

# SERVICE REPORT

## Customer Info

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Customer no	1080114	Delivery to	
Customer	NKE Electronics	NKE Electronics	
Contact	Frederic Podevin	Date of receipt	29.09.2010
Your ref	Frederic Podevin	Delivery date	01.10.2010

## Serviced Items

Type	Serial no		Next service:
4330	259	Oxygen Optode	

Reason for service

Service comments **Water leakage. Corroded el. boards and lemo plug. Repaired and recalibrated with new foil under warranty.**

Test comments

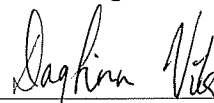
Work	Code	Description	Serial no	Qty	Price ea	Total
Warranty	0000009	Service Labour		0.00	3270.00	0.00
Warranty	1560077	Lemo Insert FFA.2S.310.ZLDY		0.00	410.00	0.00
Warranty	3969525B	El. board, interface board		0.00	1560.00	0.00
Warranty	3969543	Analog board, Optode MKII		0.00	2670.00	0.00
Warranty	3969524	El. board, DSP board		0.00	2820.00	0.00
Warranty	0974672	Calibration , Oxygen Optode		0.00	6430.00	0.00

## Summary

Serviced	Repaired	Total
0	0	0

Bergen, 29.09.2010

Service engineer



Dagfinn Vik

All prices are in NOK

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REQU 05 OCT. 2010

# Packing list

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1080114  
 NKE Electronics  
 Rue Gutenberg  
 Z.I. Kerandrè  
  
 FR-56700 HENNEBONT  
 FRANCE

**Delivery address:**

Attn: Frederic Podevin  
 Tel: +33 02 97361067

**Packing list no.**

**Order no.** 254513

**Payment by** 30 days net.

**Shipping** UPS Courier

**Packing** 1 box: 0,4 kg.

**Date** 30.09.2010

**Your reference** Frederic Podevin

Item	Part no.	Description	Ordered	Sent	Rest
1		Optode s/n 259 for service			
	0974330	Oxygen Optode Sensor w/CANbus. s/n 259	1,00	1,00	0,00
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2	3969525B	El. board, interface board for CANbus	1,00	1,00	0,00
3	1560077	Lemo Insert FFA.2S.310.ZLDY	1,00	1,00	0,00
4	0000009	Service Labour	3,00	3,00	0,00
5	0974672	Calibration , Oxygen Optode including foil	1,00	1,00	0,00
6	3969524	El. board, DSP board for 4330	1,00	1,00	0,00
7	3969543	Analog board, Optode MKII	1,00	1,00	0,00
8		Temporary imported - Eksp: 080701, Løpenr: 2010085476 SERVICE AND REPAIR UNDER WARRANTY			

**Aanderaa Data Instruments A/S**

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**Vat no.** 979 498 063MVA



# TEST & SPECIFICATIONS

Form No. 712, July 2008

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Layout No: 1372A, 1374A, 1376  
Circuit Diagram No: : V-3979A, V3977A, V-3980  
Program Version: V1.22.1

Product: Oxygen Optode 4330  
Serial No: 259

### Visual and Mechanical Checks:

- 1.1 Soldering quality
- 1.2 Visual surface
- 1.3 Galvanic isolation between housing and electronics

### Current Drain and Voltages:

2.1 Average current drain at 0.5 Hz sampling (Max.: 33 mA).....	26.9	mA
2.2 CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA).....	23.5	mA
2.3 Current drain in sleep (Max.: 180 $\mu$ A).....	112	$\mu$ A
2.4 CANBus Current drain in sleep (Max.: 180 $\mu$ A).....	107	$\mu$ A
2.5 DSP IO voltage, J4.18 (3.3 $\pm$ 0.15V).....	3.28	V
2.6 DSP Core voltage, J4.17(1.8 $\pm$ 0.05 V).....	1.80	V
2.7 Excitation driver voltage, C4 Analog Board (4.5 $\pm$ 0.15 V).....	4.57	V

