

Bluelab Soil pH Meter

Instruction Manual




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simple solutions

soil pH meter

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Table of Contents

1.0	Information about measuring the pH of soils/media.	2
2.0	Introduction to Bluelab Soil pH Meter	4
3.0	Preparing the Bluelab Soil pH Meter for Use	5
4.0	Calibrating Meter	6
5.0	Measure Soil pH Value	7
6.0	Measure Soil Solution pH value	8
7.0	Cleaning and Maintenance	9
8.0	Error Messages	9
9.0	Troubleshooting Guide	10
10.0	Technical Specifications	11

1.0 Information about measuring the pH of soils/media

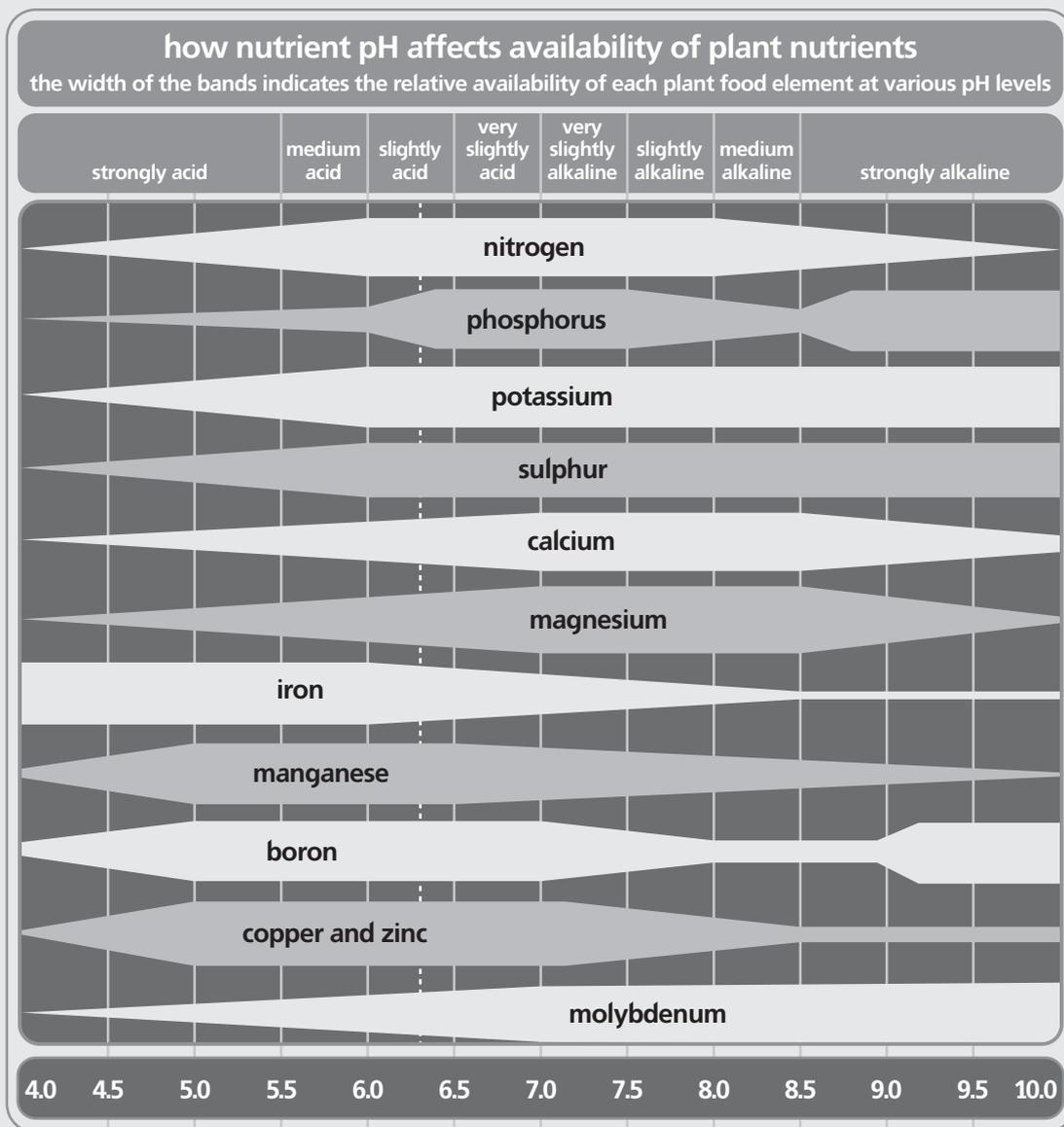
pH is the measurement of the hydrogen ion concentration (H+) - acidity and its opposite, alkalinity. Neutral pH is 7.0 pH. Acidity measures below seven pH (7.0 pH) with alkalinity measuring above it (7.0 pH).

