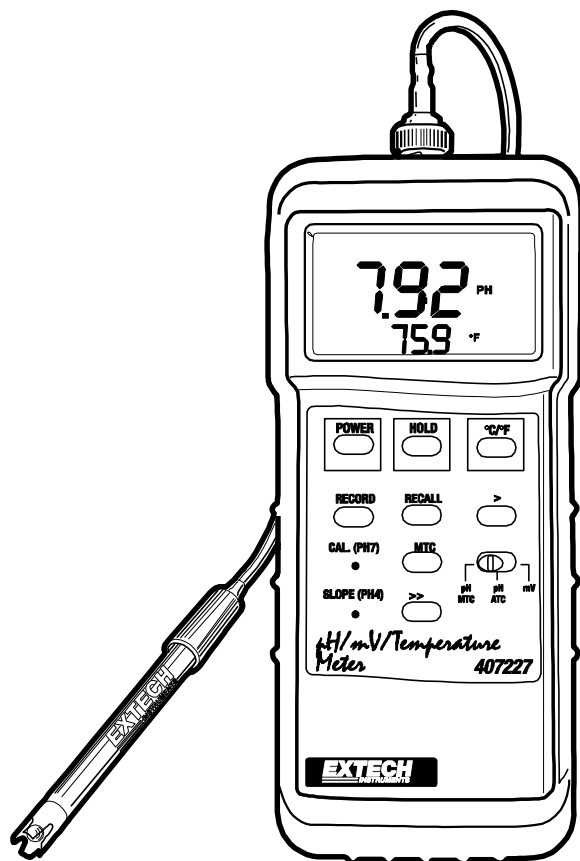


**Heavy Duty pH and ORP Meter****Model 407227 and Model 407728 Kit**

Additional User Manual Translations available at [www.extech.com](http://www.extech.com)

## ***Introduction***

---

Thank you for selecting the Extech Model 407227 pH, mV, and Temperature Meter. This device measures pH, mV (ORP), and Temperature. The temperature units (C/F) are selectable and the calibration and Slope adjustments are conveniently located on the front panel.

The 407228 is a kit that includes the 407227 meter and a pH electrode, temperature probe, protective holster with stand, and carrying case.

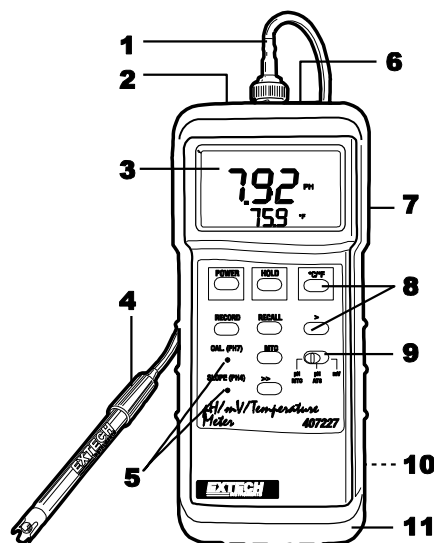
An option ORP electrode (67500B) is available.

This device is shipped fully tested and calibrated and, with proper use, will provide years of reliable service. Please visit our website ([www.extech.com](http://www.extech.com)) to check for the latest version of this User Guide. The Extech Instruments brand, a wholly owned subsidiary of FLIR Systems, Inc., is ISO-9001 certified.

## Meter Description

---

1. BNC connector for pH or ORP (Optional) probe
2. RS-232 PC Interface jack
3. LCD display
4. pH Electrode
5. Calibration and Slope adjustment potentiometers
6. Temperature probe jack
7. LCD Contrast adjustment
8. Keypad (see below)
  - POWER Press to turn the meter ON or OFF
  - HOLD Press to freeze the displayed reading
  - C/F Press to select the desired unit of measure for temperature
  - RECORD Press to track the MAX, MIN, and AVG readings
  - RECALL Press to view the MAX, MIN, and AVG readings
  - MTC This button is used during a Manual Temperature Compensation procedure. Read through the operation manual for specific operating instructions.
  - > and >> Used to program the manual compensation temperature. Read through the operation manual for specific instructions.
9. Slide Switch for Manual Temperature Compensation (MTC), Automatic Temperature Compensation (ATC), and mV (ORP) mode
10. Battery compartment and tilt stand (rear)
11. Protective rubber holster



## ***Temperature Compensation***

---

For accurate pH measurements and calibration, the temperature of the solution under test must be known. This can be accomplished manually or automatically.

