210 Benchtop pH/mV Meter

Instruction Manual

BTBPH14-1025

Introduction

Thank you for selecting the 210 benchtop pH/mV meter. This manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use.

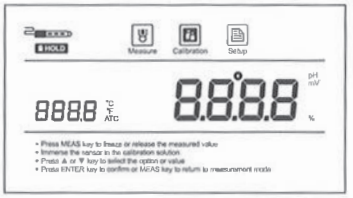
Unpacking the Meter

The following table describes the standard accessories of meter. After unpacking, please check all accessories are complete. If you have any question or concerns, please contact nearest distributor.

ACCESSORY
• pH Electrode
• Temperature Probe
• Electrode Arm
• DC 9V Power Adapter
• pH Buffer Pouches (pH4.01, 7.00, 10.01)

Display

The 210 meter is equipped with a clear and bright LCD display used to show measured values, mode indicators and help messages.



MODE INDICATOR:

Measure	Measurement mode indicator: Indicates meter is in the measurement mode.
Calibration	Calibration mode indicator: Indicates meter is in the calibration mode.
Setup	Setup mode indicator: Indicates meter is in SETUP mode.
Hold	Hold indicator: Indicates the displayed value has been frozen.
ATC	Automatic Temperature Compensation indicator: Indicates temperature compensation is enabled.

Keypad

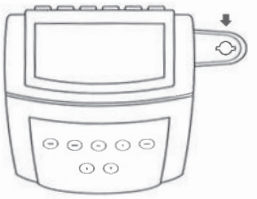
The meter includes 7 multifunction keys, names and symbols describe function key controls.

KEY	FUNCTION
MEAS | 🔒	• Power the meter ON/OFF. • Freezes the measured values on the display, press the key again to resume measuring.
	• In calibration or temperature setting mode, exits current mode and returns to measurement mode.
MODE	• Toggles between pH and mV measurement modes.
CAL | 🖹	• Press the key to enter the pH calibration mode. • Press and hold the key to enter the system menu.
°C	• Press the key to set the temperature or enter the temperature calibration mode.
▲	• Press the key to increase setting value.
▼	• Press the key to decrease setting value.
ENTER	• Confirms the calibration, setting value or displayed option.

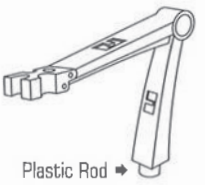
Connecting the Electrode Holder

The meter comes with a easy-to-use holder for mounting the pH electrode and temperature probe. If necessary, please follow the steps below to install the electrode holder.

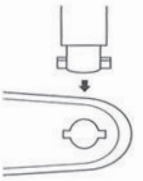
1. The base of the electrode holder with an irregular round hole.



2. The electrode arm has a plastic rod.



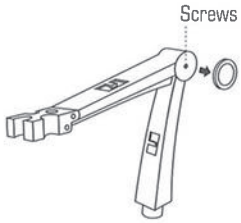
3. Insert the plastic rod into the irregular round hole and swivel the electrode arm 90°. Electrode holder is now ready to swing into desired position.



Adjustment of Electrode Arm

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

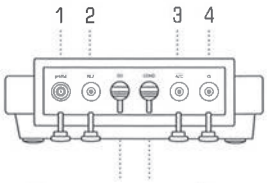
1. Remove the plastic cover from the electrode arm.



2. Use the screwdriver to tighten the screw moderately.
3. Insert the plastic cover to previous position. Installation is completed.

Connectors

The meter provides 4 connectors for connecting the various types of sensors. Listed in the below table are the details of these connectors.



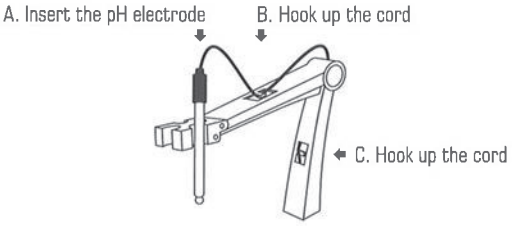
Invalid connectors

INDEX:

CONNECTOR	FUNCTION
1. pH/ISE	For connecting the pH or ORP electrode
2. REF	For connecting the reference electrode
3. ATC	For connecting the temperature probe
4. ⏻	For connecting the DC 9V power adapter

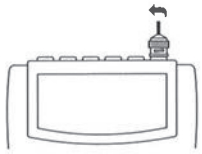
Connecting the pH Electrode

1. Take out the pH electrode from the packaging. Follow the steps below to place the sensor into left or right sides of the electrode arm.