Very acid (pH 5.0 to 5.8)	Moderately acid (pH 5.5 to 6.8)	Slightly acid (pH 6.0 to 6.8)	Very alkaline (pH 7.0 to 8.0)
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In soils or growing media, pH strongly influences the availability of nutrients and the presence of microorganisms and plants in the soil. Certain plants require a particular pH range to enable the required nutrients to be consistently available to the plant. If the solution is too acidic or too alkaline it can cause “lock up” – a situation which restricts certain elements essential for growth from being absorbed by the root structure. This in turn reduces plant health and performance. Deficiencies in the required elements become apparent in plant growth and can lead to crop failure.

Low soil pH causes aluminium and manganese toxicity in plants and reduces the availability of soil phosphorus. High soil pH also reduces soil phosphorus availability and reduces micronutrients such as zinc and boron to plants.

The chart below shows how nutrient pH levels influence the uptake of certain elements.



1.0 Information about measuring the pH of soils/media cont...

Taking pH measurements of soils with an electronic meter is indicative rather than absolute.

The following factors are outside the control of any Soil pH Meter, so to minimise their effect on the accuracy of the pH measurement you should consider the following precautions:

Moisture Level/Raw water - If the sample you are wishing to measure is dry, add distilled water to moisten. If you add tap water, you may influence the pH reading based on the pH of the raw water.

Calibration of the pH Meter and cleanliness of the probe tip – Calibrating the pH meter at least monthly will ensure accurate readings. Cleaning the soil residue from the probe tip and storing the probe in a clean state will also help to provide reliable readings as well as prolonging the probes life.

Sample Selection – For feild testing, samples are taken approximately 20 cm / 8 in down into the substrate and from various areas, then an average of the readings is used. For container grown plants, it is recommended to check the pH level of the substrate prior to planting.

Factors affecting pH in the soil or media:

Soil Type - Soils formed under high rainfall conditions (E.g. Eastern USA) are more acidic than those formed under dry conditions (E.g. Western USA).

Growth Stage of the plant – Uptake and requirements of particular elements change as the plant progresses through it's growing cycle. Recording pH level data to create a history is valuable.

Applications and types of fertilizers – This can alter the pH level significantly. The time at which you take the reading is important. Evaluate the brand of fertilizer to see if it is altering the pH in the wrong direction.

Applications of Sprays – As these can soak into the soil/media a change to the pH level could result.

Soil/Media Temperature – High temperature soils may have a high concentration of CO². The higher the concentration of Carbon dioxide pressure results in more carbonic acid which lowers pH.

2.0 Introduction to the Bluelab Soil pH Meter

The battery operated pH meter measures soil pH levels by using a soil pH probe connected to the electronic meter. The meter has a liquid crystal display (LCD) digital readout.

2.1 Basic Operation

- 1 Figure 1 shows each functioning part of the Soil pH Meter.

The Soil pH probe has a removable wetting cap. It is important that the probe tip is not allowed to dry out. The wetting cap must be placed back onto the probe tip for storage.

The meter automatically turns off after approximately four minutes if no buttons are pressed. If the meter turns off during use, a short press of the ON/OFF button will turn the meter on again.

