AANDERAA a xylem brand

TEST & SPECIFICATIONS

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
3.3. Current drain in Power Down Mode (max 1.0 mA) 0.6 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

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 728, Oct 2007

Product: Seaguard RCM SW
Serial No: 1982

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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: V
   c) 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

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

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

AANDERAA a xylem brand

TEST & SPECIFICATIONS

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:

Astrid Fjeldtvedt, Production Engineer

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Sanddalsringen 5b, Postboks 103 Midtun, 5828 Bergen
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TEST & SPECIFICATIONS

Form No. 776, Jul 2008

Product Name: Main Assembly Seaguard 9340 **Serial No:** 2656

Main Board Seaguard 9341 Serial No: 2656
Main Board tested according to form 773

1. Visual component check prior to assembly in covers

2. Initial hardware test after bootloader and image loaded and display added

2.1 Current drain after bootloader start-up (max 70mA)..... 25.40mA
2.2 Current drain with image loaded (max 130mA)..... 93.00mA
2.3 Voltage 3.3V (3.3V ± 0.1V)..... 3.30V
2.4 Voltage 1.25V (1.25V ± 0.13V)..... 1.27V
2.5 Check that the SD card is detected and found in application in Control Panel
2.6 Check that the touch panel responds when the Start button is clicked
2.7 Check that the S-Flash is present in application in Control Panel

3. Hardware test with covers

3.1 Current drain with image loaded (max 130mA)..... mA
3.2 Voltage 3.3V (3.3V ± 0.1V)..... V
3.3 Check that the SD card is detected and found in application in Control Panel
3.4 Check that the touch panel responds when the Start button is clicked
3.5 Check that the S-Flash is present in application in Control Panel
3.6 Check that the USB port is working

Display Board 9342 Serial No: 9999
Display Board tested according to form 772

1. Visual component check prior to assembly in covers

2. Hardware tests

2.1 Current drain with display on (max 230mA)..... 99.00mA
2.2 Current drain with display off (max 30mA)..... 12.00mA
2.3 Current drain in sleep mode (max 350µA) 251.00µA
2.4 Check the display colors, miscoloration is best seen on a white background
2.5 Check the touch screen operation

Main assembly with Main Board and Display Board
Main assembly tested according to form 774

4. SeaGuard Main assembly test

4.1 Current drain with display connected (max 130mA) 19.5mA
4.2 Visual display check
4.3 Current drain in Sleep Mode (max 350µA)..... 279.0µA
4.4 Clock setting (check new clock setting after switching power on)
4.5 Battery setting (check battery setting after power off)
4.6 Compact flash storage
4.7 SD card storage
4.8 USB connection to PC
4.9 RS485 connection to PC
4.10 Power spec test
4.11 Temperature test
4.12 Sensor setup test
4.13 Data collection test

Date: 30 Aug 2017 Sign:

Marius Hosøy, Production Engineer

Layout No:
Circuit Diagram No: 87

Product: Doppler Current Sensor 4830
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 µA)	180.00µA
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 ±2.0° at 0° tilt and ±3.5° at 30° tilt.

7. Tilt Compensation

7.1. Tilt sensor calibrated and verified to be within ±1.0° in the range from +35° to -35° 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 Skurve
Halvard Skurve, Production Engineer

AANDERAA a xylem brand

CALIBRATION CERTIFICATE

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

Sign:

Tor-Ove Kvalvaag, Calibration Engineer

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: Doppler Current Sensor 4830 **Certificate No:** 133439255211
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

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 712 V2,March 2014

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:

2.1	Average current drain at 0.5 Hz sampling (Max.: 33 mA)	23.0	mA	
2.2	CANBus Current drain at 0.5 Hz sampling (Max.: 33 mA)	22.0	mA	
2.3	Current drain in sleep (Max.: 180 µA)	115	µA	
2.4	CANBus Current drain in sleep (Max.: 180 µA)	99	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)	4.36	V	

Performance test:	Channel:	Blue		Red	
3.1	Average of Receiver readings (0±150mV)	8.9	mV	9.2	mV
3.2	Standard Deviation of Receiver readings (Max.: 45mV/10mV)	4.23	mV	6.60	mV
3.3	Amplitude measm. with non-fluorescence foil (<60mV/650-1200mV)	10.6	mV	849.3	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	639	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	°	921.6	°
4.4	Maximum phase measurement (Blue: <34°, Red: <5°)	36.63	°	9.58	°
4.5	Maximum standard deviation of Phase measurement: (< 0.02°)	42.66	°	10.02	°
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 IA Skåines

Production Engineer

AANDERAA CALIBRATION CERTIFICATE

a xylem brand

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

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 [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 (°)	3.24316E+01	6.15413E+01
Temperature reading (°C)	9.89556E+00	2.19015E+01
Air Pressure (hPa)	9.79617E+02	

Giving these coefficients

Index	0	1	2	3
PhaseCoef	-1.05800E00	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: 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:

Pressure (Bar)	Pressure time (hour)
30	1

Date: 22 Aug 2017

Sign:
Laila IA Skånes

Production Engineer