AADI CALIBRATION CERTIFICATE

Form No. 622, Dec 2005

a xylem brand

Sensing Foil Batch No: 1707
Certificate No: 5013 21 1115

Product: 5013
Serial No: 21
Calibration Date: November 29, 2011

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

Fluke CHUB E-4	Serial No. A7C677
Fluke 5615 PRT	Serial No. 849155
Fluke 5615 PRT	Serial No. 802054
Honeywell PPT	Serial No. 44074
Calibration Bath model FNT 321-1-40	1

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	-	-	-	-
Reading (mV)	-	-	-	-

Giving these coefficients

Index	0	1	2	3
TempCoef	2.43177E+01	-3.11208E-02	2.93847E-06	-4.22055E-09

*Note: Temperature calibration not performed

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 (°)	3.27612E+01	6.44009E+01
Temperature reading (°C)	1.00170E+01	2.24060E+01
Air Pressure (hPa)	9.84300E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-2.42427E+00	1.17630E+00	0.00000E+00	0.00000E+00

[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*

Date:
November 29, 2011

Sign: Shawn A. Sneddon

Service and Calibration Engineer

Aanderaa Data Instruments, Inc.
182 East Street, Suite B Attleboro, MA 02703 Tel. +1 (508) 226-9300 email: infoUSA@xyleminc.com

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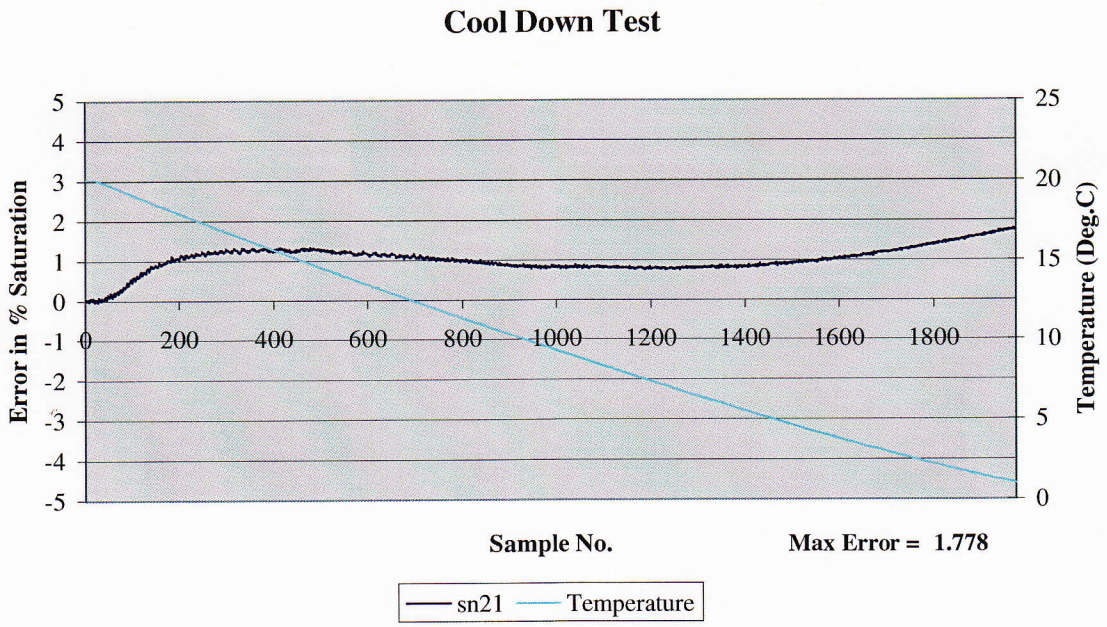
Data from Cool Down Test:



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 (uM) = A + BN + CN2 + DN3	Oxygen (%) = A + BN + CN2 + DN3

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

Date:
November 29, 2011

Sign: Shawn A. Sneddon

Service and Calibration Engineer

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AADI TEST & SPECIFICATIONS

Form No. 620, Nov 2005

a xylem brand

Layout No:
Circuit Diagram No:
Program Version:

Product: 5013
Serial No: 21

1.	**Visual and Mechanical Checks:**	
1.1.	O-ring surface	N/A
1.2.	Soldering quality	N/A
1.3.	Visual surface	OK
1.4.	Pressure test (60MPa)	N/A
1.5.	Galvanic isolation between housing and electronics	OK
2.	**Current Drain and Voltages:**	
2.1.	Average current drain at 0.5Hz sampling (Max: 38mA)	31.4 mA
2.2.	Current drain in sleep (Max: 300uA)	190 uA
3.	**Performance Test in Air, 20°C Temperature:**	
3.1.	Amplitude measurement (Blue: 290 – 470mV)	378.63 mV
3.2.	Phase measurement (Blue: 27 ±5°)	29.1 °
3.3	Temperature Measurement (100 ± 300mV)	-52.28 mV
4.	**Firmware:**	
4.1.	Firmware upgrade	3.24

Date:
November 29, 2011

Sign: Shawn A. Sneddon

Service and Calibration Engineer

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CALIBRATION CERTIFICATE

Form No. 621, Dec 2005

a xylem brand

Sensing Foil Batch No: 1707
Certificate No:

Product: O2 Sensing Foil PSt3 3853
Calibration Date: 22 June 2007

Calibration points and phase readings (degrees)

Temperature (°C)		4.54	10.98	20.44	29.92	39.26
Pressure (hPa)		968.25	968.25	968.25	968.25	968.25
O2 in % of O2+N2	0.00	74.37	73.85	73.04	72.17	70.99
	1.00	69.53	68.59	67.18	65.72	64.11
	2.00	66.04	64.85	63.10	61.34	59.52
	5.00	57.77	56.17	53.91	51.75	49.74
	10.00	48.62	46.85	44.43	42.22	40.29
	20.90	37.69	36.01	33.81	31.89	30.28
	30.00	32.57	31.02	29.05	27.36	25.96

Giving these coefficients [1)]

Index	0	1	2	3
C0 Coefficient	5.32650E+03	-1.92117E+02	4.14357E+00	-3.78695E-02
C1 Coefficient	-2.92068E+02	9.71993E+00	-2.14295E-01	2.00778E-03
C2 Coefficient	6.47595E+00	-1.98080E-01	4.49940E-03	-4.30530E-05
C3 Coefficient	-6.69288E-02	1.88066E-03	-4.42348E-05	4.28382E-07
C4 Coefficient	2.65042E-04	-6.83185E-06	1.67071E-07	-1.61989E-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:
June 22, 2007

Aanderaa Data Instruments, Inc.
182 East Street, Suite B Attleboro, MA 02703 Tel. +1 (508) 226-9300 email: infoUSA@xyleminc.com

AANDERAA DATA INSTRUMENTS

US SERVICE & CALIBRATION DEPARTMENT

DATE: November 8, 2011
Prepared by Shawn Sneddon
Service Order 2584

Service Report

Oxygen Optode 5013 sn21

1. Performed visual inspection
    a. Slight separation between cable and potting
        i. Recommend re-splicing and potting with new mold.
2. Checked for isolation between housing and electronics
    a. Isolation OK.
3. Checked current consumption
    a. Operating = 31.4mA; OK.
    b. Quiescent = 190uA; OK.
4. Performed test in air checking BAmp, BPhase, and RawTemp
    a. All OK.
5. Inspected foil visually
    a. Looks OK.
6. Checked firmware version
    a. 3.22; OLD.
    b. Upgraded to version 3.24.
7. Checked temperature in 10 deg.C bath with reference
    a. Sn21 = 9.98, Reference = 9.976; OK.
8. Checked saturation in 100% saturated bath with reference optode
    a. Sn21 = 98.36%, sn338 = 96.500%; Within spec
        i. Customer requested recalibration.
9. Optode opened to repair cable
    a. Removed potting and re-spliced cable.
    b. Tested output: OK.
    c. Potted cable.
    d. Tested output: OK.
    e. Tested current consumption.
        i. Operating = mA; .
        ii. Quiescent = uA; .
    f. O-ring 3025 replaced.
    g. BPot value set to 4 to allow optimal BAmp value.
10. Performed saturation calibration at 100% and 0% saturation
    a. PASSED.
11. Checked saturation in 100% saturated bath with reference optode

a. Sn21 = 97.28%, sn338 = 97.229%; OK.

12. Checked saturation in 20 deg.C bath with reference optode
    b. Sn21 = 96.98%, sn338 = 97.903%; OK.
13. Performed cool down test from 20 to 1 deg.C
    a. PASSED.
14. Returned to customer settings

Oxygen Optode 4330IE sn199

1. Performed visual inspection
    a. OK.
2. Checked for isolation between housing and electronics
    a. Isolation OK.
3. Checked current consumption
    a. Operating = 30.6; OK.
    b. Quiescent = 115uA; OK.
4. Performed test in air checking C1Amp, C2Amp, TCPhase, and RawTemp
    a. C1Amp slightly low; all others OK.
5. Inspected foil visually
    a. Looks slightly bleach; may need to be replaced.
6. Checked firmware version
    a. 1.22.1; OLD.
    b. Could not upgrade; boot enable not pinned out.
7. Checked temperature in 10 deg.C bath with reference
    a. Sn199 = 9.987, Reference = 9.976; OK.
8. Checked saturation in 100% saturated bath with reference optode
    a. Sn199 = 73.637%, sn338 = 96.500%; Needs to be recalibrated.
9. Performed saturation calibration at 100% and 0% saturation
    a. FAILED two calibrations; foil should be replaced.
10. Replaced foil with batch 1023E and burned in overnight
    a. Adjusted gain for optimal C1Amp and C2Amp values.
11. Checked saturation in 100% saturated bath with reference optode
    a. Sn199 = 95.638%, sn338 = 96.277%; OK.
12. Checked saturation in 20 deg.C bath with reference optode
    a. Sn199 = 94.955%, sn338 = 95.608%; OK.
13. Performed cool down test from 20 to 1 deg.C
    a. PASSED.
14. Returned to customer settings

Next Calibration Date: November 29, 2013
Next Service Date: November 29, 2013