Standard Operating Procedure for: YSI MultiLab 4010-1 Meter Calibration and YSI IDS ProOBOD DO Probe Maintenance

DEPARTMENT OF ENVIRONMENTAL PROTECTION
LABORATORY
BIOLOGY PROGRAM
TALLAHASSEE FLORIDA

The OFFICIAL COPY is the on-line version. All other copies are considered unofficial and uncontrolled.

1. EQUIPMENT AND SUPPLIES

1.1. Calibration

1.1.1. YSI MultiLab 4010-1 meter (S/N 20061905)

1.1.2. YSI IDS ProOBOD probe

1.1.3. BOD bottles and tray

1.1.4. Computer with BOD Analyst Pro program – see SOP BB-33 for program setup

1.2. Maintenance

1.2.1. New optical calibration cap kit that contains a cap, O-ring, grease, and sponge

2. REAGENTS AND STANDARDS

2.1 Deionized water

3. YSI MULTI-LAB 4010-1 METER CALIBRATION

3.1. Prior to use, the analyst must read the YSI IDS ProOBOD probe and Multi-Lab 4010-1-meter manuals located in X:\Labs\Lab5\Biology\Bench Common\BOD\Optical manuals

3.2. Make sure the probe and cap are dry and place in a BOD bottle containing at least 1 inch of water the night before calibration. The environment for the cap should be humid, but do not submerge the sensor in water prior to calibration.

3.3. Turn on the YSI Multi-Lab 4010-1 meter by pressing the on-button and allow it to stabilize until the "O2" icon in upper left corner stops flashing. The optical probe does not require any additional warm-up time.

3.4 Ensure that the salinity setting is turned off by pressing **Enter** from the measurement screen to access the settings. Return to the measurement screen. Press **M** to change the setting to mg/L if needed.

3.5 Press the **CAL** button and then **Enter**. The meter will perform a calibration and beep when it is done. The display will show the calibration results including date/time and number of + signs. Three plus signs indicate an excellent calibration curve with a relative slope between 0.94 and 1.06. Two + signs indicate a relative slope of 0.92 to 0.94 or 1.06 to 1.08. One + sign indicates a relative slope of 0.90 to 0.92 or 1.08 to 1.10. If an "error" message appears, determine the cause and re-calibrate. Select **Exit** to go back to the measurement screen.

3.6 Once the flashing "O2" in the top left corner of the screen is no longer flashing, the probe is stable. This reading is the calibration value.

The OFFICIAL COPY is the on-line version. All other copies are considered unofficial and uncontrolled.

3.7 Enter the temperature and pressure of the room using an annually calibrated temperature probe and a NIST traceable barometer in the BOD Optical calibration log BOD- Optical Calibrations YYYY.xls" (where YYYY is the current calendar year) located in *X:\Labs\Lab5\Biology\Bench Common\BOD*.

3.8 Compare the reading to a DO Saturation table (theoretical value) and record measurements. If the reading differs by more than 0.30 mg/L from the measurement given in the DO saturation table, check the probe and re-calibrate.

3.9 Prepare 3 BOD bottles with air saturated water. For best results, lightly aerate a flask of DI water for approximately 30 minutes. Allow the water to sit for several minutes before pouring into the BOD bottles.

3.10 Use the YSI Multi-Lab 4010-1 meter and IDS ProOBOD probe to measure the DO of each bottle. Once the probe is immersed in the BOD bottle, turn on the stirrer toggle switch located on top of the probe. The flashing "O2" will stop flashing when the reading is stable. The average reading should be within 1 mg/L of the DO Saturation table value. If not, the pass/fail column will read "fail". Re-aerate the water and repeat the process. If the standard deviation of the values is greater than 0.2, the average reading column will show "Remix calibration water". If the calibration passes, follow BB-33 for sample set up. Record values in the calibration file.

