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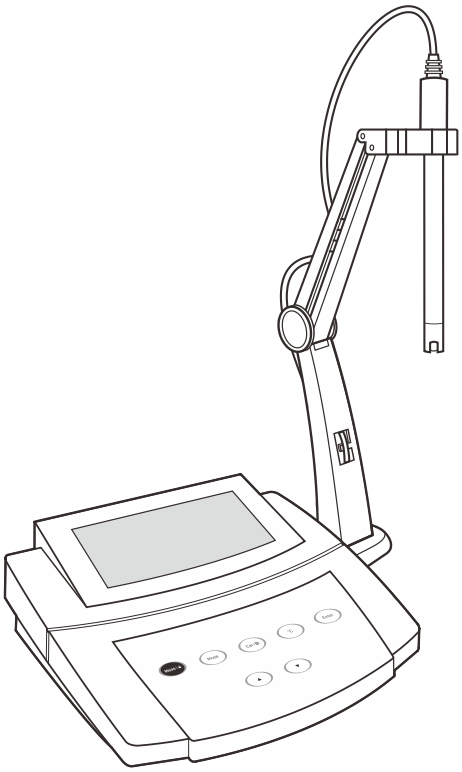
BANTE instruments

Bante 210 Benchtop pH Meter

USER MANUAL



Bante Instruments Inc.

Introduction

Thank you for selecting the 210 benchtop pH meter. This user manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use. Any use outside of these instructions may invalidate your warranty and cause permanent damage to the meter.

Environmental Conditions

Before unpacking, ensure that current environmental conditions meet the following requirements.

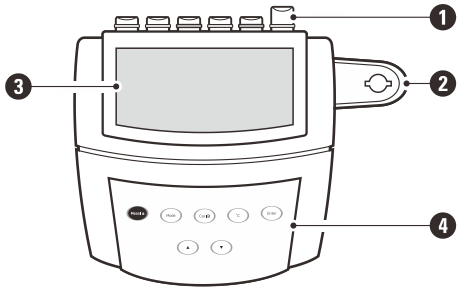
- Relative humidity is less than 80%
- Ambient temperature between 0°C (32°F) and 50°C (122°F)
- No potential electromagnetic interference
- No corrosive gas exists

Packing List

The following list describes all components of the meter. If any items are missing or damaged, contact the supplier immediately.

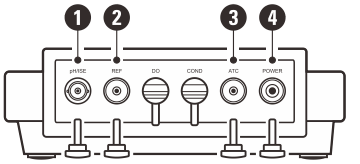
210 meter
Electrode arm
DC 9V power adapter
pH electrode
TP-10K temperature probe
pH buffer reagents 4.01, 7.00, 10.01

Meter Overview



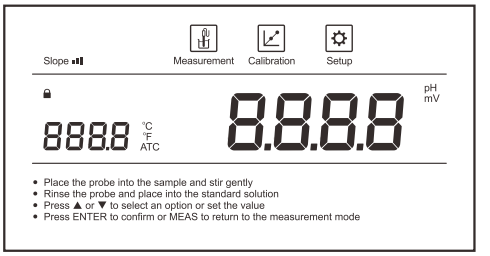
1	Sensor connections
2	Base plate of electrode arm
3	Display
4	Membrane keypad

Connectors



1	Socket for pH or ORP electrode (BNC)
2	Socket for reference electrode (3.5 mm jack)
3	Socket for temperature probe (3.5 mm jack)
4	Socket for power adapter

Display



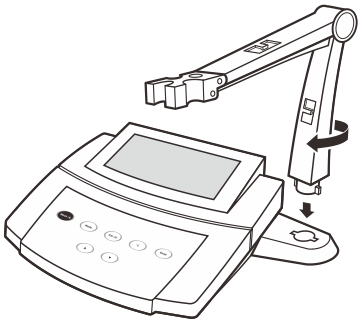
Icon	Description
	Indicates that the meter is in the measurement mode
	Indicates that the meter is in the calibration mode
	Indicates that the meter is in the setup mode
	Indicates that the measurement is locked
Slope	If the electrode slope exceeds the allowed range after calibration, the icon automatically disappears
ATC	Indicates that the automatic temperature compensation is enabled

Keypad

Key	Function
Meas | 🔒	• Switch the meter on or off • Lock or unlock the measurement • Exit the calibration, settings and return to the measurement mode
Mode	Toggle between the pH and mV measurement modes
Cal | 🗎	• Start calibration • Press and hold the key to enter the setup menu
°C	Set the temperature
▲	Increase value or scroll up through a list of options
▼	Decrease value or scroll down through a list of options
Enter	Confirm the calibration or displayed option

Installing the Electrode Holder

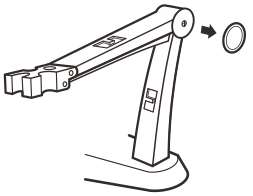
Take out the electrode arm from the accessory box. The base plate of electrode arm has a circular hole, the electrode arm has a connecting rod. Insert the connecting rod into the circular hole and swivel the electrode arm 90 degrees. The electrode holder is now ready to swing into desired position.



