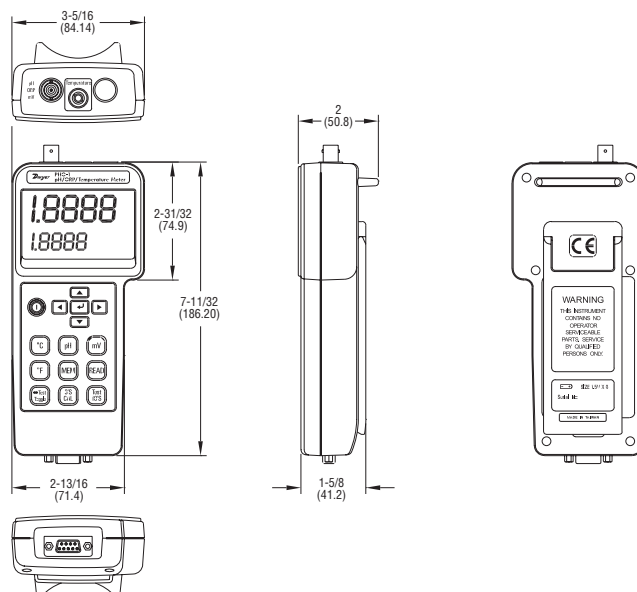




# Model PHO-1 pH/ORP/Temperature Meter

## Specifications - Installation and Operating Instructions



The microprocessor based pH/ORP/Temperature Meter offers quick response and high accuracy. Simultaneously measure and display pH from 0 to 14 pH (0 to 1999 mV) and temperatures up to 200°F (100°C). Model PHO-1 meter features manual or automatic temperature compensation, auto buffer recognition, and data logging capabilities. The recording interval can be defined by the user. The meter accepts any pH electrode with a BNC connector. For additional convenience, select model PHO-1K kit, which contains a meter, RS-232 cable, batteries, software, pH electrode, temperature probe, gender changer, carrying case and manual.

### SPECIFICATIONS

**Input:** pH electrode with BNC connector, temperature probe.

**Range:** pH: 0.00 to 14.00 pH; mV: 0 to 1999 mV.

**Temperature:** 32 to 200°F (0 to 100°C).

**Operating Temperature:** 32 to 122°F (0 to 50°C).

**Compensated Temperature Limit:** Manual (MTC): 32 to 200°F (0 to 100°C); Automatic (ATC): 32 to 200°F (0 to 100°C).

**Operating Humidity:** Max. 80% RH.

**Sampling Rate:** About 1.5 time/sec.

**Battery Life:** Approximately 120 hours.

**Power Supply:** Six "AA" batteries.

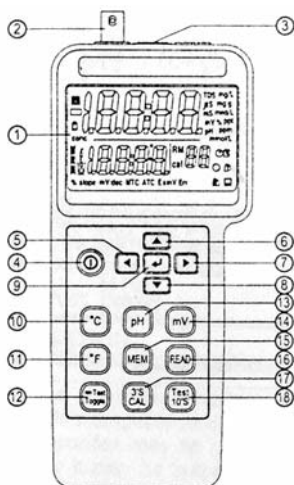
**Power Current:** Approximately 20 mA DC.

**Data Output:** RS-232 PC serial interface.

**Dimension:** 7.4" x 2.9" x 2" (187 mm x 73 mm x 53 mm).

**Weight:** 1 lb (.45 kg) meter only.

Measurement	Range	Resolution	Accuracy
pH	0 to 14 pH	0.001 pH	±0.01 pH
mV	0 to 600 mV 601 mV to 1999 mV	0.1 mV	±(0.05% + 1 digit) ±0.1%
Temp (°C)	0 to 100°C	0.1°C	±0.5°C
Temp (°F)	32 to 200°F	0.1°F	±0.9°F



