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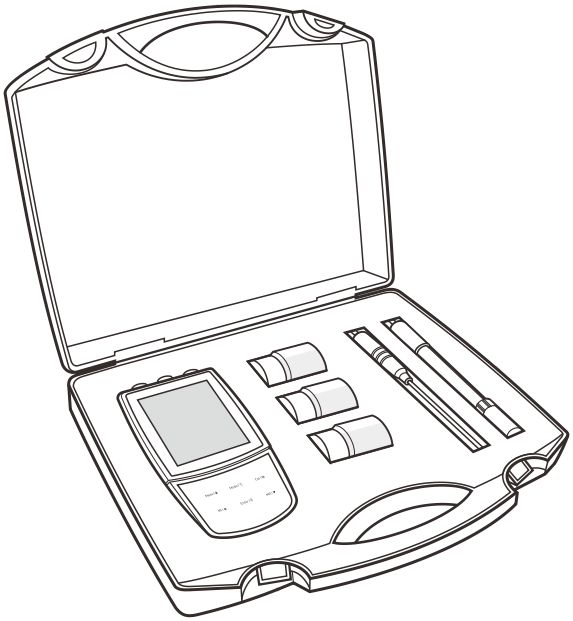
BANTE instruments

Bante 220 Portable pH Meter

USER MANUAL



Bante Instruments Inc.

Introduction

Thank you for selecting the 220 portable 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.

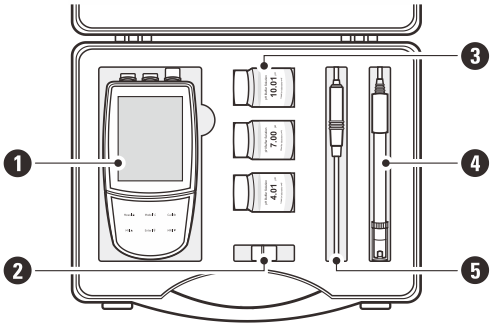
Environmental Conditions

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

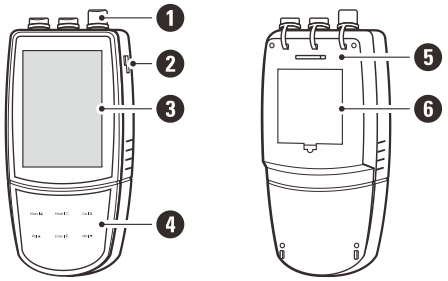
Packing List

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

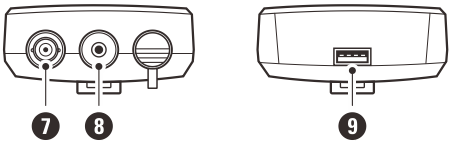


1	220 meter	4	pH electrode
2	Electrode clip	5	Temperature probe
3	pH buffer solutions		

Meter Overview

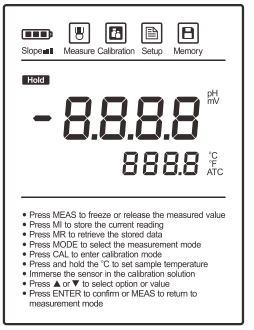


1	Sensor connections	4	Membrane keypad
2	Slot for electrode clip	5	Slot for hand strap
3	Display	6	Battery compartment



7	Socket for pH or ORP electrode (BNC)
8	Socket for temperature probe (3.5 mm jack)
9	USB-A interface to the computer or power adapter

Display



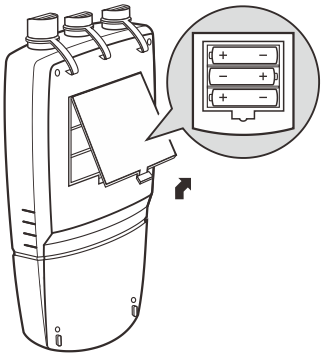
Icon	Description
	Indicates that the meter is in the measurement mode
	Indicates that the meter is in the calibration mode
	Indicates that the meter is in the setup mode
	Indicates that you are viewing the stored readings or a reading is stored into the memory
	When the battery voltage falls below the minimum power requirements, the icon automatically disappears
Slope	If the electrode slope exceeds the allowed range after calibration, the icon automatically disappears
HOLD	Indicates that the measurement is locked
ATC	Indicates that the automatic temperature compensation is enabled

