



Pulse™ Meter

User guide



Direct to mobile



Moisture



Nutrient



Temperature



Success by simplicity

bluelab.com



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English

Bluelab® Pulse™ Meter **2**



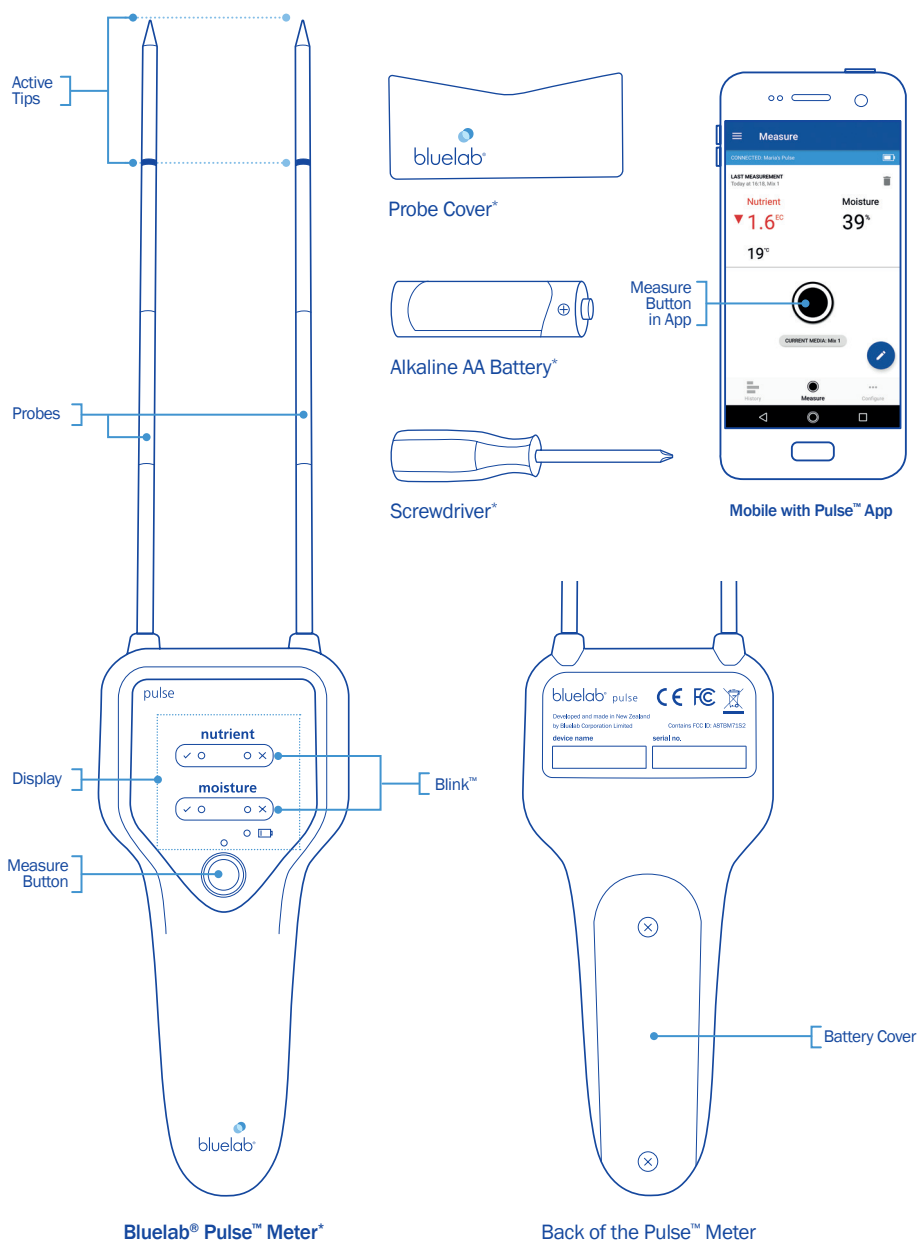
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1.0 Welcome to your Pulse™ Meter



Bluelab® Pulse™ Meter*

Back of the Pulse™ Meter

Please check and verify box contents match the items indicated here with an *.

2.0 First steps

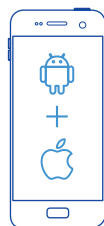
2.1 Inserting the battery

Use the screw driver to open the two screws on the back of the Pulse™ Meter, insert the alkaline battery and replace the battery cover. Tighten the screws on the battery cover to maintain water tightness. **Always use a new alkaline battery.** Your Pulse™ Meter is now active and will automatically sleep between measurements.



