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

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1. SCOPE AND APPLICATION

1.1. This method is based on the YSI MultiLab 4010-1 meter operating instructions. It is used to calibrate the YSI MultiLab 4010-1 meter and probe and to measure dissolved oxygen (DO).

2. SUMMARY OF METHOD

2.1. The DO probe is calibrated using the air saturation method. Measurements are made and recorded in appropriate logbooks and LIMS logbooks.

3. EQUIPMENT AND SUPPLIES

3.1. Calibration

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

3.1.2. YSI IDS ProOBOD probe

3.1.3. BOD bottle

3.1.4. Computer with access to the Laboratory Information Management System (LIMS)

3.2. Maintenance

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

4. REAGENTS AND STANDARDS

4.1. Deionized water

5. METHOD: INITIAL DO PROBE PREPARATION

5.1. 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\BenchCommon\ToxCommon\Manuals\Meter Manuals

5.2. 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.

6. METHOD: AIR CALIBRATION

6.1. 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.

6.2. 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.

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6.3. Press the **CAL** button and then **Enter**. The meter will perform a calibration and beep when it is done.

6.3.1. 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.

6.4. Select **Continue**. Press **F1** to verify calibration. If it passes, place probe in cup to be measured.

6.4.1. Do not keep probe in the rinse cup. Place back into BOD bottle between use. It does not need to be dried before being placed in the BOD bottle. **Never submerge the probe in a liquid sample past the point where the metal rods meet the ledge.**

6.5. 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.

6.6. Enter the temperature using an annually calibrated temperature probe.

6.7. 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.

6.8. Refer to steps 6.1-6.8 of SOP TA-06.42 for putting morning verification into LIMS.

7. METHOD: MEASUREMENT OF DISSOLVED OXYGEN

7.1. When reading samples, turn on the stirrer toggle switch located on top of the probe. Never submerge the probe too far into a water sample. The flashing "O2" will stop flashing when the reading is stable. The probe should be rinsed between different tests or descending conductivities.

7.2. To salinity adjust, push **Enter**. Scroll to **Salinity** and press **Enter**. Adjust to needed salinity and press **Enter**.

7.2.1. You can hold down the button.

7.3. Push **M** to go back to measuring. Remember for EOD check, adjust salinity back to "0".

7.4. Refer to steps 6.9-6.10 of SOP TA-06.42 for putting samples into LIMS. Refer to step 6.11-6.14 of SOP TA-06.42 for EOD check.

8. PROBE MAINTENANCE AND TROUBLESHOOTING

8.1. 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

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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.

8.2. 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.

8.3. 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, 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 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.

8.4. 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.

8.5. Enter the new calibration cap coefficients into the meter in settings. The cap has a suggested lifetime of one year. The meter will display a notice of the upcoming cap expiration date. Do not use a cap past its expiration date.

8.6. 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.

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

9. DATA ARCHIVAL

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

10. REFERENCES

10.1. YSI Multi-Lab 4010-1 Instruction Manual

10.2. YSI IDS ProOBOD User's Manual

10.3. DEP SOP TA-06.42, LIMS Entry for Laboratory Parameters

APPENDIX OF CHANGES

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