



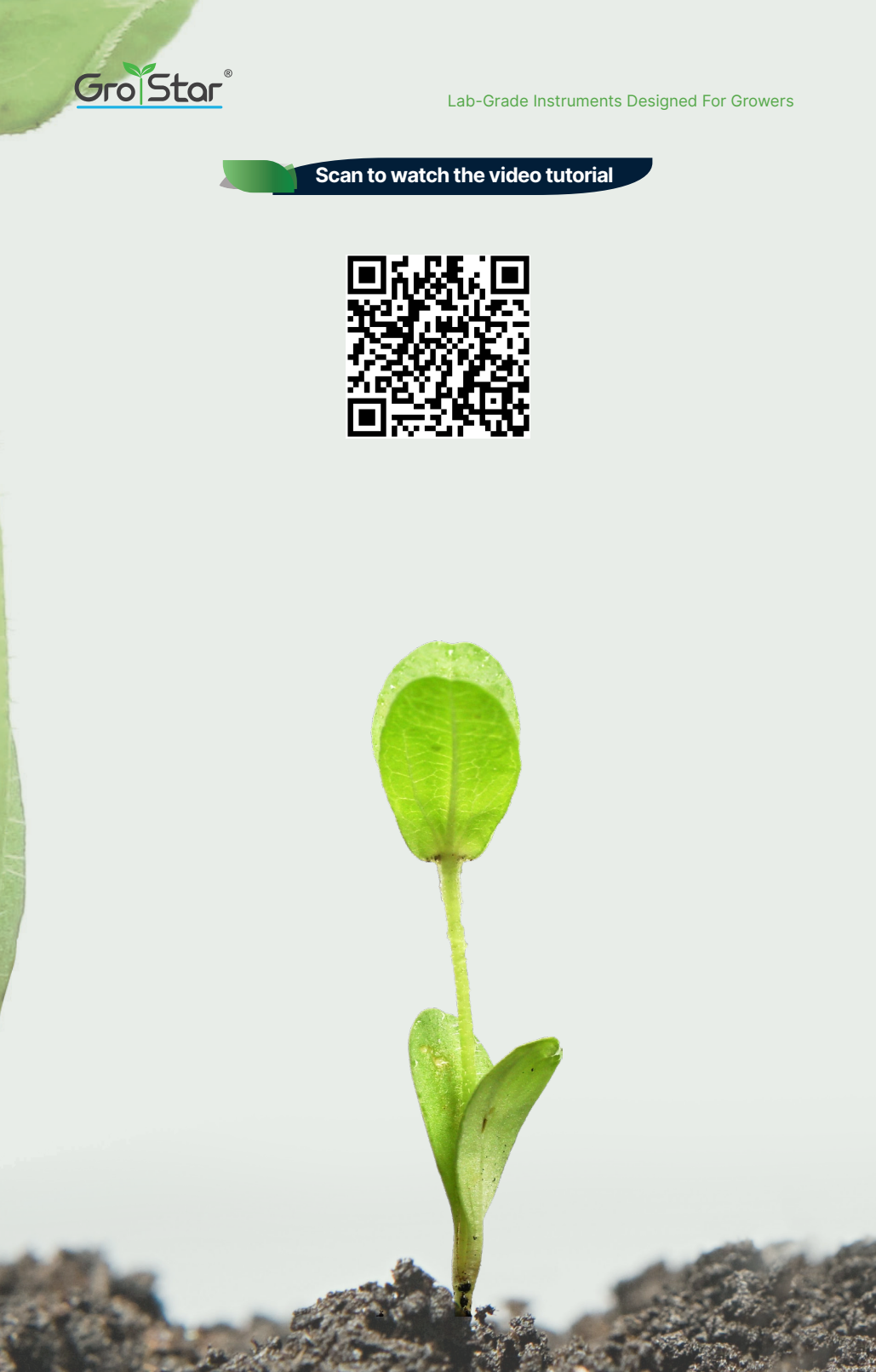
GroStar[®]

AI104G

**GS4 Premium pH/EC/ppm
Combo Pen
(Gen II)**

User Guide

Scan to watch the video tutorial



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Thank you for choosing GroStar® GS4 Premium pH/EC/ppm Combo Pen (Gen II). This premium pen has been designed specifically for the horticultural market. Since 1991, Apera Instruments has been dedicated to providing advanced lab-grade instruments and sensors. GroStar's intelligent design reduces the guesswork so you can easily manage your crops success.

