



## OXYGEN OPTODE 3835 OXYGEN OPTODE/TEMPERATURE SENSOR 4130 OXYGEN OPTODE 4175

- *Optical measurement principle*
- *Long time stability*
- *More than one year without recalibration*
- *Low maintenance*
- *User friendly*
- *Optical measurement principle*
- *Use with AADI Current Meters*
- *Use as stand alone sensor*
- *Output format: SR10, RS232, Analog output (refer specifications)*

Since oxygen is involved in most of the biological and chemical processes in aquatic environments, it is the single most important parameter needing to be measured. Oxygen can also be used as a tracer in oceanographic studies.

For environmental reasons it is critical to monitor oxygen in areas where the supply of oxygen is limited compared to demand e.g.:

- In shallow coastal areas with significant algae blooms
- In Fjords or other areas with limited exchange of water
- Around fish farms
- In areas interesting for dumping of mine or dredging waste

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 attached to a window providing optical

access for the measuring system from inside a watertight titanium housing.

The foil is excited by modulated blue light, and the phase of a returned red light is measured (see illustration overleaf). By linearizing and temperature compensating, with an incorporated temperature sensor, the absolute O<sub>2</sub> concentration can be determined.

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

- Not stirring sensitive (it consumes no oxygen)
- Less affected by fouling
- Measures absolute oxygen concentrations without repeated calibrations
- Better long-term stability
- Less affected by pressure
- Pressure behaviour is predictable
- Faster response time.

The sensor is designed to operate down to 300 meters. It fits directly on to the top end-plate of Recording Current Meter RCM 9, and other Aanderaa instruments.

# Specifications

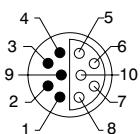
D355 - April 2009

PARAMETER	OXYGEN OPTODE 3835		OXYGEN/TEMPERATURE OPTODE 4130		OXYGEN OPTODE 4175	
	O <sub>2</sub> -Concentration	Air Saturation	O <sub>2</sub> -Concentration	Air Saturation	O <sub>2</sub> -Concentration	Air Saturation
<b>OXYGEN</b>						
<b>Measuring Range:</b>	0 - 500µM <sup>1)</sup>	0 - 120% <sup>2)</sup>	0 - 500µM <sup>1)</sup>	0 - 120% <sup>2)</sup>	0 - 500µM <sup>1)</sup>	0 - 120% <sup>3)</sup>
<b>Resolution:</b>	<1µM	0.4%	<1µM	0.4%	<1µM	0.4%
<b>Accuracy:</b>	<8µM or 5 % <sup>4)</sup> whichever is greater	<5% <sup>4)</sup>	<8µM or 5 % <sup>4)</sup> whichever is greater	<5% <sup>4)</sup>	<8µM or 5 % <sup>4)</sup> whichever is greater	<5% <sup>4)</sup>
<b>Settling Time (63%):</b>	<25s		<25s		<25s	
<b>TEMPERATURE</b>						
<b>Range:</b>	-0°C to +36°C		-7.5°C to +41°C		-0°C to +36°C	
<b>Resolution:</b>	0.01°C		0.05°C		0.01°C (0 - 5V)	0.02°C (4 - 20mA)
<b>Accuracy:</b>	±0.05°C		±0.1°C		±0.1°C (0 - 5V)	±0.15°C (4-20mA)
<b>Settling Time (63%):</b>	<10s		30s		<10s	
<b>Operating Temperature</b>	0 - 40°C (32 - 104°F)		0 - 40°C (32 - 104°F)		0 - 40°C (32 - 104°F)	
<b>Operating Depth:</b>	0 - 300m (984.3ft)		0 - 300m (984.3ft)		0 - 300m (984.3ft)	
<b>Sampling Rate:</b>	SR10: controlled by the datalogger. RS-232: From 1s to 255 minutes		Controlled by the datalogger		From 1s to 255 minutes	
<b>Output Formats:</b>	Aanderaa SR10 <sup>5)</sup> (Only Oxygen) RS-232 <sup>6)</sup>		Aanderaa SR10 <sup>5)</sup> (Oxygen) and VR22 <sup>5)</sup> (Temperature)		0 - 5V outputs: ±0.1% of FS <sup>7)</sup> 4-20mA output: ±0.2% of FS <sup>7)</sup> RS-232 <sup>6)</sup>	
<b>Current Consumption:</b>	SR10: 10mA/T where T is recording interval in minutes RS-232: 80mA/S + 0.3mA where S is recording interval in seconds		10mA/T where T is recording interval in minutes		80mA/S + 0.3mA + I <sub>a</sub> where S is recording interval in seconds and I <sub>a</sub> is quiescent: 5 - 45mA when analog adaptor enabled	
<b>Supply Voltage:</b>	SR10: -6 to -14Vdc RS-232: +5 to +14Vdc		SR10: -6 to -14Vdc		Analogue: +7 to +14Vdc RS-232: +5 to +14Vdc	
<b>Dimensions:</b>	Ø36 x 86mm (Ø1.42 x 3.386in)		Ø40 x 168mm (OD1.575 x 6.61in)		Ø40 x 175.5mm (Ø1.42 x 6.9in)	
<b>Weight:</b>	120g (4.23oz)		385g (13.58oz)		370g (13.05oz)	
<b>Materials:</b>	Titanium, Hostaform (POM)		Titanium, Hostaform (POM)		Titanium, Hostaform (POM)	
<b>Accessories included:</b>	Sensor Cable 3854					
<b>Accessories not included:</b>	Sensor Cable 3855 to PC <sup>8)</sup> Foil Service Kit 3853 PST <sup>9)</sup>		Sensor Cable 3855 to PC <sup>8)</sup> Foil Service Kit 3853 PST <sup>9)</sup>		Sensor Cable 3855 to PC <sup>8)</sup> Foil Service Kit 3853 PST <sup>9)</sup> Cable 3485 with free end	
<b>Warranty:</b>	Two years against faulty material and workmanship (4130, 3835, 4175)					

