

Premium Series

PH60S Spear pH Tester

pH | mV | Temperature

User Manual



Table of Contents

1. What's in the Kit.....	3
2. Keypad Functions	3
3. Preparation before Use.....	4
4. pH Calibration	4
5. pH Measurement.....	5
6. Probe Cleaning.....	6
7. Probe Storage.....	6
8. Parameter Settings	6
9. ORP Measurement	7
10. Technical Specifications.....	8
11. Other Specifications.....	8
12. Probe Replacement	9
13. Battery Replacement.....	10
14. Troubleshooting Guide	11
15. Limited Warranty	12

Thank you for purchasing Apera Instruments PH60S Premium Spear pH Tester. Please read this manual before use in order to properly use and maintain the product.

PH60S Spear pH tester is designed for direct spear test of solid and semi-solid samplings such as cheese, fruits, sushi rice, meats, dough. It also works well in general water solutions.

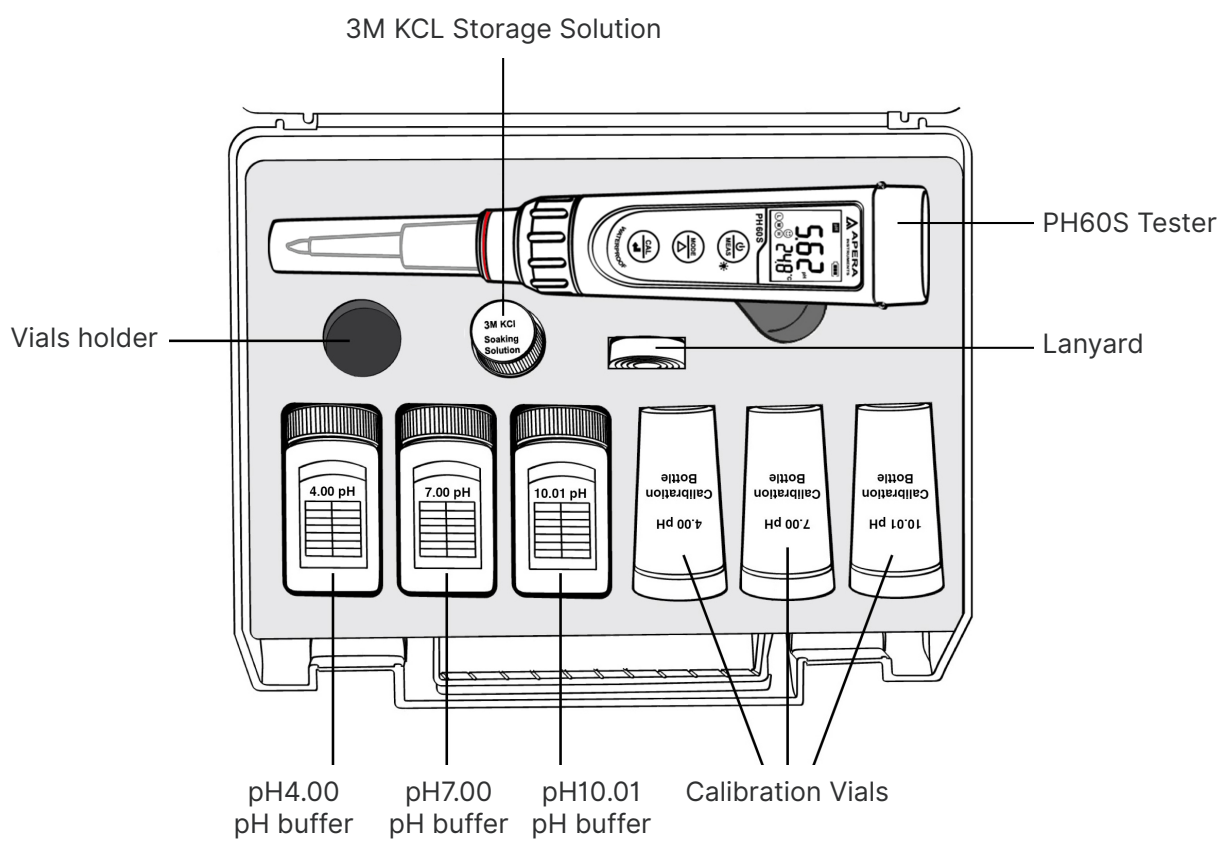
We do not recommend using PH60S to test samples containing large amount of small particles such as soil as it may clog the probe junction and cause malfunction. For soil pH test, the suitable model is GroStar GS2 (SKU: AI102G).

