

Oxygen Optode 3830/3930/3975

D335 - June 2006



OXYGEN OPTODE 3830 OXYGEN OPTODE/TEMPERATURE SENSOR 3930 OXYGEN OPTODE 3975/3975A

- *Optical measurement principle*
- *Long time stability*
- *More than one year without recalibration*
- *Low maintenance*
- *Userfriendly*
- *Use with AADI Current Meters/Profiler*
- *Use as stand-alone sensor*
- *Output format: SR10, RS232, Analogue 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 needed 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 sapphire 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 O₂ 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 1000 and 6000 meters. It fits directly on to the top end-plate of Recording Current Meters RCM 9, RCM 11 and other Aanderaa instruments.

Specifications

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PARAMETER	OXYGEN OPTODE 3830		OXYGEN/TEMPERATURE OPTODE 3930		OXYGEN OPTODE 3975/3975A	
OXYGEN	<i>O₂-Concentration</i>	<i>Air Saturation</i>	<i>O₂-Concentration</i>	<i>Air Saturation</i>	<i>O₂-Concentration</i>	<i>Air Saturation</i>
Measuring Range:	0-500 μM ¹⁾	0-120%	0-500 μM ¹⁾	0-120%	0-500 μM ¹⁾	0-120%
Resolution:	< 1 μM	0.4%	< 1 μM	0.4%	< 1 μM	0.4%
Accuracy:	< 8μM or 5 % ²⁾ whichever is greater	< 5% ²⁾	< 8μM or 5 % ²⁾ whichever is greater	< 5% ²⁾	< 8μM or 5 % ²⁾ whichever is greater	< 5% ²⁾
Settling Time (63%):	< 25 sec		< 25 sec		< 25 sec	
TEMPERATURE						
Range:	-0°C to +36°C		-7.5°C to +41°C		-0°C to +36°C	
Resolution:	0.01°C		0.05°C		0.01°C (0-5V)	0.02°C (4-20mA)
Accuracy:	±0.05°C		±0.1°C		±0.1°C (0-5V)	±0.15°C (4-20mA)
Settling Time (63%):	< 10 sec		30 sec		< 10 sec	
Operating Temperature:	0-40°C (32-104 °F)		0-40°C (32-104 °F)		0-40°C (32-104 °F)	
Operating Depth:	0-6000m (19,690 ft)		0-1000m (3,280 ft)		0-1000m (3975) 0-6000m (19,690 ft) (3975A)	
Sampling Rate:	SR10: controlled by the datalogger. RS232: From 1s to 255min		Controlled by the datalogger.		From 1 sec to 255 min	
Output Formats:	Aanderaa SR10 ³ RS232 ⁴		Aanderaa SR10 ³ (Oxygen) and VR22 ³ (Temperature)		0-5V outputs: ±0.1% of FS ⁵ 4-20mA output: ±0.2% of FS ⁵ RS232 ⁴	
Current Consumption:	SR10: 10mA/T where T is recording interval in min RS232: 80mA/S +0.3mA where S is recording interval in sec		10mA/T where T is recording interval in min.		80mA/S +0.3mA +Ia where S is recording interval in sec. and Ia is quiescent: 5 to 45mA when analogue adaptor enabled.	
Supply Voltage:	SR10: -6 to -14 Vdc RS232: +5 to +14Vdc		SR10: -6 to -14 Vdc		Analogue: +7 to +14Vdc RS232: +5 to +14Vdc	
Dimensions:	Ø36x86mm (Ø1.42x3.386in)		Ø40x168mm (OD1.575x6.61in)		Ø40x175.5mm (Ø1.42x6.9in)	
Weight:	230g (8.113oz)		495g (17.5oz)		480g (16.93oz)	
Materials:	Titanium		Titanium		Titanium	
Accessories included:	Sensor Cable 3854					
Accessories not included:	Sensor Cable 3855 to PC ⁶ Foil Service Kit 3853 PST ₃		Sensor Cable 3855 to PC ⁶ Foil Service Kit 3853 PST ₃		Sensor Cable 3855 to PC ⁶ . Foil Service Kit 3853 PST ₃ . Cable 3976 with free end, rated for 0-6000m.	
Warranty:	Two years against faulty material and workmanship (3830, 3930, 3975/3975A)					

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

2) Valid for 0-2000m (6562ft) depth, salinity 33-37ppt.

3) Aanderaa SR10/VR22 are signal protocols that are used with Aanderaa equipment only.

4) 9600 Baud, 8 data bits, 1 stop bit, No Parity, Xon/Xoff Handshake.

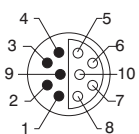
5) The accuracy of the Analogue Adaptor in 0-5V output mode is specified to 0.1% of FS. Note however that at the end of the scale (<0.0-0.07> and <4.93-5.0>) the error may be larger.

