pH meters, EC meters and Maintenance
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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

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
Conductivity Probes - Amperometric

- Measures current

**Pros:**
- Low sample volume required

**Cons:**
- Has a limited range

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

Connections

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

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

Pen-Style Portable Meters

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

Advantages and Disadvantages

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

**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

HI993310 Direct Soil EC meter
- Automatic temperature compensation
- Auto shut off
- One point calibration
- LED alarm
- Measures EC and soil activity

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

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

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

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

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

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

Benchtop Meters

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

Dedicated Edge
- Single parameter Edge
Advantages and Disadvantages

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

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

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

Electrode Care and Maintenance

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!

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

Electrode Care and Maintenance- pH

Electrode Care and Maintenance- pH
Electrode Care and Maintenance - pH

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

Questions?

Electrode Care and Maintenance - EC