Keypad

Key	Function
Meas I 🔒	• Switch the meter on or off • Lock or unlock the measurement • Exit the calibration, settings, data logs and return to the measurement mode
Mode I °C	• Select the pH or mV mode • Press and hold the key to enter the temperature setting
Cal I 🗎	• Start calibration • Press and hold the key to enter the setup menu
MI I ▲	• Store current reading to memory • Increase value or scroll up through a list of options
MR I ▼	• View the data log or calibration log • Decrease value or scroll down through a list of options
Enter I 💡	• Confirm the calibration or displayed option • Press and hold the key to switch the backlight on or off

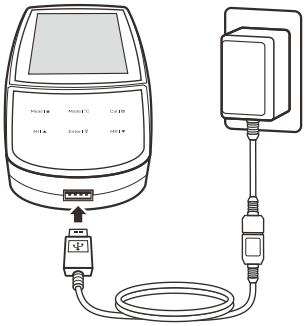
Installing the Batteries

1. Remove the battery compartment cover from the backside of the meter, insert three AA batteries into the battery compartment, note polarity.



2. Replace the battery compartment cover to its original position, push the limiter until it locks.

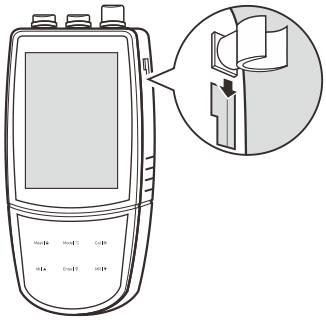
The meter allows using the DC 5V power adapter (order code: DCPA-5V) or the USB port on computer as a power supply.



Note, take out the batteries before connecting an external power supply.

Installing the Electrode Clip

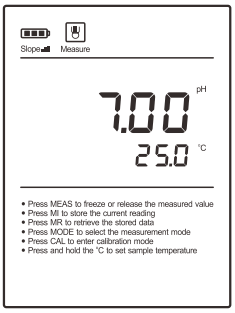
The electrode clip is designed for mounting a sensor, but it is not a necessary component for meter. If you want to install this accessory, insert the electrode clip into the slot on the right of the meter.



Switching the Meter On and Off

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

Meas I 🔒



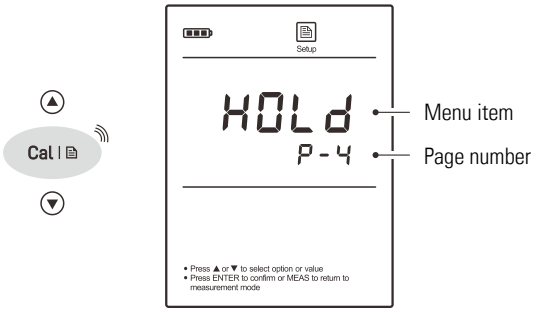
Meter Setup

The 220 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.

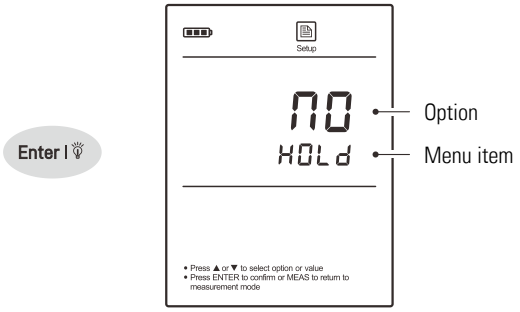
Menu Item	Option and Description	
CAL	**Calibration Points** Set the number of calibration points.	
	1	1 point
	2	2 points
	3	3 points (default)
bUF	**pH Buffer Group** Set the pH buffer group for calibration and auto-recognition.	
	USA	USA (default)
	nIST	NIST
UnIt	**Measurement Unit** Set the default 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 30 minutes.	
	YES	Enable
	nO	Disable (default)
CLr	**Clear Stored Data** Delete all data logs in the memory.	
	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 a Default Option

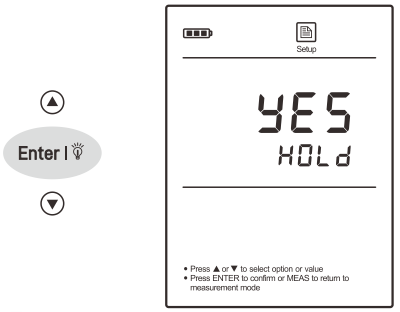
1. In the measurement mode, press and hold the 🗎 key to enter the setup menu.
2. Press the ▲ / ▼ key to select a menu item.



