

GroStar[™]

GS4 Premium pH/EC Pen Tester

User Manual



APERA INSTRUMENTS (Europe) GmbH

www.aperainst.de

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Thank you for choosing the Apera GroStar™ GS4 Premium pH EC Pen Tester. This premium pen has been designed specifically for the horticultural market. Since 1991, Apera instruments has been dedicated to providing hi-tech, accurate, lab-grade instruments and sensors. GroStar's intelligent design reduces the guesswork so you can easily manage your crops success.

1 Main Features

- Premium combo pH/EC probe measures pH, EC, ppm (500/700) all-in-one unit with minimal maintenance.
- Easy to use design and quick two-point calibration adjustment.
- 3-Color backlit LCD screen gives you clear readings in different modes even in dark environment.
- Durable structure, IP67 waterproof rating, powered by AAA batteries.
- The probe is replaceable, so you don't have to discard the entire pen when the probe reaches its end of life.

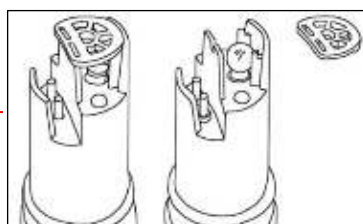
3-Color LCD Screen
• White for measurement mode • Green for calibration mode • Red for calibration error

 stands for stabilized reading
L/M/H stands for successful calibration: L is pH 4, M is pH 7 or 2.77 EC, H is pH 10. The icon(s) will disappear after 30 days to remind you for re-calibration.

Probe Cap
• Water droplets are added during production to maintain the moisture of the probe. This is normal practice and should not be attributed to used product. • The fill line shows the level to which you should pour the soaking solution or sample solution. • For details of probe storage, see Section 9.



	Short Press	Long Press
	1. Power on 2. Manual hold Press again to cancel hold.	Power off
	In measurement mode, press to turn on/off the backlight.	Start calibration
	Switch mode: pH→EC→500p pm →700ppm	Switch between °F and °C



Sensor Shield
Protects the sensitive pH glass membrane from accidental damage. Remove it when cleaning the pH sensor.

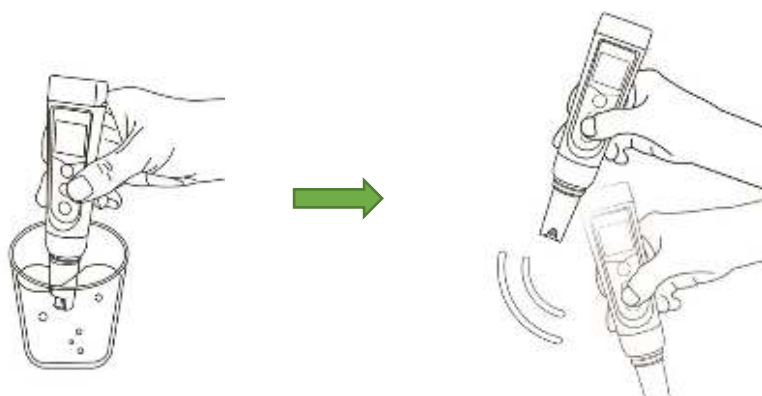
Premium pH • EC Combo Probe
• Upgraded double-junction blue pH sensor, increased durability and easier to use. • Titanium alloy conductivity sensor, highly accurate and requires minimal maintenance. • The probe is replaceable, saving money in the long run.

2 Preparation Before First Use

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



2.2 Rinse off the probe in clean water, then shake off excess water.



2.3 Calibrate pH and EC. For calibration tutorial, refer to Section 3 and Section 4.

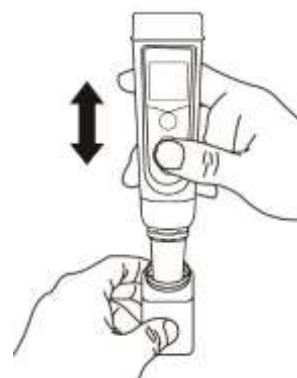
2.4 If you find the probe cap is dried out, soak the probe in 3M KCL soaking solution for 5 minutes before use.

