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TD 303 OPERATING MANUAL
SeaGuard II
February 2025

SeaGuard II Platform

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Preliminary Edition	21st October 2014	
1st Edition	10th June 2015	
2nd Edition	18th December 2015	
3rd Edition	18th May 2016	
4th Edition	24th February 2025	New layout, warnings and safety added content

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Table of Contents

INTRODUCTION

Purpose and Scope

This operating manual describes the configuration of the SeaGuardII platform with sensors, the operating instructions and maintenance. It covers both the standard SeaGuardII platform with self-recording option and SeaGuardII Real-Time with additional real-time possibilities.

SeaGuardII is a submersible data logger from Aanderaa Data Instruments, it can be used both in salt and fresh waters. Several depth versions are available: SeaGuardII Shallow Water; 300m depth rated, SeaGuardII Intermediate Water; 3000m depth rated, SeaGuardII Deep Water; 6000m depth rated, and SeaGuardII Hadal on request.

The SeaGuardII is a modular platform to which sensors can be connected either via a hub card fitted underneath the top end plate or directly to the main board via patch cables. The hub card must be used when real time is needed and when more than 4 sensors are used with the platform. Aanderaa sensors are all smart sensors; they are automatically detected and recognized by the platform when the instrument is powered up. In addition, up to 4 analog and 2 serial sensors can be connected to the platform. Both serial ports can be configured as input for sensor connection and power steering or, output for real time communication and connection of modem or other communication device.

The instrument can typically be deployed in a mooring string, in a bottom frame, or mounted underneath a buoy.

When using the instrument in self-recording mode; data will be stored on a Secure Digital card; SD card, for post-processing and analysis. Only use the original SD-card or a SD-card delivered from Aanderaa since each card has passed a throughout testing. When used in real time, data will be outputted in non-polled mode and can also be stored on the SD-card at the same time. The SeaGuardII offers unique functionalities to store a specified data set and transmit a selected amount of data in real time.

A wide range of sensors from Aanderaa are available for use with the SeaGuardII Platform. Each sensor and needed configuration are covered in their separate Manual so this Manual will only cover the operation of the logger connection of various sensors and accessories.

Number of sensors connected to one SeaGuardII Platform is mainly limited by the total current consumption of the sensors. Sensors can either be connected via analog 0-5V, serial RS-232, serial RS-422, or AiCaP. AiCaP sensor can either be connected directly to the hub-card or via patch cable, via a short cable maximum 3 meters without terminal resistor or a longer cable or string with termination resistor.

SeaGuardII Platform can either run on the internal batteries or external power connected via cable to the internal hub-card.

Document Overview

CHAPTER 1 gives information about warnings and safety.

CHAPTER 2 is a short description of the SeaGuardII Platform including connectors, sensor connection and real-time options.

CHAPTER 3 gives a short get started instruction.

CHAPTER 4 is an overview of how to establish contact between Instrument and PC.

CHAPTER 5 is an overview of how to prepare the Platform for deployment using AADI Real-Time Collector

CHAPTER 6 describes how to log data using AADI Real-Time Collector.

CHAPTER 7 describes how to configure serial sensors, analog sensors and modems/communication.

CHAPTER 7 gives an overview of status codes.

CHAPTER 8 describes the use of External Compass.

CHAPTER 10 describes the sensor electromagnetic compatibility (EMC) and cables.

CHAPTER 11 gives operating instructions.

CHAPTER 12 gives advice regarding installation.

CHAPTER 13 gives information about maintenance.

CHAPTER 14 gives a full description of how to upgrade image.

CHAPTER 15 gives some SeaGuardII based examples and available cables for use with SeaGuardII Platform.

Applicable Documents

Form 572	Test & Specification Sheet
Form 667	Pressure Certificate
Form 135	Service Order form
D-409	Data Sheet SeaGuardII DCP
TD 312	Configuration guide for DCPS and SeaGuardII DCP
TD 268	AADI Real-Time collector operating manual
TD 267	AADI Real-Time output protocol

Requirements

AADI Real-Time Collector, Data Studio 3D, for systems with 3D data or Data Studio for all systems without 3D data and configuration cable. These software are available from our web-site https://www.aanderaa.com/documents.

References

Abbreviations

AiCaP	Aanderaa Protocol: Automated idle Line CANbus Protocol
ASCII	American Standard Code for Information Interchange
CAN	Controller Area Network - sometimes referred to as CANbus
COM port	Communication port used for Serial communication RS232/RS422
DCPS	Doppler Current Profiler Sensor
DCS	Doppler Current Sensor (Single point)
EMC	Electromagnetic compatibility
EIA	Electronic Industry Alliance
GMT	Greenwich Mean Time
GND	Ground
GPRS	General Packet Radio Service
HUB	Connection Point
RAM	Random Access Memory
ROM	Read-Only Memory
RS-232	Recommended Standard 232 refers to a standard for serial communication of
RS-422	Differential serial communication for longer cables
RTC	Real Time Clock
RXD	Serial communication Received data
SD-Card	Secure Digital Card a storage device used to store data
TXD	Serial communication Transmitted data
UART	Universal Asynchronous Transmitter and Receiver
USB	Universal Serial Bus
QA	Quality Assurance, how it establishes a set of requirements for creating
QC	Quality Control, the operational techniques and activities used to fulfil

CHAPTER 1 **Warnings & Precautions**

1.1 General safety precautions

SeaGuardII are reliable and safe to use. Care has been taken to ensure that safety is an important part of the design. To provide high quality data over an extended period and in addition to prevent injuries during installation and operation the guidelines and precautions in this manual should be followed.

Any marine operation involving heavy equipment is by default categorized as dangerous. To ensure health and safety principles are followed a Safe Job Analysis (SJA) should be held locally before any operations take place. Special care needs to be taken concerning assembly, test, transport, deployment and lifting operations.

- Personal Protective Equipment PPE includes helmet, eye protection, gloves, and protective footwear.

Warning: This product has a roll weight large enough to cause harm. Take care to prevent roll by always placing the product in a stable and secure position.

Warning: This product is used with a pressure case. If temperature is changing an over pressure might occur in the pressure case and when the c-clamp are removed the top-end plate and internal frame may be launched from pressure case with high force. Never keep any body part above the instrument when removing the C-clamps

Warning: This product or equipment delivered as additional equipment operates in a partially sealed container and thus adhering to battery and charging requirements and limitations are extremely important. Failure to do so may enable the unlikely case of internal overheating which again may generate gases and risk of explosion.

Warning: This product contains Polyurethane. If exposed to temperatures of 150°C or more, isocyanates will be released. Do not execute any hot work on this product without consulting the factory. In the case of burning or explosion, toxic fumes will be released. In such case remove yourself from the area and be sure not to inhale or otherwise expose your skin and clothes to the released fumes. If exposed get medical attention!

Warning: This product or equipment delivered as additional equipment contains surfaces or materials unsafe for handling:
Leakage of battery acid could occur. The following precautions should always be taken when handling lead acid batteries. For more details, see chapter 1.3 Batteries.

Always use necessary PPE when handling batteries.
Make sure to avoid battery acid to come in contact with eyes, skin or clothing.
Always inspect the surface of the batteries before moving them.
Batteries showing any sign of cracks or damage must be replaced.
Upon any sign of acid spillage or corrosion, replace relevant parts immediately.

Warning: When configuring the instrument or attached sensors make sure that you always wait for the acknowledge before you switch of power since you may risk a corrupt flash if power is switch during writing to Flash.

1.2 Waste Management & Disposal

WEEE: Waste Electrical and Electronic Equipment. Electrical waste or WEEE is the term used to designate all electrical items that should be recycled. Its official definition is set by the Waste Framework Directive (2006/12/EC).

Aanderaa Data Instruments AS is a member of RENAS

To address environmental concerns Aanderaa Data Instruments AS has joined the industry's own recycling company for electric and electronic waste - RENAS AS. All EE products sold are part of a system for collecting and processing and can be delivered to the dealer or municipal waste treatment plant.

As a member of RENAS we take responsibility for the environment!

More information on return policies can be found at renas.no.

If you located outside Norway contact our local dealer or contact your local WEEE authorized representative.
For further assistance contact Aanderaa.support@xylem.com

1.3 Batteries.

Listed below are the three types of batteries available for the SeaGuardII

- 2x9V/15Ah Standard Alkaline
- **2x7V/35Ah Lithium**
- 2x11V/12.5Ah Lithium-ion batteries

Using the Alkaline, Lithium or Lithium-ion batteries will eliminate any acid spill as they are designed to be spill-proof. Transport and storing in a tilted position is not a problem when using Alkaline, Lithium or Lithium-ion batteries.

1.4 Fire & Explosions

Warning: This product may include Lithium batteries and operates in a partially sealed container and thus any damage on batteries or leakage may enable the unlikely case of internal overheating which again may generate gases and risk of explosion.

1.5 Toxic fumes

Warning: This product contains Polyurethane Foam. If exposed to temperatures of 150℃ or more, isocyanates will be released. Do not execute any hotwork on this product without consulting the factory. In the case of burning or explosion, toxic fumes will be released. In such case remove yourself from the area and be sure not to inhale or otherwise expose your skin and clothes to the released fumes. If exposed get medical attention!

Only skilled and trained personnel should be allowed to perform physical work in field. Any equipment used to perform work on the instrument or instrument related objects should have the required approval/certificates for the actual work being done. This is very critical and important when it comes to equipment used in lifting operations. Performing a “Safe Job Analysis” (zSJA) is a good practice and highly recommended before starting any work on the equipment.

The above warnings are of general nature. Instructions and safety precautions relevant to each phase of the instruments operational lifetime are found in the remaining sections of this manual. The relevant sections must be read carefully prior to initiating any work on the instrument.

CHAPTER 2 Short Description and Specifications

2.1 Description

The SeaGuardII consists of a platform with datalogger based on the AiCaP communication protocol.

The AiCaP, CAN bus Protocol, is designed to operate as a network connection between a control unit and nodes. The control unit is abstracted as the master of an AiCaP system while the nodes are abstracted as slaves. There is always at least one master in an AiCaP system. When slaves connect to the master, it is the master that controls the address list. However, after connection it is possible for both the master and the slave to take initiative to a write. It is thus possible for a slave to hand data packets to a master at the slaves own time disposal.

It is basically a two-way communication bus between the datalogger module and the sensors that ensures low power drain, short sampling intervals and fast response time. For additional information about the AiCaP, please refer to the TD282. The SeaGuardII Platform acts as a master and has the responsibility to collect data from the sensors (nodes or slaves).

Sensors can be fitted directly onto the top-end plate or connected via cable (maximum length of 3meter for AiCaP sensors and 5m for analog sensors, for longer cable refer to the SeaGuardII string solution).

The top end plate has room for direct connection of 6 sensors. Aanderaa sensors are all smart sensors using the CAN bus offering high accuracy, resolution and low response time. In addition, 4 of the sensors can be analog sensors (0-5V) and it is also possible to connect the sensors using a cable / split cable. And up to 2 serial sensors (serial connection can also be used for communication, as data output).

The core of the SeaGuardII is a datalogger based on the Intel PXA 255 embedded ARM. This system topology is not compatible with the old Aanderaa positive ground based SR10, VR22 and PDC4 format.

The SeaGuardII Instrument can output Real-Time data in XML-format over RS422 or RS-232 transmission line. The Real-Time Output Protocol is described in TD 267 and can be used as a guide to a skilled engineer for creating an application utilizing data from the SeaGuardII.

Accompanying the Real-Time Output, Aanderaa supplies a Real-Time Collector program for the receiver station for further distribution of data. Refer TD 268 for additional information about the Real-Time Collector.

For real time functionality, SeaGuardII Platform can be equipped with a watertight receptacle and underwater mateable plug that enables external configuration via PC and transmission of real-time data in non-polled mode. Some system examples are available in ***CHAPTER 15***

2.2 SeaGuardII Platform design and parts

Figure 2-1: SeaGuardII Platform with sensors and cable

An example of the SeaGuardII Platform with DCPS, Turbidity and Pressure sensors mounted on the top-end plate. An optional external cable for real time communication is added. Pressure case and DCPS shown in picture are Shallow Water, 300-meter version.

The USB-Cable are used for instrument and sensor configuration and not recommended for Real-Time communication mainly because is not as reliable as the other alternatives and because it don't fit into the pressure case with the USB-cable connected.

Figure 2-2: SeaGuardII Platform with USB configuration cable

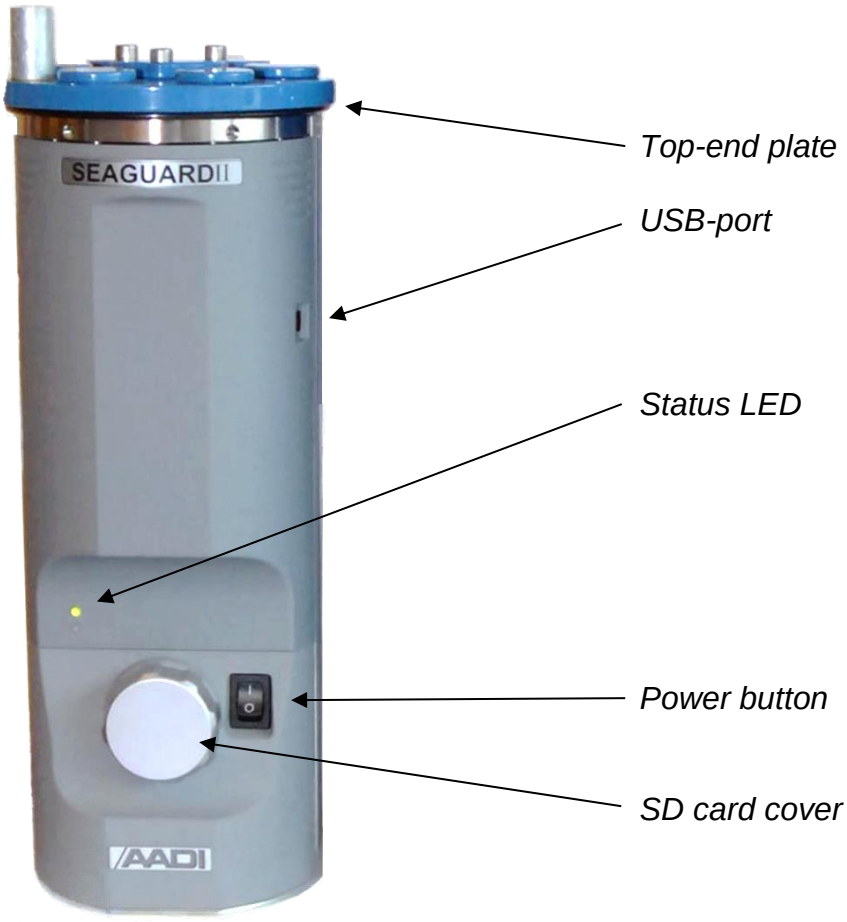


Figure 2-3: Front view of the SeaGuardII

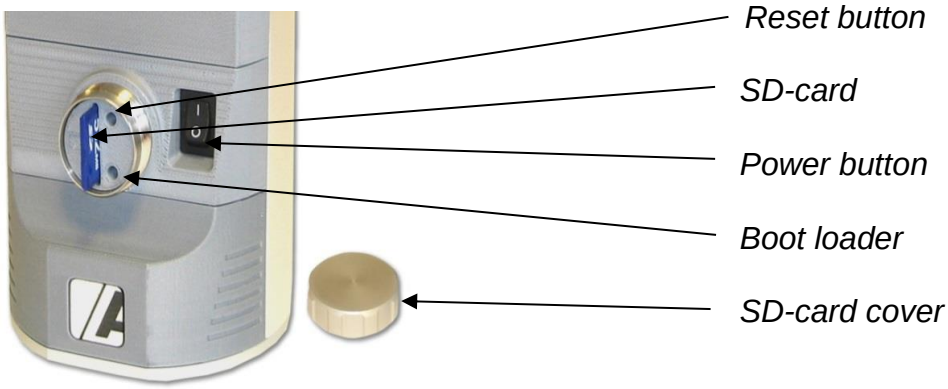


Figure 2-4: SD-card slot

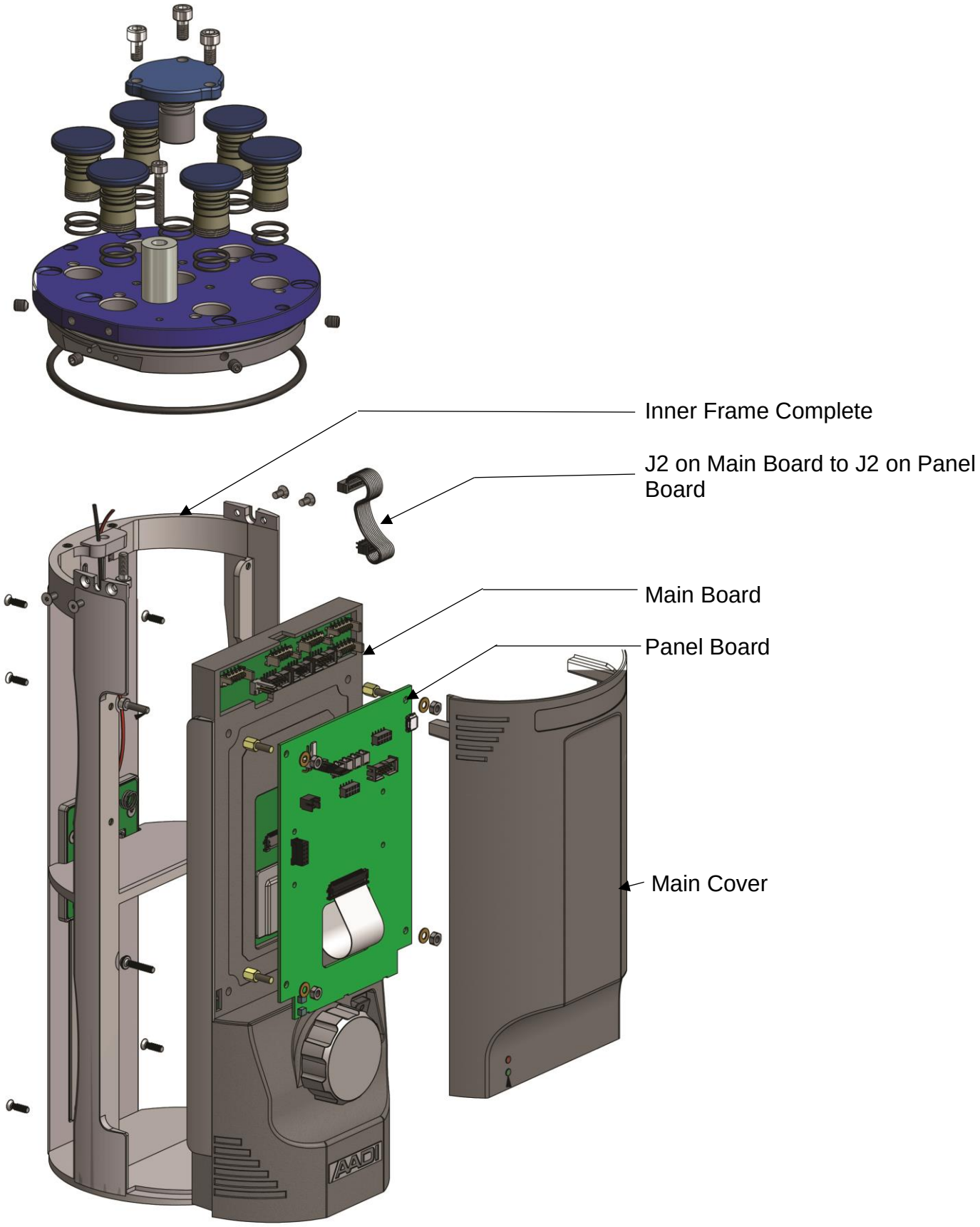
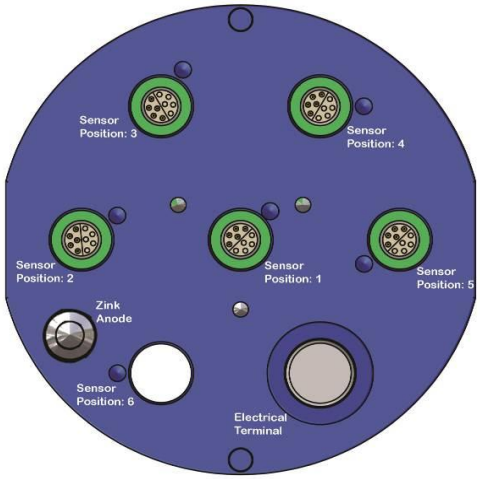


Figure 2-5: Assembly drawing

Figure 2-6: Side/Rear view of inner frame



The position of each sensor is important especially if a Conductivity Sensor is used. Conductivity sensor is an inductive sensor and any object close to the sensor will influence on the reading. This proximity effect can be fixed by a simple calibration. At factory a full calibration is perform with all surrounding sensors installed.

