



a xylem brand

TEST & SPECIFICATIONS

Form No. 712, July 2008

Layout No:
Circuit Diagram No:
Program Version: V4.5.7

Product: Oxygen Optode 4831
Serial No: 160

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)	24.2	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)		mA
2.3	Current drain in sleep (Max.: 180 μ A)	243	μ A
2.4	CANBus Current drain in sleep (Max.: 180 μ A)		μ A
2.5	DSP IO voltage, J4.18 (3.3 $\pm$ 0.15V)		V
2.6	DSP Core voltage, J4.17(1.8 $\pm$ 0.05 V)	1.82	V
2.7	Excitation driver voltage, C4 Analog Board (4.5 $\pm$ 0.15 V)	4.61	V

Performance test:

	Channel:	BLUE	RED
3.1	Average of Receiver readings (0 $\pm$ 150mV)	-7.8 mV	-3.8 mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	15.78 mV	5.58 mV
3.3	Amplitude measurement with non- fluorescence foil (<60mV/650-1200mV)	17.1 mV	999.3 mV
3.4	Amplitude measurement with fluorescence foil (700-1200mV)	944.6 mV	914.8 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)	623.7 mV	1463.7 mV
4.2	Phase measurement (Blue: 4 $\pm$ 2°,Red: 4 $\pm$ 2°)	9.0 °	8.7 °
4.3	Standard deviation of Phase measurement: (Max: 0.02°)	0.004 °	0.002 °
4.4	Raw data temperature measurement: (600 $\pm$ 200mV)		774.8 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)	620.2 mV	1058.8 mV
5.2	Phase measurement (Blue: 5 $\pm$ 2°,Red: 5 $\pm$ 2°)	9.2 °	8.8 °
5.3	Standard deviation of Phase measurement: (Max: 0.02°)	0.006 °	0.004 °
5.4	Raw data Temperature measurement: (0 $\pm$ 200mV)		80.9 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)	569.6 mV	877.7 mV
6.2	Phase measurement (Blue: 5 $\pm$ 2°,Red: 5 $\pm$ 2°)	9.6 °	9.3 °
6.3	Standard deviation of Phase measurement: (Max: 0.02°)	0.003 °	0.002 °
6.4	Raw data Temperature measurement: (-400 $\pm$ 200mV)		-355.8 mV

Pressure test :

7.1	Pressure (IW version: 20MPa, DW version 60MPa)	MPa
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Date: 07 May 2013

Sign:

Jan Øyvind Trellevik
Jan Øyvind Trellevik,
Production Engineer



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CALIBRATION CERTIFICATE

Form No. 710, Dec 2005

Sensing Foil Batch No: 1206
Certificate No:

Product: Oxygen Optode 4831
Serial No: 160
Calibration Date: 03 May 2013

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

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	1.00	11.96	24.01	35.98	
Reading (mV)	838.37	511.16	122.02	-252.58	

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.77952E01	-3.13565E-02	3.06736E-06	-4.52449E-09	0.00000E00	0.00000E00

Parameter: Oxygen:

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

Calibration points and readings²⁾:

	Air Saturated Water	Zero Solution (Na ₂ SO ₃)
Phase reading (°)	3.17603E+01	6.25573E+01
Temperature reading (°C)	9.89095E+00	2.11795E+01
Air Pressure (hPa)	9.70340E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	0.00000E00	1.00000E00	0.00000E00	0.00000E00

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

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

Date: 06 May 2013

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

AANDERAA DATA INSTRUMENTS AS



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TEST & SPECIFICATIONS

Form No. 712, July 2008

Layout No:

Circuit Diagram No:

Program Version: V4.5.7

Product: Oxygen Optode 4831

Serial No: 177

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)	26.3	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)		mA
2.3	Current drain in sleep (Max.: 180 μ A)	261	μ A
2.4	CANBus Current drain in sleep (Max.: 180 μ A)		μ A
2.5	DSP IO voltage, J4.18 (3.3 $\pm$ 0.15V)		V
2.6	DSP Core voltage, J4.17(1.8 $\pm$ 0.05 V)	1.81	V
2.7	Excitation driver voltage, C4 Analog Board (4.5 $\pm$ 0.15 V)	4.60	V

Performance test:

	Channel:	BLUE		RED	
3.1	Average of Receiver readings (0 $\pm$ 150mV)	-11.8	mv	-2.6	mv
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	10.54	mv	3.10	mv
3.3	Amplitude measurement with non- fluorescence foil (<60mV/650-1200mV)	16	mv	837.2	mv
3.4	Amplitude measurement with fluorescence foil (700-1200mV)	927	mv	804.5	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)	583.2	mv	1148.3	mv
4.2	Phase measurement (Blue: 4 $\pm$ 2°,Red: 4 $\pm$ 2°)	9.8	°	9.8	°
4.3	Standard deviation of Phase measurement: (Max: 0.02°)	0.009	°	0.007	°
4.4	Raw data temperature measurement: (600 $\pm$ 200mV)			566	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)	560.6	mv	884	mv
5.2	Phase measurement (Blue: 5 $\pm$ 2°,Red: 5 $\pm$ 2°)	9.9	°	9.8	°
5.3	Standard deviation of Phase measurement: (Max: 0.02°)	0.007	°	0.005	°
5.4	Raw data Temperature measurement: (0 $\pm$ 200mV)			-10.6	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)	534.9	mv	725.1	mv
6.2	Phase measurement (Blue: 5 $\pm$ 2°,Red: 5 $\pm$ 2°)	10.4	°	10.4	°
6.3	Standard deviation of Phase measurement: (Max: 0.02°)	0.008	°	0.005	°
6.4	Raw data Temperature measurement: (-400 $\pm$ 200mV)			-482.6	mv