3. Press the **Enter** key, the meter shows the current option.



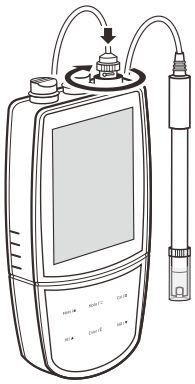
4. Press the ▲ / ▼ key to select a desired option.
5. Press the **Enter** key to save and return to the measurement mode.



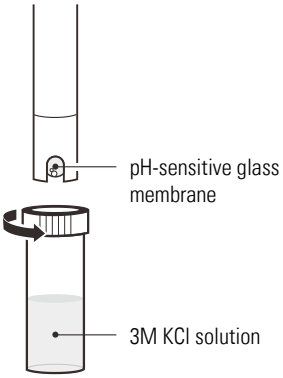
To exit the setup menu without saving changes, press the **Meas** key.

Connecting the Electrode

1. Take out the pH electrode from the carrying case. Insert the BNC connector into the connector socket on meter, rotate and push the connector clockwise until it locks.



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



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.

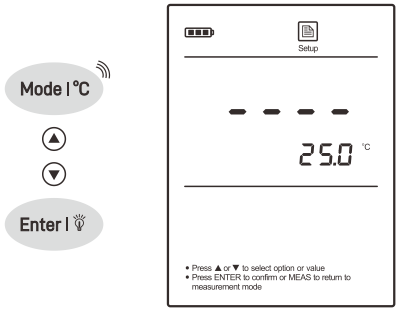
Automatic Temperature Compensation

Connect the temperature probe to meter (refer to figure 1). 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 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 and hold the **°C** key to enter the temperature setting.
2. Press the ▲ / ▼ key to modify the temperature value.
3. Press the **Enter** key to save.

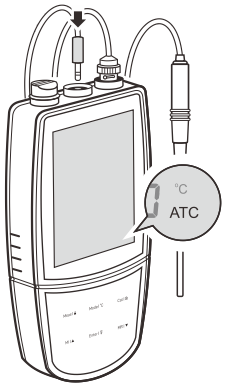


Press and hold the ▲ / ▼ key will make the value change faster.

Temperature Calibration

The 220 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.

- Make sure that the temperature probe is connected to meter and place into a solution with a known accurate temperature.
- Wait for the measurement to stabilize.
- Refer to the ***Manual Temperature Compensation*** section, repeat steps 1 through 3.



(Figure 1)

pH Calibration

The 220 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 pH 7.00 or 6.86, otherwise calibration will not be accepted.

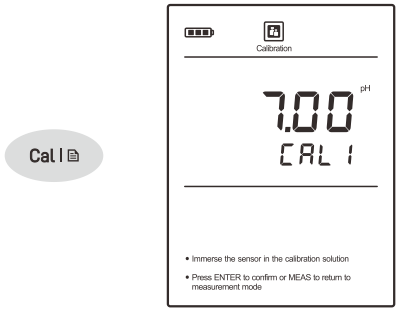
Make sure to calibrate the meter when attaching a new pH electrode or during first use. Do not reuse the buffer solutions after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Stir the pH buffer and sample solutions at a uniform rate that will help you get most accurate readings.

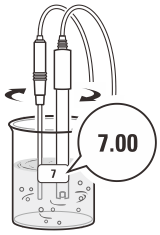
Single Point Calibration

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

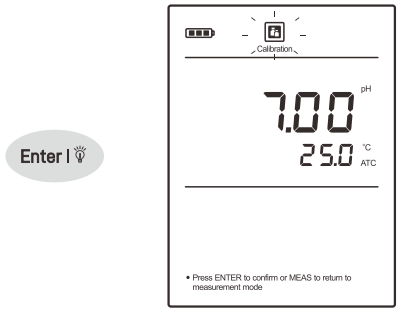
1.2 Press the **Cal** key, the meter shows 7.00/CAL 1 or 6.86/CAL 1, depending on the selected pH buffer group.



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.

