TEST & SPECIFICATIONS

Form No. 716, Nov 2005

Layout No: 1308E, 1299G
Circuit Diagram No:
Program Version: 3, Build: 24

Product: Oxygen Optode 3835
Serial No: 1771

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1. Visual and Mechanical Checks:

1.1. O-ring surface
1.2. Soldering quality
1.3. Visual surface
1.4. Galvanic isolation between housing and electronics

2. Current Drain and Voltages:

2.1. Average current drain at 0.5Hz sampling (Max: 38mA)	31 mA
2.2. Current drain in sleep (Max: 300µA)	202 µA
2.3. Quiescent current drain from –9V (Max: 5µA)	µA
2.4. DSP voltage, IC5.1 (3.3 ±0.15V)	3.31 V
2.5. Excitation driver voltage, IC1.1 (3.3 ±0.15V)	3.32 V
2.6. Flash/RS232 driver voltage, IC7.4 (5 ±0.2V)	5.09 V

3. Receiver test:

3.1. Average of Receiver readings (0 ±50mV)	-9 mV
3.2. Standard Deviation of Receiver readings (Max: 10mV)	3.09 mV

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

4.1. Amplitude measurement (Blue: 220 – 470mV)	469.22 mV
4.2. Phase measurement (Blue: 30 ±5)	33.3 °
4.3. Standard deviation of Phase measurement: (Max: 0.02°)	0.006 °
4.4. Temperature measurement: (700 ±300mV)	851.26 mV
4.5. SR10 Output tested (Set_Output(-100))	

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

5.1. Amplitude measurement (Blue: 290 – 470mV)	380.35 mV
5.2. Phase measurement (Blue: 25 ±5°)	27.8 °
5.3. Standard deviation of Phase measurement: (Max: 0.02°)	0.001 °
5.4. Temperature measurement: (100 ±300mV)	131.74 mV
5.5. SR10 Output tested (Set_Output(-100))	

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

6.1. Amplitude measurement (Blue: 320 – 500mV)	489.48 mV
6.2. Phase measurement (Blue: 22 ±5°)	24.8 °
6.3. Standard deviation of Phase measurement: (Max: 0.02°)	0.012 °
6.4. Temperature measurement: (-500 ±300mV)	-376.86 mV
6.5. SR10 Output tested (Set_Output(-100))	

Date: 19 Nov 2012

Sign:

Jan Øyvind Trellevik

Jan Øyvind Trellevik,
Production Engineer

CALIBRATION CERTIFICATE

Sensing Foil Batch No: 1023
Certificate No:

Product: Oxygen Optode 3835
Serial No: 1771
Calibration Date: 14 Nov 2012

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

Calibration Bath model FNT 321-1-40
ASL Digital Thermometer model F250 Serial: 6792/06

Parameter: Internal Temperature*:*

Calibration points and readings:

Temperature (°C)	0.99	11.96	24.01	35.99
Reading (mV)	840.72	514.07	125.17	-249.37

Giving these coefficients

Index	0	1	2	3
TempCoef	2.79046E01	-3.13895E-02	3.05169E-06	-4.51391E-09

Parameter: Oxygen:

	O2 Concentration	Air Saturation
Range:	0-500 µM [1)]	0 - 120%
Accuracy[1)]:	< ±8µM or ±5% (whichever is greater)	±5%
Resolution:	< 1 µM	< 0.4%
Settling Time (63%):	< 25 seconds	

Calibration points and readings[2)]:

	Air Saturated Water	Zero Solution (Na_2SO_3)
Phase reading (°)	3.11153E+01	6.46279E+01
Temperature reading (°C)	9.91160E+00	2.00359E+01
Air Pressure (hPa)	9.90614E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-1.49197E00	1.13859E00	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:* 1

Sensing Foil Batch No: 1023
Certificate No:

Product: Oxygen Optode 3835
Serial No: 1771
Calibration Date: 14 Nov 2012

SR10 Scaling Coefficients:

At the SR10 output the Oxygen Optode 3830 can give either absolute oxygen concentration in µM or air saturation in %. The setting of the internal property "Output" [3], controls the selection of the unit. The coefficients for converting SR10 raw data to engineering units are fixed.

