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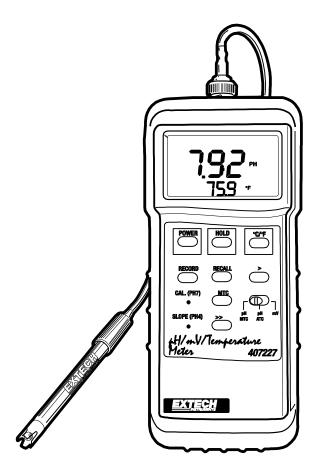
Heavy Duty pH and ORP Meter

Model 407227 Meter and 407728 Kit

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 the kit that includes the 407227 meter, pH electrode, temperature probe, protective holster jacket with stand, and carrying case. An optional ORP electrode (67500B) is available.
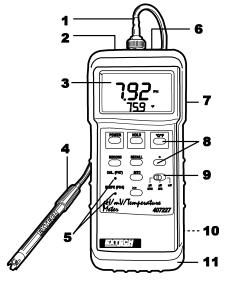
This device is shipped fully tested and calibrated and, with proper use, will provide years of reliable service. Please visit our website (www.extech.com) to check for the latest version of this user manual.

Meter Description

1. BNC connector for pH or optional ORP 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:
   POWER: Press to turn the meter ON or OFF
   HOLD: Press to freeze/unfreeze 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: Manual Temperature Compensation. Refer to the dedicated Manual Temperature Compensation section for details.
   '>' and **'>>'** used when programming the manual temperature compensation. Refer to the dedicated Manual Temperature Compensation section.
9. Slide switch to select Manual Temperature Compensation (MTC), Automatic Temperature Compensation (ATC), and mV (ORP) modes
10. Battery compartment and tilt stand (rear)
11. Protective jacket (remove to access battery compartment)

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. Refer to the steps for each, below, and determine the best method for the application.

Automatic Temperature Compensation

For Automatic compensation, use the supplied thermometer.

Perform these steps 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 these steps 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 noted earlier.

4. Perform pH calibration or take a pH measurement.

Note: If you are replacing the temperature probe with a new probe, please refer to the temperature calibration section 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 jack 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 replacing.

pH MEASUREMENTS

1. Connect the pH electrode to the meter's BNC input jack.
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 (APO)

The meter automatically switches OFF after 10 minutes. To defeat APO, put the meter in the Record mode by pressing the RECORD key. To turn the meter OFF, first exit the Record mode (long press the RECORD key until the RECORD display icon switches off) and then press 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 when the 9V battery needs replacing.

1. Remove the meter's protective jacket.
2. Open the battery compartment using a coin or 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.
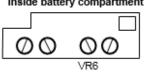
Other Battery Safety Reminders
Never dispose of batteries in a fire. Batteries may explode or leak.
Never mix battery types. Always install new batteries of the same type.

PC Interface

For streaming of data to a PC USB port via the RS232 output jack, the optional 407001-USB kit (RS232 to USB cable) is required. Contact Extech for a copy of the RS232 software (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 a slurry (water with crushed ice) and allow it to acclimate for approximately 15 minutes.

4. Adjust VR6 (inside the battery compartment, see diagram below) until the displayed value reads 0°C (32°F).

Inside battery compartment

VR6

Specifications

General Specifications

Display	Dual function LCD with contrast adjust
Input impedance	10^{12} ohms
Temp. compensation for pH	Automatic and manual 0 ~ 65°C (32 ~ 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 ~ 50°C (32°F ~ 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 x1.3")
Optional accessories	ORP Electrode (67500B) AC adaptor: 156119 (120V), 156221 (220V)

Range Specifications

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

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