01 Main Features

- Premium combo probe measures pH, EC, 500ppm, 700ppm, temperature all-in-one unit with minimal maintenance.
- Easy-to-use design and quick 2-point automatic calibration with electrode condition display.
- 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) disappear in 30 days to remind you for re-calibration.

| | Short Press | Long Press |
|--------------------|--|--------------------------|
| ⏻ HOLD | 1. Power on 2. Manual hold Press again to cancel hold. | Power off |
| CAL TruRead | In measurement mode, press to enter TruRead mode | Start calibration |
| UNIT MODE | In measurement mode, switch from pH→EC→500ppm →700ppm; | Switch between °F and °C |

Probe Cap

- Water droplets are added during production to maintain the moisture of the probe. This is a 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.

Sensor Shield

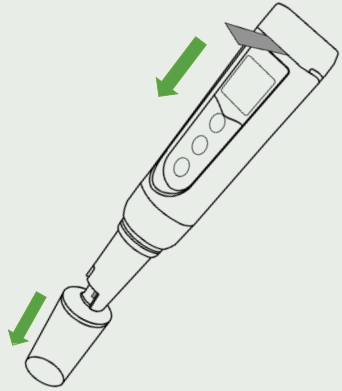
Protects the sensitive pH glass membrane from accidental damage. Remove it when cleaning the pH sensor.

Premium pH + EC Combo Probe

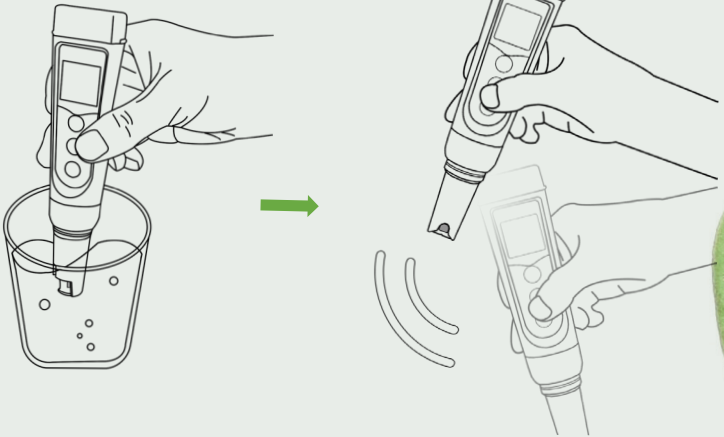
- The Double-junction blue pH sensor significantly improves durability and ease of use.
- The titanium alloy conductivity sensor is highly accurate and requires minimal maintenance.
- The probe is replaceable, saving money in the long run.

02 Preparation Before First Use

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



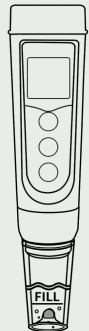
2.2 Rinse the probe in clean water, then shake with excess water.



2.3 Calibrate pH and EC. For calibration tutorial, see 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 30 minutes, then calibrate it before testing.



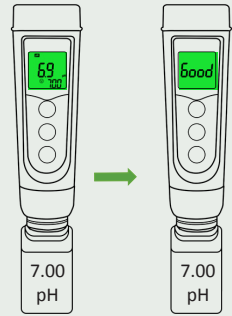
03 pH Calibration

3.1 Short press to power on the pen and remove the probe cap.

Always calibrate 7.00 pH first.

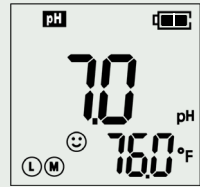
3.2 Rinse the probe with clean water and shake off excess water, then submerge it in the 7.00 pH standard buffer; **Shake the probe in the solution vial for a few seconds** and let it stand.

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.

