



# Silver Ion Meter

## LMSIM-A100

**USER MANUAL**

**Index**

<b>Sr.no</b>	<b>Title</b>	<b>Page no</b>
<b>1.</b>	Introduction	2
<b>2.</b>	Features	2
<b>3.</b>	Specifications	3
<b>4.</b>	Applications	3
<b>5.</b>	Instrument Introduction	4
<b>6.</b>	Installation	6
<b>7.</b>	Operations	11
<b>8.</b>	Maintenance	30
<b>9.</b>	Accessories	31

## 1. Introduction

**Silver Ion Meter LMSIM-A100** includes a direct ion concentration readout with a measuring range of 0.01 to 107900 ppm. It can store data up to 500 sets and allows easy data transfer through a USB interface. Featured with an automatic electrode diagnosis for reliable operation and a system menu to easily adjust parameters.

## 2. Features

- Fitted with silver ion selective electrode for measuring silver ion concentration
- Incorporated with a stability indicator for real-time information
- Advanced with a reset setting function
- Integrated with auto hold function for better recording
- Designed with a built-in real-time clock to timestamp events
- Enhanced with temperature compensation for accurate results
- Upgraded with a calibration due reminder for regular calibration of the meter
- Equipped with an LCD display

### 3. Specifications

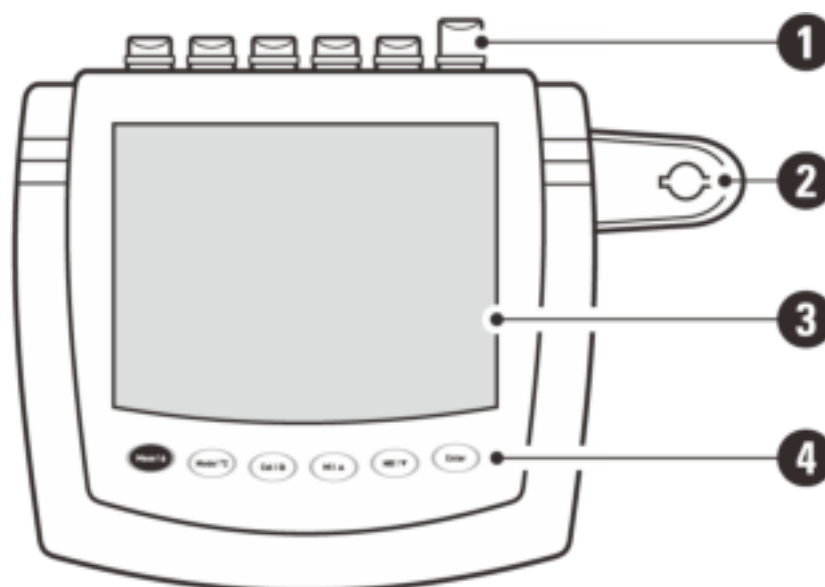
Model No.	LMSIM-A100
Ag Measurement Range	$1 \times 10^7$ to 1 M, 0.01 to 107900 ppm
Ag Measurement Accuracy	$\pm 1\%$ F.S.
Resolution	0.001, 0.01, 0.1, 1
Temperature Measurement Range	0 to 105 °C, 32 to 221 °F
Temperature Accuracy	$\pm 0.5\text{ °C}$ , $\pm 0.9\text{ °F}$
Temperature Resolution	0.1°C
Temperature Compensation	0 to 100 °C, 32 to 212 °F
mV Range	(-1999.9) to 1999.9 mV
mV Accuracy	$\pm 0.2\text{ mV}$
mV Resolution	0.1 mV
Calibration Points	2 to 5 points
Calibration Solutions	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000 ppm, mol / L, mg / L
Compensation Mode	Manual or automatic
Data Hold Function	Manual or automatic endpoint detection
Reset Function	Yes
Stability Condition	Low or high
Calibration Due	0 to 31 days
Power Off	Manual or automatic (10,20,30 minutes)
Memory	Stores up to 500 sets of data
Output	USB communication interface
Connector	BNC
Display	LCD (130 × 110 mm)
Power	DC 5 V, using AC adapter, AC 220 V / 50 Hz
Dimension (L × W × H)	210 × 188 × 60 mm
Weight	1.5 kg

### 4. Applications

Silver Ion meter is used to measure the concentration of silver ions in a solution. It is used in various fields like water quality monitoring, electroplating, metal finishing, photography, and in research.

## 5. Instrument Introduction

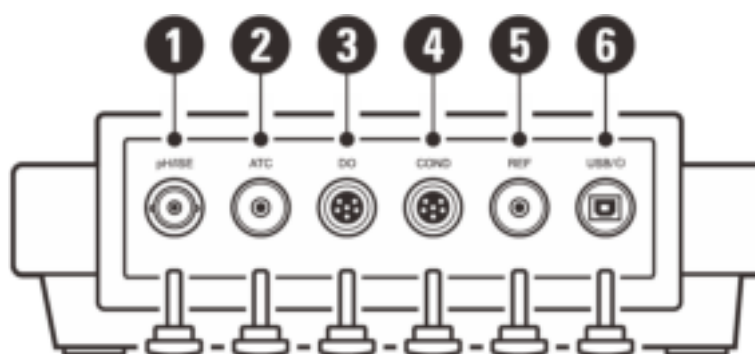
### 5.1 Meter Overview



**Figure-1**

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







#### Connectors:



**Figure-2**

- 1) Socket for pH, ORP, or ion-selective electrode
- 2) Socket for temperature probe (3.5 mm jack)
- 3) Socket for dissolved oxygen electrode (6-pin DIN)
- 4) Socket for conductivity electrode (6-pin DIN)
- 5) Socket for reference electrode (3.5 mm jack)
- 6) USB-B interface to the power adapter or computer

## 5.2 Keypad

Key	Function
	Switch the meter on or off
	Lock or unlock the measurement
	Exit the calibration, settings, and data logs and return to the measurement mode
	Select the measurement mode
	Press and hold the key to enter the temperature setting
	Start calibration
	Press and hold the key to enter the setup menu
	Store the current reading in memory
	Increase value or scroll up through a list of options
	View the data log or calibration log
	Decrease value or scroll down through a list of options
	Confirm the calibration of the displayed option
	Press and hold the key to switch the backlight on or off

## 6. Installation

### 6.1 Environmental conditions

Before unpacking, ensure the following conditions are met in the present environment.

- The relative humidity is below 80%.
- Temperature range of the surrounding air: 0°C (32°F) to 50°C (122°F)
- Absence of possible electromagnetic interference.
- There is no corrosive gas.

### 6.2 Packing list

Every part of the meter is described in the list that follows. Verify if anything is broken or missing.

#### 1) Meter



Figure-3

#### 2) Electrode arm

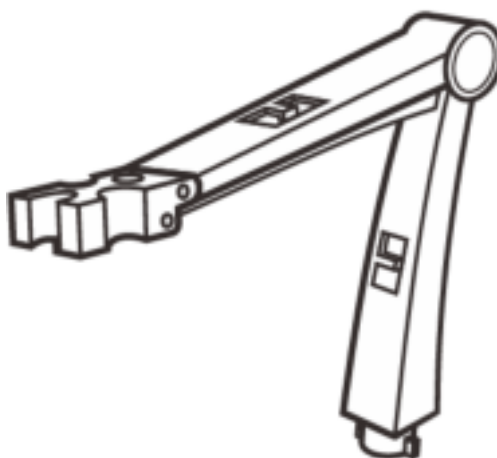


Figure-4

## 3) USB cable



Figure-5

## 4) Power adapter

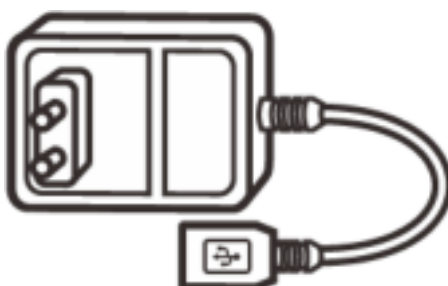


Figure-6

## 5) Ion-selective electrode



Figure-7

## 6) Ionic strength adjuster



Figure-8

## 7) Temperature probe



Figure-9



### 6.3 Installing the electrode holder

The electrode arm should be removed from the accessory box. The electrode arm has a connecting rod, and its base plate has a round hole in it. After inserting the connecting rod into the circular hole, rotate the electrode arm by 90 degrees. It is now possible to swing the electrode holder into the desired position.

