Calibration and Use of the Fisherbrand™ Traceable™ Bench Conductivity Meter for Conductivity and Salinity

(Based on the Fisherbrand™ Traceable™ Bench Conductivity Meter Operating Instructions)

1. SCOPE AND APPLICATION

1.1. This method is based on the Fisherbrand™ Traceable™ Bench Conductivity Meter Operating Instructions. It is used to calibrate the Bench Conductivity Meter and to measure conductivity and salinity in aqueous solutions.

2. SUMMARY OF METHOD

2.1. The Bench Conductivity Meter is set up and calibrated. After the initial set-up, daily (when used) calibration checks are performed and recorded in the LIMS logbook. A one-point daily (when used) calibration check is performed for conductivity and salinity. To perform the calibration verifications, the meter is turned on and the desired “MODE” is selected (u/ms for Conductivity/SAL for Salinity). The probe is placed in the aqueous standard solution and swirled until the reading stabilizes. The probe is removed from the solution, rinsed, and placed in the storage solution. End-of-day measurements are made and recorded to ensure the probe readings have not drifted.

2.2. The instrument setup calibration is performed when the values of the setup calibration standards change. The operator must check the conductivity on each standard container when the standard solution is replaced and compare the “new” conductivity with the “old” conductivity. If those values differ, an instrument setup calibration is needed. The calibration is also done when a new probe is installed, to test a suspect probe, when a daily-check reading is out of tolerance, suspicious readings, etc.

Calibration checks are performed each day prior to the first use of the meter and after last use of the meter for parameters that are being measured. If a sample’s values seem out of range, check the standards again. If needed, recalibrate the meter.

2.3. Interferences: Temperature, probe not rinsed thoroughly, not waiting for meter to stabilize, contaminated standards.

2.4. Definitions:

2.4.1. ATC: Automatic temperature compensation

2.4.2. NIST: National Institute of Standards and Technology

3. EQUIPMENT AND SUPPLIES

3.1. Fisherbrand™ Traceable™ Bench Conductivity Meter

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3.2. Conductivity Probe

3.3. 30 mL disposable plastic cups

3.4. Waste beaker

3.5. Rinse water beaker

3.6. Digital Thermometer (Calibrate per SOP TA-06.13)

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

3.8. *Bioassay bench sheets* logbooks (when applicable)

3.9. *Organism log-in bench sheets* logbook (when applicable)

3.10. *Bioassay Sample Log-in* logbook (when applicable)

3.11. *Instrument maintenance* logbook (when applicable)

4. REAGENTS AND STANDARDS

4.1. Deionized (DI) Water with 500 mL wash bottle

4.2. Conductivity Standards:

4.2.1. Low- ~100 µmhos-cm

4.2.2. Medium- ~1,000 µmhos-cm

4.2.3. High- ~10,000 µmhos-cm

4.2.4. Daily calibration standard- 1,413 µmhos-cm (NIST 1,000 µmhos-cm can be used).

4.2.4.1. Actual values will vary

4.2.4.2. A 100 mmhos-cm standard may be useful for extremely high conductivity samples (>50 mmhos)

4.2.4.3. NIST traceable standards are purchased from Fisher Scientific

4.3. Salinity Standard, 35 ppth (This can be used as an ~53,000 µmhos-cm conductivity standard)

5. SAMPLE COLLECTION, PRESERVATION AND HANDLING

5.1. See SOP FS 1000 for sample collection and preservation.

6. INITIAL SET-UP AND CALIBRATION

6.1. Connect the probe by placing the connector plug into the keyed socket located on the back of the unit labelled “Conductivity Cell”.

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6.2. Plug the AC power connector into the socket located at the back of the unit and plug the adapter into a proper AC Power Source. (A 9-volt alkaline battery can be use instead.)

