Form No. 727, Oct 2007

Layout No: Product: Seaguard RCM SW

Circuit Diagram No: Serial No: 1982

Component	Serial No.	Remarks
Main Assembly Seaguard 9340	2656	
Doppler Current Sensor 4830	211	
Oxygen Optode 4835	639	

1.

## Visual and Mechanical Checks

- 1.1. Sensors fixed in correct position
- 1.2. Watertight receptacle and plugs connected
- 1.3. HUB connectors connected to main board
- 1.4. Pressure sensor filled with oil
- 1.5. Epoxy coating intact
- 1.6. Zinc anode installed
- 1.7. O-ring groove inspected, cleaned and greased

## 2. Pre-performance Setup

- 2.1. Hardware and sensors configured
- 2.2. Sensors detected and displayed in configuration wizard
- 2.3. Analog channels configured if used
- 2.4. Touch screen calibrated
- 2.5. Battery indicator calibrated
- 2.6. SD card operation
- 2.7. S-Flash operation
- 2.8. USB Connection to PC(only if installed)
- 2.9. Clock adjusted to correct UTC
- 2.10. Analog switch in correct position

# 3. Performance test

- 3.1. Clock adjusted to UTC
- 3.2. Current drain after power up (max 130 mA)

20.3 mA 0.6 mA

- 3.3. Current drain in Power Down Mode (max 1.0 mA)
- 3.4. Pressure test
- 3.5. Field test and data analysis
- 3.6. Operation of display at 0°C
- 3.7. Operation with test probes on transducers, -5°C to +35°C (all sensors, 16 hours, data on SD)

Windows CE License-Key : 02219-024-347-298

Date: 30 Aug 2017 Sign:

Marius Hosøy, Production Engineer

Form No. 728, Oct 2007

**Product:** Seaguard RCM SW

Serial No: 1982

# 1. Final Check prior to Shipment: (point 1.1 – 1.10 depending on sensors installed)

- 1.1. Doppler Current Sensor is tested with Test Unit 3731
- 1.2. Temperature readings correspond to room temperature
- 1.3. Conductivity Sensor reads correct with seawater loop
- 1.4. Check that the pressure sensor is oil filled
- 1.5. Pressure Sensor gives correct reading at air pressure
- 1.6. Turbidity reading increases when a reflector is placed 20cm in front of it
- 1.7. The oxygen sensor reads maximum in air
- 1.8. Inspect O-ring groove and clean and grease O-ring
- 1.9. Battery in lower slot,
  - a) Type:
  - b) Open loop voltage: Vc) Voltage with 100 ohms load: V
- 1.10. Battery in upper slot,
  - d) Type:
  - e) Open loop voltage: V f) Voltage with 100 ohms load: V

Date: 30 Aug 2017 Sign:

Marius Hosøy, Production Engineer



**Product:** Seaguard RCM SW

**Serial No:** 1982 **Date:** 25.08.2017

**Certificate No:** 1334351621982

\_\_\_\_\_

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

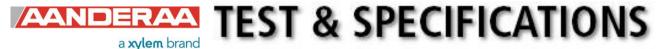
## Pressure readings:

Pressure (Bar)	Pressure time (hour)
30	1

Date: 25 Aug 2017 Sign:

Astrid Fjeldtvedt, Production Engineer

Fredhor



Oct 2014

**Product:** Seaguard RCM SW

Serial No: 1982

License:

AADI Real-Time(25 Aug 2017): **2954-0727-6078-4369** Analog Sensors(25 Aug 2017): **5972-7260-4977-4414** 

Date:25 Aug 2017

Sign:

Ind Fredhor

Product Name: Main Assembly Seaguard 9340 Serial No: 2656

Main Board Seaguard 9341 Serial No: 2656

Main Board tested according to form 773

4.13 Data collection test Date: 30 Aug 2017

# 1. Visual component check prior to assembly in covers

2 <i>5.40</i> mA 93.00mA 3.30V 1.27V
mA V
9 <i>9.00</i> mA 12.00mA 251.00µA
19.5mA 279.0μA

Sign:

Marius Hosøy, Production Engineer

Form No. 769, Jun 2008

**Layout No:** Product: Doppler Current Sensor 4830

Circuit Diagram No: 87 Serial No: 211

## **Digital Board**

1. Tested according to Test Procedure Form 754.

# **Analog Board**

2. Tested according to Test Procedure Form 757.

# **Complete Sensor**

3. Tested according to Test Procedure Form 759.

## Performance test and results from Test Procedure Form 759

## 4. Visual Check

- 4.1. Inspection of o-ring grove.
- 4.2. Pressure tested.
- 4.3. Electrical isolation to flange after pressure test (only 4520).
- 4.4. Communication tested (AiCaP, Rs-232/Rs-422).

# 5. Current Consumption

5.1. Quiescent, no ping (maximum 265  $\mu$ A) 180.00 $\mu$ A

5.2. Total with one ping each second (maximum 14.5 mA)

11.00mA

## 6. Compass and Tilt sensor

6.1. Compass calibrated and verified to be within  $\pm 2.0^{\circ}$  at  $0^{\circ}$  tilt and  $\pm 3.5^{\circ}$  at  $30^{\circ}$  tilt.