2.5 If the tester hasn't been used for a long time (over 1 month), please soak the probe in the 3M KCL soaking solution for at least 1 hour, then calibrate it before measurement begins

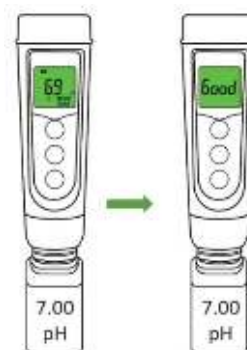
3 pH Calibration

3.1 Power on the pen and remove the probe cap. **Always calibrate 7.00 pH first.**

3.2 Rinse the probe with clean water and shake off excess water, then submerge it in the 7.00 pH standard buffer; **shake the probe up and down in the solution for a few seconds** and let it stand.

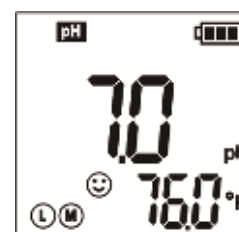


- 3.3 Hold  until screen turns green. The pen starts automatic calibration. Wait for "Good" to show up (in 10-15 seconds), indicating the calibration is completed, then the pen returns to measurement mode.



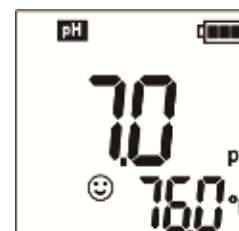
Short press any key while calibrating (in green screen) to cancel calibration and return to measurement.

- 3.4  icon will show up on the lower left corner of the screen indicating the pen is successfully calibrated. Repeat Step 3.2 to 3.3 to calibrate pH 4 using 4.00 pH buffer, then  will show up next to . You can continue to calibrate pH 10 by repeating Step 3.2 to 3.3 using 10.01 pH buffer (sold separately), then  will show up to the right of .



Calibrating pH 10 is usually not necessary unless your estimated target pH is greater than 8.0 pH.

- 3.5  /  /  will disappear in 30 days after calibration, reminding you to recalibrate the tester. We recommend calibrating pH at least once a month to ensure accuracy. If you feel like the accuracy might be off, simply test the standard buffers (make sure the buffers are fresh and clean). If a discrepancy is found, then it's time to calibrate again.
- 3.6 If the calibration fails, the screen will turn red. For details, see Section 13 Troubleshooting Guide.



Always perform at least a 2-point pH calibration to ensure accuracy. Start with 7.00 pH, followed by 4.00 pH immediately. If you happened to turn off the pen before calibrating 4.00 pH, you need to start with 7.00 pH again after rebooting the pen, then 4.00 pH.



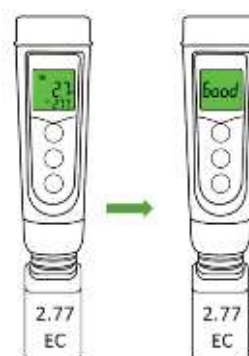
4 pH Measurement

- 4.1 Power on and remove the probe cap.
- 4.2 Rinse the probe with clean water and shake off excess water.
- 4.3 Fully submerge the probe into the solution at least 1 inch deep, make a quick stir to remove potential air bubbles around the probe.
- 4.4 Hold the pen and wait for the reading to stabilize (☺ stays on screen), then record the reading.
- 4.5 Thoroughly rinse off the probe with clean water, then close the probe cap.



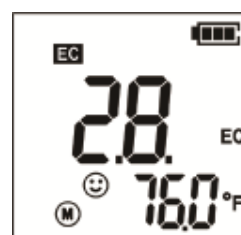
5 EC Calibration

- 5.1 Power on and remove the probe cap. Press  to switch to EC measurement mode. Rinse the probe with clean water and shake-dry, then submerge it in the 2.77 EC standard solution; shake the probe in the solution up and down for a few seconds to remove potential air bubbles, then let it stand.
- 5.2 Hold  until screen turns green. The pen starts automatic calibration. Wait for "Good" to show up (in 10-15 seconds), indicating the calibration is completed, then the pen returns to measurement mode.



