

Layout No: 1308E, 1299G  
Circuit Diagram No:  
Program Version: 3, Build: 10

Product: Oxygen Optode 5013  
Serial No: 21

**1. Visual and Mechanical Checks:**

- 1.1. O-ring surface
- 1.2. Soldering quality
- 1.3. Visual surface
- 1.4. Pressure test (60MPa)
- 1.5. Galvanic isolation between housing and electronics

**2. Current Drain and Voltages:**

- |  |        |
|--|--------|
| 2.1. Average current drain at 0.5Hz sampling (Max: 38mA) | 32 mA  |
| 2.2. Current drain in sleep (Max: 300µA)                 | 220 µA |
| 2.3. DSP voltage, IC5.1 (3.3 ±0.15V)                     | 3.31 V |
| 2.4. Excitation driver voltage, IC1.1 (3.3 ±0.15V)       | 3.31 V |
| 2.5. Flash/RS232 driver voltage, IC7.4 (5 ±0.2V)         | 5.14 V |

**3. Receiver test:**

- |  |         |
|--|---------|
| 3.1. Average of Receiver readings (0 ±50mV)              | -9 mV   |
| 3.2. Standard Deviation of Receiver readings (Max: 10mV) | 1.66 mV |

**4. Performance Test in Air, 0°C Temperature:**

- |  |           |
|--|-----------|
| 4.1. Amplitude measurement (Blue: 220 – 470mV)             | 388.57 mV |
| 4.2. Phase measurement (Blue: 30 ±5)                       | 32.9 °    |
| 4.3. Standard deviation of Phase measurement: (Max: 0.02°) | 0.004 °   |
| 4.4. Temperature measurement: (700 ±300mV)                 | 764.39 mV |

**5. Performance Test in Air, 20°C Temperature:**

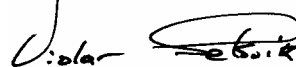
- |  |           |
|--|-----------|
| 5.1. Amplitude measurement (Blue: 290 – 470mV)             | 384.32 mV |
| 5.2. Phase measurement (Blue: 25 ±5°)                      | 28.6 °    |
| 5.3. Standard deviation of Phase measurement: (Max: 0.02°) | 0.007 °   |
| 5.4. Temperature measurement: (100 ±300mV)                 | 91.09 mV  |

**6. Performance Test in Air, 40°C Temperature:**

- |  |            |
|--|------------|
| 6.1. Amplitude measurement (Blue: 320 – 500mV)             | 354.8 mV   |
| 6.2. Phase measurement (Blue: 22 ±5°)                      | 24.9 °     |
| 6.3. Standard deviation of Phase measurement: (Max: 0.02°) | 0.010 °    |
| 6.4. Temperature measurement: (-500 ±300mV)                | -475.27 mV |

Date: 15 February 2008

Sign:



Vidar Selsvik, Production Engineer



# CALIBRATION CERTIFICATE

Form No. 710, Dec 2005

AANDERAA DATA INSTRUMENTS

Sensing Foil Batch No: 1707  
Certificate No: 5013 21 39493

Product: Oxygen Optode 5013  
Serial No: 21  
Calibration Date: 15 February 2008

This is to certify that this product has been calibrated using the following instruments:

**Parameter: Internal Temperature:**

**Calibration points and readings:**

Temperature (°C)	1.15	12.10	24.10	36.07
Reading (mV)	741.10	399.01	7.00	-359.17

**Giving these coefficients**

Index	0	1	2	3
TempCoef	2.43177E+01	-3.11208E-02	2.93847E-06	-4.22055E-09

**Parameter: Oxygen:**

	O2 Concentration	Air Saturation
Range:	0-500 $\mu\text{M}^{1)}$	0 - 120%
Accuracy <sup>1)</sup> :	< $\pm 8\mu\text{M}$ or $\pm 5\%$ (whichever is greater)	$\pm 5\%$
Resolution:	< 1 $\mu\text{M}$	< 0.4%
Settling Time (63%):	< 25 seconds	

**Calibration points and readings<sup>2)</sup>:**

	Air Saturated Water	Zero Solution ( $\text{Na}_2\text{SO}_3$ )
Phase reading (°)	3.11774E+01	6.56931E+01
Temperature reading (°C)	9.90727E+00	2.05539E+01
Air Pressure (hPa)	1.01882E+03	

**Giving these coefficients**

Index	0	1	2	3
PhaseCoef	1.54013E+00	1.09393E+00	0.00000E+00	0.00000E+00

<sup>1)</sup> Valid for 0 to 2000m (6562ft) depth, salinity 33 - 37ppt

<sup>2)</sup> The calibration is performed in fresh water and the salinity setting is set to: 0

Date: 15 February 2008

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

AANDERAA DATA INSTRUMENTS AS



# CALIBRATION CERTIFICATE

Form No. 621, Dec 2005

AANDERAA DATA INSTRUMENTS

Certificate No: 3853\_1707\_39255  
Batch No: 1707

Product: O2 Sensing Foil PSt3 3853  
Calibration Date: 22 June 2007

### Calibration points and phase readings (degrees)

Temperature (°C)		4.54	10.98	20.44	29.92	39.26
Pressure (hPa)		968.25	968.25	968.25	968.25	968.25
O2 in % of O2+N2	0.00	74.37	73.85	73.04	72.17	70.99
	1.00	69.53	68.59	67.18	65.72	64.11
	2.00	66.04	64.85	63.10	61.34	59.52
	5.00	57.77	56.17	53.91	51.75	49.74
	10.00	48.62	46.85	44.43	42.22	40.29
	20.90	37.69	36.01	33.81	31.89	30.28
	30.00	32.57	31.02	29.05	27.36	25.96

Giving these coefficients <sup>1)</sup>

Index	0	1	2	3
C0 Coefficient	5.32650E+03	-1.92117E+02	4.14357E+00	-3.78695E-02
C1 Coefficient	-2.92068E+02	9.71993E+00	-2.14295E-01	2.00778E-03
C2 Coefficient	6.47595E+00	-1.98080E-01	4.49940E-03	-4.30530E-05
C3 Coefficient	-6.69288E-02	1.88066E-03	-4.42348E-05	4.28382E-07
C4 Coefficient	2.65042E-04	-6.83185E-06	1.67071E-07	-1.61989E-09

<sup>1)</sup> Ask for Form No 621S when this O2 Sensing Foil is used in Oxygen Sensor 3830 with Serial Numbers lower than 184.

Date: 2/19/2009

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

AANDERAA DATA INSTRUMENTS AS