- 1) O<sub>2</sub> Concentration in mM = mmol/l. To obtain mg/l, divide by 31.25
- 2) The saturation range covered by SR10 is 0-150%, the temperature range covered by SR10 is -5C to 40C
- 3) The saturation range covered by analogue 0-5V and 4-20mA is 0-150%, the temperature range covered is -5C to 40C
- 4) Aanderaa SR10a/VR22 are signal protocols that are used with Aanderaa equipment only
- 5) Valid for salinity 33 - 37ppt

- 6) 9600 Baud, 8 data bits, 1 stop bit, No Parity, Xon/Xoff Handshake
- 7) The accuracy of the Analogue Adaptor in 0 - 5V output mode is specified to 0.1% of FS. Note however that at the end of the scale (<0.0 - 0.07> and <4.93 - 5.0>) the error may be larger
- 8) In order to change settings or calibrating the Optode the Sensor has to be connected to a PC. To gain access to the Optode 4130's RS-232 signals its cylindrical body must be removed, see Operating Manual TD 218

pin = ●, bushing = ○



	3835	4130	4175	When used with Cable 3485	
				Plug	Colour
1: Positive Supply <sup>A), B)</sup>		1: System Ground	1: Positive Supply	8	Green
2: Ground <sup>C)</sup>		2: Not Connected	2: Ground	7	Black
3: -9V <sup>D)</sup>		3: -9V	3: Analogue Output 1	6	White
4: Reserved, Do Not Connect		4: Not Connected	4: Return Ground 1	5	Blue
5: Bridge Voltage (BV)		5: Bridge Voltage (BV)	5: Analogue Output 2	4	Violet
6: Reserved, Do Not Connect		6: SR10 (Oxygen)	6: Return Ground 2	3	Yellow
7: RXD (RS-232)		7: Not Connected	7: RXD (RS232)	2	Brown
8: TXD (RS-232)		8: Bridge Ground	8: TXD (RS232)	1	Grey
9: Control Voltage		9: Control Voltage	9: Not Connected	10	Red
10: SR10 (Oxygen)		10: VR22 (Temperature)	10: Not Connected	9	Orange

