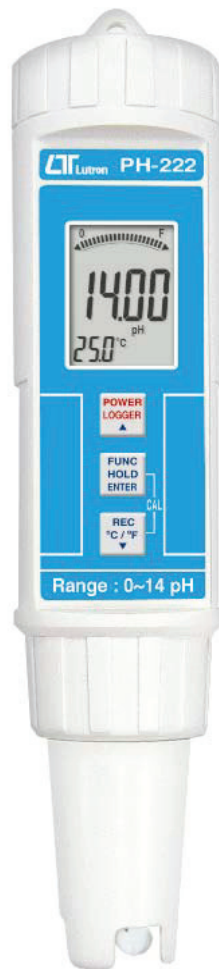


Pen type, with electrode, ATC

PH METER

Model : PH-222



Your purchase of this 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 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

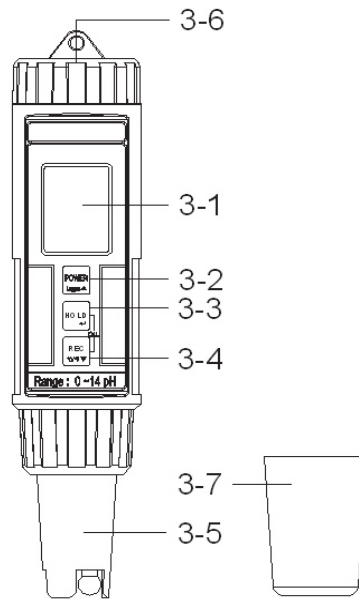
- * Pen type digital pH meter, all in one, pH electrode is included, easy for general purpose application.
- * Build in temperature sensor, ATC (auto temperature compensation).
- * pH 4, pH 7 standard solution are standard accessories.
- * Easy to change the pH electrode.
- * Temperature measurement, °C, °F.
- * IP67, water proof and protection.
- * Auto calibration for pH 4, pH 7 or pH 10 or other value.
- * High input impedance.
- * LCD with two displays and bar graph indicator.
- * Data hold function for freezing the desired value.
- * Auto power off.
- * Records max. and min. value with recall.
- * 100 point data logger with recall.
- * Microcomputer circuit, intelligent function, high accuracy.
- * Compact size, light weight.
- * Power supply by DC 1.5 V battery (UM4/AAA) x 4 PCs,
- * Available for wide applications, such as aquarium, beverage, fish hatcheries, food processing, photography, laboratory, quality control, school & colleges, swimming pools, water conditions.

2. SPECIFICATIONS

Display	LCD, size : 20 mm x 28 mm. <i>* With bar graph indicator.</i>	
Measurement Range	pH	0 to 14 pH.
	Temp.	-5 to 80 °C (23 to 176 °F).
Resolution	pH	0.01 pH.
	Temp.	0.1 °C/ 0.1 °F.
Accuracy	pH	± 0.02 pH <i>* After calibration.</i>
	Temp.	± 0.8 °C/ ± 1.5 °F.
pH Input Imped:	10 ¹² ohms.	
pH Electrode	Included. <i>* PE-12</i>	
pH Temp. Compensation	ATC (Automatic temperature compensation), built thermister Temp. sensor.	
Data Hold	Freeze the display reading.	
Memory Recall	Maximum & Minimum value.	
Sampling Time	Approx. 0.8 second.	
pH Calibration	pH 7, pH 4 or pH 10, 3 points calibration ensure the best linearity and accuracy. <i>* Other calibration point that near the pH 7, pH 4, and pH 10 are available.</i>	

Data Logger	Max. can save 100 point data with recall. Manual, push the data logger button once will save data one time.
Circuit	Custom one-chip of microprocessor LSI circuit.
Operating Temperature	Meter : 0 to 60 °C (32 to 140 °F).
	pH electrode : -5 to 80 °C (23 to 176 °F).
Operating Humidity	Less than 80% RH.
Power Supply	DC 1.5V battery (UM-4/AAA) x 4 PCs.
Power Consumption	Approx. 4.8 mA.
Dimension	186 x 40 x 32 mm (7.3 x 1.6 x 1.3 inch). <i>* Meter with pH electrode.</i>
Weight	131 g/0.36 LB (included electrode).
Power off	Auto power shut off to save battery life.
Standard Accessories	Instruction Manual..... 1 PC pH electrode, PE-12..... 1 PC pH 7.00 buffer solution, PH-07A..... 1 PC pH 4.00 buffer solution, PH-04A..... 1 PC * PE-12, PH-07A, PH-04A are the consumer accessory.
Optional Accessories	pH ELECTRODE, Model : PE-12 pH 7.00 buffer solution, Model : PH-07A pH 4.00 buffer solution, Model : PH-04A Hard carrying case, Model : CA-06 Soft carrying case, Model : CA-05A <i>* refer page 16</i>

