Optical Dissolved Oxygen Sensor

SBE 63

SUMMARY

- Initial Accuracy: larger of ± 3 µmol/kg (equivalent to 0.07 ml/L or 0.1 mg/L) or ± 2% ,
  Resolution: 0.2 µmol/kg,
  Sample-Based Drift: < 1 µmol/kg/100,000 samples (20 °C),
  Response Time (τ, 63% response): < 6 sec (20 °C),
  Measurement Range: 120% of surface saturation in all natural waters (fresh and salt)
- Sampling speed: 1 Hz
- Output signal: RS-232, 600-115,200 baud (user-selectable), 8 data bits, no parity, 1 stop
- Input power: 6 - 24 VDC; 35 mA (0.08 J/sample)
- Each sensor fully and individually calibrated
  (valid for 0 - 450 µmol/kg oxygen, 0 - 30 °C, 0 - 35 psu, 0 - 2000 dbars)
- For use in CTD pumped flow path, optimizing correlation with CTD measurements
- Configurations:
  - With optional sensor mount for use on CTD RS-232 auxiliary sensor channel, or
  - Integrated with SBE 37 MicroCAT CTD, Sea-Bird Navis float CTD, or other Argo float CTD
- Depth rating 600 or 7000 meters
- Five-year limited warranty

SBE 63 sensor (titanium housing; plastic housing to 600 m also available)

SBE 63 on Navis (Argo) float CTD

DESCRIPTION

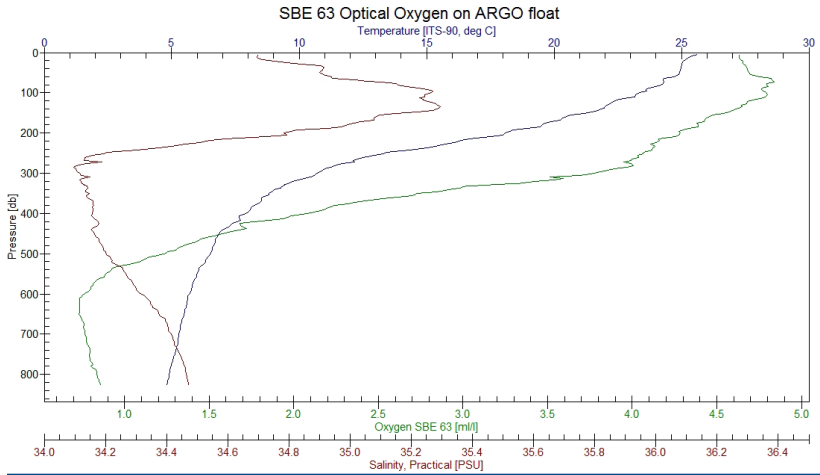
Due to increasing science demands, Sea-Bird developed an individually calibrated, high-accuracy, optical oxygen sensor to assist in critical hypoxia and ocean stoichiometric oxygen chemistry research. With this new sensor, a myriad of moored and float-based platforms can contribute significantly in these driving areas of importance. The SBE 63 sets the oxygen measurement standard for oceanographic research. Careful choices of materials and geometry are combined with superior electronics and calibration methodology to yield significant gains in performance.

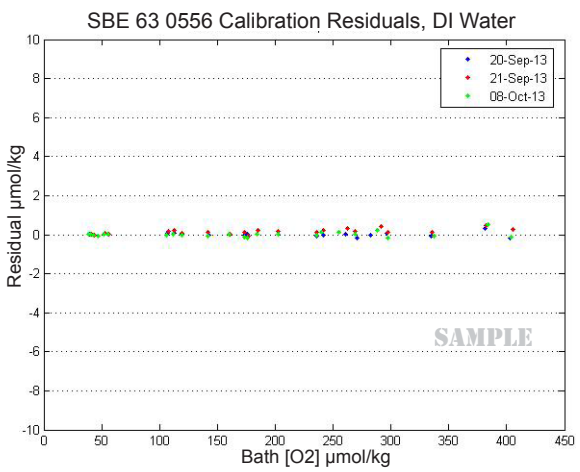
Each SBE 63 is calibrated individually in a temperature-controlled bath. Bath temperatures are varied at each of 4 oxygen values, providing a comprehensive 24-point calibration. Two reference sensors in each bath are standardized against Winkler titrations. Response time tests are conducted on each sensor, using gas. Salinity and pressure impacts on sensor response are each checked at two separate points.

The SBE 63 is designed for use in a CTD's pumped flow path, providing optimum correlation with CTD measurements. The elapsed time between the CTD and associated oxygen measurement is easily quantified, and corrected for in post-processing. The plumbing's black tubing blocks light, reducing in-situ algal growth.

CONFIGURATION OPTIONS

- SBE 63's optional sensor mount plugs into the RS-232 auxiliary sensor connector of the SBE 16*plus* V2, 16*plus*-IM V2, or 19*plus* V2 SeaCAT CTD. Configuration choices include SBE 63 with 600-meter plastic or 7000-meter titanium housing; SBE 63 sensor mount rated to 5000 or 7000 meters, with XSG or wet-pluggable MCBH connector.
- SBE 63 with a 600-meter plastic or 7000-meter titanium housing is integrated into an SBE 37 MicroCAT (IMP-ODO, SMP-ODO, or SIP-ODO).
- On a Sea-Bird Navis float CTD or other Argo float CTD, the SBE 63 with 7000-meter titanium housing is physically integrated with the CTD. Electronic operation of the SBE 63 requires an RS-232 interface in the Argo float controller; this interface is included in the Navis float.