Optode Model	3835	4130	4175
<b>Description</b>	Integrally/Direct Mounted	Immersion Body for cable or sensor string	Immersion Body with Analog and Serial Outputs
<b>Output</b>	Dual Channel: RS-232 data string (Oxygen,Temp.) or Single SR10 (Oxygen) channel to RCMs or RDCPs	Dual Channel: SR10 (Oxygen) and VR22 (Temp.)	Dual Channel: 0 - 5V (Oxygen, Temp.) or 4 - 20mA (Oxygen, Temp.) and/or RS-232 (Oxygen, Temp)
<b>Application</b>	Add sensor(s) to Top End-plate of our RCM 9, RDCP 600 or for OEM/Third party use	For use with Aanderaa DL series dataloggers; added sensors to Weather Stations AWS 2700, Data Buoys DB 4280 or our self-contained recording instruments	General Purpose use with third party dataloggers, e.g. CTDs, ARGO floats, ROVs; PLCs, process industry controllers, recorders, data acquisition and control systems.
<b>Sample Rate</b>	Set by host. <a href="#">RCM</a> : continuously* - 120 minute <a href="#">RDCP</a> : 1 minute - 8 hours. Internal interval setting for input to third party RS-232 interface.	Set by host. <a href="#">DL 3960</a> : continuously* - 180 minutes <a href="#">DL 7</a> : 1 minute - 180 minutes <a href="#">DB 4280</a> : continuously* - 180 minutes <a href="#">AWS 2700</a> : continuously* - 180 minutes	
<b>Multi-sensor Configuration</b>	<a href="#">RCM 9</a> : Yes, 2nd 3830/3835 via Cable 3296 and Receptacle 3622R. <a href="#">RDCP 600</a> : 300m version: as for RCM 9	<a href="#">DL 3960</a> : Max 15 sensors, depending on the configuration <a href="#">DL 7</a> : Max 5 sensors <a href="#">DB 4280</a> : Max 15 sensors, depending on the configuration <a href="#">Sensor attachment</a> : single points on cable use 3913; In-line 5-Sensor Disk 3829 <a href="#">RCM/RDCP</a> : contact factory.	
<b>Stand-alone Sensor (0-300m)</b>	Use Cable 3485. Output: RS-232 (Oxygen,Temp.). Sampling Rate: 1 Hz to 255 minutes		User furnished datalogger or controller, Cable 3485 <a href="#">Output</a> : 0 - 5Vdc; 4 - 20mA, dc; or RS-232 (Oxygen, Temperature) <a href="#">Sampling Rate</a> : 1 Hz to 255 min.

\*) Note that when the Optode is connected to an instrument like the RCM, CMB, AWS or a datalogger, the sampling rate in a continuous recording mode depends on the number of channels for storage etc.

## Oxyview© Program

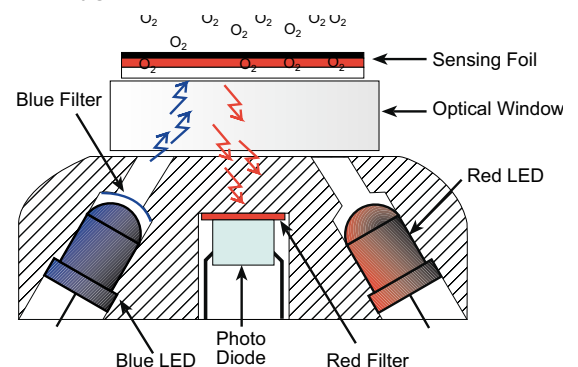
Oxyview©, has been designed for use with Oxygen Optode/ Temperature Sensor 3830/3835. The program allows display of Oxygen Concentration, Oxygen Saturation and Temperature both in tables and graphical forms.

A Calibration Wizard is included in the program. This Wizard helps calibrate the Optode.

Oxyview© can also be used to configuring the Oxygen Optode.

## The Optical System

The principle of measurement is based on the effect of dynamic luminescence quenching (lifetime based) by molecular oxygen.





**Cable 3296.** Connecting cable 10 pin to 6 pin



**Cable 3854.** Connecting cable 10 pin to Cell Plug



**Cable 3485.** Connecting cable 10 pin to free end

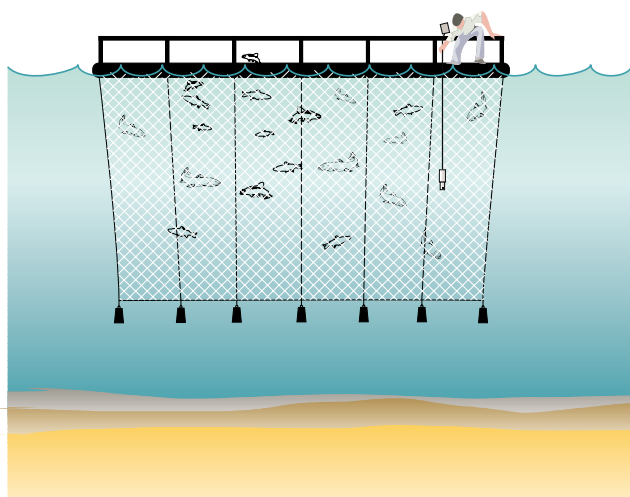


**Cable 3855.** Connecting cable for PC

## EXAMPLES OF APPLICATIONS

**To the right:** The Oxygen Optode 3835 used with a Recording Current Meter to measure dissolved oxygen and temperature as part of environmental monitoring.

**Below:** The Oxygen/Temperature Sensor 4130 used with Display Unit 3315 to measure dissolved oxygen and temperature in a fish mare



Post Box 34 SLÅTTHAUG  
5851 BERGEN, NORWAY  
Tel. +47 55604800  
Fel. +47 55604801

N. and S. America Tel. +1 508 226 9300  
Spain Tel. +34 96 286 6709  
e-mail: info@aadi.no - <http://www.aadi.no>

Representative's Stamp