Read through the steps for each (below) and determine the best method for the application

### **Automatic Temperature Compensation**

For Automatic Compensation, use the supplied thermometer.

Perform the steps below before each use or when the temperature of the solution under test changes. Note that the thermometer can remain in the solution while taking pH measurements.

1. Select 'pH ATC' on the meter's front panel slide-switch.
2. Plug the supplied thermometer into the meter's temperature sensor input jack.
3. Place the other end of the thermometer into the solution under test.
4. Perform a pH Calibration or take a pH measurement.

### **Manual Temperature Compensation**

NOTE: For Manual Compensation, an external thermometer is required (not the one supplied with the meter).

Perform the steps below before each use or when the temperature of the solution under test changes:

1. Place a thermometer in the solution under test and note the reading.
2. Select 'pH MTC' on the meter's front panel slide-switch.
3. Press the "MTC" key and the display will show 25.0°C. Using the ">>" key (for 1 °C steps) and the ">" key (for 0.1°C steps), edit the displayed temperature. Continue editing until the displayed temperature equals the measured temperature that was noted earlier.
4. Perform pH calibration or take a pH measurement.

Note: if you are replacing the temperature probe with a new probe, please see the temperature calibration adjustment later in this manual.

## ***pH Operation***

---

IMPORTANT NOTE: Manual or Automatic Temperature Compensation must be engaged before proceeding with pH calibration and pH measurements.

### **pH CALIBRATION**

Note: it is recommended that the meter be calibrated at least once per day.

1. Connect the pH electrode to the meter's BNC input socket and rinse it with distilled water.
2. Press the POWER key to turn the meter on.
3. Place the electrode in a pH 7 buffer solution.
4. Turn the CAL pH7 potentiometer on the front panel until the display reads 7.00
5. Rinse the electrode with distilled water.
6. Place the electrode in the pH 4 or pH 10 buffer solution.
7. Turn the SLOPE pH potentiometer until the display reads 4.00 or 10.00.
8. Rinse the electrode in distilled water.
9. Repeat as necessary.

Note that if the adjustments described above do not yield a 4.0, 7.0, or 10.0 pH reading, the electrode may need to be replaced.

### **pH MEASUREMENTS**

1. Connect the pH electrode to the meter's BNC input socket.
2. Connect the temperature probe if using Automatic temperature compensation. Set the manual temperature compensation if not using the temperature probe.
3. Turn the meter on using the POWER key.
4. Place the electrode and the temperature probe (if using) into the test solution and read the displayed pH value.
5. After measuring, rinse the electrode and temperature probe (If using) with distilled water.

## ***ORP Operation (mV)***

---

1. Connect the optional (67500B) mV ORP electrode to the BNC input jack at the top of the meter.
2. Turn the meter on using the POWER button.
3. Select 'mV' (millivolts) via the meter's front panel slide-switch.
4. Rinse the ORP probe in distilled water.
5. Place the electrode in the test solution and read the millivolt (ORP) value.
6. Rinse the electrode with distilled water before storing.

Note that calibration is not required for the ORP function.