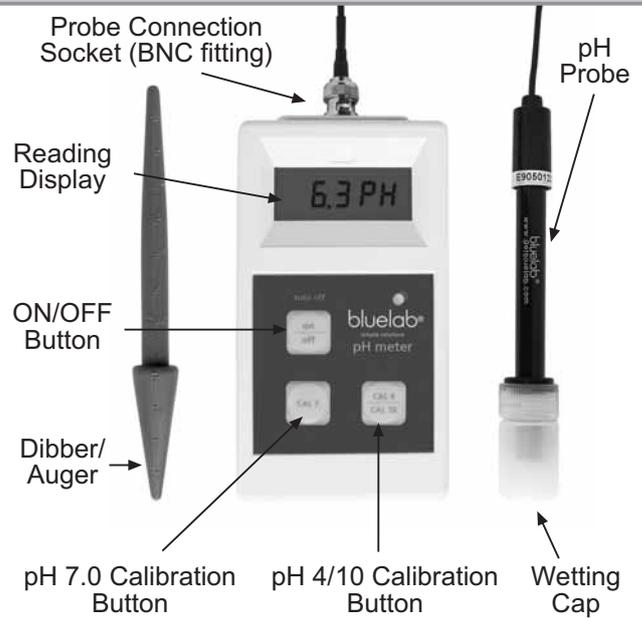


Figure 1. Soil pH Meter

2.2 Meter Calibration

- 1 Calibrate the meter before the first use to ensure reading accuracy. Ensure solutions used for calibration are stored to prevent any evaporation and replaced three months after opening. pH reading accuracy is dependent on the accuracy of these calibration solutions and also on age, use and cleanliness of the probe.

If measuring a pH below 7.0 is expected, the meter is calibrated using pH 7.0 and pH 4.0 calibrations solutions. If measuring a pH above 7.0 is expected, pH 7.0 and pH 10.0 solutions are used.

2.3 Storage of Meter

- 4 The meter should be kept out of direct sunlight to prevent irreparable damage to the LCD display; this includes storing in a cool, dry and clean place when not in use.

The meter unit is not waterproof but will withstand occasional water splashes. If the meter does get splashed, it is wiped dry as soon as possible.

Place a small amount of pH 4.0 solution or fresh water into the probe wetting cap. Replace the wetting cap and store the probe in a secure place. The probe should never be stored in de-ionized or distilled water as this will permanently damage it.

Batteries should be removed if the unit is to be stored for a prolonged period.

3.0 Preparing the Soil pH Meter for first time use

Preparing the meter for use involves, inserting the supplied 2 x AAA batteries, connecting the probe and calibration. If the probe tip has become dry it will require hydration again before use.

1 Hydrate pH probe if dry

Carefully remove probe wetting cap ensuring the body does not bend. Bending the body of the probe can break the glass tube inside. Soak the probe tip in fresh water for at least one hour. Soaking the tip for 24 hours will improve the probe's activity and is recommended.

When the probe is not in use, place a small amount of pH 4.0 solution or fresh water into the wetting cap. Place the cap onto the probe tip and store the probe in a secure place.

CAUTION: Do not use de-ionized or distilled water.

2 Insert Batteries

Open battery compartment by sliding the back cover down and insert 2 x AAA batteries as shown on the battery holder.

Slide cover back on.

NOTE: Alkaline batteries are recommended.

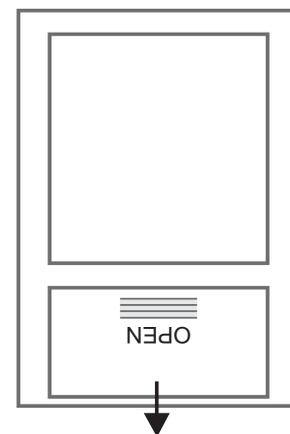
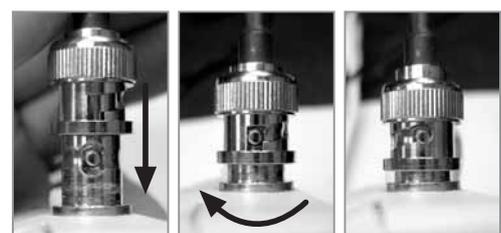


Figure 2. Battery Cover

3 Connect pH probe

Connect the probe to the meter by lining up the meter lugs of the BNC fitting. Fasten securely by pushing probe connector on and twisting one quarter turn.



Inserting

Twisting

Attached

Figure 3. Probe Attachment

4 Calibrate the pH

Calibrate the meter before use begins by following the instructions in Section 4.0.