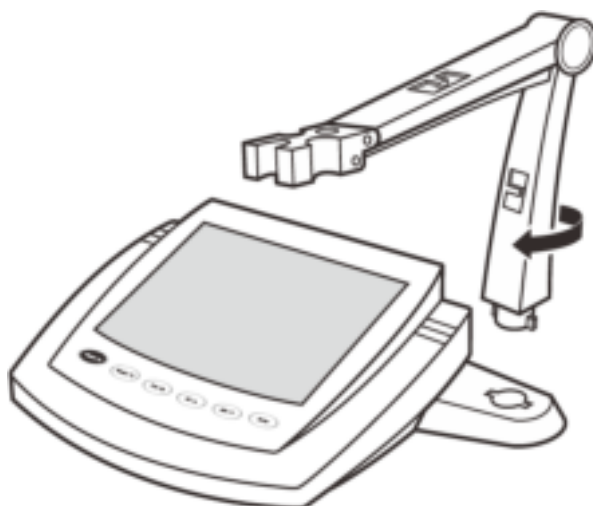


Figure-10

#### 6.3.1 Adjusting the Electrode Arm

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

**Step 1:** On the right side of the electrode arm, take off the plastic cover.

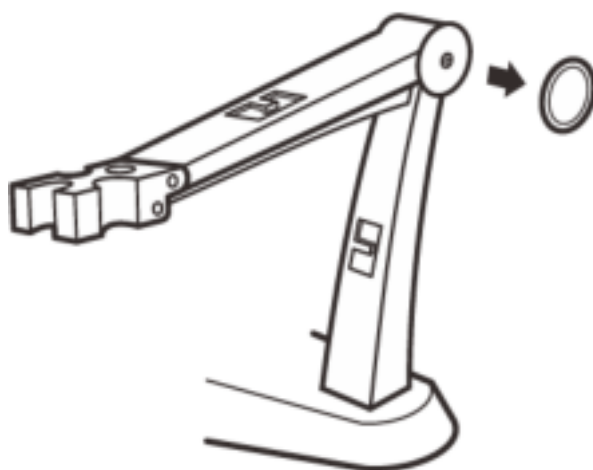
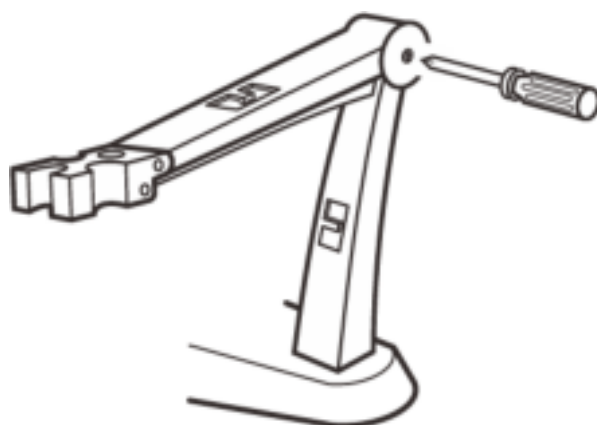


Figure-11

**Step 2:** Moderately tighten the screw with the screwdriver.



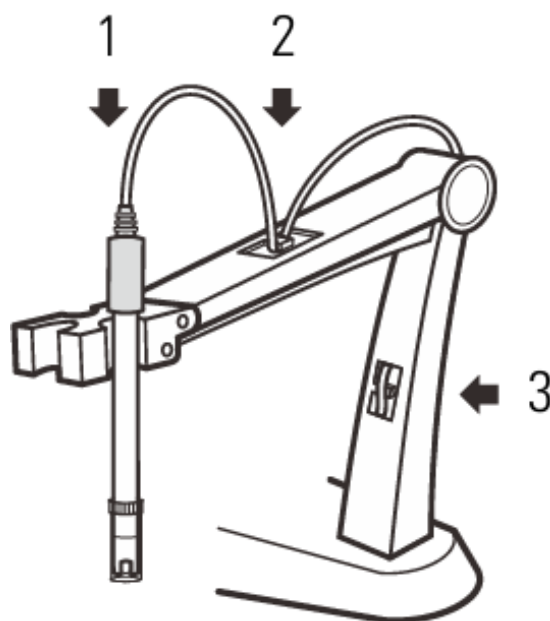
**Figure-12**

**Step 3:** Place the plastic cover back where it was.

### 6.3.2 Connection

#### 1) Connecting the Electrode

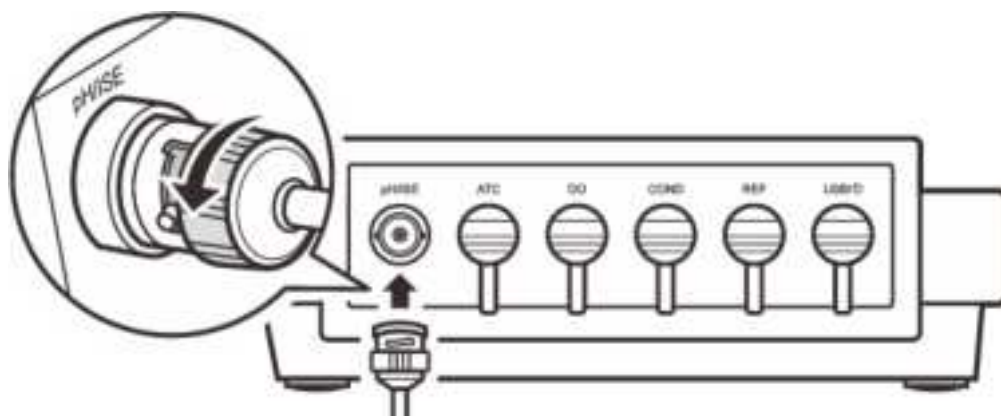
Remove the electrode from its container. To position the electrode on the left or right side of the electrode arm, follow the instructions below.



**Figure-13**

#### **For the Ion Selective Electrode:**

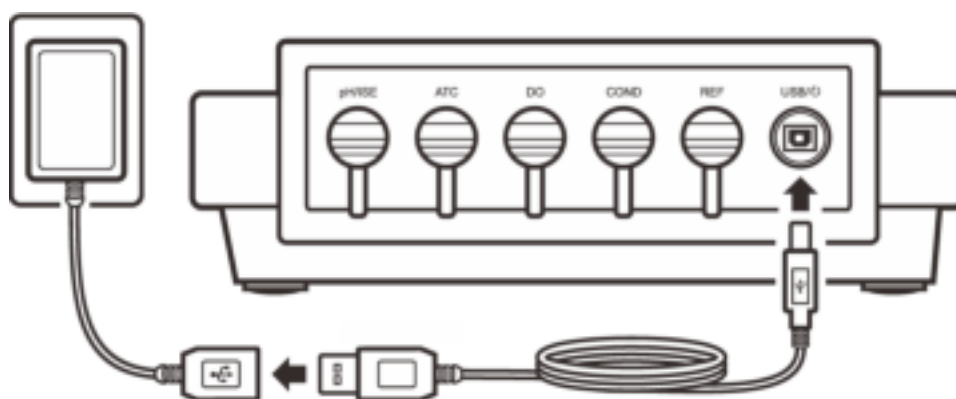
Place the BNC connector into the ISE connector socket. To lock the connector, push and rotate it in a clockwise direction.



**Figure-14**

### **2) Connecting the Power Adapter**

Use the USB cord to connect the 5V DC power adapter and the meter. In the wall outlet, plug in the power adapter.