**FRONT PANEL DESCRIPTION**

1. LCD Display
2. Input Socket: BNC connector for pH and mV
3. Input Socket: Earphone jack for temperature probe
4. POWER Button
5. Button for moving to the desired parameters (LEFT Arrow Key)
6. Button for increasing the value of parameters (UP Arrow Key)
7. Button for moving to the desired parameters (RIGHT Arrow Key)
8. Button for decreasing the value of parameters (DOWN Arrow Key)
9. Button for entering/escaping the mode of parameter settings (ENTER Button)
10. Button for selecting temperature unit in °C (°C Temperature Button)
11. Button for selecting temperature unit in °F (°F Temperature Button)
12. TOGGLE Button
13. pH Button
14. mV Button
15. MEMORY Button
16. READ Button
17. CALIBRATION Button
18. TEST Button

**pH TEMPERATURE COMPENSATION**

pH Temperature Compensation ensures proper pH values by correcting temperature variances. Compensation is accomplished manually by making adjustments in the compensation mode or automatically by using the temperature sensing probe in tandem with the pH electrode.

**Temperature Compensation Mode:**

1. Automatic temperature compensation (ATC): Plug the temperature probe into the top jack marked temperature. ATC will appear at bottom of the display. Immerse probe in test solution.
2. Manual temperature compensation (MTC): Manually enter the temperature of the test solution between 0 and 100°C. (An ATC probe will override manual compensation.) The preset temperature of pH Meter is 25°C. (See setup procedure to set MTC).

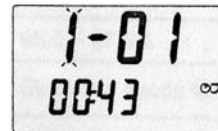
**SETUP PROCEDURE**

Please follow the steps to set up the parameters for calendar year, month, day and time (hour:minute), manual temperature compensation (MTC), and recording time interval.

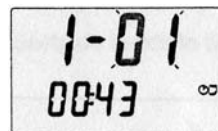
1. Press ENTER for 2 seconds until a second beep is heard. This signals that you are entering the setup mode.
2. To change the year press the UP or DOWN arrow keys.



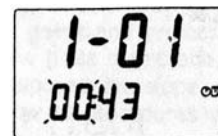
3. Press the RIGHT arrow key to set up for next parameter.
4. To change the month press the UP or DOWN arrow keys.



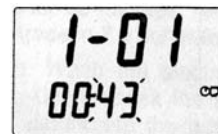
5. Press the RIGHT arrow key to set up for next parameter.
6. To change the date, press the UP or DOWN arrow keys.



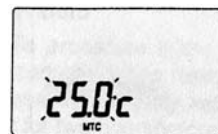
7. Press the RIGHT arrow key to set up for next parameter.
8. To change the hour press the UP or DOWN arrow keys.



9. Press the RIGHT arrow key to set up for next parameter.
10. To change the minute press the UP or DOWN arrow keys.

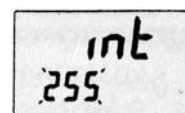


11. Press the RIGHT arrow key to set up for the next parameter.
12. To change manual temperature compensation (MTC), press the UP or DOWN arrow keys.



13. Press the RIGHT arrow key to set up for the next parameter.

14. To change the interval time, press the UP or DOWN arrow keys. This is the time between measurements in the continuously recording mode.



15. To finish the settings and return to measuring mode, press ENTER.

## CALIBRATION

### pH Calibration Procedure

To ensure accuracy, calibration procedure should be done at the initial setup of the instrument and periodically through the life of the sensor. If the accuracy is outside the limits of the instrument, the display will show "Err".

1. Connect the pH electrode to the BNC socket and place the electrode into the buffer solution (pH 7.00).



2. If using ATC, connect the temperature probe to the temperature jack and place probe into buffer solutions otherwise the unit will default to MTC.
3. Wait for the reading to become stable.
4. Press and hold CALIBRATION button for 3 seconds to enter the calibration mode.



5. Press pH button (The preset value is pH 7.000 or user can press the UP or DOWN arrow keys to select the desired pH value).



6. Press ENTER button to offset calibration.



7. Rinse electrode and blot with lint-free tissue.



8. For second buffer solution (pH 4.010), repeat steps 2 to 7.

### Temperature Calibration Procedure

1. Connect the temperature probe into the earphone jack.  
Place the temperature probe into a 0°C ice solution.
2. Press and hold the CALIBRATION button for 3 seconds.
3. Press the °C button.
4. Press ENTER button to complete calibration.

