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CALIBRATION CERTIFICATE

Form No 830, March 2021

Certificate no: 4831_961_00181587
Foil batch no: 1824M

Product: 4831
Calibration date: 14.02.2021

Serial no: 961

Index	Temperature reference(°C)	[O2] Reference(µM)	Temperature raw data(mV)	Phase reading(°)
0	30.229	1.60	-124.913	61.22
1	20.144	1.15	200.347	62.23
2	10.107	0.95	526.513	63.05
3	0.864	0.83	805.607	63.76
4	0.949	21.03	803.180	61.08
5	1.023	42.83	801.100	58.46
6	1.085	63.30	799.333	56.24
7	1.133	110.00	797.940	51.92
8	1.169	151.47	796.940	48.77
9	1.203	217.99	795.973	44.66
10	1.234	323.87	795.080	39.81
11	1.250	436.82	794.627	36.10
12	1.262	540.06	794.293	33.53
13	10.810	16.50	504.147	60.04
14	10.713	34.69	507.260	56.95
15	10.641	51.52	509.507	54.44
16	10.592	86.46	511.073	50.08
17	10.565	122.86	511.940	46.45
18	10.544	172.50	512.620	42.52
19	10.531	262.60	513.007	37.38
20	10.520	341.25	513.360	34.22
21	10.499	430.12	514.040	31.57
22	20.672	13.31	183.040	58.89
23	20.613	27.49	184.973	55.53
24	20.568	41.88	186.453	52.61
25	20.534	67.66	187.540	48.30
26	20.505	95.26	188.500	44.65
27	20.482	138.17	189.260	40.29
28	20.462	204.25	189.900	35.59
29	20.450	273.72	190.280	32.18
30	20.440	344.86	190.607	29.65
31	30.402	10.82	-130.307	57.74
32	30.386	22.45	-129.820	54.13
33	30.380	34.04	-129.600	51.07
34	30.381	56.06	-129.660	46.37
35	30.385	79.35	-129.800	42.54
36	30.392	112.91	-130.000	38.39
37	30.409	167.14	-130.533	33.76
38	30.416	227.18	-130.733	30.31
39	30.422	284.31	-130.933	28.02

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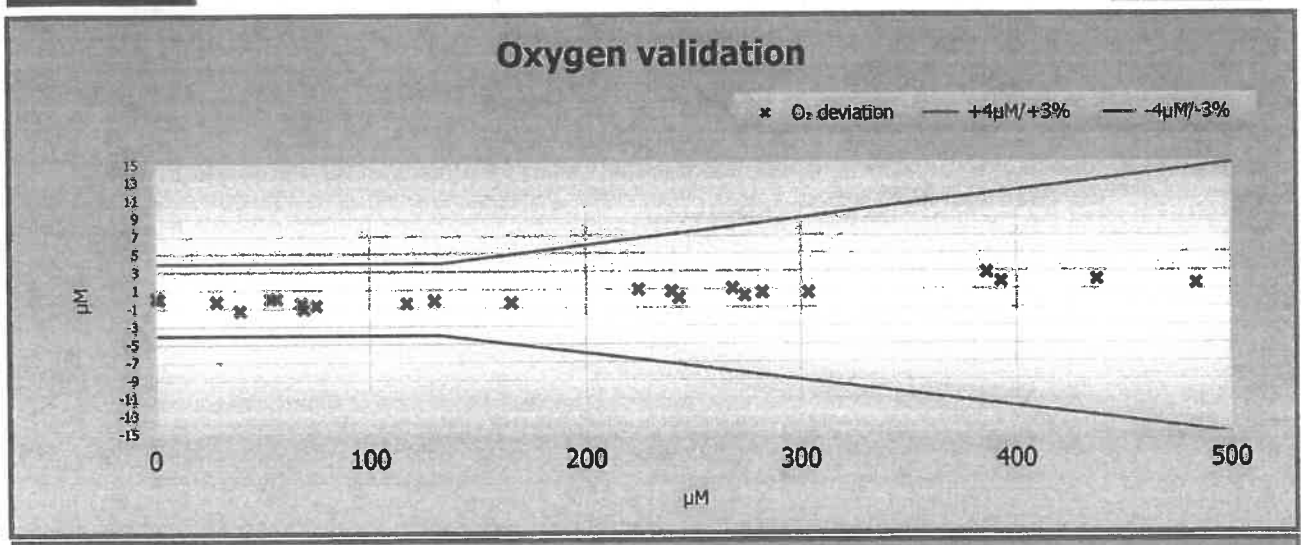
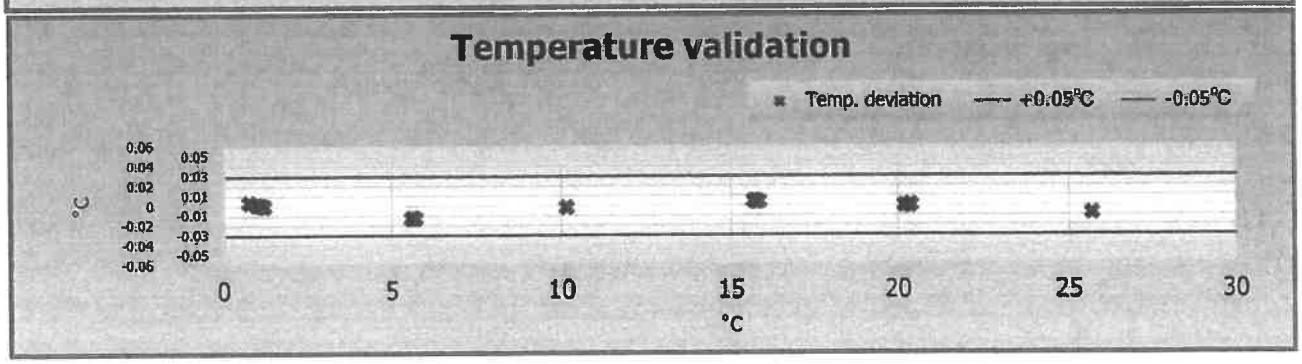
Giving these coefficients