2.2 Downloading the Pulse™ App

Go to the Google Play store or iOS App Store (coming in 2019) and search for 'Bluelab Pulse'.

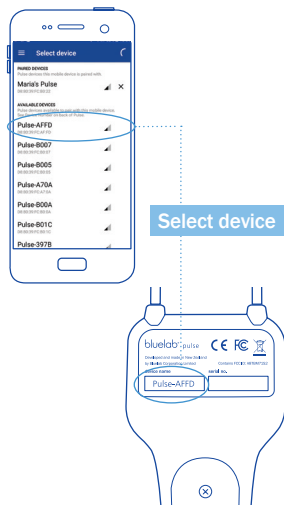


2.3 Connecting your Pulse™ Meter to the Pulse™ App

When you first open the Pulse app, you will be asked to Sign Up or Login. If you are a new Bluelab® user select Sign Up and follow the on-screen instructions. If you have an existing login for the Pulse™ App, or from Bluelab® Connect, click on login and use these credentials.

Once logged in you will be greeted with a 'Select device' screen. All Pulse™ Meters in Bluetooth range of your phone will be listed under 'Available Devices'.

See the Device Name on the rear label of your Pulse™ Meter, and find in the list. Tap the Pulse™ Meter name you wish to pair with and follow the on-screen instructions.



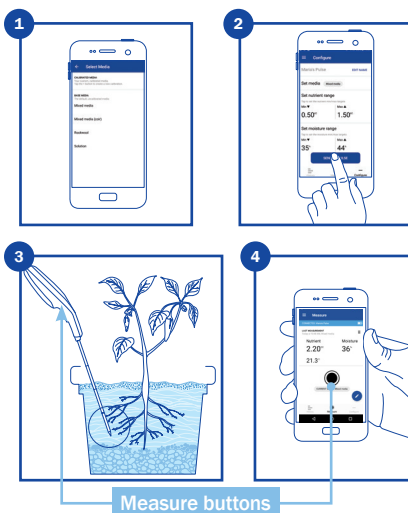
Remember to have your Pulse™ Meter powered-up, within 3m/10ft of your smartphone with Bluetooth enabled. Android requires Location Services to be activated to scan for Pulse™ Meters but can be deactivated after Pairing.

3.0 Quick setup to start measuring

Before you start measuring you need to tell Pulse™ what medium type you are measuring.

In the Configure screen within the app:

- 1 Tap 'Select Medium Type' – select the medium you are wanting to measure from the list. Each medium behaves differently so Pulse™ needs to know what medium it is measuring to give reliable results.
- 2 Tap 'Send to Device' to program your Pulse™ Meter with the medium type information.
- 3 Insert the Pulse™ Meter probes into the substrate a minimum of 75mm/3" and at least 25mm/1" away from the side and base of the container.
- 4 Press the Measure button on Pulse™, or in the app, and wait for the measurement to arrive in the Measure screen in the app.



Continue for more details on how to use your Pulse™ Meter

4.0 Interpreting measurement data

4.1 Understanding nutrient measurements

Your Pulse™ Meter uses radio frequencies to determine the pore conductivity in substrates. Electrical conductivity is a common measure of the nutrient ions present in a solution or substrate and is widely used as an indicator of available nutrients.

Electrical conductivity (measured in EC) is a measure of total ions present and cannot tell if nutrient levels are out of balance (e.g. too much nitrogen but not enough potassium).

The electrical conductivity in any substrate will generally be lower than the EC of the nutrient solution being added due to how substrates can buffer ions. Accurate EC measurements require at least 20% volumetric moisture content in the substrate.

Comparing your Pulse™ Meter measurements to other test methods

There are several standard laboratory and in-field methods for measuring the electrical conductivity of a substrate, such as; SME, pour-through, leachate measure, 1:1.5, 1:2 or 1:5. All are slightly different in the technique but all aim to extract a water sample from a growing substrate. This water sample is then measured for electrical conductivity using a standard solution EC meter which will give a reference measurement to judge the medium sample. Each method uses varying amounts of RO/distilled/deionised water to make the extraction, which dilutes the sample lowering the EC. Most also have a mechanical action (stirring or agitating the sample) which affects the number of ions released from the medium, whether these would have been available to the plant or not.