Other sensors like Turbidity and Oxygen also need to be mounted with window facing out. Please see manual for each sensor for a recommended position.

Figure 2-7: Top-end Plate and sensor position

2.3 Available sensors for connection to the SeaGuardII Platform

List of Aanderaa hydrological sensors that can be connected to the SeaGuardII:

Table 2-1 Aanderaa hydrological sensors.

Parameter	Part Number	Data Sheet	RS-232	AiCaP
DCPS Doppler Current Profiler Sensor	5400/5400P	D 411	X	X
ZPulse Doppler Current Sensor	4420/4520/4830/4930	D 367	x	x
Conductivity sensor	5819	D 425	x	x
Oxygen Optode	4330/4330F	D 378	x	x
Oxygen Optode	4835	D 385	x	x
Pressure sensor	4117	D 362	x	x
Tide sensor	5217	D 405	x	x
Wave and Tide sensor	5218	D 407	x	x
Turbidity sensor	4296/6350	D 424	x	x
Temperature sensor	4060	D 363	x	x
Motus Wave Sensor	4729/5729/6729	D 429/D 417/ D 428	x	

Please refer the sensor data sheet for specifications and other details.

You may also add 3rd party sensors such as EXO multiparameter sonde from our sister company YSI.

CHAPTER 3 **Getting Started**

3.1 SeaGuardII Platform Basic

A SeaGuardII Platform are delivered with some standard part but also a lot of optional extra features are available such as sensors from both Aanderaa and other Xylem brands and many 3rd party sensors can be used. Some sensors can be connected directly to SeaGuardII top-end plate while others need an adapter or cable.

With SeaGuardII you may put the different sensors in up to 3 recording group. Each group may run on different interval. This feature is especially useful if you have sensor that you need fast update such as Oxygen and others which are typical slower such as wave and current. To save power you may then put them in different recording interval.

Data is normally stored internally on the supplied SD-card but can also be transmitted real-time by adding a modem or similar to one of the serial ports. Only use SD-card approved by Aanderaa since the logger is critical to both size and speed.

Aanderaa Real Time Collector is our own developed software for instrument configuration and real-time data collection when instrument is used with real time output. Data Studio 3D is a Windows based software used when a 3D sensor like DCPS or Motus are connected. If you are only using standard sensors like DCS and water quality you may also use Data Studio whit more statistics and possibilities to compare dataset. Each software is used for data post processing, export of data and visualization of the measurements in customized graphs. You may download these software from our webpage https://www.aanderaa.com/documents.

Also available on our website is an Excel based Power calculator; to calculate the deployment duration according to the configuration. This is a useful tool when planning a deployment to optimize configuration based on the available power.

For configuration of the platform including all sensor connected you may use the included USB cable if instrument is already configured with a real-time connection either LAN or Com-port you may also use this. Then together with Aanderaa Real-Time Collector you have access to all sensor data and configuration of input and output.

If your system is delivered with real-time cable, you may power the instrument from shore. Please note that you may add an internal back-up battery, but you will then loose the possibility to reset the instrument by toggling the power.

To protect the instrument during storage and transport a Shipping box is a standard part of the delivery and we recommend using this also when instrument is sent back to factory for repair/maintenance. Before sending the instrument back to our factory please contact Aanderaa.support@xylem.com and they will issue an RMA number.

All general and specific documentation will follow each order on a memory stick. If this memory stick is missing or you are not able to download data, please contact Aanderaa.support@xylem.com to get access to data online or to get a new copy.

3.2 Selectable features:

In addition to the delivery included in SeaGuardII Platform Basic we offer different standard packages, or you may configure the instrument with additional features. Sensor can also be moved from one SeaGuardII to another and additional sensors can be ordered.

Additional Sensor can be installed on the top-end plate either connected via patch cable to the instrument or connected to one of the 5 sensor plugs on the HUB-card if selected. The Hub-card is also needed if you want to use the instrument with real-time output and/or using external power to run the instrument.

In addition to all Aanderaa smart sensor also up to 4 sensors with analog 0-5V output can be connected to the Hub-card. These sensors are normally installed on a cable with a watertight connection on the top-end plate. 2 serial sensors can also be connected to the internal Panel board via cable. Please note that the two serial ports can either be configured as input or output.

We offer a wide range of real-time cables and transmitters ranging from cellular phone, radio, satellite and wire-less. Normally a real-time solution is customer specified to fit the local conditions. It can either be delivered as a part of a new system or added to an existing SeaGuardII.

If the instrument is used as a self-recording unit with-out external power or used with back-up power in a real-time system, we offer 4 battery alternatives.

- Alkaline Battery 3988 with 15Ah capacity
- Lithium Battery 3908 with 70Ah capacity
- Lithium-ion batteries with12.5Ah capacity
- Empty battery shell that can be used if you want to build your own batteries.

Ther are space for 2 batteries on each SeaGuardII but if used with a Doppler Current Sensor DCPS or DCS an Alkaline battery should not be used in the upper battery slot unless it’s checked for magnetism. Alkaline batteries can be slightly magnetic, and this may interfere with the internal compass in the sensor.

The instrument also needs a pressure case to operate. This pressure case is available in three different depth rating and need to be matched to the instrument top-end plate. SW and IW are using the same mechanical sealing and can therefore be used interchangeably but then the unit with lowest depth rating will set the installation depth. 3 different versions are available.

- Pressure case 5063 for SW with depth rating 300-meter.
- Pressure case 4020 for IW with depth rating 3000-meter.
- Pressure case 2175B for DW with depth rating 6000-meter.

A wide range of Mooring frames are also available. Bottom mooring frame for seabed installation, In-line mooring frame, clamp on mooring and more.

If the instrument is part of a system, it will already be assembled, all system parts included, attached devices and sensors defined and configured. A real-time system may have been partly disassembled for transport purposes and may need to be reassembled according to the supplied system drawing. The complete system has been tested by the factory to verify the functionality.

Connect and/or check all system parts and connections according to the system drawing.
We recommend that you power the instrument from an AC/DC source when working with the instrument in the office to avoid unnecessary battery drain. For an instrument without real-time and external net power put the 4908 AC/DC adapter in one of the battery lids.

3.3 Configure SeaGuardII Platform

The following chapters will guide you through all configuration of SeaGuardII Platform and attached sensors. You may either configure the instrument using the USB cable following the delivery or if you have a real-time solution you may configure through this connection. However if your Real-time system is not already configured you need to configure this using the USB cable first.

The best alternative for configuring the instrument is using Aanderaa Real-Time Collector. The next chapters will show examples using this software. If you use a display software to present real-time data Aanderaa Real-Time collector is used to collect data and send it to your display system.

An AiCaP sensor connected to the AiCaP bus need to be set to AiCaP mode to be used. Serial and analog sensors also need to be configured before they are connected.

To avoid accidental change, some of the settings are write-protected. There are four levels of access protection, refer ***Table 3-1.***

Table 3-1: Passkey protection

Output	Passkey	Description
No		No Passkey needed for changing property.
Low	1	The Passkey must be set to 1 prior to changing property.
High	1000	The Passkey must be set to 1000 prior to changing property. This Passkey value also gives read access to factory properties that usually are hidden.
Read Only	Factory	The user has only read access. Only available for authorized Aanderaa service engineer.

3.4 Sensor Properties

When using AADI Real-Time Collector you don’t need to think about the command string sent to the sensor since this is fully controlled by the software.
Some properties of the ‘AiCaP’ sensor will not be applicable / visible when the sensor is connected to a SeaGuardII, as these properties will then be controlled by the logger. Most of the properties are stored in the individual sensors so we recommend seeing each sensor manual for a full list of available properties.

The properties that are stored in the platform will be described in the following chapters.

3.1 Real time data transfer with SeaGuardII

When enabled for real-time data transfer each new data record will be transmitted through the communication port immediately.
SeaGuardII supports cabled real-time transfer, GPRS, radio modem and equivalent data channels where modem can be used without initiation messages (e.g. AT commands) from SeaGuardII.
The data format is:

- AADI Real-Time XML
- ASCII
- Pseudo-Binary
- AIS (message 8)
- SMS

3.2 Connection between the SeaGuardII and a local PC with real-time cable

For connection between the PC and the SeaGuardII, use watertight connection cable ***5587C*** and real-time cable ***5589/5590***; install a RS422 to RS232 converter between the standard cable and the PC if your PC has not a RS422 Serial Port.

NOTE: when utilizing RS-422, the cables are terminated in the SeaGuardII as required by the protocol, if the equipment connected to the SeaGuardII over RS-422 does not turn off its Tx/Rx lines, this could cause additional current draw from the system. Consider utilizing RS-232 in low power systems or make sure the equipment connected to the SeaGuardII power downs its modem lines.

Figure 3-1: SeaGuardII with 5587C Real-Time cable

CHAPTER 4 Establish contact between Instrument and PC

Since the introduction of SeaGuard Aanderaa has used Windows Mobile Device Center for connection between logger and PC. This WMDC has been a part of Windows until Windows10, and in March 2022 Microsoft removed the software from their download list. Based on this Aanderaa has developet a replacement for WMDC called USB Serial.

This chapter decribes the different alternatives for how to configure a SeaGuardII via our AADI Real-Time Collector software either using the old WMDC if allready installed on your PC or using USB Serial.

What type of connection you need to use depending on your current firmware version. But also an AADI Real-time Collector with matching version is needed to obtain contact with your instrument.

Please note that a SeaGuardII firmware upgrade also might require a sensor upgrade or reconfiguration of sensors.

4.1 Establish communication with the SeaGuardII using the AADI Real-Time Collector via USB cable

Connect the supplied configuration cable to the USB connector in front of the instrument and to the PC (refer ***Figure 2-2)***

Install and start the AADI Real-Time Collector software on your PC (provided on the memory stick delivered with the instrument) or use the link under. For more information about the AADI Real-Time Collector, refer TD 268 AADI Real-Time Collector Operating Manual.

Switch on the instrument by pressing the power button in the front of the instrument.

The following steps depend on what windows version are installed on your PC and what SeaGuardII version and AADI Real-Time Collector you are using.

You may download the latest version of or software image from our webpage ***https://www.aanderaa.com/*** or use the link below.

AADI- Real-Time Collector:
https://aanderaa1.xyleminc.com/AADI%20Real-Time%20Collector/

SeaGuardII Image:
https://www.aanderaa.com/media/software/seaguardii-latest-firmware.zip

4.2 Version Dependencies

What alternatives you may use depends on your image version and if you have WMDC available.

4.2.1 SeaGuardII

- Image older than 3.0.224
    - AADI Real-Time Collector version older than 7.0.11.0
        - WMDC(ActiveSync)
    - AADI Real-Time Collector version 7.0.11.0 or newer.
        - Use USB ActiveSync

- Image 3.0.224 or newer
    - AADI Real-Time Collector version 7.0.11.0 or newer needed.
        - Use USB Serial, without WMDC
        - Use USB ActiveSync, with WMDC

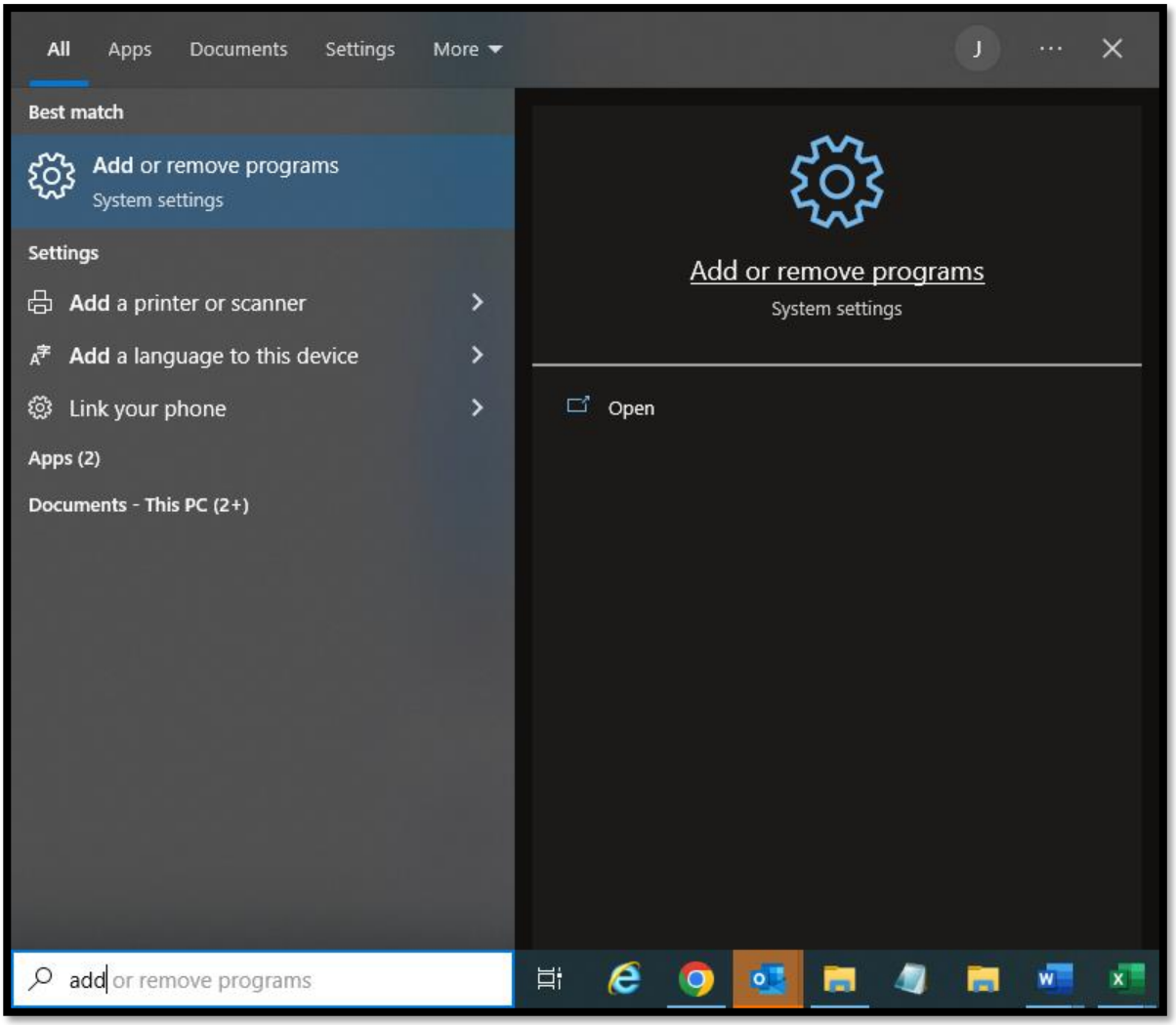
Please note that there may also be a version dependency if you have older sensors installed.

4.3 Installing or updating AADI Real-Time Collector

If you already have an older version of AADI Real-Time Collector installed. You need to remove this before you install the newest version.

4.3.1 Remove older version.

Please note that the example shown might be different on your screen depending on Window version.



Type ***add*** in the lower left search window.

Select ***Add or remove programs***.

Figure 4-1: Remove older version

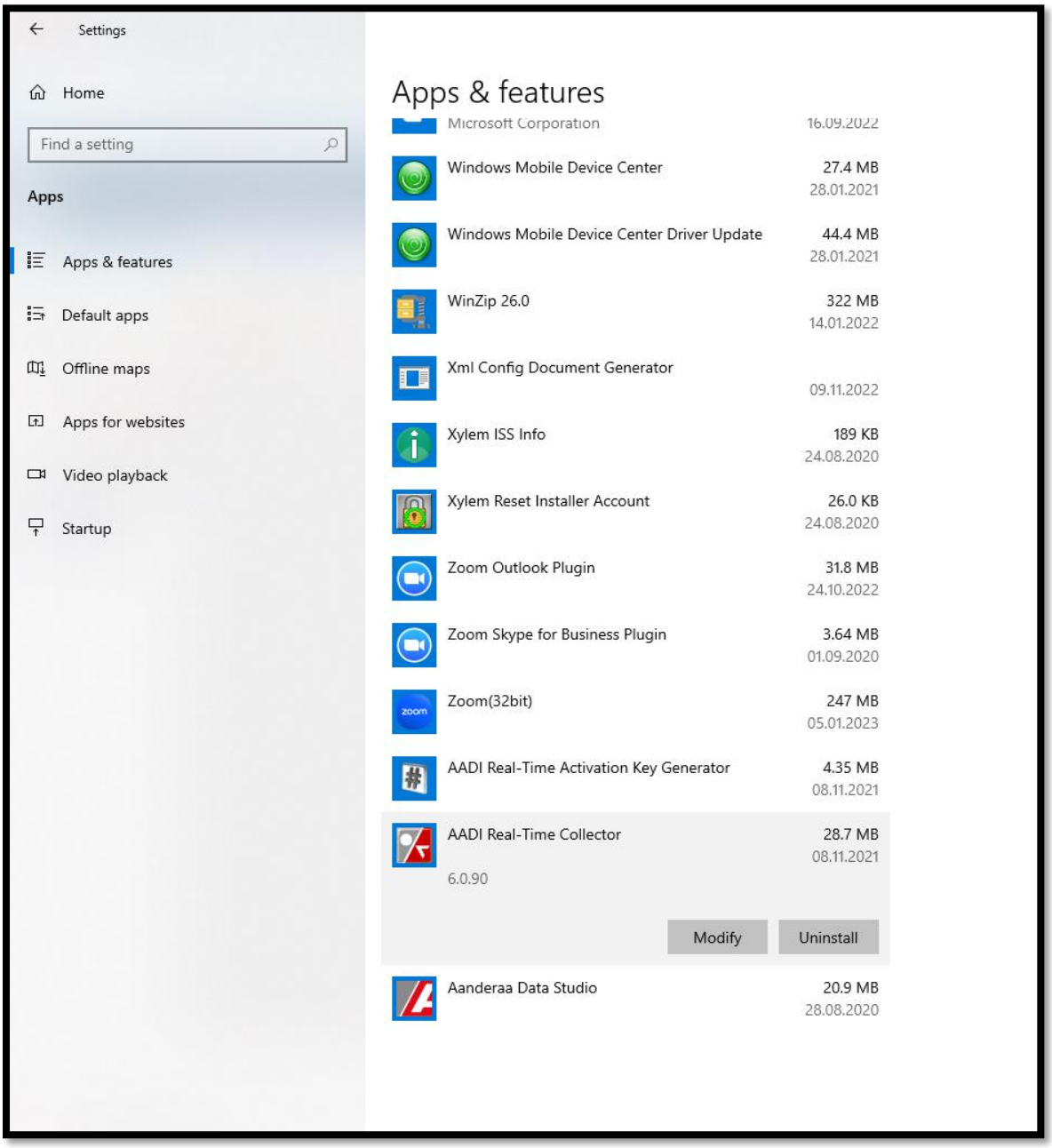


Figure 4-2: List of Apps

A new window will show up.

Select ***APPs & features***.

Select ***AADI Real-Time Collector***.

Select ***Uninstall***.

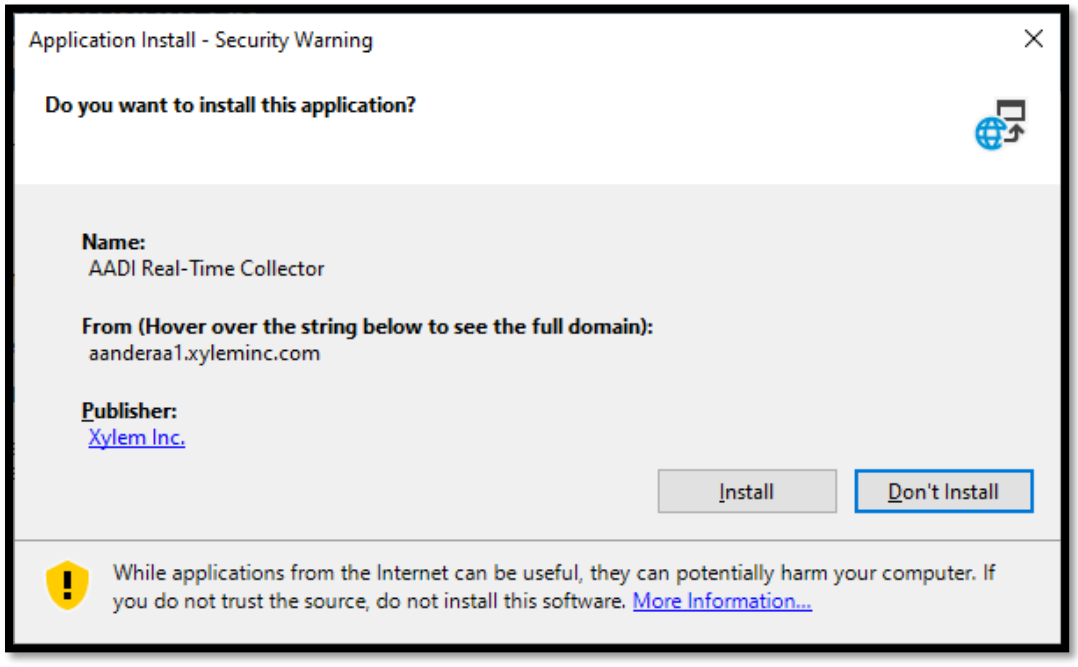
.