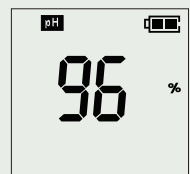
3.4 will show up on the lower left corner of the screen indicating the first point calibration is successful. Repeat Steps 3.2 to 3.3 to calibrate pH 4 using 4.00 pH buffer, then will show up next to . You can continue to calibrate pH 10 by repeating Steps 3.2 to 3.3 using 10.01pH buffer (sold separately), then will show up at 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 re-calibrate 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, it's time to calibrate again.

3.6 After finishing the 2nd point calibration, the slope data of the pH electrode will show up, indicating the health condition of the pH electrode. The closer the slope is to 100%, the better the electrode's condition is. In general, we would consider 97% to 100% as great condition, 93% to 96% as good condition. If below 90%, it means the pH electrode is close to its end of life, and we recommend replacing it to ensure the optimal measurement accuracy.




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

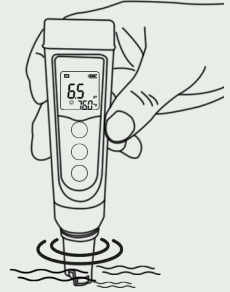


Always perform at least a 2-point pH calibration to ensure accuracy. Start with pH 7, followed by pH 4 immediately. If you happened to turn off the pen before calibrating pH 4, you need to start with pH 7 again after rebooting the pen, then pH 4.





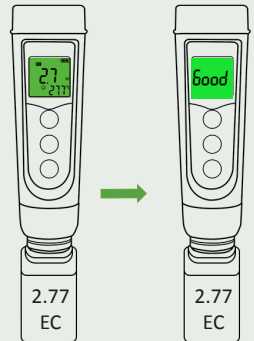
04 pH Measurement

- 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 in the solution to remove air bubbles around the probe.
- 4.4 Hold the pen and wait for the reading to stabilize (☺ stays on screen), then record the reading. Press  to lock the reading if needed. Press it again to cancel the lock.
- 4.5 Thoroughly rinse the probe with pure water, then put on the probe cap.



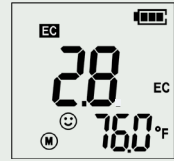
05 EC Calibration

- 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 vertically for a few seconds to remove 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 **M** will show up on the lower left corner indicating a successful calibration. **M** disappears in 30 days after calibration to remind 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 solution 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.

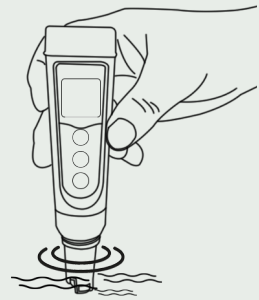


5.4 If the calibration fails, the screen will turn red. For details, see Section 13 Troubleshooting Guide.



06 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 in the solution. Hold still and wait for the reading to stabilize (☺ stays on the screen), then record the reading. Press  to lock the reading if necessary. Press it again to cancel the lock.
- 6.4 Short press  to switch from EC→500ppm→700ppm
- 6.5 Thoroughly rinse the probe with clean water and put on the probe cap.



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




EC (electrical conductivity) is a measure of the nutrients in the solution. Low EC indicates a low nutrient concentration, which usually results in nutritional deficiencies and slow growth rates of plants. A higher conductivity indicates more food for plants. However, be careful with abnormally high levels. 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 results is the safest way and minimizes confusion. Here is how they convert to each other:


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



07 Other Functions

7.1 Short press  to enter **TruRead** mode. As you are testing, the pen automatically records measurements after each reading is stabilized for 7 seconds ("01" will show up at the bottom right to indicate the 1st set of data is recorded). After you finish all the testing, short press  again to check the average, maximum, and minimum values of all the recorded measurements. Then short press  again to end TruRead mode and return to normal measurement mode.

7.2 If needed, you can manually hold (lock) the reading by short pressing . Short press it again to cancel the hold.

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, turn off the tester first, and then hold  for 5 seconds until you see "Auto off". Then it will power on and go to measurement mode automatically.



7.4 In measurement mode, Long press  to switch temperature units between °F and °C.

7.5 The pen can measure ORP with the installation of an ORP probe (SKU: GS5-E, see Section 11 on how to replace a probe). The meter would automatically recognize the ORP probe and switch to mV mode. Then you are ready to test the ORP level of your solution.