## ***Advanced Features***

---

### **MIN MAX AVG Record / Recall Mode**

1. Press the RECORD key (the REC indicator will appear on the LCD).
2. Press the RECALL key to view the highest (MAX) reading recorded since the RECORD key was first pressed. The MAX indicator will appear on the LCD.
3. Press the RECALL key to view the lowest (MIN) reading recorded since the RECORD key was first pressed. The MIN indicator will appear on the LCD.
4. Press the RECALL key to view the average (AVG) reading recorded since the RECORD key was first pressed. The AVG indicator will appear on the LCD.
5. Press the RECORD key again to exit this mode.
6. Note that the Auto Power OFF feature is disabled in this mode.

### **Automatic Power OFF Feature**

This meter is equipped with a battery conservation feature that automatically turns the meter off after approximately 10 minutes of use. To defeat this feature, put the meter in the Record / Recall mode by pressing the RECORD key. To turn the meter off, exit the Record mode first (by holding in the RECORD key until the RECORD display icon switches off) and then pressing the POWER key.

### **Data Hold**

Press the HOLD key to freeze the displayed reading. The DH indicator will switch on in the Data Hold mode. Press the HOLD key again to exit the Data Hold mode (the DH indicator will switch off).

## Battery Replacement

---

The low battery indicator (LBT) appears on the LCD when the 9V battery needs replacing.

1. Remove the meter's rubber protective holster.
2. Open the battery compartment using a coin or a flat blade screwdriver.
3. Replace the 9V battery and re-assemble.



Never dispose of used batteries or rechargeable batteries in household waste.

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.

### Other Battery Safety Reminders

Never dispose of batteries in a fire. Batteries may explode or leak.

Never mix battery types. Always install new batteries of the same type.

## PC Interface

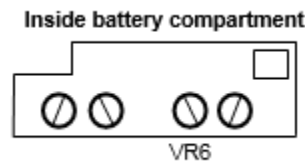
---

For streaming of data to a USB port on a PC via the RS232 output jack, the optional 407001-USB kit (RS232 to USB cable) is required.

Contact Extech support for a copy of the RS232 protocol (Support@Extech.com)

## Calibrating a New Temperature Probe (850188)

1. Connect the new temperature probe to the meter's temperature sensor input jack.
2. Select "pH ATC" via the meter's front panel slide-switch.
3. Place the temperature probe in water with crushed ice and let it sit there for about 15 minutes.
4. Adjust VR6 (inside the battery compartment, see diagram below) until the displayed value reads 32 °F (0 °C).



## Specifications

---

### General Specifications

Display	Dual function LCD with contrast adjust
Input impedance	10 <sup>12</sup> ohms
Temp. compensation for pH	Automatic and manual 0 to 65 °C (32 to 149 °F)
pH electrode compatibility	Any pH electrode with BNC connector
Data hold	Freezes displayed reading
Memory recall	Records / Recalls MAX (maximum), MIN (minimum), and AVG (average) readings
Auto Power OFF	Meter powers off after 10 minutes
PC Interface	Serial RS-232 Communication
Over range indication	All dashes on display "- - -"
Sampling time	Approximately 0.8 seconds
Operating conditions	0 °C to 50 °C (32 °F to 122 °F); < 80% RH
Power supply	9V battery (power consumption 5.7mA approx.)
Weight	270g (0.59 lbs.) including batteries
Dimensions	180 x 72 x 32mm (7.1 x 2.8 x 1.3")
Optional accessories	ORP Electrode (67500B) AC adaptor 156119 (120V); 156221 (220V)

### Range Specifications

Measurement	Range	Resolution	Accuracy (of reading)
pH	0 to 14 pH	0.01 pH	± (0.03 pH + 2 digits)
mV	±1999 mV	1 mV	± (0.5% + 1 digits)
Temperature (°C)	0 to 50°C	0.1°C	± 1°C
	50 to 65°C		± 4°C
Temperature (°F)	32 to 122°F	0.1°F	± 1.8°F
	122 to 149°F		± 7.5°F

Copyright © 2012-2016 FLIR Systems, Inc.

All rights reserved including the right of reproduction in whole or in part in any form

ISO-9001 Certified

[www.extech.com](http://www.extech.com)