Wait until the software is removed.

Figure 4-3: Removing software

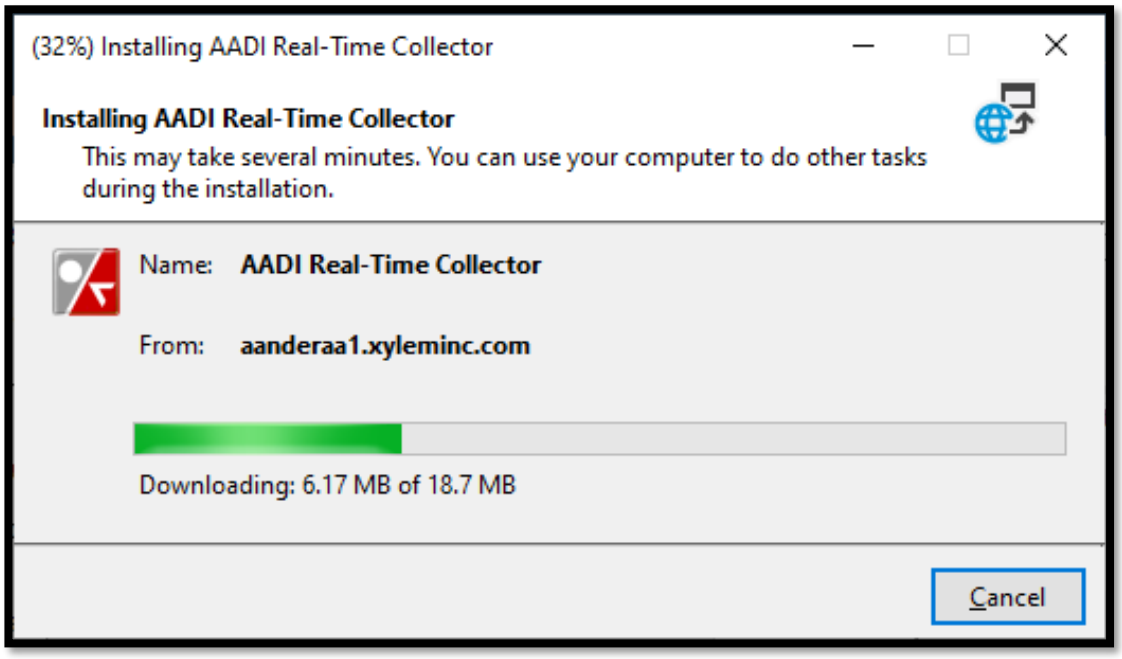
Select the new installation file from link and then press on ***Install*** to start the installation.

Figure 4-4: AADIReal-Time Collector Install



Press Install again.

Figure 4-5: Start Install.



Wait until the software are installed.

Figure 4-6: Complete installation.

If you are not able to install the new version, please contact your administrator or contact Aanderaa.support@xylem.com

4.4 SeaGuard II connection

- Upgrade SeaGuardII to Image 3.0.224 (or later).
- Upgrade AADI Real-Time Collector to version 7.0.11.0 (or later)
- Connect the USB cable.

4.4.1 USB as virtual Comport/USB Serial

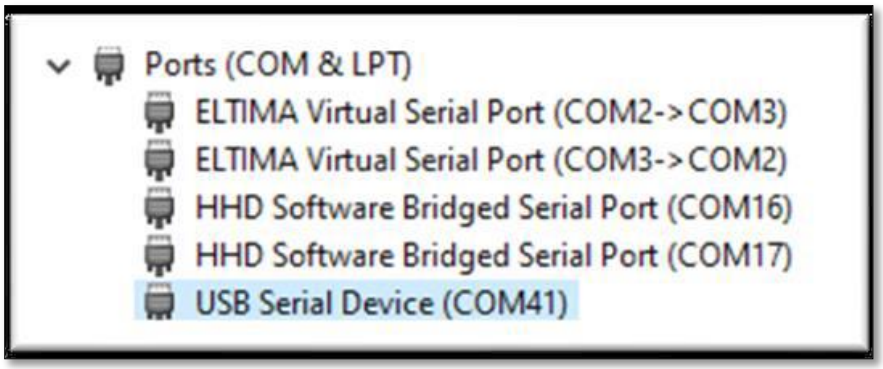
This alternative is used if you don't have WMDC (Windows Mobile Device Center on your PC).

- Create a text file called "***StartupConfig.txt***" and set following content:
  "***usbfunction = virtualcomport***".
- Place the file on the SeaGuardII SD Card.
- Insert the SD Card.
- Reboot the SeaGuardII.

StartupConfig.txt

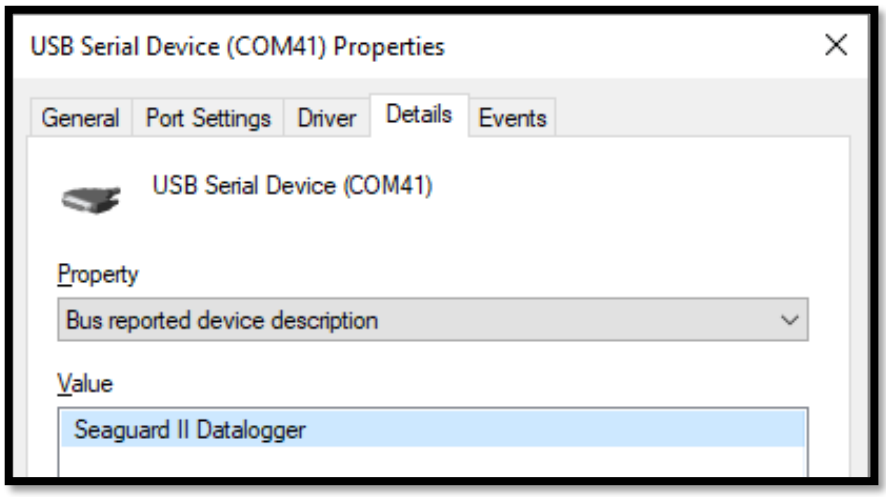
usbfunction = virtualcomport

After reboot the SeaGuardII will appear in Device Manager:



Click on the USB Serial Device.

Figure 4-7: Ports in Device Manager



Note which COM-port the SeaGuardII is connected to.

Figure 4-8: Virtual COM-port

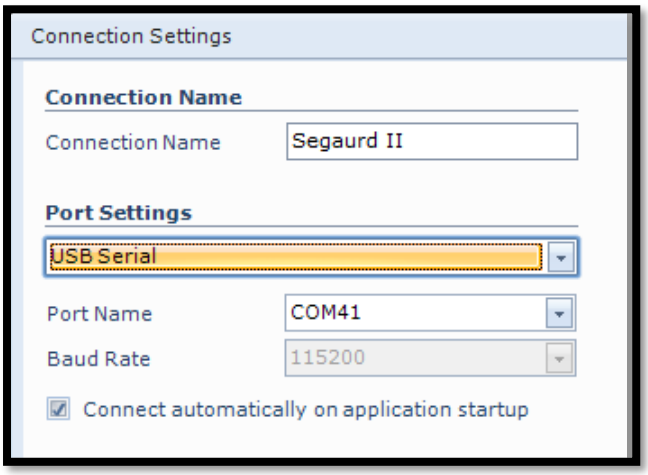


Figure 4-9: Connection Settings USB Serial

In ***AADI Real-Time Collector > Settings > Connection Settings*** configure a connection as ***USB Serial*** and select the COM-port as ***Port Name***.

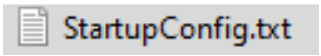
4.4.2 USB as Active Sync (WMDC):

This alternative is used if you have WMDC (Windows Mobile Device Center on your PC).

- Create a text file called "***StartupConfig.txt***" and set following content:

  "*usbfunction = activesync*".

- Place the file on the SeaGuardII SD Card.
- Insert the SD Card and reboot the SeaGuardII.
- Reboot the SeaGuardII.



usbfunction = activesync

After reboot the SeaGuardII will appear in Device Manager:

Figure 4-10: Device Manager

Start Windows Mobile Device Center.

Figure 4-11: Windows Mobile Device Manager

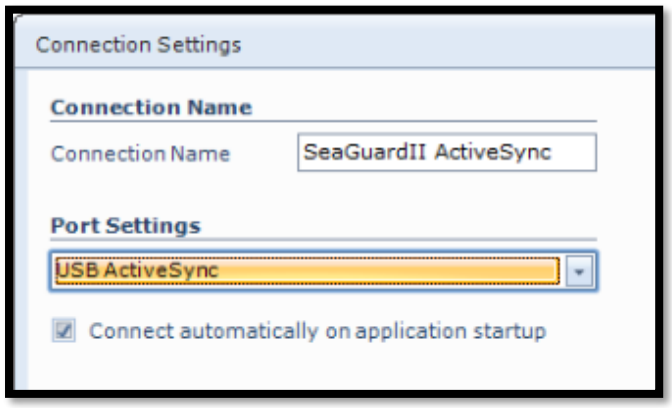


Figure 4-12: Connection Settings USB ActiveSync

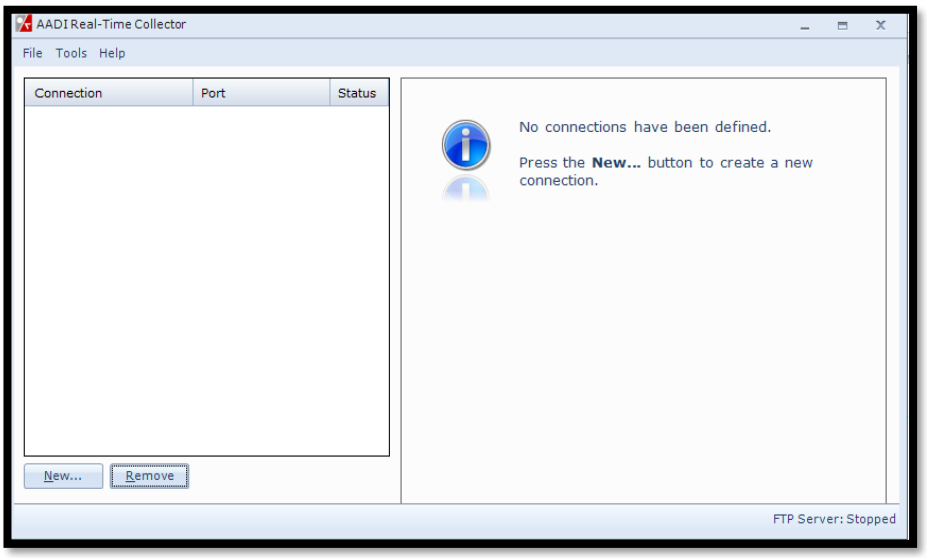
In ***AADI Real-Time Collector > Settings > Connection Settings*** configure a connection as ***USB ActiveSync***:

4.5 SeaGuardII Image Upgrade

See ***CHAPTER 14*** for a detailed instruction how to upgrade the instrument image. Please note that an image upgrade may also require a AADI Real-Time Collector update. Some older SeaGuardII might be returned to factory for a complete upgrade due to some hardware requirements. Contact Aanderaa.support@xylem.com or your local representative for assistance.

CHAPTER 5 **Preparing the instrument for deployment**

Your SeaGuardII Platform has been configured from the factory to optimize the recording situation in which the instrument is to be used. This chapter describes how to start and configure your SeaGuardII for a deployment using the USB connection and ***AADI Real-time Collector***. To configure the instrument in real time, refer to ***CHAPTER 7*** *Error! Reference source not found.*for a description of the configuration menus related to real time.
Before each deployment, you must consider configuration properties that determine how the sensors and the data logger will collect data. Examples of configuration properties are recording interval, enabling/disabling of measurement parameters, sampling interval, sensor groups, etc. During configuration of the data logger, the configuration properties are defined by the user.



Press ***New*** to create a new connection or select one connection from the list if already made.

Figure 5-1: AADI Real-Time Collector start up menu

Write a name in the ***Connection Name*** box (for i.e. SeaGuardII)

Select ***USB ActiveSync*** or ***USB Serial*** from the ***Port Settings*** drop down menu, refer ***CHAPTER 4*** for guidance.

If you do not manage to connect when reusing an existing connection make sure that the COM port in Settings is the same port as you try to connect to.

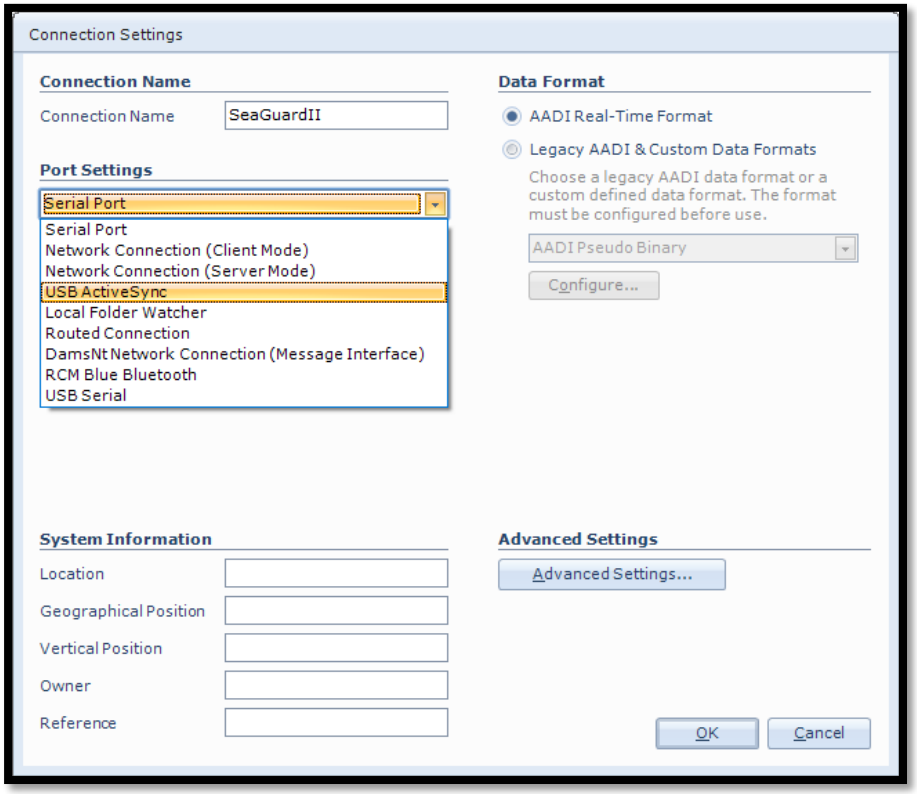


Figure 5-2: AADI Real time Collector connection settings

Press ***OK.***

NOTE: This only needs to be done once. ***AADI Real-Time Collector*** will use the same settings at next connection.

Press ***Open Port*** and then connection to the ***SeaGuardII*** should be established within a few seconds and the status light turns green.

If you do not manage to connect when reusing an existing connection make sure that the COM port in Settings is the same port as you try to connect to.

5.1 Changing Values

In the following chapters we will learn more about the SeaGuardII configuration. Sometimes you will need to change the value of a property.

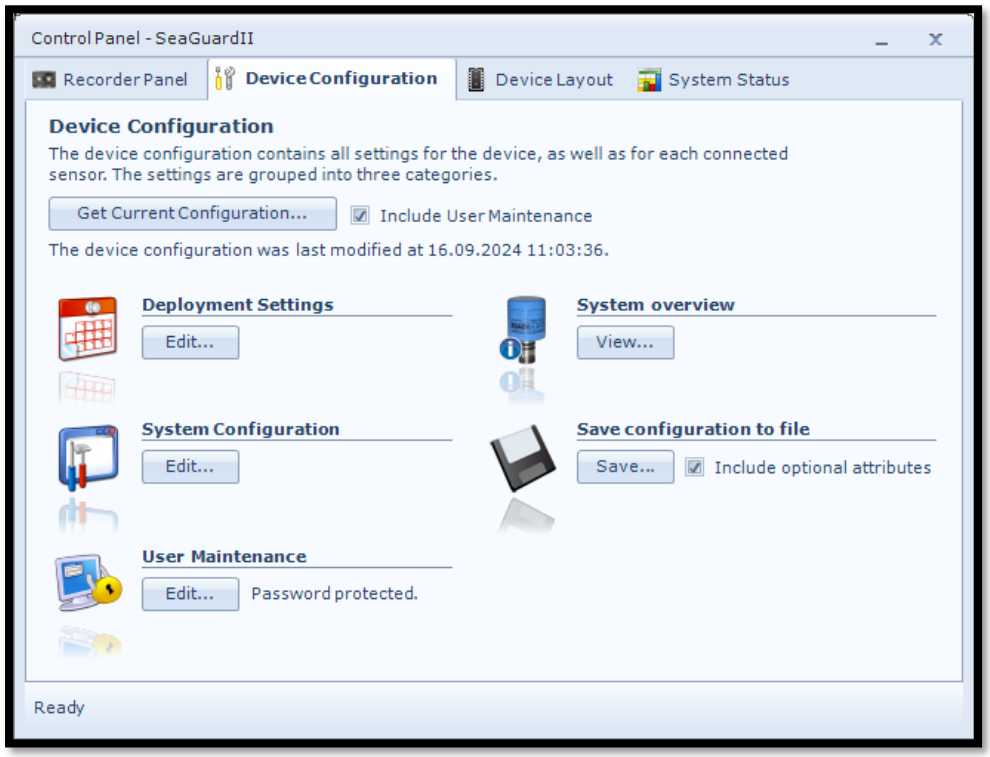


Figure 5-3: Device Configuration

First select the tab where the property is located. In this example: ***Device Configuration.***

Then press ***Get Current Configuration…***

If you want to change settings in ***User Maintenance,*** you need to tick of ***Include User Maintenance*** before pressing ***Get Current Configuration…***

Under ***Deployment Setting*** press ***Edit…***

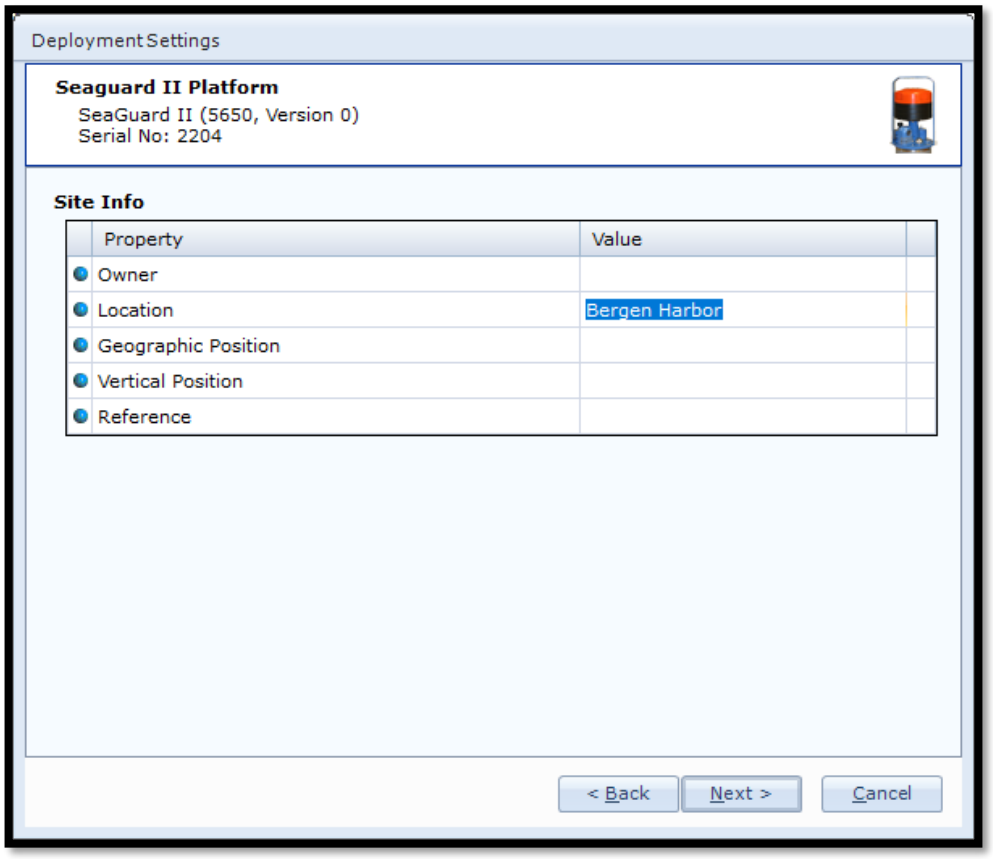


Figure 5-4 Change value

Select by double clicking on the ***Platform*** icon.

Then select the property you want to change in this example ***Location*** by clicking the ***Value*** box next to ***Location***.