4.0 Calibrating Meter

For accurate readings the probe must be clean and recently calibrated. Calibration is recommended when:

- The reading you were expecting is different
- The probe is replaced with a new one
- It has been one month since the last calibration
- Typically more than 30 readings have taken place
- The meter is reset after an error message

pH calibration involves cleaning the probe and then calibrating in TWO SOLUTIONS.

If a reading below 7.0 is expected, use pH 7.0 and pH 4.0 calibration solutions. If a reading above 7.0 is expected, use pH 7.0 and pH 10.0 calibration solutions.

1 Clean soil pH probe (not required for initial calibration)

Clean probe as described in Section 7.0.

2 pH 7.0 Calibration

Turn meter on. Rinse probe thoroughly in fresh water, shake off excess water and place probe in a pH 7.0 calibration solution for at least one minute for reading to stabilize.

Press and hold the CAL7 button. When the display starts flashing release the button. If calibration is accepted it will display CAL then 7.0 pH.

NOTE: If a message appears during the calibration process, such as 'E2:PH', the calibration was unreliable. See Section 8.0.



pH 7.0 Calibration Solution
Figure 4. Reading Stabilized

3 Rinse Probe

Rinse completely in fresh water and shake off excess.

4 pH 4.0/pH 10.0 Calibration

Place probe into pH 4.0 or pH 10.0 calibration solution and wait for at least one minute for reading to stabilize.

Press and hold CAL 4/10 button. Once the display starts flashing release the button. It will display CAL then 4.0 pH or CAL then 10.0 pH if calibration is accepted, otherwise refer to error messages section 8.0.

The meter is now calibrated and ready for use.

5.0 Measure Soil pH Value

Once the meter has been set up and calibrated, using it to measure a pH value involves the probe, the green dibber/auger, a soil/media sample and button functions.

NOTE: The probe tip must not have dried out. If it has dried, soak the probe in tap water for one hour prior to taking a measurement.

- 1 Remove the top 5 cm / 2 in. from the surface of the sample area.
- 2 Insert the dibber/auger into the sample to a depth of about 20 cm / 8 in. and remove.
- 3 If the soil/media is dry, moisten with a small amount of distilled water.
- 4 Insert probe to the same depth ensuring it makes proper contact with the soil.
- 5 Turn the meter on.
- 6 Wait for the reading displayed on the meter to stabilize. This can take up to four minutes. Record the reading.
- 7 Remove the probe from the soil/media and wash with probe tip under fresh running water (not distilled) to remove any remaining soil residue.
- 8 Repeat the procedure in different locations and take the average of the measured data as the pH level is representative of the sample area.
- 9 Turn Meter off or allow instrument to turn off automatically (after four minutes). If the meter turns off while taking a measurement, simply press the ON/OFF button to turn the meter back on and continue with your measurement.
- 10 **Store Probe Between Measurements**
Place the wetting cap back on the probe tip with a small amount of fresh water or pH 4.0 solution in it or store probe tip in a container of fresh water between uses.
CAUTION: The Soil pH probe is never stored in de-ionized or distilled water as this will permanently damage it.

6.0 Measure soil solution pH value

The greatest source of error in soil analysis comes during sample collection. An effort should be made to ensure each sample properly represents the area being sampled.

NOTE:

- The readings taken with this method could be higher than those taken by other methods
- Consistency of the method used is important to be able to compare sets of results
- The accuracy of this method cannot be guaranteed because of the variables involved
- The results should be viewed as 'indicative' rather than 'absolute'

6.1 Collection of Sample

- 1 Sample in a zig-zag pattern across the required area.
- 2 Remove 15 mm / ½ in. of top soil before sampling at a depth of 150 mm / 6 in.
- 3 Mix all collected samples together thoroughly.
- 4 Allow to dry in the air or in an oven at 40°C / 104°F.
- 5 Weigh out 20 g / 0.7 oz of the collected soil into a 150 ml / 5 fl oz plastic sample jar.

6.2 Sample Preparation

- 1 Add 100 ml / 3 fl oz of distilled or deionised water, screw lid on tightly.
- 2 Shake continuously for 5 minutes. Leave overnight and shake again the next morning.
- 3 Allow to settle for 15 minutes after shaking and strain sample into clean measuring cup.

