

# Smart Multimeter eXact pH+

## Training Document

Please note: Information in this document gives only a short overview of the most important aspects.  
 Read the entire meter manual before starting your activities!



# Introduction



## pH measuring principle

The pH value (abbreviation for potential of hydrogen  $H^+$ ), is a measure of the acidic or basic character of an aqueous solution. The higher the concentration of hydrogen ions in the solution, the lower the pH value.

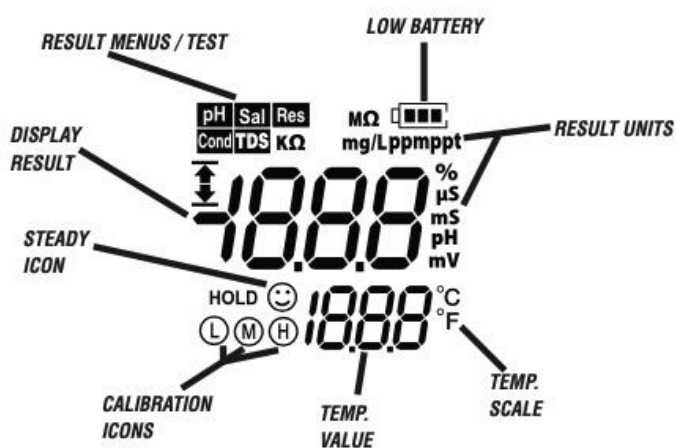
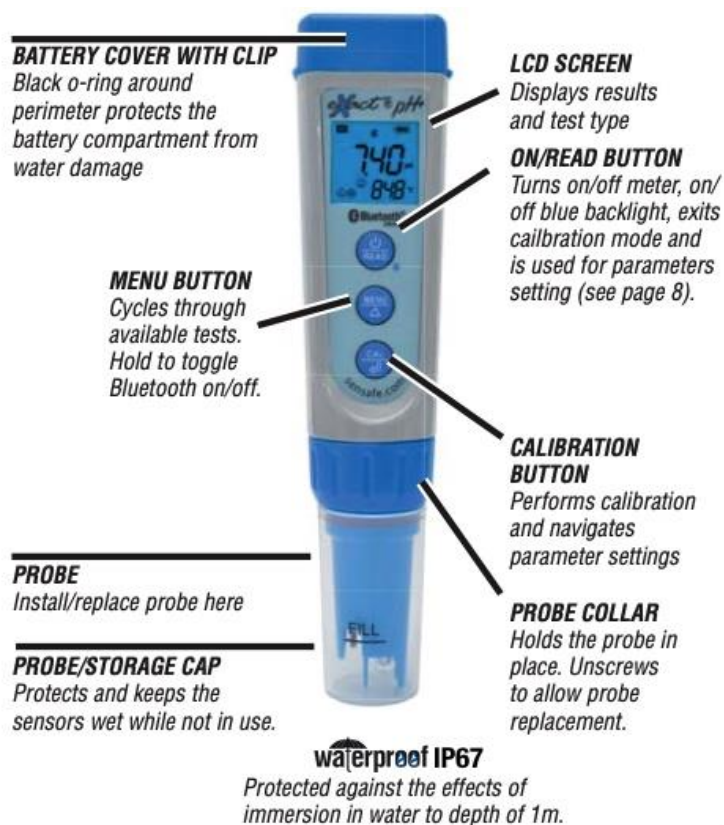
The glass electrode for measuring the pH has a glass bulb specifically designed to be selective to hydrogen-ion concentration.

## Conductivity, TDS, Salinity, Temperature measuring principle

The electrolytic conductivity is a sum parameter for dissolved, dissociated substances. The constituents dissociated as ions give the water an electrical conductivity.

The measuring cell consists of 2 metal electrodes to which an alternating voltage is applied, and which are immersed in a solution. The electrical current flow between the two electrodes is measured. The device calculates the value for TDS and Salinity from the conductivity value and the temperature.

