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## **INSTRUMENT OPERATING PROCEDURE**

### **INSTRUMENT:**

pH meter

### **MODEL:**

Accumet® model XL15 and model XL150

### **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-immerses 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. General procedures for 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 the probe has a filling hole it must be opened. Check the level of the filling solution. Fill to the proper level with appropriate solution for the brand of probe (attachment). Buffer solutions are changed daily; the change is noted in the instrument log book.

- VI. Instrument setup procedures
  - A. Remove the *shorting cap* on the BNC connector.
  - B. Plug the combination electrode into the BNC input connector.
  - C. Install the ATC probe into the ATC jack.
  - D. Open the filling hole on the electrode by turning the collar near the top of the probe.
  - E. If the pH electrode has been in long-term storage, soak it in electrode storage solution.
- VII. Instrument startup procedure
  - A. Connect the power adaptor to the meter.
  - B. Plug the adapter into a power outlet or a terminal strip.
  - C. Turn on the power at the terminal strip.
  - D. Model XL15 -Press the black startup button on the right-rear side of the unit and hold for five seconds. Release the button and the unit will power on.  
Model XL150 – Press and hold startup button on the bottom right panel until “System Loading Please Wait” appears in the display.

VIII. Touch screen operation

- A. The meter operates with a touch screen. The buttons on the right side of the screen control all functions of the meter.
- B. XL15 -A stylus is provided for tapping on the touch screen (stored inside the back - top/right - of the meter).
  - 1. When you touch the screen with the stylus you will hear a tone; the screen will not change until the stylus is lifted.
  - 2. The stylus is used like a mouse; you can tap to select or drag to change position of an item.

For the XL150 No stylus is used.

- C. Screen calibration (model XL-15 only): see maintenance section.
- D. Buttons used during normal operation.
  - 1. **Channel 1:** accesses the display screen corresponding to the channel.
    - a. **Standardize:**
      - (1) **Confirm:** accepts the current value of the buffer
      - (2) **Clear:** clears all previous standardization points
      - (3) **Cancel:** cancels current standardization and returns to measurement screen
      - (4) **Temp std:** allows accuracy check of the temperature probe
    - b. **Measure:** Directs the meter to measure the sample when in the Auto Read function
  - 2. **Mode:** allows switching among the various operations of the meter; used to configure display options and select input parameters.
    - a. **pH mode:** selected from the Mode screen for Channel 1.
    - b. **pH mode:** allows switching to the various pH operations.
  - 3. **Setup:** accesses the setup screen of the channel in use.
  - 4. **Help:** accesses helpful information on the screen.

IX. pH calibration and measurement

- A. Standardization
  - 1. Tap (once) the **standardize** button on the top right of the channel 1 screen (the meter should default to this screen when turned on).
  - 2. Tap the **clear** button to clear the previous standardization; respond to "are you sure?" by tapping **OK**.
  - 3. Place the pH electrode and the temperature probe into a buffer.
  - 4. After allowing five minutes for the reading to stabilize, tap the **confirm** button to standardize on the buffer.

5. Remove the probe from the buffer, rinse in deionized water, pat dry with a tissue, and place into a second buffer.
6. After allowing five minutes for the reading to stabilize, tap the **confirm** button to standardize on the second buffer.

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

B. Sample measurement

1. Measurements of pH are made in samples of stream water collected in plastic bottles. Samples are transported from the collection site and measured as quickly as possible to minimize pH changes.
2. Remove the pH electrode and temperature probe from the second buffer, rinse, and pat dry.
3. Place the pH electrode and temperature probe in the unknown sample and allow 5 minutes for stabilization (subsequent samples may be read a shorter stabilization period).
4. Tap the **measure** button. The pH of the sample will be displayed.

X. Instrument shut down procedure

Model XL15:

- A. Close any open applications and log off.
- B. Bring up the task bar by tapping anywhere on the thin black band along the bottom of the screen.
- C. Tap on the **Start** button.
- D. Tap on the **Shutdown** button.
- E. Tap on the **Yes** button in the *shutdown* window.

Model XL150:

- A. Press and hold startup button until screen display reads Warning Are you sure you want to shut down?
- B. Select OK.

XI. 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 with an efficiency that falls outside of this range require re-conditioning or replacement. A section on electrode troubleshooting and maintenance is included in the instrument operating instructions as IOP: 008B Atch3 Use of Glass Double Junction pH Electrodes.
  
- B. The Model XL15 unit touch screen occasionally requires calibration.
  - 1. From the **HOME** screen, tap the thin black strip at the bottom edge of the screen to access the Task bar.
  - 2. Tap **Start > Settings > Control Panel**. This launches the Control Panel screen.
  - 3. Double tap the **Stylus** icon.
  - 4. Tap the **Calibration** tab to access the calibration screen.
  - 5. Tap the **Recalibrate** button.
  - 6. Carefully tap and briefly hold the stylus on the center of the target. Repeat tapping the target as it moves to the 4 corners of the screen. If you miss the target center, keep the stylus on the screen, slide it over the target's center, and then lift the stylus.
  - 7. Once the calibration is complete, the target will disappear. Tap anywhere in the screen to accept the new calibration and go back to the "*Stylus Properties*" window. Tap **OK** to close the "*Stylus Properties*" window.

**REFERENCE:**

Fisher Scientific Model XL15 and XL150 pH Meter Operating Instructions.  
IOP: 008B Atch3 Use of Glass Double Junction pH Electrodes

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This procedure has been reviewed and approved by the undersigned representatives of the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada.

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

REVIEWED/APPROVED Julie Spivak DATE 05 MAR 2020  
Program Manager (Canada)