### Performance test:

	Channel:	BLUE	RED
3.1 Average of Receiver readings (0 $\pm$ 150mV)		-20.9 mv	-13.9 mv
3.2 Standard Deviation of Receiver readings (Max.: 45mV/10mV)		10.71 mv	4.83 mv
3.3 Amplitude measurement with non- fluorescence foil (<60mV/650-1200mV)		18.1 mv	1072.6 mv
3.4 Amplitude measurement with fluorescence foil (700-1200mV)		888.2 mv	972 mv
3.5 CANBus Output test			

### Function test at 0°C Temperature (in air with reference foil):

	Channel:	BLUE	RED
4.1 Amplitude measurement (Blue: 150 – 500mV,Red 650-1800mV)		592.8 mv	1242 mv
4.2 Phase measurement (Blue: 4 $\pm$ 2°,Red: 4 $\pm$ 2°)		5.5 °	4.9 °
4.3 Standard deviation of Phase measurement: (Max: 0.02°)		0.009 °	0.008 °
4.4 Raw data temperature measurement: (600 $\pm$ 200mV)			794.5 mv

### Function test at 20°C Temperature (in air with reference foil):

	Channel:	BLUE	RED
5.1 Amplitude measurement (Blue: 100 – 300mV,Red 650-1800mV)		541.7 mv	969.3 mv
5.2 Phase measurement (Blue: 5 $\pm$ 2°,Red: 5 $\pm$ 2°)		5.6 °	5.0 °
5.3 Standard deviation of Phase measurement: (Max: 0.02°)		0.008 °	0.007 °
5.4 Raw data Temperature measurement: (0 $\pm$ 200mV)			160.5 mv

### Function test at 40°C Temperature (in air with reference foil):

	Channel:	BLUE	RED
6.1 Amplitude measurement (Blue: 150 – 500mV,Red 650-1800mV)		578.6 mv	814.6 mv
6.2 Phase measurement (Blue: 5 $\pm$ 2°,Red: 5 $\pm$ 2°)		5.7 °	5.1 °
6.3 Standard deviation of Phase measurement: (Max: 0.02°)		0.011 °	0.009 °
6.4 Raw data Temperature measurement: (-400 $\pm$ 200mV)			- mv

### Pressure test :

7.1 Pressure (IW version: 20MPa, DW version 60MPa).....	60MPa
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Date: 25 August 2010

Sign:

*Jan Øyvind Trellevik*

Jan Øyvind Trellevik,  
Production Engineer

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# CALIBRATION CERTIFICATE

Form No. 710, Dec 2005

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Sensing Foil Batch No: 4909  
Certificate No:

Product: Oxygen Optode 4330  
Serial No: 259  
Calibration Date: 24 August 2010

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

**Parameter: Internal Temperature:**

**Calibration points and readings:**

Temperature (°C)	1.01	11.97	23.99	35.96	
Reading (mV)	705.63	359.90	-32.24	-393.88	

**Giving these coefficients**

Index	0	1	2	3	4	5
TempCoef	2.29855E01	-3.11280E-02	2.95292E-06	-4.22265E-09	0.00000E00	0.00000E00

**Parameter: Oxygen:**

	O2 Concentration	Air Saturation
Range:	0-500 $\mu\text{M}$ <sup>1)</sup>	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 (Na <sub>2</sub> SO <sub>3</sub> )
Phase reading (°)	3.07288E+01	6.23339E+01
Temperature reading (°C)	9.91452E+00	2.10287E+01
Air Pressure (hPa)	1.00348E+03	

