

IOP 008A.5  
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## **INSTRUMENT OPERATING PROCEDURE**

### **INSTRUMENT:**

pH meter

### **MODEL:**

Accumet® model AR 15

### **MANUFACTURER:**

Fisher Scientific

### **PRECAUTIONS:**

#### **POTENTIAL INTERFERENCES**

Substances that can contaminate the probe  
Do not expose the meter or probe to freezing temperatures.  
High humidity and cold temperatures may affect meter operation.  
Do not use filling or storage solutions in Ross probes if they contain silver chloride.  
Do not over-immers the probe.  
Buffers stored in the light may degrade-change daily

#### **SAFETY**

No special precautions

**PROCEDURES:**

- I. Dispense 50 – 70 mL samples of buffer solutions into glass beakers. The three U.S. standard buffers used for calibration of the meter are pH 4.0, 7.0 and 10.0.
- II. Calibration procedures must be followed closely due to the importance of pH measurements in determining treatment concentrations of lampricide. Equipment failures are corrected immediately.
- III. The meter allows for auto-recognition of U.S. standard buffers (pH 4, 7, and 10). This procedure need only be performed during the initial set up of the meter following the procedure as described in the operating instructions.
- IV. The meter allows for multi-point standardization for measurements performed over a very broad pH range (i.e. from naturally occurring stream water pH to lower values encountered during alkalinity titration). With multiple buffer points (4, 7, and 10), the meter uses the electrode slope applicable to the pH range of the current sample.
- V. pH meter calibration

Over time, both an electrode's slope and its zero potential will change. As a general rule of thumb, pH electrodes require a complete re-standardization at least once per working day and single buffer updates roughly once an hour or immediately prior to conducting a series of pH measurements. In order to do a complete re-standardization, the existing buffers must be cleared from memory. If probe has a filling hole it must be opened. Check level of filling solution. Fill to proper level with appropriate solution for brand of probe (attachment). Buffer solutions are changed daily; changes are noted in the instrument log book.

A. Clearing existing buffers

1. Press the **pH** key to select pH measurement. Observe display of the current pH standardization points.
2. Press **STD**. A menu of standardization options appears.
3. Press **CLEAR** to clear existing standards.
4. The meter returns to the main screen, but with all the pH standardization points cleared from memory.

B. Adding a buffer

When the meter is standardized with a new calibration buffer, the value (temperature compensated with U.S. standard) is added to the standardization data set, and shown in the display.

1. Press **pH** to select pH measurement (if not in pH mode).
2. Prepare the electrode by rinsing with deionized water then pat dry with a lab wipe tissue. Alternatively, a portion of the next buffer (to be discarded) can be used to rinse the electrode. Immerse the electrode in the buffer solution and stir slowly for 5 minutes.
3. Press **STD**. A menu of standardization options is displayed.

4. Press **STD** again to access standard mode.
5. Press the **STD** key to accept the buffer.
6. The meter will wait until a predetermined electrode stability is reached, and then it will automatically read the signal and calibrate.
7. The meter returns to the main screen with the added buffer point shown. Record the pH and temperature in the instrument log book.
8. Press **STD** to access standardize mode.
9. Press **STD** to standardize new buffer.
10. The probes are stored in electrode storage solution (pH ~ 4) between measurements.

Note: A relationship exists between the pH and temperature of buffers used in calibration. The following table delineates this relationship:

pH buffer	Temperature °C			
	0	10	20	30
4.00	4.00	4.00	4.00	4.01
7.00	7.12	7.06	7.02	6.99
10.00	10.31	10.17	10.05	9.95

C. Updating the standardization

Over periods of an hour or so, the zero potential of a pH electrode changes much more significantly than does its slope. Consequently, it is more convenient, and usually sufficiently accurate, to simply update the electrode's zero potential for drift by re-standardizing at a single point roughly once per hour.

1. To update the existing standardization for zero drift, select a buffer of value identical to any of the currently stored buffer points.
2. Press the **pH** key to select pH measurement if necessary.
3. Rinse the electrodes with deionized water and pat dry with a lab wipe tissue, or rinse with a portion of the buffer, then immerse in the buffer. Stir slowly.
4. Press the **STD** key. A menu of standardization options is displayed.
5. Press **STD** to update a standard.
6. Press **STD** to accept the buffer.
7. The meter will wait until a predetermined electrode stability is reached, then it will automatically read the signal and calibrate.
8. The meter returns to the main screen with the added buffer point shown. Record the pH and temperature in the instrument log book.

VI. pH measurement

- A. Measurements of pH are made in samples of stream water collected in plastic bottles. Samples are measured as quickly as possible to minimize pH changes.
- B. Rinse probes with water sample and immerse tips of probes into sample ensuring that probe junction is completely submerged. Wait 5 minutes.
- C. Press **MEAS**. When **MEAS** is selected the meter continuously monitors the pH of the sample. The **STABLE** display indicates the stability of the measured pH.
- D. When **STABLE** is displayed and the operator is confident that the readings have stabilized, the measurement is recorded.

VII. Storage

At the end of the work day the pH probe is stored upright, in electrode storage solution, with the filling hole left open.

**MAINTENANCE:**

- A. Electrode efficiency (expressed as a percent) is monitored by the meter. On this scale, properly functioning pH electrodes typically exhibit efficiencies between 90 and 105%. Probes that fall outside of this range fail to measure pH and may require re-conditioning or replacement. A section on electrode troubleshooting and maintenance is included in the instrument operating instructions as IOP: 008A Atch3 Use of Glass Double Junction pH Electrodes.
- B. The unit touch screen occasionally requires calibration.
  - 1. Go into **System Setup**.
  - 2. Under System Setup options, select – **Display Meter Information**.
  - 3. Unit must have Software Revision Number 1.02 or higher to be able to have field calibration performed.
  - 4. Touch upper right hand corner of the touch screen area 10 times (unit will flash each time you touch it).
  - 5. **Maintenance Mode** will be displayed.
  - 6. Touch the number 1 (dark circle with a white 1).
  - 7. To re-calibrate the touch screen, touch yes.
  - 8. In the upper left hand corner of the screen, there will appear the numbers (64, 64) with a tiny black dot next to them. With a fine tipped object (a pen tip, mechanical pencil, the edge of a small flat blade screwdriver) touch the screen where the tiny black dot is located.

9. In the lower right hand corner of the screen, there will appear the numbers (416,576) with a tiny black dot next to them. Touch the tiny black dot with a fine tipped object.
10. Your touch screen will now be re-calibrated.
11. Unplug the meter to exit the program.

**REFERENCE:**

Fisher Scientific Model AR15 pH Meter Operating Instructions.  
IOP: 008A Atch3 Use of Glass Double Junction pH Electrodes

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This procedure has been reviewed and approved by the undersigned representative of the U.S. Fish and Wildlife Service.

REVIEWED/APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
Field Supervisor (U.S.)