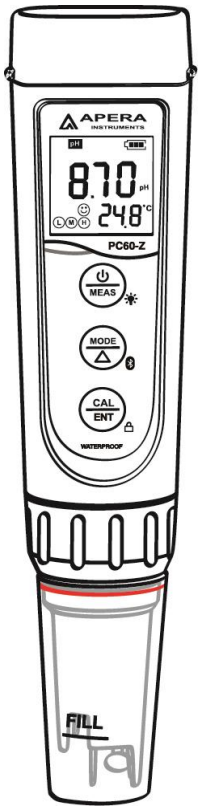
PC60-Z Smart Multi-Parameter Tester

(pH/Cond./TDS/Salinity/Resistivity/ORP/Temp.)

Instruction Manual



RoHS compliant ISO 9001:2015 CE Bluetooth® IP67 WATERPROOF

APERA INSTRUMENTS, LLC

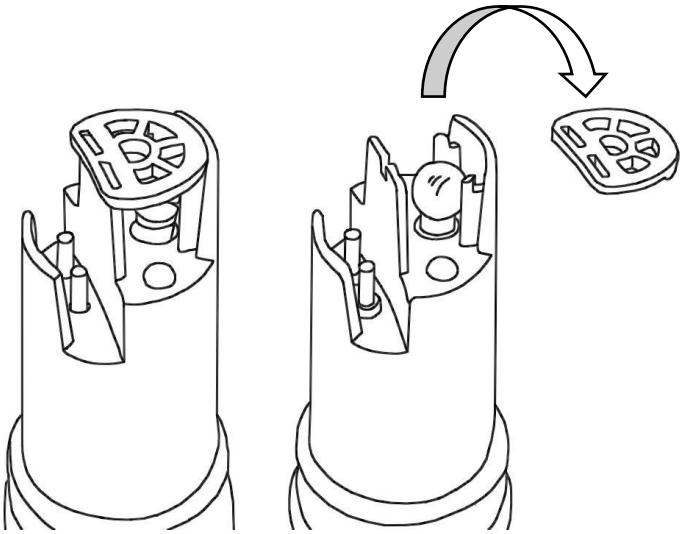
aperainst.com

V1.03

Contents

Upgrade Note

The latest PC60 Tester comes with an upgraded probe structure, which is equipped with a sensor shield that prevents the glass bulb breakage from accidental collision (see picture below). Users can remove the shield when cleaning the sensor and put it back on after cleaning.



1 Introduction

Dear Customer,

Thank you for choosing Apera Instruments PC60-Z Smart Multi-Parameter Tester. Please carefully read this manual before using the product in order to have a reliable testing experience.

1.1 This product is designed with a two-way control on both the tester and ZenTest Mobile 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

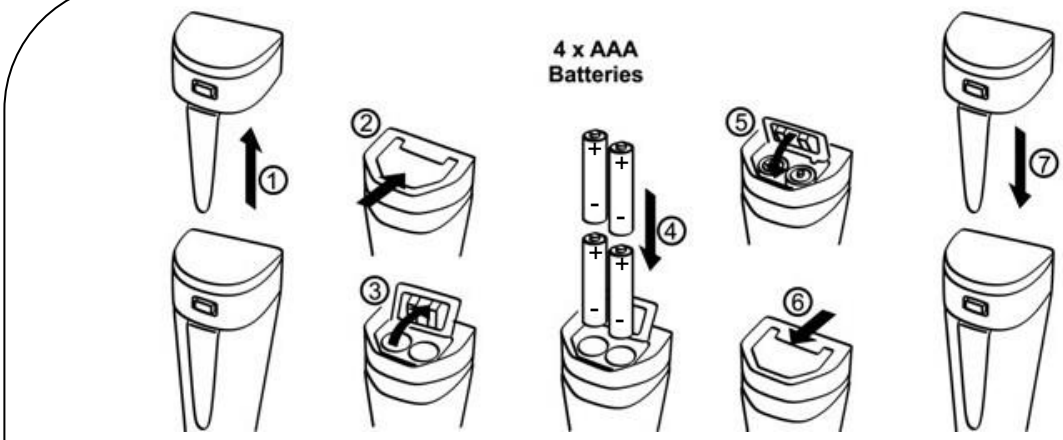
Functions	**60-Z Tester**	**ZenTest Mobile App**	
Display	LED display	1. Basic Mode: digital display+calibration info	Swipe to switch among various modes
		2. Dial Mode: digital display+dial display	
		3. Graph Mode: digital display+graph display	
		4. Table Mode: digital display+real time measurement 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	
Datalogger	N/A	Manual or Auto. Datalogger; notes can be added to saved data	
Data Output	N/A	Share data via Email	