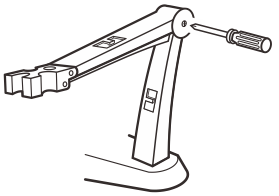
Adjusting the Electrode Arm

After installation, if the electrode arm automatically rises or falls, you are able to adjust the screw until arm locate at any position.

1. Remove the plastic cover from the right side of the electrode arm.



2. Use the screwdriver to tighten the screw moderately.

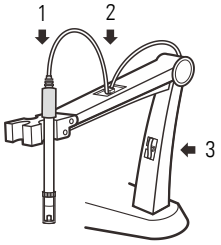


3. Insert the plastic cover to previous position.

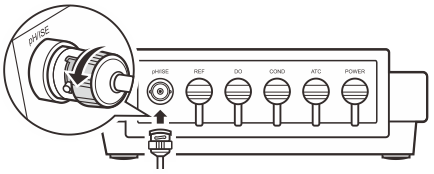
Connection

Connecting the pH Electrode

1.1 Take out the electrode from packaging. Follow the steps below to place electrode into the left or right side of the electrode arm.



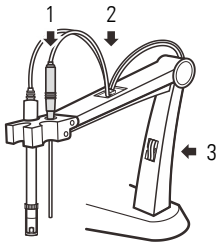
1.2 Insert BNC connector into the connector socket labeled pH/ISE. Rotate and push the connector clockwise until it locks.



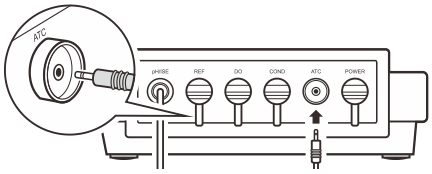
1.3 After the connection is completed, DO NOT pull on the cable. Always make sure that the connector is clean and dry.

Connecting the Temperature Probe

2.1 Place the temperature probe into the circular hole located at the center of the electrode arm.

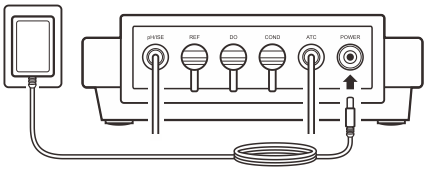


2.2 Insert the jack plug to the connector socket labeled ATC. Ensure the connector is fully seated.



Connecting the Power Adapter

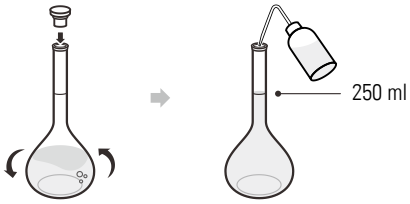
3.1 Insert the connector of power adapter to the power socket.
3.2 Plug the DC 9V power adapter into the wall outlet.



Preparation of pH Buffer Solutions

1. The meter is packaged with pH 4.01, 7.00, 10.01 buffer reagents required for calibration. Half fill a 250 ml volumetric flask with distilled water and add the pH 7.00 buffer reagent.

2. Swirl the volumetric flask gently to dissolve the reagent and fill to the mark with distilled water.

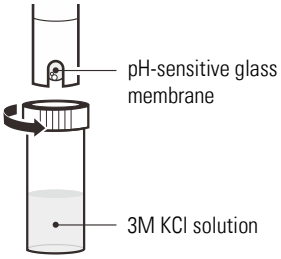


3. Cap and upend the volumetric flask several times to mix the solution.

- Preparation of pH 4.01 and 10.01 buffer solutions are the same as above.
- Prepared buffer solution should be stored in hermetically sealed glass container and avoid direct sunlight.

