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# CALIBRATION CERTIFICATE

Form No 830, March 2021

Certificate no: 4831_953_00181581
Foil batch no: 1824M

Product: 4831
Calibration date: 14.02.2021

Serial no: 953


| Index | Temperature reference(°C) | [O2] Reference(µM) | Temperature raw data(mV) | Phase reading(°) |
|---|---|---|---|---|
| 0 | 30.229 | 1.60 | -27.233 | 59.67 |
| 1 | 20.144 | 1.15 | 297.640 | 60.66 |
| 2 | 10.107 | 0.95 | 615.567 | 61.43 |
| 3 | 0.864 | 0.83 | 881.580 | 62.09 |
| 4 | 0.949 | 21.03 | 879.320 | 59.38 |
| 5 | 1.023 | 42.83 | 877.327 | 56.77 |
| 6 | 1.085 | 63.30 | 875.627 | 54.56 |
| 7 | 1.133 | 110.00 | 874.333 | 50.25 |
| 8 | 1.169 | 151.47 | 873.387 | 47.08 |
| 9 | 1.203 | 217.99 | 872.453 | 42.97 |
| 10 | 1.234 | 323.87 | 871.633 | 38.10 |
| 11 | 1.250 | 436.82 | 871.200 | 34.37 |
| 12 | 1.262 | 540.06 | 870.867 | 31.81 |
| 13 | 10.810 | 16.50 | 593.987 | 58.35 |
| 14 | 10.713 | 34.69 | 597.020 | 55.29 |
| 15 | 10.641 | 51.52 | 599.180 | 52.80 |
| 16 | 10.592 | 86.46 | 600.693 | 48.44 |
| 17 | 10.565 | 122.86 | 601.540 | 44.79 |
| 18 | 10.544 | 172.50 | 602.187 | 40.85 |
| 19 | 10.531 | 262.60 | 602.580 | 35.71 |
| 20 | 10.520 | 341.25 | 602.933 | 32.55 |
| 21 | 10.499 | 430.12 | 603.567 | 29.88 |
| 22 | 20.672 | 13.31 | 280.527 | 57.23 |
| 23 | 20.613 | 27.49 | 282.453 | 53.92 |
| 24 | 20.568 | 41.88 | 283.913 | 51.02 |
| 25 | 20.534 | 67.66 | 284.980 | 46.72 |
| 26 | 20.505 | 95.26 | 285.933 | 43.06 |
| 27 | 20.482 | 138.17 | 286.687 | 38.70 |
| 28 | 20.462 | 204.25 | 287.333 | 33.99 |
| 29 | 20.450 | 273.72 | 287.747 | 30.58 |
| 30 | 20.440 | 344.86 | 288.053 | 28.03 |
| 31 | 30.402 | 10.82 | -32.700 | 56.15 |
| 32 | 30.386 | 22.45 | -32.213 | 52.57 |
| 33 | 30.380 | 34.04 | -32.000 | 49.52 |
| 34 | 30.381 | 56.06 | -32.000 | 44.83 |
| 35 | 30.385 | 79.35 | -32.173 | 41.01 |
| 36 | 30.392 | 112.91 | -32.387 | 36.86 |
| 37 | 30.409 | 167.14 | -32.920 | 32.22 |
| 38 | 30.416 | 227.18 | -33.140 | 28.77 |
| 39 | 30.422 | 284.31 | -33.333 | 26.47 |