To change a value enter the new text or number in the value box and press ***Next.***

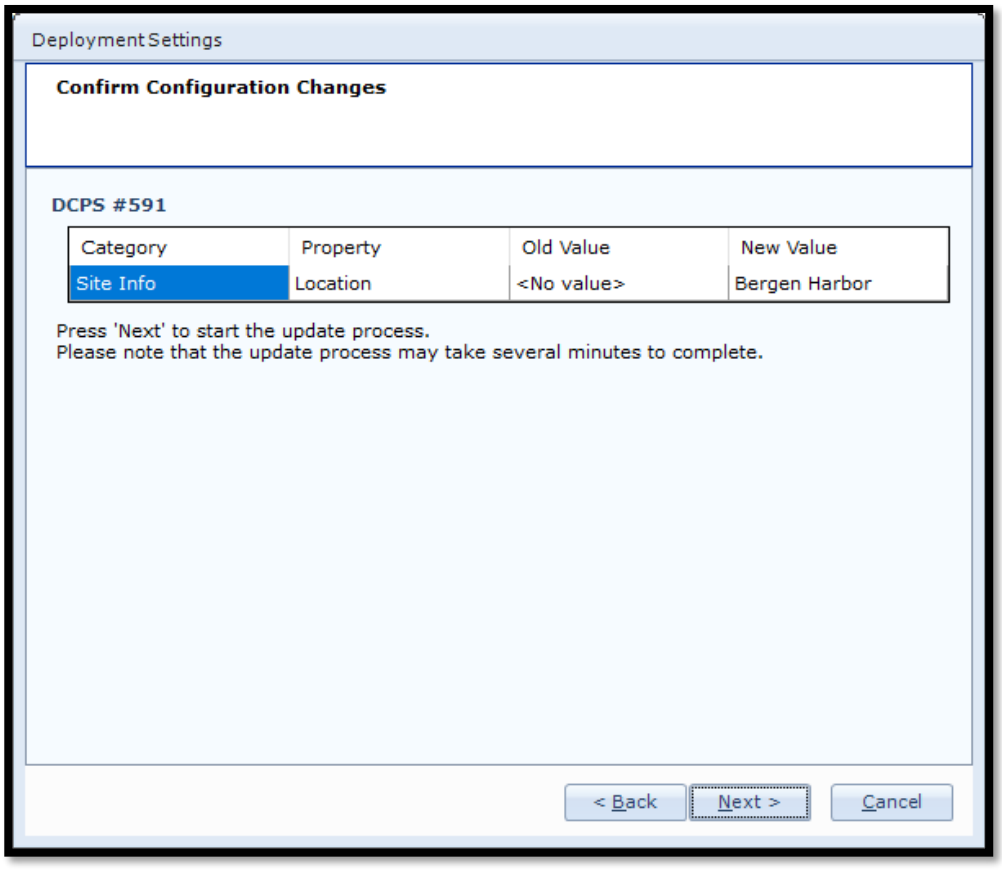


Figure 5-5 Confirm Configuration Changes

Some boxes contain text and others contain numbers. Some of the boxes only accept a specific set of options while other accept free text or any numbers. Check each property about accepted content for each property.

In the next window called ***Confirm Configuration Changes*** you will find a list of all changed properties with old and new values.

If the list of configuration changes is correct press ***Next*** to start the update process.

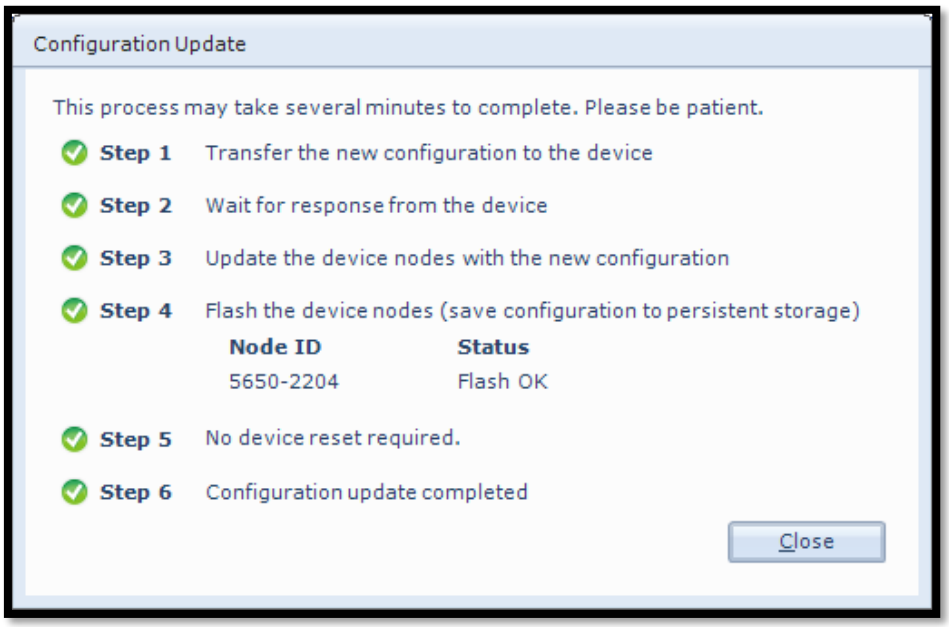


Figure 5-6 Configuration Update

An automatic process will start with 6 steps transferring and storing the new settings in the sensor ***Flash***.

If necessary, a reset will be executed.

Do not switch off before the entire process is completed.

.

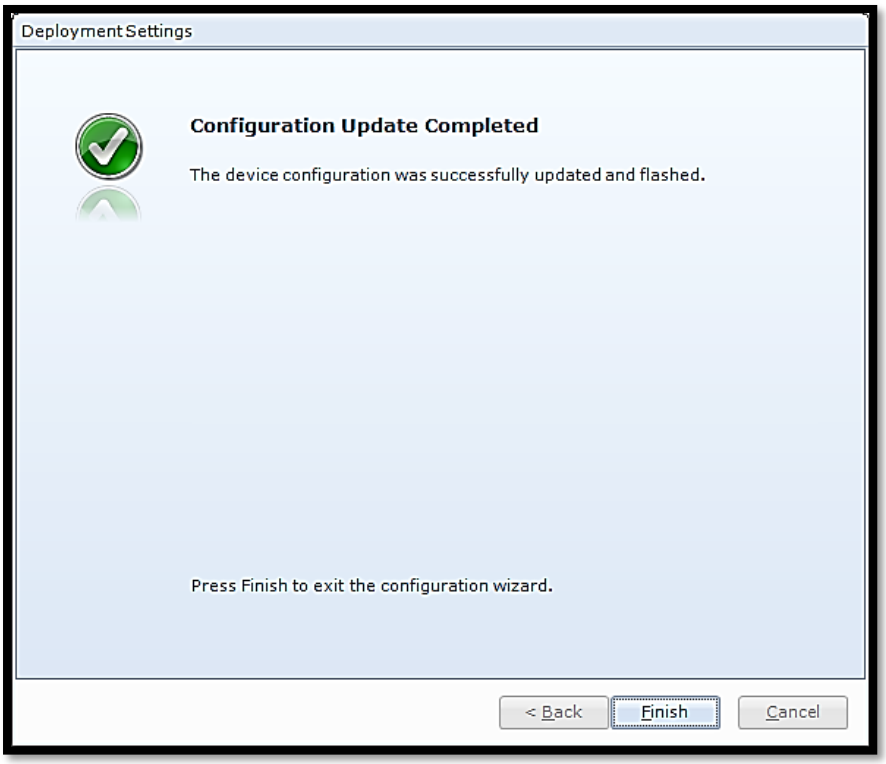


Figure 5-7 Configuration Update Completed

When the updating process is finished a confirmation will show up. Press ***Finish*** to continue.

If the process is not completed please repeat the process until you confirm that the changes are confirmed.

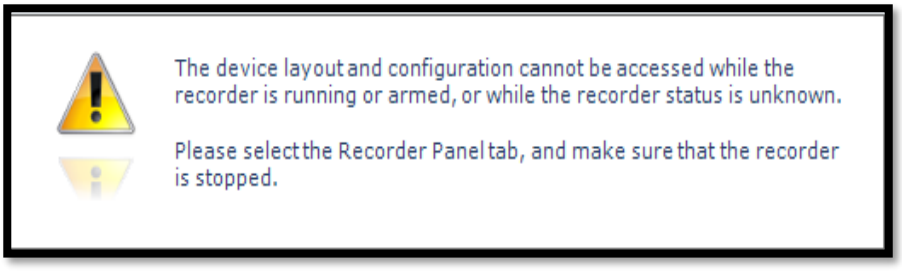


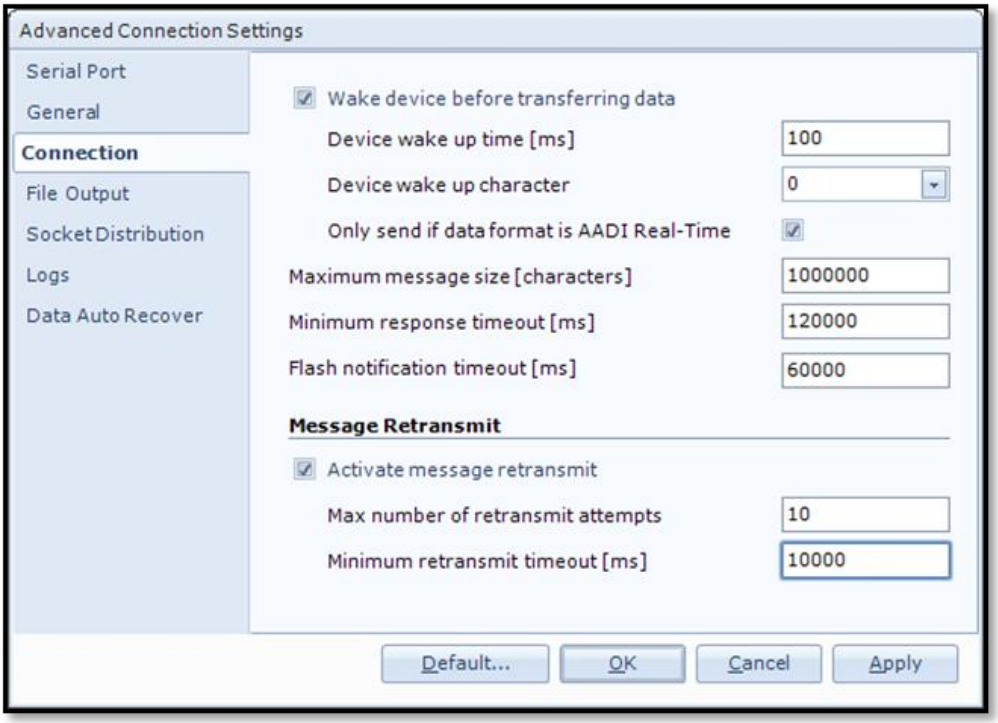
Figure 5-8: Warning after changing values

When you click finish the following warning may show up. Then you need to open the ***Recorder Panel*** and select ***Stop*** or ***Stop All Groups*** and/or press the ***Refresh Status*** button.

5.2 Advanced Connection Settings

In the main menu select ***Settings*** and then ***Advanced Settings*** under ***Advanced Settings***.

In the ***Advanced Connection Settings*** window select ***Connection*** from the list on the left side.



AADI Real-Time Collector uses a default setting that fits for most Smart Sensors. However some sensors like the ***DCPS*** may output a large amount of data and might have longer response time (depending on the configuration) than other smart sensors.

Some of the connection settings might need to be changed. We recommend using the settings as shown in ***Figure 5-9*** if a DCPS or similar are connected.

Figure 5-9: Advanced connection setting

After updating the ***Advanced Connection Settings***, click on ***Apply*** and ***OK*** and then ***OK*** to go back to the start screen.

The ***Advanced Settings*** are only accessible to change when the port is closed. If the settings are grey, then you first need to close the port.

5.3 SeaGuardII configuration steps

What steps you need to do to configure a SeaGuardII depends on which sensors connected, How you want to store/present the data and the location where you want to measure. In the following pages we will give you a guideline and explain the different settings available.

After adding a new connection this is shown in the ***AADI Real-Time Collector*** connection list.

The connection list might contain different connection to other sensors as well. Then highlight your connection to proceed.

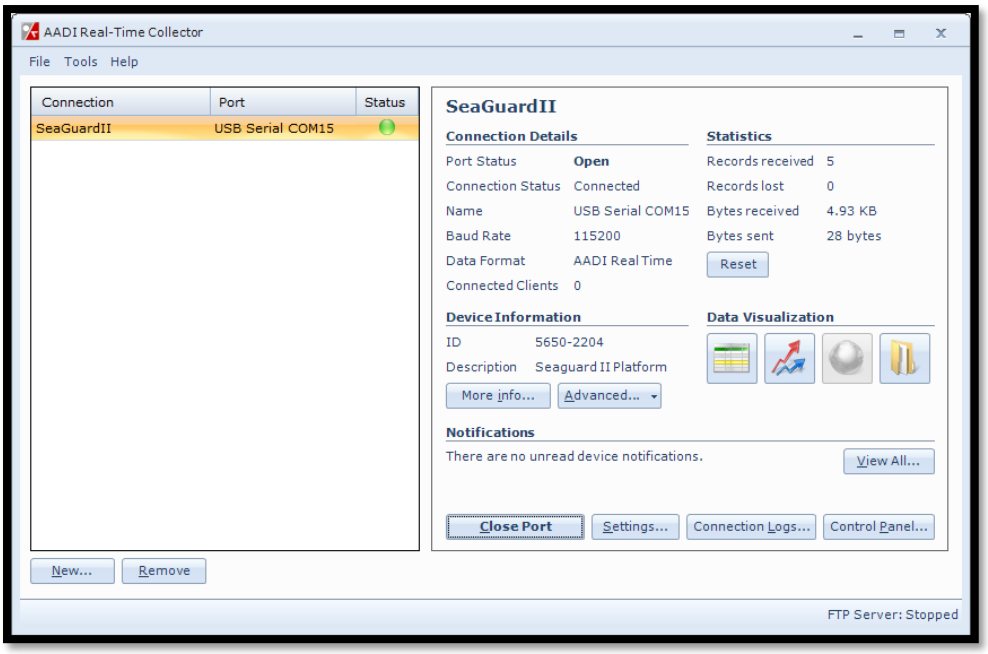


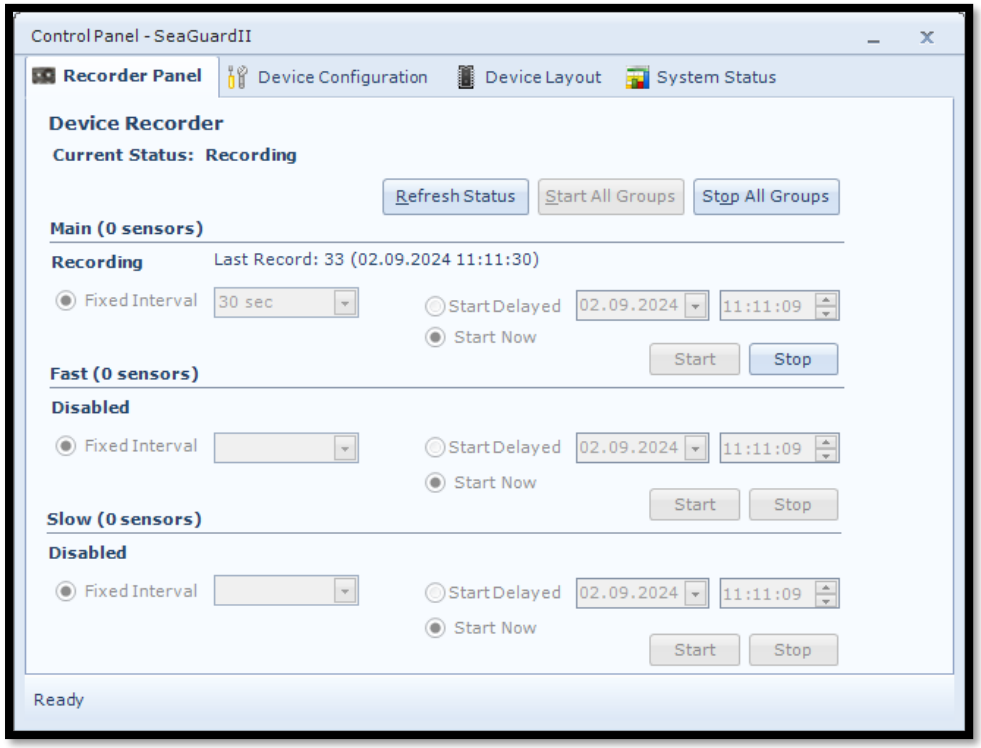
Figure 5-10: AADI Real-Time Collector main menu

Press ***Open Port*** and then connection to the ***SeaGuardII*** should be established within a few seconds and the status light turns green.

For information about the different available options in the Main Menu, refer to the TD 268 AADI Real-Time Collector.

To start the configuration press ***Control Panel*** in lower right corner.

5.4 Control Panel



Note! The configuration cannot be changed during a recording session.

You may either click on ***Stop All Groups*** or stop each group individually using the ***Stop*** button.

Start and stop the recording in the ***Recorder Panel.***

By selecting ***"Start Delayed",*** you can enter the date and time you would like the instrument to start recording.

Figure 5-11: Control panel

Please note that these tabs are controlling the SeaGuardII, and the sensor is controlled by the SeaGuardII together with all other sensors and equipment connected to the same logger.

The control panel has 4 tabs or menus and many subgroups:

- ***Recorder Panel***; to start and stop recordings, setting a fixed recording interval or setting up a delayed start. ***Fixed Interval*** can also be set in the ***Multi Group Recorder*** menu.

- ***Device Configuration***; holds settings that the user can change to set up the system for a particular deployment. A default configuration is stored in all AiCaP sensors, but these settings can be modified. A new configuration will then be stored in the sensor and used further. For analog and serial sensors the configuration is stored in the SeaGuardII. They will not be visible in ***Device Configuration*** before they are activated in ***Device Layout***. ***Device Configuration*** is categorized into five menus: ***Deployment Settings, System Configuration***, ***User Maintenance***, ***System Overview*** and ***Save Configuration to file***.

  - ***Deployment Settings*** deals with settings related to the location, recorder groups and parameter particular to a deployment site like for e.g. geographical position, sampling interval, group members, etc.
  - ***System Configuration*** settings deals with settings that are usually not changed between deployments/recording sessions like e.g. sensor output parameter.
  - ***User Maintenance*** deals with advanced settings that are rarely changed in a system setup. The user needs a certain level of skills and system understanding. Access to this menu is password protected to avoid any fatal error changes by non-advanced users.
  - ***System Overview*** holds information for each item about ***Product Name, Number and firmware version***.
  - ***Save Configuration to file*** gives you an option to store configuration for later use.

- ***Device Layout*** is used to specify non smart sensors and other devices connected to the SeaGuardII. It contains the individual sensors product identification and parameter definition (name, unit, data type, max and min limits). For all AiCaP sensors this information is stored in the sensor and transferred to the SeaGuardII at power up. For all other sensors the information is stored in the SeaGuardII.

- ***System Status***, holds information about System Status, SD-Card status and RAM usage.

5.5 Recorder Panel

In the ***Recorder Panel*** you will find 3 groups that are all controlled by the SeaGuardII. Each group might have a different recording interval. Each group can contain different kind of sensors with different outputs. Also 3rd party sensors connected to the SeaGuardII can be controlled by the logger. Each group can individually be either set to ***Start Now*** or ***Start Delayed***. To check in which group a sensor is placed or move it to another group select ***Multi Group Recorder*** under ***Device Configuration*** > ***Device Nodes*** and then check ***Add/Remove Sensors*** for each group. The ***Fixed Interval*** or recording interval can be configured individual for each group either in ***Recorder Panel*** or in the ***Multi Group Recorder*** menu.

Each Sensor will do a calculation based on the configuration for each recording interval.

Most sensors are making their measurement in the end of a recording interval.

If DCPS is used and Acoustic Wave is enabled then one recording interval will consist of a wave measurement period followed by one current measurement period. During the Wave measurement period only a reduced current measurement is calculated. Other sensors in the same group will present one measurement during each recording interval.

