APERA INSTRUMENTS

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GroStar®

AI102G

GS2 Premium Soil pH Pen

(Gen II)

User Guide

GroStar®

Lab-Grade Instruments Designed for Growers

Scan to watch the video tutorial

Contents

Thank you for choosing Apera GroStar® GS2 Premium Soil pH Pen Tester (Gen II). This premium pen has been designed specifically for professional soil pH test as well as nutrient solution pH test. 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

- The Swiss LabSen® Spear soil pH probe provides accurate results with minimal maintenance in soil pH test.
- 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.
- TruRead function available for taking measurements in multiple locations and get the most reliable result.
- The pH 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, H is pH 10. The icon(s) will disappear after 30 days to remind you for re-calibration.

	Short Press	Long Press
HOLD	1. Power on 2. Manual hold Press again to cancel the hold.	Power off
CAL TruRead	In measurement mode, press to enter TruRead mode	Start calibration
UNIT MODE	In measurement mode, press to switch to mV mode (for ORP test)	Switch between °F and °C

Probe Cap Ring

Loosen the probe cap ring before pulling out the probe cap.

Swiss LabSen® Spear Soil pH Probe

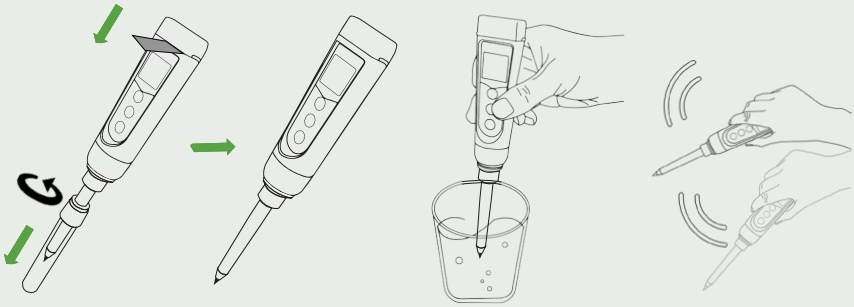
Backed by Apera's proprietary sensor technology from Switzerland, this spear pH probe is specifically designed for making soil pH test easier and more reliable.

- Impact-resistant spear glass tip, 10 times stronger than conventional glass bulb
- PTFE ring prevents a clogged junction caused by soil particles.
- Long-life reference system ensures high durability

Probe Cap

- The probe must be soaked in 3M KCL soaking solution when not in use.
- Fill in 3M KCL soaking solution to about 1/3 of the probe cap, store the probe in it, then twist on the probe cap ring.

02 Preparation Before First Use

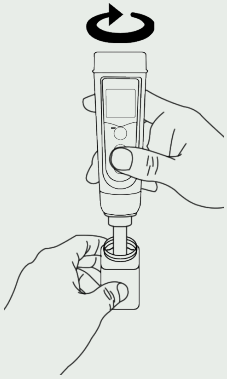


2.1 Remove the battery slip; Loosen the probe cap ring, then pull out the probe cap.

2.2 Prepare a bucket of pure water (tap water is ok. Ideally use RO or distilled water). Rinse off the probe with pure water and then shake off excess water.

2.3 Calibrate the tester at pH 7 and pH 4 before first use. See below for calibration tutorial.

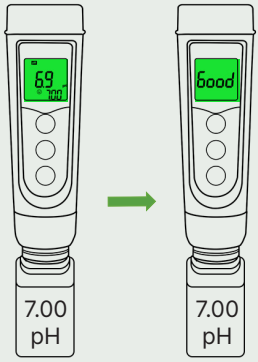
03 pH Calibration



3.1 Short press HOLD to power on the pen and remove the probe cap.
Always calibrate pH 7 first.

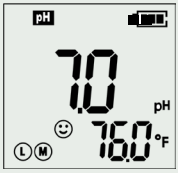
3.2 Rinse the probe with clean water and shake-dry, then submerge it in the 7.00 pH standard buffer; Make a quick stir in the solution and hold still.