## Your Meter



## Advantages

- Providing results for pH, Conductivity, TDS and Salinity in one meter → Economical
- Connect the meter to a smart device via Bluetooth and use the free app for data management with many advantages.
- Portable
- Waterproof
- Robust (dry electrode does not cause irreparable damage to the probe)

## Before Testing

### pH Probe Check

- Always store the pH probe in clean 4.00 pH buffer solution. Pour pH 4.0 buffer solution up to the "FILL" line of the storage cap to completely immerse the pH glass bulb. If the probe by accident was stored dry, soak in pH 4.00 storage buffer for at least 4 hours to restore the probe's sensitivity.
- If first-time use, or if the meter hasn't been used for a long time, add 3M KCL storage solution into the probe cap to the fill line (about 1/5 of the cap) and soak probe for a minimum of 15 minutes. Rinse the probe and place into the pH 4.00 storage solution.

### Calibration Solution Check

- ~~Avoid any contamination of calibration solutions~~
- To maintain the accuracy of the buffer solutions, replace them before ten (10) uses. To prevent contamination, NEVER pour used Buffer solutions back into the original Buffer solution bottles. If possible, find a local supplier of pH and conductivity buffer solutions (see manual for type of buffers needed)

# Best practice test methodology

The eXact pH+ Meter was especially engineered/designed for the nontechnical service person who requires a quick and accurate (within  $\pm 0.05$ ) on-site pH measurement. The test methodology, if followed carefully, is this:


- Perform 2-point calibration weekly and store pH probe in 4.00 pH Buffer between measurements. During the week of use, each time you power ON eXact pH+ meter, the pH should display between 3.97 and 4.03. This verifies the meter is still maintaining calibration. When display is  $< 3.97$  or  $> 4.03$ , discard the solution and pour a fresh pH 4.0 buffer solution and check display again. Remove Probe Storage Cap and set aside with pH 4.00 Buffer solution. Rinse the pH probe with clean water, then proceed to pH measurement.

## Calibrate the meter


Calibrate the meter for pH and conductivity by following step-by-step the provided instruction:

**10 PH CALIBRATION PROCEDURE**

**Things needed in addition to what's in the kit:**  
A clean plastic cup, clean water (distilled, deionized, or purified bottled water) for rinsing, and soft paper towels for drying the outside body. Ensure pH probe is securely installed (see image at right). If not, see page 6 for Probe Replacement.

**1 POWER ON METER**  
Press the  button 1 second to turn on the meter.






**2 RINSE PH PROBE**  
Remove Probe/Storage Cap and use clean water to thoroughly rinse the pH probe. Wipe probe body with soft paper towel or cloth to remove excess water. (never rub or touch the pH glass bulb)

**3 SELECT MENU**  
Press and re-press the  button until the pH test parameter appears.






**NOTE:** If pH 4.00 Storage Solution reads between 3.96 to 4.04 then Calibration of exact pH is not needed unless you require best Accuracy. If your pH 4.00 Storage Solution pH reads between 3.90 to 4.10, a 1-POINT Calibration (7.00) may be adequate. After 1-POINT Calibration with 7.00 Standard and the reading of a fresh pH 4.00 Storage Solution reads very close to 4.00, you can elect to use unit for measuring or elect to complete 2nd POINT Calibration with the pH 4.00 Storage Solution.


**PH CALIBRATION PROCEDURE 11**

**PREPARATION FOR 1-POINT, 2-POINT CALIBRATION**  
Quality 7.00 pH and 4.00 pH calibration solutions should be in place in calibration bottles. Refresh standards if used more than ten times. Be sure the bottle has enough of the standard to completely immerse the bulb sensor into the solution.

**4 RUN 1<sup>ST</sup> CALIBRATION (1-POINT)**  
Dip the meter in 7.00 pH calibration solution, swirl gently, and allow the probe to sit in the solution until a stable reading is reached. Press and hold the  button to enter calibration mode until green backlight appears (press  to exit). When the  stable icon appears on the LCD, press the  key until green backlight starts blinking. Once the green backlight disappears 1-POINT calibration is complete. The meter returns to measurement mode and the  icon will appear at the bottom left of the LCD.

**5 RINSE PH PROBE**  
Remove Probe/Storage Cap and use clean water to thoroughly rinse the pH probe. Wipe probe body with soft paper towel or cloth to remove excess water. (never rub or touch the pH glass bulb)


**6 RUN 2<sup>ND</sup> CALIBRATION (2-POINT)**  
Dip the meter in 4.00 pH calibration solution, stir gently, and allow the probe to sit in the solution until a stable reading is reached. Press and hold the  button to enter calibration mode until green backlight appears (press  to exit). When the  stable icon appears on the LCD, press the  key to complete one-point calibration. Once the green backlight disappears 2-POINT calibration is complete. The meter returns to measurement mode and the  icons will appear at the bottom left of the LCD.