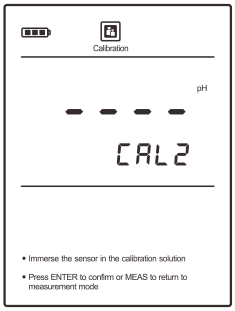


1.5 When the reading has stabilized, the meter will show End and return to the measurement mode.

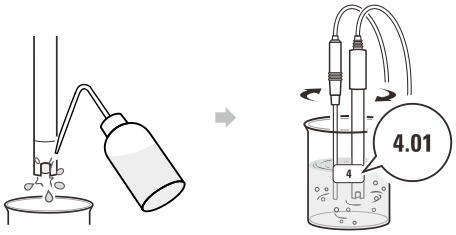
Multipoint Calibration

2.1 Ensure that you have selected 2 or 3 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.

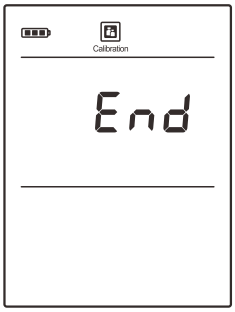


2.3 Rinse the pH electrode with distilled water, place the electrode (and temperature probe) into the next buffer solution (e.g., pH 4.01).



The meter will automatically recognize the buffer solution and begin the calibration, the Calibration icon continuously flashing.

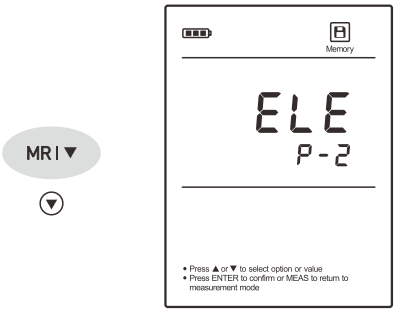
2.4 When the reading has stabilized, the display will show ----/CAL3. The meter prompts you to continue with third point calibration.
2.5 Repeat the step 2.3 above until the meter shows End. Calibration is completed.



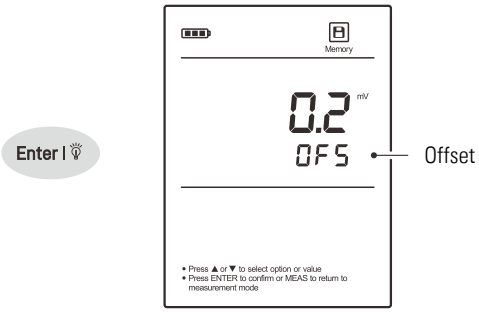
- During the calibration, if the display shows ---- indicating the meter is waiting for recognizing the pH buffer solution.
- If the display shows Err, please check the pH electrode and ensure the buffer solutions are fresh and uncontaminated.
- If the calculated electrode slope is not between 70% to 110%, Slope icon will disappear from the display, you should consider replacing the electrode.
- To exit the calibration without saving changes, press the **Meas** key.

Viewing the Calibration Log

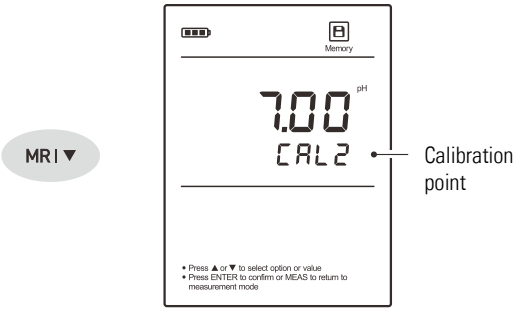
3.1 Press the **MR** key in the measurement mode and press the ▼ key until the meter shows ELE / P-2 (Electrode / Page 2).



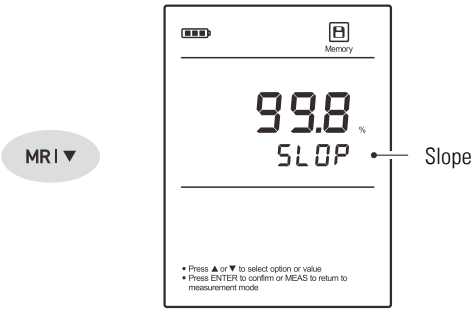
3.2 Press the **Enter** key, the meter shows the zero-point offset.



3.3 Press the ▼ key to view the calibration point 1.
3.4 Press the ▼ key to view the calibration point 2.



3.5 Press the ▼ key to view the electrode slope.



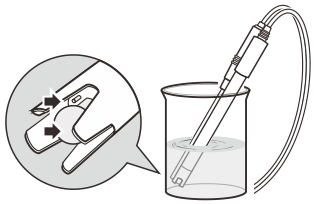
3.6 To exit the calibration log, press the **Meas** key.

