



# Care of Biogeochemical Sensors

Sea-Bird Scientific University 26



## Overview

**Care of Biogeochemical Sensors**

This module covers the following:

- Care of Oxygen Sensors in the field
  - Freezing and shock
  - Cleaning and removing the plenum
- Storage of Oxygen Sensors after recovery

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## Care of Oxygen Sensors in the Field



### Care of Oxygen Sensors in the Field

- Oxygen sensors measure flux of oxygen across a Teflon membrane
- Measurement is sensitive to membrane permeability
- Membrane permeability is decreased by oil or bacterial coating
- SBE 43 does not have a field replaceable membrane
  - Cleaning of sensor used to restore performance

## Care of Oxygen Sensors in the Field (*continued*)



### Care of SBE 43 Oxygen Sensors in the Field

- Oxygen sensitivity may be **maintained** by briefly rinsing the sensor with 0.1% Triton X, and then rinsing thoroughly with distilled water
- Oxygen sensitivity may be **restored** by:
  1. Briefly (1 minute) rinsing with 0.1% Triton X,
  2. Rinsing thoroughly (5 minutes) with distilled water,
  3. Soaking (1 minute) in dilute chlorine bleach,
  4. Rinsing thoroughly (5 minutes) in distilled water.

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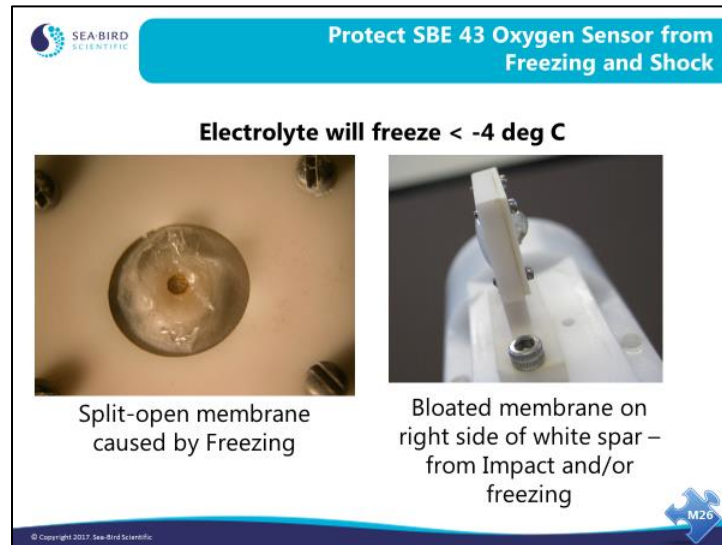


In the past, we recommended using Triton X-100 for the combined purpose of degreasing and discouraging biological growth. We recently discovered that prolonged exposure of Triton X-100 to the sensor membrane is harmful and causes the sensor's calibration to drift. Our present recommendation is to continue to use Triton X-100 for degreasing (with a short wash), and to use a short wash with a dilute chlorine bleach solution to reduce biological growth.

- Avoid fouling the membrane with oil or grease as this directly affects (reduces) sensor output.
- **Preventive Field Maintenance between Profiles:** After each cast, flush with a 0.1% solution of Triton X-100, using a 60 cc syringe, then rinse thoroughly with fresh water. Between casts, ensure that the membrane remains shaded from direct sunlight and stays cool and humidified.
- **Routine (post-cruise) Cleaning (no visible deposits or marine growths on sensor):**
  1. Soak the sensor for 1 minute in a 50:1 solution of bleach (50 parts de-ionized water to 1 part chlorine bleach). After the soak, drain and flush with warm (not hot) fresh water for 5 minutes.
  2. Soak the sensor for 1 minute in a 1% solution of Triton X-100 warmed to 30 °C. After the soak, drain and flush with warm (not hot) fresh water for 5 minutes.
- **Cleaning severely fouled sensors (visible deposits or marine growths on sensor):** Repeat the *Routine Cleaning* procedure up to 5 times.
- **Long-Term Storage (after field use): Do not fill the tubing with water, Triton solution, or Bleach solution.**
  - If there is no danger of freezing, loop tubing from inlet to outlet. Place a small piece of clean sponge, *slightly dampened* with fresh, clean water, in the center of the tubing (not near the membrane).
  - **If there is danger of freezing, shake all excess water out of the plenum and loop tubing from inlet to outlet, leaving the sensor membrane dry.**
  - To minimize drift during storage, connect 1 end of the tubing loop to the plenum, displace the air in the plenum and tubing with Nitrogen gas, and connect the other end of the tubing to the plenum.


See **Application Note 64** on our website for complete details on cleaning and maintenance.

## Care of Oxygen Sensors in the Field (*continued*)






In both of these examples, the sensor was left on the deck of a boat when it froze outside overnight. The photo on the left showed 0 volts output from the CTD data outputs. The photo on the right showed some reasonable data near the surface, but the data became clearly unreasonable under pressure. The membranes and electrolyte solution had to be replaced on both sensors.