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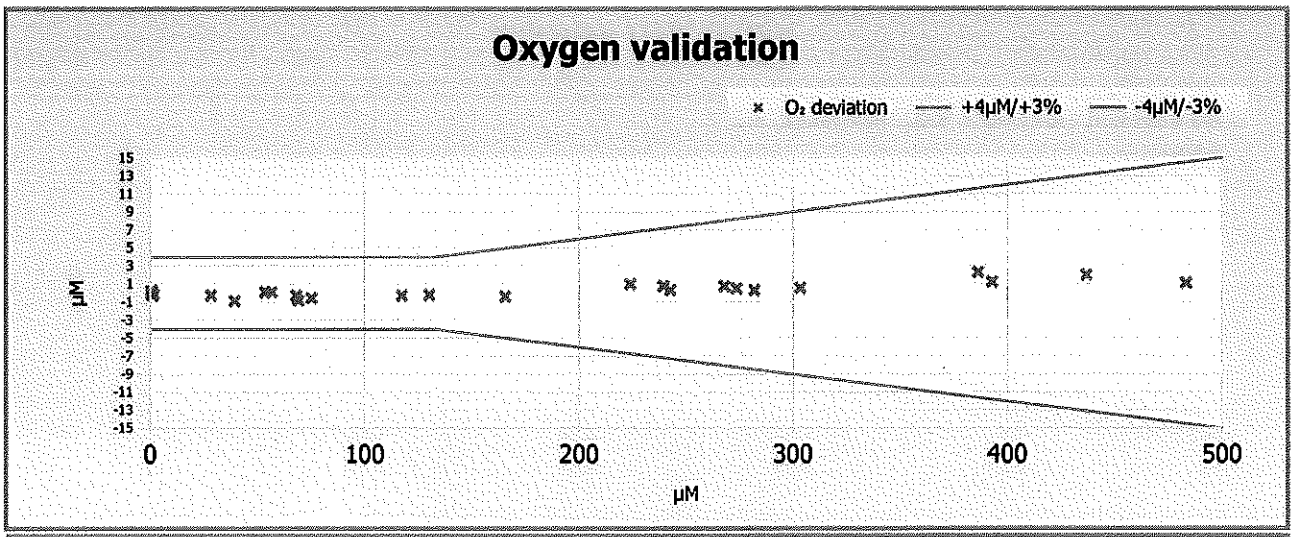
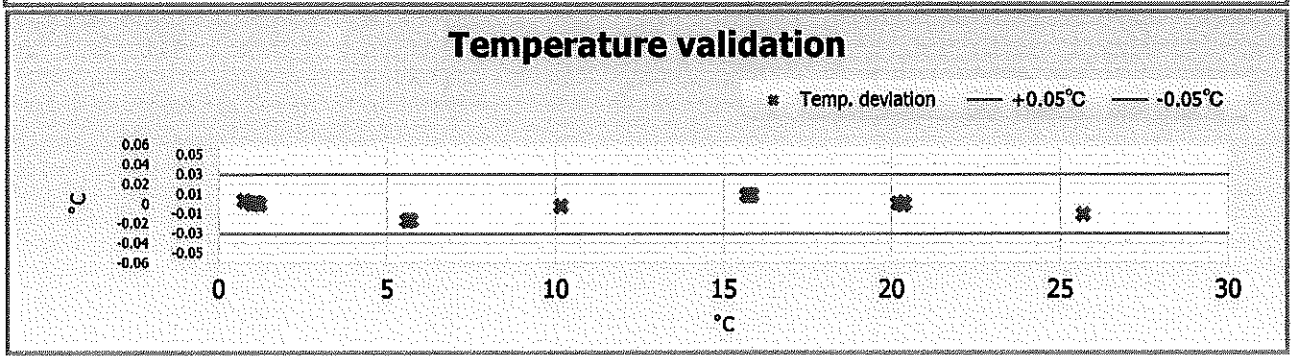
**Giving these coefficients**

| Index | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| SVUFoilCoef | 2.75315E-03 | 1.14616E-04 | 2.38177E-06 | 1.64960E02 | -2.27877E-01 | -3.70800E01 | 3.30433E00 |
| TempCoef | 2.93645E01 | -3.16033E-02 | 3.59882E-06 | -5.01289E-09 | 0.00000E00 | 0.00000E00 | |




**With following settings**

| Index | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| PhaseCoef | -1.17400E00 | 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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# TEST & SPECIFICATIONS

Form No. 712 V3, May 2020

**Program Version:** 5.3.1

**Product:** Oxygen Optode 4831IW
**Serial No:** 953

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**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) | 22.6 | mA |
| 2.2 | CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA) | | mA |
| 2.3 | Current drain in sleep (Max.: 270 µA) | 242 | 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) | 1.81 | 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) | -14.9 | mV | -11.2 | mV |
| 3.2 | Standard Deviation of Receiver readings (Max.: 45mV/10mV) | 1.45 | mV | 0.84 | mV |
| 3.3 | Amplitude measurement with non-fluorescence foil (<60mV/650-1200mV) | 9.9 | mV | 858.5 | 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) | 726.2 | mV | 669 | mV |
| 4.2 | Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV) | 1131.3 | mV | 1060.1 | mV |
| 4.3 | Minimum phase measurement (Blue: >32°, Red: >3°) | 33.5 | ° | 6.23 | ° |
| 4.4 | Maximum phase measurement (Blue: <45°, Red: <10°) | 39.61 | ° | 7.66 | ° |
| 4.5 | Maximum standard deviation of Phase measurement: (< 0.07°) | 0.06 | ° | 0.05 | ° |
| 4.6 | Minimum temperature raw data measurement: (<-200 mV) | | | -383.8 | mV |
| 4.7 | Maximum temperature raw data measurement: (>450 mV) | | | 810.9 | mV |

Date: 11 Feb 2021

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:** 953
**Date:** 11.02.2021

**Certificate No:** 181485260953

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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: 11 Feb 2021

Sign:
Laila A. Skålnes

Laila Skålnes, Production Engineer