**Giving these coefficients**

Index	0	1	2	3
PhaseCoef	-1.44870E00	1.01397E00	0.00000E00	0.00000E00

<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: 25 August 2010

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

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# CALIBRATION CERTIFICATE

Form No 770. . Jun 2008

AANDERAA DATA INSTRUMENTS

Certificate No: 3853\_4909E\_40239  
Batch No: 4909E

Product: O2 Sensing Foil PSt3  
Calibration Date: 5 February 2010

Serial No: 4909

## Calibration points and phase readings

Index	Temperature (°C)	Phase Reading (°)	Oxygen reference (µM)	Index	Temperature (°C)	Phase Reading (°)	Oxygen reference (µM)
0	3.237	63.051	0.00	32	39.412	33.610	84.17
1	3.242	58.698	18.65	33	39.415	25.601	175.91
2	3.247	55.688	37.29	34	39.419	22.147	252.49
3	3.249	48.603	93.21	35	6.661	62.823	0.00
4	3.256	40.791	186.38	36	6.666	58.276	17.14
5	3.274	31.831	389.36	37	6.668	55.160	34.27
6	3.275	27.624	558.88	38	6.670	47.886	85.67
7	10.085	62.595	0.00	39	6.673	39.991	171.33
8	10.090	57.854	15.63	40	6.682	31.069	357.99
9	10.089	54.631	31.26	41	6.683	26.963	513.85
10	10.091	47.169	78.14	42	15.002	62.235	0.00
11	10.091	39.191	156.28	43	15.004	57.227	14.06
12	10.091	30.306	326.63	44	15.006	53.850	28.11
13	10.092	26.302	468.83	45	15.006	46.168	70.28
14	19.918	61.875	0.00	46	15.006	38.175	140.56
15	19.918	56.599	12.48	47	15.006	29.419	293.77
16	19.922	53.069	24.97	48	15.006	25.499	421.67
17	19.922	45.168	62.42	49	24.800	61.485	0.00
18	19.922	37.159	124.84	50	24.818	55.916	11.34
19	19.921	28.531	260.91	51	24.822	52.270	22.68
20	19.920	24.697	374.52	52	24.820	44.226	56.71
21	29.682	61.095	0.00	53	24.821	36.230	113.42
22	29.719	55.233	10.20	54	24.819	27.745	237.06
23	29.722	51.471	20.40	55	24.819	24.007	340.28
24	29.719	43.285	51.01	56	34.553	60.509	0.00
25	29.720	35.300	102.01	57	34.570	54.453	9.31
26	29.718	26.960	213.21	58	34.571	50.609	18.62
27	29.719	23.318	306.04	59	34.570	42.363	46.54
28	39.424	59.923	0.00	60	34.566	34.455	93.09
29	39.422	53.673	8.42	61	34.567	26.281	194.56
30	39.420	49.748	16.83	62	34.569	22.732	279.26
31	39.421	41.440	42.08	63			

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Giving these coefficients

Index	FoilCoefA	FoilCoefB
0	-2.822802E-06	7.511727E-08
1	-6.776306E-06	3.624938E+03
2	1.803907E-03	-3.762469E+01
3	-1.930332E-01	2.454485E-01
4	6.291334E-04	-3.315326E-03
5	-2.982824E-07	4.753640E-05
6	1.049904E+01	-4.883913E-07
7	-5.455740E-02	0.000000E+00
8	9.256500E-05	0.000000E+00
9	-4.397045E-07	0.000000E+00
10	-2.971280E+02	0.000000E+00
11	2.236731E+00	0.000000E+00
12	-7.953454E-03	0.000000E+00
13	4.779584E-05	0.000000E+00

Using the following monomial degrees

Index	FoilPolyDegT	FoilPolyDegO
0	1	4
1	0	5
2	0	4
3	0	3
4	1	3
5	2	3
6	0	2
7	1	2
8	2	2
9	3	2
10	0	1
11	1	1
12	2	1
13	3	1
14	4	1
15	0	0
16	1	0
17	2	0
18	3	0
19	4	0
20	5	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0

Date: 5 February 2010

Sign:

  
 John Arne Lillestøl,  
 Automation Engineer