2. Insert the connector of electrode into the BNC connector socket on the meter. Rotate and push the connector clockwise until it locks.

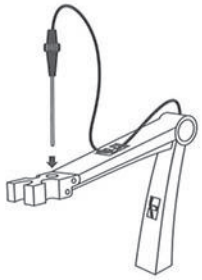
After connection is completed, DO NOT pull on the sensor cord. Always make sure that the connector is clean and dry.



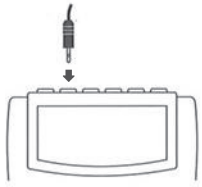
Connecting the Temperature Probe

The meter comes with a temperature probe for measuring temperature of the sample solution. When temperature probe is connected to meter, Automatic Temperature Compensation function will immediately start.

1. Place the temperature probe into the circular hole of electrode arm.



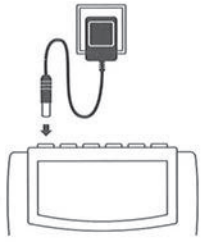
2. Insert the connector of probe into the corresponding connector socket on the meter (marked "ATC). Ensure the connector is fully seated.



Connecting the Power Adapter

Before plugging in the power adapter, ensure the voltage of power adapter matches your local main voltage.

Insert the connector of power adapter into the meter power socket.
The meter is now ready for use.



Power On/Off

- Press MEAS key to turn on the meter, the display shows measured values.
- Press and hold the MEAS key for 5 seconds, the meter will turn off.
- If you do not press any key for 3 hours, the meter will automatically turn off.

To disable the auto-off function, please read the SYSTEM MENU section.

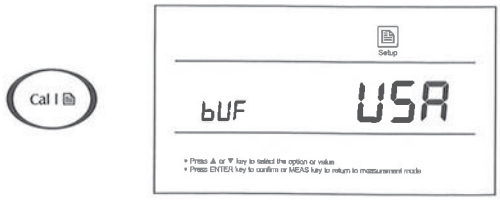
System Menu

The 210 meter contains an integrated menu that allows you to customize each displayed option to meet personal preference.

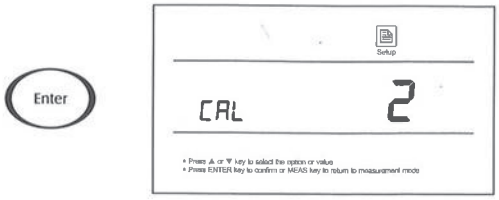
PARAMETER	OPTIONS
bUF pH Buffer	USA USA Standard (pH4.01, 7.00, 10.01, Default)
	nIST NIST Standard (pH4.01, 6.86, 9.18)
CAL Calibration Point	1 Single point calibration
	2 2 points calibration (Default)
	3 3 points calibration
UNIt Temperature Unit	°C Degrees Celsius (Default)
	°F Degrees Fahrenheit
HOLd Auto-Hold Function	YES Enable
	NO Disable (Default)
OFF Auto-Off Function	YES Enable
	NO Disable (Default)
rSt Reset	YES Restore factory settings
	NO Disable (Default)

Setting the Default Parameters

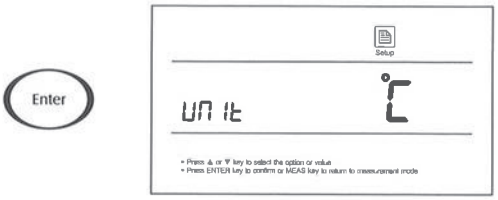
1. Press and hold the 🖹 key for 3 seconds to enter system menu, the meter shows default pH buffer option.



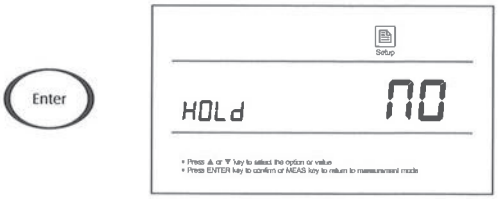
2. Press ▲ or ▼ key to select the available standards, press ENTER key to confirm. The meter goes to calibration point selection mode, the display shows 2 points calibration.



3. Press ▲ or ▼ key to select the number of calibration points, press ENTER key to confirm. The meter goes to temperature unit selection mode, the display shows "UNIT/°C".