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SENSOR CHARACTERIZATION

The SBE 63's luminescence decay time decreases non-linearly with increasing oxygen concentration. Because the phase delay between excited and emitted signals is shifted as a function of the ambient oxygen concentration, the phase delay is detected instead of the decay time. The signal is characterized by a modified Stern-Volmer equation as follows:

$$O_2\ (ml/L) = [\ \{\ (a_0 + a_1T + a_2V^2)\ /\ (b_0 + b_1V) - 1\ \}\ /\ K_{sv}\ ]\ [\ S_{Corr}\ ]\ [\ P_{Corr}\ ]$$

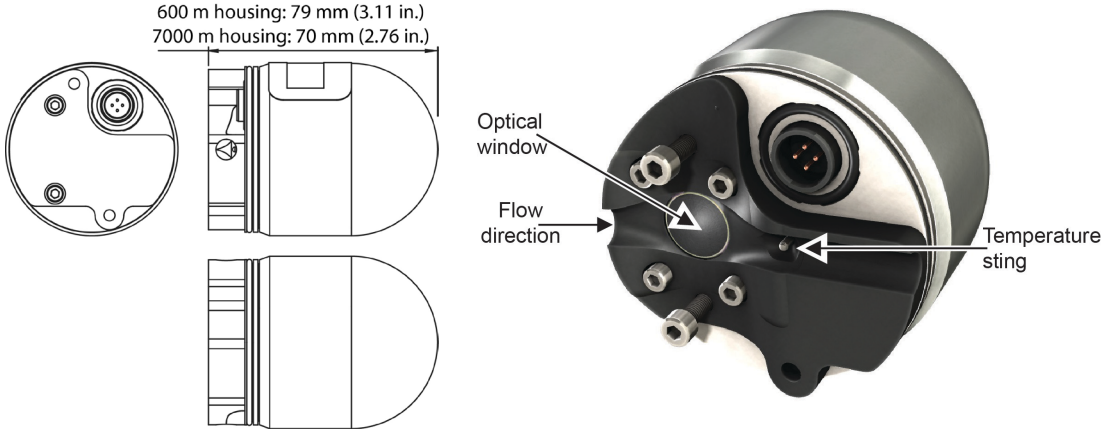
where

O_2 is oxygen concentration (ml/L)
T is temperature output from SBE 63's thermistor in °C
V is raw measured phase delay in volts = φr / 39.457071
φ_r is raw measured phase delay in µsec
a_0, a_1, a_2, b_0, b_1 are calibration coefficients (Uchida et al, 2008)
K_{sv} is Stern-Volmer constant (with calibration coefficients c_0, c_1, c_2) (Demas et al, 1999)
S_{Corr} is salinity correction function (with calibration coefficients Sol_{B0}, Sol_{B1}, Sol_{B2}, Sol_{B3}, Sol_{C0})
P_{Corr} is pressure correction function (with calibration coefficient E)

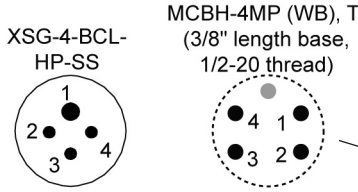
WEIGHTS AND DIMENSIONS

SBE 63 sensor (weight in air):	600-m Plastic housing - 245 g	7000-m Titanium housing - 270 g
Optional sensor mount for SeaCAT (weight in air):	5000-m Plastic mount - 190 g	7000-m Titanium mount - 545 g

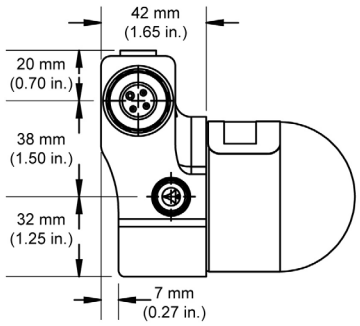
SBE 63 sensor for integration with SBE 37 ODO MicroCAT, or CTD for Navis and other Argo floats

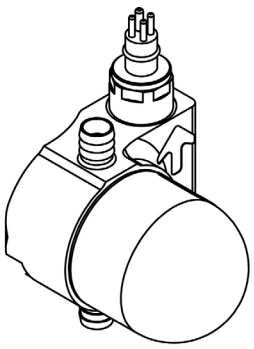


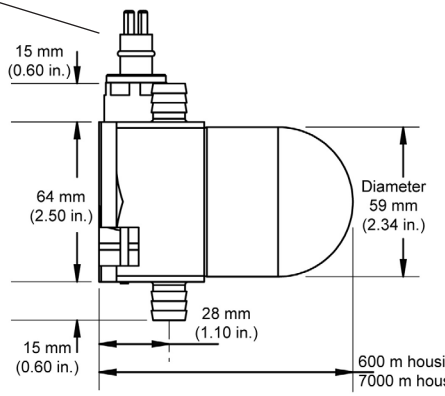
SBE 63 sensor installed in sensor mount for use with RS-232 auxiliary sensor channel on CTD

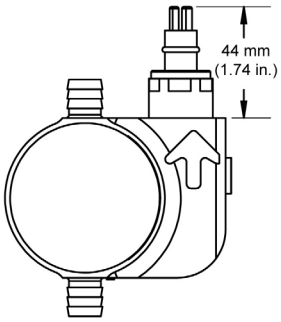


Pin	Description
1	Ground
2	RS-232 Receive
3	RS-232 Transmit
4	Power (6 - 24 VDC)









Note: Sensor mount is rated to 5000 m (plastic version) or 7000 m (titanium version); dimensions are identical.

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