METRIA

METRIA M21 Benchtop pH Meter

Instruction Manual

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Introduction

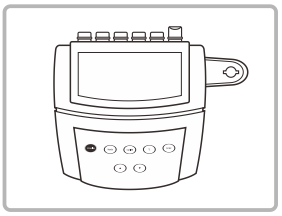
Thank you for selecting the METRIA M21 benchtop pH meter. This manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use.

Unpacking

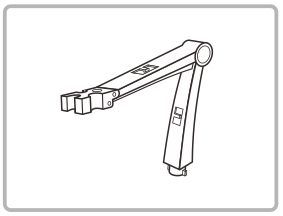
Before unpacking, ensure that the current work environment meets the following conditions.

- Relative humidity is less than 80%.
- Ambient temperature is greater than 0°C/32°F and less than 50°C/122°F.
- No potential electromagnetic interference.

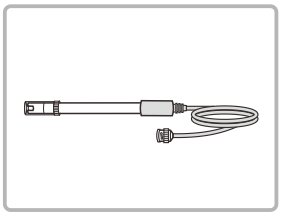
The following list describes the standard components of meter. After the unpacking, please check all components are complete. If any are damaged or missing, please contact the supplier.



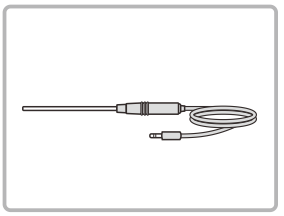
- 210 pH meter



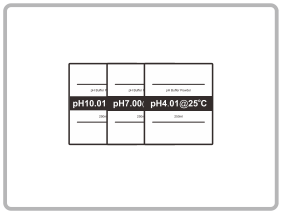
- Electrode arm



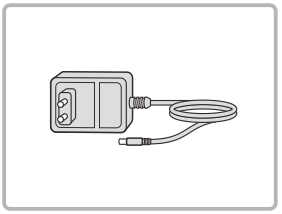
- pH electrode



- Temperature probe



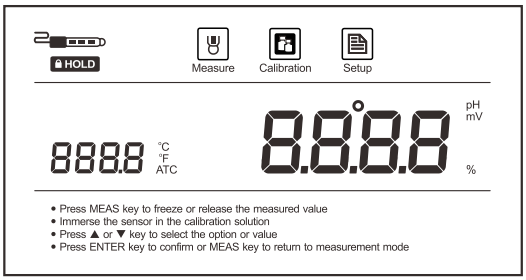
- pH buffer sachets



- DC9V power adapter

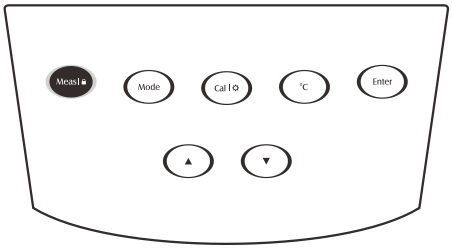
Meter Overview

Display



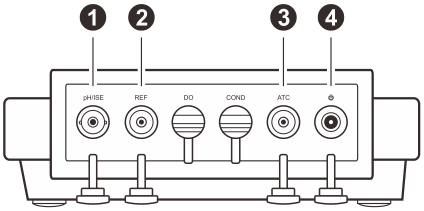
Measure	Measurement mode icon: Indicates the meter is in the measurement mode.		Electrode slope icon: Indicates the average slope of the pH electrode.
Calibration	Calibration mode icon: Indicates the meter is in the calibration mode.	HOLD	Hold icon: Indicates the measured value has been locked.
Setup	Setting mode icon: Indicates the meter is in the setting mode.	ATC	Automatic temperature compensation icon: Indicates the temperature compensation is enabled.

Keypad



Name and Icon	Function
Meas | 🔒	• Switch the meter On/Off. • Lock the measured value, press the key again to resume measuring. • Exit the calibration or setting and return to the measurement screen.
Mode	• Select the measurement mode (pH/mV).
Cal | ☼	• Start calibration. • Enter the setup menu (Press and hold the key for 3 seconds).
°C	• Set the temperature.
▲	• Increase value or scroll up through the menu option.
▼	• Decrease value or scroll down through the menu option.
Enter	• Confirm the calibration, setting or displayed option.