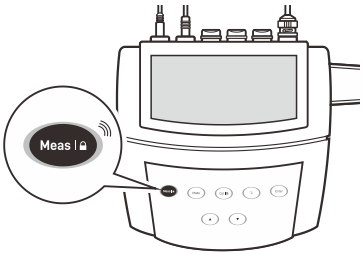
Prior to Use

Remove the protective cap from the bottom of the pH electrode. If tiny air bubbles are present inside the pH-sensitive glass membrane, gently shake the electrode downward to remove air bubbles.



Switching the Meter On and Off

- Press the **Meas** key for about 3 seconds and release to switch on the meter.
- Press and hold the **Meas** key to switch off the meter.



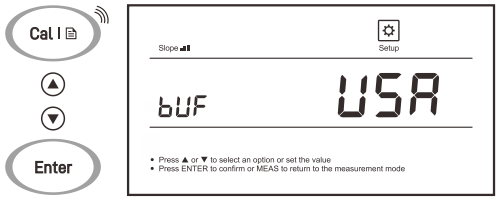
Meter Setup

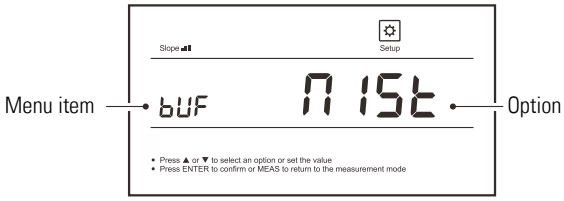
The 210 meter contains an integrated setup menu for customizing the displayed option to meet measurement requirements. The following table describes the functions of each menu item.

Menu Item	Option and Description	
bUF	**pH Buffer Group** Set the pH buffer group for calibration and auto-recognition.	
	USA	USA (default)
	nISt	NIST
CAL	**Calibration Points** Set the number of calibration points.	
	1	1 point
	2	2 points (default)
	3	3 points
UNIt	**Measurement Unit** Set the default temperature unit.	
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit
HOLd	**Auto-Hold** If enabled, the meter will automatically sense and lock the measurement endpoint.	
	YES	Enable
	nO	Disable (default)
OFF	**Auto-Power Off** If enabled, the meter will automatically switch off if no key is pressed within 3 hours.	
	YES	Enable
	nO	Disable (default)
rSt	**Factory Reset** Reset the meter to factory default settings. Note, the meter must be recalibrated.	
	YES	Enable
	nO	Disable (default)

Setting the Default Option

1. In the measurement mode, press and hold the ⎙ key to enter the setup menu.
2. Press the ▲ / ▼ key to select an option, press the **Enter** key to confirm and switch to the next menu item.
3. Repeat the steps above until the meter returns to the measurement mode.





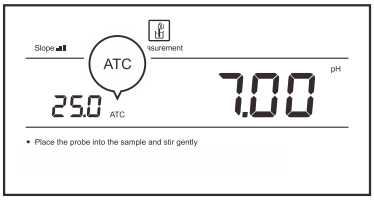
To exit the setup menu without saving changes, press the **Meas** key.

Temperature Compensation

For better accuracy, we recommend the use of either a sensor with a built-in or a separate temperature probe. The meter will calculate the pH slope with measured temperature and show the temperature compensated readings.

Automatic Temperature Compensation

Connect the temperature probe to meter, the ATC icon appears on the display, the meter is now switched to the automatic temperature compensation mode.



Refer to the ***Connecting the Temperature Probe*** section on page 3.

Manual Temperature Compensation

If the meter does not detect a temperature probe, the degrees Celsius icon (°C) will show on the display indicating the meter is switched to the manual temperature compensation mode. To set the temperature value follow the steps below.

1. Press the **°C** key to enter the temperature setting.
2. Press the ▲ / ▼ key to modify the temperature value.
3. Press the **Enter** key to save.

pH Calibration

The 210 meter allows up to 3 points pH calibration. We recommend that you perform at least 2 points calibration for high accuracy measurement. The meter will automatically recognize and calibrate to following standard buffer values.

USA Standard Buffers	pH 4.01, 7.00, 10.01
NIST Standard Buffers	pH 4.01, 6.86, 9.18

Single point calibration should only be carried out with the pH7.00 or 6.86, otherwise calibration will not be accepted.

Make sure to calibrate the meter when attaching a new pH electrode or during first use. Do not reuse the buffer solutions after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Stir the pH buffer and sample solutions at a uniform rate that will be obtained most accurate readings.