**Figure-15**

## 7. Operations

### 7.1 Switching the Meter On and Off

- 1) Press the **Meas** key and release to switch on the meter.
- 2) Press and hold the **Meas** key to switch off the meter.

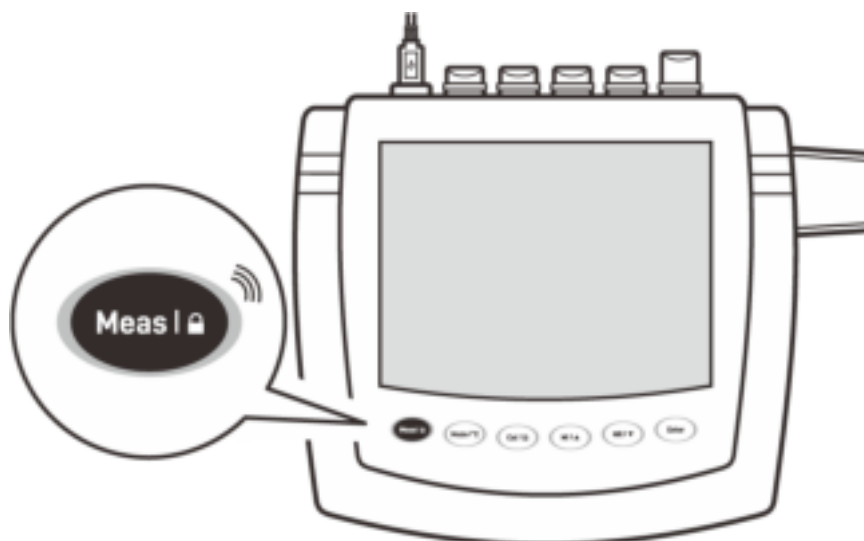


Figure-16


### 7.2 General Settings

To adjust the function parameters, the meter has an integrated setup menu. The correct menu items will be displayed on the display in each of the various settings. Once the setting is altered for the general settings, it will be applied to all modes.

Menu Item	Option and Description	
StA	<b>Stability Criteria</b>	
	Set when a measurement is recognized as stable.	
	LO	Standard (default)
	HI	High accuracy
HOLd	<b>Auto-Hold</b>	
	If enabled, the meter will automatically sense a stable reading and lock the measurement.	
	YES	Enable
	NO	Disable (default)
OFF	<b>Auto-Power Off</b>	
	If enabled, the meter will automatically switch off if no key is pressed within a specified period.	

	...30	10, 20, 30 minutes
	NO	Disable (default)
CALL	<b>Calibration Due Reminder</b> Set the calibration interval to activate the alarm 📢.	
	...31	1 to 31 days
	OFF	Disable (default)
DATE	<b>Date and Time</b> Set the date and time for the data log and calibration log.	
CLR	<b>Clear Stored Data</b> Delete all data logs in the memory.	
	YES	Enable
	NO	Disable (default)
rSt	<b>Factory Reset</b> Reset the meter to factory default settings. <b>Note:</b> The meter must be recalibrated.	
	YES	Enable
	NO	Disable (default)

### 7.2.1 Setting a Default Option

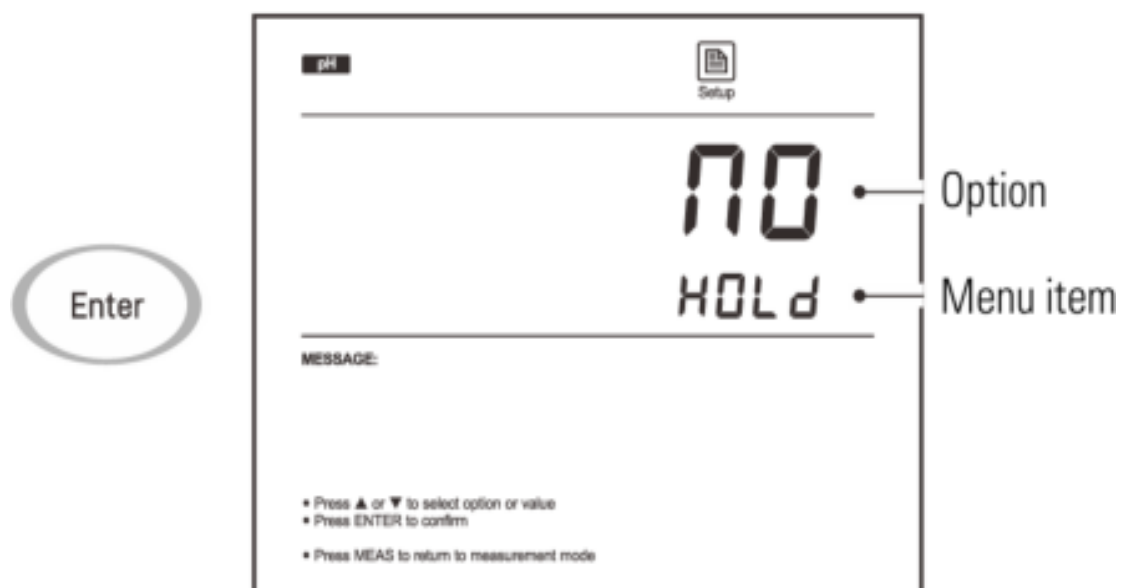
**Step 1:** In the measurement mode, press and hold the  key to enter the setup menu.