6) In order to change settings or calibrating the Optode the Sensor has to be connected to a PC. To gain access to the 3930 Optode's RS232 signals its cylindrical body must be removed, see Operating Manual TD218.

Pin Configuration:

Receptacle, exterior view;

pin = ●, bushing = ○



A) Ground for SR10

B) Supply for RS232

C) Ground for RS232

D) Supply for SR10

3830	3930	3975/3975A
1: Positive Supply ^{A), B)}	1: System Ground	1: Positive Supply
2: Ground ^{C)}	2: Not Connected	2: Ground
3: -9V ^{D)}	3: -9V	3: Analogue Output 1
4: Reserved, Do Not Connect	4: Not Connected	4: Return Ground 1
5: Bridge Voltage (BV)	5: Bridge Voltage (BV)	5: Analogue Output 2
6: Reserved, Do Not Connect	6: SR10 (Oxygen)	6: Return Ground 2
7: RXD (RS232)	7: Not Connected	7: RXD (RS232)
8: TXD (RS232)	8: Not Connected	8: TXD (RS232)
9: Control Voltage	9: Control Voltage	9: Not Connected
10: SR10 (Oxygen)	10: VR22 (Temperature)	10: Not Connected

Optode Model	3830	3930	3975/3975A
Description	Integrally/Direct Mounted.	Immersion Body for cable or sensor string.	Immersion Body w/ Analog and Serial Outputs.
Output	Dual Channel: RS232 data string (Oxygen,Temp.) or Single SR10 (Oxygen) channel to RCM's or RDCP.	Dual Channel: SR10 (Oxygen) and VR22 (Temp.).	Dual Channel: 0-5V (Oxygen, Temp.) or 4-20mA (Oxygen, Temp.) and/or RS232 (Oxygen, Temp.).
Application	Add sensor(s) to top end-plate of our RCM 9/11, RDCP 600 or for OEM/Third party use.	For use with Aanderaa DL series datalogger's; added sensors to AWS 2700 Weather Stations, DB 4280 Data Buoys or our self-contained recording instruments.	General Purpose use with third party datalogger's, e.g. CTD's, ARGO floats, ROV's; PLC's, process industry controllers, recorders, data acquisition and control systems.
Sample Rate	Set by host. <u>RCM</u> : continuously* – 120min. <u>RDCP</u> : 1min – 8hours. Internal interval setting for input to third party RS232 interface.	Set by host. <u>DL3960</u> : continuously* - 180min. <u>DL7</u> : 1min – 180min. <u>DB4280</u> : continuously* - 180min. <u>AWS 2700</u> : continuously* - 180min.	
Multi-sensor Configuration	<u>RCM9</u> : Yes, 2nd 3830 via cable 3964 and Receptacle 3622R. <u>RCM11</u> : Yes, 2nd 3830 via coupling 3979, cable 3980 and Flange Terminal 3978. <u>RDCP600</u> : 300m version: as for RCM9 2000m version: as for RCM11	<u>DL3960</u> : Max 15 sensors, depending on the configuration. <u>DL7</u> : Max 5 sensors. <u>DB4280</u> : Max 15 sensors, depending on the configuration. <u>Sensor attachment</u> : single points on cable use 3913; In-line 5-sensor disk 3829. <u>RCM/RDCP</u> : contact factory.	
Stand-alone Sensor (0–1000m)	Use 3485 Cable. <u>Output</u> : RS232 (Oxygen,Temp.). <u>Sampling Rate</u> : 1s to 255 min.		User furnished datalogger or controller, 3485 Cable. <u>Output</u> : 0-5 Vdc; 4-20 mAdc; or RS232 (Oxygen, Temperature). <u>Sampling Rate</u> : 1s to 255 min.
Stand-alone Sensor (0–6000m)	Use Coupling 3979 and Cable 3976 <u>Output</u> : RS232 (Oxygen,Temp.). <u>Sampling Rate</u> : 1s to 255 min.		User furnished datalogger or controller, Coupling 3977 and Cable 3976. <u>Output</u> : 0-5 Vdc; 4-20 mAdc; or RS232 (Oxygen, Temperature). <u>Sampling Rate</u> : 1s 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

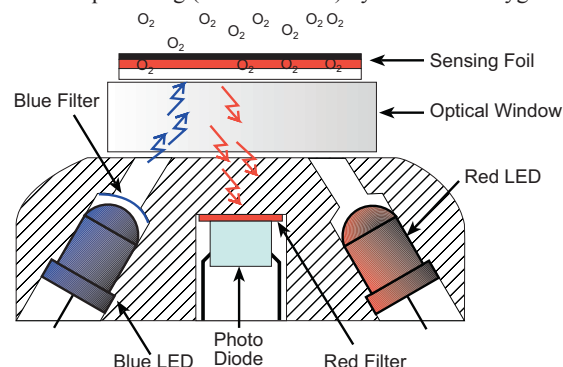
Oxyview©, has been designed for use with Oxygen Optode/Temperature Sensor 3830. The program allows display of Oxygen Concentration, Oxygen Saturation and Temperature both in tables and in graphical forms.