For video tutorials, please go to support.aperainst.com

ATTENTION

- Never use the product when it's freezing cold. Let it warm to room temperature before using.

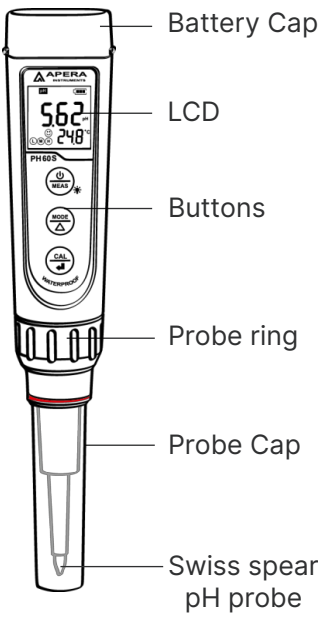
1. What's in the Kit



2. Keypad Functions

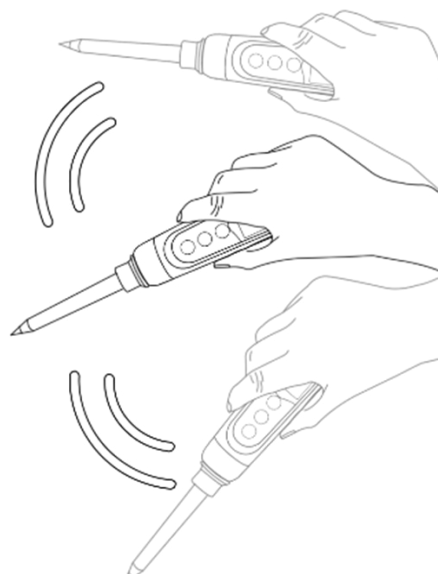
Short press: < 2 seconds Long press: > 2 seconds

	1. Short press to turn on the tester and long press to turn off the tester. 2. When the tester is turned off, long press to enter settings mode. 3. In measurement mode, short press to turn on backlight. 4. In calibration mode, short press to cancel calibration.
	1. In measurement mode, short press to switch between pH and mV. 2. In settings mode, short press to change parameters (Unidirectional).
	1. Long press to enter calibration mode. 2. In calibration mode, short press to confirm calibration. 3. When reading is locked (Auto. Hold), short press to unlock.



3. Preparation before Use

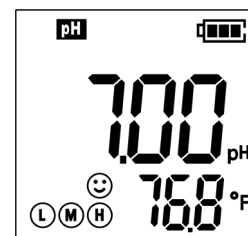
- 3.1 Pull out the battery insulation slip, and screw off the probe cap.
- 3.2 Rinse off the probe in pure water (preferably distilled or deionized water. RO water is ok), then shake off excess water.
- 3.3 Perform at least a 2-point calibration. For tutorial, refer to Section 4.
- 3.4 When you are not using the tester, always store the spear probe in the 3M KCL soaking solution. Never let it dry out. Replace the soaking solution if it gets contaminated.



4. pH Calibration

4.1 How to Calibrate

- 4.1.1 Short press  to power on.
- 4.1.2 Pour pH buffer solutions in the correspondent calibration vials to about half volume.
- 4.1.3 Rinse the probe in pure water; Shake off excess water. Dip the probe in the pH 7.00 buffer solution first, then hold still.
- 4.1.4 Long press  to enter calibration mode, screen will turn green (Short press  if you decide to quit calibration and return to measurement mode).
- 4.1.5 Wait for the reading to stabilize (when  stays on the screen), then short press  to finish the 1st point calibration. After calibration is completed, the tester will return to measurement mode. Icon  will appear at the bottom left, indicating a successful 1-point calibration (middle point).
- 4.1.6 To calibrate 2nd point, use 4.00 pH buffer and repeat Step 4.1.3 to 4.1.5 (Do NOT turn off the tester after you finish pH 7 calibration).  will display next to  , indicating a successful 2-point calibration (low and middle points).
- 4.1.7 If necessary (target pH>8.00), calibrate 3rd point using 10.01 standard pH buffer and repeat Step 4.1.3 to 4.1.5,  will show up next to  and  , indicating a successful 3-point calibration (high, low, and middle points).