**Step 2:** Press the  key to select a menu item.



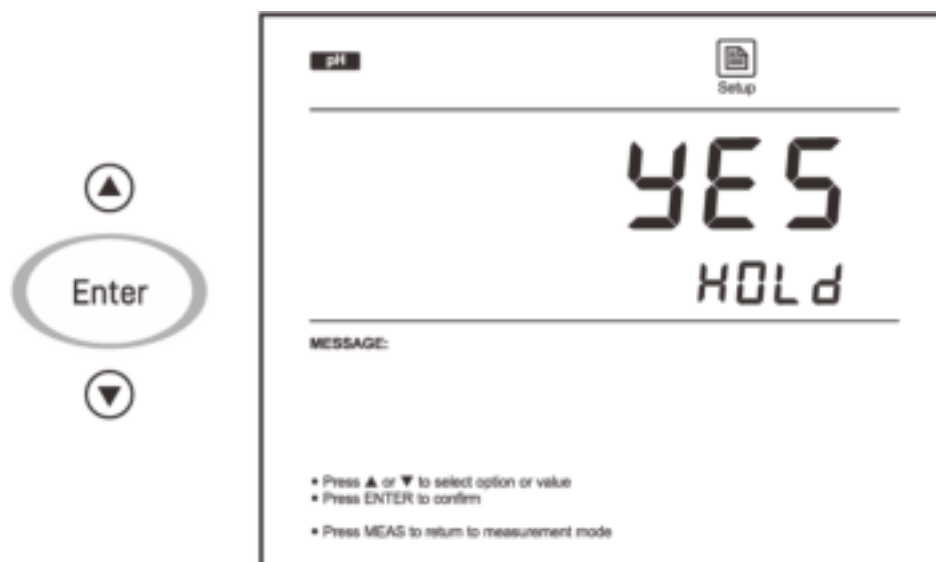
Figure-17

**Step 3:** When you press **Enter**, the current option is displayed on the meter.



**Figure-18**

**Step 4:** Press the ▲ / ▼ key to select a desired option, and press the Enter key to save.



**Figure-19**

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

### 7.2.2 Setting the Date and Time

**Step 1:** To access the configuration menu in the measurement mode, press and hold the key.

**Step 2:** Press the ▼ key until the meter shows *dAtE* (date).

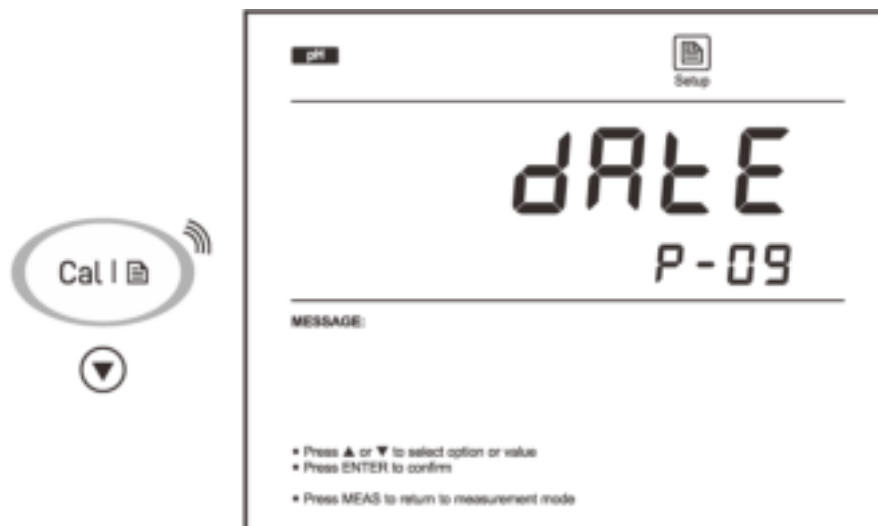


Figure-20

**Step 3:** The current year is displayed on the meter when you press the **Enter** key.



Figure-21

**Step 4:** Press the ▲ / ▼ key to set the year, and press the Enter key to switch to the date and time options.



Figure-22

**Step 5:** Press the ▲ / ▼ key to set the month, day, hours, and minutes, and press the Enter key to save until the meter returns to the measurement mode.

### 7.3 Temperature Calibration

A temperature probe for measuring and temperature correction is included with the meter. The probe must be calibrated if the measured temperature reading deviates from that of a reliable thermometer.



**Note:** This probe is not necessary because the dissolved oxygen electrode has an integrated temperature sensor.

#### 7.3.1 Connecting the Temperature Probe

**Step 1:** Insert the temperature probe into the circular opening in the electrode arm's middle.

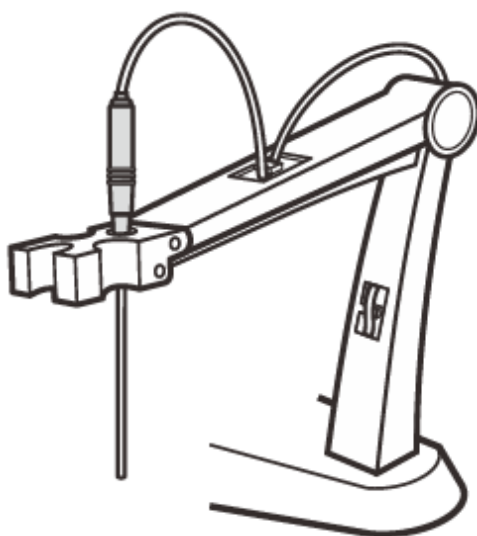
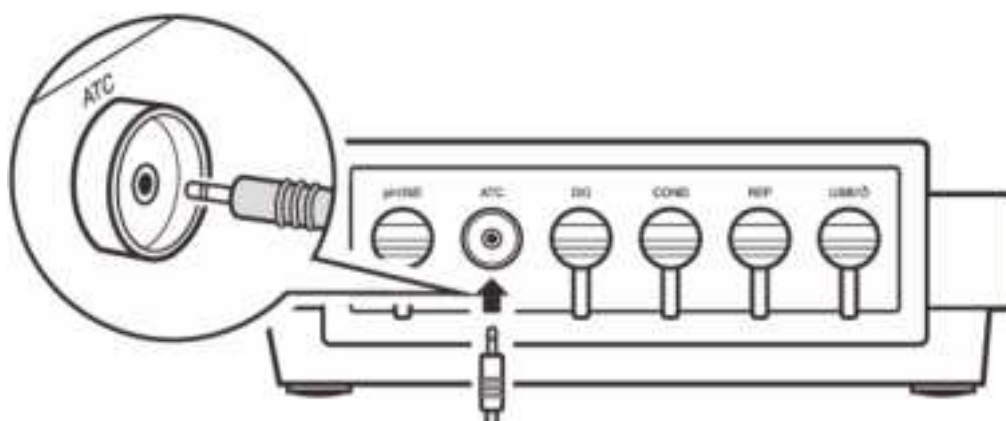


Figure-23



**Step 2:** Place the jack plug into the ATC connector socket. Make sure the connector is inserted all the way.



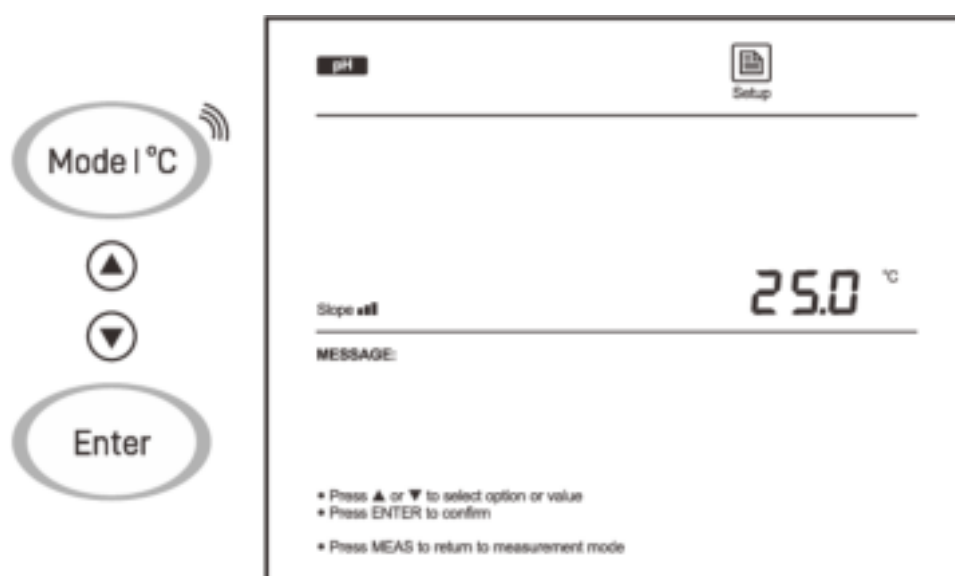
**Figure-24**

## 7.3.2 Calibrating the Temperature Probe

**Step 1:** Place the temperature probe in a solution with a known, accurate temperature and wait for the reading to stabilize.

**Step 2:** Press and hold the °C key to enter the temperature setting.

**Step 3:** Press the ▲ / ▼ key to modify the temperature value, and press the Enter key to save.



**Figure-25**

**Note:** Pressing the **Meas** key will end the calibration without preserving any modifications.

## 7.4 Ion Calibration and Measurement

### 7.4.1 Prior to use

**Step 1:** The ion-selective electrode should be connected to the meter. (Refer to 6.3.2 Connection)

**Step 2:** Take off the protective cap and immerse the electrode for ten minutes or so in a 100 ppm standard solution.

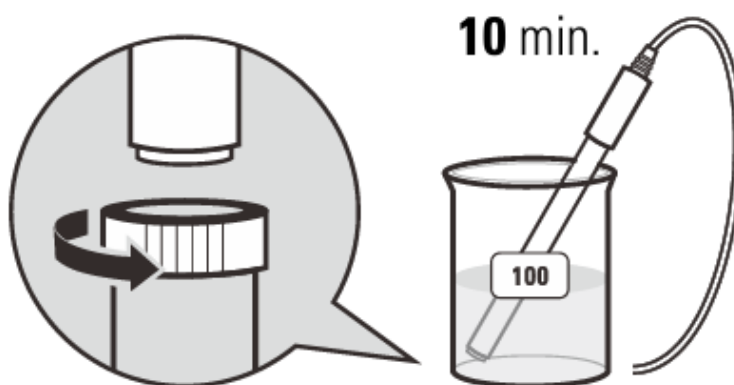


Figure-26

### Selecting the Measurement Mode:

Press the **Mode** key until the **ION** icon appears on the display, and the meter enters the ion concentration measurement mode.