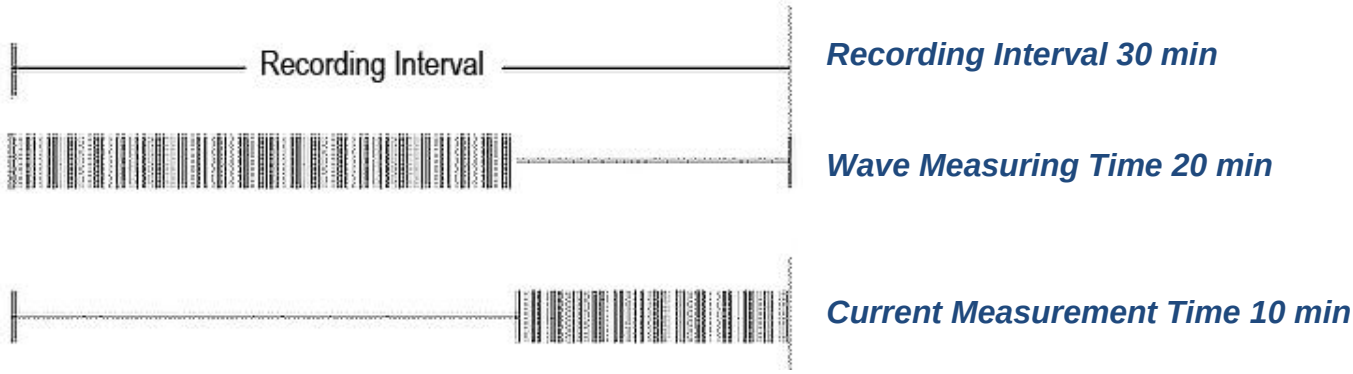


Figure 5-12: Typical Recording Interval Acoustic Wave and Current

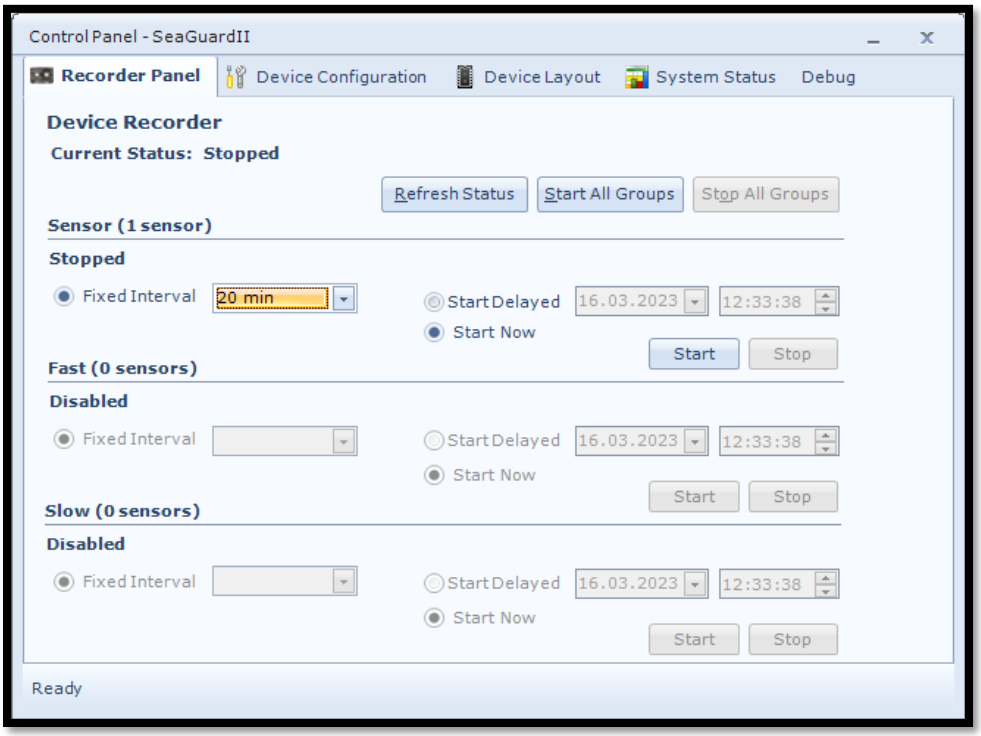


Figure 5-13: Recorder panel

Select ***Recorder Panel.***
Note! *The configuration cannot be changed during a recording session.*

If the instrument is recording, under ***Recorder Panel,*** press ***"Stop All Groups".***

Each recording group may be set to either ***Start Now*** or ***Start Delayed.***
Please note that the recorder panel controls the SeaGuardII recording, and each sensor connected are controlled by the SeaGuardII.

Note! The screen shots might show minor discrepancies compared to screen shots taken from your sensor due to sensor updates.
Note! We recommend that you verify the system settings prior to starting a recording session.

5.6 Device Configuration

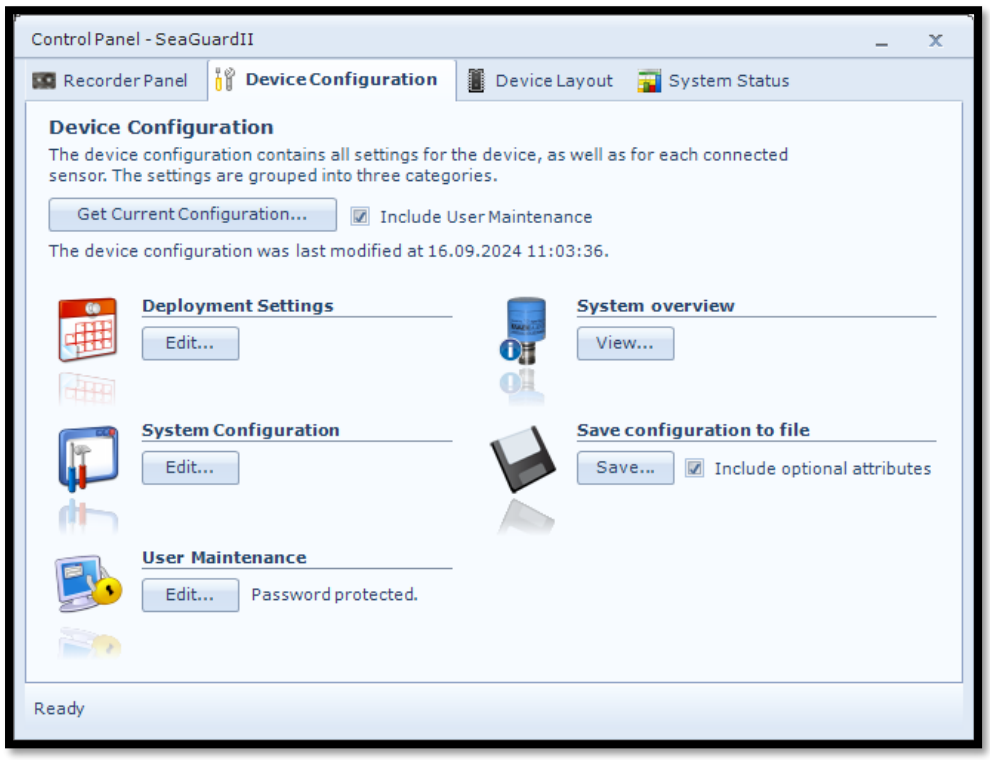


Figure 5-14: Device Configuration

To start configuring the instrument, select the ***Device Configuration*** tab on the top row in the ***Control Panel***.

Press ***"Get Current Configuration..."*** to get the actual configuration from the SeaGuardII.

Tick off ***Include User Maintenance*** before ***"Get Current Configuration..."*** if you also want access to the ***User Maintenance*** menu.

This level is protected with password ***1000.***

The ***Device Configuration*** is separated into five sections:

- ***Deployment settings***
- ***System Configuration***
- ***User Maintenance***
- ***System overview***
- ***Save configuration to file***

User accessible sensor properties that are used to configure the sensor are found in the first three sections. ***Deployment Settings*** are described in ***chapter 5.7*** through ***5.9***, ***System Configuration*** in ***chapter 5.10*** through ***5.14***, ***User Maintenance*** in ***chapter 5.15*** through ***5.21***. ***System Overview*** in ***chapter 5.22*** and ***Save Configuration*** to file in ***chapter 5.23.***

5.7 Deployment Settings

Deployment Settings deals with settings related to the location, recorder groups and parameter particular to a deployment site like for e.g. geographical position, sampling interval, group members, etc.

Under ***Device Configuration***, press ***"Edit…"*** in the ***Deployment Settings*** heading.

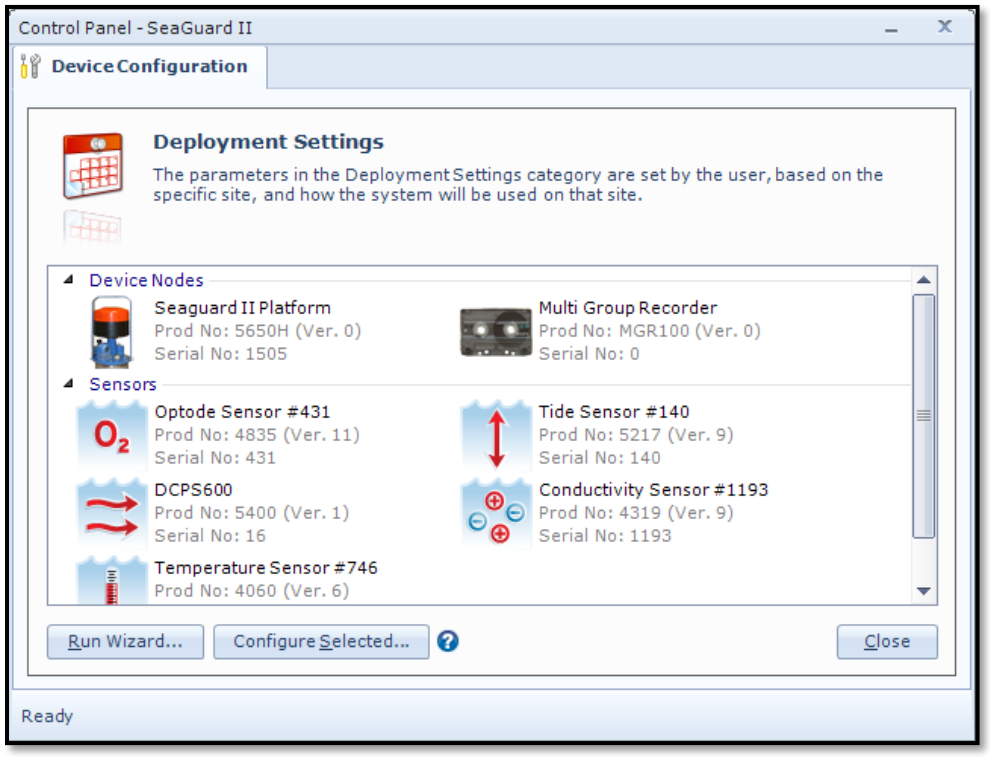


Figure 5-15: Device Settings

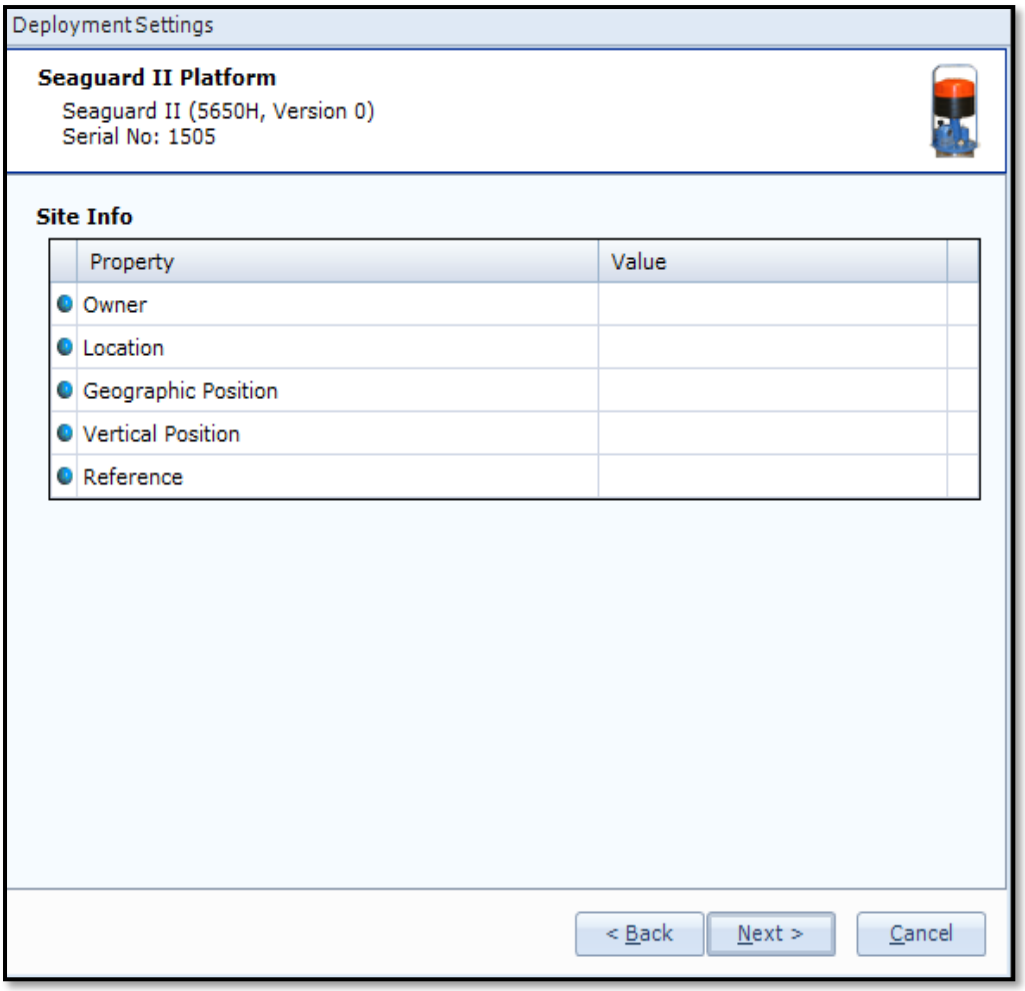
The deployment settings can be changed using either; ***Run Wizard…*** which steps you through the settings of all available nodes or, by choosing a specific node to configure; click first on the node to modify and then ***"Configure Selected…"***

The ***Deployment Settings*** are separated in two groups:

- ***Device Node***
- ***Sensors***

NOTE! You need a power reset after connecting a new AiCaP sensor before it will show up in the ***Sensors*** menu.

5.7.1 SeaGuard II Platform Deployment Settings



If you select "***Run Wizard…***" in the ***Deployment Settings***, you will first be able to define information about the deployment site for the platform. This information will be included in data output.

This information is not used in any calculations, only for information.

Press "***Next"*** to continue.

All these settings are optional information where you can enter and store information about the deployment. This can be useful information to store together with a data set.

Figure 5-16: Deployment Settings for the platform

These settings are useful if you share your data with others or want to look at data later. But it's also important to update these settings between each deployment.

5.7.2 Site Info

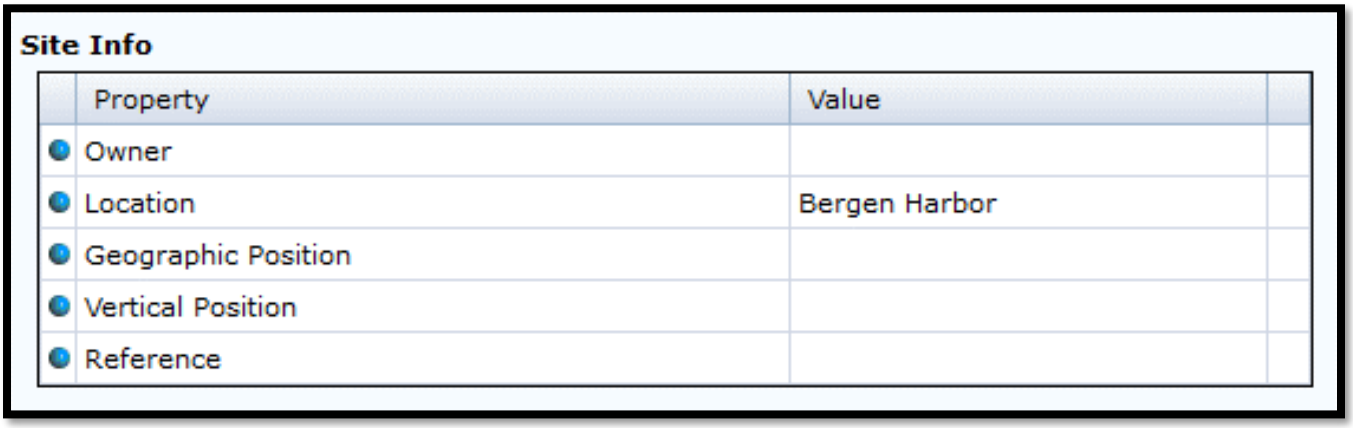


Figure 5-17: Site Info for Platform

Site Info containing five properties:

- ***Owner:*** Name of owner or similar.
- ***Location:*** Name of location where the instrument is deployed.
- ***Geographic Position:*** GPS potion for deployment format Latitude, Longitude.
- ***Vertical Position:*** Position in the water column, e.g. 5-meter depth. Especially useful if you have more than one instrument in a mooring or string and without pressure or tide sensor.
- ***Reference:*** Free text for additional information.

5.8 Multi Group Recorder Deployment Settings

Data structure is controlled by the **Multi Group Recorder Settings**. Sensors are organized in up to 3 separate groups (Group 0,1 and 2). Each group has its own recording interval and will generate its own set of data files.

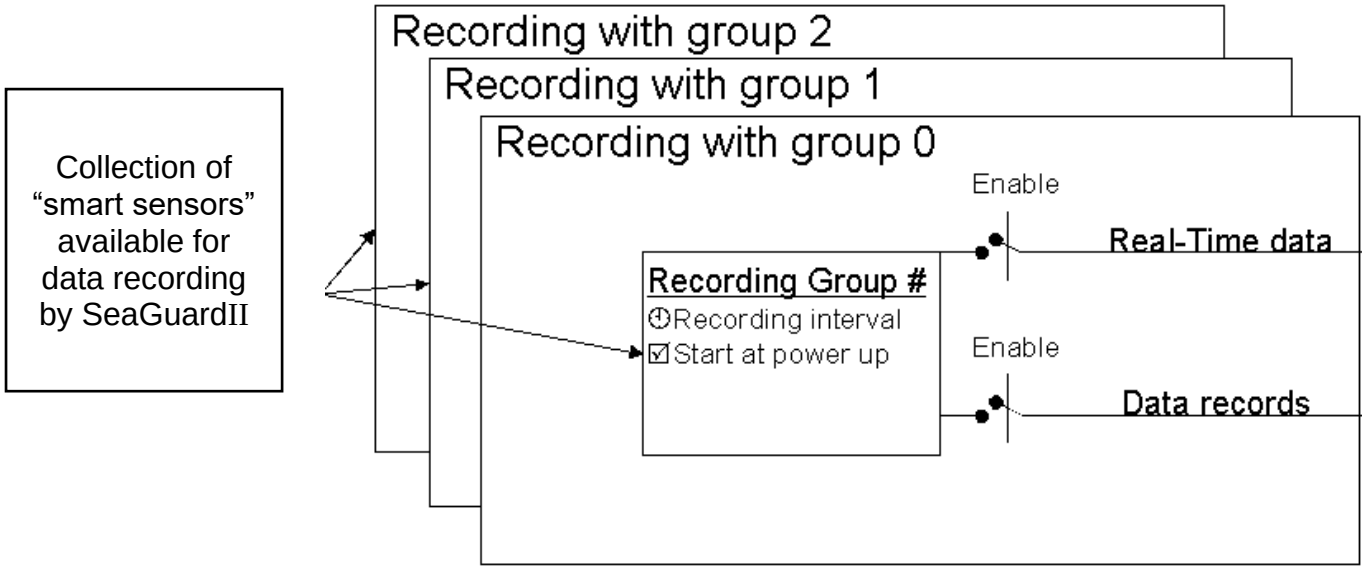


Figure 5-18: Recording group structure

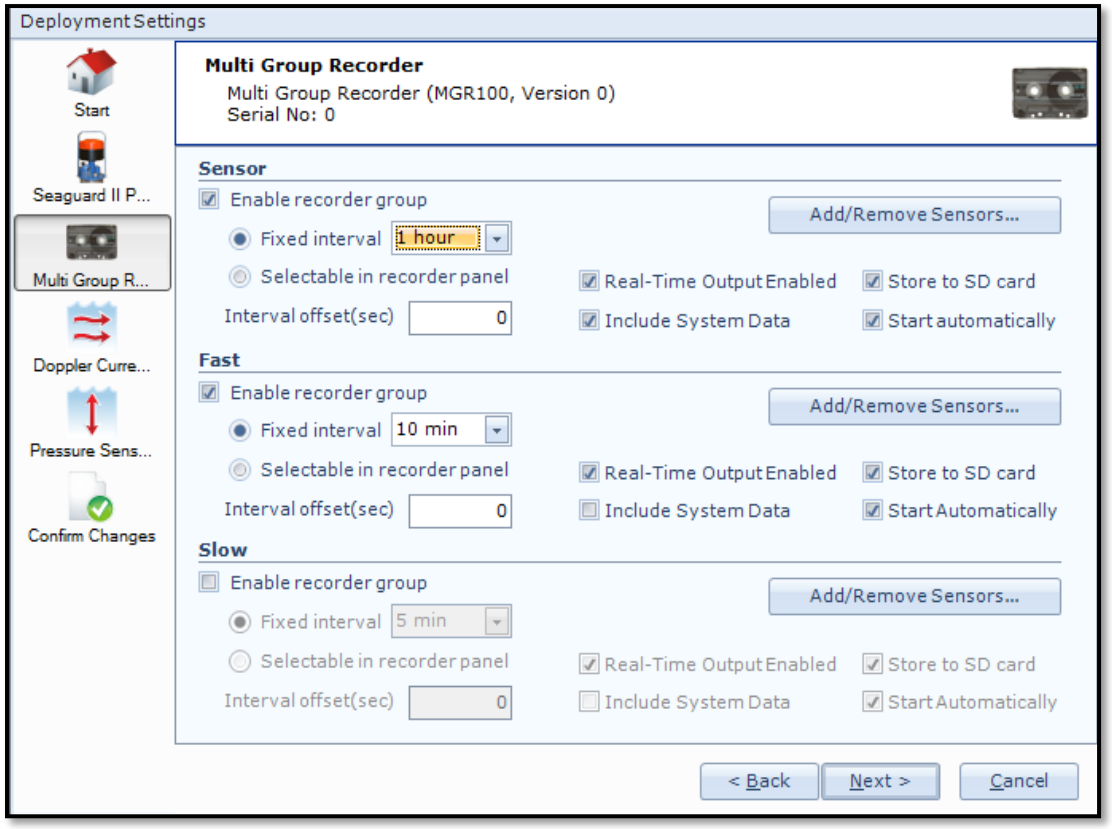


Figure 5-19: Multi Group Recorder

To configure the Multi Group Recorder: First select the groups you want to use by checking "**Enable recorder group**"

Select if you want a ***Fixed Interval*** or ***Selectable in recording panel*** for each group**.** If you select the first you will not be able to change interval in the ***Recorder Panel***.