ORP (Oxidation Reduction Potential) describes the ability of water to break down waste and contaminants. Hydroponic ORP management gives growers the ability to observe and maintain a relative measure of the health of nutrient solutions. The optimal ORP range for nutrient solutions is 250 – 400 mV.

08 Probe Cleaning

- 8.1 The tester is only as accurate the probe is clean. Always thoroughly rinse the probe before and after each measurement with pure water or with a wash bottle (tap water is ok. Ideally use RO or distilled water).



- 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, then re-calibrate the tester before using it again. These cleaning tools can be found in Apera's Probe Care Kit (see Section 15).

09 Probe Storage

- 9.1 Under regular usage (daily or weekly use), just make sure the probe cap is wet (with a few water droplets inside), and tightened with the red O-ring.

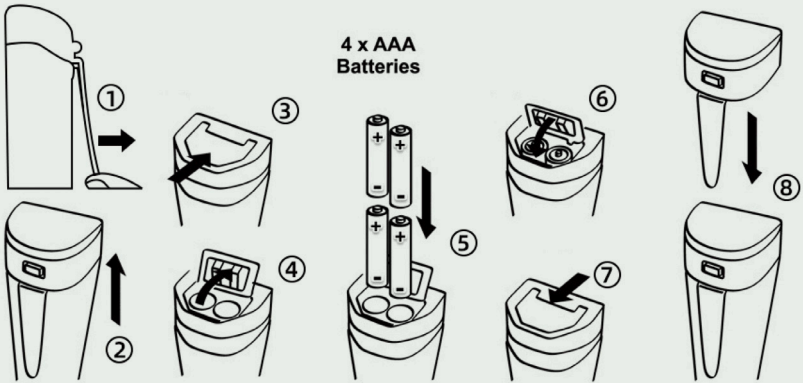


- 9.2 For long-term storage (you are not going to use the product for more than a month), add 3M KCL soaking solution to the Fill line in the cap and store the probe in it. Tighten the probe cap with the red O-ring.



If you find white crystals around the probe, it is perfectly normal. It is the probe's 3M KCL inner electrolyte that crystallizes over time by its nature. Just rinse them with clean water and use the pen as normal. This chemical is not poisonous nor dangerous, and the probe's performance will not be affected at all.

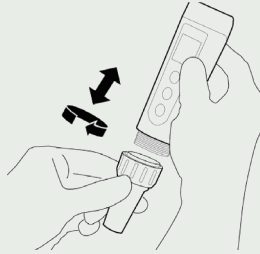
10 Battery Replacement



- ① Loosen the battery cap lock.
- ② Pull off the battery cap.
- ③ Slide the battery cover along the OPEN arrow to open the cover.
- ④ Open the battery cover.
- ⑤ Insert the batteries (**ALL POSITIVE SIDES FACING UP**).
- ⑥ Press down the battery cover and hold it.
- ⑦ Slide the battery cover along the LOCK arrow to lock the cover.
- ⑧ 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



Twist off the probe ring, unplug the old probe; plug in the new probe (make sure to align the connector's position properly), then twist on the probe ring.



pH probes are technically chemical batteries, hence don't last forever. Every pH probe will eventually age and fail even if you don't use it. The typical service life of GroStar pH 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 or when the pH electrode slope is lower than 90% (see Section 3.6 for details).

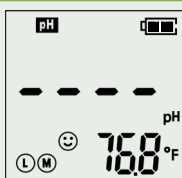
The nice thing about GroStar is that you can always just buy a replacement probe to rejuvenate your pen.

12 Notes

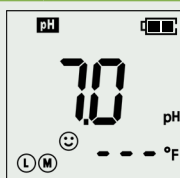
- 12.1 Never store the probe in pure water such as tap water, RO water, distilled water & deionized water.
- 12.2 Never use your finger to touch the glass membrane or use other material to wipe it.
- 12.3 Avoid testing in high (>113°F) or low temperature (<41°F) solutions as it will cause greater measurement 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 red O-ring. Otherwise, the waterproof rating could be compromised.