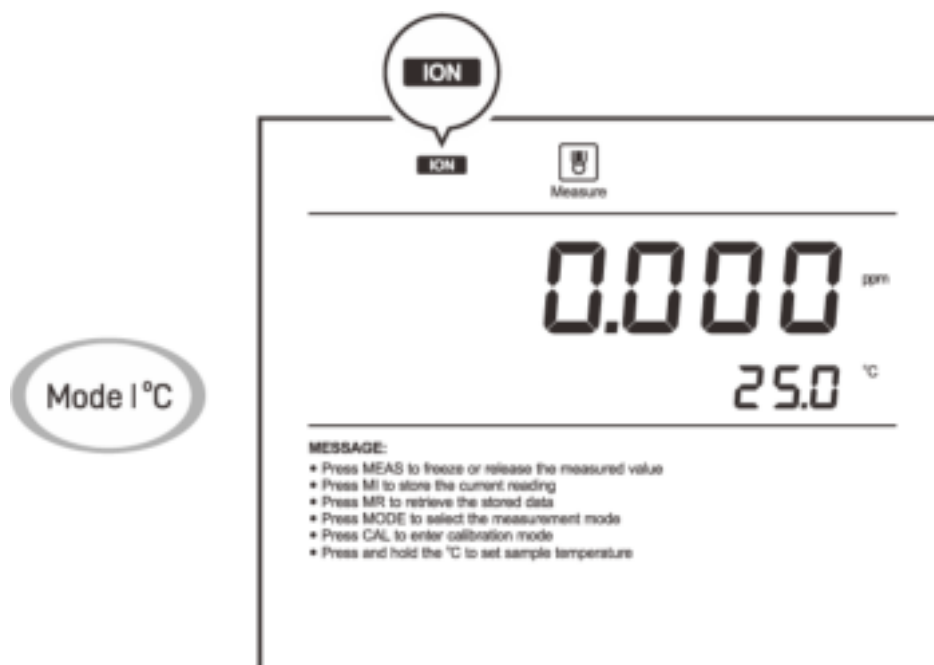


Figure-27

### 7.4.2 Ion Settings

Three measurement settings and seven general options are available in the meter's setup menu.

Menu Item	Option and Description	
UNIT	Measurement Unit Set the ion concentration and temperature units.	
	ppm	Parts per million (default)
	mg/L	Milligrams per liter
	mol/L	Moles per liter
	°C	Degrees Celsius (default)
	°F	Degrees Fahrenheit
CAL	Calibration Points Set the number of calibration points.	
	...5	2 to 5 points (default 2 points)
ION	Ionic Valency Set the ion valence of the electrode.	
	1	Monovalent (default)
	2	Divalent

To access the setup menu and modify the current settings, press and hold the key. Press the ▲ / ▼ key to select an option and press the Enter key to confirm.

**NOTE:** Refer to the Setting a Default Option section.

**Attention:**

If the ion concentration unit has been converted, the meter will show **CAL** always and wait for calibration. The calibration is done by pressing the Cal key and consulting the Ion Calibration section. Upon completion of calibration, the meter will change to the chosen concentration unit.



**Figure-28**

### 7.4.3 Temperature Compensation

We advise turning on temperature compensation during calibration and measurement since the temperature difference between the standard and sample solutions will result in a measurement inaccuracy of about 2% for every degree Celsius of temperature change.

#### 1) Automatic Temperature Compensation

After connecting the temperature probe to the meter, the meter is now in the automatic temperature adjustment mode and the ATC icon shows on the screen.

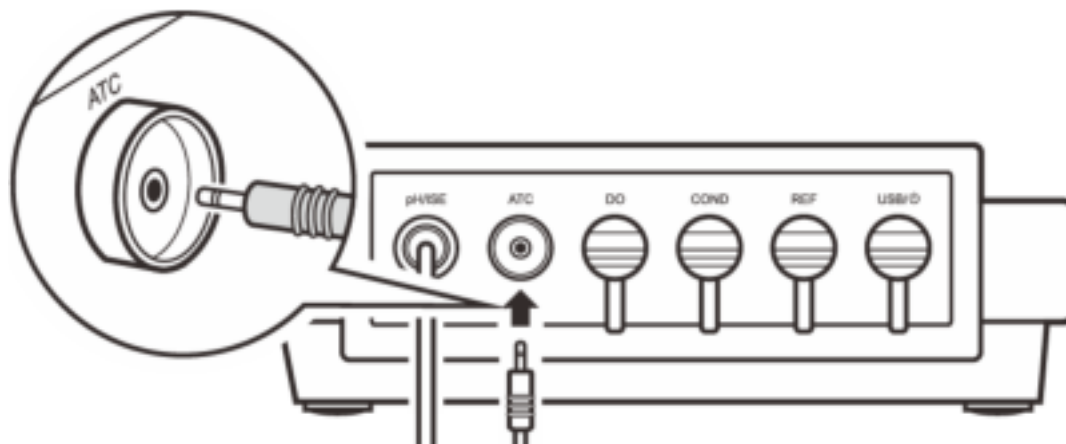


Figure-29

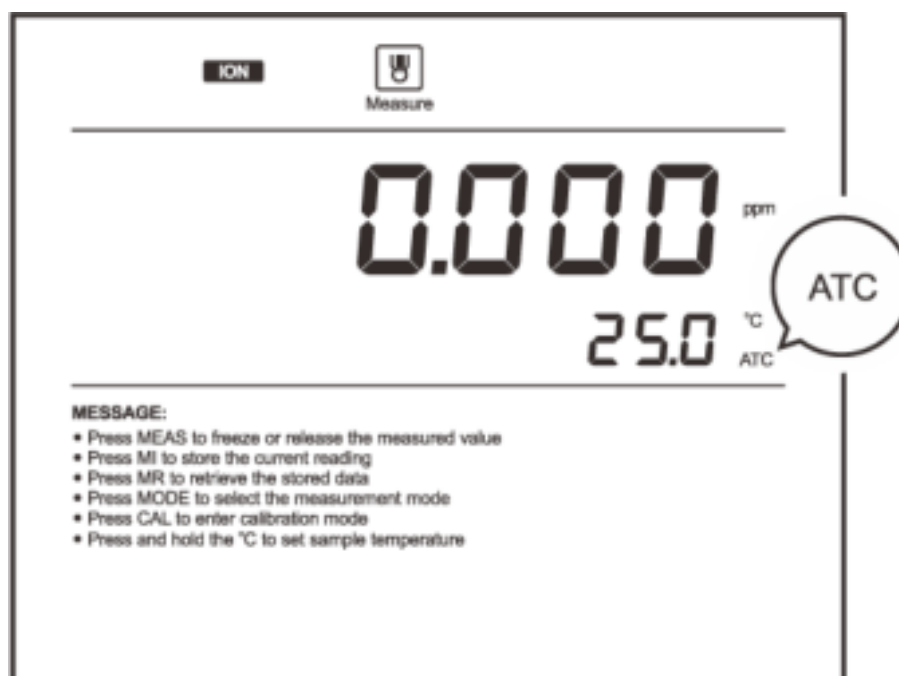


Figure-30

## 2) Manual Temperature Compensation

The meter will display the degrees Celsius indicator (°C), signifying that it is in the manual temperature correction mode, if it is unable to detect a temperature probe. Use the procedures listed below to set the temperature.

**Step 1:** To change the temperature, press and hold the °C key.

**Step 2:** Press the ▲ / ▼ key to modify the temperature value.

**Step 3:** Press the **Enter** key to save.

**Attention:** Press and hold the ▲ / ▼ key will make the value change faster.

### 7.4.4 Ion Calibration

In the ion mode, the meter can be calibrated from 2 to 5 points. The following choices are examples of acceptable calibration points.

Measurement Unit	Calibration Points
ppm	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
mg/L	0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
mol/L	0.001, 0.01, 0.1, 1, 10
mmol/L	0.001, 0.01, 0.1

Make that the ionic valency choice in the setup menu corresponds to the connected electrode before starting the calibration. The temperature of all the standards and samples should be the same, and the calibration points should span the expected range of the samples.