6.3. Turn the Meter on using the ON/OFF toggle switch located on the back of the meter.

6.3.1. Be sure the “Platinizing” switch is set to the “OFF” position.

6.4. Select “Conductivity” or “Salinity” by pressing the “MODE” button on the meter.

6.5. Before calibrating the meter, be sure to clear all previous calibration data.

6.5.1. To clear previous calibration data, press the “CHECK” key. “CHK” will appear in the top right corner of the screen.

6.5.2. Press and hold the “ENTER” key for 10 seconds. “0” will be displayed to the far left of the display to indicate that the calibration data has been cleared.

6.5.3. Release the “ENTER” key to return to the measurement mode.

6.6. Insert the probe into a known solution.

6.7. Press the “MODE” key until “conductivity” is selected.

6.8. Press the arrow keys to adjust the value on the display to the value of the known solution. (“CAL” will flash on the display.)

6.9. When the correct value is displayed, press the “ENTER” key to enter the value as a calibration point.

6.10. Repeat the previous 4 steps for additional calibration points. (Up to 4 calibration points can be saved.)

6.10.1. NOTE: Once a calibration has been made in the desired mode, you are not able to calibrate in any other measurement mode or change the cell constant until you have cleared the calibration data.

6.11. To review calibration data, press the “CHECK” key once. “CHK” will appear on the display in an alternating readout. The display will first show the calibration number and then the solution calibration value.

6.11.1. To ensure a calibrated meter is properly reading salinity, pour the 35 ppth salinity standard into an empty, disposable plastic cup. Press the “MODE” key until “salinity” is selected and rinse the probe thoroughly before checking. The meter should read 35±2 ppth. If the salinity reading fails, the conductivity must be recalibrated again using all 3 standards.

6.12. After calibration is complete, perform a calibration check using the acceptance criteria given in 10.1 below.

7. DAILY CALIBRATION CHECK

7.1. Meter should be turned on and calibration check (ie. Verification) should be conducted before measuring sample values.

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7.2. Pour ~25 mL of each of the calibration standards (1413 µmhos-cm or ~1000 µmhos-cm standard, the low conductivity standard, and the high conductivity standard) into separately labeled 30 mL plastic cups.

7.3. Press the "MODE" key until Conductivity is selected. Remove the probe from the storage bottle, rinse with DI water and shake off the excess water.

7.4. Immerse the probe into the lowest conductivity standard and swirl the probe until the meter stabilizes. Record the value in LIMS/Laboratory/Technical/Laboratory Logbook/TOX_COND_SAL. Take and record the temperature of the medium "Calibration" standard (~1000 umhos) in the comment section of the same LIMS entry.

7.5. Repeat the previous step for each conductivity standard to be measured. Rinse the probe with DI Water and return the probe to the storage bottle.

7.5.1. If salinity is also being measured, pour 25 mL of the salinity standard into a 30 mL plastic cup. Switch the mode to salinity and place probe in the solution. Record value in LIMS/Laboratory/Technical/Laboratory Logbook/TOX_COND_SAL.

7.6. After all measurements have been taken on a given day, measure the conductivity of the calibration standard (1413 or ~1000 µmhos-cm standard) and record it in LIMS/TOX_COND_SAL.

7.7. After the Calibration Standard has been checked, rinse the probe with DI water and return it to the storage bottle.

8. DAILY MEASUREMENTS

8.1. Ensure the meter is in the correct mode.

8.1.1. Press the "MODE" button until the meter is in the appropriate mode.

8.1.1.1. Salinity can also be determined by conversion by going to https://www.hamzasreef.com/Contents/Calculators/SalinityConversion.php. Conductivity and Temperature values are needed for conversion.

8.2. Remove the conductivity probe from the storage bottle. Rinse with DI water and shake off the excess water.

8.2.1. The conductivity probe is also used to measure Salinity.

8.3. Immerse the probe in the solution and swirl until the reading value stabilizes. Avoid touching the sides and the bottom of the cup. When the reading stabilizes, record the measurement in LIMS/TOX_COND_SAL and/or the appropriate logbook. Remove the probe from the sample and rinse with DI water.