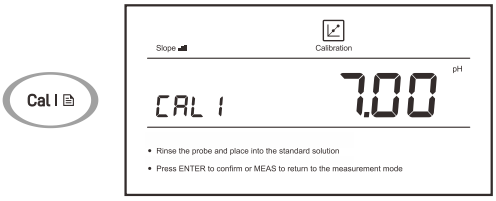
Setting the Number of Calibration Points

1. Press and hold the ▤ key to enter the setup menu.
2. Press the **Enter** key, the display shows CAL 2.
3. Press the ▲ / ▼ key to select 1 or 2 or 3 points calibration.
4. Press the **Enter** key until the meter returns to the measurement mode.

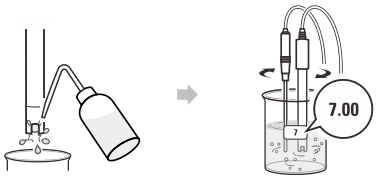
Single Point Calibration

1.1 Ensure that the meter is in the pH measurement mode and you have selected 1 point calibration in the setup menu.

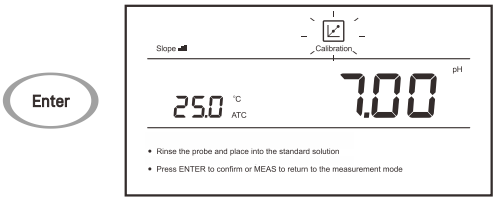
1.2 Press the **Cal** key, the meter shows CAL 1/7.00 or CAL 1/6.86, depending on the selected pH buffer group.



1.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the pH 7.00 buffer solution, stir gently to create a homogeneous solution.



1.4 Press the **Enter** key, the Calibration icon begins flashing.

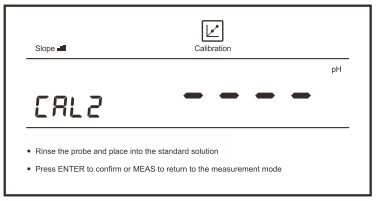


1.5 When the reading has stabilized, the meter will show End and return to the measurement mode.

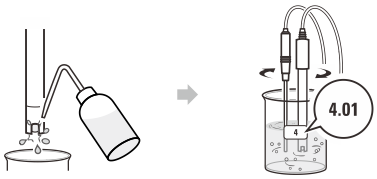
2 Points Calibration

2.1 Ensure that you have selected 2 points calibration in the setup menu.

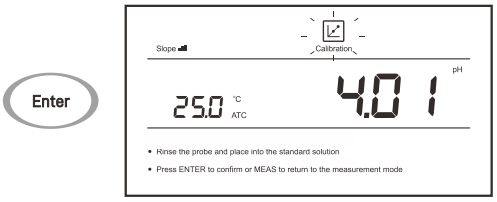
2.2 Repeat steps 1.2 through 1.4 above. When the first calibration point is completed, the display will show CAL 2/----. The meter prompts you to continue with second point calibration.



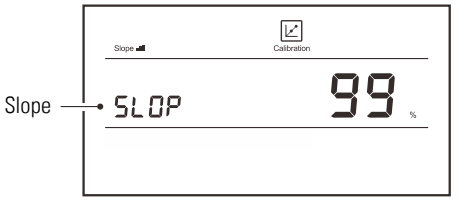
2.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the next buffer solution (e.g., pH 4.01).

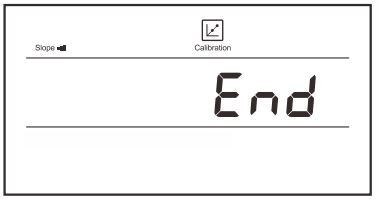


2.4 Press the **Enter** key, the meter automatically recognizes the buffer solution and begins the calibration, the Calibration icon continuously flashing.



2.5 When the reading has stabilized, the display will show electrode slope and End. Calibration is completed.





3 Points Calibration

3.1 Ensure that you have selected 3 points calibration in the setup menu.

3.2 Repeat steps 1.2 through 1.4 above. When the first calibration point is completed, the display will shows CAL2/4.01. The meter prompts you to continue with second point calibration.

3.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the pH 4.01 buffer solution and stir gently.

3.4 Press the **Enter** key, the meter begins calibration, the Calibration icon continuously flashing.

3.5 Wait for the reading to stabilize, the display will show electrode slope and CAL3/10.01 (or CAL3/9.18).

3.6 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the pH 10.01 (or 9.18) buffer solution and stir gently.