Connector



No.	Name and Icon	Description
1	pH/ISE	Use for pH or ORP electrode
2	REF	Use for reference electrode
3	ATC	Use for temperature probe
4	⏻	Use for power adapter

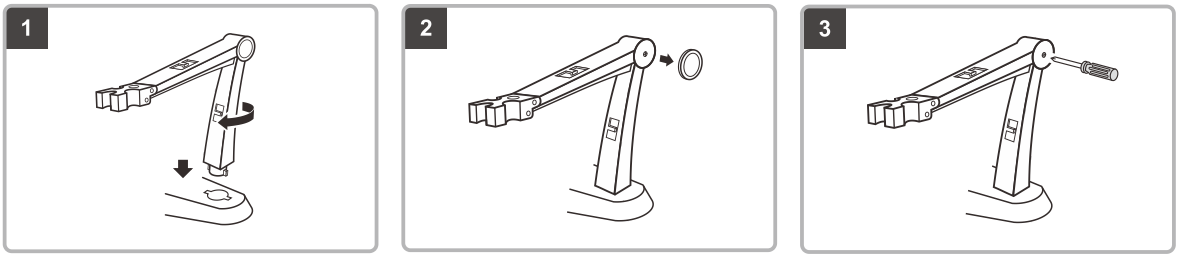
Installing the Electrode Holder

Take out the electrode arm from the accessory box. The base plate of the electrode holder 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°. 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 need 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.



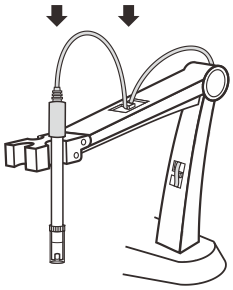
Connection

Connecting the Electrode

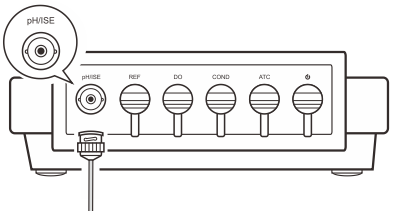
1.1 Take out the pH electrode from the packaging. Follow the steps below to place the electrode into left or right side of the electrode arm.

1.2 Insert the BNC connector into the connector socket labeled **pH/ISE**. Rotate and push the connector clockwise until it locks. After the connection is completed, DO NOT pull on the cable. Always make sure that the connector is clean and dry.

1. Insert the electrode



2. Hook up the cable

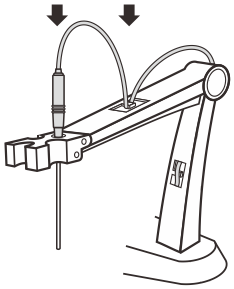


Connecting the Temperature Probe

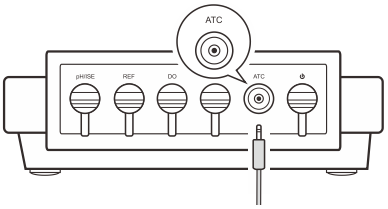
2.1 Place the temperature probe into the circular hole located at the center of the electrode arm.

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

1. Insert the probe

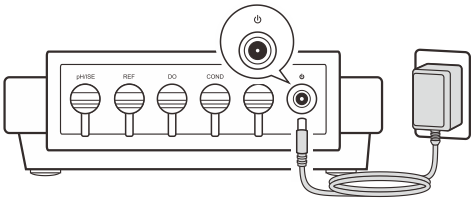


2. Hook up the cable



Switching the Meter On and Off

1. Insert the connector of power adapter to the power socket.
2. Press and release the **Meas** key to switch on the meter. Press and hold the **Meas** key for 3 seconds to switch off the meter.



Setup Menu

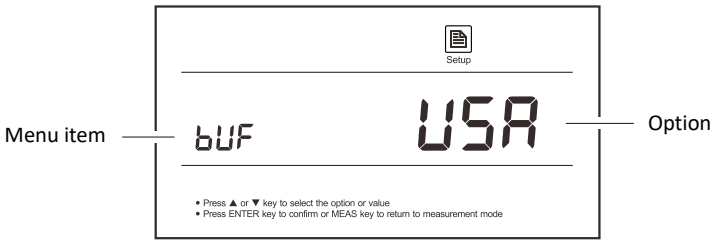
The METRIA M21 pH meter contains an integrated setup menu that is used to customize the displayed option to meet measurement requirement.

The following table describes the functions of each menu item.