4.2 Notes about Calibration

4.2.1 **Always start calibrating with pH 7.00 first.** Perform the 2nd and 3rd point calibration immediately after the 1st point is finished. **Do NOT turn off the meter before you calibrate the second or third point.** Otherwise, after you restart the meter and perform calibration in pH 4.00 or pH 10.01, Er1 error will be generated and you will have to calibrate with pH 7.00 again. For more troubleshooting tips with calibration, refer to Section 14.

4.2.2 The pH 4.00 and 7.00 buffer solutions poured into the calibration vials can be used for up to 10 times as long as they are not contaminated and the bottles are capped when not in use. pH 10.01 can only be used for up to 5 times as it will lose its accuracy much faster. After that, replace the buffer solutions in the calibration vials with new ones to keep the accuracy. Keeping the freshness and cleanliness of calibration buffers is essential for accurate pH measurement

4.2.3 The tester can perform 1 to 3 points of automatic calibration and can recognize 5 types of pH standard solutions. For details, please refer to the following table:

Calibration	USA Series		NIST Series		Icon	When to use
1-pt	7.00 pH		6.86 pH		(M)	Accuracy requirement ≥ 0.1 pH
2-pt	Option A	1st pt: 7.00 pH 2nd pt: 4.00 pH or 1.68 pH	Option A	1st pt: 6.86 pH 2nd pt: 4.01 pH or 1.68 pH	(L) (M)	Range < 7.00 pH
	Option B	1st pt: 7.00 pH 2nd pt: 10.01 pH or 12.45 pH	Option B	1st pt: 6.86 pH 2nd pt: 9.18 pH or 12.45 pH	(M) (H)	Range > 7.00 pH
3-pt	1st pt: 7.00 pH 2nd pt: 4.00 or 1.68 pH 3rd pt: 10.01 or 12.45 pH		1st pt: 6.86 pH 2nd pt: 4.01 or 1.68 pH 3rd pt: 9.18 pH or 12.45 pH		(L) (M) (H)	Range: 0 to 14.00 pH

5. pH Measurement

5.1 When performing spear tests in solid samples, pay attention to insert probe evenly, and be careful to prevent probe from damage. If the medium is too hard, please bore a small hole with a clean knife before inserting the spear probe.

5.2 For food pH measurement (e.g. sushi, cheese, meat, fruit, etc.), it should always be a sampling test. That means test samples should no longer be edible.

5.3 How to take pH measurement

Short press (MEAS) to power on the tester. Rinse the probe in pure water, shake off excess water. Dip the probe in your sample solution or pierce the probe into your solid sampling at least 1 inch deep, then hold still. Record the reading as the pH measurement after it is stabilized (😊 appears and stays).

5.4 If you turn on the Auto-Hold function (refer to Section 8.3.3), the reading will be automatically locked when it's stable for more than 10 seconds. Short press (CAL) to cancel the Auto-Hold and keep measuring.

5.5 To achieve the best measurement accuracy, calibrate the pH probe at the same/similar temperature as your sample.

5.6 **Avoid** testing in very high (>113°F) or very low (<41°F) temperature solutions as it will cause greater measurement error and will shorten the pH probe's life span.

5.5 Pure Water pH Measurement

When testing pure water like tap water, drinking water, RO water and distilled water, it will take longer for the readings to get fully stabilized (typically 1-5 minutes). Please be patient. Before taking measurement, soak the probe in pH 4.00 buffer solution for 30 seconds. If reading is not stabilized in 5 minutes, add Apera 3M KCL (AI1107) to your pure water at the ratio of 1:1000 (e.g. 1 ml KCL to 1000 ml water) to accelerate stabilization while minimizing pH change. If the accuracy does not meet your requirement, please contact Apera to find the specialized meter designed for pure water pH test.

