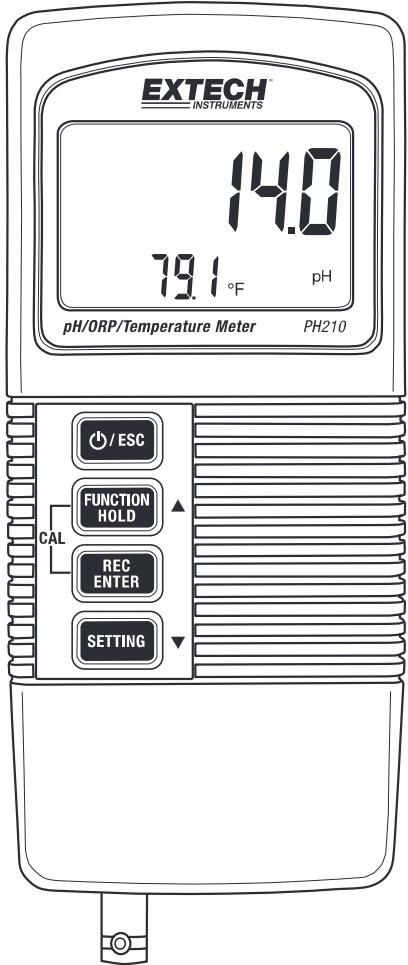


# Model PH210

## pH / ORP / Temperature Meter



## Introduction

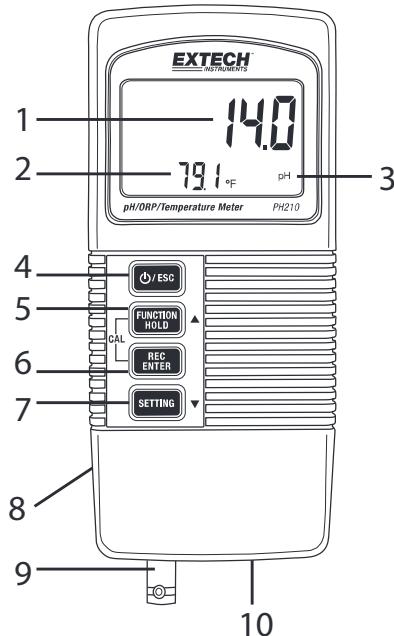
Thank you for selecting the Extech PH210 pH/ORP/Temperature meter. This microprocessor-based device with tactile push-buttons is battery operated and ideal for field use. The PH210 simultaneously displays pH or mV (ORP) and solution temperature measurements. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

## Features

- *LCD display shows pH or mV (ORP) and solution temperature simultaneously*
- *pH measurement range 0 to 14.00pH*
- *mV (ORP) measurement range  $\pm 1999mV$*
- *BNC input socket accommodates most pH or ORP electrodes*
- *Detachable probe for ease of use in a variety of measurement environments*
- *Automatic (via optional temperature probe) or Manual temperature compensation*
- *High impedance pH measurements*
- *User pH calibration ability*
- *DATA HOLD for freezing displayed reading*
- *Records MIN MAX readings*
- *Selectable function (pH or mV), Temperature measurement units (C/F), Auto power off disable/enable, and Manual solution temperature compensation*

## Meter Description

1. Measurement reading
2. Solution temperature
3. Unit of measure (pH or mV)
4. Power/Escape button
5. Function/Hold/Up arrow button
6. Record (MIN/MAX)/Enter button
7. Setting/down arrow button
8. Battery compartment (rear of meter)
9. pH or mV Electrode BNC connector input
10. Optional ATC probe input jack



## Getting Started

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1. Calibrate the instrument often, as described in a later section. Note that only a pH calibration is required; mV (ORP) is calibrated as a by-product of the pH calibration.
2. Set the unit of measure for solution temperature ( $^{\circ}\text{C}$  or  $^{\circ}\text{F}$ ) as described in the Temperature Units Selection section of this guide.
3. Determine if Automatic or Manual temperature compensation will be employed. Refer to the Temperature Compensation section of this guide for details.
4. Follow the instructions and electrode cleaning/rinsing recommendations closely as slight deviations in test procedures can have a significant effect on test results.