1.2 Search ZenTest in Apple App Store or Google Play App Store to download the latest App for your tester.

1.3 For video tutorials on how to connect the tester to your smartphone and perform more functions in **ZenTest** Mobile App, please go to **support.aperainst.com**

2 Battery Installation

Please install batteries according to the following steps. *Please note direction of batteries: **All POSITIVE SIDES ("+") FACING UP. (Wrong installation of batteries will cause damage to the tester and potential hazards)**

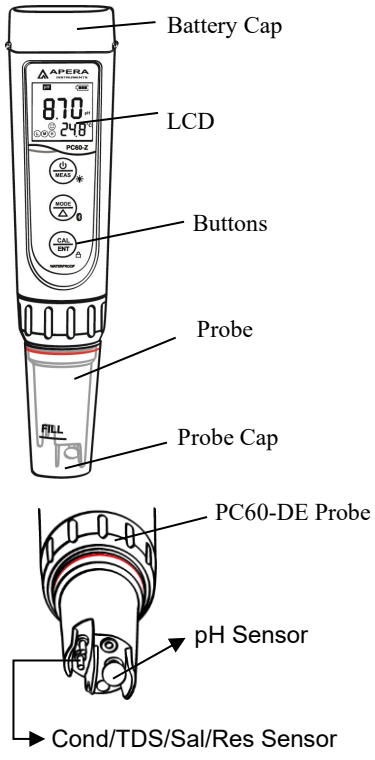


① Pull the battery cap up ② Slide the battery cap along to the direction of arrow
③ Open the battery cap
④ Insert the batteries **(ALL POSITIVE SIDES FACING UP)** (see graph)
⑤ Close the battery cap ⑥ Slide and lock the battery cap along to the direction of arrow
⑦ Fit the tester's cap while making sure to push all the way down. The tester's waterproof design may be compromised if the cap is not fitted correctly.

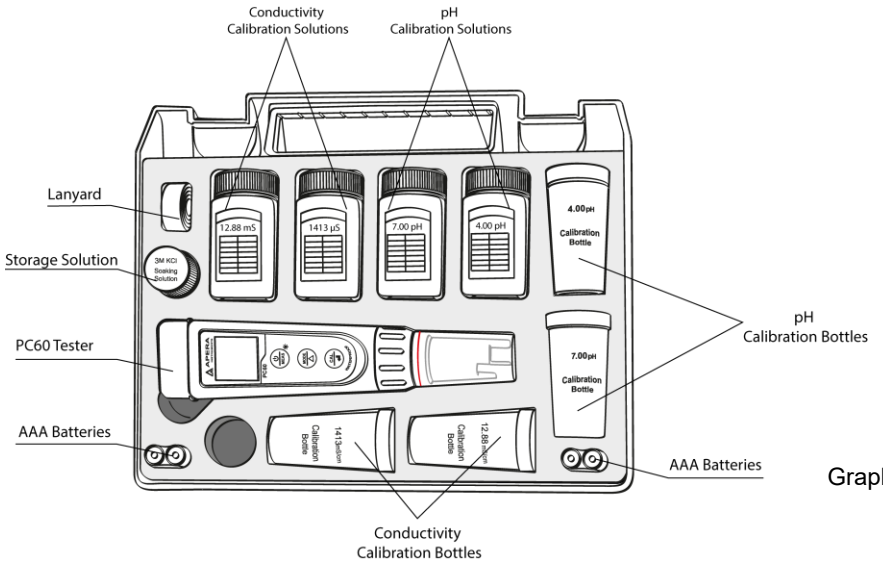
3 Keypad Functions

■ **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	1.In measurement mode, short press to switch parameter pH→Cond→TDS→Sal→Res 2.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.



4 Complete Kit



Graph-2

5 Things to Know Before Use

1) A few drops of water are added to the probe cap to keep the pH electrode in an activated state before the tester leaves factory. Generally, users can start using the tester directly. If the measuring response is slow, users can soak the pH electrode for 30 minutes in the 3M KCL storage solution (fill to the fill-line) before using it; if the electrode is dry for a long time (> 1 month), the pH electrode responds slowly, You can soak the pH electrode for 8 hours in the storage solution before using.
2) When the tester is not in use, we recommend adding one to two drops of tap water to the probe cap, and close the cap (be careful not to add too much water). This way, the pH probe's sensitivity can be maintained and users can start using the tester right away next time.
3) Do not soak the pH electrode in purified (e.g. distilled/deionized) water for a long time, which will make the electrode response slow. If this happens, soak the pH electrode in 3M KCl solution for 3~5 hours, and then re-calibrate it before using.
4) The storage solution is 3M KCL (SKU: AI1107), and the tester kit comes with a bottle of 10mL storage solution (can be used repeatedly). If it is contaminated, replace it with a new one. Please do not use other brands' storage solutions as they may contain other chemicals that can cause damage to the electrodes.
5) Things needed in addition to what's in the box:
   a) Distilled or deionized water (8-16oz) for rinsing the probe after each test
   b) Tissue paper for drying the probe