Short press any key while calibrating (in green screen) to cancel calibration and return to measurement.

- 5.3  icon will show up on the lower left corner indicating the tester is successfully calibrated.  will disappear in 30 days after calibration, reminding you to re-calibrate EC. We recommend calibrating the EC once every month to ensure the accuracy. If you feel like the accuracy might be off, simply test the standard solution (make sure the standard is fresh and clean). If the reading is greater than 2.8 EC or smaller than 2.7 EC, then it's time to calibrate again.



- 5.4 If the calibration fails, the screen will turn red. For details, see Section 13 Troubleshooting Guide.



6 EC/500ppm/700ppm Measurement

- 6.1 Power on and remove the probe cap.
- 6.2 Rinse the probe with clean water and shake off excess water.
- 6.3 Submerge the probe into the solution, make a quick stir to remove potential air bubbles around the sensor. Hold still and wait for the reading to stabilize (☺ stays on the screen), then record the reading.
- 6.4 Short press  to switch from EC → 500ppm → 700ppm
- 6.5 Thoroughly rinse off the probe with clean water.



What is EC and its relation to 500ppm & 700ppm?

EC (electrical conductivity) is a measure of the nutrients in the solution. Low conductivity implies a low nutrient concentration, which usually results in nutritional deficiencies and slow growth rates of your plants.

A higher conductivity is more food for your plants. However, be careful of very high levels as delicate plants, cuttings, and seedlings can experience fertilizer burn if the conductivity is excessively high.

EC, 500ppm, and 700ppm are simply different units preferred by different markets. 500ppm and 700ppm both originate from EC. Therefore, using EC to compare and analyze test result is the safest way and will minimize confusion. Here is how they convert to each other:

1.0 (EC) = 500ppm (500ppm) = 700ppm (700ppm)

2.6 (EC) = 1300ppm (500ppm) = 1820ppm (700ppm)

3.5 (EC) = 1750ppm (500ppm) = 2450ppm (700ppm)

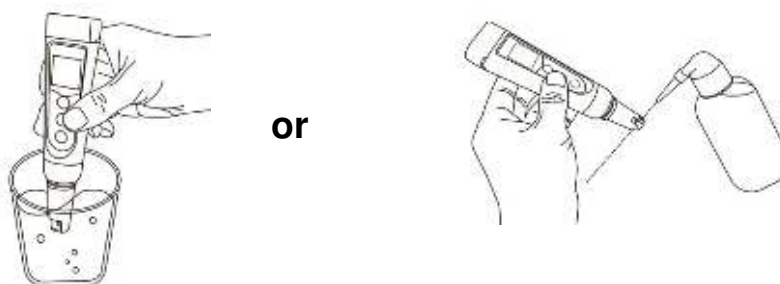
7 Other Functions

- 7.1 If necessary, you can manually hold (lock) the reading by short pressing . Press it again to cancel the hold.
- 7.2 Long press  to switch temp. unit between °F and °C.
- 7.3 The tester will automatically power off if there is no operation within 10 minutes. If you want to turn off/on the Auto. Power Off function, power off the tester, and then hold  for 5 seconds until you see Auto Off or Auto On. Then it will power on and go to measurement mode automatically.



8 Probe Cleaning

- 8.1 The tester is only as accurate as the probe is clean. Always thoroughly rinse off the probe before and after each measurement with clean water in a container or with a wash bottle.



- 8.2 For tough contaminants, remove the sensor shield, soak the probe in Apera's cleaning solution 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 1 hour. Rinse it off, then re-calibrate the tester before using again.

9 Probe Storage

- 9.1 Under regular usage (daily or weekly use), make sure there are several drops 3M KCL soaking solution in the probe cap, and tightly close the cap with the O-ring.