If the meter is not calibrated, the display will show ---- only.

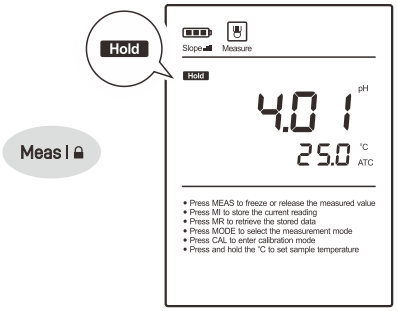
Measurements

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 lock the measurement endpoint and show HOLD icon. 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

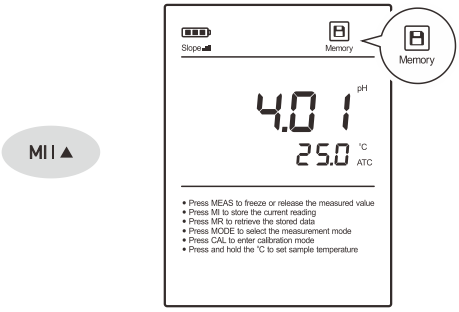
2.1 Press the **Mode** key to switch the meter to mV mode.
2.2 Rinse the electrode and place into the sample solution, stir gently.

Data Management

The 220 meter is capable of storing and recalling up to 100 data sets.

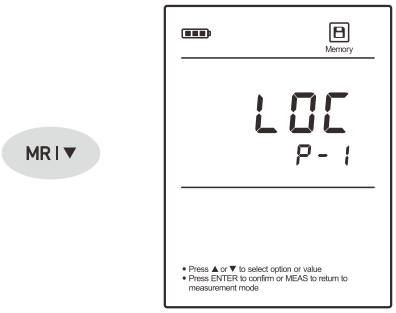
Storing a Measurement Result

In the measurement process, press the **MI** key to store the reading into the memory, the Memory icon appears on the display.

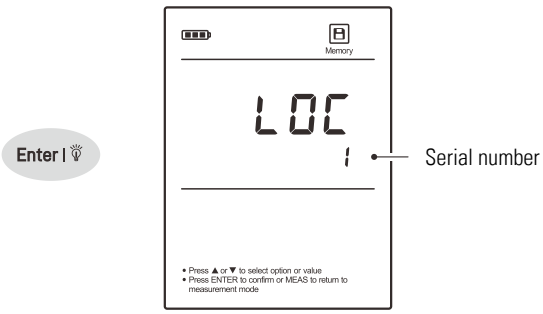


Viewing the Data Logs

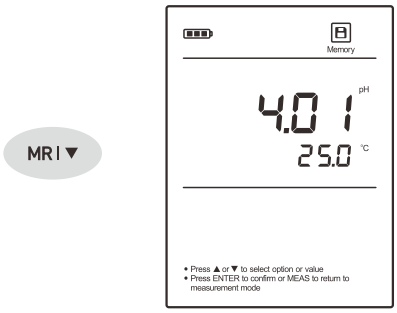
1.1 Press the **MR** key in the measurement mode, the meter shows LOC/P-1 (Log/Page 1).



1.2 Press the **Enter** key, the meter shows the serial number of the stored data.



1.3 Press the ▼ key to view the stored data.



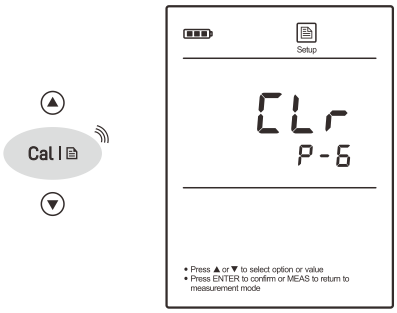
1.4 Press the ▼ key to view the next data set.
1.5 To exit the data log, press the **Meas** key.

If the meter does not store any reading, the display will show ---- only.

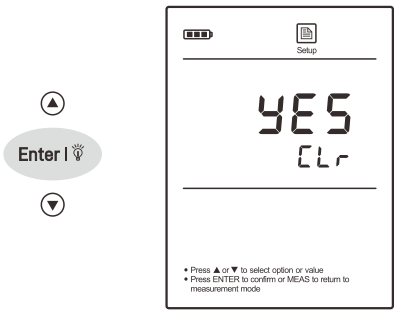
Clearing the Data Logs

If the memory is full, the meter will automatically show FULL when the **MI** key is pressed. To delete the data logs, please follow the steps below.