6 pH Calibration

6.1 Calibration Steps

1) Short press (MEAS) to turn on the meter; rinse the probe in distilled water, shake the meter in the air and use tissue paper to dap off excess water **(never rub or wipe the sensor)**.
2) Pour certain amount of pH 7.00 and pH 4.00 buffer solution into the corresponding calibration vials (to about half volume of the vial);
3) Long press (CAL ENT) to enter calibration mode; Short press (MEAS) to exit.

4) Place the probe in pH7.00 buffer solution, shake it for a few seconds, and allow it to stand still in the buffer solution until a stable reading is reached. When stable icon ☺ stays on the LCD screen, short press CAL/ENT to complete 1st point calibration and the tester returns to measurement mode. Indication Icon (M) will appear at the bottom left of the LCD screen.

5) Rinse the probe in distilled water and dry it. Long press CAL/ENT to enter calibration mode to perform 2nd point of calibration.

6) Place the probe in pH 4.00 buffer solution, shake it for a few seconds, and allow it to stand still in the buffer solution. When stable icon ☺ stays on the LCD screen, short press CAL/ENT to complete 2-point calibration and the tester returns to measurement mode. Indication icon (L) (M) will appear at the bottom left of the LCD screen.

7) If necessary, rinse the probe in distilled water and dry it, and place the probe in 10.01 buffer solution (sold separately) to complete 3rd point of calibration according to the steps in 6), (L) (M) (H) will appear at the bottom left of the LCD.

6.2 Notes

1) Tester will automatically recognize pH buffer solution. Users can perform one-point, two-point, or three-point calibration. **For the 1st point calibration, always start with 7.00 pH**. Then use other buffer solutions to conduct 2nd or 3rd point calibration. **Perform the 2nd point calibration immediately after the 1st point.** Do NOT turn off the meter before you perform 2nd point calibration. If the meter is turned off after 1st point calibration, users will need to restart the calibration process with the 7.00 pH first and the 2nd point following after. Otherwise, Er1 will occur.

2) The tester will automatically recognize 5 kinds of pH buffer solutions in both USA and NIST series of standards. Refer to the table below:

Calibration	USA Series	NIST Series	Calibration Indication Icon	Recommended Accuracy and Range
1-point	1) 7.00 pH	1) 6.86 pH	(M)	Accuracy ≥ 0.1 pH
2-point	1) 7.00 pH 2) 4.00 or 1.68 pH	1) 6.86 pH, 2) 4.01 pH or 1.68 pH	(L) (M)	Measurement Range＜7.00 pH
	1) 7.00 pH 2) 10.01 or 12.45 pH	1) 6.86 pH, 2) 9.18 pH or 12.45 pH	(M) (H)	Measurement Range＞7.00pH
3-point	1) 7.00 pH 2) 4.00 or 1.68 pH 3) 10.01 or 12.45 pH	1) 6.86pH 2) 4.01 or 1.68pH, 3) 9.18 pH or 12.45 pH	(L) (M) (H)	Wide Measurement Range

3) For pH Calibration buffer solutions, we recommend that users replace new buffer solution after 10 to 15 times of use to keep the standard buffer's accuracy. Do NOT pour the used calibration solutions back into the solution bottles in case of contamination.

4) When calibrating strong basic solutions (pH>10), use 7.00 pH and 12.45 pH to calibrate; When measuring strong acidic solutions (pH<4), 7.00 pH and 1.68 pH should be calibrated.

5) 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 6.2 (1). 4. Please check whether pH electrode 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. 6. If none of the above, please contact us at info@aperainst.com or +1 (614) 285-3080
Er2	CAL ENT is pressed before measurement is fully stable	Wait for ☺ to come up and stay on screen before pressing CAL ENT
Er3	During calibration, readings being unstable for over 3 minutes	1. Please check whether pH electrode 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 electrode is aged (used for over a year and has a much slower response). A replacement is needed. 4. If none of the above, please contact us at info@aperainst.com or +1 (614) 285-3080
Er4	pH electrode 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 electrode is damaged or broken. If so, please replace with a new one. 4. The electrode is aged (used for over a year and has a much slower response). A replacement is needed. 5. The electrode is invalidated (Er4/Er5 repetitively appears, and problems 1, 2, 3 are excluded). A replacement is needed. 6. If none of the above, please contact us at info@aperainst.com or +1 (614) 285-3080
Er5	pH electrode slope out of range (<85% or >110%)	
Er6	The calibration reminder is triggered. It's time to perform a new pH calibration	Perform pH calibration or cancel calibration reminder in ZenTest settings.

