



Nursery & Garden Industry
Queensland

Calibrating pH and EC meters

pH and Electrical Conductivity (EC) meters are extremely useful pieces of equipment used to measure and monitor basic chemical characteristics of water and growing media. As with any measuring equipment, regular and correct calibration of this equipment is necessary to ensure the results are as accurate as possible.

There are many different models of meters available, ranging from relatively inexpensive pocket meters, to more robust and expensive top of the range bench meters, with calibration procedures differing for each type and model.



To give the greatest accuracy, meters need to be calibrated regularly, with either the interval since the last calibration, or the number of tests done being used to determine how often calibration needs to occur. The best idea is to **calibrate your meter before each sampling session**. Alternatively, the following can be used as a guide as to how often to calibrate:

- For regular use – at least once per week.
- For irregular use – at least once per month.
- If the readings being obtained seem incorrect.
- Daily, if testing very acid or alkaline liquids.
- When the sensor is replaced.

Calibration procedures are usually provided with the unit, and it's important these be followed to ensure accurate calibration. The following are generalised procedures for calibrating meters. For specific details on a particular meter refer to the manufacturer's instructions.

Calibrating the unit against 2 pH buffers (2 point calibration) will provide sufficient accuracy for most situations. pH buffers of 4, 7 and 10 are the most common calibration solutions, but for most nursery situations a pH 4 and pH 7 calibration will cover most commonly encountered pHs. For additional accuracy, some meters have the ability to complete a 3 point calibration. If only a 1 point calibration is to be done, select a buffer about midway within the range of readings you are likely to encounter during testing. Many modern meters have the capacity to recognize the value of the buffer or standard, and to automatically calibrate to each solution, making it much easier to calibrate these meters.

Calibration procedures

Materials and equipment required

- pH/EC meter.
- Distilled water.
- Relevant pH buffers.
- Conductivity standard (usually 2.76 mS/cm). Use a standard solution that is close to the EC's likely to be encountered.
- A plastic or glass container to hold buffers and standards. Metal containers may affect conductivity meter readings.

pH sensor calibration procedure

- Turn on the meter, select the calibration mode, and allow the readings to stabilise.
- Take the pH sensor out of the storage solution. Manufacturer's instructions will recommend the appropriate storage solution. pH sensors are made from glass and need to be protected and stored in appropriate storage solutions and kept moist.
- Rinse the sensor with distilled water and very gently shake off any excess water.
- Submerge the pH sensor in a small quantity of pH 7.01 or pH 6.88 buffer, ensuring the end of the sensor is submerged 2-5cm deep. Only use a small sample of calibration



buffer and don't submerge the sensor in the main buffer solution, as this will contaminate the buffer.

- Allow the pH reading to stabilise, then calibrate the meter. Specific instructions vary with different meters. Some meters will calibrate automatically after pressing a button, while others may require manual adjustment. The sensor will take longer to stabilise the older it gets.
- Rinse the sensor in distilled water and very gently shake off any excess water.
- Submerge the pH sensor in a small sample of pH 4 buffer.
- Allow the pH reading to stabilise, then calibrate using the same method as the first calibration.

EC sensor calibration procedure

- Clean the sensor by rinsing in distilled water and gently shake off any excess water. Some sensors use a platinum coated wire as the sensor. The wires in these should NEVER be rubbed or scrubbed, or the platinum will be removed and have to be replaced.
- Any difference in temperature between the sensor and the sample will cause an error of about 2% per °C. To reduce this error, allow plenty of time for the temperatures to equalise. A useful tip is to store the sensor and calibration solution at the same temperature.
- After cleaning the sensor, place it in the standard solution in the plastic or glass container and stir until the reading stabilises. This may take considerable time if the sensor and solution temperatures differ significantly.
- On the meter, select the EC calibration mode, then calibrate the meter according to directions and check the reading.
- To prevent salt build up on the sensor, rinse the sensors with distilled water after you have finished calibrating.
- Discard the calibration solution. DO NOT pour the remaining solution back into the original bottle, as this will contaminate the calibration solution.

- For a zero EC calibration, allow the sensor to air dry then calibrate as per directions.

Other considerations

- Always read the instructions and follow the manufacturer's recommendations.
- Calibration solutions should be stored in a cool dark place and replaced if past the use by date. An unopened bottle of calibration solution has a shelf life of about two years.
- Always decant sufficient calibration solution to perform the calibration, and discard this when completed. Contamination of the calibration solution will affect the accuracy of the result.
- Never store the meter in high heat or humidity.
- Never touch the sensor with your fingers as skin oils will affect readings and may damage the sensor.
- Lightly swirl the sensor in the solution being measured to dislodge air bubbles.
- If the pH sensor has a cap with a storage solution in it, store the sensor upright to make sure the sensor remains fully saturated.
- pH sensors have a lifespan of around 1-2 years. If a sensor is difficult to calibrate it may require replacement.
- Some pH sensors have a solution contained within them that needs replenishing at regular intervals.
- Never store the pH sensor in distilled water and don't allow a pH sensor to dry out, as it will take some time to stabilise when next used.
- Store EC sensors dry.
- Always rinse sensors in distilled water after calibration and testing to minimise build-up of residue and salts on the sensors.
- Variations in readings, or a faint display can indicate battery failure.

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Published February 2016*