6. Probe Cleaning

- 6.1 The tester is only as accurate as the probe is clean. Always thoroughly rinse off the probe before and after each measurement with pure water in a container or with a wash bottle.
- 6.2 For tough contaminants, detach the sensor shield, soak the probe in Apera probe cleaning solution (AI1166) or detergent water for 30 minutes. Then use a soft brush to remove the contaminants. Afterwards, soak the probe in 3M KCL soaking solution for at least 1 hour. Rinse it off, then re-calibrate the tester before using again.
- 6.3 **Never** use your finger to touch the glass membrane or use other material to rub it. Doing so could generate static electricity and cause measurement errors. To remove excess water, just shake them off or use clean tissue paper or Kimwipe to dap off.

7. Probe Storage

- 7.1 Always store the spear probe in the storage sleeve that contains 3M KCL when not in use. Never let it dry out. Replace the soaking solution if it gets contaminated.
- 7.2 **NEVER** store the probe **in pure water** like tap, RO, distilled, or deionized water as they could damage the pH probe. Pure water is only for rinsing the probe.

8. Parameter Settings

8.1 Setup Menu

Symbol	Parameter Setting Contents	Code	Factory Default
P1	Select pH buffer standard series	USA – NIST	USA
P2	Low value measurement alarm setting	0 to 14.00 pH	0
P3	High value measurement alarm setting	0 to 14.00 pH	14.00
P4	Automatic Hold function	Off – On	Off
P5	Screen backlight	Off - 1 - On	1
P6	Select temperature unit	°C - °F	°F
P7	Restore to factory default	No – Yes	No

8.2 Parameter Settings

When the tester is turned off, long press  to enter parameter settings → Short press  to switch P1-P2-P3...P7 → Short press  to select parameter (starts flickering) → Short press  to change parameter → Short press  to confirm the change → Long press  to return to measurement mode.

8.3 Parameter Setting Instruction

8.3.1 Select standard pH buffer solution (P1):

There are two options of standard buffer solutions: USA series and NIST series. Factory default is USA series, for details see section 4.2.3.

8.3.2 Alarm Function (P2&P3):

- a) Alarm triggered when measurement ≤ 3.20 pH:

Preset lowest value (P2) = 3.20 pH, highest value (P3) = 14.00 pH, when measured value ≤ 3.20 pH (stable  displays on screen); screen turns red.

- b) Alarm triggered when measurement ≥ 8.60 pH:

Preset highest value (P3) = 8.60 pH, lowest value (P2) = 0.00 pH, when measured value ≥ 8.60 pH (stable  displays on screen); screen turns red.

- c) Alarm triggered when measurement ≤ 3.20 pH or ≥ 8.60 pH

Preset lowest value (P2) = 3.20 pH, highest value (P3) = 8.60 pH, when measured value is lower than 3.20 pH or higher than 8.60 pH (stable  displays on screen), screen turns red.

8.3.3 **Automatic Lock (P4):** Select "On" to activate auto lock function. When reading is stable for more than 10 seconds, the tester will lock the value automatically, and HOLD icon will display on LCD. Short press  key again to cancel the lock and keep measuring.

8.3.4 **Backlight (P5):** "Off"-turn off backlight, "On"-always turn on backlight, "1"- backlight will last for 1 minute.

8.3.5 **Temperature Unit (P6):** Select between C° and F°.

8.3.6 **Factory default setting (P7):** Select "Yes" to recover instrument calibration to the theoretical value (pH value in zero potential is 7.00pH, slope is 100%), parameter setting return to initial value. This function can be used when the tester does not work properly or after you replace a new probe. Calibrate and measure again after recovering the tester to factory default.

9. ORP Measurement

ORP stands for Oxidation-Reduction Potential. ORP is a measure of the cleanliness of the water & its ability to break down contaminants. An ORP probe is needed to test ORP (sold separately, SKU: AI1207). After powering on the tester, press  to enter ORP mode (mV). Rinse the probe in distilled water and dry it. Dip the probe in your sample solution, make a quick stir, and hold still. Record the reading after it is fully stabilized.