All standards and samples should have an ionic strength adjuster (ISA) added for low concentrations or samples that contain interfering ions. Adding 2 milliliters of ISA to 100 milliliters of standard and sample is a common procedure.

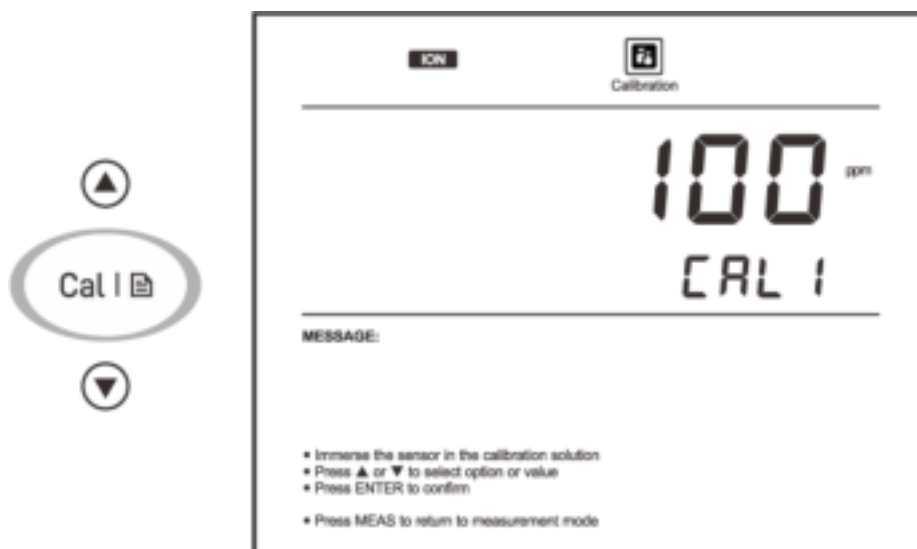
The laboratory plastic beaker should be used as a container for the low-level sodium determination (<1 ppm).

To obtain the most accurate readings, stir the standards and samples consistently.

#### 1) Calibrating the Meter

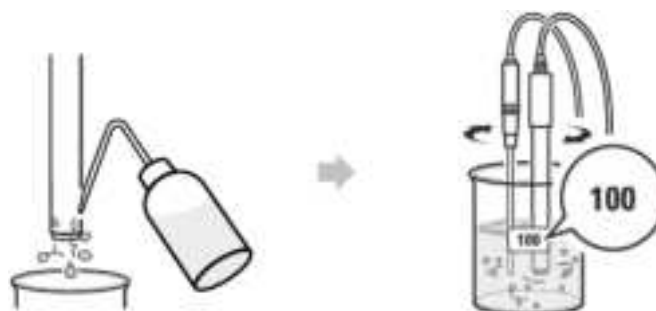
**Step 1:** Depending on the concentration unit chosen, the meter displays 0.001 ppm/CAL1 or mg/L, mol/L, or mmol/L when the Cal key is pressed.

**Step 2:** Press the ▲ key to select the first calibration point (e.g., 100 ppm), the meter will automatically perform the calibration from the low to high concentrations.



**Figure-31**

**Step 3:** Deionized water should be used to rinse the ion-selective electrode before adding a tiny bit of standard solution. To make the solution homogenous, add the electrode (along with the temperature probe) to the standard solution and mix gently.



**Figure-32**

**Step 4:** Press the **Enter** key, and the Calibration icon begins flashing.



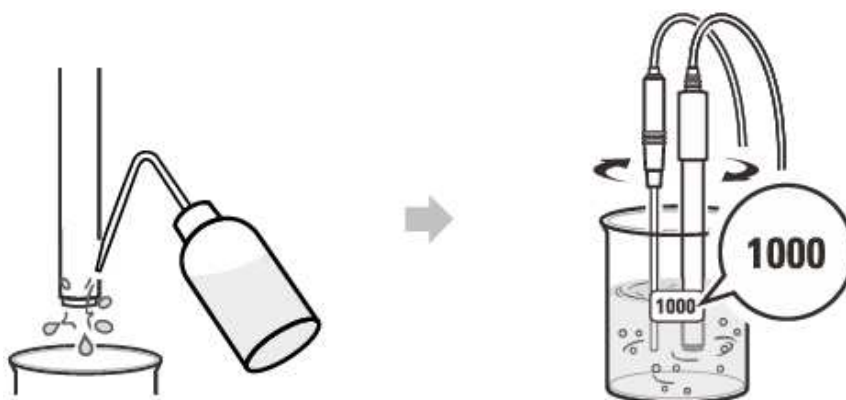
**Figure-33**

**Step 5:** Once the measurement has stabilized, 1000 ppm/CAL2 will appear on the screen. You are prompted by the meter to proceed with the second point calibration.



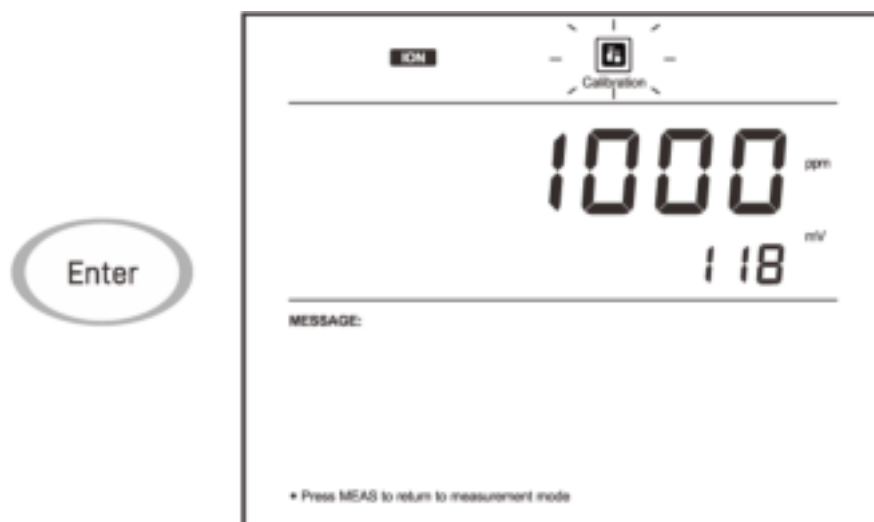
**Figure-34**

**Step 6:** Before rinsing with a small quantity of standard solution, rinse the ion-selective electrode with deionized water. After adding the electrode and temperature probe to the subsequent standard solution, carefully stir.



**Figure-35**

**Step 7:** Press the Enter key, and the Calibration icon begins flashing.



**Figure-36**

**Step 8:** CAL3 will appear on the screen once the reading has stabilized. You are prompted to proceed with the third point calibration by the meter.

