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CALIBRATION CERTIFICATE

Form No 830, March 2021

Certificate no: 4831_1132_00217751
Foil batch no: 2310M

Product: 4831
Calibration date: 13.08.2023

Serial no: 1132

Index	Temperature reference(°C)	[O2] Reference(µM)	Temperature raw data(mV)	Phase reading(°)
0	30.254	0.98	-142.187	60.58
1	20.282	0.55	173.493	61.57
2	10.223	0.41	496.580	62.36
3	0.871	0.72	778.373	63.03
4	0.948	20.37	776.240	60.32
5	1.121	38.50	771.320	58.07
6	1.192	59.26	769.280	55.74
7	1.202	107.44	768.987	51.19
8	1.292	142.33	766.440	48.45
9	1.309	214.31	765.933	43.86
10	1.324	321.78	765.500	38.87
11	1.347	410.13	764.813	35.88
12	1.331	511.76	765.307	33.19
13	10.582	15.47	485.233	59.48
14	10.402	30.92	490.927	56.75
15	10.345	47.23	492.740	54.24
16	10.306	79.85	493.947	50.03
17	10.293	117.81	494.373	46.10
18	10.223	165.02	496.567	42.28
19	10.209	246.68	497.000	37.40
20	10.187	328.17	497.700	33.92
21	10.150	411.15	498.853	31.30
22	20.433	11.78	168.607	58.53
23	20.280	24.65	173.580	55.36
24	20.262	39.75	174.167	52.24
25	20.243	63.97	174.800	48.11
26	20.246	92.67	174.700	44.20
27	20.249	133.01	174.600	39.98
28	20.276	196.83	173.733	35.26
29	20.280	262.22	173.600	31.88
30	20.288	328.75	173.327	29.35
31	30.465	9.63	-148.613	57.38
32	30.446	20.29	-148.000	53.92
33	30.444	31.97	-147.993	50.75
34	30.449	53.28	-148.100	46.06
35	30.456	74.68	-148.313	42.41
36	30.461	109.96	-148.493	37.87
37	30.465	163.52	-148.593	33.15
38	30.482	215.86	-149.100	30.04
39	30.499	272.52	-149.633	27.57

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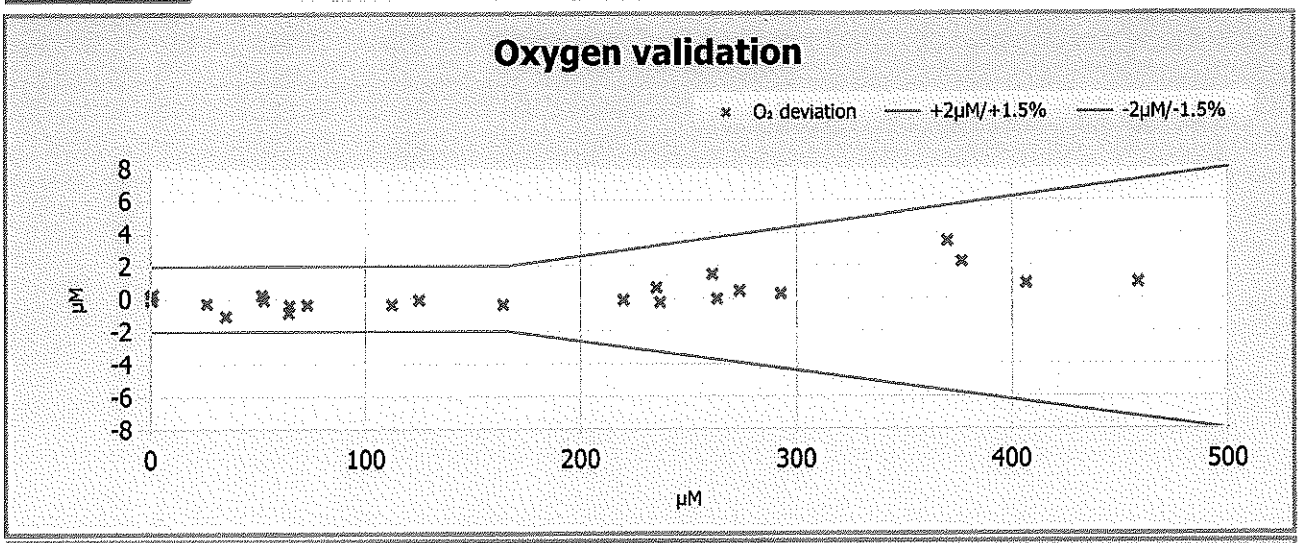
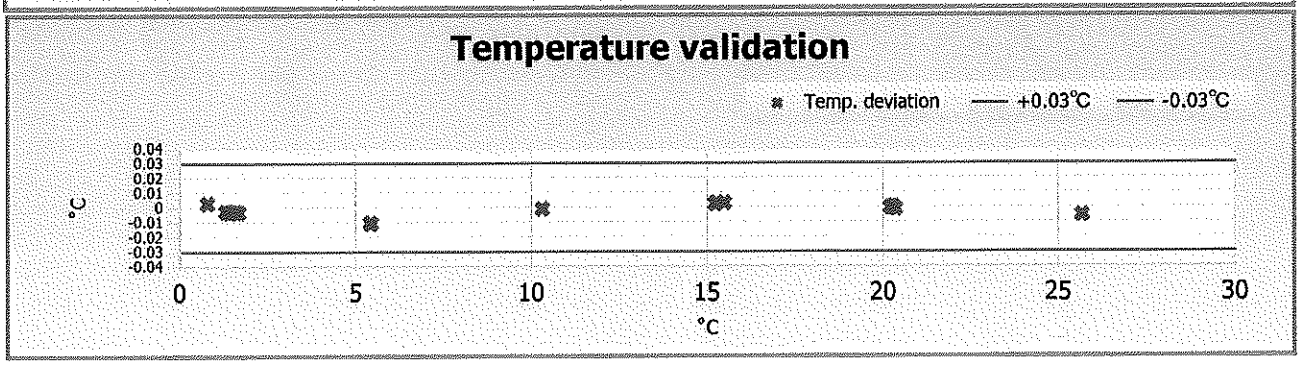
Giving these coefficients