Any changes of recording interval made directly in the recording panel could thus not be kept in the configuration session. For this reason you may also disable the option to change interval settings from the recorder panel. The group will start recording at a round time (for e.g., if you define a sampling interval of 1h and start the instrument at 11.40am, the first recording will start at 12.00am).

You can then define an **Interval offset** in seconds, if you want the interval to start with an offset (for e.g., with an offset of 300 seconds = 5 minutes, the group will start at 12.05am). The **Interval offset** can also be used to control a second or third group to start with an offset compared to the first group. (for e.g., the first two group are configured to start at 12.00am and the second group has an offset of 300seconds, then it will start at 12.05am).

In this menu, you will also define if data should be stored on the SD Card and/or transmitted in real time.

- To enable real time transmission of the selected group, select ***"Real-Time Output Enabled"***
- Select ***Store to SD card*** if you want data from this group to be stored on the SD card
- Select ***Include System Data*** if you want system data to be included in the group.

The ***System Data*** or ***System Parameters*** depends on what sensors are connected and output settings for each sensor. Typical output may be:

- ***Input Voltage***: Monitors the battery voltage during recording.
- ***Memory Used***: Monitors the use of available system memory during recording.

The ***System Parameters*** can be used for quality check and diagnostics.

Select ***Start Automatically*** if you want this group to start automatically when instrument is powered up, independently if the instrument was started up or not when previously powered up. You can select to start the instrument in the ***Recorder Panel*** to a defined time point and even if "start automatically" is not selected and instrument loses power, the instrument will start recording again. This is because the Instrument will always remember the status before power reset and return to this when power is back on.

To assign the sensors to one of the groups press the "***Add/Remove Sensor...***" button. Sensor already included in this group will be displayed in the left column and available sensors not assigned to a group will show up in the right column.

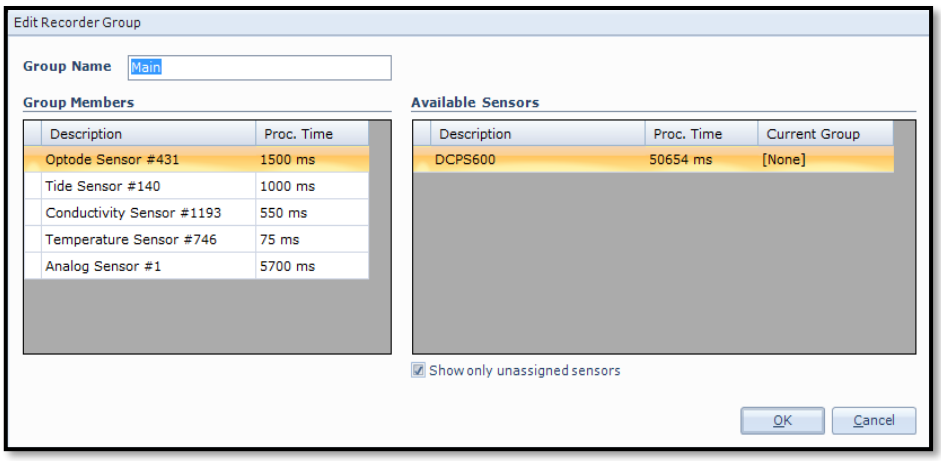


Figure 5-20: Recording group members

You may assign a sensor to a specific group by clicking on the sensor under ***Available Sensors*** and drag and drop it into the ***Group Members***.

You can modify the ***Group Name*** by clicking on the actual group name and writing the desired name.

Then press "***ok***".

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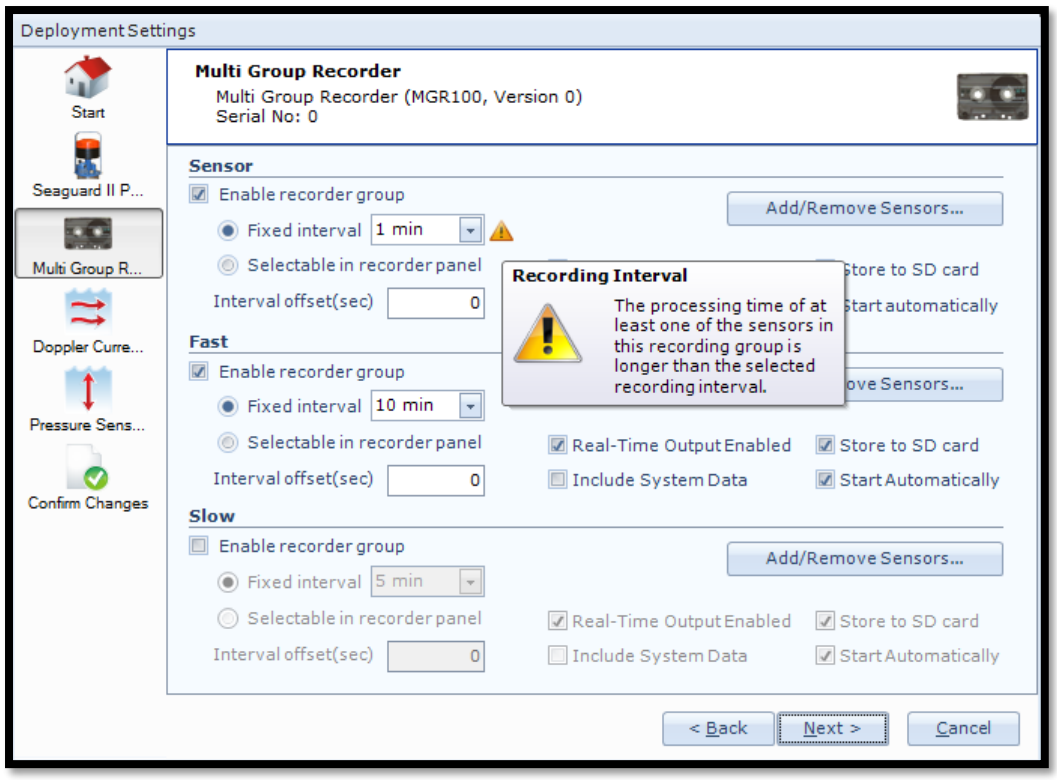


Figure 5-21: Multi Group recording interval setting

The processing time for each sensor is displayed in the ***Multi Group Recorder*** window. If the selected interval is shorter than the total processing time a warning will show up. You might then increase the interval or disable sensors.

Once the multi group recorder has been configured and by clicking "***Next***" in the wizard, you will be able to define the sensor settings for available sensors.

5.9 AiCaP Sensor Deployment settings

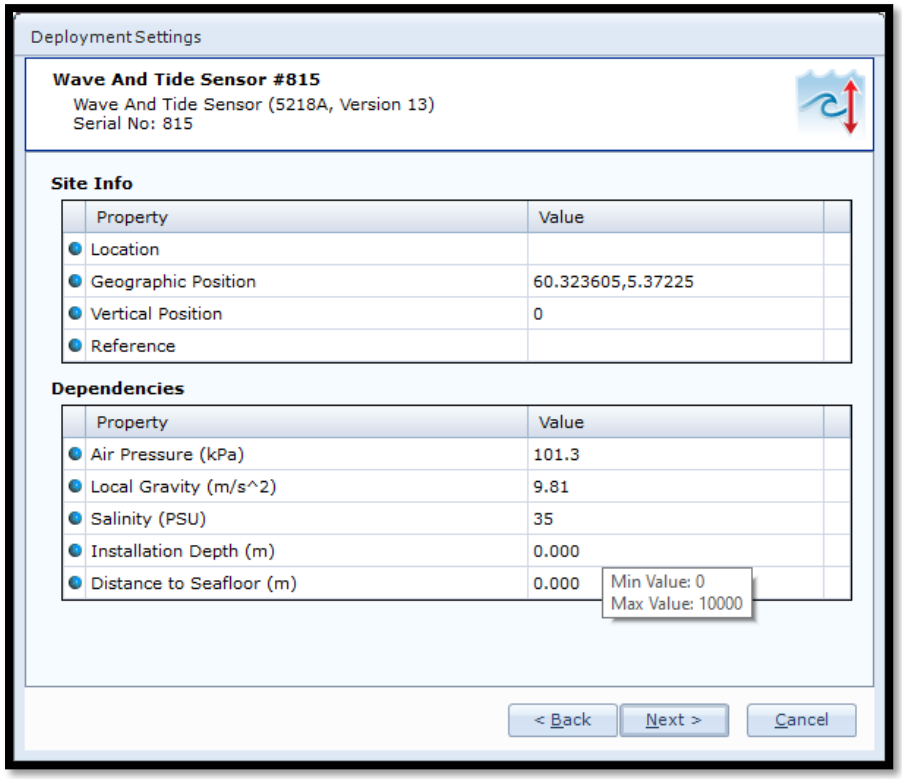


Figure 5-22: Example of sensor settings for Wave & Tide Sensor

The ***Deployment Settings*** hold information about the deployment site for each of the ***AiCaP*** sensors.

The content in this menu is highly dependent on which sensor you have selected.

Refer to Operating Manual for each sensor to see exactly what parameters are available for each sensor.

The example in this chapter shows settings for a ***Wave & Tide Sensor 5218A***.

5.9.1 Site Info

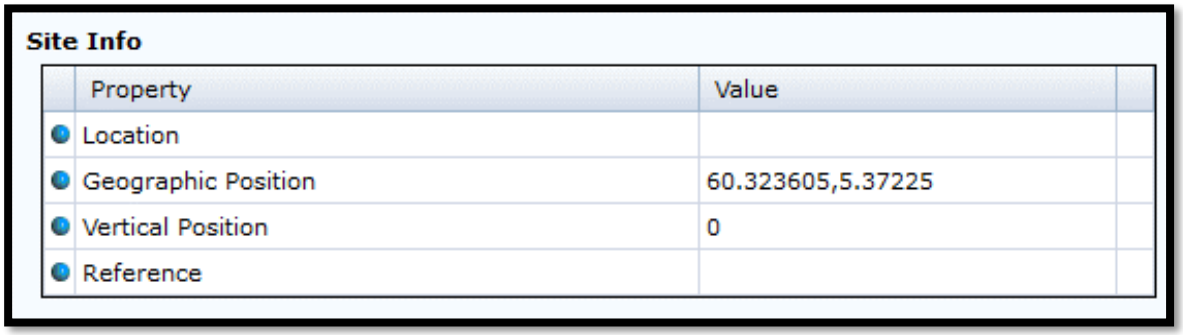


Figure 5-23: Site Info for Sensors

Site info is only used for information and not used in any calculations.

Site Info containing four properties:

- ***Location:*** Name of location where the instrument is deployed.
- ***Geographic Position:*** GPS potion for deployment format Latitude, Longitude.
- ***Vertical Position:*** Position in water column, e.g. 5-meter depth.
- ***Reference:*** Free text for additional information.

5.9.2 Dependencies

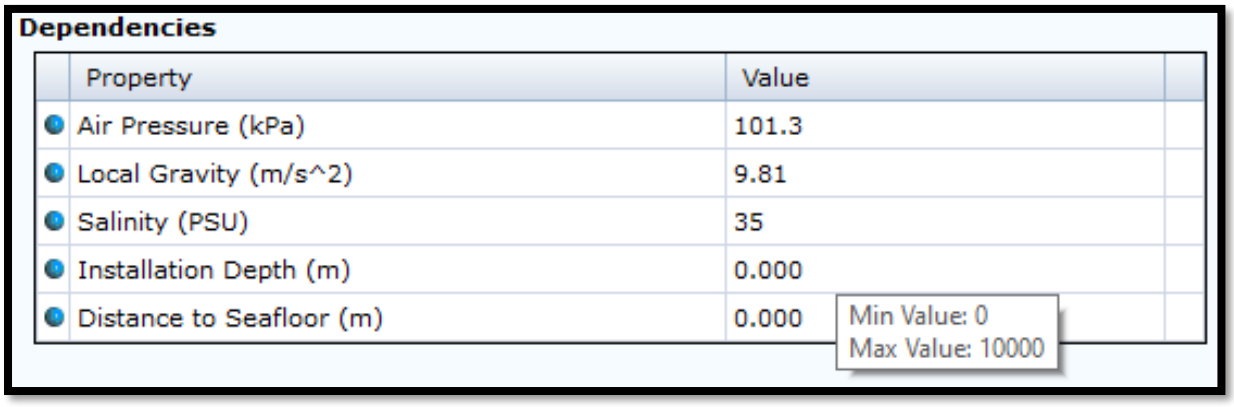


Figure 5-24: Dependencies

The ***Dependencies*** menu contains 5 parameters for Wave & Tide Sensor. These are fixed values that the sensor might use if not a measured parameter is available.

- ***Air Pressure (kPa)*** are used in calculations where barometric pressure is needed. Default value is set to 101.3kPa. If a barometric pressure sensor is connected to the SeaGuardII Platform this measured value can be used instead of the fixed.
- ***Local Gravity (m/s^2)*** are used in calculations. Default value is 9.81.
- ***Salinity (PSU)*** are used in calculations if not a Conductivity sensor is connected to the same platform. Default value is 35.
- ***Installation Depth (m)*** is a value for installation depth for the actual sensor. Default value is 0.
- ***Distance to Seafloor (m)*** is a value giving the distance from sensor to Seafloor. Default value is 0.

5.10 System Configuration

Under ***Device Configuration***, press "***Edit…"*** in the ***System Configuration*** heading. System configuration deals with settings that are proper to the sensors like e.g. sensor output parameters, measurement strategy (for e.g., the Doppler Current Profiler Sensor with number of pings, broadband / narrowband…)

The ***System Configuration*** menu is divided in two groups.

- ***Device Nodes***
- ***Sensors.***

The Sensors shows both AiCaP sensor that are automatically shown if connected when power up but also Analog and Serial Sensors that are shown if they already enabled in ***Device Layout***.

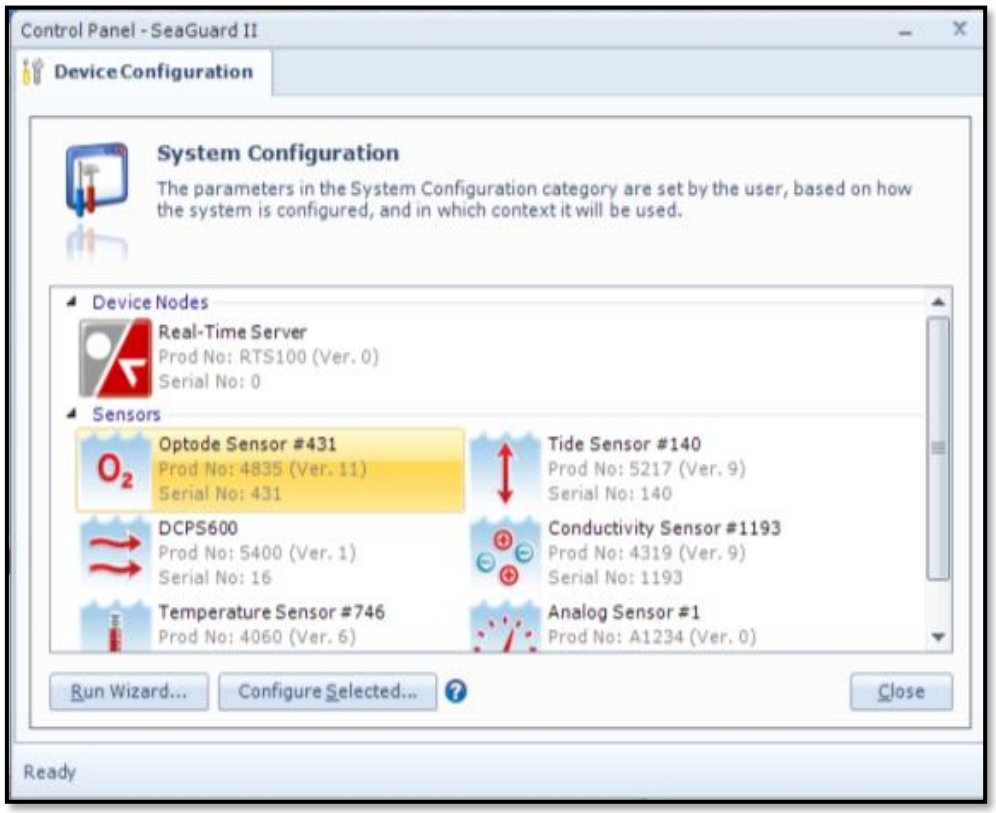


Figure 5-25: Control Panel > Device configuration > System Configuration

The **System Configuration** can be changed using either a wizard ("***Run Wizard…"***) which steps you through the settings of all available nodes or, by choosing a specific node to configure; click first on the node to modify and then "***Configure Selected…***"

5.11 System Configuration Real-Time

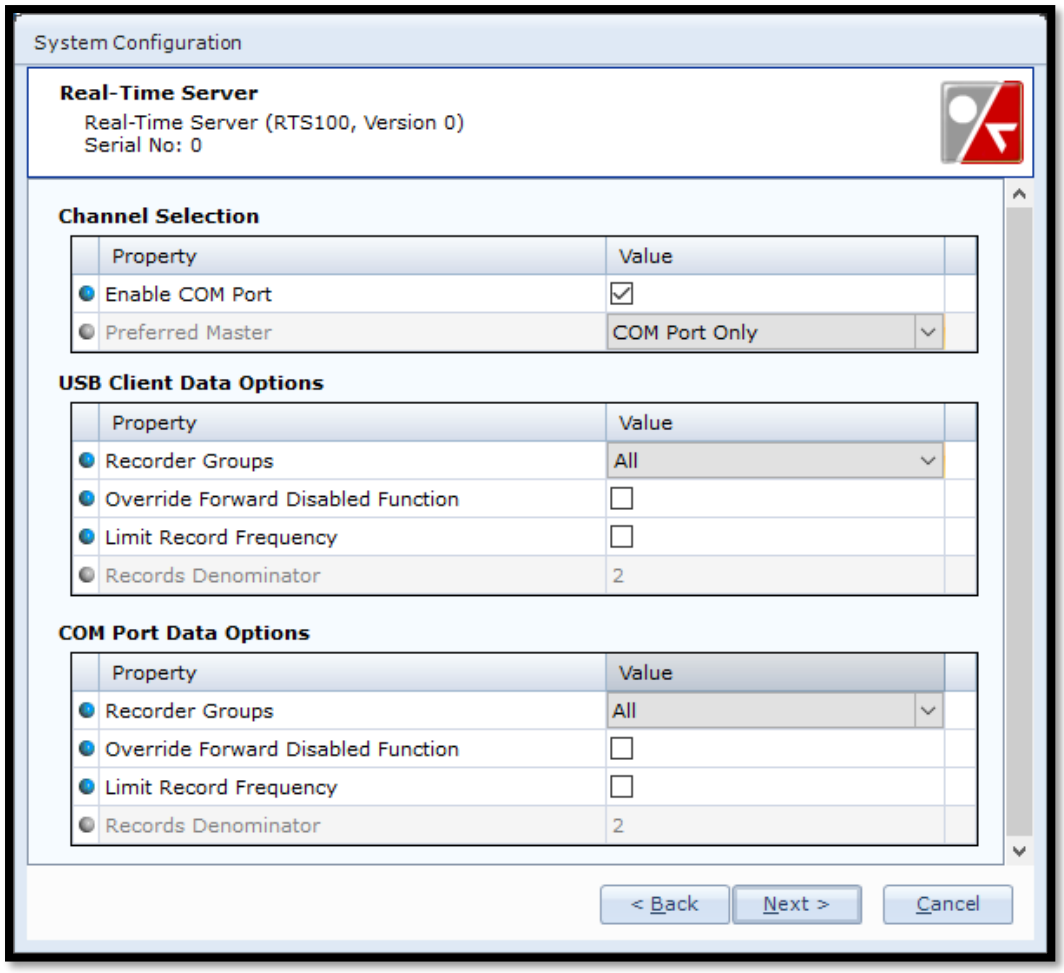


Figure 5-26: System Configuration Real-Time

The content in this menu depends on the settings done in ***Device Layout***.