3. FRONT PANEL DESCRIPTION



- 3-1 Display
- 3-2 Power (Logger, ▲) Button
- 3-3 Hold (Enter, CAL) button
- 3-4 REC (°C/°F button, ▼) Button
- 3-5 pH electrode +Temp. sensor, PE-12
- 3-6 Battery compartment/Cover
- 3-7 Protection cover
- 3-8 pH 7.00 buffer solution, PH-07A
- 3-9 pH 4.00 buffer solution, PH-04A

4. pH CALIBRATING PROCEDURE

4-1 Calibrating Consideration

The pH meter already calibrated by mV signal that simulated from the ideal pH ELECTRODE mV output (base on 25 °C environment). However due to (a) An ideal electrode will produce 0 mV at pH 7.00, but most electrodes are slightly off. (b) The measuring environment temperature may not near 25 °C (15 to 35 °C).

If intend to keep instrument combined electrode within high accuracy, it is necessary to make the following calibration procedures (4-3).

* *Basic calibration (single point calibration) :
pH 7 calibration.*

* *Complete calibration (two points calibration) :
pH 7 calibration and pH 4 calibration.*

* *During execute the calibration procedures,
if the Display show " Error " information, then please
do the " Calibration clear " procedures, refer page 8.*

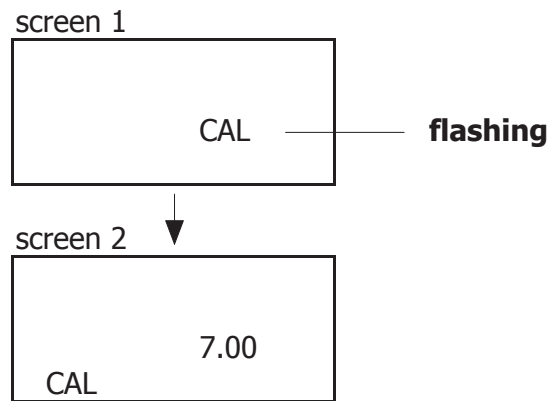
4-2 Requiring Equipment for Calibration

- 1) Combination pH electrode (PE-12, included).
- 2) Buffer solutions :
 - pH 7.00 buffer solution (PH-07A, included).
 - pH 4.00 buffer solution (PH-04A, included).

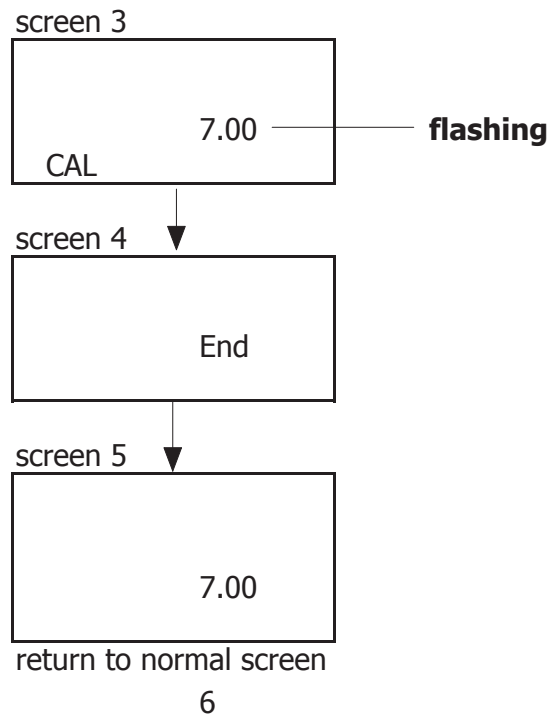
4-3 Calibration procedures

pH 7 calibration

- 1) Rinse the electrode in distilled water.
- 2) Power on the instrument by pressing the " Power button " (3-2, Fig. 1).
- 3) Press the " Hold button " (3-3, Fig. 1) once. the display will show the " HOLD " symbol. Press the " ▼ button " (3-4, Fig. 1) once, the display will show following screen in sequence.