10. Technical Specifications

pH	Measurement Range	-2.00 – 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH ±1 digit
	Calibration Points	1 – 3 points
	Automatic Temperature Compensation (ATC)	0 – 50°C (32 – 122°F)
mV	Measurement Range	± 1000mV
	Resolution	1mV
	Accuracy	±0.2% F.S
Temp.	Measuring Range	0 – 50°C (32 – 122°F)
	Resolution	0.1°C
	Accuracy	±0.5°C

11. Other Specifications

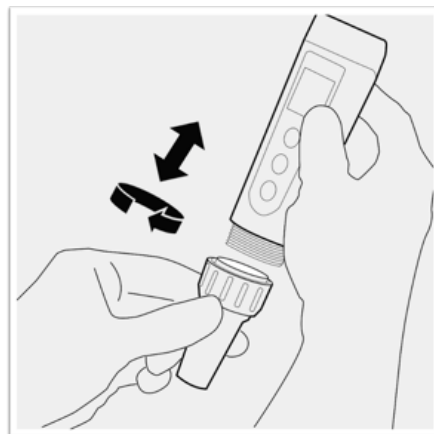
Screen	3-color LCD screen, Blue: Measurement; Green: Calibration; Red: Alarm
Reading Lock	HOLD
Low-Voltage Warning	 flashing, reminder of battery replacement needed
Auto. Power-Off	In 8 minutes without operation
Waterproof Rating	IP67
Power	DC3V, AAA alkaline batteries×4
Battery Life	Operation up to 2000 hours
Dimension& weight	Tester: 40×40×178mm/133g; Case: 255×210×50mm/700g;

12. Probe Replacement

12.1 pH probes don't last forever. Every pH probe gradually ages and will eventually fail. A typical service life of a pH probe is 1-2 years depending on many factors such as frequency of use, nature of test samples, and how well it is maintained, etc. Apera Instruments recommends replacing the pH probe every 1 to 2 years to guarantee the optimal performance.

12.2 How to replace a probe

- 1) Take off the probe cap
- 2) Screw off the probe ring
- 3) Unplug the probe
- 4) Plug in the new replacement probe (pay attention to the probe's position);
- 5) Screw on the probe ring tightly. Soak the probe in 3M KCL for 5-15 minutes. Then perform calibration before testing.



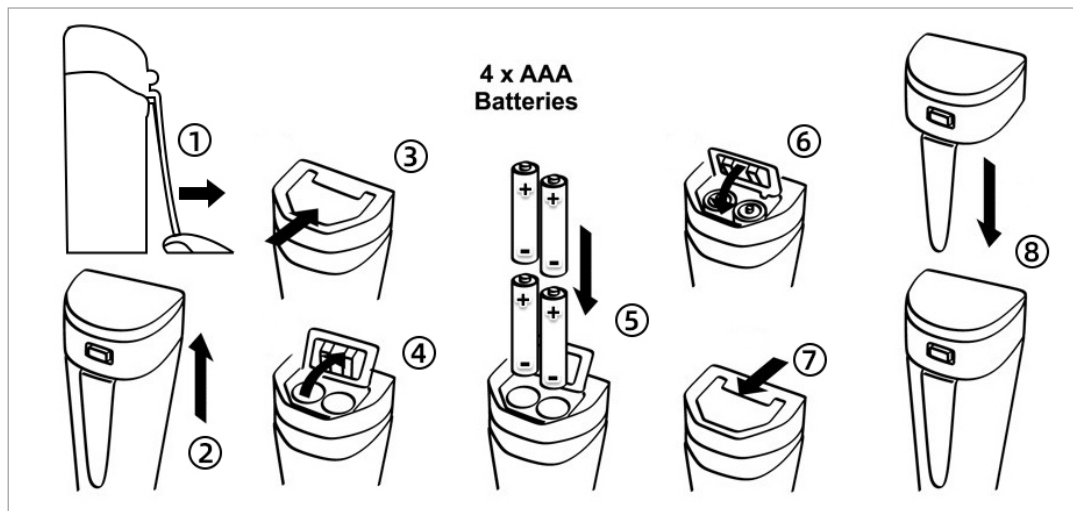
12.3 Replacement probes compatible with PH60S Tester

- AI1205 PH60S-E (spear pH probe for soft-solid samples)
- AI1203 PH60F-E (flat pH probe for surface test)
- AI1201 PH60-E (regular pH probe for general water solutions)
- AI3711-E PH60-DE (double-junction pH probe for general water solutions)
- AI3713-E PH60S-DE (double-junction spear pH probe for soft-solid samples)
- AI802G GS2-E (spear pH probe for soil direct test)
- AI1207 ORP60-E (ORP probe)

13. Battery Replacement

Please install batteries according to the following steps. *Please note the correct direction of battery installation: **The Positive Side ("+") OF EVERY SINGLE Battery MUST FACE UP.**

⚠ (WRONG INSTALLATION OF BATTERIES WILL CAUSE DAMAGE TO THE TESTER AND POTENTIAL HAZARDS!)