Output = -1	Output = -2
A = 0	A = 0
B = 4.883E-01	B = 1.465E-01
C = 0	C = 0
D = 0	D = 0
Oxygen (µM) = A + BN + CN2 + DN3	Oxygen (%)= A + BN + CN2 + DN3

[3] The default output setting is set to -1

Date: 19 Nov 2012

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

TEST & SPECIFICATIONS

Form No. 716, Nov 2005

Layout No:
Circuit Diagram No:
Program Version: , Build:

Product: Oxygen Optode 3835
Serial No: 1777

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1. Visual and Mechanical Checks:

1.1. O-ring surface
1.2. Soldering quality
1.3. Visual surface
1.4. Galvanic isolation between housing and electronics

2. Current Drain and Voltages:

2.1. Average current drain at 0.5Hz sampling (Max: 38mA)	30.977 mA
2.2. Current drain in sleep (Max: 300µA)	207 µA
2.3. Quiescent current drain from –9V (Max: 5µA)	µA
2.4. DSP voltage, IC5.1 (3.3 ±0.15V)	3.33 V
2.5. Excitation driver voltage, IC1.1 (3.3 ±0.15V)	3.29 V
2.6. Flash/RS232 driver voltage, IC7.4 (5 ±0.2V)	5.08 V

3. Receiver test:

3.1. Average of Receiver readings (0 ±50mV)	2 mV
3.2. Standard Deviation of Receiver readings (Max: 10mV)	2.44 mV

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

4.1. Amplitude measurement (Blue: 220 – 470mV)	368.95 mV
4.2. Phase measurement (Blue: 30 ±5)	33.9 °
4.3. Standard deviation of Phase measurement: (Max: 0.02°)	0.006 °
4.4. Temperature measurement: (700 ±300mV)	659.95 mV
4.5. SR10 Output tested (Set_Output(-100))	

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

5.1. Amplitude measurement (Blue: 290 – 470mV)	378.07 mV
5.2. Phase measurement (Blue: 25 ±5°)	28.9 °
5.3. Standard deviation of Phase measurement: (Max: 0.02°)	0.014 °
5.4. Temperature measurement: (100 ±300mV)	-44.05 mV
5.5. SR10 Output tested (Set_Output(-100))	

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

6.1. Amplitude measurement (Blue: 320 – 500mV)	367.86 mV
6.2. Phase measurement (Blue: 22 ±5°)	26.1 °
6.3. Standard deviation of Phase measurement: (Max: 0.02°)	0.022 °
6.4. Temperature measurement: (-500 ±300mV)	-456.15 mV
6.5. SR10 Output tested (Set_Output(-100))	

Date: 19 Nov 2012

Sign:

Jan Øyvind Trellevik

Jan Øyvind Trellevik,
Production Engineer

CALIBRATION CERTIFICATE

Sensing Foil Batch No: 1206
Certificate No:

Product: Oxygen Optode 3835
Serial No: 1777
Calibration Date: 14 Nov 2012

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

Calibration Bath model FNT 321-1-40
ASL Digital Thermometer model F250 Serial: 6792/06

Parameter: Internal Temperature*:*

Calibration points and readings:

Temperature (°C)	0.99	11.96	24.01	35.99
Reading (mV)	724.72	379.28	-16.17	-382.01

Giving these coefficients

Index	0	1	2	3
TempCoef	2.35133E01	-3.09425E-02	2.88996E-06	-4.24797E-09

Parameter: Oxygen:

	O2 Concentration	Air Saturation
Range:	0-500 µM [1)]	0 - 120%
Accuracy[1)]:	< ±8µM or ±5% (whichever is greater)	±5%
Resolution:	< 1 µM	< 0.4%
Settling Time (63%):	< 25 seconds	

Calibration points and readings[2)]:

	Air Saturated Water	Zero Solution (Na_2SO_3)
Phase reading (°)	3.20699E+01	6.59279E+01
Temperature reading (°C)	9.92616E+00	2.10061E+01
Air Pressure (hPa)	9.90614E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-1.05299E00	1.10799E00	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

Sensing Foil Batch No: 1206
Certificate No:

Product: Oxygen Optode 3835
Serial No: 1777
Calibration Date: 14 Nov 2012

SR10 Scaling Coefficients:

At the SR10 output the Oxygen Optode 3830 can give either absolute oxygen concentration in µM or air saturation in %. The setting of the internal property "Output" [3], controls the selection of the unit. The coefficients for converting SR10 raw data to engineering units are fixed.