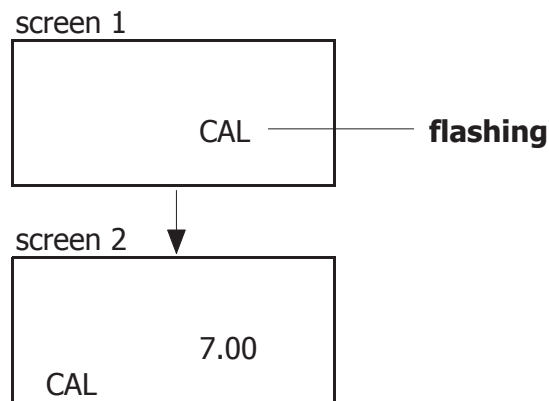


4) Place the electrode into pH 7.00 buffer solution (PH-07A)
 Press the " Hold button " (3-3, Fig. 1) once.
 The " 7.00 " will flashing, following show " End ".
 then return the normal measurement screen and
 finish the pH 7.00 calibration procedures.

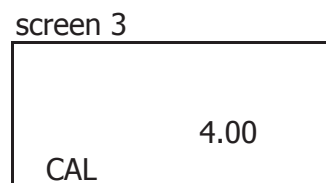


pH 4 calibration

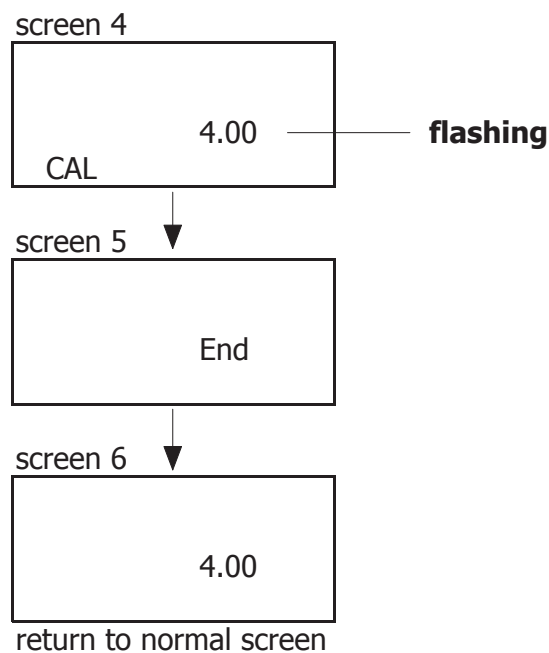
- 1) Rinse the electrode in distilled water.
- 2) Power on the instrument by pressing the " Power button " (3-2, Fig. 1).
- 3) Press the " Hold button " (3-3, Fig. 1) once. the display will show the " HOLD " symbol. Press the " ▼ button " (3-4, Fig. 1) once, the display will show following screen in sequence.



- 4) Press the " ▼ button " (3-4, Fig. 1) once, the display will show :



- 5) Place the electrode into pH 4.00 buffer solution (PH-04A)
Press the " Hold button " (3-3, Fig. 1) once.
The " 4.00 " will flashing, following show " End ".
then return the normal measurement screen and
finish the pH 4.00 calibration procedures.



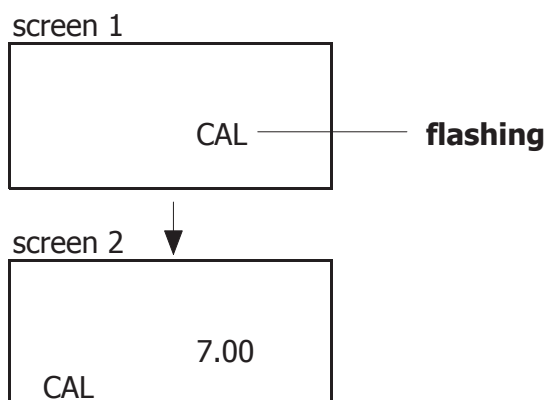
Calibration clear

During execute the calibration procedures, if happen some thing wrong (Display show Error information), then execute the following " Calibration clear " procedures will clear all the existing calibration data and return to the Default value.

