AANDERAA
a xylem brand

Oxygen Optode 4531

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

Advantages:

- Optical lifetime-based luminescence quenching meassurement 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:

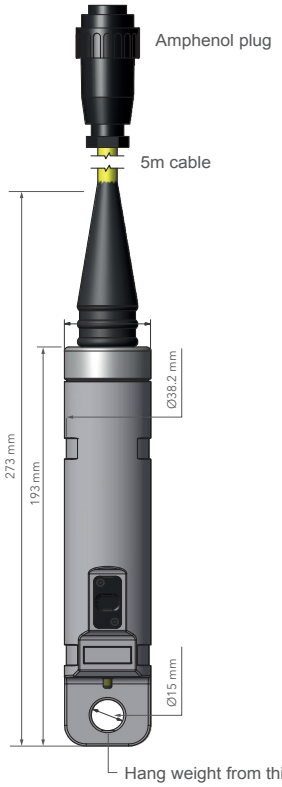
- Industry processes
- Water and waste water systems
- Ship tanks
- Ballast water
- Aquaculture
- Fjords or other areas with limited exchange of water

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 performes 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 °C.



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. PSt$_3$

Misleading specifications

When Aanderaa states an absolute accuracy of e.g (±5% or ±8 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.

Oxygen:	**O_2 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%
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:	±0.03°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:	O_2 Concentration in µM, Air Saturation in %, Temperature in °C, Oxygen raw data and Temperature raw data	
Analog channel 1:	O_2 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 +48 mA/S where S is sampling interval in seconds	
Maximum:	100 mA	
Quiescent:	0.16 mA	
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) O_2 concentration in µM = µmol/l. To obtain mg/l, divide by 31.25
(2) requires salinity compensation for salinity variations > 1mS/cm, and pressure compensation for pressure > 100meter
(3) within calibrated range 0 - 120% / 0 - 30°C
(4) within calibrated range 0 - 36°C

Specifications subject to change without prior notice.

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Let's Solve Water

Visit our Web site for the latest version of this document and more information
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