7 pH Measurement

Short press MEAS to turn on the tester. Rinse the probe in distilled water and dry it. Dip the probe in sample solution, stir gently, and allow it to stand still in the solution. Get readings after ☺ comes up and stays on screen.

Notes

a) For solutions with low ionic strength (e.g. distilled or deionized water), the pH measurements will be fluctuating and difficult to get a stable reading. A specialized pure water pH electrode is required. For more information, please contact us at info@aperainst.com. Likewise, when testing clean water such as drinking water, RO water or tap water, the test time could be longer, usually 2-4 minutes.

8 Conductivity Calibration

8.1 How to calibrate

1) Press (MODE △) key to switch to conductivity measurement mode (**Cond**). Rinse the probe in distilled water and dry it.
2) Pour certain amount of 1413μS/cm and 12.88mS/cm conductivity calibration solution into corresponding calibration bottles (to about half volume of the vial).
3) Long press (CAL ENT) key to enter calibration mode, short press (MEAS) to go back to measurement mode.
4) Place the probe into 1413 μS/cm conductivity calibration solution, shake it for a few seconds and allow it to stand still in the solution until a stable reading is reached. When ☺ stays on the LCD screen, short press (CAL ENT) key to complete 1st calibration, the tester returns to measurement mode and indication icon (M) will appear at the bottom left of the LCD screen.
5) After calibration, place the probe in 12.88 mS/cm conductivity calibration solution. If the value is accurate, it is not necessary to conduct 2nd point calibration. If it is inaccurate, follow the steps in 3) to 4) to complete the 2nd point of calibration using 12.88 mS/cm calibration solution.

8.2 Notes

1) TDS, salinity, and resistivity values are converted from conductivity. So only conductivity needs to be calibrated.
2) The tester can calibrate 1413 μS/cm, 12.88 mS/cm, and 84 μS/cm(sold separately) conductivity calibration solution. User can conduct 1 to 3 points calibration. Refer to the table below. Usually calibrating the tester with 1413 μS/cm conductivity buffer solution alone shall meet the testing requirement.

Calibration Indication Icon	Calibration Standards	Measuring Range
(L)	84 μS/cm	0 - 199 μS/cm
(M)	1413 μS/cm	200 - 1999 μS/cm
(H)	12.88 mS/cm	2.0 – 20.00 mS/cm

3) The tester has been calibrated before leaving factory. Generally, users can use the tester directly or users can test conductivity calibration solutions first. If the error is large, then calibration is needed.
4) Conductivity calibration solutions are easier to get polluted than pH buffers, we recommend that users replace new conductivity solutions after 5 to 10 times of use to keep the standard solution's accuracy. Do NOT pour the used calibration solutions back into the solution bottles in case of contamination.
5) Temperature compensation factor: The default setting of the temperature compensation factor is 2.0%/℃.

   User can adjust the factor based on test solution and experimental data in parameter setting P10.

Solution	Temperature compensation factor	Solution	Temperature compensation factor
NaCl	2.12%/˚C	10% Hydrochloric acid	1.32%/˚C
5% NaOH	1.72%/˚C	5% Sulfuric acid	0.96%/˚C
Dilute ammonia	1.88%/˚C		

6) *1000μS/cm =1mS/cm; 1000 ppm = 1 ppt
7) TDS and conductivity is linear related, and its conversion factor is 0.40-1.00. Adjust the factor in parameter setting P13 based on the requirements in different industries. The factory default setting is 0.71. Salinity and conductivity is linear related, and its conversion factor is 0.5. The tester only needs to be calibrated in Conductivity mode, then after calibration of conductivity, the meter can switch from conductivity to TDS or salinity.
8) Conversion Example

   if conductivity measurement is 1000μS/cm, then the default TDS measurement will be 710 ppm (under the default 0.71 conversion factor), and the salinity be 0.5 ppt.
9) For the self-diagnosis information, please refer to the table below:

Symbol	Self-Diagnosis information	How to fix
Er 1	The meter cannot recognize the conductivity standard solutions.	1. Make sure the probe is fully submerged in the solution. 2. Check if the standard solution is expired or contaminated. 3. Check if the conductivity electrode (two black rods) is damaged. 4. Check if the conductivity electrode is contaminated. If so, please use a soft brush with warm water to clean up. 5. If none of the above, please contact us at info@aperainst.com or +1 (614) 285-3080
Er2	CAL ENT Is pressed before measurement is fully stable (☺ comes up and stays)	Wait for ☺ to come up and stays on screen before pressing CAL ENT
Er3	During calibration, readings being unstable for over 3 minutes	1. Shake the probe to remove the air bubbles on the surface of the black rods 2. Check if the conductivity electrode is contaminated. If so, please use a soft brush with warm water to clean up. 3. Soak the probe in 12.88mS/cm solution for 10 minutes, then rinse with distilled water. 4. If none of the above, please contact us at info@aperainst.com or +1 (614) 285-3080
Er6	The calibration reminder is triggered. It's time to perform a new conductivity calibration	Perform conductivity calibration or cancel calibration reminder in ZenTest settings.

9 Conductivity Measurement

Press ⏻ MEAS key to turn on the tester. Press MODE △ to switch to Conductivity measuring mode. Rinse the probe in distilled water and dry it. Dip the probe in sample solution, shake it for a few seconds, and allow it to stand still in the solution until a stable reading is reached. Get readings after ☺ comes up and stays. Press MODE △ to switch from conductivity to TDS, salinity, and resistivity.

10 ORP Measurement

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.

Power on the PC60-Z tester, unscrew the original probe, and install the ORP60-DA probe, then the tester will automatically switch to ORP measurement mode (Refer to Section 14 for how to replace a probe).

Rinse the probe in distilled water and dry it. Dip the probe in sample solution, shake for a few seconds, and allow it to stand still. Get the ORP readings after ☺ appears and stays on screen.

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
P9	Conductivity Reference Temperature	15˚C to 30˚C	25˚C
P10	Temp. Compensation Coefficient	0 to 9.99	2.00
P11	Conductivity Calibration Reminder	H-hours D-Days (set up in ZenTest App)	/
P12	Conductivity Back to Factory Default	No – Yes	No
P13	TDS Factor	0.40 to 1.00	0.71
P14	Salinity Unit	ppt – g/L	ppt

11.2 Parameter Setting

1) When the meter is turned off, long press (MEAS) to enter parameter setting →short press (MODE △) to switch P01-P02…→P14. Short Press (CAL ENT), parameter flashes → short press (MODE △) to adjust parameter → short press (CAL ENT) to confirm →Short press (MEAS) 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 (CAL ENT) 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 (CAL ENT) 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 (MEAS) 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 (MEAS) to manually shut down the meter.
5) **pH Calibration Reminder (P07) and Conductivity Calibration Reminder (P11)** – set XX hours (H) Or XX 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) and Conductivity Back to Factory Default (P12)** – 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.

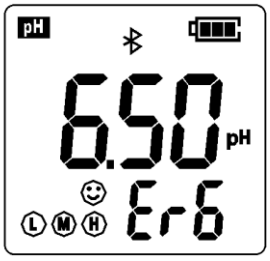
12 Technical Specifications

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)
Conductivity	Range	0 to 199.9 µS, 200 to 1999 µS, 2 to 20.00 mS/cm
	Resolution	0.1/1 µS, 0.01 mS/cm
	Accuracy	±1% F.S
	Calibration Points	1 to 3 points
TDS	Range	0.1 ppm to 10.00 ppt
	TDS Factor	0.40 to 1.00
Salinity	Range	0 to 10.00 ppt
Resistivity	Range	50Ω to 20MΩ
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

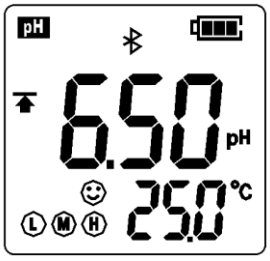
13 Icons and Functions

Calibrated points	(L) (M) (H)	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	ᛒ	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;		

Graph-3
LCD Display



Graph-4
pH calibration reminder



Graph-5
pH alarm triggered

14 Probe Replacement

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.

The replacement probes that are compatible with PC60-Z are:

- PC60-DE (Default pH/cond. Probe), PH60-DE (general-purpose pH probe), PH60S-DE (spear pH probe for solid-sample pH testing), PH60F-DE (flat pH probe for surface pH testing), EC60-DE (conductivity probe), ORP60-DA (ORP Probe).

15 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, unauthorized repair, normal wear and tear, or external causes such as accidents, abuse, or other actions or events beyond our reasonable control.

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