2.1 Press and hold the key to enter the setup menu.
2.2 Press the ▲ key until the meter shows CLr/P-6.



2.3 Press the **Enter** key, the meter shows NO/CLr.
2.4 Press the ▲ key to select the YES/CLr.



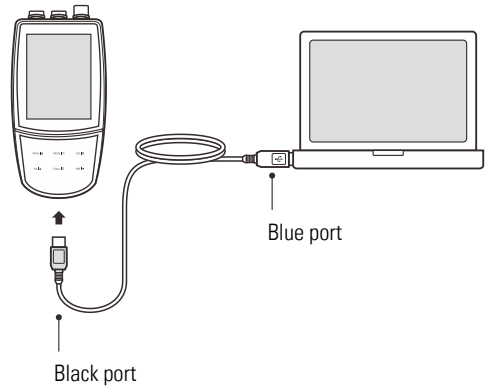
2.5 Press the **Enter** key to confirm.

Communication

The 220 meter can transfer data to a computer or export data to Excel using DAS software. You can download the software from our official website.
Before installation, make sure that Windows 10 is installed on your computer and that you have a USB-2303A data cable.

Receiving the Data

1. Connect the black port of the data cable to the meter and the blue port to the computer.



2. Open the "DAS_220_520_820_EN" folder.
3. Double-click "**220_520_820_APP**". The system will automatically scan for an available port and display "Device port successfully recognized."
3. Click **OK** to start the application.
4. Click **Connect**. The screen displays "Connection established."
5. Click **OK** to continue.
6. Click **Receive**. The measurement values stored in the meter are automatically transferred to the computer.

Interval Recording

This function helps the user record measurement values at regular intervals over a specified time period. The recording interval can be set to 10/30/60 seconds, 10/30 minutes, or turned off.

1. Click the Interval Recording dropdown and select a parameter.
2. Click **Receive** to begin automatically transferring the measured values to the data sheet.

Creating an Excel File

1. Click **Save as Excel** to open the Save As dialog.
2. Enter a file name, then click **Save**.

Once the software is closed, all received measurement values will be lost and cannot be recovered.

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.

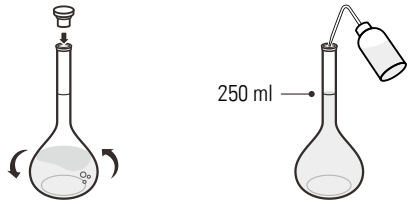
Appendix

Preparation of pH Buffer Solutions

The 220 meter is packaged with pH 4.01, 7.00, 10.01 buffer reagents required for calibration.

1. 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 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.

Preparation of Electrode Storage Solution

Dissolve 24.6 grams of analytical grade KCl reagent in 100 ml distilled water.

Optional Accessories

Electrode Cleaning Solutions

Order Code	Description
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

Electrode Storage Solution

Order Code	Description
PHCS-ES	For maintaining pH electrodes, 480 ml

pH Buffer 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

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

Communication and Power Supply

Order Code	Description
USB-2303A	USB Type-A to Type-A data cable, 1 m (3.3 ft)
DCPA-5V	DC 5V power adapter, european standard plug

Meter Specifications

Model	Bante 220
pH	
Range	-2.00 to 20.00 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	0.1 (0.0 to 999.9), 1 (1000 to 1999) mV
Accuracy	±1 mV
Temperature	
Range	0 to 105°C (32 to 221°F)
Resolution	0.1°C (0.1°F)
Accuracy	±0.5°C (±0.9°F)
Calibration Point	1 point
Other Specifications	
Memory	100 data sets
Communication Interface	USB-A
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, 80 × 60 mm (3.15 × 2.36 in.)
Power Requirements	3 × 1.5V AA alkaline batteries or DC 5V power adapter
Auto-Off	30 minutes after last key pressed
Dimensions	170 (L) × 85 (W) × 30 (H) mm, (6.69 × 3.35 × 1.18 in.)
Weight	300 g (10.5 oz.)

Troubleshooting

Fault	Cause and Corrective Action
Screen shows - - - -	Electrode dried out. Soak the pH electrode in 3M KCl solution for about 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.
Keypad is not working	Replace the batteries.

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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