3.3 Hold CAL ThiRead 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.

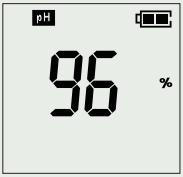
3.4 Ⓜ icon will show up on the lower left corner of the screen indicating the tester is successfully calibrated. Repeat Steps 3.2 to 3.3 to calibrate pH 4 using 4.00 pH buffer, then Ⓛ will show up next to Ⓜ . You can continue to calibrate pH 10 by repeating Steps 3.2 to 3.3 using 10.01pH buffer (sold 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, then it's time to calibrate again.

3.6 After finisihing the 2nd point calibration, the slope data of the pH electrode will show up, indicating the health condition of your 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 your 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, refer to 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 Measure Solution's pH

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.

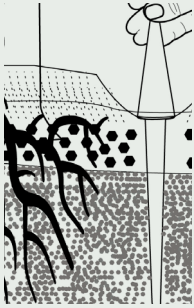
4.4 Wait for the reading to stabilize (☺ stays on screen), then record the reading. Press HOLD to hold the reading if necessary. Press it again to cancel the hold.

4.5 After measurement, thoroughly rinses off the probe with clean water, then put the probe back into the cap with 3M KCL soaking solution.

05 Measure Soil pH Directly

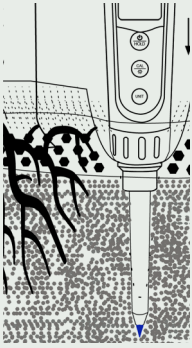
In the practice of direct soil pH testing, as soil is not evenly distributed by its nature, different locations and different depth will generate slightly different pH readings. Even when the angle at which you stick in the probe is different, the reading can also be slightly affected. Therefore, selecting multiple locations while doing your best sticking in the probe at the same depth and angle, then using the TruRead function to record the average/maximum/minimum values is the best way to minimize measurement errors.

5.1 Remove about 2 inches (5cm) of the top layer soil in the test area, **make sure the soil is wet**. If the soil is dry, pH measurement cannot be performed, and the probe can be damaged. For dry soil, please add some distilled or RO water to moisten. Ideally, wait 24 hours before measuring.



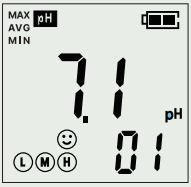
5.2 Use the dibber to create a pathway for the spear probe at about 4-6 inches (10-15cm) in depth. This will help minimize the wear and tear of the spear glass probe.

5.3 Remove the probe cap; Power on the pen; Rinse the probe with clean water, and shake off excess water.



5.4 Insert the probe into the hole you just created up until the bottom where you cannot stick in any further (do NOT use excessive force to stick in), then hold it still.

5.5 Short press CAL TruRead to enter **TruRead** mode. The pen will automatically record pH measurement of the soil after the reading is stabilized for 7 seconds ("01" will show up at the bottom right to indicate the 1st set of data is recorded). Then repeat steps 5.2 to 5.4 in different spots of your soil to record multiple sets of pH measurement in order to minimize errors.



5.6 After you finish all the tests in different spots, short press CAL TruRead again to check the average, maximum, and minimum values of all the recorded measurements. Then short press CAL TruRead again to end TruRead mode and return to normal measurement mode.

5.7 After each test, the probe must be thoroughly rinsed with clean water. Make sure to clean off the dirt on the white PTFE junction ring using the probe cleaning brush. For details of probe cleaning, refer to Section 8. After measurement, put the probe back in the storage cap and soak in the 3M KCL solution.

The recommended pH range for soil crops is 5.8 to 7.2 pH. And the best pH range for each plant is different. The factors that are affecting the soil pH include soil type, growth stage of the plant, use and types of fertilizers, use of pesticides, and the soil's temperature.

06 Meausre Soil Slurry

6.1 Remove about 2 inches (5cm) of the top layer soil and collect different locations' soil samples at approximately 6 inches (15cm) deep.