This means each sampling methods will give a different EC measurement for the same medium sample. This is not an issue as they are reference measurements of the EC in the medium. If the measurement method is consistent, this is a useful relative measurement for the nutrient levels in the substrate.

4.1 Understanding nutrient measurements (continued)

Pulse™ is a fast, consistent, direct measurement tool providing an electrical conductivity measurement of the pore water in the volume of medium around the active tips on the probes. Through experimentation and correlation to plant performance, and irrigation cycles, the measurements can be used to improve plant performance.

4.2 Understanding moisture content measurements

The Pulse™ Meter radio frequencies are also absorbed by the water content in media, which is used to measure volumetric water content expressed as % of moisture content. Pulse™ can measure the moisture content of growing media in two ways. These can be selected in the Configure screen in the app:

- 1 Base media** measure Volumetric Moisture Content: The % of water by volume, in the area where Pulse™ is measuring.
- 2 Calibrated media** measure % of Maximum Water Holding Capacity of the root zone. This relates the measurement to the maximum amount of water the medium can hold, which can change over time, and is a better guide for irrigation cycles. Pulse™ calibration sets 100% at maximum water holding capacity.

See Section 11.2 for how to calibrate Pulse™ to the maximum water holding capacity of a substrate.

A medium becomes more liquid than solid above a certain point of moisture and it is hard to differentiate increased moisture levels. The point at which this happens will depend on the medium, for example, a potting mix may begin to liquify at 60% moisture while coco coir may stay mostly solid up to 70-75% moisture. Any growing substrate that reaches liquefaction is unlikely to be effective in a root zone.

20% volumetric moisture content is required for an accurate EC measurement.

5.0 How to read the Pulse™ Meter display

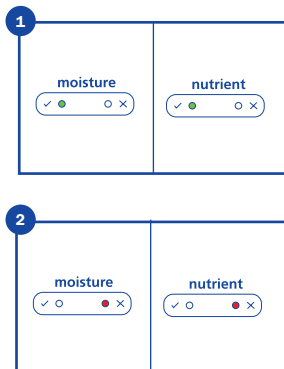
5.1 Fast target measurement feedback with Blink™

Nutrient (EC) and moisture range targets can be set in the app and programmed into your Pulse™ Meter. Blink™'s quick in or out-of-range indicators on Pulse™ light after a measurement to enable faster spot checks.

Blink™ is shown to the right.

Blink™ indicates how the measurement relates to the nutrient and moisture target ranges set in the app. See section 7.0 for setting target ranges.

- 1 A green light/✓** indicates the nutrient or moisture measurement is within the set range
- 2 A red light/X** indicates the nutrient or moisture measurement is outside the set range. See the app for over or under range indicators



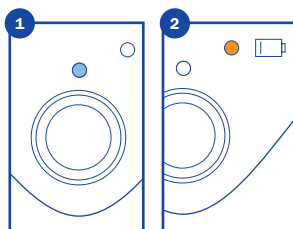
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5.2 Other lights on the Pulse™ Meter display

- 1 **Activity indicator (blue)** – lights each time a measurement is taken (from device or app) or when Pulse™ is receiving settings.
- 2 **Low battery indicator (orange)** – lights when a measurement is taken to show if the battery level is low. A rapid flash with no measurement means the battery is very low and must be replaced.

No data is lost if the battery is replaced.



6.0 Measuring with your Pulse™ Meter

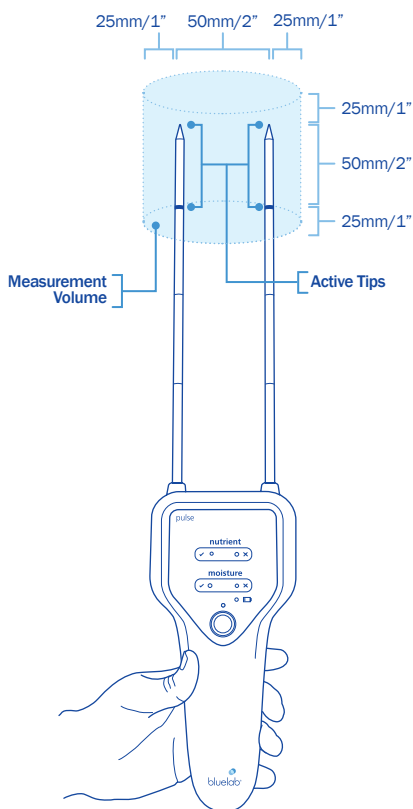
6.1 How and where your Pulse™ Meter measures

The Pulse™ Meter probes take the measurement at the active tips - the last 50mm/2" of the probes (after the black line). These active tips measure a volume of medium around them, not just the medium in contact with the metal probes. The measured volume is about the size of a standard drinks can, with the tips in the centre. An average of this medium volume is measured. As you measure deeper into the medium the moisture gradient will be measured - containers will generally have higher moisture content deeper in the container.