8.4. Repeat the steps above until all samples have been read.

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8.4.1. Measure one sample at a time. Rinse the probe between measurements with deionized water.

8.4.1.1. It is suggested that conductivity be measured before pH is measured in any sample due to possible leaking of fill solution from the pH electrode into the sample.

8.5. When the last sample is measured and recorded, remove the probe from the sample, rinse with DI water and return to the appropriate storage bottle.

9. DATA ARCHIVAL

9.1. Use a black, waterproof pen for all bench sheets and logbooks.

9.2. FDEP Laboratory Information Management System (LIMS)

9.3. Record information in appropriate logbooks (*Bioassay bench sheets* logbooks, *Organism log-in bench sheets* logbook or *Bioassay Sample Log-in* logbook).

9.4. To correct raw data entries, place a single line through the incorrect or illegible entry. Write the corrected entry near the error, date and initial the correction. Do not overwrite entries.

9.4.1. The corrected entry is written as near as possible to the error or in the comment box on the appropriate bench sheet.

9.4.2. If the correction requires an explanation, write a comment and reference the error. Initial and date the explanation. Do not attempt to put all information (correction and comments) into a small space.

9.4.3. Use sequential alphabetical annotation to identify errors and corresponding comments (use A for first error and use A for corresponding explanatory comment; use B for second error, etc.).

10. QUALITY CONTROL

10.1. During the daily conductivity calibration check, if the value obtained from any of the conductivity standards is not within ±5% of the listed value, the calibration check should be repeated. If a value still is not within ±5% of the listed value, then an initial calibration procedure should be performed. The additional daily calibration must be recorded in LIMS/TOX_COND_SAL. If the problem is not resolved, notify the toxicity lab coordinator.

10.2. Samples, standards and controls should be warmed to near 25°C before being poured into their cups for measurement.

10.3. Sample parameters are read from lowest value to highest value to minimize the potential for contamination. (Probe is rinsed with deionized water between measurements).

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10.4. If a problem occurs during the sample processing or testing, the following steps are performed:

10.4.1. Lab coordinator is notified.

10.4.2. Client is notified (client make decision for additional testing).

10.4.3. Section administrator is notified.

10.4.4. A non-conformance report (NCR) is submitted describing the problem and the corrective action.

10.4.4.1. To create an NCR: open LIMS and go to Laboratory/Administrative/Non-Conformance Report

10.5. Refer to the FDEP Laboratory Quality Manual for corrective action and handling out-of-control data.

10.6. Proper laboratory protection, including lab hood or ventilation system, lab coat, gloves, and safety glasses, is required when working with chemicals and unprocessed samples.

11. SAFETY/HAZARDOUS WASTE MANAGEMENT

11.1. Proper laboratory protection, including lab hood or ventilation system, lab coat, gloves and safety glasses, is required when working with chemicals and unprocessed samples.

11.2. Refer to the Laboratory Quality Manual for sample disposal.

11.3. Refer to the Laboratory Health and Safety Manual and Hazardous Waste Management.

11.4. Read MSDS information for reagent handling and disposal.

12. REFERENCES

12.1. Laboratory Quality Manual

12.2. Laboratory Health and Safety Manual

12.3. Fisherbrand™ Traceable™ Bench Conductivity Meter Operating Instructions

12.4. MSDS Information Sheets

12.5. DEP SOP TA-06.13 Thermometer Accuracy Check and Use

12.6. DEP SOP FS 1000 General Sampling

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APPENDIX OF CHANGES

08/31/2020	Updated equipment section. Emphasized use of LIMS in place of the conductivity/salinity logbook.
08/24/2021	Reviewed SOP for grammar and accuracy.
09/01/2022	Deleted irrelevant information, reworded for clarity, and updated links.
09/05/2023	Updated links, added references 12.5 and 12.6, and reviewed for grammatical errors.

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