6.2 Thoroughly mix all collected soil.

6.3 Ideally, dry the soil in the air or bake in an oven at 104˚F / 40˚C.

6.4 Weigh out 20g of the mixed soil sample into a glass jar and add 100g of distilled or deionized water in it.

6.5 Shake well for 5 minutes or use a magnetic stirrer to automatically stir for 15 minutes. Leave overnight.

6.6 Shake or stir again next morning, then allow it to settle for 15-30 minutes.

6.7 Power on the tester; Remove the probe cap; Rinse the probe in the water bucket, and shake dry.

6.8 Submerge the probe into the soil solution, shake for a few seconds, and wait for the reading to fully stabilize. Then record the reading.

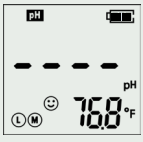
6.9 After measurement, put the probe back in the storage cap and soak in the 3M KCL solution.

07 Other Functions

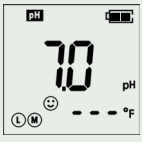
7.1 If necessary, you can manually hold the reading by short pressing (HOLD). Press it again to cancel the hold.

7.2 Long press (UNIT MODE) to switch temp. unit between °F and °C.

7.3



Out of range reminder for pH



Out of range reminder for temperature

7.4 The pen will automatically power off if there is no operation within 10 minutes. If you want to turn off the Auto. Power Off function, go turn off the tester first, then hold (HOLD) for about 5 seconds until you see "Auto off". Then it will power on and go to measurement mode automatically.

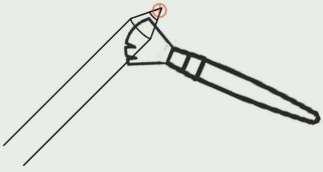
7.5 The pen can measure ORP with the installation of an ORP probe (SKU: GS5-E). In measurement mode, short press (UNIT MODE) to switch to mV mode. Replace on an ORP probe (refer to Section 11 on how to replace a probe). Then you are ready to test the ORP level of your solution.

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. In general, maintaining ORP level for your nutrient solutions at 250 – 420 mV is a good practice.

08 Probe Cleaning

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

8.2 Use the probe cleaning brush with water to clean off all the dirt on the probe, especially the white PTFE junction ring. Avoid rubbing the blue spear tip.



The white PTFE ring junction will become slightly brownish after the first soil pH test. This is normal. The brownish ring will not affect the accuracy as long as the soil particles are eliminated by the cleaning brush in water.

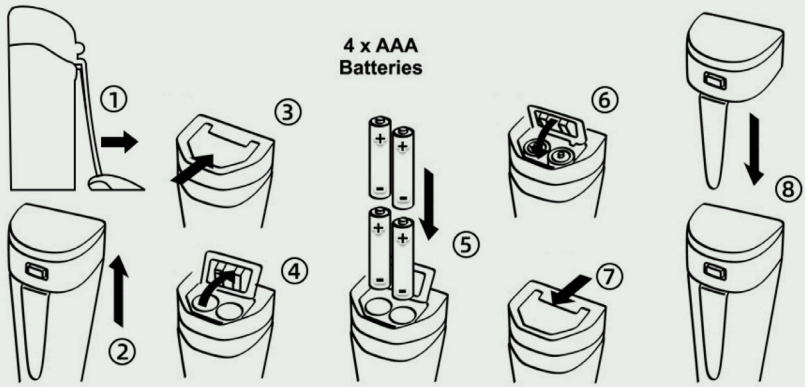
8.3 For tough contaminants, soak the probe in Apera's probe cleaning solution or detergent water for 30 minutes. Then use a soft brush to remove the contaminants. Afterwards, soak the probe in 3M KCL storage solution for at least 1 hour. Rinse it off, then re-calibrate the tester before using again. These cleaning tools can be found in the Probe Care Kit (refer to Section 15).

09 Probe Storage

9.1 The spear pH probe must be soaked in 3M KCL soaking solution when not in use. Fill in 3M KCL soaking solution to about 1/3 of the probe cap, store the probe in it, then screw on the cap ring tightly. If the spear probe is accidentally stored dry, you can restore it by soaking in 3M KCL overnight.