Index	0	1	2	3	4	5	6
SVUFoilCoef	2.74988E-03	1.13980E-04	2.55480E-06	1.00392E02	-1.38412E-01	-2.27002E01	2.01418E00
TempCoef	2.62880E01	-3.10956E-02	3.05055E-06	-4.49677E-09	0.00000E00	0.00000E00	





With following settings

Index	0	1	2	3
PhaseCoef	-2.86200E00	1.00000E00	0.00000E00	0.00000E00

Index	0 (Offset)	1 (Slope)
ConcCoef	0.00000E00	1.00000E00
Salinity	0.00	
Firmware Version	5.3.1	

Date:14.02.2021

Tor-Ove Kvalvaag, Calibration Engineer

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PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4831
Serial No: 961
Date: 11.02.2021

Certificate No: 181492260961

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: 11 Feb 2021

Sign:
Laila A. Skålnes

Laila Skålnes, Production Engineer

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TEST & SPECIFICATIONS

Form No. 712 V3, May 2020

Program Version: 5.3.1

Product: Oxygen Optode 4831
Serial No: 961

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)	23.2	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)		mA
2.3	Current drain in sleep (Max.: 270 µA)	229	µA
2.4	CANBus Current drain in sleep (Max.: 180 µA)		µA
2.5	DSP IO voltage, J4.18 (3.3 ±0.15V)	3.29	V
2.6	DSP Core voltage, J4.17(1.8 ±0.05 V)	1.80	V
2.7	Excitation driver voltage, C4 Analog Board (4.3 ±0.1 V)	4.34	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	-5.2	mV	-2.7	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	3.52	mV	0.58	mV
3.3	Amplitude measurement with non-fluorescence foil (<60mV/650-1200mV)	8.4	mV	989.8	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 >550 mV)	631.9	mV	785.6	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	984.6	mV	1258.6	mV
4.3	Minimum phase measurement (Blue: >32°, Red: >3°)	34.81	°	5.82	°
4.4	Maximum phase measurement (Blue: <45°, Red: <10°)	40.88	°	7.33	°
4.5	Maximum standard deviation of Phase measurement: (< 0.07°)	0.05	°	0.04	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			-454.3	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			722.9	mV

Date: 11 Feb 2021

Sign:
Laila A. Skålnes

Laila Skålnes, Production Engineer