ZenTest™ PH60S-Z Smart Spear pH Tester
(*pH/Temp./ORP)*

User Manual

RoHS compliant   ISO 9001:2015   C E   Bluetooth®   IP67 WATERPROOF

APERA INSTRUMENTS, LLC

aperainst.com

TABLE OF CONTENTS

ATTENTION

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

1   Introduction

Dear Customer,

Thank you for choosing Apera Instruments PH60S-Z Smart pH Tester. Please carefully read this manual in order to properly use and maintain the product.

1.1 Search "zentest smart" in Apple App Store or Google Play App Store to download the latest App for your tester. Turn on the Bluetooth of your phone, go to ZenTest™ App, tap $\circledast$ on the upper right corner, then select your tester to connect.
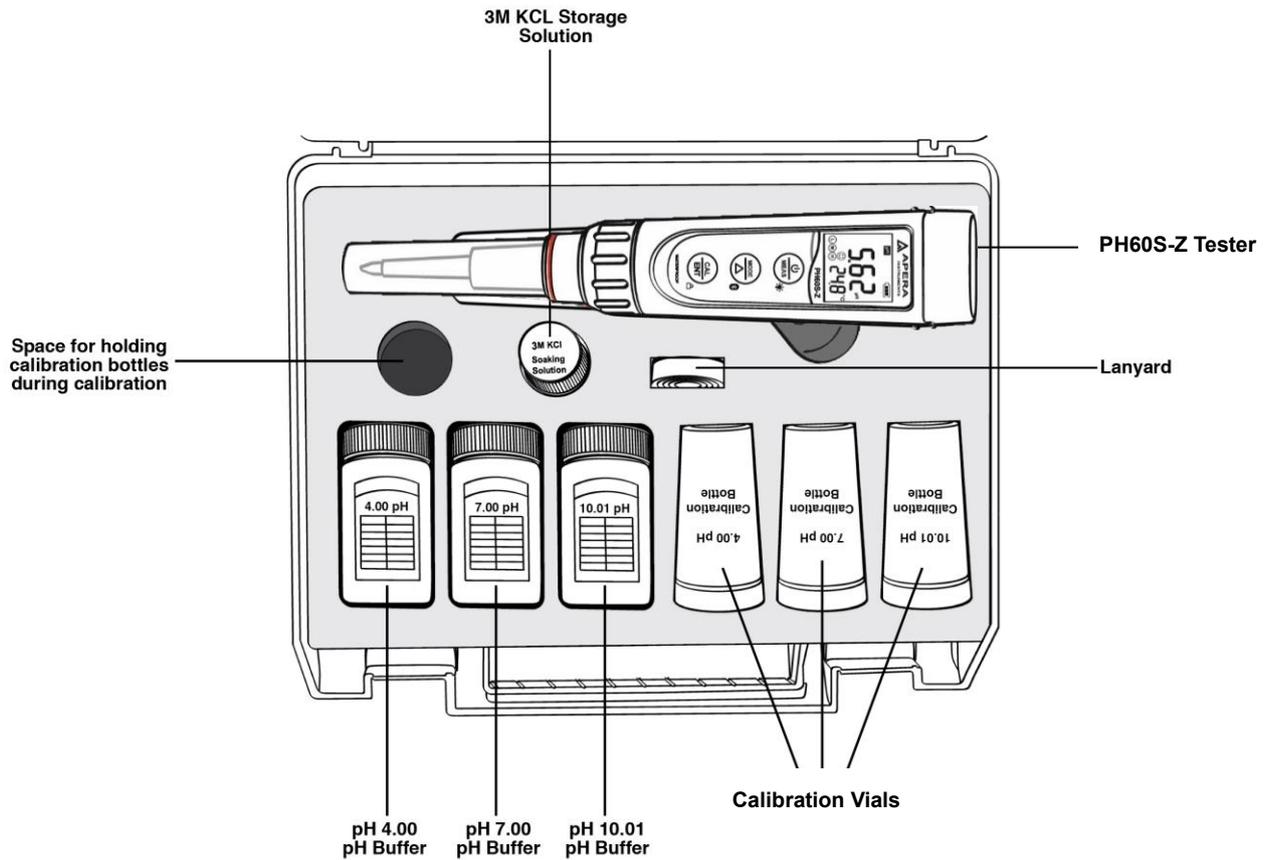

1.3 For video tutorials on how to get the most out of **ZenTest™**, please go to **support.aperainst.com**

1.4 This product is designed with a two-way control on both the tester and ZenTest™ App. Please refer to the functions available on each platform in the following table. This manual shows you how to operate the tester without connecting to a smartphone.