Menu	Description	Options	Description	Default
bUF	Set the pH buffer group for calibration and auto-recognition.	USA	USA (pH4.01/7.00/10.01)	USA
		nISt	NIST (pH4.01/6.86/9.18)	
CAL	Set the number of calibration points.	1	1 point	3 points
		2	2 points	
		3	3 points	
UNIt	Set the default temperature unit.	°C	Degrees Celsius	°C
		°F	Degrees Fahrenheit	
HOLd	When the option is enabled, the meter will automatically sense a stable reading and lock the measurement.	YES	Enable	Disable
		nO	Disable	
OFF	When the option is enabled, the meter will automatically switch off if no key is pressed within 3 hours.	YES	Enable	Disable
		nO	Disable	
rSt	Reset the meter to factory default settings.	YES	Enable	Disable
		nO	Disable	

Setting the Default Option

1. Press and hold the ☼ key for 3 seconds 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.



Restore Factory Settings

The rSt (Reset) option is used to restore the meter back to default settings. If enabled, all of the calibration data and selected options will be deleted or reset, the meter must be recalibrated.

1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the **Enter** key until the display shows rSt/nO.
3. Press the ▲ / ▼ key to select the rSt/YES, press the **Enter** key to confirm.

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

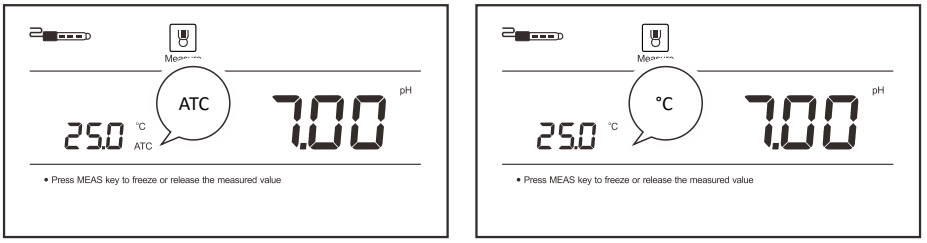
Temperature Compensation

For better accuracy, we recommend the use of either a sensor with a built-in or a separate temperature probe for the calibration and measurement.

Automatic temperature compensation:
Connect the temperature probe to the meter (Refer to page 5 “Connection”). The **ATC** icon immediately appears on the display, the meter is now switched to the automatic temperature compensation mode.

Manual temperature compensation:
If the meter does not detect a temperature probe, the **°C** icon will show on the display indicating that the meter is switched to the manual temperature compensation mode. To set the temperature value, follow the steps below.

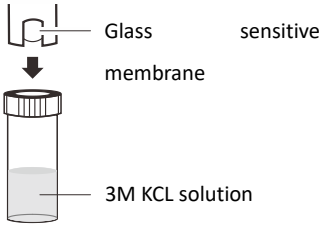
1. Press the **°C** key to enter the temperature setting.
2. Press the ▲ / ▼ key to set the temperature value, press the **Enter** key to confirm.



ⓘ Press the ▲ / ▼ key once, the setting value will increase or decrease by 0.1. Press and hold the key, the setting value will increase or decrease by 1.

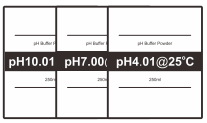
Prior to Use

Remove the protective cap from the bottom of the pH electrode. If the glass sensitive membrane has dried out, soak the electrode in 3M KCL
solution for at least 30 minutes.



Preparing the pH Buffer Solution

1. Open the pH7.00 buffer sachet, place the reagent into a 250ml volumetric flask.
2. Fill the volumetric flask to the mark with distilled water, mix the solution until the reagent is completely dissolved.
3. Preparation of pH4.01 and 10.01 buffer solutions are the same as above. Prepared standard buffer solutions should be stored in hermetically sealed glass containers.



pH Calibration

The METRIA M21 pH meter allows 1 to 3 points calibration in the pH mode. 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.

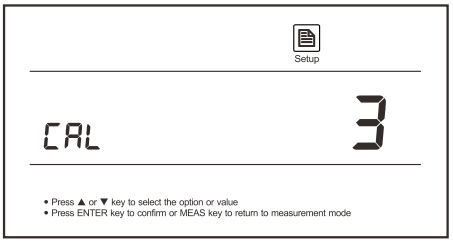
USA Standard Buffers	pH4.01, 7.00, 10.01
NIST Standard Buffers	pH4.01, 6.86, 9.18

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

Make sure to calibrate the meter when attaching a new electrode. Do not reuse the calibration solution after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.
In order to get accurate measuring results, we recommend using a stirrer to create the homogeneous buffer solutions and sample.

