



**Standard Operating Procedure
SM012
(Issue 1)**

Calibration of an Aanderaa Optode

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Issue and Validation

Production summary

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Seen by QA		
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Calibration of an Aanderaa Optode

: Issue (1)

1 Introduction

Effective marine monitoring is vital for the accurate assessment of environmental change. In response, Cefas has developed SmartBuoy: a cost effective, high frequency, multi-parameter data acquisition platform. SmartBuoy's instrument package includes an Aanderaa optode which makes measurements of oxygen concentration.

2 Scope

This SOP describes the procedure for changing the foil on and calibrating the Aanderaa optode.

3 Training (Identify any specific training linked to the SOP)

This procedure may only be carried out by staff who have received training in this SOP and are familiar with creating and maintaining sensor records on the SmartBuoy user interface. Training records must be maintained and archived accordingly.

4 Safety Precautions

Before performing this procedure staff should have read and understood the following COSHH & risk assessments.

4.1 COSHH

New COSHH for preparation of 1% sodium sulphite solution (MPM-MAS-MOS-COSHH-106 Calibrating Optode (080724))

4.2 Risk Assessments

5 References/Associated documents

The operator should refer to the TD 218 Aanderaa Optode operating manual (kept in 046) for further details.

6 Equipment /Apparatus

1. Laptop with oxyview.exe loaded
2. Optode comms/power cable
3. Aanderaa optode for calibration
4. Spare Aanderaa optode sensing foils
5. Access to laboratory compressed air
6. Orange thin walled tubing to fit onto compressed air tap
7. Blue 1ml pipette tip
8. 1 litre glass beaker
9. volumetric flask
10. Access to barometer in electronics calibration laboratory

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11. Access to the SmartBuoy user interface

7 Ingredients/Reagents/Media

1. Sodium sulphite
2. Ultra pure water
3. Tap water

8 Procedure**24 hours before calibration:**

1. Fill a 5 litre glass beaker with tap water
2. Fit a 1 ml pipette tip into one end of the orange tubing
3. Fit other end of orange tubing to compressed air tap.
4. Place pipette tip at the surface of the water in the beaker NOTE: it is important that the pipette tip is at the surface; if too low in the water it may increase chance of creating a super-saturated solution
5. Open tap to allow minimum flow of air into beaker. Bubble rate should be approximately 3 bubbles per second. Allow water to aerate for 24 hours.
6. Inspect the sensing foil fitted to the optode for any damage. If the existing foil is damaged, replace with a new foil. Make a note of the batch number of the new sensing foil which is used. Locate the calibration certificate for the old and new sensing foils (if new foil has been fitted) in the box file kept in 046. **NOTE: it is very important to note down the batch number of the foil used. Each batch of foils has unique calibration coefficients which are stored on the optode. If these are not updated on the optode when a new foil is fitted, incorrect data will be obtained which can not be corrected post-deployment.**
7. Open the sensor record for the optode on the SmartBuoy user interface. Select the "additional comments" tab. The record of the foil batch numbers will appear at the top of the tab. Check the batch number of the old foil and enter details of the new foil number. If the record of the foil batch number is unclear, the details can be verified on the optode by following steps 12 to 15.
8. Stand the optode in The beaker prepared in step 1-5. Allow to stand for 24 hours to enable the foil to hydrate.

Preparation of zero oxygen solution:

Note: all weighing out of chemicals must be carried out in a weighing hood. All subsequent making up of solutions must be carried out in a fume cupboard.

Preparation of 1% sodium sulphite solution

9. Weigh out 5 g of sodium sulphite in a weighing boat. (Kept in cupboard in rm 155a.
10. Transfer into a 500ml volumetric flask and make up to volume with UPW.

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Calibration of optode:

11. Find the barometric pressure from a website such as <http://news.bbc.co.uk/weather/forecast/>
12. Connect the comms/power cable to the serial port on the laptop and connect other end to the Aanderaa optode
13. Open the oxyview programme on the laptop
14. Select "tools" then "run commands" from the drop down menu. This will open the "command dialogue" window.
15. Select "Get_all" under the command drop down menu then "send". All the coefficients which are stored on the optode will be displayed on the bottom right hand of the screen. This includes the foil batch number and the coefficients c0, c1, c2, c3 and c4.
16. Select "set" under the command drop down menu then "output" under sub-command/property. Enter "0" in the box under "Element 1" and press "Send". This will set the output type from the optode to RS232. Select "close dialogue box" to close the window.
17. Select DAQ settings from the drop down menu then Sample interval. Enter the sample interval of 1 second and select OK.
18. Select "tools" then "calibrate" from the drop down menu. This will open the 2 point calibration window. Select "next" to start the procedure.
19. The foil calibration coefficients which are stored on the optode will appear on the next screen. These will need to be changed if a foil from a different batch was fitted to the optode. If required, enter the new values for each of the coefficients from the calibration certificate for the new foil. Select "next".
20. Enter the ambient air pressure ascertained in step 11. Select "next".
21. Allow the readings of oxygen concentration and temperature to stabilise for several minutes. Oxygen saturation should be stable within +/- 0.1%. (the readings will appear in the bottom left screen every 10 seconds) then select "next". The optode will store calibration data for several seconds.
22. Place the optode in a 250 ml beaker containing the sodium sulphite solution as prompted by the next screen.
23. Allow the readings of oxygen concentration and temperature to stabilise for several minutes. Oxygen saturation should be stable within +/- 0.05% (the readings will appear in the bottom left screen every 10 seconds) then select "next". The optode will store calibration data for several seconds.
24. The next screen will prompt you to enter the salinity the optode will be deployed at. Enter zero in the box and select "next".
25. Select "finish" to exit the calibration routine.
26. Rinse the optode and return it to the beaker of aerated water. Check that the oxygen percentage reading reaches 100%. (This may take some time)
27. Select "tools" then "run commands" from the drop down menu. This will open the "command dialogue" window.
28. Select "set" under the command drop down menu then "output" under sub-command/property. Enter "100" in the box under

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“Element 1” and press “Send”. This will set the output type from the optode to RS232 with all text removed. Select “close dialogue box” to close the window.

29. Select DAQ settings from the drop down menu then Sample interval. Enter the sample interval of 0 seconds and select OK.
30. Record the calibration on Smartbuoy database. Open the sensor record for the optode on the SmartBuoy user interface. Select the “additional comments” tab. Add the date of the calibration. Select the “parameters” tab. Click on Oxygen concentration then click calibration. Click ‘change calibration’ then ‘ok’. Click ‘apply’. The new detail will be added to the sensor record.

9 Review

This procedure will be reviewed as a minimum on the time scales given in the review / amendment programme. A record of the review will be made on a separate Review / Amendment Sheet which will be added to the Master Copy file of this SOP. Any amendments arising from such review or from operating requirements will result in the issue of the entire amended procedure as a new Issue.

10 Records

This procedure, its review sheets and its subsequent revisions constitute records in themselves and each master copy will be retained in a file as arranged by the Quality Manager. Records will be retained for a minimum of five years unless otherwise specified.

(List specific record sheets/books)