## 7. Tilt Compensation

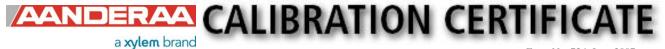
7.1. Tilt sensor calibrated and verified to be within  $\pm 1.0^{\circ}$  in the range from  $+35^{\circ}$  to  $-35^{\circ}$  on both axes.

#### 8. Performance test

- 8.1. The sensor is tested with Test Unit 3731 during climatic tests to control sensor performance over the whole temperature range.
- 8.2 The direction data is also controlled by changing the direction of the Test Unit 3731.

Date: 23 Aug 2017 Sign:
Halvard Skurre

Halvard Skurve, Production Engineer



Form No. 726, June 2007

**Product:** Doppler Current Sensor 4830 **Serial No:** 211

Calibration Date: 24 Aug 2017

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

Calibration Bath model FNT 321-1-40 ASL Digital Thermometer model F250 Serial: 6792/06

# Calibration points and readings:

**Parameter:** Temperature Calibration points and readings

Temperature (°C)	1.169	12.127	24.128	36.096	0.000	0.000
Reading (LSB)	12497341	10827244	8865672	6983437	0	0

# Giving these coefficients

Index	0	1	2	3	4	5
TempCoef	2.70652E01	-5.20300E01	7.94853E00	-1.97340E01	0.00000E00	0.00000E00

Date: 24 Aug 2017 Sig

Tor-Ove Kvalvaag, Calibration Engineer

Tor. Ove Horlvog



**Certificate No:** 133439255211

**Product:** Doppler Current Sensor 4830 **Serial No:** 211 **Date:** 25.08.2017

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: 25 Aug 2017 Sign:

Astrid Fjeldtvedt, Production Engineer

Fredhor

Form No. 712 V2.March 2014

Red

639 mV

**Program Version:** V4.9.1 **Product:** Oxygen Optode 4835

Serial No: 639

# Visual and Mechanical Checks:

- 1.1 Soldering quality
- 1.2 Visual surface
- 1.3 Galvanic isolation between housing and electronics

# **Current Drain and Voltages:**

0	
.0 1117	4
5 μ <i>A</i>	1
μΑ	1
3.2	28 V
80 V	
86 V	
1.	9 μΑ 3.2 80 V

Performance test: Channel:		Blue		Red	l	
3.1	Average of Receiver readings (0±150mV)		8.9	mV	9.2	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV	<b>'</b> )	4.23	mV	6.60	mV
3.3	Amplitude measm, with non-fluorescence foil (<60mV/650-1	200mV)	10.6	mV	849.3	mV

3.4 CANBus Output test

# Function test from 0 to 40°C: Channel: Blue 4.1 Minimum amplitude measurement (Blue: >550 mV, Red >650 mV) 4835 mV

4.2	Maximum amplitude measurement (Blue: <1600 mV, Red <1400 mV)	765.3	mV	571.4	mV
4.3	Minimum phase measurement (Blue: >24°, Red: >1°)	1084.5	0	921.6	0
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	36.63	0	9.58	0
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	42.66	0	10.02	0
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: Lailer A Skahes

**Production Engineer** 



Form No. 710, Nov 2013

Sensing Foil Batch No: 1711

**Certificate No:** 

Product: Oxygen Optode 4835

Serial No: 639

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)	799.99	477.49	100.08	-261.26

## Giving these coefficients

onning uncer						
Index	0	1	2	3	4	5
TempCoef	2.72267E01	-3.24124E-02	3.16437E-06	-4.51942E-09	0.00000E00	0.00000E00

# Parameter: Oxygen:

	O2 Concentration	Air Saturation
Range:	0-500 μM <sup>1)</sup>	0 - 120%
Accuracy <sup>1)</sup> :	< ±8µM or ±5% (whichever is greater)	±5%
Resolution:	< 1 µM	< 0.4%
Settling Time (63%):	< 25 seconds	

# Calibration points and readings<sup>2)</sup>.

Cambration points and readings .				
	Air Saturated Water	Zero Solution (Na <sub>2</sub> SO <sub>3</sub> )		
Phase reading (°)	3.24316E+01	6.15413E+01		
Temperature reading (°C)	9.89556E+00	2.19015E+01		
Air Pressure (hPa)	9.79617E+02			

# Giving these coefficients

- J			1	
Index	0	1	2	3
PhaseCoef	-1.05800E00	1.00000E00	0.00000E00	0.00000E00
ConcCoef				

<sup>1)</sup> Valid for 0 to 2000m (6562ft) depth, salinity 33 - 37ppt

Date: 09 Aug 2017

Arne Instebø,

Sign:

Calibration & Production Engineer

 $<sup>^{2)}</sup>$  The calibration is performed in fresh water and the salinity setting is set to:  $\,0\,$ 



Form No. 667, Sept 200

**Product:** Oxygen Optode 4835

**Serial No:** 639 **Date:** 15.08.2017

**Certificate No:** 133239185639

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:**

11000010101000		
Pressure (Bar)	Pressure time (hour)	
30	1	

Date: 22 Aug 2017 Sign: Lailer H Skahes

**Production Engineer**