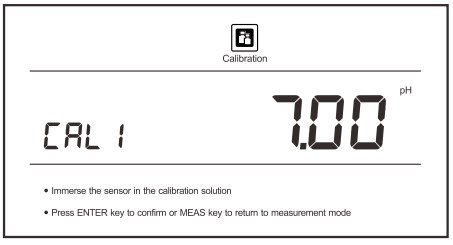
Setting the Number of Calibration Points

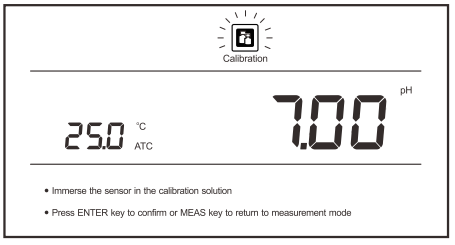
1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the **Enter** key, the display shows CAL 3.
3. Press the ▲ / ▼ key to select 1 or 2 or 3 points calibration, press the **Enter** key until the meter returns to the measurement mode.



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 display shows CAL 1/7.00 or CAL 1/6.86, depending on the pH buffer group you selected.
1.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the pH7.00 (or 6.86) buffer solution and stir gently.
1.4 Press the **Enter** key, the meter begins the calibration, the Calibration icon continuously flashing.
1.5 Wait for the reading to stabilize, the meter will automatically show End and returns to the measurement mode.





2-Points Calibration

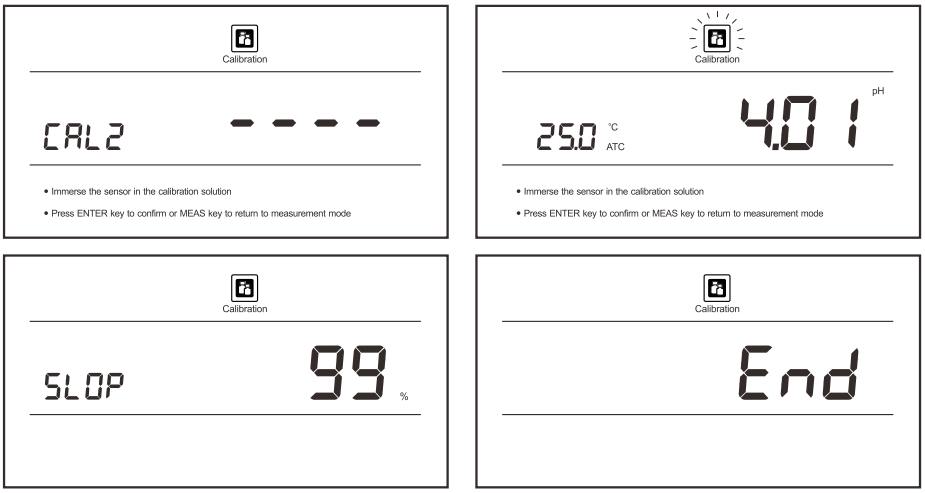
2.1 Ensure that you have selected 2 points calibration in the setup menu.

2.2 Repeat steps 1.2 through 1.4 above. When the first calibration point is completed, the display will show CAL2. 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 and stir gently (E.g., pH4.01).

2.4 Press the **Enter** key, the meter automatically recognizes the pH buffer solution and begins the calibration.

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



3-Point 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 show 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 pH4.01 buffer solution and stir gently.

3.4 Press the **Enter** key, the meter begins the 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 pH10.01 (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 meter shows Err, please check the pH electrode and ensure the pH buffers are fresh and uncontaminated.
- If the electrode slope is not within the normal range, the icon will disappear on the display.
- To exit the calibration mode without saving the calibration, press the **Meas** key.

Temperature Calibration

During the measurement, if the temperature reading displayed differs from that of an accurate thermometer, the temperature 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 set the temperature value, press the **Enter** key to confirm.

