



Since oxygen is involved in most of the biological and chemical processes in aquatic environments, it is a crucial parameter to measure. Oxygen can also be used as a tracer in oceanographic studies. 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 Aanderaa optodes.

These sensors are based on the ability of selected substances to act as dynamic fluorescence quenchers. The fluorescent indicator is a special platinumporphyrin complex embedded in a gas permeable foil that is exposed to the surrounding water. This sensing foil is attached to a sapphire window providing optical access to the measuring system 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

Oxygen Optode 4330/4330F

is a compact fully integrated sensor for measuring the O_2 -concentration and temperature.

Fast Response Foil (4330F, refer overleaf)

Advantages:

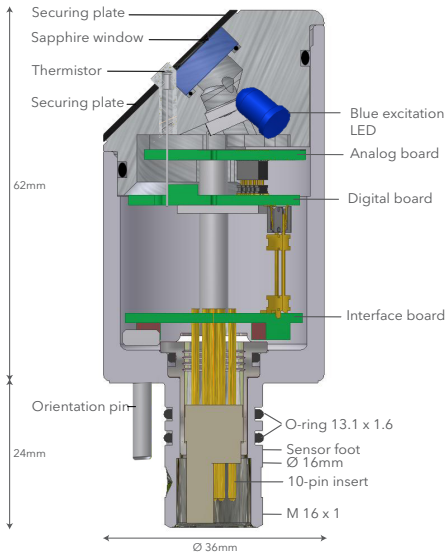
- Optical lifetime-based luminescence quenching measurement principle
- Multipoint calibrated in 40 points
- Long time stability with pre-burned foil and red reference LED
- Low maintenance needs
- Not stirring sensitive (it consumes no oxygen)
- User friendly
- Use with Aanderaa SeaGuard and SmartGuard Platform
- Automatically detected and recognized
- Use as stand-alone sensor
- Output format: CANbus AiCaP, RS232
- Four depth ranges, maximum 12000 meters

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:

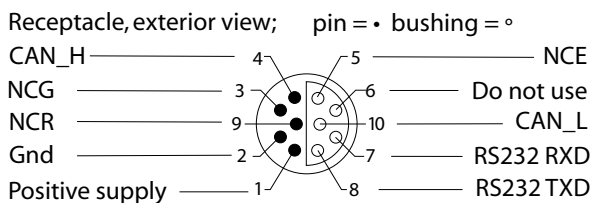
- Less affected by fouling
- Measures absolute oxygen concentration without repeated calibrations
- Excellent long-term stability
- Less affected by pressure
- Pressure behaviour is predictable
- Faster response time

The oxygen optode outputs data in AiCaP CANbus and RS-232. The sensor can present the O_2 concentration in μM , the air saturation in % and the temperature in $^{\circ}C$.

The SeaGuard/SmartGuard datalogger and the Smart Sensor are interfaced by means of a reliable CANbus interface (AiCaP), using XML for plug and play capabilities.



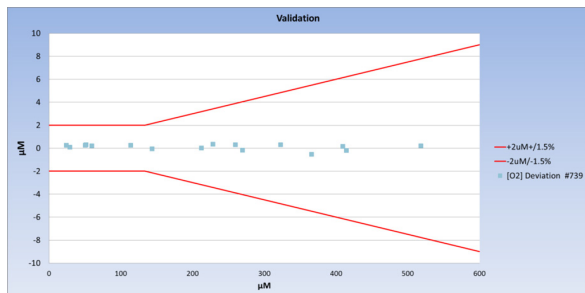
PIN CONFIGURATION



Cable from sensor to:	Cable
PC with waterproof SP (Sealing Plug), RS-232	4865
Seaguard as sixth sensor on top-end plate	4999
Seaguard with waterproof top end plate connection	4793
SmartGuard single sensor with SP	5236
User furnished datalogger, SP to free end	4762

Sensing Foil Considerations

The standard sensing foil is protected by an optical isolation layer which makes the foil extra rugged and insensitive to direct sunlight. The fast response sensing foil is not equipped with this layer; ambient light intensity higher than 15000 lux may cause erroneous readings. To avoid potential bleaching the fast response foil should be protected from ambient light when storing the sensor. We recommend the standard foil in applications where fast response time is not needed.



Typical validation at 20 points after calibration



Visit our Web site for the latest version of this document and more information www.aanderaa.com

- Oxygen:** O₂-Concentration Air Saturation
- Measurement Range:** 0 - 1000 µM¹⁾ 0 - 300%
- Calibration method:** 40-point automatic calibration, 20-point verification, 3 fully Winkler calibrated optodes for referencing
- Foils:** Pre-burned PreSens Pst3 foils
- Calibration Range²⁾:** 0 - 500 µM²⁾ 0 - 150%
- Resolution:** < 0.1 µM 0.05 %⁴⁾
- Accuracy:** < 2 µM or 1.5%³⁾ <1.5 %⁴⁾
- Response Time (63%):** 4330F (with fast response foil) <8 sec
4330 (with standard foil) <25 sec
- Typical field drift:** <0.5 % per year
- Temperature:**
- Range:** -5 to +40°C (23 - 104°F)
- Resolution:** 0.01°C (0.018°F)
- Accuracy:** ±0.03°C (0.18°F)⁵⁾
- Response Time (63%):** <2 sec
- Output format:** AiCaP CANbus, RS-232
- Output Parameters:** O₂-Concentration in µM, air saturation in %, temperature in °C, oxygen raw data and temperature raw data
- Sampling interval:** 2 sec - 255 min
- Supply voltage:** 5 to 14Vdc
- Current drain:**
- Average:** 0.16 +48mA/S where S is sampling interval in seconds
- Maximum:** 100mA
- Quiescent:** 0.16 mA
- Operating depth:** SW: 0-300m (0-984ft)
IW: 0-3000m (0-9,845ft)
DW: 0-6000m (0-19,690ft)
Hadal⁶⁾: 0-12000m (0-39,380ft)
- Elec. connection:** 10-pin receptacle mating plug SP
- Dimensions (WxDxH):** Ø36 x 86 mm (Ø1.4"x 3.4")
- Weight:** 175g (6.17oz)
- Materials:** Epoxy coated Titanium, PA
- Accessories:** Foil Service Kit 4733/47330 (not included): (standard)/4794(fast)
AiCap extension cable with SP 4793
SP to Free End Cable 4762
SP to PC Cable 4865
Setup and Config Cable 3855⁷⁾/3855A⁷⁾

¹⁾ O₂ concentration in µM = µmol/l. To obtain mg/l, divide by 31.25
²⁾ other ranges available on request
³⁾ requires salinity compensation for salinity variations > 1mS/cm, and pressure compensation for pressure > 100meter
⁴⁾ within calibrated range 0 - 120% / 0 - 30°C
⁵⁾ within calibrated range 0 - 30°C
⁶⁾ productnumber 5420
⁷⁾ laboratory use only

Specifications subject to change without prior notice.

Misleading specifications

When Aanderaa states an absolute accuracy of e.g (±1.5% or ±2 µM) 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.

Aanderaa Data Instruments AS
 Sanddalsringen 5b, Postboks 103 Midtun,
 5843 Bergen, Norway
 Tel +47 55 60 48 00
 Fax +47 55 60 48 01