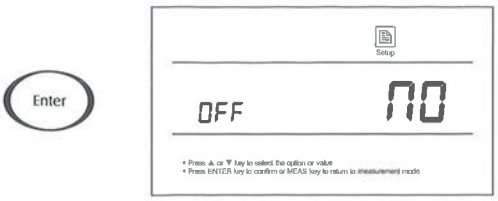


4. Press ▲ or ▼ key to select the desired temperature unit (°C or °F), press ENTER key to confirm. The meter shows "HOLD/NO" indicating that the auto-hold function is disabled.



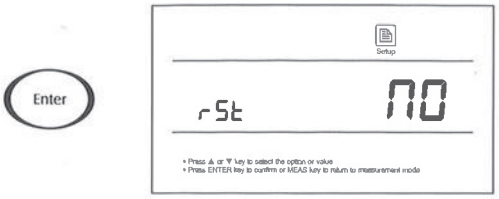
- If the auto-hold function is enabled, the meter will automatically sense a stable end-point reading and freeze it.
- If you disable this function, the meter allows you to freeze the reading by pressing the HOLD key.

5. Press ▲ or ▼ key to enable or disable the auto-hold function, press ENTER key to confirm. The meter shows "OFF/NO" indicating that the auto-off function is disabled.



When the auto-off function is enabled, if you do not press any keys within 3 hours, the meter will automatically turn off to conserve energy.

6. Press ▲ or ▼ key to enable or disable the auto-off function, press ENTER key to confirm. The meter shows "RST/NO" indicating that the meter should not be reset.



Reset function will restore the meter back to factory default parameters, all calibration values and selected parameters will be lost or reset.

7. Press ▲ or ▼ key to enable or disable the reset function, press ENTER key to confirm. The meter returns to measurement mode. Settings is done.

Prior to Use

- Remove the protective cap from the bottom of the pH electrode.
- If the electrode bulb dries out, soak the electrode in storage solution or tap water for at least 15 minutes. Do not use distilled or deionized water, it will shorten the life of sensor.

Preparation of pH Standard Buffer Solutions

The meter is packaged with three pH buffer packets required for calibration.

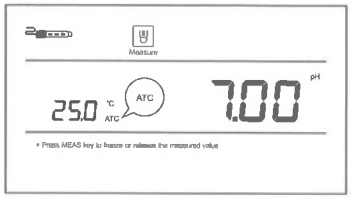
- Open the pH7.00 buffer packet, place the powder into a 250ml volumetric flask. Pour distilled water 250ml to scale line, mix the solution until reagent is completely dissolved.
- Preparation of pH4.01 and 10.01 standard buffer solutions are the same as above. Prepared standard buffer solutions should be stored in hermetically sealed glass containers.

Temperature Compensation

In order to get accurate measuring results, you need to enable the manual or automatic temperature compensation before measurement or calibration.

AUTOMATIC TEMPERATURE COMPENSATION:

Insert the connector of temperature probe into corresponding "ATC" socket, the display immediately shows "ATC" indicator. The meter is now switched to automatic temperature compensation mode.



MANUAL TEMPERATURE COMPENSATION:

1. Do not connect the temperature probe to meter.
2. Press °C key to enter the temperature setting mode.
3. Press ▲ or ▼ key to set the temperature value of sample.
4. Press ENTER key to confirm. Setting is completed.

In the temperature setting mode, press ▲ or ▼ key once, the setting value will increase or decrease by 0.1. Press and hold the ▲ or ▼ key, the setting value will increase or decrease by 1.

pH Calibration

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

- USA Standard: pH4.01, 7.00, 10.01
- NIST Standard: pH4.01, 6.86, 9.18

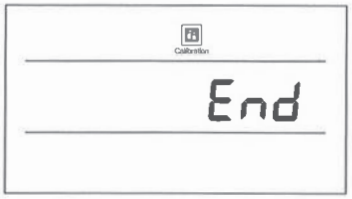
Single point calibration should only be carried out with pH7.00 or pH6.86, otherwise calibration will not be accepted.

The meter must be calibrated prior to first use or new electrode replaced. To ensure accuracy, regular calibration is recommended. Do not reuse calibration solution after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Single point calibration

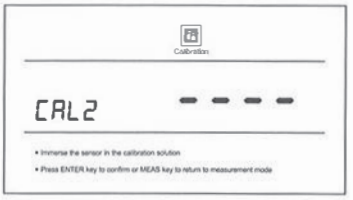
1. Make sure that you have selected 1 point calibration in the system menu.
2. Rinse the pH electrode with distilled water.
3. Press CAL key, the meter shows "CAL1/pH7.00"(or "CAL1/pH6.86").