Objects and medium components within this volume will affect the readings, including the side of a pot, air (if the probes are not deep enough), rocks or similar.

Ensure the active tips are at least 25mm/1" from the edge of the container/grow bag, and the active tips are at least 25mm/1" below the surface or above the bottom of the container.

The minimum container/pot size Pulse can measure in is 2L/0.5gal (6" traditional container/pot)

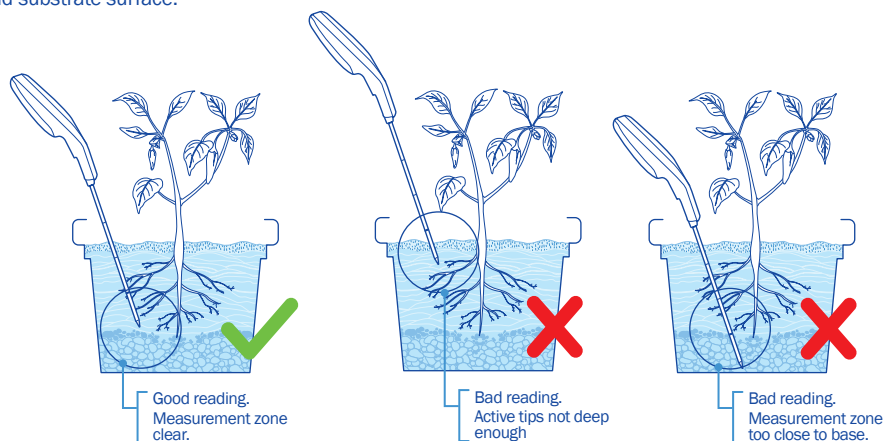


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6.2 Taking a good measurement

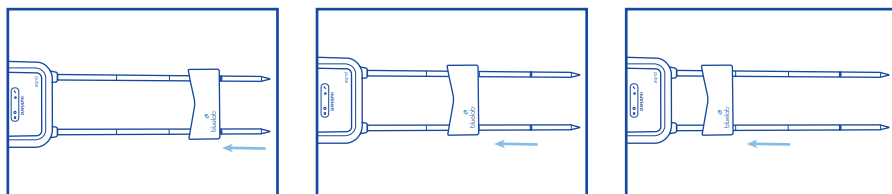
Ensure the active tips of the Pulse™ Meter probes are 25mm/1" clear of the container sides, base and substrate surface:



6.3 Consistent depth measurements

Pulse™ has two features that can be used to measure at consistent depths.

- 1 Lines etched every 50mm/2" on the probes
- 2 The probe cover can clip onto the probes and act as a hard stop ensuring all readings are at the same depth



6.4 Minimum container/pot size

Pulse™ measures a volume of medium around the active tips on the probes. The minimum container/pot size for measuring with Pulse™ is 2L/0.5gal (6" traditional container/pot) to ensure the container walls and environment outside the container does not affect the measurement.

6.5 Temperature compensation

Both nutrient and moisture measurements are affected by medium temperature. When you first press the measurement button the Blink™ green/red indicator lights on Pulse™ flash. Pulse™ then waits for the temperature to stabilise. Once stabilised, the Blink™ indicator lights will go on solid. This should take less than 10 seconds but may take longer in extreme temperature changes. You may see the measurement in the app change as Pulse™ adjusts to the temperature in the medium - this is normal.

6.6 Minimum moisture levels

Pulse™ requires at least 5% moisture content for a reliable moisture reading. Below 5% a measurement will be generated but with reduced accuracy.

Pulse™ also requires above 20% moisture content for any nutrient (EC) measurements. Below this level there is very little water in the medium pores reducing the accuracy of the nutrient (EC) measurement.

6.7 Cleaning

After use, simply wipe the Pulse™ Meter probes with a damp cloth and use disinfectant if required.

While the probes are made of stainless steel boiling water or highly corrosive cleaning products should not be used.