## Calibration (pH)

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### Calibration Considerations

This pH meter was factory calibrated by mV signals simulating an ideal pH Electrode in a  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ) environment. An ideal electrode will produce 0.0mV at pH of 7.00 in ideal conditions.

Electrodes are imperfect however and the temperature at which tests are taken is not always ideal. To maintain a high level of accuracy, and to accommodate any given application, choose a calibration method from the selections below:

- Basic Calibration (single point calibration): pH 7.00
- Complete Calibration (two points): pH 7.00 then pH 4.00 or pH 7.00 then pH 10.00

The meter should be calibrated once per testing session. Calibration is performed using standard buffer solutions at room temperature  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ). Calibration should always be performed using the pH 7.00 buffer first, followed by a second calibration buffer if desired. Select the pH 4.00 buffer for the second calibration if typical measurements will be lower than pH 7.00 or use a pH 10.00 buffer for the second calibration if typical measurements will be greater than pH 7.00. If the display shows "ERR", clear the existing calibration data as discussed in the pH Calibration Procedure below, and perform the calibration again.

### pH Calibration Procedure

1. Place the electrode in a buffer solution. Power the meter ON and simultaneously press and release the REC and HOLD buttons; 'CAL' appears in the lower left corner of the display.
2. Use the up and down arrow buttons to scroll through the 4, 7, and 10 calibration points and the Clear function (CLr). Once the correct point is selected press the ENTER button. The reading will flash for several seconds and then END will appear. Calibrate to the other buffers in the same way.

*Note: If there is a deviation of more than 1 pH unit from the 4, 7, or 10 pH buffer, or if the electrode slope is low, the instrument will assume an error and abort the calibration (ERR will be displayed). In this case, clear the calibration data (see step 2 above) and perform the calibration again. If the problem persists, the electrode may require replacing.*

3. For multi-point calibration, use the arrow buttons to scroll through the calibration points as described in step 2. Always calibrate with a pH 7 buffer first, and then follow with pH 4 or pH 10. Rinse electrode and probe with distilled water between calibration buffers.
4. Press ESC at any time to abort the calibration and return to the normal operating mode.

## Measuring pH

**Important:** Electrodes and temperature probes should always be rinsed before and between samples with distilled water to remove all traces of storage solution, process media, or previous test solution.

1. Connect the pH electrode to the meter (BNC connection at bottom of meter).
2. Optionally connect the temperature probe (Extech model 850188 only) to the jack at the bottom of the meter. This temperature probe is used for automatic temperature compensation (ATC). Manual temperature compensation is possible as explained below.
3. Turn the meter on using the POWER/ESC button.
4. Press and hold the FUNCTION button to select pH units if necessary. The unit of measure appears on the LCD (pH).
5. To change the solution temperature units ( $^{\circ}\text{C}$  /  $^{\circ}\text{F}$ ) refer to the Temperature Units Selection section of this guide.
6. Rinse the pH electrode and temperature probe with distilled water.
7. Place the electrode and temperature probe (if ATC is to be used) in the solution. Allow 30 seconds for the electrode and ATC probe to reach thermal equilibrium with the buffer solution. Refer to the Temperature Compensation section for more information on Automatic and Manual Temperature Compensation.
8. After the measurement stabilizes, view the pH reading and temperature solution temperature on the display.
9. When the test is complete rinse the electrode and probe with distilled water.
10. Store electrodes and probes when not in use according to manufacturer's requirements.

## Measuring mV (ORP: Oxidation Reduction Potential)

**Important:** Electrodes and temperature probes should always be rinsed before and between samples with distilled water to remove all traces of storage solution, process media, or previous test solution.

