User's Guide

EXTECH
INSTRUMENTS

Heavy Duty pH, mV, & Temperature Meter

Model 407227

- Measures pH, mV and Temperature

- RS-232 PC Interface

- °C/°F switchable

- Front panel Slope and Calibration adjustments

Introduction

Congratulations on your purchase of Extech's pH, mV, and Temperature Meter. This professional meter, with proper care, will provide years of safe reliable service.

Specifications

Display	Dual function LCD with contrast adjust
Input impedance	10^{12} ohms
Temp. compensation for pH	Automatic and manual 32 to 149°F (0 to 65°C)
pH electrode compatibility	Any combination 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	32°F to 122°F (0°C to 50°C); < 80% RH
Power supply	9V battery (power consumption 5.7mA approx.)
Weight	0.59 lbs. / 270g (including batteries)
Dimensions	7.1 x 2.8 x1.3" (180 x 72 x 32mm)
Optional accessories	ORP Electrode, AC adaptor, datalogger, and data acquisition Windows^{TM} software

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

Meter Description

1. pH Electrode input (BNC jack)
2. RS-232 PC Interface jack
3. LCD display
4. Keypad
5. pH Electrode
6. Calibration potentiometers
7. Temperature sensor input jack
8. LCD Contrast adjustment wheel
9. Protective rubber holster
10. Battery compartment and tilt stand (rear)

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 that best method for the application at hand:

Automatic Temperature Compensation

NOTE: For Automatic Compensation, the supplied thermometer must be used. Perform these steps before each use or when the temperature of the solution under test changes. The thermometer can remain in the solution while taking pH measurements in order to track temperature changes and compensate for them if necessary.

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.

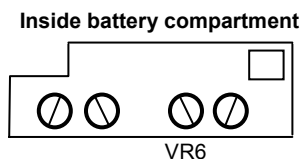4. Perform a pH Calibration or take a pH measurement as described later in the manual.

Manual Temperature Compensation

NOTE: For Manual Compensation, an external thermometer is required (separate from 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 25.0^oC will display on the LCD temperature display line. Using the ">>" key (for $1\ ^oC$ steps) and the ">" key (for 0.1^oC steps), edit the displayed temperature. Continue editing until the displayed temperature equals the measured temperature that was noted earlier.

4. Perform pH calibration or pH measurement normally.

Calibrating a new thermometer

1. Connect the thermometer 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 and a mercury thermometer in water.

4. Adjust VR6 (inside the battery compartment, see diagram below) until the displayed value matches the mercury thermometer reading.

Inside battery compartment

VR6

IMPORTANT NOTE: Manual or Automatic Temperature Compensation (covered earlier in this manual) must be performed before proceeding with pH calibration and pH measurements.

pH CALIBRATION

Note that the meter must be calibrated before each use

1. Press the POWER key to turn the meter on (if it isn't already on).

2. Connect the Combination pH electrode to the meter's BNC input socket and place the electrode in a pH 7 buffer solution.

3. Turn the CAL pH7 potentiometer on the front panel until the display reads 7.00

4. Rinse the electrode with distilled water.

5. Place the electrode in the pH 4 or pH 10 buffer solution.

6. Turn the SLOPE pH potentiometer until the display reads 4.00 or 10.00.

7. Rinse the electrode in distilled water.

8. Repeat as necessary.

Note that if the adjustments described above do not yield a 4, 7, or 10 pH reading, as the case may be, the electrode may require replacing.

pH MEASUREMENTS

1. Connect the combination pH electrode to the meter's BNC input socket.

2. Turn the meter on using the POWER key.

3. Place the electrode in the test solution and read the displayed pH value.

4. After measuring, rinse the electrode with distilled water.

ORP Operation (millivolts)

1. Connect the mV electrode (not supplied) to the BNC input jack at the top of the meter.
2. Turn the meter on using the POWER switch.
3. Select 'mV' (millivolts) via the meter's front panel slide-switch.
4. Place the electrode in the test solution and read the millivolt (ORP) value.
5. 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 CALL 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 CALL 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 CALL 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 shuts off the power after approximately 10 minutes. To defeat this feature, put the meter in the MIN MAX AVG Record / Recall mode by pressing the RECORD key. To turn the meter off, exit the Record mode first (by pressing 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 and the DH indicator will switch off.

RS-232 Serial PC Interface

The 407227 is equipped with an RS-232 serial data port. This interface was designed to operate with the Extech Data Acquisition Software (Part Number 407001). For detailed information contact your distributor or refer to the 407001 manual.

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 small coin or screwdriver.

3. Replace the 9V battery and re-assemble the meter.

Calibration and Repair Services

Extech offers complete repair and calibration services for all of the products we sell. For periodic calibration, NIST certification or repair of any Extech product, call customer service for details on services available. Extech recommends that calibration be performed on an annual basis to insure calibration integrity.

Warranty

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website at www.extech.com (click on 'Contact Extech' and go to 'Service Department' to request an RA number). A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

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