13 Troubleshooting Guide

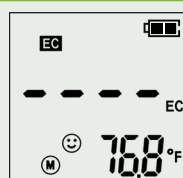
| Trouble | Reason | How to fix |
|--|--|---|
| <p>Cannot calibrate</p> | Incorrect calibration order | Power on the tester, calibrate pH7 first, then pH4. After pH4 is calibrated, if you want to calibrate pH7 again, you need to reboot the tester. |
| | Poor quality standard solutions | Replace with fresh and clean standard calibration solutions made by legitimate 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 15 minutes. |
| | 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. |
| | Contaminated probe | Clean the probe with Apera's cleaning solution or detergent water. |
| Reading is always slowly changing, won't stabilize. | 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, distilled water | Be patient, wait for 1-5 minutes to reach a fully stabilized reading. If still not stabilizing, add 3M KCL soaking solution to your test water at 1:1000 ratio(e.g. 1ml to 1000ml or 1 teaspoon to 1 gallon) |
| 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 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 aged, 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 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 calibrate at the same pH7 standard, then test pH4. Whichever gives more accurate reading is the more accurate one. Test strips or drop tests' accuracy is not comparable to pH meters'. |



Out of range reminder for pH



Out of range reminder for temperature

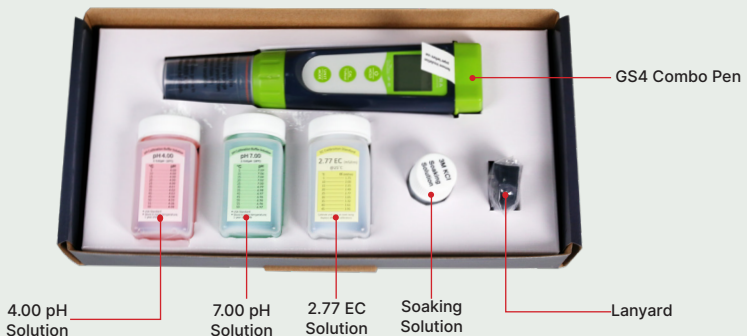


Out of range reminder for EC

14 Technical Specs

| | |
|---|--|
| Range | 0.0-14.0 pH, 0-10.0 EC, 0-7000ppm (700ppm), 0-5000ppm (500ppm), 0-50°C (32-122 °F) |
| Resolution | 0.1 pH, 0.1 EC, 10 ppm (700ppm), 10ppm (500ppm), 0.1°C /0.1 °F |
| Accuracy | ±0.1 pH, ±0.1 EC, ±30 ppm (500ppm) ±40ppm (700ppm) ±0.1°C /±0.1 °F |
| Temperature compensation | Automatic |
| Calibration | pH:Automatic 1 to 3 points (7/4/10) *pH 10.01 solution sold separately EC: Automatic 1 point (2.77 EC) |
| Unit | pH,EC, 500ppm, 700ppm, °C , °F |
| 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 |
| Successful calibration indicator | M (7.00 pH), L(4.00 pH), H(10.01 pH) |
| Low battery reminder | |
| Waterproof rating | IP67 |
| Reading stabilization icon | |

What's in the box



15 Accessories

pH Calibration Kit
(pH 4/7/10, 16oz. each
& CalPod Solution Organizer)
SKU: AI1114



pH Calibration Kit
(pH 4/7/10, 16oz. each
& CalPod Solution Organizer)
SKU: AI1116



2.77 EC Standard Calibration Solution



Replacement Probes

GS4-E pH/EC
Combo Probe



GS2-E
Soil pH Probe



GS1-E
pH Probe



GS3-E
EC Probe



GS5-E
ORP Probe



Probe Care Kit
SKU: AI1170

includes 3M KCL soaking solution (4oz.),
probe cleaning solution (8oz.),
a CalPod solution organizer, a probe
cleaning brush, and pH 4/7/10 solutions
(4oz. each)



How Long Does the Coverage Last?

Apera Instruments® (Apera) warrants the GroStar® GS4 pH/EC/ppm 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 to 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 any 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 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.

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.

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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.