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 storage solution. This chemical is not poisonous nor dangerous, and the probe's performance will not be affected at all.

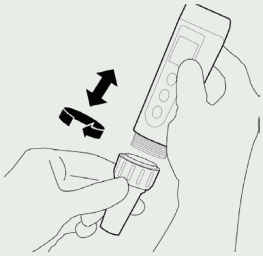
10 Battery Replacement



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 electrode slope is lower than 90% (refer to 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, 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°F) or low temperature (<41°C) solutions as it will cause greater measurement error and cause 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.

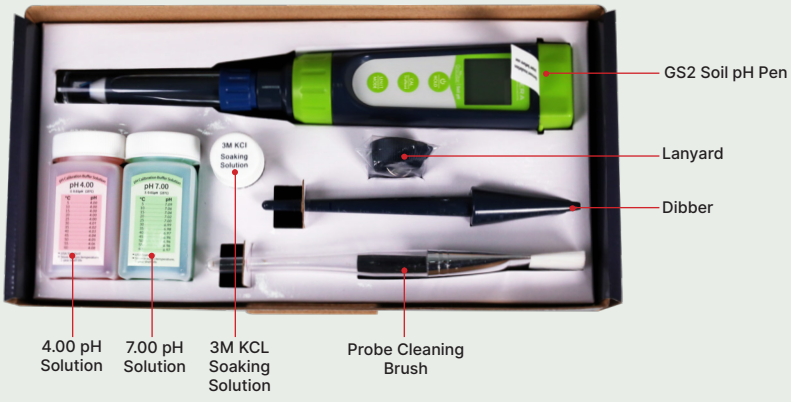
13 Troubleshooting Guide

Trouble	Reason	How to fix
 **Cannot calibrate**	Incorrect calibration order	Power on the tester, calibrate 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 prode	Replace the probe.
	Dried-out probe	Soak the probe in clean water for 30 minutes.
	Probe is not fully submerged in the solution	Make sure the probe is fully immersed in the solution at least 1 inch deep.
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 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.
	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 tha the probe connector is not exposed in the air too long.
Calibration is successful, but reading is not accurate	Contaminated probe	After each measurement, make sure to use a soft brush with water to clean off all the dirt on the probe, especially the white PTFE junction ring. Avoid wiping or rubbing the blue spear tip.
	Dry soil	Make sure the soil is wet. If the soil is dry, pH test cannnot be performed, and the probe can be damaged. For dry soil, please add some distilled or RO water to moisten. Ideally, wait 24 hours before measuring.
	Soil difference	Soil in different locations and different depth will have slightly different pH values. Even when the angle at which you stick in the probe is different, the measurement can also be affected. Therefore, selecting multiple locations and sticking in the probe at the same depth and angle, then calculating the average is the best way to maximize accuracy.
	Aged probe	Replace the probe.
	Clogged junction	Clean the probe with cleaning solution, the 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, the test pH4. Whichever gives more accurate reading is the more accurate one. Test strips or drop tests' accuracy is not comparable to pH meters'.

14 Technical Specs

Range	0.0-14.0 pH 0-50℃（32-122 ℉）
Resolution	0.1 pH，0.1℃ /0.1 ℉
Accuracy	±0.1 pH， ±0.1℃ /±0.1 ℉
Temperature compensation	Automatic
Calibration	Automatic 1 to 3 points (7/4/10) *pH 10.01 solution sold separately
Unit	pH, ℃ , ℉
Power supply	4-AAA alkaline batteries
Backlight	White（measurement）；Green（calibration）；Red（errors）
Reading hold	Manual
Warranty	Two years for the instrument, one year for the probe
pH probe	LabSen® Spear Soil pH Probe
Successful calibration indicators	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

Replacement Probes

GS2-E
Soil pH 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)

Limited Warranty

How Long Does the Coverage Last?

Apera Instruments® (Apera) warrants the GroStar® GS2 Soil pH 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 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.

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, INCIDENTIAL 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 INCIDENTIAL 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.

APERA® INSTRUMENTS

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