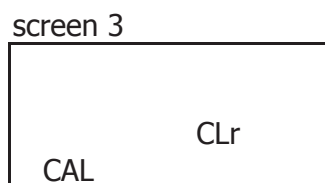
However after execute the " Calibration clear ". then make the calibration again. if the Display still show the " Err " (error information), then the " Standard solution " or the pH electrode " may existing problem.

The calibration procedures are :

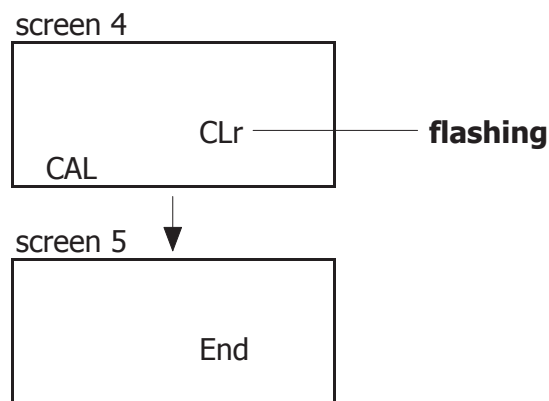
- 1) Power on the instrument by pressing the " Power button " (3-2, Fig. 1).
- 2) Press the " Hold button " (3-3, Fig. 1) once. the display will show the " HOLD " symbol. Press the " ▼ button " (3-4, Fig. 1) once, the display will show following screen in sequence.



- 3) **Press the " ▼ button " (3-4, Fig. 1) once 3 times, the display will show :**



- 5) Press the " Hold button " (3-3, Fig. 1) once.
The " CLr " will flashing, following show " End ".
then return the normal measurement screen and
finish the " Calibration clear " procedures.



5. MEASURING PROCEDURE

5-1 pH measurement

After the pH electrode is calibrated
(section 4-3) , the unit is ready for measuring.

- 1) Power on the meter by pressing the " Power button "
(3-2, Fig. 1).
- 2) Place the electrode into the measured solution, little
shake the electrode and wait a few seconds to let the
ATC (automatic temperature compensation) sensor
to stabilize with the temperature of the solution..
The LCD will show pH value (up main display) and
the temperature value (lower display) at the same
time.

3) After make the measurement, please rinse the electrode in distilled water.

*** After the measurement, the " pH electrode " (3-5, Fig. 1) should insert into the " Protection bottle " (3-7, Fig. 1).**

*** PE-12, PH-07A, PH-04A is the consumer accessory.**

5-2 Data Hold

* During the measurement, press the " Hold Button " (3-3, Fig. 1) momentarily to hold the measured value. The LCD will show a " HOLD " symbol.

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

5-3 Data Record (Max., Min. reading)

1) The data record function records the maximum and minimum readings. Press the " REC Button " (3-4, Fig. 1) momentarily to start the Data Record function, shows " REC " on the display.

2) With the " REC " symbol on the display.

a) Press the " REC Button " (3-4, Fig. 1) momentarily, the " REC MAX " symbol along with the maximum value will appear on the display.

b) Press the " REC Button " (3-4, Fig. 1) momentarily again, the " REC MIN " symbol along with the minimum value will appear on the display.

When display shows " REC MAX " or " REC MIN ",

** press the " Hold Button " (3-3, Fig. 1) momentarily will delete the max. (min.) value, the display will show the " REC. " only and execute the memory function continuously.*

c) To exit the memory record function, press the " REC " button for 2 seconds at least. The display will revert to the current reading, not show " REC "

5-4 Change Temp. unit °C, °F

Press the " °C/°F button " (3-4, Fig. 1) continuously at least two seconds, then release the button will change the Temp. unit from °C to °F or °F to °C .