3.11 Immediately after reading samples and rinsing the probe, measure the three bottles of air saturated water from 3.8. Record D.O. readings in the calibration file. If the average result is not within +/- 0.3 mg/L of the average D.O. reading from the initial calibration, or if the standard deviation of the values is greater than 0.2, the Pass/Fail column will show "Fail." See section 4 and correct the issue. Immediately re-read all samples.

4. PROBE MAINTENANCE AND TROUBLESHOOTING

4.1 The DO probe should be checked after each use for cracks or scratches in the sensor cap. It should also be checked if the meter fails to calibrate or readings are erratic and unstable. Sensor caps should be changed every 12 months depending on use if the probe is turned on for approximately 5 hours per day of the week. The probe has a lifetime luminescence that depletes over time as the meter is left on.

4.2 The sensor must remain in a humid environment. If it is not stored in a BOD bottle containing at least 1 inch of water, it must be rehydrated before use. Readings will be erratic, and the calibration may drift. To rehydrate, soak the sensor in tap water for 24 hours prior to calibration. Blot dry before calibration.

4.3 Check the sensor cap daily for biofilm build-up. The cap should be rinsed well at the end of each use and excess water gently dried. If dirt or residue is visible anywhere on the probe or cap, or if method blanks consistently exceed method limits clean the probe and sensor cap. Make a 1% Liquinox solution and gently clean the sensor cap with a soft lens cloth weekly or more frequently if necessary. DO NOT use anything abrasive such as a brush or scrub pad. DO NOT use any other cleaning agents (such as

The OFFICIAL COPY is the on-line version. All other copies are considered unofficial and uncontrolled.

ethanol or bleach) because it will strip the paint coating. The paint coating is the diffusion layer, and if affected, the probe will yield erroneous readings.

4.4 If the paint coating or the clear part of the cap is chipped or scratched, replace the cap. Replace the cap by twisting off the damaged cap. Remove the old O-ring, and replace with a new one. Add some grease to the O-ring and wipe the grease around the O-ring to secure a proper seal. Gently wipe off excess grease. Do not touch any of the optical parts. Use a lens cleaning cloth to remove any grease residue. Place the sensor cap on and twist to tighten. Remove any grease that gets on the probe.

4.5 Enter the new calibration cap coefficients into the meter in settings. The cap has an expiration date of 360 days. The meter will display a notice of the upcoming cap expiration date. Do not use a cap past its expiration date.

4.6 Most of the time, erroneous readings are due to a damaged cap since the internal optical components are protected by the cap. However, if it is suspected that any internal optical components or the stir bar/shaft and motor are damaged due to dropping or mishandling, install a new probe.

Note: Always re-calibrate after changing the cap or probe before taking measurements.

5. DATA ARCHIVAL

5.1 Record any maintenance or problems with the probe or meter in the *BOD Instrument Maintenance Log*.

6. REFERENCES

6.1 YSI Multi-Lab 4010-1 Instruction Manual

6.2 YSI IDS ProOBOD User's Manual

APPENDIX OF CHANGES

07/08/2009	Updated SOP style. Updated SOP to the current procedure of using YSI readings to calibrate Auto EZ probes.
10/28/2010	Added probe maintenance section.
01/14/2015	Formatted for 508 compliance
02/24/2015	updated to reflect new file location.
05/25/2016	Edited YSI Model 50B Calibration; BOD AutoEZ Calibration; and Probe Maintenance sections
12/29/2016	Made clarifications in AutoEZ calibration section and added figure of tray positions.

The OFFICIAL COPY is the on-line version. All other copies are considered unofficial and uncontrolled.

12/19/2017	Amended comment about aeration step in section 4.0 and fixed hyper link in section 3.4
04/26/2019	Updated link to BOD folder. Edited probe maintenance section to include specific instructions for the AutoEZ.
04/28/2020	Updated the name and location of data logs. Reorganized procedure instruction in Section 5. Added graphics to section 8.
02/11/2021	Updated all sections. Removed all references to YSI Model 50B and polarographic style probes. Added new meter and optical probe information. Removed section 7.

The OFFICIAL COPY is the on-line version. All other copies are considered unofficial and uncontrolled.