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.

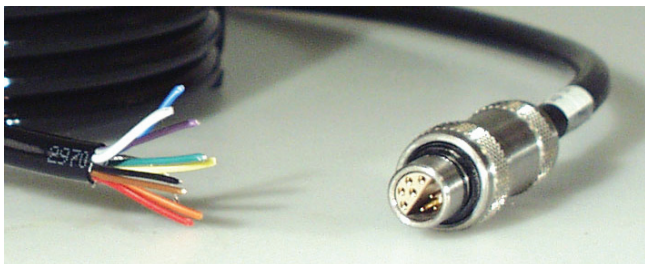


Specifications

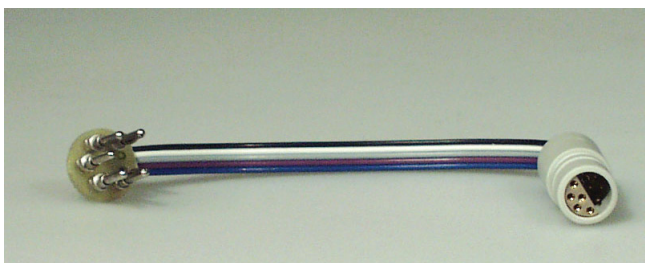
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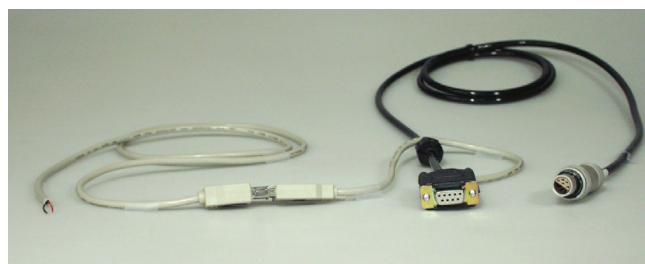
cable 3296. Connecting cable 10 pin to 6 pin



cable 3485. Connecting cable 10 pin to free end



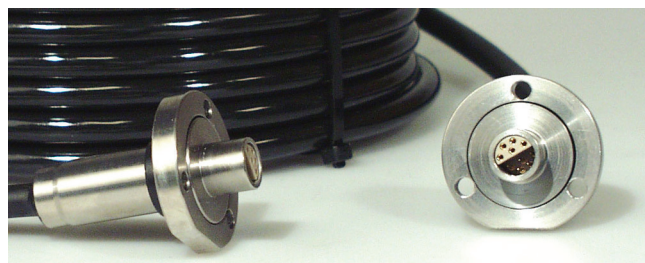
cable 3854. Connecting cable 10 pin to Cell Plug



cable 3855. Connecting cable for PC



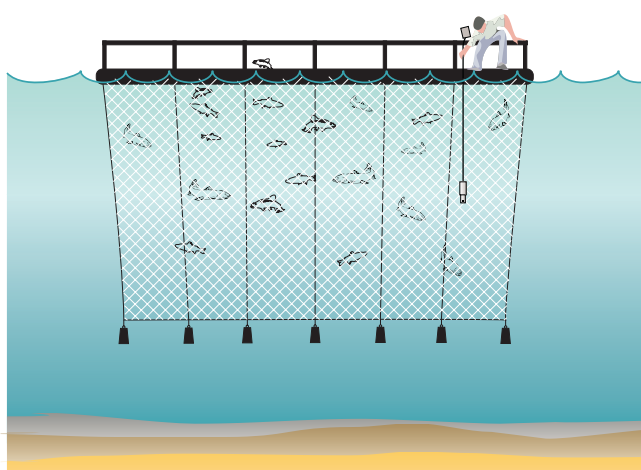
cable 3976*. Flange Connecting cable 10 pin to free end



cable 3980*. Flange connecting cable 10 pin to 10 pin

EXAMPLES OF APPLICATIONS

Below: The Oxygen/Temperature Sensor 3930 used with Display Unit 3315 to measure dissolved oxygen and temperature in a fish mare



Below: The Oxygen Optode 3830 used with a Recording Current Meter to measure dissolved oxygen and temperature as part of environmental monitoring.



Representative's Stamp _____

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