Table 1: Funtions on 60-Z Tester and ZenTest® Mobile App

| Functions	60-Z Tester	ZenTest Mobile App	
Display	LED display	1. Basic Mode: digital display+calibration info	Swipe to switch among various modes
		2. Dial Mode: digital display+dial display	
		3. Graph Mode: digital display+graph display	
		4. Table Mode: digital display+real time measurement and history display	
Calibration	Press buttons to operate	Operate on smartphone following graphic guides	
Self-Diagnosis	Er1 – Er6 icons	Detailed problem analysis and solutions	
Parameter Setup	Press buttons to set up (except for P7 and P11)	All parameters can be set up in Settings.	
Alarm	The screen turns red when alarm triggered; cannot be setup	Alarm display and alarm values can be preset for each parameter	
Data Management	N/A	Manual or Auto. Datalogger; notes can be added to saved data	
Data Output	N/A	Share data via Email	

2 What's in the Kit

3M KCL Storage Solution

PH60S-Z Tester

Space for holding calibration bottles during calibration

3M KCl Soaking Solution

Lanyard

4.00 pH

7.00 pH

10.01 pH

Calibration Bottle 4.00 pH

Calibration Bottle 7.00 pH

Calibration Bottle 10.01 pH

Calibration Vials

pH 4.00 pH Buffer

pH 7.00 pH Buffer

pH 10.01 pH Buffer

3 Keypad Functions

■ **Short press------** < 2 seconds, **Long press-------** > 2 seconds

⏻/MEAS ☀	1. When turned off, short press to turn on the tester; long press to enter parameter setting. 2. In calibration mode or parameter setting, short press to return to measurement mode. 3. In measurement mode, long press to turn off the tester, short press to turn on/off backlight.
MODE △ ᛒ	1.In measurement mode, long press to turn on/off **Bluetooth®** receiver. When turned on, ᛒ will be flashing; when connected to smartphone, ᛒ will stay on. 3.In parameter setting, short press to change parameter (Uni-directional).
CAL/ENT 🔒	1. Long press to enter calibration mode. 2. In calibration mode, short press to confirm calibration. 3. In measurement mode, when automatic lock is turned off, short press to manually lock or unlock readings.