7.0 Setting target ranges for Blink™

When root zone nutrient and moisture measurement target ranges are understood, these can be programmed into your Pulse™ Meter for quick in or out-of-range feedback from the Blink™ light indicators.

Target ranges are set in the Configure tab in the app:

- 1 Select the medium type you are measuring
- 2 Set min and max measurements for nutrient and moisture
- 3 Tap 'Send to Pulse' to program these settings into your Pulse™ Meter
- 4 Take a measurement. A green light and ✓ will show on Blink™ on Pulse™ if the measurement falls between the target min and max values. If the measurement falls outside of this range a red light and ✗ will show.

7.1 Default ranges

The default ranges in Pulse™ are the maximum 0–15 EC and 0–100% moisture content. Any measurement taken with default ranges will show green lights on Blink™.

A default medium is also loaded. Ensure a medium type is selected in the Configure screen closest to what is being measured for the most reliable measurement.



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7.2 Choosing a target measurement range

The following steps suggest a way to become familiar with your measurements, and how to define a target range for nutrient and moisture measurements.

Starting with moisture measurements:

- 1 When you first start using Pulse™, select your medium type and leave the target range values as default. 'Send to Pulse' to program your Pulse™.
- 2 Find a sample of plants known to have the correct moisture levels. Take multiple measurements in different locations into the plants' root zones.
- 3 Review these measurements under the History tab in the app to understand what an acceptable 'good' range may be.
- 4 Find further plants that would be considered too dry (close to the wilting point), and others that are too wet.
- 5 Repeat multiple measures in each root zone then review all the data.
- 6 There should be a clear distinction between the 'good' plants and plants considered too dry or too wet.
- 7 Determine the acceptable moisture range (min and max) and enter this in the Configure tab in the app, 'Send to Pulse' to program your Pulse™. Blink™ will now reflect the new target range.
- 8 Repeat for nutrient levels

See Section 11 for calibrating Pulse™ to account for how media changes through a plant's growth cycle.

8.0 Using your Pulse™ Meter without a smartphone - syncing data

When Pulse™ is paired and within Bluetooth range (~3m/10') of a smartphone running the Pulse™ App, the current measurement is automatically sent to and shown on-screen. A push notification is used if the phone is asleep or using another app (Android 8 and above).

Pulse™ also has internal memory to store over 2000 measurements on the device. If Pulse™ is out-of-range of the smartphone it will still measure and display in or out-of-range information via Blink™, and store the measurement in the internal memory. When Pulse™ is next within range of the smartphone it will automatically pair, connect and sync all measurements to the app.

This is a useful feature to allow Pulse™ to be used without the smartphone for fast measurement collection that can be reviewed later after syncing. Out-of-range plants can be flagged for later review.

The measurements on Pulse™ are a rolling 2000 meaning measurement 2001 will replace the first measurement, and so on.



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9.0 Measurement technology

A Pulse™ Meter sends radio frequencies (RF) from one probe and measures how much of these are received by the other probe. The amount of RF absorbed by the medium between and around the probes is measured and these values are then related to the actual moisture content and pore conductivity (linked to total nutrient content) using specific algorithms created through machine learning. Temperature is measured using a thermistor in one probe and is used to adjust the conductivity (nutrient) and moisture measurements, as these are both affected by temperature.

10.0 Measuring different media types

Each substrate absorbs the Pulse™ Meter's radio frequencies differently depending on the composition. For example, pure coco coir absorbs the radio frequencies differently compared to a bark and peat medium. For this reason, Pulse™ has three default media configurations;

- **Mixed Media** - For general mixed media blends. Measures volumetric moisture content, temperature and pore conductivity of the medium.
- **Mixed Media (Coir)** - For mixed media predominantly made of coco coir (50% or more). This corrects for the effect of coco coir. Measures volumetric moisture content, temperature and pore conductivity of the medium.
- **Solution** - For measuring nutrient solutions e.g. run-off. Measures bulk EC and temperature.

Each configuration has specific analytical models tuned to particular medium types to give the required accuracies. Ensure the correct medium type is selected in the app and sent to Pulse™ for the growing substrate you are measuring. The medium type can be easily and quickly changed in the Pulse™ app for each new measurement if measuring different media types.

