage. 9.5 mm dia. x 120 m. Epoxy body, 1 - 13 pH. (0 - 14 pH typical)
BUFFER SOLUTION PH-07	PH 7.00 standard buffer solution.
BUFFER SOLUTION PH-04	PH 4.00 standard buffer solution.
ATC TEMP. PROBE TP-07	ATC ( automatical temperature control ) temperature probe.