3.7 Press the **Enter** key, the meter begins the calibration.

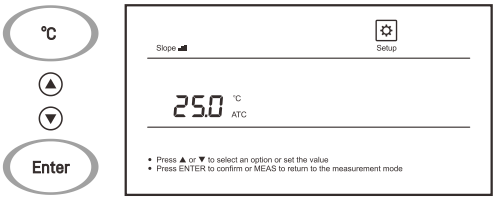
3.8 Wait for the reading to stabilize, the display will show electrode slope and End. Calibration is completed.

- During the calibration, if the display shows ---- indicating the meter is waiting for recognizing the pH buffer solution.
- If the display shows Err indicating the measured mV value for the current calibration point deviates by more than 60 mV from the theoretical value of the pH buffer. The calibration will not be accepted. Please check the pH electrode and ensure the buffer solutions are fresh and uncontaminated.
- If the calculated electrode slope is not between 70% to 110%, Slope icon will disappear from the display. The pH electrode may need to be replaced.
- To exit the calibration without saving changes, press the **Meas** key.

Temperature Calibration

The 210 meter is supplied with a temperature probe for measurement and temperature compensation. If the measured temperature reading differs from that of an accurate thermometer, the probe needs to be calibrated.

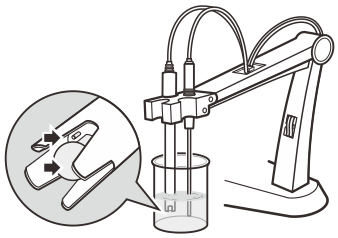
1. Connect the temperature probe to the meter and place into a solution with a known accurate temperature.
2. Press the **°C** key to enter the temperature setting.
3. Press the ▲ / ▼ key to modify the temperature value.
4. Press the **Enter** key to save.



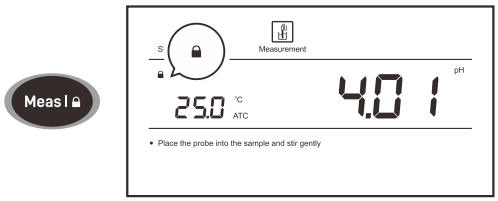
Measurements

pH Measurement

1.1 Rinse the pH electrode with distilled water. Place the electrode (and temperature probe) into the sample solution and stir gently. Note, the pH-sensitive glass membrane and liquid junction must be completely immersed into the solution.



1.2 If the Auto-Hold option in the setup menu is enabled, the meter will automatically sense a stable reading and lock measurement, the 🔒 icon appears on the display. Press the **Meas** key to resume measuring.
If the option is disabled, the meter will continuously measure and update the readings.



1.3 Wait for the measurement to stabilize and record the reading.
1.4 When all of the samples have been measured, rinse the electrode according to the instructions in the ***Electrode Maintenance***.

- During the measurement process, never wipe the pH-sensitive membrane as this will cause static interference, blot dry with a lint-free tissue to remove waterdrops on electrode.
- If the meter shows ---- indicating the measurement exceeds the range, remove the electrode from the sample immediately.
- If your sample is pure water, low ionic or low conductivity water, we recommend measuring the pH in the smallest sample volume possible or adding 0.3 ml of the 3M KCl to 100 ml of the sample solution. Note, only high purity KCl can be used.

mV Measurement

2.1 Press the **Mode** key to switch the meter to mV mode.
2.2 Rinse the electrode with distilled water. Place the electrode into the sample solution and stir gently. Record the reading when the measurement is stable.

Electrode Maintenance

Cleaning the pH Electrode

Since pH electrode is susceptible to contamination, thoroughly clean as necessary after each use.

- General Cleaning
  Rinse the pH electrode with distilled water and soak in 3M KCl solution.

- Salt Deposits
  Dissolve the deposit by immersing the electrode in warm tap water. Rinse the electrode with distilled water and soak in 3M KCl solution.

- Oil or Grease
  Place the electrode in the detergent or ethanol solution for 15 minutes. Rinse the electrode with distilled water and soak in 3M KCl solution.

- Protein
  (1) Add 1% pepsin to 0.1M HCl solution.
  (2) Place the electrode in above solution for 15 minutes.
  (3) Rinse the electrode with distilled water and soak in 3M KCl solution.

- Clogged Liquid Junction
  (1) Heat a diluted KCl solution to 60°C (140°F).
  (2) Place the electrode into the heated solution for 10 minutes.
  (3) Allow the electrode to cool in unheated KCl solution.