- ① Loosen the battery pocket clip ② Pull off the battery cap
- ③ Slide and unlock battery compartment ④ Open the battery compartment
- ⑤ Insert the batteries (all POSITIVE sides FACE UP) ⑥ Press down the battery compartment
- ⑦ Slide and lock the battery compartment ⑧ Close on the battery cap

*** Make sure the battery cap is completely closed with the red O-ring.** Otherwise, the waterproof rating could be compromised.

14. Troubleshooting Guide

Trouble	Reasons	How to Fix
Cannot calibrate	Pressing  too early (Er 2)	Wait for the reading to get stabilized (smiley face to stay on the screen) before pressing  button to finish calibration.
	Incorrect calibration order (Er 1)	Refer to Section 4.2.1
	Poor quality calibration buffer solutions (Er 1)	Make sure your calibration standard solutions are fresh and clean, and made by a legitimate manufacturer.
	Dirty probe or clogged junction (Er 1)	Thoroughly clean off the probe. Refer to Section 6.
	Aged probe (Er 1)	Replace the probe.
	Dried-out probe (Er 1)	Soak the probe in Apera 3M KCL soaking solution for at least 1 hour. And refer to Section 7 for proper probe storage.
	Probe is not fully submerged in the solution (Er 1)	Make sure the probe is immersed in the solution at least 1 inch deep.
	Broken Probe (Er 1)	If you don't find any visible damage of the probe, contact Apera for warranty fulfillment. If there is visible damage, replace the tester.
Reading is always slowly changing, won't stabilize.	Dirty probe or clogged junction	Thoroughly clean off the probe. Refer to Section 6.
	Aged probe	Replace the probe.
	Testing pure water like tap/ drinking/well/RO/distilled/ deionized water	Refer to Section 5.2
Display similar readings in any solutions or always display 7	Broken probe	If you don't find any visible damage of the probe, contact Apera for warranty fulfillment. If there is visible damage, replace the probe.
	Instrument defect	Contact Apera for warranty fulfillment
Reading keeps jumping erratically	Probe is not fully submerged in the solution	Make sure the probe is immersed into the solution for at least 1 inch.
	Probe is not properly connected or the connector is broken.	Check the probes connector, make sure it's not broken and is correctly connected. Align the electrode and instrument correctly before plugging in. Never force it. Ensure that the electrode connector is not exposed to the air too long.
Calibration is successful, but reading is not accurate	Aged probe	Replace the probe.
	Comparison with other testers, test strips, or drop tests	To compare with other testers, make sure to perform a 2-point calibration for all testers in the same standards, then test a 3rd point. Whichever gives more accurate reading in the 3rd point standard is the most accurate one. Test strips or drop tests' accuracy is not comparable to pH meters'.
	Your pH probe is not suitable for your application	Contact Apera to find the appropriate model for your specific application.

15. Limited Warranty

We warrant this instrument to be free from defects in material and workmanship and agree to repair or replace free of charge, at option of APERA INSTRUMENTS, LLC, any malfunctioned or damaged product attributable to responsibility of APERA INSTRUMENTS, LLC for a period of TWO YEARS (SIX MONTHS for the probe) from the delivery.

This limited warranty does NOT cover any damages due to: Accidental damage, transportation, storage, improper use, failure to follow the product instructions or to perform any preventive maintenance, unauthorized repair or modifications, normal wear and tear, or other external causes or actions beyond our reasonable control.

To get the fastest warranty fulfillment, go to support.aperainst.com and click "New Support Ticket" on the upper right corner. Type your email in the requester field, "Warranty" in the Subject field, and then input the following information in the description field:

- Your full name
- Product model
- Serial number (can be found on the back sticker of the tester body)
- What problem or issue you had experienced with the product
- Attach a photo of your proof of purchase
- Attach a photo/video of the problematic product

Then click Submit. One of our customer service specialists will get in touch with you within one business day.

APERA INSTRUMENTS, LLC

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