11.0 Calibration

11.1 Why is calibration required?

Pulse™ has been developed to accurately measure conductivity and moisture content in different medium types. A variety of factors in the root zone however, can affect the transmission of the radio frequencies that Pulse™ uses to measure volumetric moisture content, including:

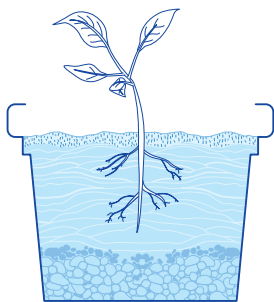
- Medium composition – variation between constituent media parts
- Medium density – light, loose medium vs dense, compact medium
- Quantity of roots – young plants vs mature plants
- Type of roots – variation between plant age and type
- Size and shape of the container – drainage characteristics can change



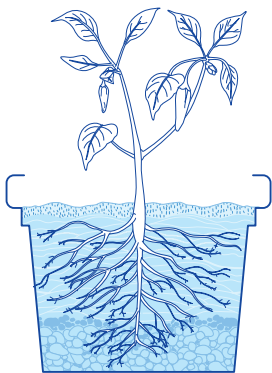
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11.1 Why is calibration required? (continued)



Young plant
Loose medium, higher water capacity



Mature plant
More roots, compacted medium, lower water capacity

How media changes with plant age

As plants age, the structure of the medium in the root zone changes through root growth and compaction. This can make the volumetric moisture content measurement more difficult to interpret because the same container can hold less water content. Pulse™ can be calibrated to the maximum water holding capacity of the root zone to account for this variability.

These variations can produce counter intuitive measurements between plants because the volume of water held in the root zone has changed.

Same medium starting point	
Young plant, recently potted with new medium	Mature plant
New medium: light, loose medium with small root mass and good porosity	Aged medium: compacted medium with large root mass and reduced porosity
High water capacity	Low water capacity
Example moisture content at saturation: 45-55%	Example moisture content at saturation: 35-45%

Over time, gravity compacts the medium, and roots develop, filling the air spaces and reducing the ability for the medium to hold moisture. This can make comparison of moisture content measurement challenging across different plant types and age etc.

Pulse™ can be calibrated to the maximum water holding capacity of the medium to account for this variability.

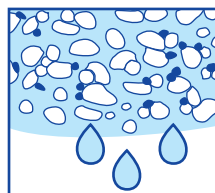
11.2 Calibrating to maximum water holding capacity

The maximum water holding capacity (WHC), also known as the field or pot capacity, is the maximum amount of water a container, bag, slab or area of field can hold after being saturated, and then being allowed to drain. Pulse™ calibration sets it to read 100% at maximum water holding capacity.

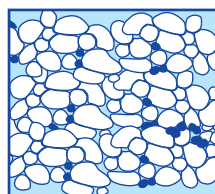
The water held in the rootzone medium is the water available to the plant.

The maximum water holding capacity is also affected by several factors:

- Medium composition - e.g. coir holds more water than clay
- Medium texture - medium with smaller particles generally can hold more water than medium with larger particles
- Medium compaction - the more compact a medium the less water it can generally hold
- Other matter in the medium - roots, rocks, organic matter etc, occupy the space that could be held by water



Free draining



At max water holding capacity

After calibrating the moisture content measurement will now be the percentage of maximum water holding capacity, with 100% being maximum water holding capacity.

11.3 How to calibrate Pulse™

To calibrate, select 'Calibrated Medium' from the menu in the top left corner of the app, tap the + button, and follow the in-app instructions.

To prepare for calibration you will need to select a sample of plants of the similar root zone characteristics and irrigate to maximum water holding capacity:

- 1 Select 2–5 plants of similar age with the same starting medium and container size
- 2 Irrigate until saturation and the container begins to drain
- 3 Leave to freely drain for one hour to reach maximum water holding capacity
- 4 Have Pulse™ ready for calibration... After one hour, continue the calibration process following the in-app instructions:
- 5 Set a memorable name for the calibration. Referencing the medium type, plant and age can help.
- 6 Use Pulse™ to take a minimum of three measurements per container. Take measurements at the location in the container where you will be normally be measuring. See Section 6.2 for how to take a good measurement with Pulse™.
- 7 Review the measurements to verify if the sample has created a good calibration. Measure the same containers again with Pulse™ and review the in-app results to understand if the measurements are acceptable, or if calibration needs to be repeated: (see table on p14)

11.3 How to calibrate Pulse™ (continued)

Green (✓) - good measurement	A good calibration has been achieved if good measurements are repeated
Orange (-) – acceptable measurement	If you have repeated ok measurements, consider restarting the calibration process
Red (✗) – poor measurement	If you have repeated poor measurements, discard and restart the calibration process