Reactivating the Electrode

If the pH-sensitive membrane has dried out, the electrode response will become sluggish. Immerse the electrode in a pH 4.01 buffer solution for about 30 minutes to rehydrate. If this fails, the electrode requires activation.

1. Soak the electrode in a 0.1M of HCl for 10 minutes.
2. Remove and rinse with distilled water, then place into a 0.1M of NaOH for 10 minutes.
3. Remove and rinse again, and soak in 3M KCl solution for at least 6 hours.

If these steps fail to restore the response, replace the electrode.

Storing the Electrode

- For best results, always soak the electrode in 3M KCl solution.
- If above solution is not available, use a pH 4.01 buffer solution.

- DO NOT store the electrode in distilled or deionized water that will deplete the hydration layer of the pH-sensitive membrane and render the electrode useless.
- If you do not use the electrode for a period longer than 1 month, store the electrode in storage solution.

Appendix

Troubleshooting

Fault	Cause and Corrective Action
Screen shows - - - -	Electrode dried out. Soak the electrode in 3M KCl solution at least 30 minutes.
	Measurement exceeded the maximum range. Check the electrode and sample.
Drifting erratic readings	Check whether electrode is contaminated, clogged or broken.
Screen shows Err	pH buffer problem. Use freshly prepared buffer solutions to calibrate the meter.
	Electrode has expired. Replace pH electrode.

Optional Accessories

pH Electrodes

Order Code	Description
E201-BNC	For measuring non-viscous, non-corrosive solutions
E202-BNC	For measuring semi-solid, gel and viscous samples
E205-BNC	For piercing and measuring soft solids
E206-BNC	For measuring solutions in test tubes
E207-BNC	For measuring non-aqueous solutions
E208-BNC	For measuring strong acid and strong alkaline solutions.
E209-BNC	For measuring solutions containing hydrofluoric acid (concentration < 0.1 mol/L)
E210-BNC	For measuring high temperature solutions (< 130°C)
E211-BNC	For measuring pure water
P11	For measuring mildly corrosive solutions
P16	For measuring Tris-buffered solutions

Temperature Probe

Order Code	Description
TP-10K	Range: 0 to 100°C (32 to 221°F), 1 m (3.3 ft.) cable

Solutions

Order Code	Description
PHCS-USA	pH 4.01, 7.00, 10.01 buffer solutions, 480 ml
PHCS-NIST	pH 4.01, 6.86, 9.18 buffer solutions, 480 ml
PHCS-ES	Electrode storage solution, 480 ml
PHCS-A	For removing acidic deposits, 480 ml
PHCS-B	For removing bacterial contaminants, 480 ml
PHCS-G	For removing oil and grease, 480 ml
PHCS-O	For removing organic contaminants, 480 ml
PHCS-P	For removing protein residues, 480 ml

Power Supply

Order Code	Description
DCPA-9V	DC 9V power adapter, european standard plug

Meter Specifications

Model	Bante 210
pH	
Range	-1.00 to 15.00 pH
Resolution	0.01 pH
Accuracy	±0.01 pH
Calibration Points	1 to 3 points
pH Buffer Options	USA (pH 4.01, 7.00, 10.01)
	NIST (pH 4.01, 6.86, 9.18)
Temperature Compensation	0 to 100°C (32 to 212°F), manual or automatic
mV	
Range	-1999 to 1999 mV
Resolution	1 mV
Accuracy	±1 mV
Temperature	
Range	0 to 105°C (32 to 221°F)
Resolution	0.1°C (0.1°F)
Accuracy	±1°C (±1.8°F)
Calibration Point	1 point
Other Specifications	
Operating Temperature	0 to 50°C (32 to 122°F)
Storage Temperature	0 to 60°C (32 to 140°F)
Relative Humidity	< 80% (non-condensing)
Display	LCD, 135 × 75 mm (5.3 × 2.9 in.)
Power Requirements	DC 9V/400mA power adapter
Auto-Off	3 hours after last key pressed
Dimensions	210 (L) × 205 (W) × 75 (H) mm, (8.2 × 8.0 × 2.9 in.)
Weight	1.5 kg (3.3 lb)

Disposal

This product is required to comply with the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC and may not be disposed of in domestic waste. Please dispose of product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

Warranty

The warranty period for meter is one year from the date of shipment. Above warranty does not cover the electrode and pH buffer solutions. Out of warranty products will be repaired on a charged basis.

The warranty on your meter shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorized modification or misuse
- Operation outside of the environment specifications of the products

For more information, please contact the supplier.

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