Battery cap

Probe ring
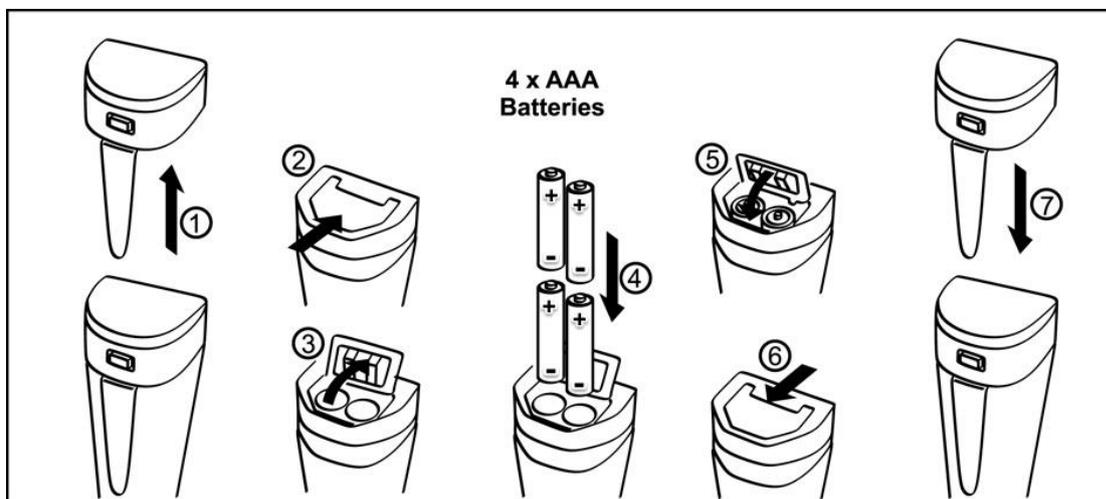
Swiss spear pH probe

Probe cap
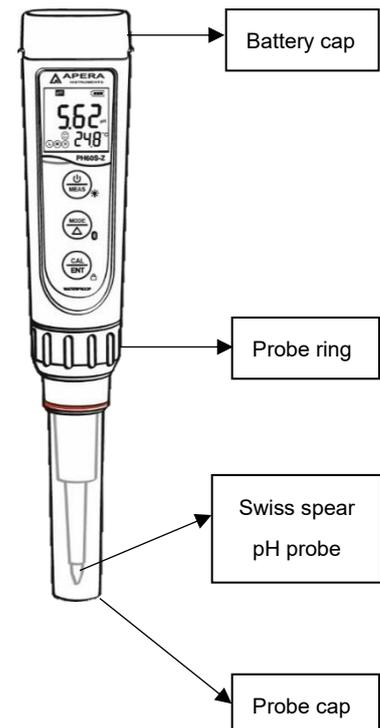
4   Battery Replacement

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!)


5   Preparation before Use

5.1   Pull out the battery insulation slip, and take off the probe cap.

5.2   Rinse off the probe in pure water (preferably distilled or deionized water. RO water or tap water is the alternative) , then shake off excess water (see graph on the right).

5.3   Perform at least a 2-point calibration. For pH calibration tutorial, refer to Section 6.

5.4   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.
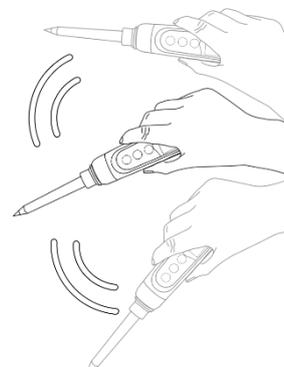
6   pH Calibration

6.1 Short press ⏻/MEAS to power on the meter; rinse the probe in pure water. Shake off excess water.

6.2 Pour pH 7.00 and pH 4.00 buffer solution in the corresponding calibration vials (to about half volume of the vials).

6.3 Long press CAL to enter calibration mode (screen turns green);

6.4 Insert the probe into pH 7.00 buffer solution, make a quick stir, and hold still. When the reading is stabilized (☺ stays on screen), short press (CAL⏎) to start 1st point calibration. After calibration is completed, the tester will return to measurement mode. Icon (M) will appear at the bottom left of the screen, indicating a successful 1st point pH calibration.

6.5 To calibrate 2nd point, use 4.00 pH buffer and repeat Step 6.3 to 6.4 (Do NOT turn off the tester after you finish pH 7 calibration). (L) will display next to (M), indicating a successful 2-point pH calibration (low and middle points).

6.6 If necessary (target pH>8.00), calibrate 3rd point using 10.01 standard pH buffer and repeat Step 6.3 to 6.4, (H) will show up next to (L) and (M), indicating a successful 3-point calibration (high, low, and middle points).

6.7 Notes about Calibration

1) The 1st point calibration must be 7.00 pH. Perform the 2nd and 3rd point calibrations (4.00, 10.01, 1.68, or 12.45) immediately after the 1st point calibration is finished. Do NOT turn off the meter before you calibrate 2nd or 3rd point. Otherwise, you will need to restart the calibration process with 7.00 pH first.

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.

