Calibration and Maintenance Procedure: YSI Model 60 pH Meter

These procedures are to be performed by program staff or people who have been trained by staff. Calibrate the pH meters before every monitoring session. Replace buffer solutions as needed so as not to exceed expiration dates. Solutions are good until the last day of the month listed on the expiration date.

Equipment Needed:

- "Maintenance & Calibration" notebook
- YSI Model 60 pH Meter
- Purified water
- Kimwipes
- pH 4, 7 and 10 buffering solution
- 3 100 mL graduated cylinders
- Scissors if using powder packets
- (Product manual for troubleshooting)

Calibration:

1. Turn the instrument on. The instrument will activate all segments of the display for a few seconds, which will be followed by a self test procedure which will last for several more seconds. If "LO BAT" is displayed you will need to replace the batteries. Also, if the meter locks up, try replacing the batteries. When the meter is first turned on, it is in the pH mode and should display pH and °C. If pH and temperature are not displayed, press "MODE" until you get to the right display on the screen.

2. If the probe is in the long-term storage bottle, remove it from this bottle and cap it (see last page for details). Or, if the probe is in the transport chamber in the meter, simply remove it from this chamber.

3. Rinse the probe with purified water, then carefully dry the probe using Kimwipes (or rinse it with some of the buffer solution to be used for calibration).

4. Place 30 to 35 mL of pH 7 buffer solution in a 100 mL graduated cylinder. Immerse the probe, making sure that both the pH and temperature sensors are covered by the solution. Let the probe sit in this solution for 20 minutes.

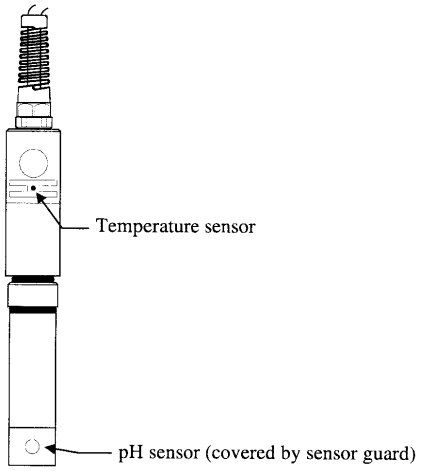
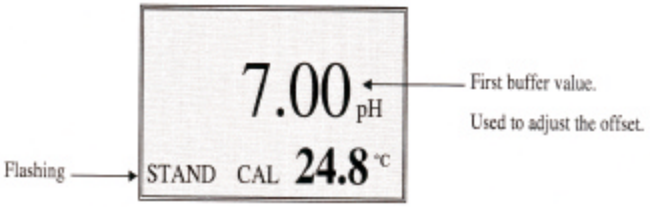


Figure of YSI Model 60 pH probe, showing temperature and pH sensor locations. Note that both sensors need to be submerged while measuring pH.

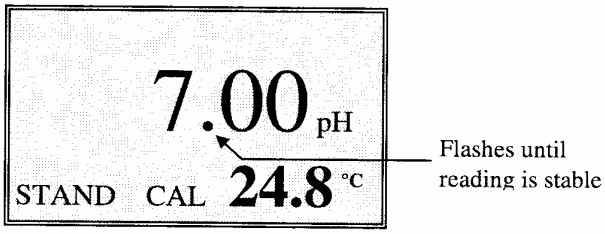
5. Once the reading is stable (doesn't vary by more than 0.01 for 2 min.), record the Unit#, date, and the "pH 7 before calibration" reading in the calibration notebook.

6. To enter the calibration menu, simultaneously press both the "UP ARROW" and "DOWN ARROW" keys. The display will show "CAL" at the bottom, "STAND" will be flashing and the main display will show 7.00 (the buffer you are using).



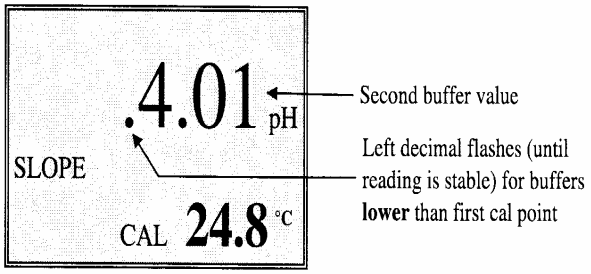
[Note: The meter automatically accounts for the fact that the true pH of the buffers changes with temperature; therefore, the pH values displayed during calibration will vary with temperature. For example, pH 7 buffer at 20° C (rather than 25°C) has an actual pH of 7.02, and this number (rather than 7.00) will appear on the display when the probe is placed in the solution.]

7. **Setting the midpoint:**
   a. Press the "ENTER" key. The screen will show "CAL" at the bottom, "STAND" will stop flashing and the pH calibration value is shown with the middle decimal point flashing.



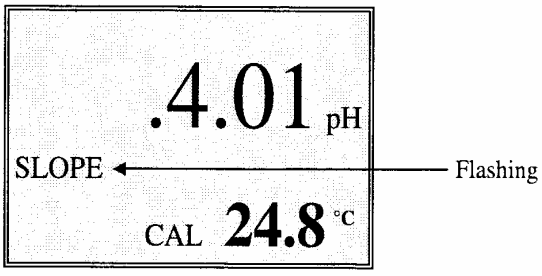
   b. When the reading is stable (does not change by 0.01 pH in 10 seconds), the decimal point will stop flashing. Press and hold the "ENTER" key until "SAVE" along with "OFS" is displayed and the display returns to the main screen. "SLOPE" will now appear on the display and be flashing. This indicates that the slope is ready to be set using a second pH buffer. Leave the 7.00 pH buffer solution in the cylinder and set aside.

