

pH meters, EC meters and Maintenance

Kathleen McDermott and Mike Tremel

Overview

- Electrode Types
- Portable pH meters
- Portable EC meters
- Pen-Style meters
- Combination/Multi-parameter meters
- Electrode Maintenance



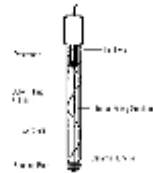
Electrode types



pH Probe- Electrode Types

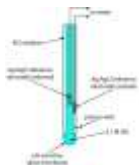
Two components to an electrode:

- **Sensing electrode:** bulb at the base of the electrode that is composed of thin glass to sense ion concentration of sample
- **Reference electrode:** metal component in electrode that supplies stable electrical charge so that the sensing electrode can measure potential changes
 - Primary purpose is **stability**



Electrode Types-Reference Electrode

Single Junction



Double Junction



Electrode Types

Electrolyte Types

- Liquid (Ag/AgCl vs. KCl), gel, viscolene, polymer, non-aqueous

Junction Types

- Single ceramic, triple ceramic, PTFE, open, sleeve

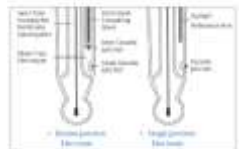
Bulb Types

- Spherical, conical, flat

Body Types

- Glass, titanium, stainless steel, plastic

Diagram illustrating the internal structure of a pH electrode, showing the sensing bulb and the reference electrode assembly.



Conductivity Probes- Amperometric



- Measures current
- Pros:
- Low sample volume required
- Cons:
- Has a limited range

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Potentiometric

- 4 ring probe
- Measurement takes place between inner rings



- Pros
- Higher range

- Cons
- Vent holes need to be covered so a high sample amount is required
 - More expensive than Amperometric

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Connections

- BNC- universal connection
- DIN- unique to the meter



Why is this important?
Not every probe will connect to every meter

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Portable meters



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Pen-Style Portable Meters

- Plastic bodied meter
- Two button display
- Two calibration points
- Auto on/off
- Floats
- Waterproof
- Automatic temperature compensation
- Renewable cloth junction



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Advantages and Disadvantages

- Pros
- Portable
 - Replaceable electrode (for pH)
 - Available in multiparameter
 - Easy to use
 - Economical
 - Can do pour-through method



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- Cons
- No electrode diagnostics/ no Cal-Check
 - No advanced features (logging, GLP, PC connectivity)
 - Lacking soil electrode
 - Small buttons



Portable EC/TDS Meters

Single parameter portable meters available in a variety of styles

HI9033 EC Meter

- Automatic temperature compensation
- Potentiometric conductivity probe
- Four measuring ranges
- One calibration point



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HI993310 Direct Soil EC meter



- Automatic temperature compensation
- Auto shut off
- One point calibration
- LED alarm
- Measures EC and soil activity

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HI98192 EC/TDS Meter

- Automatic temperature compensation
- GLP
- Logging feature
- Thermoformed case
- Pour-through method or soil slurry (if electrode shield is removed)
- Increased durability
- 5 point calibration



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Portable pH meters



Direct Soil pH meter

- Simple 2 button display
- 1-2 point calibration
- Automatic temperature compensation
- Special conical tip electrode for piercing soil
- Comes with soil auger to pierce especially hard soil

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HI98190/H98191

- Automatic temperature compensation
- GLP
- Logging feature
- 5 calibration points
- Option to use ISEs with HI98191
- Thermoformed case
- Also available in EC/TDS option



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Advantages and Disadvantages

Advantages

- Portable
- Wide variety of meters depending on needs/ price point
- Meters have many of the same features as benchtop meters
- Bigger buttons

Disadvantages

- Lacking some features of benchtop meters

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Combination (Multiparameter) Meters

- HI98130
- Test several parameters (pH/EC/TDS)
 - Auto shut-off
 - Automatic temperature compensation
 - Replaceable pH electrode (cannot replace EC/TDS sensor)
 - pH can be calibrated at 1 or 2 points
 - EC/TDS can be calibrated at 1 point



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HI9814 Multiparameter GroPro Meter

- 3 sensors in one probe
- Quick calibration- calibrate all parameters with one solution
- Waterproof
- Automatic temperature compensation
- Stability indicator
- Auto-off
- Hold button



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Benchtop meters



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Benchtop Meters

- HI5521
- Meter is stationary- cannot be taken into the field
 - Capacitive touch screen (no jammed keys/easy clean screen)
 - Fast processing
 - Dual channel for simultaneous pH/EC measurements
 - BNC connection for extra electrode options
 - Graphing



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The Edge

- Multiparameter edge can do pH and EC by switching electrodes
- Digital electrodes store calibration
- Capacitive touch
- Cradle for benchtop or wall use
- Has a battery life for up to 8 hours- can also be used as a portable



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Dedicated Edge

- Single parameter Edge



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Advantages and Disadvantages

Pros

- More features compared to the other style meters
- Some are multiparameter
- More calibration points compared to the other style meters



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Cons

- Stationary, not appropriate if doing testing across many locations/ greenhouses/ fields



Electrode use



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Electrode Use

1. Remove fill hole cover (only in refillable electrodes)
2. Stir sample
3. Calibrate instrument
-Bracket calibration around your sample
4. Completely submerge electrode in sample
5. Wait for meter to stabilize (usually ~ 1 minute)
6. Rinse electrode between samples
7. Replace fill hole cover after sampling and store in storage solution



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Electrode Care and Maintenance



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Electrode Care and Maintenance- pH

Storage

- Short term: store in pH 4 or storage solution
- Long term: store in storage solution
- Storage solution rehydrates outer layer of glass of sensing electrode
 - When stored dry, rehydrate electrode in storage solution for 3-5 hours to rebuild outer membrane
- **Never** store your electrode in water!



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Electrode Care and Maintenance- pH

Cleaning

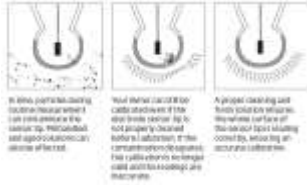
- Removes buildup around sensing electrode and any potential clogging of reference electrode
- Maintain cleaning schedule (weekly, biweekly)
- Place electrode in solution for a couple minutes, increase if necessary
- Rehydrate bulb in storage solution for about a half hour



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Electrode Care and Maintenance-pH



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Electrode Care and Maintenance-EC

- Remove sleeve and clean with cloth or nonabrasive detergent if more cleaning is required
- Carefully replace sleeve after cleaning and recalibrate



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Questions?



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