Output = -1	Output = -2
A = 0	A = 0
B = 4.883E-01	B = 1.465E-01
C = 0	C = 0
D = 0	D = 0
Oxygen (µM) = A + BN + CN2 + DN3	Oxygen (%)= A + BN + CN2 + DN3

[3] The default output setting is set to -1

Date: 15 Nov 2012

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

CALIBRATION CERTIFICATE

Form No. 621, Dec 2005

Certificate No: 3853_1206_41134
Batch No: 1206

Product: O2 Sensing Foil PSt3 3853
Calibration Date: 13 Aug 2012

Calibration points and phase readings (degrees)

Temperature (°C)		3.27	10.01	19.72	29.36	38.83
Pressure (hPa)		978.50	978.50	978.50	978.50	978.50
O2 in % of O2+N2	0.00	73.27	72.78	71.94	71.02	70.02
	1.00	68.43	67.47	66.00	64.53	63.02
	2.00	65.03	63.83	62.03	60.23	58.45
	5.00	56.82	55.18	52.84	50.64	48.58
	10.00	47.49	45.66	43.16	40.89	38.86
	20.90	36.28	34.57	32.25	30.27	28.58
	30.00	31.02	29.39	27.31	25.56	24.08
	0.00	0.00	0.00	0.00	0.00	0.00

Giving these coefficients [1)]

Index	0	1	2	3
C0 Coefficient	4.80074E+03	-1.95329E+02	4.86670E+00	-5.03484E-02
C1 Coefficient	-2.68024E+02	1.07066E+01	-2.88523E-01	3.16416E-03
C2 Coefficient	6.10125E+00	-2.39181E-01	6.95300E-03	-7.98418E-05
C3 Coefficient	-6.50012E-02	2.49664E-03	-7.76409E-05	9.21493E-07
C4 Coefficient	2.65501E-04	-9.97211E-06	3.29503E-07	-4.00407E-09

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

Date: 12/18/2012

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

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CALIBRATION CERTIFICATE

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Form No. 621, Dec 2005

Certificate No: 3853_1023_40408
Batch No: 1023

Product: O2 Sensing Foil PSt3 3853
Calibration Date: 18 Aug 2010

Calibration points and phase readings (degrees)

Temperature (°C)		3.81	10.40	19.94	29.39	38.67
Pressure (hPa)		970.25	970.25	970.25	970.25	970.25
O2 in % of O2+N2	0.00	72.97	72.50	71.81	71.02	70.09
	1.00	68.13	67.16	65.72	64.27	62.70
	2.00	64.72	63.48	61.63	59.79	57.95
	5.00	56.48	54.75	52.40	50.16	48.05
	10.00	47.08	45.17	42.67	40.36	38.33
	20.90	35.87	34.01	31.74	29.73	28.04
	30.00	30.48	28.83	26.79	25.03	23.56

Giving these coefficients [1)]

Index	0	1	2	3
C0 Coefficient	4.27019E+03	-1.32724E+02	2.15630E+00	-1.40276E-02
C1 Coefficient	-2.29730E+02	5.74242E+00	-6.85358E-02	1.88612E-04
C2 Coefficient	5.06402E+00	-9.62085E-02	5.22181E-04	7.70890E-06
C3 Coefficient	-5.26332E-02	7.15467E-04	3.31185E-06	-1.86124E-07
C4 Coefficient	2.10917E-04	-1.84088E-06	-4.28646E-08	1.11120E-09

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

Date: 12/18/2012

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

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