**Step 9:** Repeat steps 6 and 7 above until the meter shows *End*. Calibration is completed.



**Figure-37**

**NOTE:** To exit the calibration without saving changes, press the Meas key.

## 2) Viewing the Calibration Log

**Step 1:** Press the MR key in the ion measurement mode and press the ▼ key until the meter shows *ELE/P-02*.

**Step 2:** Press the **Enter** key, and the meter shows the last calibration date.



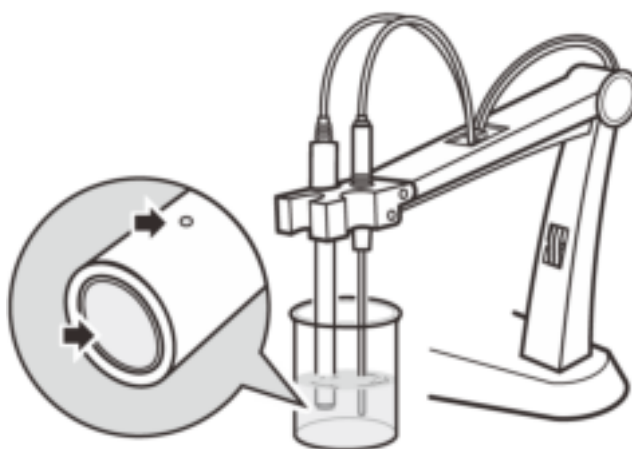


**Figure-38**


**Step 3:** Press the ▼ key to view the calibration point and mV value.

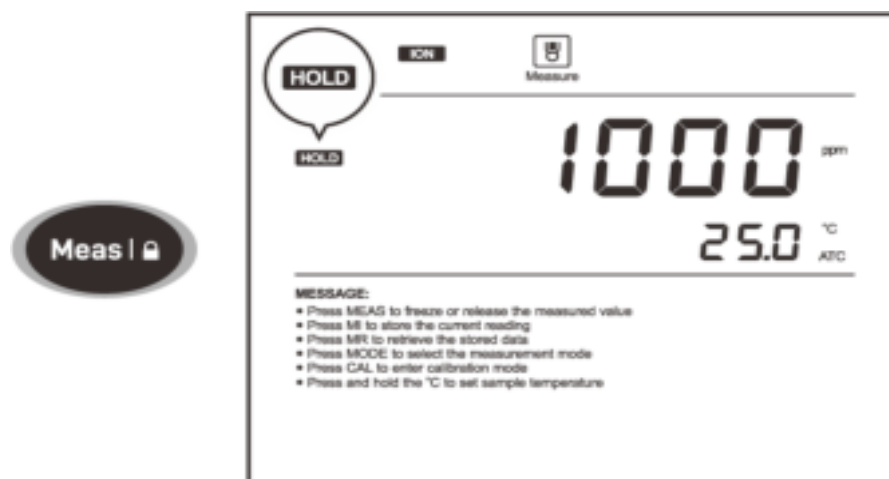
## 7.4.5 Ion Measurement

**Step 1:** Deionized water should be used to rinse the ion-selective electrode. Gently swirl the electrode (along with the temperature probe) into the sample solution. The liquid junction and ion-sensitive membrane need to be fully submerged in the solution.



**Figure-39**

**Step 2:** If the Auto-Hold option in the setup menu is enabled, the meter will automatically sense a stable reading and lock measurement, the **HOLD** icon appears on the display. Press the  key to resume measuring. The meter will continually measure and update the readings if the option is turned off.



**Figure-40**

**Step 3:** Once the measurement has stabilized, take a reading.

**Step 4:** Rinse the electrode with deionized water after measuring every sample.

**NOTE:**

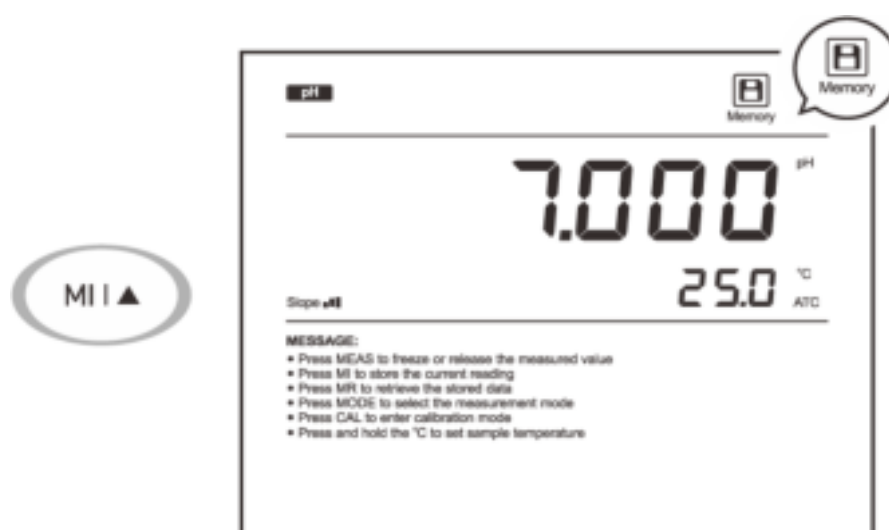
- Never wipe the ion-sensitive membrane while taking a measurement; instead, use a lint-free tissue to blot dry any water droplets that may have landed on the electrode.
- The meter's display will always read 0.000 if the electrode is not calibrated.
- Remove the electrode from the sample right away if the meter displays ----, which indicates that the measurement is outside of the range.

## 7.5 Data Management

The meter can store and recall up to 500 data sets.

### 7.5.1 Storing Measurement Result

Press the MI key during the measurement to save the reading to the memory; the Memory icon will show on the screen.