**7 RUN 3<sup>RD</sup> CALIBRATION (OPTIONAL)**  
If necessary, rinse the probe in distilled water, blot it dry, enter calibration mode, and then dip the meter in 10.01 pH buffer solution (not supplied in kit and sold separately). Repeat as in step 6 to complete the 3 point calibration. The  icons will appear at the bottom left of the LCD.


**14 CONDUCTIVITY PROCEDURES**

**Things needed in addition to what's in the kit:**  
A clean plastic cup, clean water (distilled, deionized, or purified bottled water) for rinsing, and soft paper towels for drying the outside body. Ensure pH probe is securely installed. If not, see page 6 for Probe Replacement.



**CALIBRATION PROCEDURE**




**1 POWER ON METER**  
Press the  button 1 second to turn on the meter.

**2 RINSE METER SENSORS**  
Remove Probe/Storage Cap and use clean water to thoroughly rinse the pH probe. Wipe probe body with soft paper towel or cloth to remove excess water. (never rub or touch the pH glass bulb)

**3 SELECT MENU**  
Press and re-press the  button to select the conductivity test parameter.

**4 CALIBRATION SOLUTION**  
Pour 1413µS/cm and 12.88 mS/cm conductivity calibration solutions into separate calibration bottles. Pour enough to completely immerse the sensors into the solution.

**5 ENTER CALIBRATION MODE**  
Press and hold the  button to enter calibration mode (press  to exit).

**6 RUN CALIBRATION**  
Dip the meter in 1413 µS/cm calibration solution, stir gently, and allow the probe to sit in the solution until a stable reading is reached. When the  stable icon appears on the LCD, press the  key to complete one-point calibration. The meter returns to measurement mode and the  icon will appear at the bottom left of the LCD.

**CONDUCTIVITY PROCEDURES 15**

**7 RINSE METER SENSORS**  
Rinse the sensors in clean water and blot dry (never rub or touch the pH glass bulb)

**8 VERIFY CALIBRATION**  
After calibration, dip the meter in 12.88 mS/cm calibration solution. If the value is accurate, it is not necessary to conduct a 2nd point calibration. If it is inaccurate, follow steps 5 to 6 to complete the 2<sup>nd</sup> point calibration using the 12.88 mS/cm buffer solution.

**Important:** Use a logbook for each pH+ multimeter you may possess to document all calibrations in the following manner:

Date	Buffer solutions used	Signature	Comments

## Additional internal quality control Check

Whether you are a professional laboratory or a company that checks water quality internally, your task is to ensure that the uncertainty of your measurements is as low as possible. Therefore, regular internal quality control of your equipment is a must!

If you are not operating a professional water laboratory, you probably do not have a mature quality management system in place which ensures that your equipment is well controlled. In this case, we recommend that you carry out the following quality control measures at least every 6 months (without guarantee):

1. **Test for reproducibility:** The same sample is tested by at least two different instruments. Results should be identical. (second pH+ multimeter required)

## Testing with the meter

Remember that pH and conductivity are parameters that are very sensitive to environmental conditions. They must be measured immediately on site, otherwise they can fluctuate to a considerable extent.

### Materials needed

- pH+ Multimeter
- Clean sample collection bottle (provided)
- Clean Water (distilled, deionized , or purified bottled water) for rinsing in-between samples
- Soft paper towels for drying the probe

### How to test?

**Perform a testing for pH, conductivity, TDS and Salinity exactly as described in the pH+ Multimeter instructions.**

# Maintenance & Storage

## Maintenance

- Take care of your buffer solutions
- Follow calibration procedure properly
- Rinse cell immediately with clean water after a test is completed
- Do not touch or rub the pH glass bulb.
- Always rinse pH probe properly with clean water in between measurements and before putting in storage solution.

## Storage

- Store the meter and all test materials out of direct sunlight, heat, and away from chemical storage areas. **Minimize exposure of meter and calibration solutions to heat above 100°F (38°C).**
- Pour pH 4.0 buffer solution up to the "FILL" line of the storage cap. **Always store the pH probe in clean 4.00 pH buffer solution.**

## Trouble shooting procedure:

1. Battery check
2. Perform calibration with clean buffer solutions
3. Contact LETZTEST

## Notes

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