Poor measurements during the review stage could be because:

The plants samples have different root zone characteristics so not a consistent sample	<ul style="list-style-type: none">• Reeselect a representative sample set• Consider splitting the current sample set and make separate calibrations
The water in the medium is not spread homogenously	Reirrigate to saturation and leave for a further hour to reach maximum WHC
Medium has rocks or air pockets where the Pulse™ probes are measuring	Ensure the medium is well mixed and free of objects in the measurement volume

Select the new medium calibration from the list on the Configure screen and 'Send to Pulse'. Pulse™ is now programmed with the new calibration.

11.4 Using maximum water holding capacity

Using Pulse™ with the same plant of a similar age, in the same container size, similar media, etc, should measure between 90% and 100% moisture content when at maximum water holding capacity (around an hour after irrigating to saturation). Variations between individual plants or media will likely mean all readings won't be 100% at maximum water holding capacity.

As the plant take-up water from the root zone, the moisture level, as a percentage of maximum water holding capacity, will decrease.

The wilting point and acceptable moisture ranges

The point at which the root zone medium is too dry for the plant to take-up water is called the wilting point. The wilting point will vary between root zones.

To find the ideal moisture range for a calibrated medium, measure the root zone of a plant close to the wilting point - take several measurements around the root zone to understand the lower point of the acceptable moisture range.

Between maximum water holding capacity and the wilting point is a useful range to set within Pulse™ for quick in or out-of-range feedback via Blink™. See Section 7.0 for more information on setting Blink™ ranges.

11.5 When should I calibrate/recalibrate?

Because the maximum WHC of the medium changes with plant age, due to increased roots and medium compaction, the same plant may need to be recalibrated with Pulse™ to account for the change.

To test if Pulse™ requires calibration to the medium:

- 1 Irrigate the container to saturation and leave to freely drain for one hour to reach maximum WHC
- 2 Test moisture levels with Pulse™ with the current calibration programmed.
- 3 If the moisture measurements are between 90% and 100% of the maximum WHC the calibration is still relevant. If the moisture is below 90%, make a new calibration following the same process described in See Section 11.2.

Clearly name the new calibration including information like the container type or size, the plant type and the age of the plant to differentiate it from the first calibration.

12.0 Different measurements in different parts of the container

The moisture content and electrical conductivity will vary across the growing media. Reasons for this variation could include:

- The position of an irrigation dripper meaning the moisture content is higher next to the dripper
- The medium is non-uniform (non-homogenous)
- Areas of the medium are denser than others that are more aerated
- The roots are taking up more nutrients from one area than another

Pulse™ measures a volume of medium between and around the probes' active tips giving an average of that volume, but it is likely that if you move your Pulse™ to different areas in the container you will get different readings. It is recommended that you take three measurements across the container and average these to get a good representation of the root zone.

13.0 Troubleshooting

Symptom	Possible cause	Solution
I cannot pair with my Pulse™ Meter	Out of range	Bring your Pulse™ Meter back into range (3m/9') of the smartphone
	Phone Bluetooth/Location not tuned on	Turn phone's Bluetooth/Location on and try again
	Other Bluetooth devices interfering with connection	Turn off other Bluetooth devices (headphones, smart watch, etc), pair with Pulse™, then turn other devices back on
No lights come on when I press the button on my Pulse™	Flat battery	Replace battery
My Pulse™ won't boot up, the boot up sequence keeps repeating	Phone is trying to connect to device before it has fully booted up	Turn off phone Bluetooth, wait for Pulse™ to finish booting (lights stop spinning), then turn on your phone's Bluetooth again
Can't find my device on the 'Pair/Unpair' list	Phone Bluetooth not tuned on	Turn phone's Bluetooth on and try again
	Phone has connected to Pulse™ in the background, outside the app	Turn Bluetooth and location off on your phone and then turn them back on again.
	Flat battery in Pulse™	Replace battery and try again. Always use a new alkaline battery.
	Another phone, in range, is paired with Pulse™	Find the other phone and unpair this from the Pulse™, or turn off Bluetooth on other devices
	Pulse™ is not in range	Bring Pulse™ into range (3m/9')
	Still not connecting after all of the above	Restart phone (this will reboot the phones Bluetooth)
Export file is corrupted	USB cable between the phone and the PC is connected	Disconnect the USB cable from the phone, export the data and place back in the USB cable to extract the file
	*.csv extension was deleted	Export again, and don't delete the csv extension. (only *.csv is supported)