4. Dip the pH electrode into the pH7.00 (or pH6.86) standard buffer solution, stir the electrode gently.
5. Press ENTER key to confirm. Wait for the measured value to stabilize, the display will show "END". Single point calibration is done.

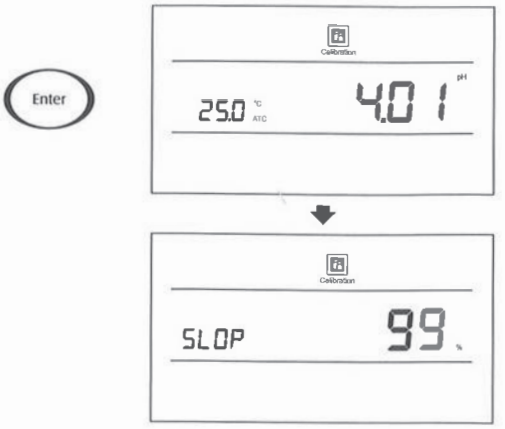


2 points calibration

- Make sure that you have selected 2 points calibration in the system menu.
- Repeat steps 2 to 5 above. When the first calibration point is done, the display will show "CAL2". The meter prompts you to continue with second point calibration.

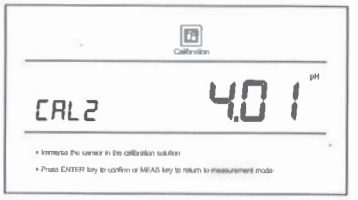


- Rinse the pH electrode with distilled water, dip the electrode into the pH 4.01 or 10.01 (pH4.01 or 9.18) standard buffer solution, stir the electrode gently.
- Press ENTER key to confirm. Wait for the measured value to stabilize, the display shows electrode slope and "END". Second point calibration is done.

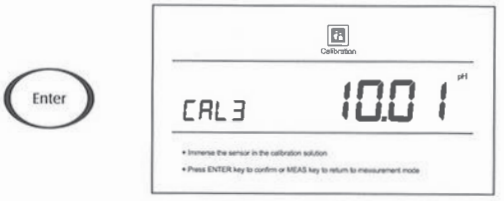


3 points calibration

- Make sure that you have selected 3 points calibration in the system menu.
- Repeat steps 2 to 5 above. When the first calibration point is done, the display will show "CAL2/pH4.01". The meter prompts you to continue with second point calibration.



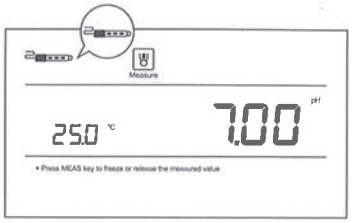
- Rinse the pH electrode with distilled water, dip the electrode into the pH 4.01 standard buffer solution, stir the electrode gently.
- Press ENTER key to confirm. Wait for the measured value to stabilize, the display shows electrode slope and "CAL3/pH10.01" (or "CAL3/pH9.18").



- Rinse the pH electrode with distilled water, dip the electrode into the pH 10.01 (or pH9.18) standard buffer solution, stir the electrode gently.
- Press ENTER key to confirm. Wait for the measured value to stabilize, the display shows electrode slope and "END". The meter automatically returns to measurement mode. Calibration is completed.

- During the calibration, if the meter shows "Err", please check your sensor and calibration solution is fresh and uncontaminated.

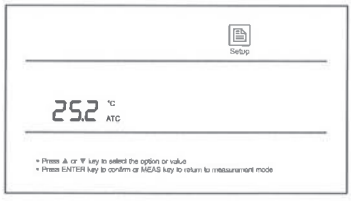
- If you want to exit from calibration mode, press MEAS key, the meter will immediately return to measurement mode.
- The electrode indicator will show average slope of the pH electrode after calibration. If the slope or calibration result does not meet measurement requirement, the indicator will disappear on the display.



Temperature Calibration

During the measurement mode, when automatic temperature compensation is enabled, if the temperature reading displayed differs from that of an accurate thermometer, you need to calibrate the meter.

1. Make sure the connecter of temperature probe is connected to the meter.
2. Press °C key to enter the temperature calibration mode, the display shows current temperature reading.