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		Indication icon	Recommended
1-pt	7.00 pH		6.86 pH		(M)	Accuracy ≥ 0.1 pH
2-pt	Option A	1st pt: 7.00 pH 2nd pt: 4.00 or 1.68 pH	Option A	1st pt: 6.86 pH 2nd pt: 4.01 or 1.68 pH	(L) (M)	Range < 7.00 pH
	Option B	1st pt: 7.00 pH 2nd pt: 10.01 or 12.45 pH	Option B	1st pt: 6.86 pH 2nd pt: 9.18 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

6.8 For the self-diagnosis information, please refer to the table below:

Symbol	Self-Diagnosis information	Potential problems and how to fix
Er 1	The pH calibration solution cannot be recognized by the meter.	1. Make sure the probe is fully immersed in the calibration solution. 2. Check if calibration solution is expired or polluted. 3. 1st point of pH calibration must be pH 7.00 or 6.86. See 6.6. 4. Please check whether pH probe is damaged or broken. If so, please replace with a new one. 5. The glass bulb or junction is severely contaminated. Please use a soft brush with soap water to clean it thoroughly. Then soak it in 3M KCL 3-5 hours before performing calibration again.
Er2	(CAL ENT) is pressed before measurement is fully stabilized.	Wait for ☺ to stay on screen before pressing (CAL ENT)
Er 3	During calibration, readings being unstable for over 3 minutes.	1. Please check whether pH probe is damaged or broken. If so, please replace with a new one. 2. The glass bulb or junction is severely contaminated. Please use a soft brush with soap water to clean it thoroughly. Then soak it in 3M KCL overnight before performing calibration again. 3. The probe is aged (used for over a year and has a much slower response). A replacement is needed.
Er 4	pH probe zero electric potential out of range (<-60mV or >60mV)	1. Check whether pH buffer solutions comply with the USA or NIST standard. 2. Check whether pH buffers are expired or contaminated. 3. Please check whether pH probe is damaged or broken. If so, please replace with a new one. 4. The probe is aged (used for over a year and has a much slower response). A replacement is needed. 5. The probe is invalidated (Er4/Er5 repetitively appears, and problems 1, 2, 3 are excluded). Probe replacement is needed.
Er 5	pH probe slope out of range (<85% or >110%)	
Er 6	The calibration reminder is triggered. It's time to perform a new pH calibration.	Perform pH calibration or cancel calibration reminder in ZenTest App settings.

7   pH Measurement

7.1   PH60S-Z Spear pH tester is designed for direct spear test of solid samplings such as cheese, fruit, sushi rice, meat, dough. It also works well in general water solutions.

7.2   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.

- 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.

7.3 How to take pH measurements

Short press $\left(\begin{smallmatrix}\circ\\\text{MEAS}\end{smallmatrix}\right)$ to power on the tester. Rinse the probe in pure water, shake off excess water. Insert the probe in your sample solution or solid sample, and hold still. Record the reading when it is stabilized(😊 stays on screen).

7.4 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. If still not working, 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 is not meeting your requirement, please contact us at info@aperainst.com to find the specialized meter designed for pure water pH test.

---

8   ORP Measurement

1)   ORP stands for Oxidation-Reduction Potential, measured in mV. It's also called redox. ORP is a measure of the cleanliness of water & its ability to break down contaminants. A separate ORP probe (ORP60-DA) needs to be installed to be able to measure ORP.

2)   Power on the tester, unscrew the original probe, and install the ORP60-DA probe, then the tester will automatically switch to ORP measurement mode (Refer to Section 15 for how to replace a probe).

3)   Rinse the probe in distilled water and dry it. Dip the probe in sample solution, shake for a few seconds, and hold still. Record the ORP reading after 😊 appears and stays on screen.

---

9   Probe Cleaning

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.

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.

---

10   Probe Storage

1)   Always store the spear probe in the 3M KCL soaking solution when not in use. Never let it dry out. Replace the soaking solution if it gets contaminated.

2)   NEVER store the probe in pure water like tap, RO, distilled, or deionized water as they could damage the pH probe. If this happens, immediately soak the pH probe Apera 3M KCL soaking solution overnight, then re-calibrate it before using. Pure water is only for rinsing the probe.