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Symptom	Possible cause	Solution
Measurements take a long time to appear on History screen	Having large numbers of measurements on old phones can slow this down	Export the measurements to back them up then delete some of the older data
Measurements at the edge of the container are very different from the rest of the container	Pulse™ measures a volume around the probes. If the probes are at the edge of the container Pulse™ will be measuring air, or the ground.	Move Pulse™ so the active tips on the probes are at least 25mm/1" away from the edge of the container in all directions
My reading sometimes takes longer than others	Pulse™ requires temperature compensation to ensure accuracy. Large variations in temperature require more time to stabilise.	Leave Pulse™ in the medium and wait until temperature is stable before taking a measurement.
Pulse™ sometimes does not measure 100% moisture in solution	Different media type selected	Change the 'Medium Type' to 'Solution' in Configure screen.
Measurements in History screen take a long time to appear.	There are a large number of measurements stored on the phone	Export the measurements and delete all previous measurements from the phone.
App hangs on 'Connecting...' during pairing process	Bluetooth is busy	Go back and try again
	Bluetooth is busy	Force stop the app try again
	Bluetooth is busy	Turn Bluetooth off and on
	Bluetooth is busy	Restart phone



14.0 Technical specification

Measurement Range	Conductivity 0-15 EC Moisture Content 5% - 70% MC _{vol} Temperature 5-40 °C/40-104 °F
Measurement Accuracy	Conductivity * 0.0 - 6.0 EC +/- 0.1EC 6.1 - 15.0 EC +/- 0.2EC Moisture Content ** +/- 5 % MC _{vol} Temperature +/-1 °C or +/-1 °F
Units	Conductivity EC Moisture Content % moisture content by volume Temperature °C, °F
Probe Length	200 mm/8"
Probe Separation	50 mm/2"
Active Tip* Length	50 mm/2"
Minimum pot size	2 Litre/0.5 gallon
Android Version	Android 5.0 and later
Power Source	1 x AA alkaline battery
Certifications	CE and FCC

* Measured in KCl solution at 20 °C in a 150 mm dia x 250 mm high vessel

** Measured in a coir, bark, peat and pumice mixed media that the Bluelab® Pulse™ was calibrated to at 20 °C in a 150mm dia x 250mm high vessel

+ The last 50mm/2" of the probes where the measurements are taken

Bluelab® Limited Warranty



Bluelab® Corporation Limited (Bluelab) provides a warranty on its products (Bluelab® Pulse™ Meter) under the following terms and conditions:

How Long Does Coverage Last?

Bluelab® warrants the Bluelab® Pulse™ Meter (Product) for a period of 12-months from date of purchase by original purchaser or consumer. Proof of purchase, to Bluelab's sole satisfaction, 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?

Bluelab® warrants the Product against defects in material and workmanship when used in a normal manner, in accordance with Bluelab® instruction manuals. If Bluelab® is provided with valid proof of purchase (as defined above) and determines the Product is defective, Bluelab® 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.

Any part or Product that is replaced by Bluelab® shall become its property. Further, if a replacement part or Product is no longer available or is no longer being manufactured, Bluelab® may at its sole discretion replace it with a functionally-equivalent replacement part or product, as an accommodation in full satisfaction of the warranty.

What is NOT covered?

This warranty does not apply to equipment, component or part that was not manufactured or sold by Bluelab®, 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, neglect and careless operation or handling of Product not in accordance with Bluelab® instruction manuals, or failure to maintain or care for Product as recommended by Bluelab®
- Damage caused by use of parts not assembled/installed as per Bluelab® instructions
- Damage caused by use of parts or accessories not produced or recommended by Bluelab®
- Damage due to transportation or shipment of Product
- Product repaired or altered by parties other than Bluelab® or its authorised agents
- Product with defaced, missing or illegible serial numbers
- Products not purchased from Bluelab® or a Bluelab® authorised 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 (as defined above).

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, BLUELAB 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, BLUELAB 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, Bluelab does not limit or exclude other rights a consumer may have with regard to the Product. No Bluelab distributor, employee or agent is authorised to modify, extend or otherwise change the terms of this warranty.

Register your guarantee online at [bluelab.com](https://www.bluelab.com)



English

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Limited Written Guarantee

A limited written guarantee is
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