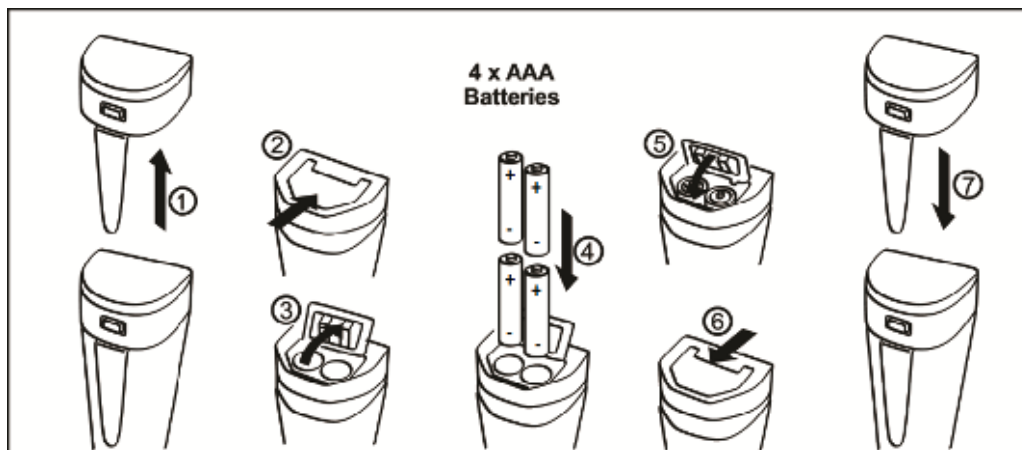


- 9.2 For long-term storage (you are not going to use the product for more than a month), add 3M KCL soaking solution to the Fill line in the cap and store the probe in it. Close the probe cap tightly with the O-ring.



If you find white crystals inside or outside the probe cap, it is perfectly normal. It is the 3M KCL soaking solution that crystalizes over time by its nature. Just rinse them off and add in new soaking solution. This chemical is not poisonous nor dangerous, and the probe's performance will not be affected at all.

10 Battery Replacement



- ① Pull up the battery cap (might take some force).
- ② Slide the battery cover along the OPEN arrow to open the cover.
- ③ Open the battery cover.
- ④ Insert the batteries (**ALL POSITIVE SIDES FACING UP**).
- ⑤ Press down the battery cover and hold it.
- ⑥ Slide the battery cover along the LOCK arrow to lock the cover.
- ⑦ Close the battery cap. Make sure to push it all the way down. The tester's waterproof rating may be compromised if the battery cap is not tightly closed.

11 Probe Replacement

- Screw off the probe ring, unplug the old probe; plug in the new probe (make sure to align the connector's position properly), and screw on the probe ring.



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 GroStar probes is 18-24 months depending on the frequency of usage and how well you keep it clean and properly stored.

We recommend replacing your probe at least every 18 months to ensure the best accuracy. The nice thing about GroStar pens is that you can just buy a replacement probe instead of a whole new tester.

12 Notes

- 12.1 Never store the probe in pure water such as tap water, RO water, distilled water, deionized water, etc.
- 12.2 Never use your finger to touch the glass membrane or use other material to wipe it.
- 12.3 Avoid testing in high ($>113^{\circ}\text{F}/45^{\circ}\text{C}$) or low temperature ($<41^{\circ}\text{F}/5^{\circ}\text{C}$) solutions as it will cause greater measurement error and damage to the probe. Test your samples and perform calibration close to room temperature as much as possible.

12.4 Never test oily liquids.

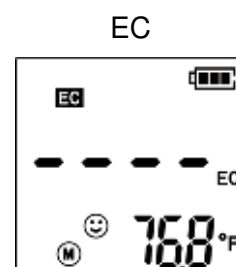
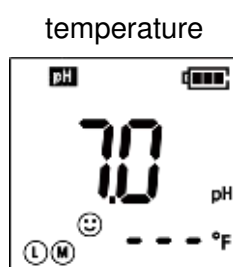
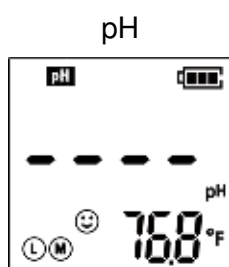
12.5 Make sure the battery cap is completely closed with the O-ring. Otherwise, the waterproof rating could be compromised.