COM Port settings are only available if a ***COM Port*** is also set as output.

5.11.1 Channel Selection

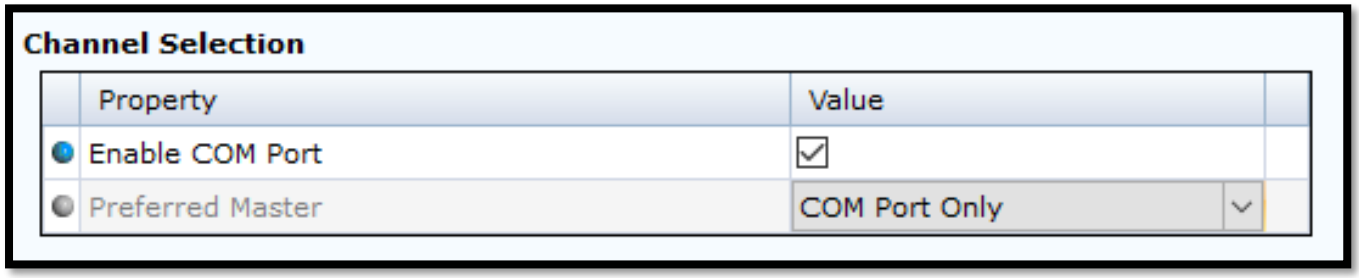


Figure 5-27: Channel Selection

Select ***Enable COM Port*** to set up for serial communication

Preferred Master has only one available setting; ***COM Port Only***.

5.11.2 USB Client Data Options

USB Client Data Options refer to real time data sent through the USB connection. This option will always be available but you may configure what to output.

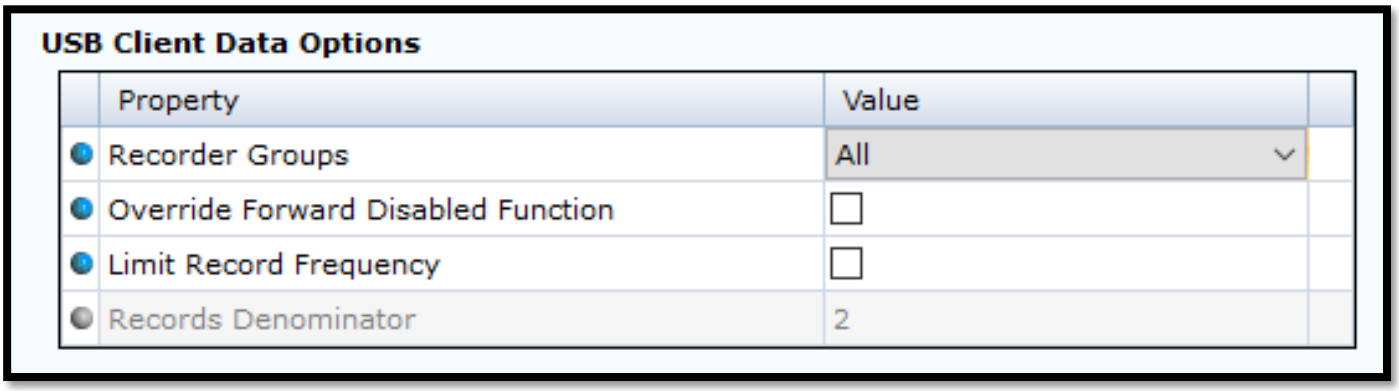


Figure 5-28: USB Client Data Options

Recorder Groups gives you the option to select which group to output in real-time through USB. Select ***All*** groups or only selected groups.

Override Forward Disabled Function; During the sensor configuration, you can define which parameters from the sensor to be sent out in real time (especially for the DCPS which provides a large amount of data) By selecting the ***Override Forward Disabled Function***, even if you have selected to transmit only some parameters from the sensor for the real time, all parameters will be sent anyway through USB if selected under the ***USB Client Data Options***.

Limit Record Frequency gives you the opportunity to not transmit every record in real-time.

Record Denominators if set to 2 and ***Limit Record Frequency*** are selected, every second record will be transmitted via USB but all records will be stored to SD card if enabled.

5.11.3 COM Port Data Options

COM Port Data Options concerns data sent in real time through ***COM Port***. This is only available if one ***COM Port*** is set as output in ***Device Layout***.

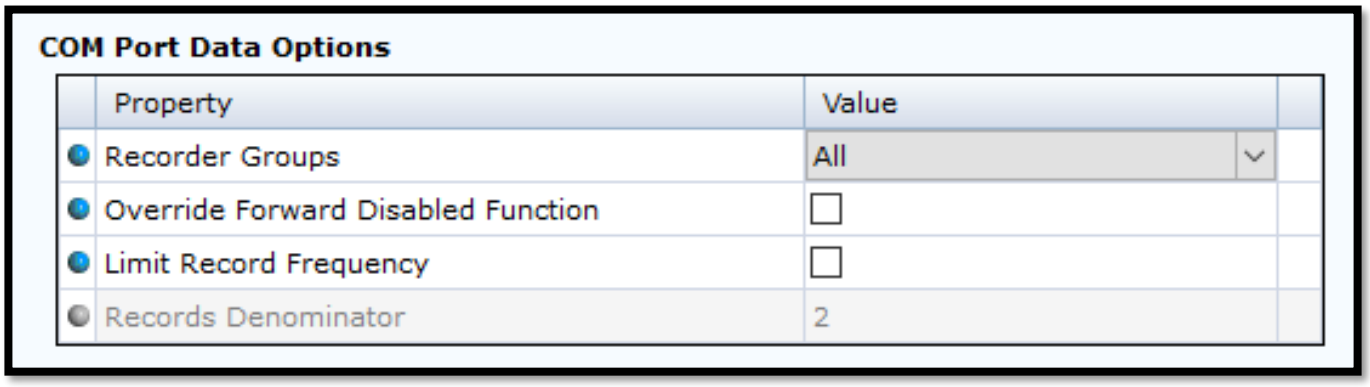


Figure 5-29: Com Port Data Options

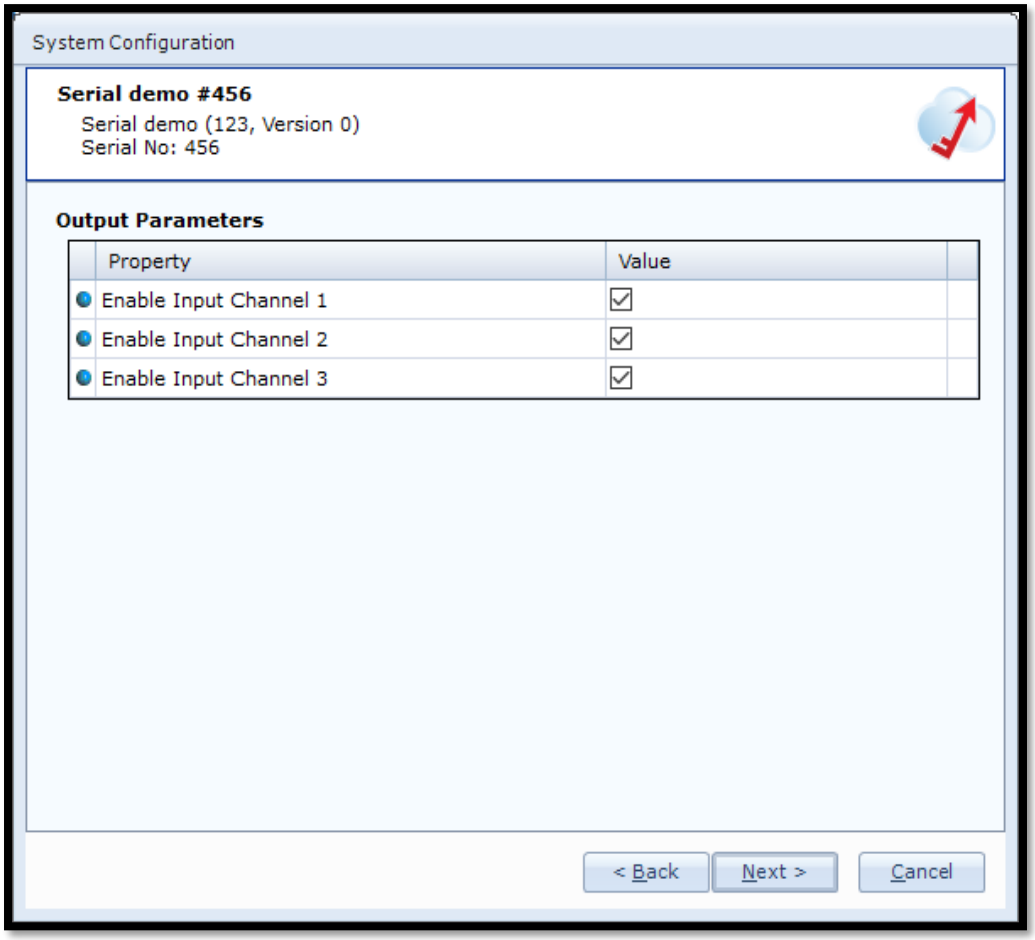
Recorder Groups gives you the option to select which group to output in real-time through COM Port. Select ***All*** groups or only selected groups.

Override Forward Disabled Function; During the sensor configuration, you can define which parameters from the sensor to be sent out in real time (especially for the DCPS which provides a large amount of data) By selecting the ***Override Forward Disabled Function***, even if you have selected to transmit only some parameters from the sensor for the real time, all parameters will be sent anyway through COM port if selected under COM port data options.

Limit Record Frequency gives you the opportunity to not transmit every record in real-time.

Record Denominators if set to 2 and ***Limit Record Frequency*** are selected, every second record will be transmitted via ***COM Port*** but all records will be stored to SD card if enabled.

5.12 System Configuration Serial Sensors



This menu is only available if the ***Serial Sensor*** is defined in ***Device Layout.*** If the instrument has been ordered with the sensor, this has been performed at the factory.

The SeaGuardII has two Serial ports available that can either be configured as input or output.

You may enable or disable each channel and/or raw data output from each channel

Figure 5-30: Serial Sensor

For connection of serial sensor please refer to ***chapter CHAPTER 7*** or contact aanderaa.support@xylem.com for assistance.

The menu shown are only an example and will vary depending on sensor connected and data format. This sensor used as an example is easy to configure because data format is quite simple.

5.12.1 Output Parameters

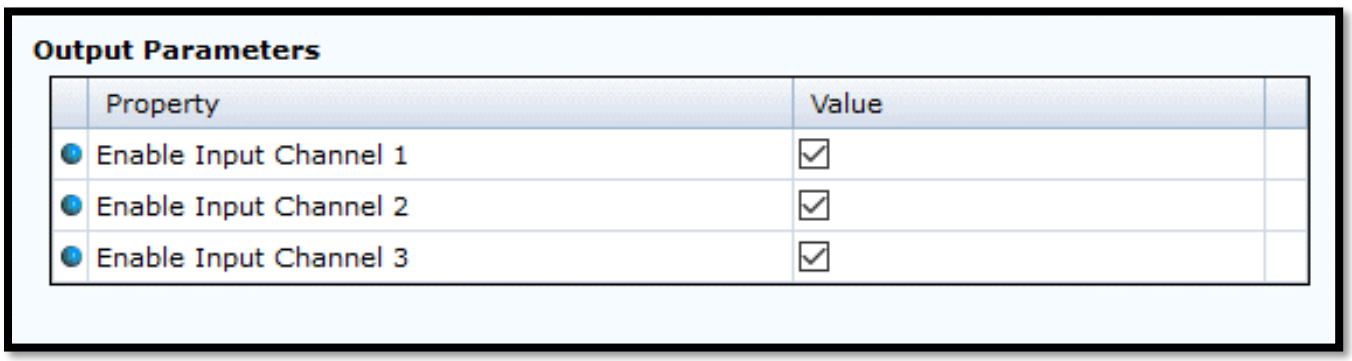


Figure 5-31: Output Parameters

Enable Input Channel 1-3 Each channel can either be set enabled or disabled. This is data from a single sensor string with 3 channels and configured in ***Device Layout***.

5.13 System Configuration Analog Sensor

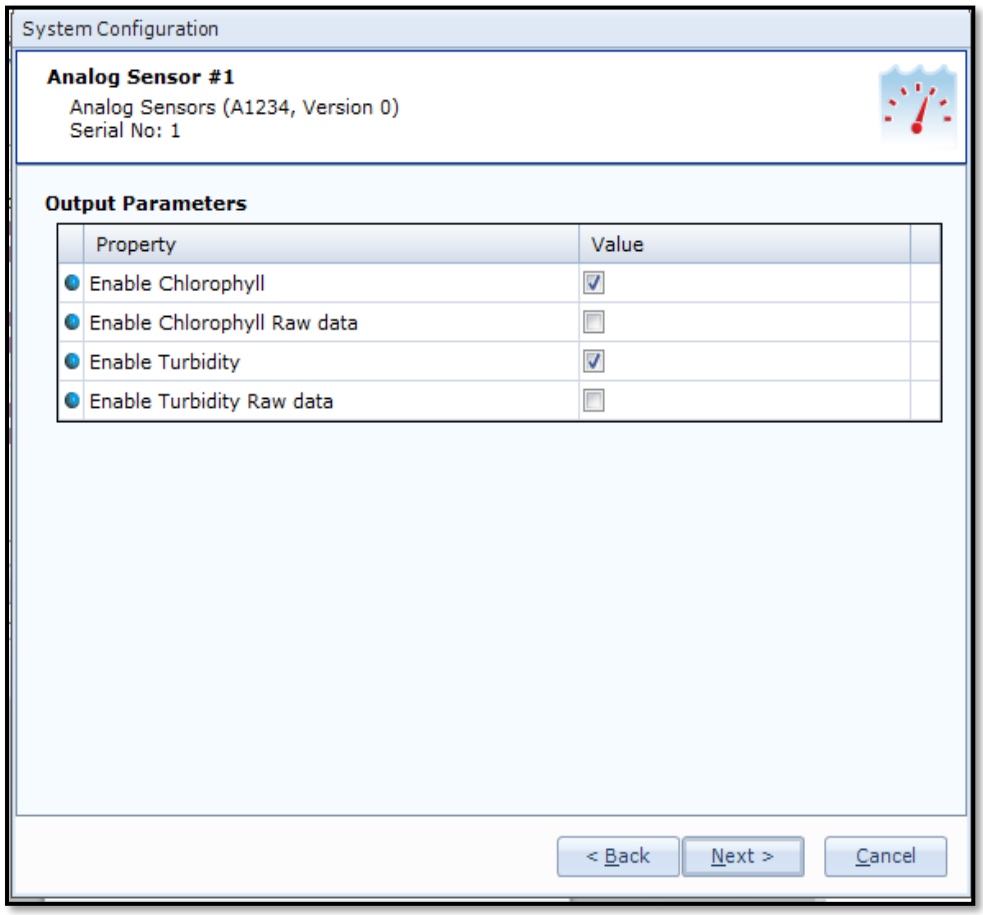


Figure 5-32: Analog Sensor

This menu is only available if the ***Analog Sensor*** is defined in ***Device Layout.*** If the instrument has been ordered with the sensor, this has been performed at the factory, if not refer to ***chapter 7.8***.

Open ***Device Configuration > System Configuration > Analog Sensor*** or use the ***"Run Wizard…"***

You may enable or disable each channel and/or raw data output from each channel.

5.13.1 Output Parameters

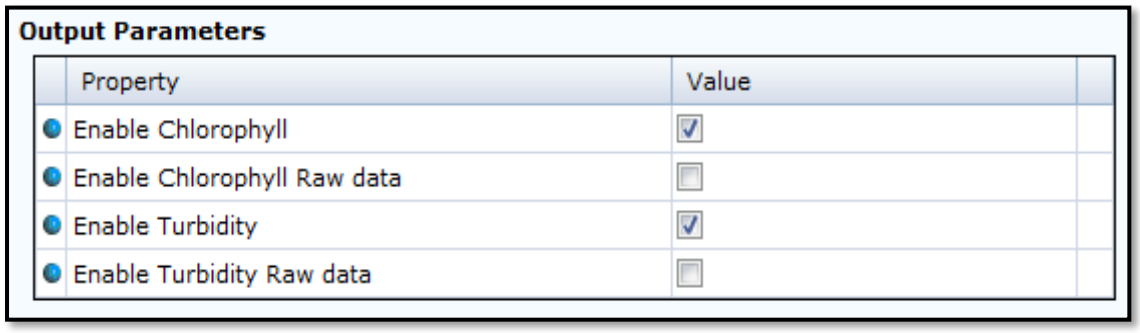


Figure 5-33: Output Parameters

The menu shown are only an example and will vary depending on sensor connected and data format.

The parameters in this menu can either be enabled or disabled by the SeaGuardII. Parameters are configured in ***Device Layout*** and require that an Analog 0- 5V sensor is connected to the input terminal.

There are 4 analog inputs on a SeaGuard II Platform. Each input can handle one 0-5V analog channel. Please note that some Analog Sensors are multichannel sensors and might need more than one 1 channel if you want to read all parameters.

Enable Chlorophyll, Enable Turbidity. Each channel configured in ***Device Layout*** are available.

5.14 System Configuration AiCaP sensors

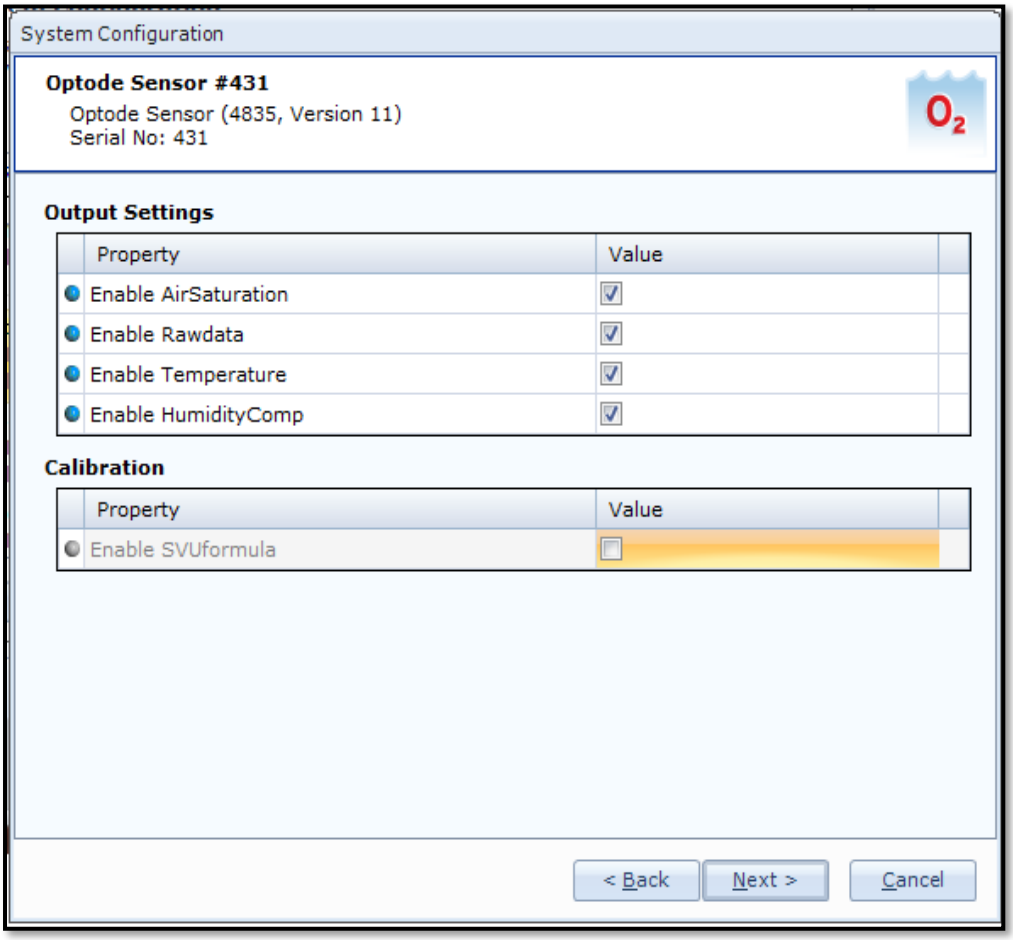


Figure 5-34: Sensor property settings

Open ***Device Configuration > System Configuration***. Select the sensor from the list or use the "Run Wizard…"

Each sensor has a default parameter which cannot be disabled.