11 Parameter Setting

11.1 Table of Settings

Symbol	Parameter Setting Contents	Content	Factory Default
P1	Temperature Unit	˚C – ˚F	˚F
P2	Select automatic lock	5-20 seconds – Off	Off
P3	Automatic Backlight Off	1-8 minutes – Off	1
P4	Automatic Power Off	10-20 minutes – Off	10
P5	pH Buffer Series Selection	USA – NIST	USA
P6	pH Resolution	0.1 – 0.01	0.01
P7	pH Calibration Reminder	H-hours D-Days (set up in ZenTest App)	/
P8	pH back to factory default	No – Yes	No

11.2 Parameter Setting

1) When the meter is turned off, long press $\left(\frac{\circlearrowleft}{MEAS}\right)$ to enter parameter setting →short press $\left(\frac{MODE}{\triangle}\right)$ to switch P01-P02… →P8. Short Press $\left(\frac{CAL}{ENT}\right)$, parameter flashes → short press $\left(\frac{MODE}{\triangle}\right)$ to adjust parameter → short press $\left(\frac{CAL}{ENT}\right)$ to confirm →Short press $\left(\frac{\circlearrowleft}{MEAS}\right)$ to exit parameter setting and go back to measurement mode.

2) **Auto. Lock (P02)** – Users can set the auto lock time from 5 to 20 seconds. For example, if 10 seconds is set, when the measured value is stable for more than 10 seconds, the measured value will be automatically locked, and the HOLD icon will be displayed. Short press $\left(\frac{CAL}{ENT}\right)$ to release the lock. When the setting is "Off" , the Auto. lock function is turned off, that is, the measured value can only be manually locked. Short press $\left(\frac{CAL}{ENT}\right)$ to lock or unlock the measured value. The HOLD icon will be displayed when reading is locked.

3) **Auto. Backlight (P03)** ― Users can set the automatic backlight time for 1 to 8 minutes. For example, if 3 minutes is set, the backlight will turn off automatically after 3 minutes; when the "Off" is set, the auto. backlight function will be turned off, and short press $\left(\frac{\circlearrowleft}{MEAS}\right)$ to manually turn the backlight on or off.

4) **Auto. Power off (P04)** ― The auto. power off time can be set to 10 to 20 minutes. For example, if 15 minutes is set, the meter will automatically shut down after 15 minutes if no operation; when "Off" is set, the auto. power off function will be turned off. Long press $\left(\frac{\circlearrowleft}{MEAS}\right)$ to manually shut down the meter.

5) **pH Calibration Reminder (P07)** – set X hours (H) Or X days (D) in ZenTest mobile app – settings – Parameter – pH – Calibration Reminder. On the meter, you can only check the values that's been set up on ZenTest App. For example, if 3 days is set up, the Er6 icon (see Figure-4) will appear in the lower right corner of the LCD screen in 3 days to remind you to perform calibration, also in the ZenTest App there will be a pop-up reminder. After calibration is finished or the reminder setting is cancelled in the ZenTest App, the Er6 icon will disappear.

6) **pH Back to Factory Default (P08)** – Select "Yes" to recover instrument calibration to theoretical value. This function can be used when instrument does not work well in calibration or measurement. Calibrate and measure again after setting the instrument back to factory default.

12 Technical Specifications

pH	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH ±1 digit
	Calibration Points	1 to 3 points
	Auto. Temperature Compensation	0 – 50˚C (32 – 122˚F)
ORP (mV)	Range	-1000 mV to 1000 mV
	Accuracy	±0.2% F.S
Temperature	Range	0 to 50˚C (32-122˚F)
	Accuracy	±0.5˚C

13 Icons and Functions
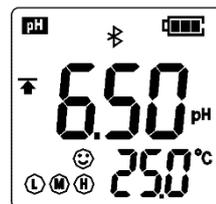
Calibrated points	Ⓛ Ⓜ Ⓗ	Self-Diagnosis Symbol	Er1, Er2, Er3, Er4,Er5, Er6
Stable reading indicator	☺	Waterproof Rating	IP67, floats on water
Reading Lock	HOLD	Power	DC3V, AAA batteries*4
Bluetooth Signal	✳	Battery Life	＞200 Hours
Low power reminder	▭	Backlight	White: Measurement；Green: Calibration；Red: Alarm
Auto. Power Off	Automatically power off if no operation for 10 minutes		
Dimension/Weight	Instrument：40×40×178mm/133g; case：255×210×50mm/680g;		
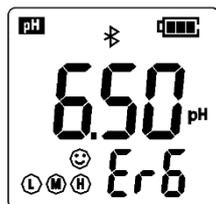
LCD Display   pH calibration reminder   pH alarm triggered