13 Troubleshooting Guide

Trouble	Reason	How to fix
Cannot calibrate  	Incorrect calibration order	Power on the tester, calibrate pH 7 first, then pH 4. After pH 4 is calibrated, if you want to calibrate pH 7 again, you need to reboot the tester.
	Poor quality standard solutions	Replace with fresh and clean standard calibration solutions made by legitimate scientific instrument manufacturers.
	Contaminated probe	Clean the probe with Apera's cleaning solution or detergent water.
	Aged probe	Replace the probe.
	Dried-out probe	Soak the probe in the 3M KCL soaking solution for at least 1 hour.
	Probe is not fully submerged in the solution	Make sure the probe is fully immersed in the solution at least 1 inch deep.
	Air bubbles around the sensor	Make a quick stir in the solution to remove air bubbles.
Reading is always slowly changing, won't stabilize.	Contaminated probe	Clean the probe with Apera's cleaning solution or detergent water.
	Clogged junction	Clean the probe with Apera's cleaning solution, then soak it in 3M KCL soaking solution overnight.
	Aged probe	Replace the probe.
	Testing pH of low ionic strength solutions like tap water, drinking water, RO water	Be patient, wait for 2-5 minutes to reach a fully stabilized reading. If still not stabilizing, add 1ml of 3M KCL solution to 1000ml of test solution.
Display similar readings in any solutions or always display 7.0	Broken probe	If you don't find any visible damage of the probe and it's within the 1-year probe warranty, contact your point of purchase for warranty fulfillment; If there is visible damage or the probe is more than 1-year old, replace the probe.
Reading keeps jumping	Probe is not fully submerged in the solution	Make sure the probe is fully immersed in the solution at least 1 inch deep.
	Air bubbles around the sensor	Make a quick stir in the solution to remove air bubbles.
	Probe is not properly connected, or the pin 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 in the air too long.

Calibration is successful, but reading is not accurate	Aged probe	Replace the probe.
	Air bubbles around the sensor	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 soaking solution overnight
	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'.

Out of range reminder for:



14 Technical Specs

Range	0.0 to 14.0 pH, 0 to 10.0 EC, 0 to 7000ppm (700ppm), 0 to 5000ppm (500ppm), 0 to 50°C (32 to 122°F)
Resolution	0.1 pH, 0.1EC, 10ppm (700ppm), 10ppm(500ppm), 0.1°F/0.1°C
Accuracy	±0.1 pH, ±0.1 EC ±30ppm (500ppm) ±40ppm (700ppm) ±1°C/±1°F
Temperature compensation	Automatic
Calibration	pH: automatic 1 to 3 points (7/4/10) *10.01 pH solution sold separately; EC: automatic 1 point (2.77 EC)
Unit	pH, EC, 500ppm, 700ppm, °F, °C
Power Supply	4-AAA alkaline batteries, up to 1000 hours of operation
Backlight	White (measurement); Green (calibration); Red (errors)
Reading hold	Manual

Warranty	Two years for the instrument, one year for the probe
pH probe	Low-resistance lithium glass membrane, double-junction, blue gel electrolyte
EC probe	Titanium alloy
Successful calibration indicators	M (7.00 pH/2.77 EC), L (4.00 pH), H (10.01 pH)
Low battery reminder	
Waterproof rating	IP67
Reading stabilization icon	

15 What's in the box



16 Accessories

- pH buffer Kit (pH4/7, 250ml, each), item AI1113
- pH buffer Kit (pH4/7/10, 250ml, each), item AI1115
- 2.77 EC Standard Calibration Solution
- 3M KCl storage solution 250ml, item AI1107
- GS1-E pH Probe, item AI58010
- GS2-E Soil pH Probe, item AI58020
- GS3-E EC Probe, item AI58030
- GS4-E pH/EC-Combo-Probe, item AI58040

17 Warranty

How Long Does the Coverage Last?