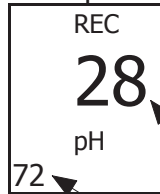
6. DATA LOGGER

The meter can save max. 100 point data into the the memory circuit

6-1 Save data

- 1) Turn on the meter.
- 2) Press the " REC Button " (3-4, Fig. 1) momentarily, shows " REC " on the display.
- 3) Press the " Logger Button " (3-2, Fig. 1) momentarily will save one measuring value to memory, display will show :

Example :



a. The memory position that save the recent data.

b. The memory left space no.

$$c. a + b = 100$$

$$\text{For example : } 28 + 72 = 100$$

- 4) To exit the memory data logger (record) function, press the " REC " button for 2 seconds at least. The display will revert to the current reading, not show " REC "

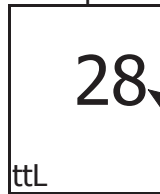
6-2 Call data

1) Turn on the meter.

Press the " Hold Button " (3-3, Fig. 1) momentarily, LCD shows " HOLD ".

Following, press the " REC Button " (3-4, Fig. 1) continuously until display shows following , then release the button.

Example :



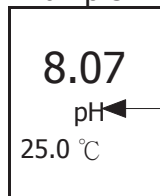
The total data point that are saved into the memory.

2) Uses " ▲ Button " (3-2, Fig. 1) or " ▼ Button " (3-4, Fig. 1) to call the data that already saved into the memory.

During call the data, the " pH " unit will be flashed.

*

Example :

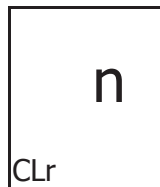


flashing

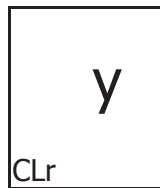
Press " Hold Button " (3-3. Fig. 1) will exit the
* data call function.

6-3 Delete data (Empty the memory)

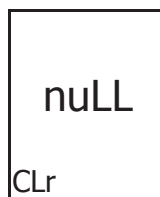
- 1) Turn off the meter first.
- 2) Press the " REC Button " (3-4, Fig. 1) continuously and not release, at the same time press the " Power Button " (3-2, Fig. 1) momentarily, the display will show following screen, then release both fingers from the buttons.



- 3) Press " ▼ Button " momentarily, display shows :




- 4) Press " ←| Button " (3-3. Fig. 1) momentarily, the display shows :



Now all the saved data is deleted, memory will empty.

7. REPLACEMENT OF BATTERY

- 1) When the 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 instruments instrument become inaccurate.
- 2) To replace the battery, rotate and remove the " Battery Cover " (3-6, Fig. 1), take out the old batteries, install new batteries :
DC 1.5V battery (UM-4/AAA) x 4 PCs.
- 3) When install the batteries, should make attention the battery polarity.
- 4) After install the batteries, reinstall the battery cover again.

8. REPLACEMENT OF pH ELECTRODE

- 1) Take away the pH electrode and change the new unit, refer the Fig. 2 .
- 2) The pH electrode, PE-12 is the standard accessory of the meter. However the PE-12 is also the consumer parts, its life is depend the working period and the maintenance.
- 3) Rinse the electrode in distilled water after the usage.
- 4) " pH Electrode sensing head " should insert into the " Protection bottle " if the meter is not used.

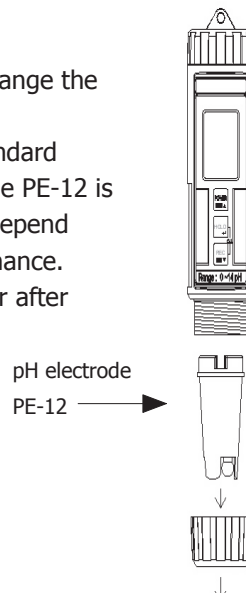


Fig. 2

9. OPTIONAL ACCESSORIES

pH ELECTRODE

Model : PE-12

General purpose & high quality pH electrode with BNC connector.

Range : 1 to 13 pH (typical 0 to 14 pH).

pH 7.00 buffer solution

Model : PH-07A

pH 4.00 buffer solution

Model : PH-04A

CARRYING CASE Model : CA-06

Hard carrying case.
(280 x195 x 65 mm).

CARRYING CASE Model : CA-05A

Vinyl soft case.
(260 x110 x 55 mm).