## MEASURING PROCEDURE

### pH Measurement

Calibrate the instruments and pH electrode before measuring.

1. Connect the pH electrode to the BNC socket.
2. Power on the instrument by pushing the power on/off button.
3. Place the electrode into the solution to measure pH value.
4. After each measurement, rinse electrode with distilled water.

### mV Measurement

This instrument has a built-in mV measuring function which is capable to take ORP or other precise mV measurements. To switch to mV measurement, press and hold mV key for one second.

### Temperature Measurement

1. Plug the temperature probe into the temperature jack (MTC will change to ATC).
2. Place probe into the solution.

### Data Hold

To freeze a reading during measurement, press the TEST TOGGLE button. An **A** will be displayed on the LCD to indicate that the instrument is in hold mode. To return to measuring status, press the TEST TOGGLE button and the **A** indicator will be removed, indicating the instrument is in measuring mode.

### Recording Data

The meter can perform single point data recording or continuous recording.

Individual Recording: Press the MEMORY button to record a single data point (M1-M99).

Continuous Recording: Press and hold the memory button for two seconds. Display will show "M" followed by the set number. "M" will blink each time a data point is recorded.

Recalling Memory: To view individual points press READ button, the LCD will show the last record. Press UP and DOWN button to view the data that has been recorded. R1 to R99 indicates the order of readings you measured.





To view the continuous recorded data requires use of the enclosed software.

To clear memory, turn off instrument. Press and hold the MEMORY button. Press POWER button. "CLt" will be displayed on LCD to verify memory cleared.

## ELECTRODE PRECAUTIONS AND LIMITATIONS

1. Do not allow the electrode to dry.
2. Do not wipe the electrode tip. Blot it with a lint-free tissue.
3. Do not leave the electrode in organic solvents, strong basic solutions, concentrated fluoride solutions or hydrofluoric acid for extended periods of time. If measurements are made in these solutions, readings should be taken quickly and the electrode should be rinsed immediately with deionized water. After rinsing the electrode, soak it in 7.0 buffer for two hours before using it again.
4. Do not use the electrodes in solutions that exceed a temperature range of 0 to 100°C.
5. pH only.

## ELECTRODE CONDITION CHART

	98.0 - 102.0% Electrode is in good condition.
	95.0 - 97.9% Electrode needs to be cleaned.
	92.0 - 94.9% Electrode needs to be cleaned.
	Electrode needs to be renewed.

## MAINTENANCE

Proper use and protection of the electrode will prolong the life of the glass membrane. If your pH electrode is exhibiting slow response, low slope values, continuous drift, or erratic readings, follow the procedure listed below.

### Cleaning the pH Bulb


1. Protein contamination: Soak the electrode bulb/tip in a 10% solution of pepsin for 30 minutes. Rinse with deionized water and soak the electrode in 7.0 buffer for two hours before using.
2. Oil contamination: Wash the electrode with a 50% water-acetone solution. Do not soak the electrode in the acetone solution or it will deteriorate the bottom seals of the plastic electrode. Rinse with deionized water and soak the electrode in 7.0 buffer for two hours before using.

### Recondition of the pH Bulb

Only use this procedure if the preceding maintenance and cleaning procedures fail to restore acceptable electrode performance. Rinse electrodes immediately with deionized water and soak in 7.0 buffer for two hours before using.

CAUTION: To prevent permanent damage, care should be taken to prevent liquid from entering the pH meter. Also, if instrument will not be in service for an extended period of time, please remove batteries.

## BATTERY REPLACEMENT

1. When the LCD shows, “”, it indicates that the normal battery output is less than 6.8 V and is time to replace the battery.
2. Remove the battery cover.
3. Replace batteries with new batteries and replace back cover.
4. Ensure the 6 AA battery cover is secured.

## WARRANTY

Calibration prior to use is recommended. The internals of Model PHO-1 are not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping. Calibration prior to use is recommended.