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CALIBRATION CERTIFICATE

Form No 830, Juli 2012

Certificate no: 4831_670_00124185
Foil batch no: 1517M

Product: 4831
Calibration date: 20.11.2016

Serial no: 670

Index	Temperature reference(°C)	[O2] Reference(µM)	Temperature raw data(mV)	Phase reading(°)
0	30.064	0.32	-37.900	61.44
1	19.784	0.04	287.640	62.47
2	9.691	0.20	603.010	63.24
3	0.522	1.15	864.945	63.88
4	0.547	19.06	864.300	61.41
5	0.576	41.49	863.505	58.64
6	0.590	61.31	863.155	56.45
7	0.602	101.47	862.825	52.59
8	0.609	142.49	862.600	49.31
9	0.615	211.25	862.465	44.89
10	0.620	305.88	862.315	40.34
11	0.624	416.56	862.215	36.44
12	0.625	510.59	862.200	33.92
13	10.056	13.16	591.990	60.68
14	9.982	31.51	594.215	57.44
15	9.925	47.74	595.930	54.93
16	9.881	80.04	597.265	50.71
17	9.852	109.03	598.160	47.60
18	9.835	166.61	598.655	42.73
19	9.824	244.83	598.990	37.99
20	9.812	328.49	599.345	34.38
21	9.802	406.98	599.680	31.83
22	19.847	10.22	285.600	59.54
23	19.780	25.04	287.775	55.94
24	19.727	38.52	289.470	53.13
25	19.691	63.67	290.605	48.77
26	19.669	88.43	291.310	45.31
27	19.653	131.11	291.800	40.72
28	19.643	195.16	292.120	35.87
29	19.637	260.08	292.300	32.45
30	19.633	329.95	292.420	29.76
31	30.022	7.79	-36.600	58.52
32	30.034	19.10	-36.975	54.77
33	30.045	29.39	-37.300	51.85
34	30.056	50.04	-37.615	47.10
35	30.057	70.76	-37.700	43.38
36	30.060	105.48	-37.800	38.71
37	30.079	156.96	-38.385	33.96
38	30.085	209.54	-38.585	30.63
39	30.092	265.85	-38.780	28.10