**Figure-41**

### 7.5.2 Viewing the Data Logs

**Step 1:** Press the MR key in the measurement mode, and the meter shows LOC/P-01.

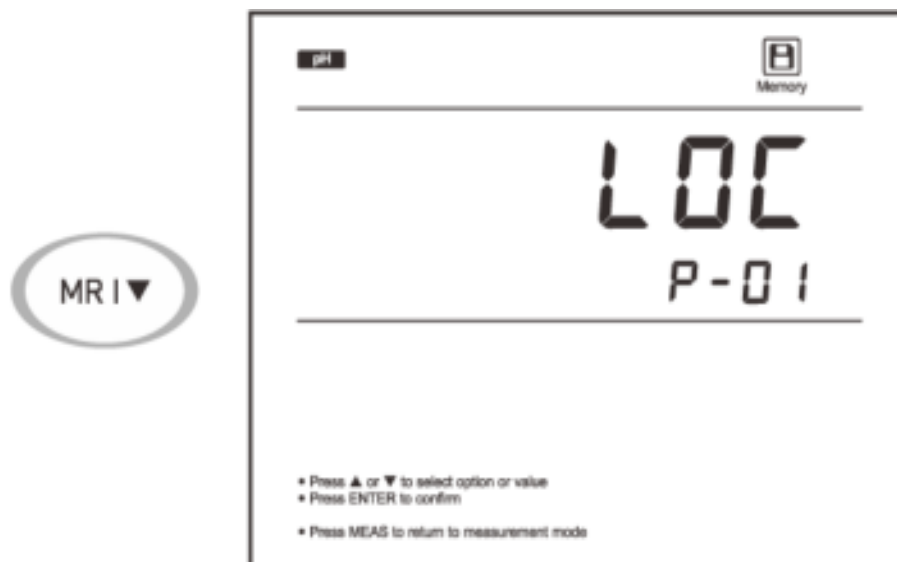


Figure-42

**Step 2:** The meter displays the serial number of the saved data when you press the Enter key.



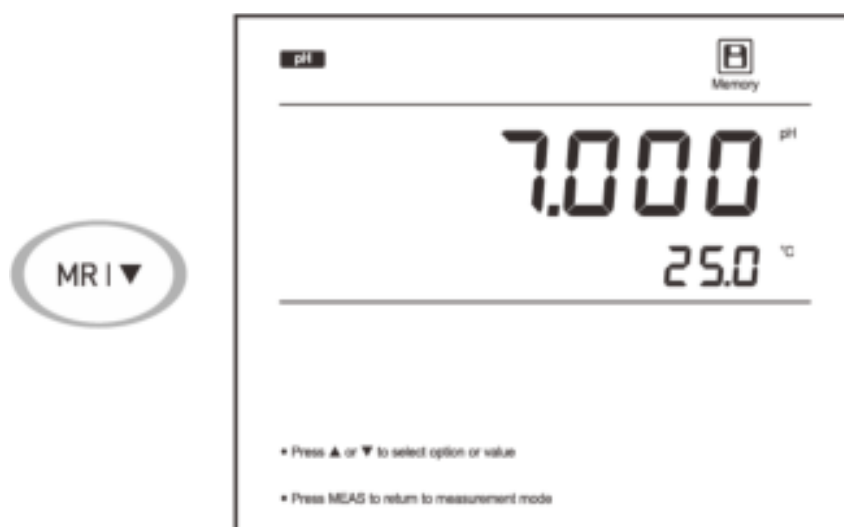
Figure-43

**Step 3:** Press the ▼ key to view the date and time of measurement.



**Figure-44**

**Step 4:** Press the ▼ key to view the stored data.



**Figure-45**

**Step 5:** Press the ▼ key to view the next data set.

**Step 6:** Press the **Meas** key to close the data log.

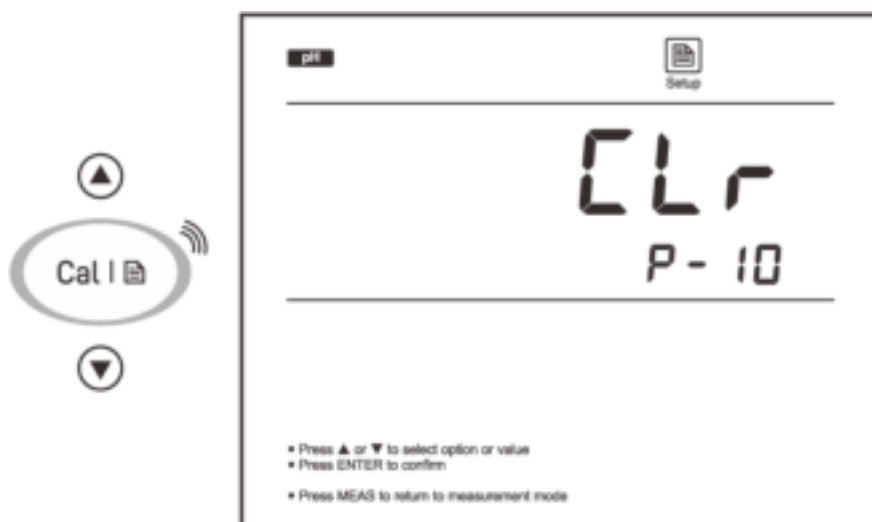
**NOTE:** The display will only show ---- if the meter is not storing any readings.

## 7.5.3 Clearing the Data Logs

The meter will automatically display when the MI key is press if the memory is full. Please follow the instructions below to remove the data logs.

**Step 1:** Press and hold the key to enter the setup menu.

**Step 2:** Press the ▼ key until the meter shows **CLr**.

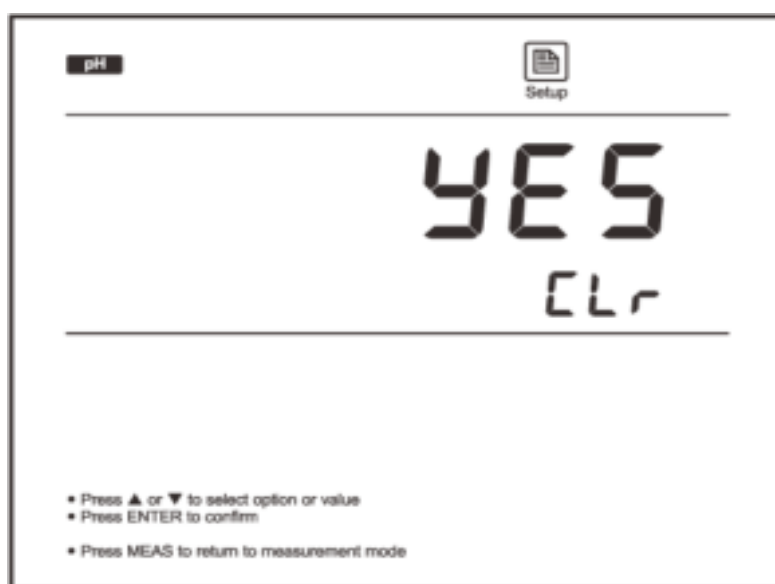


**Figure-46**

**Step 3:** Press the Enter key, and the meter shows *NO/CLr*.

**Step 4:** Press the ▼ key to select the *YES/CLr*.

**Step 5:** To confirm, press the Enter key.



**Figure-47**

## 7.5.4 Communication

The meter may either import the data into Excel using a free program or transfer the data to a computer. This software is available for download on our official website. Ensure your computer has the Windows 10 operating system installed before beginning the installation.

### 1) Receiving the Data

**Step 1:** Click the icon after connecting the USB cable to the meter. "**Found a port on your computer**" appears in a message box after the system automatically searches for an open communication port.

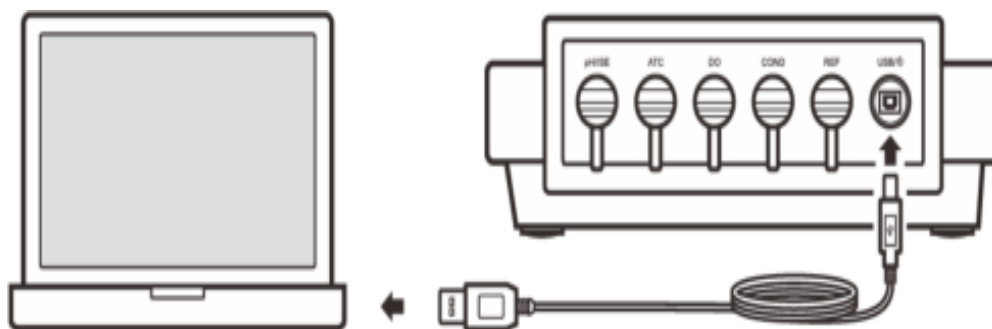


Figure-48

**Step 2:** A message box labeled "**Found a port on your computer**" shows when you click the icon, following an automatic search for an open communication port by the system.

**Step 3:** Click **OK**, and the application starts.

**Step 4:** When you click Connect, "**Port is connected**" appears on the screen.

**Step 5:** The stored data will be automatically transferred to the computer when you click **OK** and then Receive.

### 2) Interval Readings

- Choose a time by clicking the Interval Recording selection box.
- To start recording the readings, click the Receive button.

#### NOTE:

- After a minute, the first data will appear on the screen.
- In the Interval Readings mode, avoid pressing any keys on the meter as this will disrupt communication.

### 3) Creating an Excel File

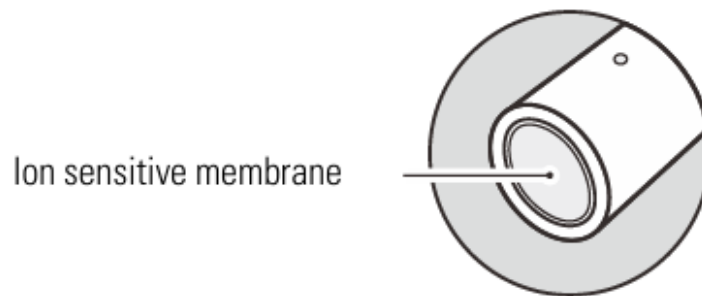
The data sheet's readings will automatically be converted to an Excel file when you click the **Save as** Excel button after the transfer is finished.

**NOTE:** All received data will be erased and unrecoverable after the app has been closed.

### 8. Maintenance

#### 8.1 Electrode Maintenance

- 1) After using the ion-selective electrode, rinse it well with deionized water, wipe it clean with a lint-free tissue, reinstall the protective cap, and keep it somewhere cold, dry, and well-ventilated.
- 2) The electrode's ion-sensitive membrane should never be scratched.
- 3) Soak the electrode for at least an hour in a 100 ppm standard solution if the electrode response starts to lag.



**Figure-41**

#### 8.2 Disposal



The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC of the European Union mandates that this product not be disposed of in household garbage. Use the collection location designated for electrical and electronic equipment to dispose of this product in compliance with local laws.

## 9. Accessories

### Standard Accessories

S. No	Accessory Name
1	Silver ion selective electrode
2	Temperature probe
3	Standard solution (1000 ppm)
4	Ionic strength adjuster (30 mL)
5	USB cable
6	DC 5V Power adapter

### Optional Accessories

S. No	Accessory Name
1	Ag ion selective electrode range: 0.01 to 107900 ppm
2	Ion standard solutions: 480 mL/bottle
3	Ionic strength adjuster: 480 mL/bottle
4	Temperature probe with sensor



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