6.2 Take pH readings as follows:

- 1 Insert probe into the soil solution sample.
- 2 Turn the meter on.
- 3 Wait for the reading displayed on the meter to stabilize. This can take up to four minutes. Record the reading.
- 4 Remove the probe from the soil solution and wash with probe tip under fresh running water (not distilled) to remove any possible soil residue.
- 5 Turn Meter off or allow instrument to turn off automatically (after four minutes).
If the meter turns off while taking a measurement, simply press the ON/OFF button to turn the meter back on and continue with your measurement.

6.3 Store probe between measurements

- 1 Place wetting cap back on probe tip with a small amount of fresh water or pH 4.0 solution in it or store probe tip in a container of fresh water between uses.

7.0 Cleaning and Maintenance

7.1 Clean Soil pH Probe

1 Preparation

Rinse the probe tip under fresh running water. Fill a small container with clean water and add a small amount of mild detergent.

2 Clean Glassware

Place the probe tip into the container and slowly stir it through the liquid several times. If the probe is heavily contaminated, gently brush around the glassware with a few drops of detergent and a soft toothbrush.

3 Rinse Glassware

Rinse well under fresh running water to remove all traces of detergent.

CAUTION: Do not touch probe glassware with fingers. This will contaminate the probe and affect performance. Do not use excessive force on glassware or the probe body as they are easily damaged.

7.2 Battery Replacement

- Batteries are replaced in the unit when the message 'LO BAT' appears in top left-hand corner of LCD display. See Section 3.2.

NOTE: Batteries should be checked at least once every six months for signs of deterioration, leakage, rusting or swelling. If signs of deterioration are found, the battery holder contacts should be cleaned and the batteries replaced.

8.0 Error Messages

Error messages will only appear following pH calibration failure.

Error messages are described below.

To clear a calibration error message press any button once. The meter will reset to the factory set calibration and will need to be recalibrated successfully before use.

Error display	Indicates	Possible causes
E1: PH	Not enough difference between pH 7.0 and pH 4.0 readings.	pH 4.0 calibration solution contaminated or wrong solution used. Probe contaminated, not properly connected, worn out or damaged.
E2 : PH	Not enough difference between pH 7.0 and pH 10.0 readings.	pH 10.0 calibration solution contaminated or wrong solution used. Probe contaminated, not properly connected, worn out or damaged.
E3 : PH	Not enough difference between the readings.	Calibrate to pH 7.0 FIRST, then to pH 4.0/10.0.
E4 : PH	pH 7.0 calibration unreliable.	pH 7.0 calibration solution contaminated or wrong solution used. Probe contaminated, not properly connected, worn out or damaged.

9.0 Troubleshooting Guide

The following table describes problems that can occur with the Soil pH Meter, the possible reasons and explains possible solutions.

Trouble	Possible reason	Possible solution
pH readings inaccurate	Contaminated probe. Incorrect calibration. Broken glass bulb, stem or connector.	Clean pH probe as described in section 7.0. Ensure calibration solutions are accurate. Replace if in doubt. Wait longer for readings to stabilize before calibrating. Check soil pH probe for damage.
Display shows LO BAT in top left hand corner	Insufficient power to take a reliable reading.	Replace the batteries. DO NOT use rechargeable batteries.
Meter will not turn on	Batteries dead or inserted incorrectly.	Check batteries are inserted correctly. Replace if necessary.
Display shows E2 : PH or similar	Problem with pH calibration or the meter is damaged.	See error messages in Section 8.0.
orPH urPH	Over range pH Under range pH	Solution > 14.0pH Solution < 0.0pH Check pH probe connection. pH probe could be faulty. Meter could be wet inside.

10.0 Technical Specifications

	Bluelab Soil pH Meter
Range	0 - 14 pH
Resolution	0.1 pH
Accuracy (at 25°C)	± 0.1 pH
Temperature Compensation	Not applicable
Operating Temperature Range	0 - 45°C 32 - 113°F
Power Source	2 x AAA Alkaline batteries
Calibration	Manual calibration
Other Features	Low battery warning Auto turn off function Over range and under range indicators

Contact Details

Bluelab Corporation Limited, 43 Burrows Street, PO Box 949, Tauranga, New Zealand
Ph +64 7 578 0849 Fax +64 7 578 0847 Email support@getbluelab.com

www.getbluelab.com

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