1. Connect the ORP electrode to the meter (BNC connection at bottom of meter).
2. Optionally connect the temperature probe (Extech model 850188 only) to the jack at the bottom of the meter. This temperature probe is used for automatic temperature compensation (ATC) purposes. Manual compensation is possible as explained below.
3. Turn the meter on using the POWER/ESC button.
4. Press and hold the FUNCTION button to select mV units if necessary. The unit of measure appears on the LCD (mV or pH).
5. To change the solution temperature units ( $^{\circ}\text{C}$  /  $^{\circ}\text{F}$ ) refer to the Temperature Units Selection section of this guide.
6. Rinse the ORP electrode and ATC probe (if being used) with distilled or deionized water.
7. Place the electrode and ATC probe (if being used) in the solution. Allow 30 seconds for the ORP electrode and ATC probe to reach thermal equilibrium with the buffer solution. Refer to the Temperature Compensation section for more information on Automatic and Manual Temperature Compensation.
8. After the measurement stabilizes, view the ORP reading in mV on the main display.
9. When the test is complete rinse the electrode and probe with distilled water.
10. Store electrodes and probes when not in use according to manufacturer's requirements.

## **Automatic (ATC) and Manual Temperature Compensation**

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The PH210 automatically compensates (ATC) for solution temperature deviations when the Model 850188 temperature probe (inserted at bottom of meter) is placed in the measurement solution. The temperature of a solution is displayed on the meter's lower LCD line.

To manually compensate for solution temperature deviations a separate thermometer must be placed in the solution to monitor the solution's temperature; then proceed as follows:

1. Press and hold the SETTING button for 5 seconds. The display will show **noATC**.
2. Press ENTER and **noATC** will flash (indicating the automatic compensation is switched OFF and Manual Temperature Compensation is active). Note that when **noATC** is not flashing Automatic Temperature Compensation mode is active.
3. Use the up and down buttons to manually adjust the temperature value to match the solution temperature (as determined by the solution thermometer). Once the temperature is programmed, press ENTER to save the data and then press ESC to return to the normal operating mode.
4. If the solution temperature changes, the manual temperature compensation procedure must be repeated.

## **Temperature Units (C/F) Selection**

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To change the temperature units ( $^{\circ}\text{C}$  /  $^{\circ}\text{F}$ ):

1. Power on the device
2. Press and hold the Setting button for 5 seconds, until the Setting mode is accessed
3. Press the Setting button again; either an **F** or a **C** will be displayed
4. Use the up arrow button to select the desired unit of measure for temperature solution
5. Press ENTER to save the setting
6. Press ESC to return to the normal mode of operation

## **Automatic Power OFF Enable/Disable**

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To conserve battery power, the instrument automatically shuts off after approximately 10 minutes of inactivity. To disable or enable this feature, follow the steps below:

1. Power on the device
2. Press and hold the SETTING button for 5 seconds until the Setting mode is accessed
3. Use the SETTING button to step to the screen that shows either **OFF YES** or **OFF NO**
4. Use the up arrow button to select YES (Auto Power OFF active) or NO (Auto Power OFF not active)
5. Press the ENTER key to save the setting and to return to the normal operating mode

## ***MIN/MAX Data Recording (REC) mode***

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This instrument has the ability record the highest (MAX) and the lowest (MIN) readings recorded. Readings are retained even after the instrument is switched OFF.

1. Momentarily press the REC button (REC will be displayed at the upper right).
2. Press REC again. REC/MAX will be displayed along with the maximum reading.
3. Press REC again to display the MIN reading. REC/MIN will display along with the minimum reading.
4. To delete either the MAX or the MIN reading, press the HOLD button while either the REC/MAX or the REC/MIN icons are displayed.
5. Press and hold REC for 2 seconds to exit and to return to the normal operating mode. The REC and MAX/MIN icons will switch OFF.