3. Press ▲ or ▼ key to set the temperature value of sample.
4. Press ENTER key to confirm. Calibration is completed.

pH Measurement

1. Rinse the pH electrode thoroughly with distilled or de-ionised water.
2. Dip the electrode into the sample solution, stir the sensor gently.
3. Wait for the reading to stabilize, record the measured value on the display.

mV Measurement

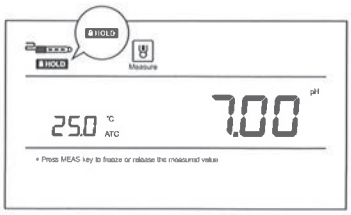
1. Press MODE key until display shows measurement unit "mV".
2. Rinse the electrode thoroughly with distilled or de-ionised water.
3. Dip the electrode into the sample solution, stir the sensor gently.
4. Wait for the reading to stabilize, record the measured value on the display.

Auto-Hold Function

When the auto-hold function is enabled, the meter will automatically sense a stable end-point measured value and freeze it, "HOLD" indicator appears on the display. Press 🔓 key, the meter resumes measuring.

Manual Hold Function

Press 🔓 key in measurement mode, "HOLD" indicator appears on the display. Press key again to release the measured reading, you can continue to take measurement.



Electrode Care and Maintenance

Since pH electrode is susceptible to dirt and contamination, clean as necessary depending on the extent and condition of use.

AFTER MEASURING:
Rinse the pH electrode and reference junction in distilled water, store sensor into the electrode storage solution.

CLEANING THE ELECTRODE:

- Salt deposits:

Dissolve the deposits by immersing the electrode in the tap water for 10 to 15 minutes, then thoroughly rinse with distilled water.

- Oil or Grease film:

Wash electrode pH bulb gently in some detergent and water, rinse electrode tip with distilled water.

- Clogged reference junction:

Heat a diluted KCl solution to 60 to 80°C, place the sensing part of the sensor into the heated solution for about 10 minutes, allow the electrode to cool in some unheated KCl solution.

- Protein deposits:

Prepare a 1% pepsin solution in 0.1M of HCL, set the electrode in the solution for 5 to 10 minutes, rinse the electrode with distilled water.

REACTIVATING THE ELECTRODE:
If stored and cleaned properly, the pH electrode should be ready for immediate use. However, a dehydrated bulb may cause sluggish response.
To rehydrate the bulb, immerse the electrode in a pH4.01 buffer solution for 10 to 30 minutes. If this fails, the electrode requires activation. Never touch or rub glass bulb, contact builds up an electro-static charge.

Optional pH Electrodes

ORDER CODE	APPLICATION
P11	General purpose
P11-HA	Photographic processing solutions
P12	Sample in the tube
P13	Micro-volume samples
P15	Low conductivity samples
P16	Tris buffers
P17	Semi-solid substances (Flat Surface)
P18	Slurries
P19	Semi-solid substances (Spear Tip)
P21	Colloids
P22	High temperature liquids

Troubleshooting

LCD DISPLAY	CAUSE
- - - -	• Electrode dried out. Soak the pH electrode in tap water for 10 minutes. • Measured value is out of range. Check the electrode whether clogged, dirty or broken.
Err	• Incorrect buffer used or contaminated buffer solution. Use fresh pH buffer solutions for calibration. • Electrode is broken. Replace the pH electrode.

Specifications

Model	210
pH Range	-1.00~15.00pH
Resolution	0.01pH
Accuracy	±0.01pH
mV Range	-1000~1000mV
Resolution	1mV
Accuracy	±1mV
Temperature Range	0~105°C, 32~221°F
Accuracy	±1°C
Calibration Points	1 to 3 points
pH Buffer Groups	USA (pH4.01, 7.00, 10.01)
	NIST (pH4.01, 6.86, 9.18)
Temperature Compensation	0~100°C, 32~212°F, Automatic or Manual
Auto-Off	After 3 hours from last key press
Operating Temperature	0~60°C, 32~140°F
Connector	BNC
Power Requirement	DC 9V Power Adapter
Dimensions	210(L)×205(W)×75(H)mm
Weight	1.5kg

Appendix: How to prepare electrode storage solution

1. Dissolve 223.65 grams of potassium chloride reagent (KCL) in the 1 liter distilled water.
2. Pour the 50mL of KCL solution into beaker.
3. Pour the 50mL of pH4.01 standard buffer solution into the same beaker.
4. Stir the solution until the solution has thoroughly mixed, preparation is done.

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