



Sea-Bird Electronics, Inc.  
1808 136th Place NE  
Bellevue, WA 98005  
USA

Phone: (425) 643-9866  
Fax: (425) 643-9954  
E-mail: seabird@seabird.com  
Web: www.seabird.com

## APPLICATION NOTE NO. 19

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### **SBE 27 or 30 Oxidation Reduction Potential (ORP) Sensor**

The SBE 27 and 30 include a Sea-Bird pH sensor to which a platinum electrode has been added. The electrode potential (in water) is measured differentially with respect to the pH sensor's silver-silver chloride reference junction. This differential voltage is offset and scaled to provide a high-level, ground-referenced, 0-to-5 Volt output.

**Note:** For proper operation, remove the pH soaker bottle and immerse the pH electrode, platinum electrode (near the base of the pH electrode shield), and at least part of the SBE 30 aluminum housing in the water.

#### **ORP Calibration and Use of Sea-Bird Software**

To calibrate the ORP electronics, Sea-Bird places a short-circuit between the internal wire connecting to the platinum electrode and signal ground; the measured output is the value of *B* required in the CTD configuration (.con) file. Next, we apply 1.000 Volts to the electrode and record the *change* in output. The .con file *M* entry is 1 volt/*change*. The electrical components upon which the gain and offset depend are extremely stable, and no subsequent calibrations should be necessary.

Select Oxidation Reduction Potential as a voltage sensor when setting up the configuration (.con) file in Sea-Bird software. The CTD configuration (.con) file is edited using the Configure menu (in SEASAVE or SBE Data Processing in our SEASOFT-Win32 suite of programs) or the Configure Inputs menu in SEASAVE V7.

The software prompts for *M*, *B*, and offset, and calculates ORP as:

$$\text{ORP (milliVolts)} = M * (V - B) * 1000.0 + \text{offset (milliVolts)}$$

where:

- *V* = **measured** voltage in Volts (0 to 5V)
- *M* = slope *M* from the ORP calibration sheet
- *B* = offset *B* from the ORP calibration sheet
- offset = **user-supplied** offset in milliVolts; enter 0 unless attempting to compensate for discrepancies between ORP as measured by the SBE 27 or 30 and other instruments.

**Note:** The ORP channel voltage (*V* in the equation above) in the raw data file is the sensor output voltage, not the Oxidation Reduction Potential. You can view and/or plot both the raw voltage (in Volts; 0 to 5 Volts) and the calculated ORP (in milliVolts); do not confuse these.