## ***Specifications***

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Measurements/Parameters	Range (Resolution)	Accuracy
Solution Temperature measurement	0 to 100°C (32 to 212°F)	0.8°C (±1.5°F)
pH measurement	0.00 to 14.00pH (0.01pH)	± 0.04pH
mV (ORP) measurement	± 1999mV	±0.5mV
Note: Accuracy does not include pH buffer temperature coefficient		
Automatic Temperature Compensation (ATC) range	0 to 65°C (32 to 149°F)	
Manual Temperature Compensation Adjustment range	0 to 100°C (32 to 212°F)	
Power	9 volt alkaline battery	
Display	LCD display for simultaneous pH or mV and temperature readings plus programming menu parameters and icons	
Operating Temperature and Relative Humidity	0 to 50°C (32 to 122°F); <80% RH	
pH Calibration points	4.00, 7.00, 10.00 (1, 2, or 3 point calibration can be performed)	
Auto Power OFF	10 minutes from last key-press (can be disabled)	
Low Battery Indication	Battery display icon will flash when battery requires replacing	
Dimensions / Weight	135 x 60 x 33mm (5.3 x 2.4 x 1.3"); 200g (7.1 oz.)	

## **Battery Replacement**

The 9V battery that powers the instrument requires replacing when the battery icon flashes on the display. To replace the battery follow the steps below:

1. Disconnect the electrode/probe from the instrument.
2. Open the rear battery compartment using a screwdriver to remove the two Phillips head screws that secure the compartment.
3. Carefully remove the old battery from the compartment lid chamber and gently unsnap the battery's terminals from the wired (red/black) connectors.
4. Install a new 9V battery by snapping the battery terminals onto the wired connectors (observing correct polarity) and inserting the battery into the compartment lid chamber.
5. Install the compartment lid chamber into the meter housing and secure with the two screws.



Never dispose of used batteries or rechargeable batteries in household waste. As consumers, users are legally required to take used batteries to appropriate collection sites, the retail store where the batteries were purchased, or wherever batteries are sold.

**Disposal:** Do not dispose of this instrument in household waste. The user is obligated to take end-of-life devices to a designated collection point for the disposal of electrical and electronic equipment.

## **Electrode Maintenance and Troubleshooting**

Most measurement difficulties are caused by the electrode. Careful handling and proper storage of the electrode will increase measurement accuracy and electrode life.

Electrodes should be rinsed often to remove all traces of storage solution, process medium, or previous test solution.

### **Electrode Storage**

The electrode should be stored in a soaker bottle or wetting cap filled with pH4 buffer. Never store an electrode in distilled or deionized water as this will cause migration of the fill solution from the electrode.

### **Electrode Cleaning**

The type of electrode coating that occurs over time will determine the cleaning method. Soft coatings can be removed by vigorous stirring or by using a squirt bottle. Organic chemical coating (hard coatings) should be chemically removed. Only in extreme cases should the bulb be cleaned mechanically.

## Troubleshooting an Electrode

Symptom	Cause	Recommendation
Long response time or reading drift	Clogged Junction	Soak in 4.07 M Potassium Chloride (KCl) @ 60°C for 30 minutes.
	Strong Alkaline measurement	Soak in 0.1 M HCL overnight.
	Deteriorated Gel layer	Replace electrode.
	Protein coating on electrode surface	Soak in 1 gm Pepsin dissolved in 100ml of 0.1 m HCL for 30 minutes or as needed.
	Oil, paint, dyes, suspended solids etc. are on sensor	Rinse electrode alternately with a materials solvent and a buffer 7.00.
	Organic solvents are coating the sensor	Organic mole fraction has to be less than 50% to assure reasonable readings. Limit time of measurement. Keep probe in the 7.0 buffer between readings.
	Dehydrated membrane	Read solution for dry bulb below:
Dry Bulb	Long term storage without wetting	Soak electrode tip in wetting cap filled with 1ml 7.00 buffer for 24 to 48 hours
Static Charge	Wiping electrodes	Rinse electrode in 7.0 buffer and blot. Do no wipe electrode.
Same readings in different buffers and samples	Cracked or broken bulb	Replace electrode. Use bulb guard. Avoid plunging electrode to bottom of container and spinning bars. Wetting cap will protect bulb between tests.
Erratic LCD display	Samples have low ionic strength (lacks salt); e.g. distilled, de-ionized, boiled, lake water (high pressure)	For each 50 ml of sample add 1 drop (50uL) of SAT. KCl (No alteration in pH will occur using inert KCl).

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