Apera Instruments® (Apera) warrants the GroStar™ GS4 Premium pH/EC Combo Pen Tester (Product) for a period of 24 months for the instrument and 12 months for the probe from date of purchase by original purchaser or consumer. Proof of purchase is required for the warranty to be effective (store sales receipt for Product showing model number, payment, and date of purchase). This warranty is non-transferable and terminates if the original purchaser/consumer sells or transfers the Product a third party.

What is Covered?

Apera warrants the Product against defects in material and workmanship when used in a normal manner, in accordance with Apera instruction manuals. If Apera is provided with valid proof of purchase (as defined above) and determines the Product is defective, Apera may, in its sole discretion either (a) repair the Product with new or refurbished parts, or (b) replace the Product with a new or refurbished Product.

What is NOT Covered?

This warranty does not apply to equipment, component or part that was not manufactured or sold by Apera and shall be void if any such item is installed on a Product. Further, this warranty does not apply to replacement of items subject to normal use, wear and tear and expressly excludes:

- Cosmetic damage such as stains, scratches, and dents
- Damage due to accident, improper use, negligence, careless operation or handling of Product not in accordance with Apera instruction manuals, or failure to maintain or care for Product as recommended by Apera
- Damage caused by use of parts not assembled/installed as per Apera instructions
- Damage caused by use of parts or accessories not produced or recommended by Apera
- Damage due to transportation or shipment of Product
- Product repaired or altered by parties other than Apera or its authorized agents
- Product with defaced, missing, or illegible serial numbers
- Products not purchased from Apera or an Apera-authorized distributor or reseller.

How Do You Get Service?

To begin a warranty claim you must return the Product to the point of purchase with valid proof of purchase.

Limitation of Liability & Acknowledgments

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS WARRANTY AND THE REMEDIES SET OUT ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES AND REMEDIES (ORAL OR WRITTEN, EXPRESS OR IMPLIED). EXCEPT AS PROVIDED IN THIS WARRANTY AND TO THE MAXIMUM EXTENT PERMITTED BY LAW, APERA INSTRUMENTS IS NOT RESPONSIBLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGES, OR ANY OTHER

LOSS OR DAMAGES RESULTING FROM SALE OR USE OF THE PRODUCT, OR BREACH OF WARRANTY, HOWEVER CAUSED, INCLUDING DAMAGES FOR LOST PROFITS, PERSONAL INJURY OR PROPERTY DAMAGE.

IT IS UNDERSTOOD AND AGREED BY CONSUMER UPON PURCHASE OF A PRODUCT THAT, EXCEPT AS STATED IN THIS WARRANTY, APERA INSTRUMENTS IS NOT MAKING AND HAS NOT MADE ANY EXPRESS OR IMPLIED WARRANTY OR OTHER REPRESENTATION REGARDING THE PRODUCT AND DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT PERMITTED BY LAW. ANY WARRANTIES WHICH ARE IMPOSED BY LAW AND CANNOT BE DISCLAIMED ARE HEREBY LIMITED IN DURATION TO THE PERIOD AND REMEDIES PROVIDED IN THIS WARRANTY.

SOME JURISDICTIONS (STATES OR COUNTRIES) DO NOT ALLOW EXCLUSION OR LIMITATION FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT BE APPLICABLE. IF ANY PROVISION OF THIS WARRANTY IS JUDGED TO BE ILLEGAL, INVALID OR UNENFORCEABLE, THE REMAINING PROVISIONS OF THE WARRANTY SHALL REMAIN IN FULL FORCE AND EFFECT.

Governing Law; Authority

This warranty is governed by the laws of the state of country where Product is purchased, without regard to its choice of law principles. Except as allowed by law, Apera does not limit or exclude other rights a consumer may have with regard to the Product. No Apera distributor, employee or agent is authorized to modify, extend, or otherwise change the terms of this warranty.

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