



Oxygen Optode 4531

The Oxygen Optode 4531 is a compact fully integrated sensor for measuring the O_2 concentration and temperature.

Advantages:

- Optical lifetime-based luminescence quenching measurement principle
- Long time stability with red reference LED
- New more stable and rugged foil
- Low maintenance needs
- Not stirring sensitive(it consumes no oxygen)
- Smart Sensor technology: presenting calibrated data directly
- Stand-alone sensor
- Output format: 4-20mA/0-5V/0-10V and RS-232
- Customized cable length

Since oxygen is involved in most of the biological and chemical processes in aquatic environments and in the process industry, it is one of the most important parameters to be measured. Aanderaa revolutionized oceanographic oxygen monitoring/research with the introduction of oxygen optodes in 2002. Applications range from shallow creeks to the deepest trenches, from tropical to in-ice/in-sediment measurements. More than 150 scientific papers have so far been published using these optodes.

Monitoring the oxygen level is crucial in many applications, e.g. in:

- Industry processes
- Water and waste water systems
- Ship tanks
- Ballast water
- Aquaculture
- Fjords or other areas with limited exchange of water

The Aanderaa Oxygen Optodes are based on the ability of selected substances to act as dynamic fluorescence quenchers. The fluorescent indicator is a special platinum porphyrin complex embedded in a gas permeable foil that is exposed to the surrounding water. A black optical isolation coating protects the complex from sunlight and fluorescent

particles in the water. This sensing foil is mounted on a glass window providing optical sampling from inside a watertight housing. The sensing foil is excited by modulated blue light; the sensor measures the phase of the returned red light. For improved stability the optode also performs a reference phase reading by use of a red LED that do not produce fluorescence in the foil.

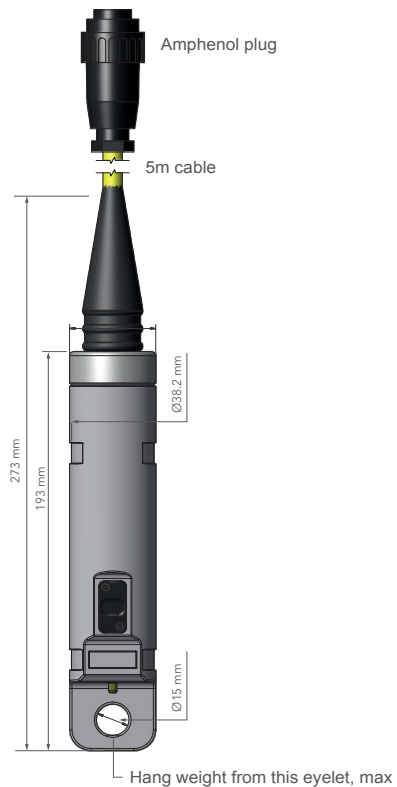
The sensor has an incorporated temperature thermistor which enables linearization and temperature compensation of the phase measurements to provide the absolute O_2 -concentration

The lifetime-based luminescence quenching principle offers the following advantages over electro-chemical sensors:

- Less affected by fouling
- Measures absolute oxygen concentration without repeated calibrations
- Better long-term stability
- Not affected by pressure

The Oxygen Optode outputs data in RS-232 and analog 0-5V, 0-10V or 4-20mA. The sensor can present the O_2 concentration in μM , Air Saturation in % and Temperature in $^{\circ}C$.

Specifications



Available cables	Cable
Cable from sensor to Amphenol plug	5440
8-pin male Subconn plug directly on sensor	5441
Cable from sensor to free end	5442
Cable from sensor to 8-pin male Subconn plug	5443
Cable from sensor to 9-pin Dsub, RS-232	5972

Foil Service Kit 5551. PSt₃



Misleading specifications

When Aanderaa states an absolute accuracy of e.g. ($\pm 5\%$ or $\pm 8 \mu\text{M}$) we mean the accuracy of the sensor in the field over the entire range of oxygen concentrations and temperatures, others might refer to accuracy in the laboratory just after the sensor was calibrated. When Aanderaa give response time in water others refer to response time in air which is much faster. For more information read our Best Practice document on Oxygen Optodes.

Specifications subject to change without prior notice.



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- Oxygen:** O₂ Concentration Air Saturation
- Foil:** Stable and rugged WTW foil
- Operation Range: 0 - 1000 μM ¹⁾ 0 - 300%
- Calibration Range: 0 - 500 μM ¹⁾ 0 - 120%
- Resolution: <0.1 μM 0.05%³⁾
- Accuracy: <8 μM ²⁾ <5%³⁾
- Response Time (63%): <30 sec
- Typical field drift: <0.5% per year
- Temperature:**
- Range: -5 to +30°C (23 - 86°F)
- Resolution: 0.01°C (0.018°F)
- Accuracy: $\pm 0.03^\circ\text{C}$ (0.18°F)⁴⁾
- Response Time (63%): 2 sec
- Output format:**
- 4531A: 0 - 5V, RS-232
- 4531B: 0 - 10V, RS-232
- 4531C: 4 - 20mA, RS-232
- 4531D: RS-232
- Output Parameters:**
- RS-232: O₂ Concentration in μM , Air Saturation in %, Temperature in °C, Oxygen raw data and Temperature raw data
- Analog channel 1: O₂ Concentration in μM , or Air Saturation in %,
- Analog channel 2: Temperature in °C
- Sampling interval:** 2 sec - 255 min
- Supply voltage:**
- RS-232: 5 to 30Vdc
- Analog: 7 to 30Vdc, 12 to 30Vdc for 0-10V
- Current drain:**
- RS-232:
- Average: 0.16 + 48mA/S where S is sampling interval in seconds
- Maximum: 100mA
- Quiescent: 0.16mA
- Analog: 20mA + RS-232 drain
- Operating depth:** 0-100 meters (0 - 328ft)
- Elec. connection:** Amphenol 16C or Subconn 8M
- Dimensions :** Ø38.2 x 193/273mm (Ø1.50 x 7.60/10.75in)
- Weight:** sensor: 160g (5.6oz)
5m cable: 500g (17.6oz)
- Materials:** PA
- Cable:**
- Outer diameter: 9.9 +/- 0.4mm (0.39 +/- 0.016in)
- Min. bending radius: 155mm (6.10in)
- Accessories:** Foil Service Kit 5551
Cable with Amphenol plug 5440
Cable with free end 5442
Cable with Subconn 5443
Bulkhead Subconn 5441
Cable with 9-pin Dsub 5972

¹⁾ O₂ concentration in μM = $\mu\text{mol/l}$. To obtain mg/l, divide by 31.25

²⁾ requires salinity compensation for salinity variations > 1 mS/cm, and pressure compensation for pressure > 100meter

³⁾ within calibrated range 0 - 120% / 0 - 30°C

⁴⁾ within calibrated range 0 - 36°C