Pressure test :

7.1	Pressure (IW version: 20MPa, DW version 60MPa)	MPa
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Date: 07 May 2013

Sign:

Jan Øyvind Trellevik

Jan Øyvind Trellevik,
Production Engineer



a xylem brand

CALIBRATION CERTIFICATE

Form No. 710, Dec 2005

Sensing Foil Batch No: 1206
Certificate No:

Product: Oxygen Optode 4831
Serial No: 177
Calibration Date: 03 May 2013

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

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	1.00	11.96	24.01	35.98	
Reading (mV)	685.87	334.27	-62.42	-424.89	

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.20751E01	-3.07466E-02	2.89650E-06	-4.19350E-09	0.00000E00	0.00000E00

Parameter: Oxygen:

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

Calibration points and readings²⁾:

	Air Saturated Water	Zero Solution (Na ₂ SO ₃)
Phase reading (°)	3.12520E+01	6.24251E+01
Temperature reading (°C)	9.89750E+00	2.11221E+01
Air Pressure (hPa)	9.70340E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	0.00000E00	1.00000E00	0.00000E00	0.00000E00

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

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

Date: 06 May 2013

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

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Product: Oxygen Optode 4831
Serial No: 177
Date: 08.04.2013

Certificate No: 82393260177

This is to certify that this product has been pressure tested with the following instrument, and we confirm that no irregularities were found during the test:

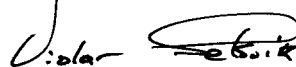
Autoklav 800 bar – sn: 0210005

Pressure readings:

Pressure (Bar)	Pressure time (hour)
600	1

Date: 12 Apr 2013

Sign:



Vidar Selsvik, Production Engineer

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CALIBRATION CERTIFICATE

Form No 770., Jun 2008

Certificate No: 3853_1206E_41134
Batch No: 1206E

Product: O2 Sensing Foil PSt3
Calibration Date: 13 Aug 2012

Serial No: 1206

Calibration points and phase readings

Index	Temperature (°C)	Phase Reading (°)	Oxygen reference (µM)	Index	Temperature (°C)	Phase Reading (°)	Oxygen reference (µM)
0	3.088	63.586	0.00	32	39.178	34.676	86.08
1	3.087	59.547	19.04	33	39.178	26.472	179.90
2	3.091	56.583	38.07	34	39.173	22.918	258.25
3	3.091	50.047	95.17	35	6.512	63.396	0.00
4	3.088	42.297	190.35	36	6.512	59.118	17.49
5	3.088	33.166	397.83	37	6.514	56.071	34.98
6	3.087	28.868	571.06	38	6.513	49.146	87.46
7	9.936	63.206	0.00	39	6.513	41.334	174.92
8	9.937	58.688	15.95	40	6.515	32.286	365.56
9	9.937	55.558	31.90	41	6.514	28.070	524.73
10	9.936	48.245	79.75	42	14.845	62.851	0.00
11	9.937	40.371	159.49	43	14.846	58.053	14.34
12	9.941	31.406	333.29	44	14.847	54.780	28.69
13	9.941	27.271	478.41	45	14.846	47.231	71.72
14	19.753	62.495	0.00	46	14.845	39.292	143.45
15	19.756	57.418	12.74	47	14.849	30.439	299.78
16	19.757	54.002	25.48	48	14.851	26.415	430.28
17	19.755	46.217	63.70	49	24.657	62.056	0.00
18	19.753	38.213	127.40	50	24.641	56.776	11.58
19	19.756	29.471	266.26	51	24.639	53.228	23.16
20	19.761	25.559	382.15	52	24.642	45.285	57.89
21	29.560	61.617	0.00	53	24.640	37.283	115.79
22	29.526	56.133	10.42	54	24.641	28.666	241.99
23	29.521	52.454	20.84	55	24.643	24.833	347.33
24	29.528	44.354	52.08	56	34.379	61.214	0.00
25	29.527	36.353	104.17	57	34.356	55.482	9.51
26	29.526	27.861	217.71	58	34.354	51.696	19.02
27	29.525	24.107	312.51	59	34.355	43.480	47.56
28	39.198	60.811	0.00	60	34.353	35.515	95.12
29	39.186	54.832	8.61	61	34.352	27.167	198.81
30	39.186	50.938	17.21	62	34.349	23.513	285.38
31	39.182	42.606	43.03	63			

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Giving these coefficients

Index	FoilCoefA	FoilCoefB
0	-2.988314E-06	-3.560390E-07
1	-6.137785E-06	3.816713E+03
2	1.684659E-03	-4.475507E+01
3	-1.857173E-01	4.386164E-01
4	6.784399E-04	-7.146342E-03
5	-5.597908E-07	8.906236E-05
6	1.040158E+01	-6.343012E-07
7	-5.986907E-02	0.000000E+00
8	1.360425E-04	0.000000E+00
9	-4.776977E-07	0.000000E+00
10	-3.032937E+02	0.000000E+00
11	2.530496E+00	0.000000E+00
12	-1.267045E-02	0.000000E+00
13	1.040454E-04	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: 13 Aug 2012

Sign:



Tor-Ove Kvalvaag, Calibration Engineer

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