14 Troubleshooting Guide

| Trouble	Reason	How to fix
Cannot calibrate	Pressing (CAL) too soon	Wait for (☺) to stay on the screen before pressing (CAL)
	Incorrect standard solutions	Reboot tester, calibrate pH 7 first, then pH 4. For details refer to Section 5.2 (a)
	Poor quality standard solutions	Replace with fresh and clean standard calibration solutions made by legitimate scientific instrument manufacturers.
	Contaminated probe	Use a soft brush to clean the probe with Apera probe cleaning solution or detergent water.
	Aged probe	Replace the probe.
	Dried-out probe	Soak in Apera 3M KCL soaking solution for at least 30 minutes.
	Probe is not fully submerged	Make sure the probe is immersed in the solution at least 1 inch.
	Air bubbles around the sensor shield	Make a quick stir in the solution to remove air bubbles.
Reading is always slowly changing, won't stabilize.	Contaminated probe	Use a soft brush to clean the probe with Apera probe cleaning solution or detergent water.
	Clogged junction	Use a soft brush to clean the probe with Apera probe cleaning solution or detergent water, then soak it in Apera 3M KCL soaking solution overnight.
	Aged probe	Replace the probe.
	Testing pure water like tap/drinking/RO/distilled water	Be patient, wait for 1-5 minutes to reach a fully stabilized reading. If still not stabilizing, add Apera 3M KCL solution to test water at 1:1000 ratio.
Display similar readings in any solutions or always display 7.0 pH	Broken probe	If you don't find any visible damage of the probe, contact us for warranty fulfillment; If there is visible damage, replace the probe.
	Instrument defect	Contact us for warranty fulfillment
Reading keeps jumping	Probe is not fully submerged in the solution	Make sure the probe is immersed into solution at least 1 inch.
	Air bubbles around the sensor shield	Make a quick stir in the solution to remove air bubbles.
	Probe is not properly connected or the connector is broken.	Check the probe's connector, make sure it's not broken and is correctly connected. Align the probe and instrument correctly before plugging in. Never force it. Ensure that the probe connector is not exposed to the air too long.
Calibration is successful, but reading is not accurate	Aged probe	Replace the probe.
	Air bubbles around the sensor shield	Make a quick stir in the solution to remove air bubbles.
	Clogged junction	Clean the probe with cleaning solution, then soak it in 3M KCL storage solution overnight
	Comparison with other testers, test strips, or drop tests	To compare accuracy with other testers, make sure to perform calibration for all testers in the same standard, then test another standard. Whichever gives more accurate reading is the more accurate one. Test strips or drop tests' accuracy is not comparable to pH meters'.
	Poor quality standard solutions	Replace with fresh and clean standard calibration solutions made by legitimate scientific instrument manufacturers.
	The probe is not suitable for your appliacation.	Contact us to find the most appropriate product for your specific application.

15 Probe Replacement

pH probes don't last forever. Every probe will eventually age and fail even if you don't use it that often. The typical service life of Apera probes is 12-24 months depending on the frequency of usage and how well you keep it clean and properly stored. We recommend replacing your probe every 1 to 2 years to ensure the best performance.

To replace the 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.
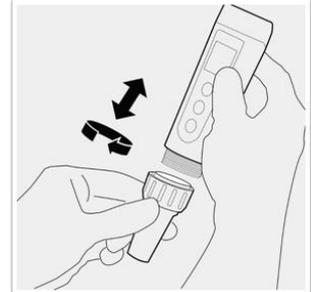
The replacement probes that are compatible with PH60S-Z:

- PH60S-DE (Spear pH probe for solids/semi-solids pH testing), PH60-DE (Regular pH glass bulb probe), PH60F-DE (Flat pH probe for surface pH testing), ORP60-DA (ORP Probe).

16 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 that needs warranty fulfillment
- Serial number of the product (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 of the problematic product

Then click Submit. One of our customer care specialists will help you fulfill the warranty within one business day.

APERA INSTRUMENTS, LLC
Address: 6656 Busch Blvd, Columbus Ohio 43229；Tel: 1-614-285-3080
Email: info@aperainst.com
Website: www.aperainst.com