



## Parameter and Sample Type

Optical Dissolved Oxygen in Seawater

### Introduction

The dissolved oxygen concentration of seawater can indicate the type of life which may be present or if pollution has occurred. Dissolved oxygen levels are also affected by salinity and temperature. The Rugged Dissolved Oxygen (RDO) probe features automatic temperature compensation for the most accurate oxygen measurements. The RDO meter compensates readings for the sample salinity. See Electrode Log 54 Correcting DO Measurement for Salinity for instructions on salinity measurements and corrections.

### Reference

Carpenter, J. "The Accuracy of the Winkler Method for Dissolved Oxygen Analysis". *Limnology and Oceanography*, Vol. 10, No. 1 (Jan., 1965), pp. 135-140.

### Recommended Equipment

5-Star Plus Portable RDO meter (Orion 1213320); RDO Probe (Orion 087010MD); Calibration Sleeve (087003)  
Optional: RS232 computer interface cable (1010053),  
Stainless steel sensor guard (087002)

### Required Solutions

Deionized water (DI)

### Meter Setup

Turn meter on. Move pointer arrow to the DO reading line and set units to mg/L. In Setup mode, set read type to auto, log delete to no (to allow overwrite of the oldest data points), log auto to on, and set the following DO settings: resolution to 0.01 mg/L, salinity correction to manual or automatic\*, barometric pressure to auto, and calibration type to air. \*See Electrode Log 54 for salinity setup details.

### Electrode Setup

See RDO Probe Users Guide for assembly and preparation of the probe. Place the probe into the calibration sleeve (be sure the sponge in the sleeve is moist) and connect to Star Meter. Once assembled, the probe can be used immediately.

### Electrode Performance Check

RDO probe should read between 98 and 102% saturation in the calibration sleeve after calibration. Expect the probe to calibrate within 2 minutes when working properly. Duplicate samples should read within 0.2mg/L of each other. See probe manual if probes do not pass check requirements.

### Electrode Storage, Soaking, and Rinsing

For short term storage, overnight or between measurements, DO probe should be kept in the calibration sleeve or a BOD bottle with water saturated air. For long-term storage, keep the probe in the calibration sleeve. The conductivity probe should be cleaned and stored dry at all times.

### Sample Preservation

Samples cannot be preserved; measure in-situ for best results or immediately following collection.

### Sample Preparation

None required, dissolved oxygen can be measured directly in the sample.

### Calibration

Make sure the arrow is pointing to the DO line in Measure mode. Perform RDO calibration using water-saturated air (calibration sleeve) as the calibration standard. Calibrate the probe; 100.0% sat will be displayed when probe is calibrated.

### Analysis

Enter the salinity factor (previously set to 0000) of the sample or use automatic salinity correction. See Electrode Log 54 for details. Rinse RDO probe with DI water and blot with a lint-free wipe. If measuring below the surface, attach the sensor guard to sink the probe to the desired depth. Water level must be above the thermistor of the electrode. Measure the sample and wait for a stable reading to be displayed. This data will be logged in the meter.

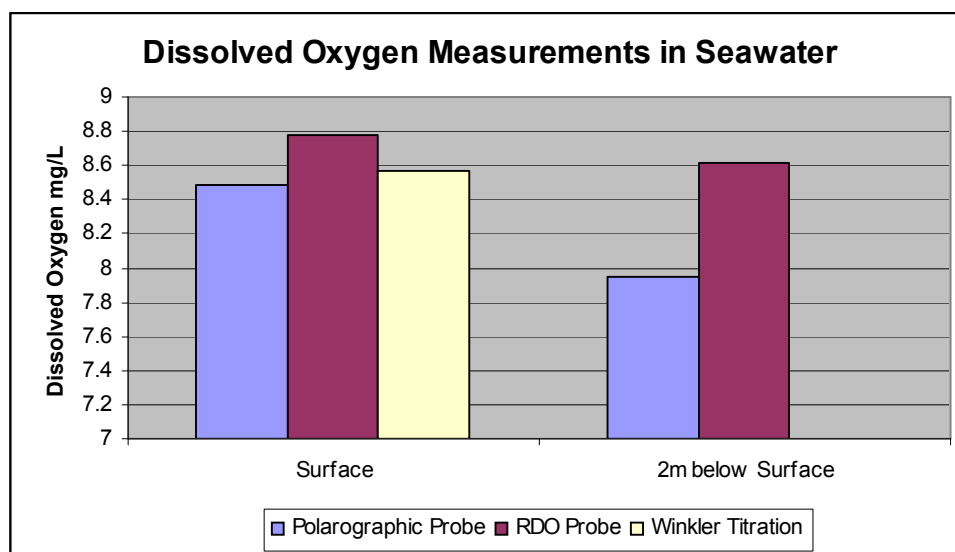
### Quality Control (QC)

Recommended QC procedures include: calibration, check of the thermistor response against a calibrated thermometer, and duplicate samples.



## Dissolved Oxygen Measurements of Seawater

|                     | Surface          |                    |       |              | 2 meters below Surface |                    |       |              |
|---------------------|------------------|--------------------|-------|--------------|------------------------|--------------------|-------|--------------|
|                     | Dissolved Oxygen |                    |       | Temperature  | Dissolved Oxygen       |                    |       | Temperature  |
|                     | Average (mg/L)   | Standard Deviation | % CV  | Average (oC) | Average (mg/L)         | Standard Deviation | % CV  | Average (oC) |
| Polarographic Probe | 8.49             | 0.155              | 1.80% | 12.9         | 7.94*                  | 0.250              | 3.14% | 12.5         |
| RDO Probe           | 8.78             | 0.093              | 1.10% | 13.5         | 8.61                   | 0.096              | 1.12% | 12.8         |
| Winkler Titration   | 8.57             | 0.067              | 0.80% | n/a          | Not Collected          |                    |       |              |



### Notes

The speed, accuracy and precision of the RDO probe is equivalent or superior to current DO measurement techniques. See Electrode Log 57 DO Comparison of Methods for detailed information.

Winkler titration was performed on surface seawater according to Carpenter's Modification of the Winkler Method which is recommended for oxygen in seawater measurements. See reference for details.

It is important to thoroughly clean the probe after sample measurement before placing it back in the calibration sleeve. Salt, dirt and any other particles in the sample that get in the calibration sleeve can cause erroneous readings and calibrations. Rinse with DI water and thoroughly wipe all excess water with a lint free cloth before putting the probe in the calibration sleeve.

When downloading the logs after measurements are made, be sure that the arrow is pointing to the line of interest before downloading the calibration and data logs.

The RDO probe is offered with a variety of cable lengths. See the probe's User Guide for more information.

If salinity of the sample is not known or for more information regarding the salinity factor, refer to Electrode Log 54 Correcting DO Measurement for Salinity.