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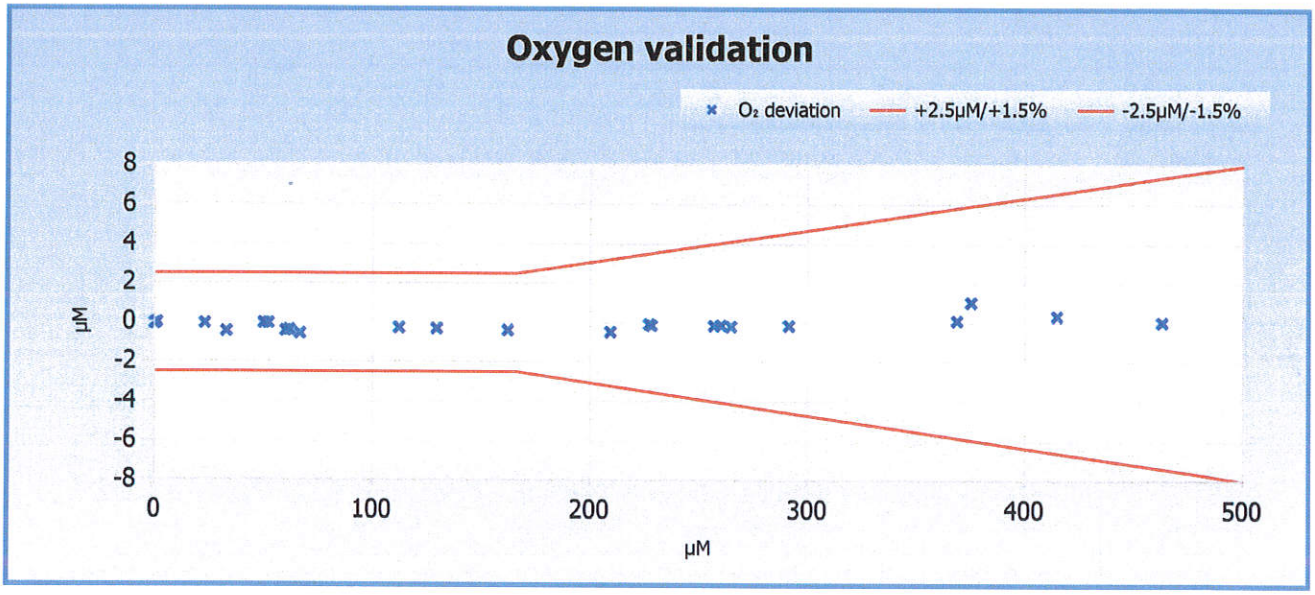
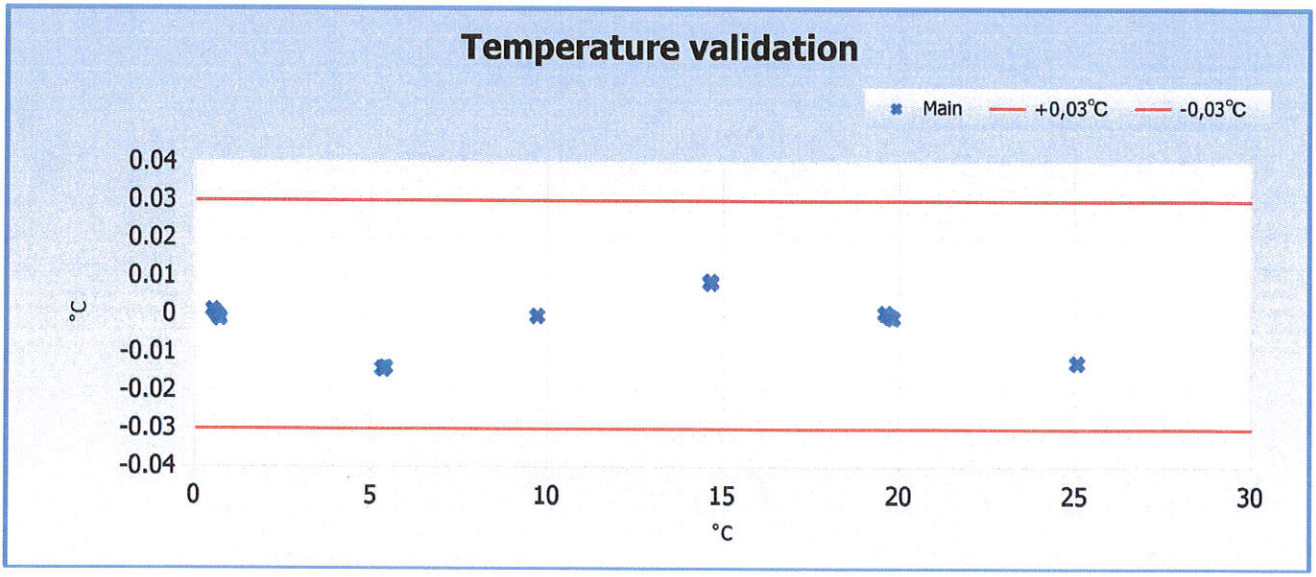
Index	0	1	2	3	4	5	6
SVUFoilCoef	2.80963E-03	1.18012E-04	2.47494E-06	2.30237E02	-3.78396E-01	-5.77698E01	4.54717E00
TempCoef	2.88412E01	-3.21151E-02	3.61744E-06	-5.01780E-09	0.00000E00	0.00000E00	





Date:20.11.2016

Tor-Ove Kvalvaag, Calibration Engineer

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PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4831
Serial No: 670
Date: 14.11.2016

Certificate No: 124237260670

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: 21 Nov 2016

Sign:

Vidar Selsvik, Production Engineer

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TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

Program Version: 4:09:01 AM

Product: Oxygen Optode 4831
Serial No: 670

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)	22.8	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)		mA
2.3	Current drain in sleep (Max.: 180 µA)	217	µA
2.4	CANBus Current drain in sleep (Max.: 180 µA)		µA
2.5	DSP IO voltage, J4.18 (3.3 ±0.15V)		V
2.6	DSP Core voltage, J4.17(1.8 ±0.05 V)	1.82	V
2.7	Excitation driver voltage, C4 Analog Board (4.5 ±0.15 V)	4.32	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	8.6	mV	4.3	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	2.66	mV	0.80	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)	16.5	mV	984.9	mV
3.4	CANBus Output test				

Function test from 0 to 40°C:	Channel:	Blue		Red	
4.1	Minimum amplitude measurement (Blue: >550 mV, Red >650 mV)	704.5	mV	724.6	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	1113.7	mV	1170.2	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)	35.58	°	6.91	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	42.23	°	8.1	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	0.04	°	0.03	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			-379.2	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			799.5	mV

Pressure test :

5.1	Pressure (IW version: 20MPa, DW version 60MPa)	60MPa

Date: 21 Nov 2016

Sign:

Vidar Selsvik, Production Engineer