AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

Program Version: V4.9.1

Product: Oxygen Optode 4835

Serial No: 628

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)	22.9	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)	22.2	mA
2.3	Current drain in sleep (Max.: 180 µA)	122	µA
2.4	CANBus Current drain in sleep (Max.: 180 µA)	114	µA
2.5	DSP IO voltage, J4.18 (3.3 ±0.15V)	3.30	V
2.6	DSP Core voltage, J4.17(1.8 ±0.05 V)	1.80	V
2.7	Excitation driver voltage, C4 Analog Board (4.5 ±0.15 V)	4.36	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	8.2	mV	8.3	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	4.28	mV	1.98	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)	8.7	mV	995.9	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)	4835	mV	628	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	722.5	mV	775.5	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)	1045.6	°	1139	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	36.52	°	8.59	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	42.55	°	9.08	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			0.02	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			0.02	mV

Pressure test :

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

Date: 15 Aug 2017

Sign:

Laila A Skåtnes

Production Engineer

AANDERAA a xylem brand

CALIBRATION CERTIFICATE

Form No. 710, Nov 2013

Sensing Foil Batch No: 1711
Certificate No:

Product: Oxygen Optode 4835
Serial No: 628
Calibration Date: 08 Aug 2017

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

Parameter: Internal Temperature*:*

Calibration points and readings:

Temperature (°C)	1.01	11.98	24.01	35.99
Reading (mV)	807.68	482.88	101.78	-263.49

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.72465E01	-3.20652E-02	3.08753E-06	-4.46729E-09	0.00000E00	0.00000E00

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 (°)	3.32386E+01	6.22009E+01
Temperature reading (°C)	9.89205E+00	2.19219E+01
Air Pressure (hPa)	9.79617E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-1.58200E00	1.00000E00	0.00000E00	0.00000E00
ConcCoef				

[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: 09 Aug 2017

Sign:

Arne Instebø,
Calibration & Production Engineer

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4835
Serial No: 628
Date: 15.08.2017

Certificate No: 132927185628

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)
30	1

Date: 15 Aug 2017

Sign:
Laila IA Skåtnes

Production Engineer

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

Program Version: V4.9.1

Product: Oxygen Optode 4835
Serial No: 629

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)	22.9	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)	22.1	mA
2.3	Current drain in sleep (Max.: 180 μA)	110	μA
2.4	CANBus Current drain in sleep (Max.: 180 μA)	105	μA
2.5	DSP IO voltage, J4.18 (3.3 ±0.15V)	3.28	V
2.6	DSP Core voltage, J4.17(1.8 ±0.05 V)	1.80	V
2.7	Excitation driver voltage, C4 Analog Board (4.5 ±0.15 V)	4.34	V

Performance test:		Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)		-16.6	mV	-16.0	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)		1.64	mV	1.21	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)		10.2	mV	977.7	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)		4835	mV	629	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)		774.2	mV	680.2	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)		1065.3	°	1128.3	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)		36.48	°	8.54	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)		42.46	°	9.05	°
4.6	Minimum temperature raw data measurement: (<-200 mV)				0.02	mV
4.7	Maximum temperature raw data measurement: (>450 mV)				0.02	mV

Pressure test :

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

Date: 15 Aug 2017

Sign:
Laila H Skåtnes

Production Engineer

AANDERAA a xylem brand

CALIBRATION CERTIFICATE

Form No. 710, Nov 2013

Sensing Foil Batch No: 1711
Certificate No:

Product: Oxygen Optode 4835
Serial No: 629
Calibration Date: 08 Aug 2017

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

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	1.01	11.98	24.01	35.99
Reading (mV)	769.32	439.79	58.07	-303.45

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.58621E01	-3.20566E-02	3.03854E-06	-4.37103E-09	0.00000E00	0.00000E00

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 (°)	3.32395E+01	6.23808E+01
Temperature reading (°C)	9.89432E+00	2.18805E+01
Air Pressure (hPa)	9.79617E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-1.69200E00	1.00000E00	0.00000E00	0.00000E00
ConcCoef				

[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: 09 Aug 2017

Sign:

Arne Instebø,
Calibration & Production Engineer

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4835
Serial No: 629
Date: 15.08.2017

Certificate No: 132928185629

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)
30	1

Date: 15 Aug 2017

Sign:
Laila IA Skåtnes

Production Engineer

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

Program Version: V4.9.1

Product: Oxygen Optode 4835
Serial No: 631

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)	23.6	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)	22.5	mA
2.3	Current drain in sleep (Max.: 180 μA)	92	μA
2.4	CANBus Current drain in sleep (Max.: 180 μA)	85	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 (4.5 ±0.15 V)	4.35	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	6.1	mV	5.6	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	3.47	mV	1.18	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)	9.2	mV	1004.7	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)	4835	mV	631	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	703.4	mV	736.9	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)	1046.4	°	1189.8	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	35.96	°	8.02	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	42.02	°	8.53	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			0.02	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			0.02	mV

Pressure test :

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

Date: 15 Aug 2017

Sign:
Laila A Skåtnes

Production Engineer

AANDERAA a xylem brand

CALIBRATION CERTIFICATE

Form No. 710, Nov 2013

Sensing Foil Batch No: 1711
Certificate No:

Product: Oxygen Optode 4835
Serial No: 631
Calibration Date: 08 Aug 2017

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

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	1.01	11.98	24.01	35.99
Reading (mV)	783.35	452.70	67.87	-297.48

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.61546E01	-3.17824E-02	3.01803E-06	-4.37192E-09	0.00000E00	0.00000E00

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 (°)	3.32469E+01	6.24898E+01
Temperature reading (°C)	9.89496E+00	2.19071E+01
Air Pressure (hPa)	9.79617E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-1.71900E00	1.00000E00	0.00000E00	0.00000E00
ConcCoef				

[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: 09 Aug 2017

Sign:

Arne Instebø,
Calibration & Production Engineer

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4835
Serial No: 631
Date: 15.08.2017

Certificate No: 132930185631

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)
30	1

Date: 15 Aug 2017

Sign:
Laila IA Skåtnes

Production Engineer

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

Program Version: V4.9.1

Product: Oxygen Optode 4835

Serial No: 632

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)	23.3	mA
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)	22.8	mA
2.3	Current drain in sleep (Max.: 180 µA)	119	µA
2.4	CANBus Current drain in sleep (Max.: 180 µA)	115	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 (4.5 ±0.15 V)	4.35	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	-20.8	mV	-16.8	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	5.56	mV	1.80	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)	11.4	mV	1074.5	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 >650 mV)	4835	mV	632	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	776.2	mV	800	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)	1135.4	°	1197.8	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	35.39	°	8.45	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	41.39	°	8.99	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			0.02	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			0.02	mV

Pressure test :

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

Date: 15 Aug 2017

Sign:

Laila H Skåtnes

Production Engineer

AANDERAA a xylem brand

CALIBRATION CERTIFICATE

Form No. 710, Nov 2013

Sensing Foil Batch No: 1711
Certificate No:

Product: Oxygen Optode 4835
Serial No: 632
Calibration Date: 08 Aug 2017

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

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	1.01	11.98	24.01	35.99
Reading (mV)	750.59	414.20	27.23	-335.99

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.48690E01	-3.16202E-02	2.98098E-06	-4.27149E-09	0.00000E00	0.00000E00

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 (°)	3.21641E+01	6.13513E+01
Temperature reading (°C)	9.89384E+00	2.18785E+01
Air Pressure (hPa)	9.79617E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-7.87000E-01	1.00000E00	0.00000E00	0.00000E00
ConcCoef				

[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: 09 Aug 2017

Sign:

Arne Instebø,
Calibration & Production Engineer

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4835
Serial No: 632
Date: 15.08.2017

Certificate No: 132931185632

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)
30	1

Date: 15 Aug 2017

Sign:
Laila IA Skåtnes

Production Engineer

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

Program Version: V4.9.1

Product: Oxygen Optode 4835
Serial No: 634

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)	21.9	mA
2.3	Current drain in sleep (Max.: 180 μA)	94	μA
2.4	CANBus Current drain in sleep (Max.: 180 μA)	87	μA
2.5	DSP IO voltage, J4.18 (3.3 ±0.15V)	3.30	V
2.6	DSP Core voltage, J4.17(1.8 ±0.05 V)	1.80	V
2.7	Excitation driver voltage, C4 Analog Board (4.5 ±0.15 V)	4.35	V

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	-24.6	mV	-22.0	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	3.22	mV	2.55	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)	9.3	mV	1071.2	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 >650 mV)	4835	mV	634	mV
4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	667.7	mV	757	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)	963.9	°	1135.3	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	36.35	°	8.06	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	42.44	°	8.53	°
4.6	Minimum temperature raw data measurement: (<-200 mV)			0.02	mV
4.7	Maximum temperature raw data measurement: (>450 mV)			0.02	mV

Pressure test :

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

Date: 15 Aug 2017

Sign:
Laila H Skåtnes

Production Engineer

AANDERAA a xylem brand CALIBRATION CERTIFICATE

Form No. 710, Nov 2013

Sensing Foil Batch No: 1711
Certificate No:

Product: Oxygen Optode 4835
Serial No: 634
Calibration Date: 08 Aug 2017

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

Parameter: Internal Temperature:

Calibration points and readings:

Temperature (°C)	1.01	11.98	24.01	35.99
Reading (mV)	870.85	554.65	175.20	-195.89

Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.95494E01	-3.20527E-02	3.31643E-06	-4.75916E-09	0.00000E00	0.00000E00

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 (°)	3.37207E+01	6.26808E+01
Temperature reading (°C)	9.89395E+00	2.19050E+01
Air Pressure (hPa)	9.79617E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-2.16900E00	1.00000E00	0.00000E00	0.00000E00
ConcCoef				

[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: 09 Aug 2017

Sign:

Arne Instebø,
Calibration & Production Engineer

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Oxygen Optode 4835
Serial No: 634
Date: 15.08.2017

Certificate No: 132933185634

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)
30	1

Date: 15 Aug 2017

Sign:
Laila IA Skåtnes

Production Engineer