Measurements

pH

1. Press the **Mode** key until the meter shows the measurement unit **pH**.
2. Rinse the pH electrode with distilled water. Place the electrode (and temperature probe) into the sample solution and stir gently.
3. Wait for the measurement to stabilize and record the pH and temperature values.
4. When all of the samples have been measured, rinse the electrode with distilled water, store the electrode into the 3M KCL solution.

mV

1. Press the **Mode** key until the meter shows the measurement unit **mV**.
2. Rinse the electrode with distilled water. Place the electrode into the sample solution and stir gently.
3. Wait for the measurement to stabilize and record the mV value.
4. When all of the samples have been measured, rinse the electrode with distilled water, store the electrode according to the instructions in the electrode user guides.

ⓘ If the HOLd option is enabled in the setup menu, the meter will automatically lock a measurement endpoint and show HOLD icon. Press the **Meas** key to resume measuring.

Electrode Care and Maintenance

pH Electrode

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

- General deposits: Rinse the electrode with distilled water, store the electrode into the 3M KCL solution.
- Salt deposits: Soak the electrode in warm tap water to dissolve deposits, then thoroughly rinse with distilled water.
- Oil or grease: Wash the glass sensitive membrane of electrode in some detergents and water. If necessary, use the alcohol to clean, then rinse with distilled water. Place the electrode in the 3M KCL solution for at least 30 minutes.
- Protein deposits: Prepare a 1% pepsin solution in 0.1M of HCL. Place the electrode in the solution for 10 minutes. Rinse the electrode with distilled water.
- Clogged reference junction: Heat a diluted KCl solution to 60°C to 80°C. Place the electrode into the heated solution for about 10 minutes. Allow the electrode to cool in some unheated KCl solution.

If stored and cleaned properly, the electrode should be ready for immediate use. However, a dehydrated glass sensitive membrane may cause sluggish response. To rehydrate the sensitive membrane, immerse the electrode in a pH4.01 buffer solution for 10 to 30 minutes. If this fails, the electrode requires activation.

1. Soak the electrode in 0.1M HCl for 5 minutes.
2. Remove and rinse with distilled water, then place in 0.1M NaOH for 5 minutes.
3. Remove and rinse again, and soak in 3M KCL solution for at least 30 minutes.

ORP Electrode

- General deposits: Rinse the electrode with distilled water, store the electrode into the 4M KCL solution.
- Inorganic deposits: Soak the electrode in 0.1M HCl for 10 minutes. Remove and rinse with distilled water, then place in alcohol for 5
  minutes. Remove and rinse again, soak the electrode in pH4.01 buffer solution for 30 minutes.
- Oil or grease: Wash the electrode in some detergents and water. Place the electrode in the 4M KCL solution for at least 30 minutes.

Appendix

Troubleshooting

Fault	Possible Cause	Corrective Action
- - - -	Electrode dried out	Soak the pH electrode in 3M KCL solution at least 30 minutes
	Measured value exceeded the allowed range	Check the electrode and sample
Drifting erratic readings	Electrode fault	Check the electrode whether clogged, contaminated or broken
Err	Buffer problem	Use freshly prepared pH buffers to calibrate meter
	Electrode has expired	Replace pH electrode

Specifications

pH	Model	METRIA M21
	Range	-1.00~15.00pH
	Accuracy	±0.01pH
	Resolution	0.01pH
	Calibration Points	1 to 3 points
	pH Buffer Options	USA (pH4.01, 7.00, 10.01) or NIST (pH4.01, 6.86, 9.18)
	Temperature Compensation	0~100°C, 32~212°F, manual or automatic
mV	Range	-1999~1999mV
	Accuracy	±1mV
	Resolution	1mV
Temperature	Range	0~105°C, 32~221°F
	Accuracy	±1°C
	Resolution	0.1°C
General Specification	Connector	BNC
	Display	Segmented LCD, 135(L)×75(W)mm
	Power Requirements	DC9V/400mA, using AC adapter, 220V/50Hz
	Dimensions	210(L)×205(W)×75(H)mm
	Weight	1.5kg

Hazardous Substance Statement

METRIA Instruments is committed to the reduction and eventual elimination of all hazardous substances in both the manufacturing process and finished products we supply. We have an active manufacturing and procurement program to minimize and eliminate the use of harmful heavy metals such as cadmium, lead, mercury and the like. New technologies and design parameters are also promoting these efforts and we expect to have little or no such materials in our product in the coming years. We welcome our customer suggestions on how to speed up these efforts.



Warranty

The warranty period for meter is two years from the date of shipment. Above warranty does not cover the electrode and calibration 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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