Index	0	1	2	3	4	5	6
SVUFoilCoef	2.78590E-03	1.16413E-04	2.46456E-06	1.80829E02	-2.49219E-01	-4.03394E01	3.62738E00
TempCoef	2.56917E01	-3.15713E-02	3.03791E-06	-4.41662E-09	0.00000E00	0.00000E00	





With following settings

Index	0	1	2	3
PhaseCoef	-2.21700E00	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:13.08.2023

Tor-Ove Kvalvaag, Calibration Engineer

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TEST & SPECIFICATIONS

Form No. 712 V3, May 2020

Program Version: V5.3.1

Product: Oxygen Optode 4831IW
Serial No: 1132

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)	22.3	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)		mA
2.3	Current drain in sleep (Max.: 270 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)	3.31	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)	4.26	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	6.5	mV	3.4	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	1.29	mV	0.25	mV
3.3	Amplitude measurement with non-fluorescence foil (<60mV/650-1200mV)	6.8	mV	818.2	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)	626.1	mV	655.6	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	955.6	mV	1016.3	mV
4.3	Minimum phase measurement (Blue: >32°, Red: >3°)	35.51	°	8.13	°
4.4	Maximum phase measurement (Blue: <45°, Red: <10°)	42.48	°	8.75	°
4.5	Maximum standard deviation of Phase measurement: (< 0.07°)	0.04	°	0.04	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			-464.9	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			679.5	mV

Date: 01 Sep 2023

Sign:
Laila A. Skålnes

Laila Skålnes, Production Engineer

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PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4831IW
Serial No: 1132
Date: 10.08.2023

Certificate No: 2184902601132

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)
300	1

Date: 01 Sep 2023

Sign:
Laila A. Skålnes

Laila Skålnes, Production Engineer

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Product Name    4831    1132    Oxygen Optode
Product Number  4831    1132    4831
Serial Number   4831    1132    1132
SW ID   4831    1132    1940031
SW Version      4831    1132    5       3       1
Node Description        4831    1132    Oxygen Optode #1132
Owner   4831    1132
Salinity[PSU]   4831    1132    35.00
PhaseCoef       4831    1132    -2.217000E+00   1.000000E+00    0.000000E+00    0.000000E+00
FoilID  4831    1132    2310M
FoilCoefA       4831    1132    -4.429471E-06   -9.934120E-06   2.539297E-03    -2.623883E-01
9.495663E-04    -1.385170E-06   1.384506E+01    -7.820107E-02   2.077827E-04    1.951742E-07
-3.815226E+02   2.968714E+00    -4.551691E-03       -3.449760E-04
FoilCoefB       4831    1132    5.200052E-06    4.547302E+03    -4.453296E+01   -1.936771E-01
2.230949E-02    -4.134188E-04   1.497347E-06    0.000000E+00    0.000000E+00    0.000000E+00
0.000000E+00    0.000000E+00    0.000000E+00 0.000000E+00
FoilPolyDegT    4831    1132    1       0       0       0       1       2       0       1       2
 3       0       1       2       3       4       0       1       2       3       4       5       0
  0       0       0       0    0       0
FoilPolyDegO    4831    1132    4       5       4       3       3       3       2       2       2
 2       1       1       1       1       1       0       0       0       0       0       0       0
  0       0       0       0    0       0
SVUFoilCoef     4831    1132    2.785899E-03    1.164125E-04    2.464555E-06    1.808289E+02
-2.492189E-01   -4.033938E+01   3.627383E+00
ConcCoef        4831    1132    0.000000E+00    1.000000E+00
NomAirPress[hPa]        4831    1132    1013.25
NomAirMix       4831    1132    0.20946
CalDataSat[Deg] 4831    1132    0.00    0.00
CalDataAPress[hPa]      4831    1132    1013.250
CalDataZero[Deg]        4831    1132    0.000   0.000
Mode    4831    1132    Smart Sensor Terminal
Enable Sleep    4831    1132    No
Enable Polled Mode      4831    1132    No
Enable Text     4831    1132    No
Enable Decimalformat    4831    1132    Yes
Analog TempLimit[Deg.C] 4831    1132    -5.00   35.00
Analog ConcLimit[uM]    4831    1132    0.00    800.00
Analog SatLimit[%]      4831    1132    0.00    200.00
Analog PhaseLimit[Deg.] 4831    1132    10.00   70.00
Analog Output   4831    1132    O2Concentration
Analog1 Coef    4831    1132    0.000000E+00    1.000000E+00
Analog2 Coef    4831    1132    0.000000E+00    1.000000E+00
Enable AirSaturation    4831    1132    Yes
Enable O2Content        4831    1132    No
Enable Rawdata  4831    1132    Yes
Enable Temperature      4831    1132    Yes
Enable HumidityComp     4831    1132    Yes
Enable SVUformula       4831    1132    Yes
Interval[s]     4831    1132    2.000
Location        4831    1132
Geographic Position     4831    1132    60.323605,5.37225
Vertical Position       4831    1132
Reference       4831    1132
#
```