8. **Setting the lower point:**
   a. Rinse the probe with purified water, then carefully dry the probe. Put 30 to 35 mL of pH 4 buffer in a different clean cylinder and immerse probe in the solution, making sure the temperature probe is immersed.
   b. Press "ENTER." The screen will now show "CAL" at the bottom, and "SLOPE" will stop flashing and the pH 4 buffer value is shown with one of the decimal points flashing.

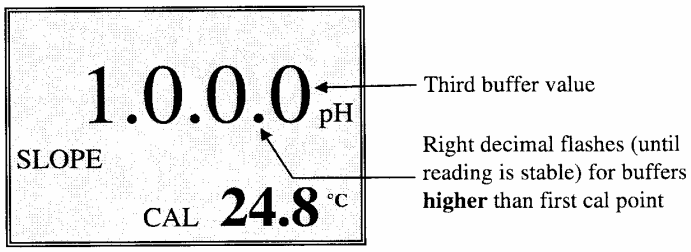


   c. When the reading stabilizes, the decimal point will stop flashing. Press and hold "ENTER" to save the first slope until "SAVE" is displayed along with "SLP," and you return to a normal screen.

   d. "SLOPE" will start flashing again indicating that the slope is ready to be set using a third pH buffer.



9. **Setting the upper point:**
   a. Rinse the probe with purified water, then carefully dry the probe. Fill a clean cylinder with 30 to 35 mL of pH 10 solution and immerse the probe into the solution, making sure the temperature sensor is immersed.
   b. Press "ENTER." The screen will now show "CAL" at the bottom, "SLOPE" will stop flashing, and the pH value for the pH 10 buffer is shown with the right decimal point flashing.



   c. When the reading is stable, the decimal point will stop flashing. Press and hold "ENTER" until "SAVE" flashes on the display along with "SLP" to indicate the second slope value has been saved.

   d. The system is now calibrated at three points and will return to normal operation.

10. **Testing the calibration:**
    a. Rinse probe with purified water and dry carefully.
    b. Immerse the probe into the cylinder of pH 7 buffer that was set aside earlier.
    c. Wait for the readings to stabilize (not varying by more than 0.01 for 2 min.).
    d. In the Water Quality Equipment Maintenance and Calibration Log, record the "pH 7 after calibration" reading, Activity (3-point calibration), buffers used and their expiration dates, and initials.

11. Label the side of the meter with a piece of tape: "Calibrated [date] [initials]."

12. If there is tape blocking the probe chamber opening, remove it. If the sponge inside is dry, wet it with a few drops of purified water. (If the sponge is grungy, replace it by cutting a new one.) Rinse the probe with purified water and insert it into the chamber.

13. If possible, test the probe by letting it soak in room-temperature tap or creek water (NOT purified water) for 20 minutes, then recording pH readings to the nearest 0.01 unit at ½- or 1-minute intervals. It shouldn't take longer than a few minutes after that for the unit to get to a stable reading (not varying by more than 0.01 for 2 minutes).

Calibration troubleshooting: If display reads "undr" or "OVEr" while calibrating, try letting it sit for a few minutes to see if the problem goes away. If not, try the probe-cleaning procedures described in the product manual. If those don't work, the probe may need replacing or the unit may need servicing. (Expected service life of a pH probe is 1½ -3 years.)

Meter troubleshooting: If the meter takes a long time to stabilize or fails to stabilize in the field, follow the cleaning procedures in the product manual. If these procedures fail to correct the problem, it may be time to replace the probe.

Buffer bottle for long-term pH probe storage (more than a week): Store the pH probe in pH4 buffer solution if it's not going to be used for more than a week. Setup of this storage container (which comes from the manufacturer, except for the Velcro strips added by Streamkeepers) is depicted in the accompanying diagram. To set the probe in this bottle:

1. Slide the cap with the hole (the "open cap") up the probe, to just below the O-ring that's on the probe.
2. Roll the loose O-ring that comes with the storage bottle up the probe until it's under the open cap.
3. Fill the storage bottle to slightly below the shoulder with pH4 buffer solution.
4. Insert the probe into this bottle, and then screw the bottle up into the cap. (You may have to slide the cap down a bit to get the threads to engage.) With the O-ring inside, this seal should be water-tight—test it to make sure.
5. Attach the "closed cap" to the bottom of this bottle, using the Velcro to make it grip.
6. Store the unit out of the way, preferably with the probe facing straight down as in the diagram.

Removing the probe from the storage bottle: To take the probe back out of the storage bottle and prepare it for further sampling:

1. Remove the "closed cap" from the Velcro at the bottom of the bottle.
2. Holding the bottle upright, unscrew it from the cap with the hole ("open cap") and screw the closed cap onto it.
3. Rinse the probe and open cap with distilled water.
4. Slide the open cap toward the cord to expose the O-ring beneath the cap. Roll off the O-ring, then slide the open cap off the end of the probe.
5. Smush the O-ring into the Velcro at the bottom as you press the open cap into it. Thus, the bottle, both caps, and O-ring are all stored together in a single "package."
6. Remove the tape that's covering the probe chamber on the side of the meter, being careful not to lose the little sponge that's inside.
7. With the little sponge inside the chamber, add a few drops of purified water.
8. Put the probe all the way into this chamber.
9. (If possible, before sending the meter back out in the field, soak the probe in creek or tap water for 30 minutes before placing the probe in the meter's storage chamber.)