## Cleaning Dissolved Oxygen Sensors in the Field




### SBE 43 Dissolved Oxygen Field Care


- If plenum is filled with mud, oil, sand, or instrument has been moored, might need to remove plenum for cleaning



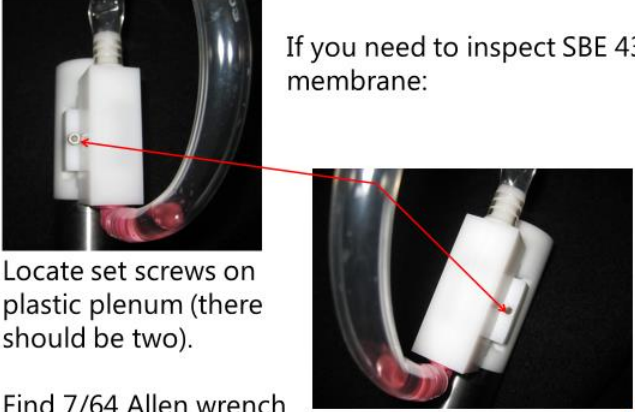
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## Cleaning Dissolved Oxygen Sensors in the Field (*continued*)

 **Removing Plenum on SBE 43**

If you need to inspect SBE 43 membrane:




Locate set screws on plastic plenum (there should be two).


Find 7/64 Allen wrench

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## Cleaning Dissolved Oxygen Sensors in the Field (*continued*)

 **Removing Plenum on SBE 43**



Remove both set screws  
with Allen wrench

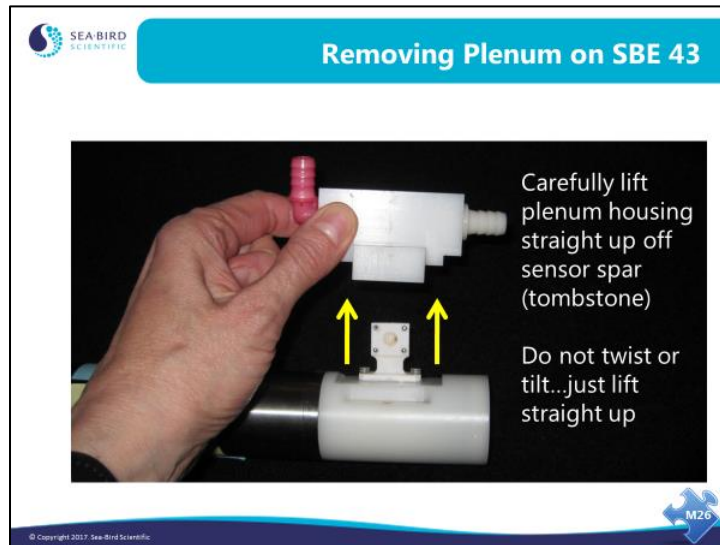
Put screws in a safe place

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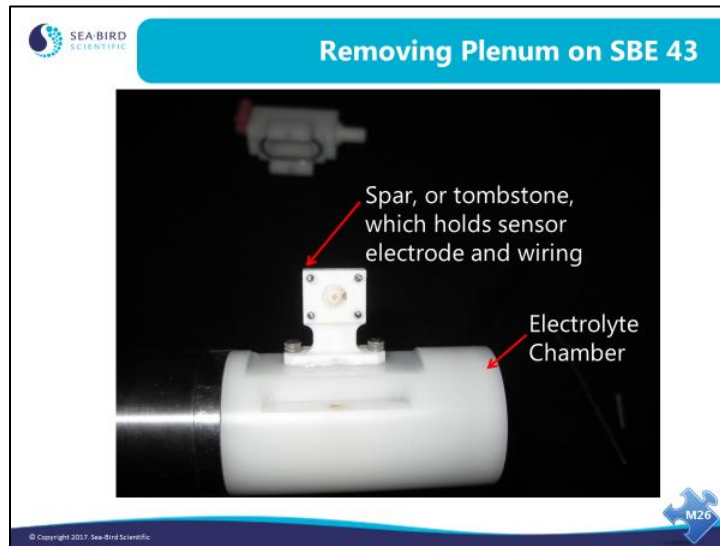
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## Cleaning Dissolved Oxygen Sensors in the Field (*continued*)



## Cleaning Dissolved Oxygen Sensors in the Field (*continued*)



## Cleaning Dissolved Oxygen Sensors in the Field (*continued*)

 **Removing Plenum on SBE 43**

Lay plenum down. You will see an O-ring and interior housing that holds DO sensor when it is put together.



Inspect sensor face.  
Do not handle membrane.  
Light rinse with DI is OK.  
**DO NOT TOUCH MEMBRANE. DO NOT WIPE MEMBRANE.**






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## Dissolved Oxygen Sensor Storage




**Storing Sensors**


- Oxygen sensor storage between retrieval and calibration:
  - If stored with seawater, further bio-fouling may occur
  - Because electrode is polarized, sensor will drift in storage
  - Short-term (< 1 day): place small, water-saturated sponge or piece of foam in a Tygon tube looped from inlet to outlet
  - Long-term (> 1 day): store dry, with Tygon tube looped from inlet to outlet



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## Dissolved Oxygen Sensor Storage

 **Storing SBE 43 Oxygen Sensors**



- Dissolved Oxygen best with moist sponge instead of water

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