To disable the default parameters you may either disconnecting the sensor or removing the sensor from the recording groups.

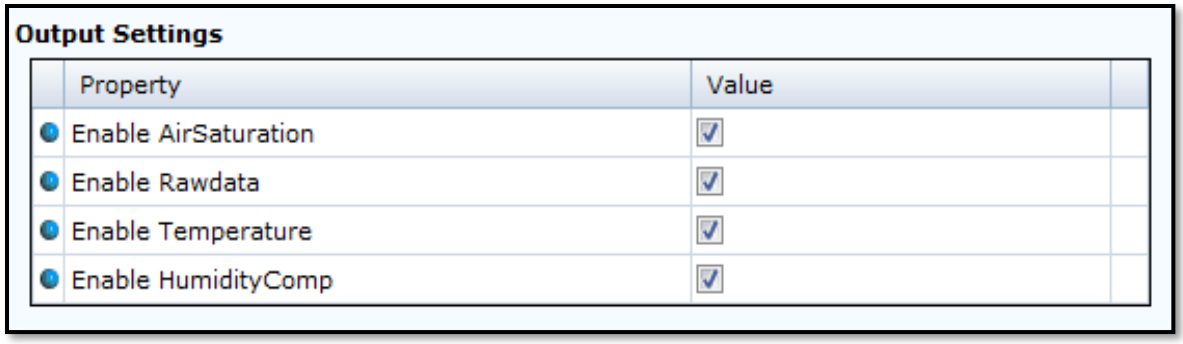
The menu shown are only an example and will vary depending on sensor connected and data format

NOTE! Refer each sensor operating manual for individual settings.

In this example we have used an Aanderaa Oxygen Optode Sensor 4535 with AiCaP output. This sensor can either be connected via one of the sensor connections on the top-end plate or via a sensor cable/string cable.

The setting belove are unique for this sensor but similar properties will also be available for other AiCaP sensors

5.14.1 Output Settings



The parameters in this menu can either be enabled or disabled by the SeaGuardII

Figure 5-35: Output Settings

Enable AirSaturation enables the output of Oxygen Air Saturation if selected.

Enable Rawdata enables Raw Data from the Oxygen sensor if selected

Enable Temperature enables Temperature Output from the Oxygen sensor if selected. Temperature is always measured even if this setting is disabled because temperature is used by the sensor in calculations.

Enable HumidityComp enables compensation for vapor pressure, - disable only for use in dry air or external humidity compensation.

5.14.2 Calibration

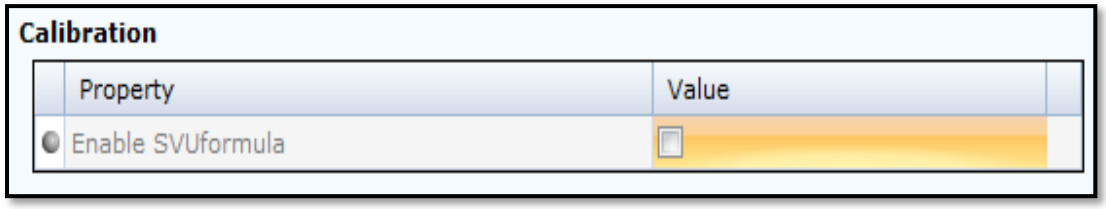


Figure 5-36: Calibration

The menu shown are only an example and will vary depending on sensor connected and data format.

Enable SVUformula is only used with the Oxygen Optode Sensor. Other sensor connected will have other properties or no properties. SVUformula is a new calibration coefficient introduced with Oxygen Optode MkII and used for most of our newer oxygen sensors.

NOTE! Refer each sensor operating manual for individual settings.

5.15 User maintenance

Under ***User Maintenance***, you find properties that are password protected and are set/altered by a ***trained*** user. These properties are not changed during normal operation. They have been set up at the factory to optimize the instrument performances and you are not recommended to change properties unless instructed.

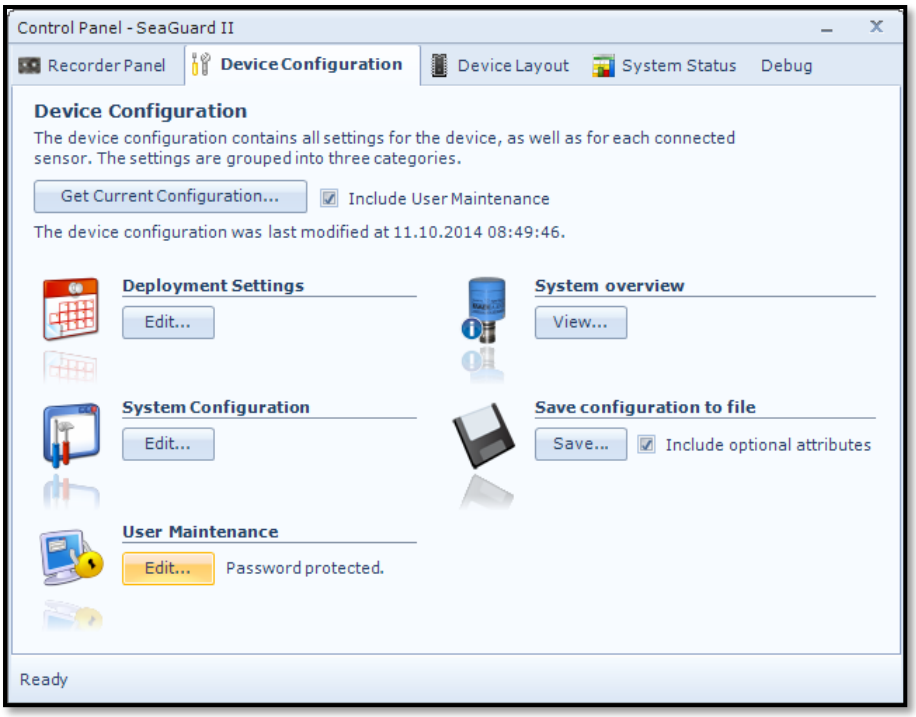


Figure 5-37: Include User Maintenance

Check ***"Include User Maintenance"*** in the ***Control Panel > Device Configuration*** then click ***"Get Current Configuration"*** and then ***"Edit…"*** under ***User Maintenance***

Note! The password is: 1000

If you don't tick the Include ***User Maintenance*** box before ***"Get Current Configuration"*** the other menus will be available but ***User Maintenance*** will be grey and not available.

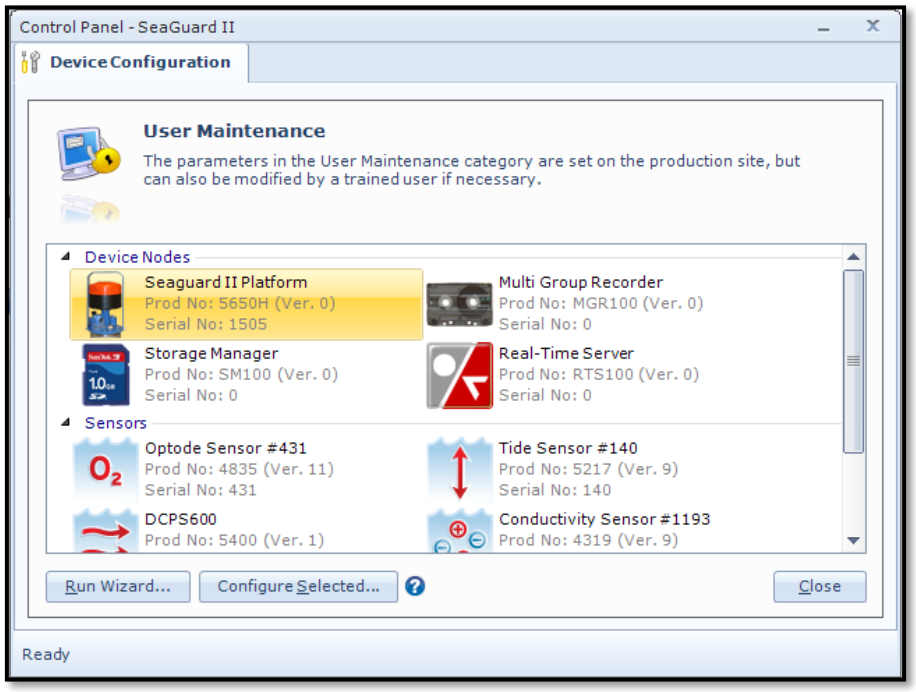


Figure 5-38:User Maintenance Menu

User Maintenance is divided in two categories:

- ***Device Nodes***
- ***Sensors.***

Select ***"Run Wizard"*** to start the user maintenance wizard for each category or configure specific items by choosing from the list and select ***"Configure Selected…"*** in the lower part of the window.

5.16 SeaGuardII Platform

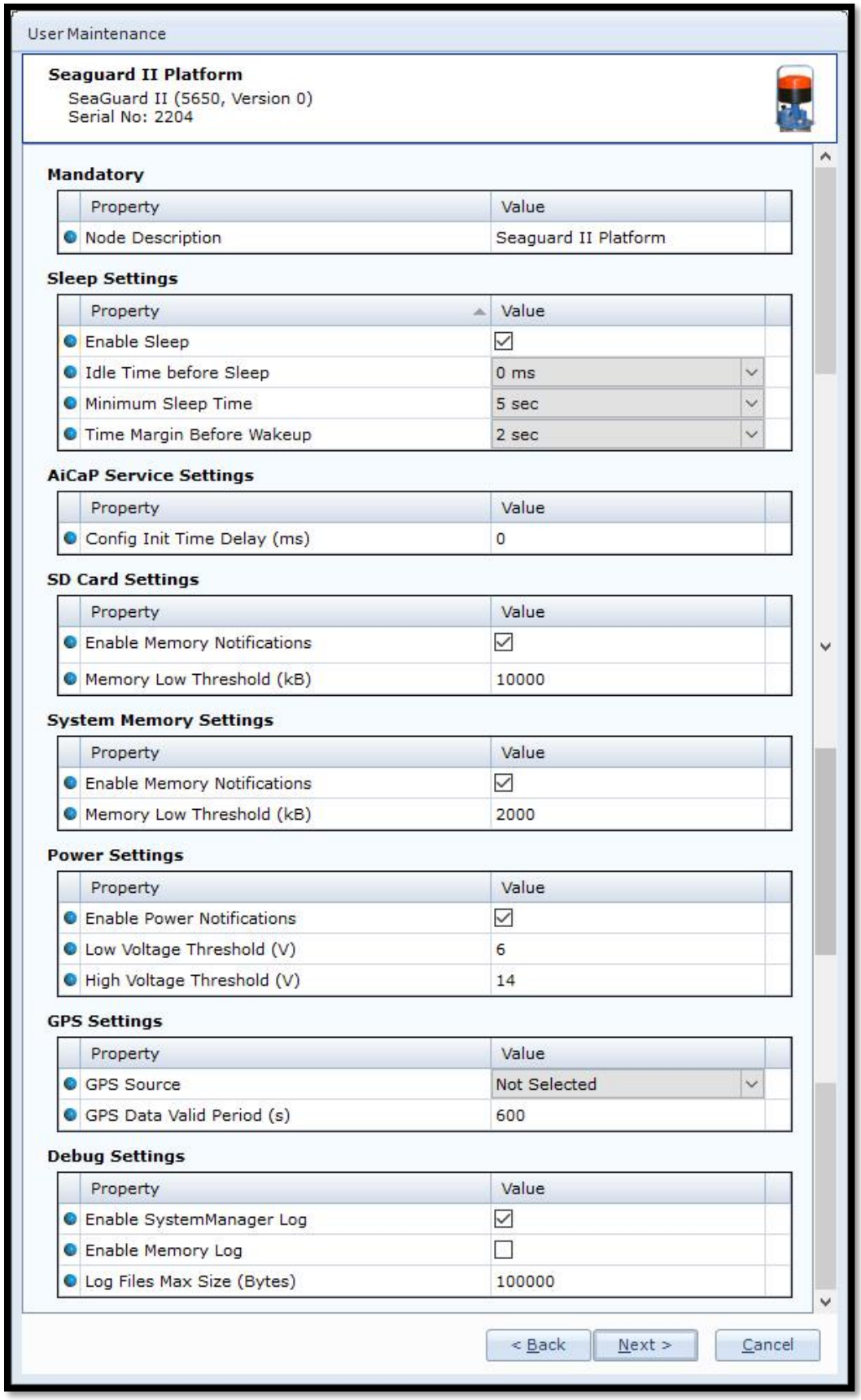


Figure 5-39: User Maintenance Platform

Open ***Device Configuration > User Maintenance > Platform***.

This menu consists of 7 sub menus.

- ***Mandatory***
- ***Sleep Settings***
- ***SD Card Settings***
- ***System Memory Settings***
- ***Power Settings***
- ***GPS Settings***
- ***Debug Settings***

5.16.1 Mandatory

Figure 5-40: Mandatory

All sensors and Platforms are given a ***Node Description*** text like ***SeaGuard II Platform #xxx*** (where xxx is the serial number of the sensor) or just SeaGuardII Platform. The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

5.16.2 Sleep Settings

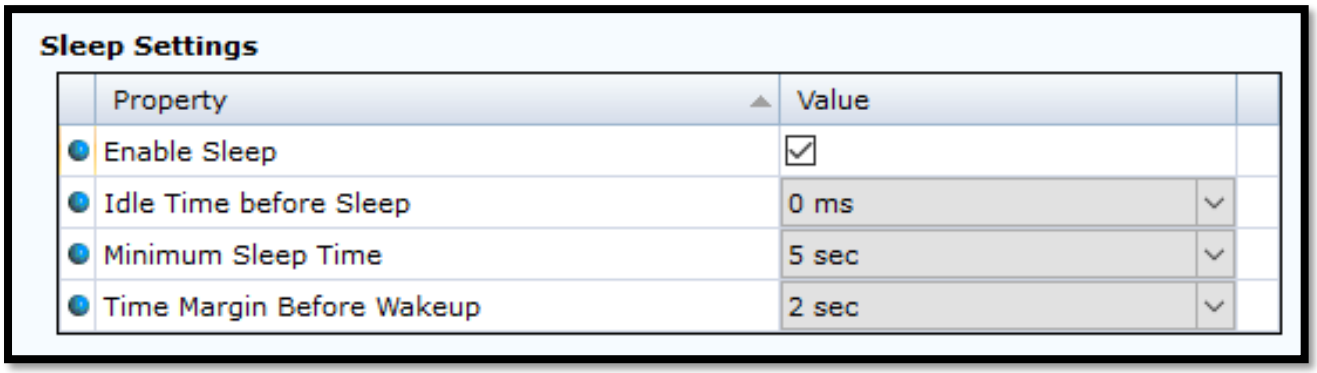


Figure 5-41: Sleep Settings

Select ***Enable Sleep*** to enable sleep between measurements to save power.

Idle Time before Sleep is the time before instrument goes to sleep.

Time Margin Before Wakeup is the wake-up time needed before starting a measurement.

Minimum Sleep Time is the minimum time required between activity to be able to enter sleep.

5.16.3 AiCaP Service Settings

AiCaP Service Settings

Property	Value
Config Init Time Delay (ms)	0

Figure 5-42: AiCaP Service Settings

Config Init Time Delay (ms) are used to set different starting time for each AiCaP sensor to avoid a high peak current or different sensors from disturbing each other.

5.16.4 SD Card Settings

SD Card Settings

Property	Value
Enable Memory Notifications	☑
Memory Low Threshold (kB)	10000

Figure 5-43: SD Card Settings

Enable Memory Notifications will give a notification when the left memory on SD Card reaches the value set in Memory Low Threshold (kB).

Memory Low Threshold (kB) sets a limit when a Notification are sent if activated.

5.16.5 System Memory Settings

System Memory Settings

Property	Value
Enable Memory Notifications	☑
Memory Low Threshold (kB)	2000

Figure 5-44: System Memory Settings

If ***Enable Memory Notification*** is selected, the value set in ***Memory Low Threshold (kB)*** defines the limit before a warning is sent.

Memory Low Threshold (kB) sets a limit when a Notification are sent if activated.

5.16.6 Power Settings

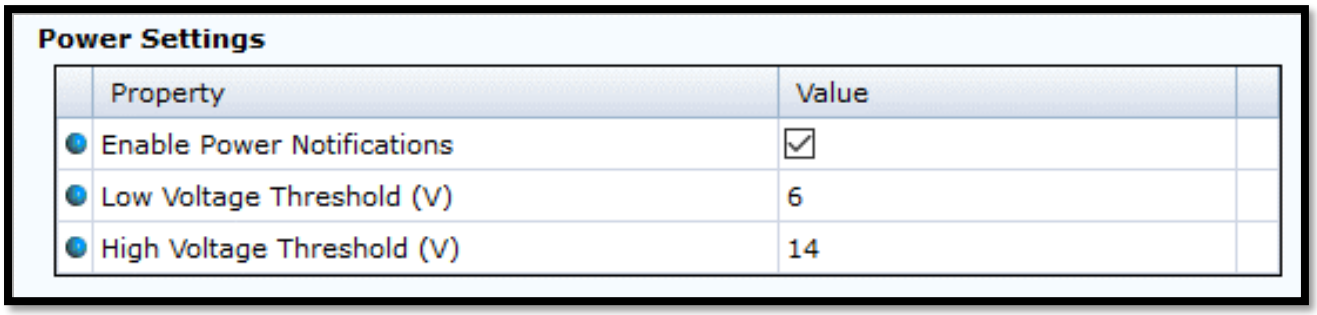


Figure 5-45: Power Settings

Enable Power Notifications will give a notification when the Input Power reaches the value set in ***Low Voltage Threshold (V)*** or get higher than the value set in ***High Voltage Threshold (V).*** A too low input Power might cause the instrument to stop and a too high Input Power might cause the instrument to take permanent damage.

Low Voltage Threshold (V) sets a lower limit when a Notification are sent if activated.

High Voltage Threshold (V) sets an upper limit when a Notification are sent if activated.

5.16.7 GPS Setting

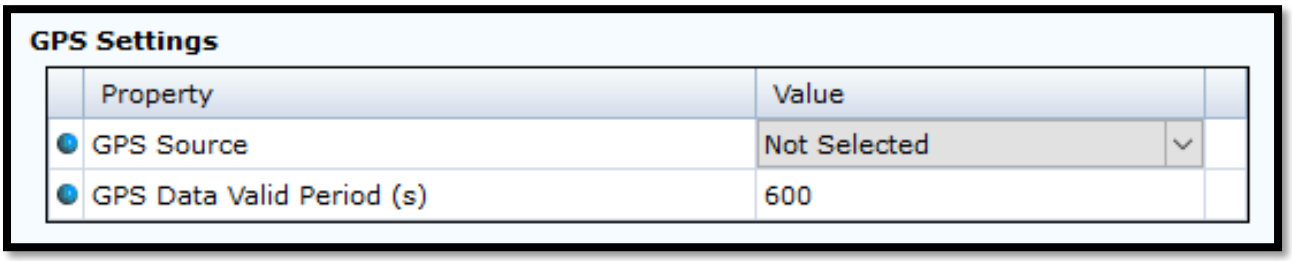


Figure 5-46: GPS Settings

Select to include GPS settings if GPS source available.

GPS Source is used to select a GPS source if a unit is connected to the platform.

GPS Data Valid Period (s) are used to set the time interval for how many seconds a measurement is valid after sampling.

5.16.8 Debug Settings

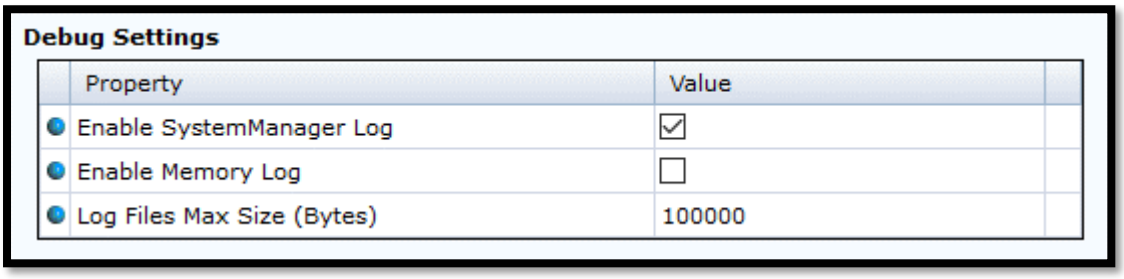


Figure 5-47: Debug Settings

Enable SystemManager Log logs the activity of different software services and when the system goes down and up from sleep.

Enable Memory Log logs the memory allocation of the different software services.

Log Files Max Size(Bytes) sets the maximum size for each log file.

5.17 Storage Manager

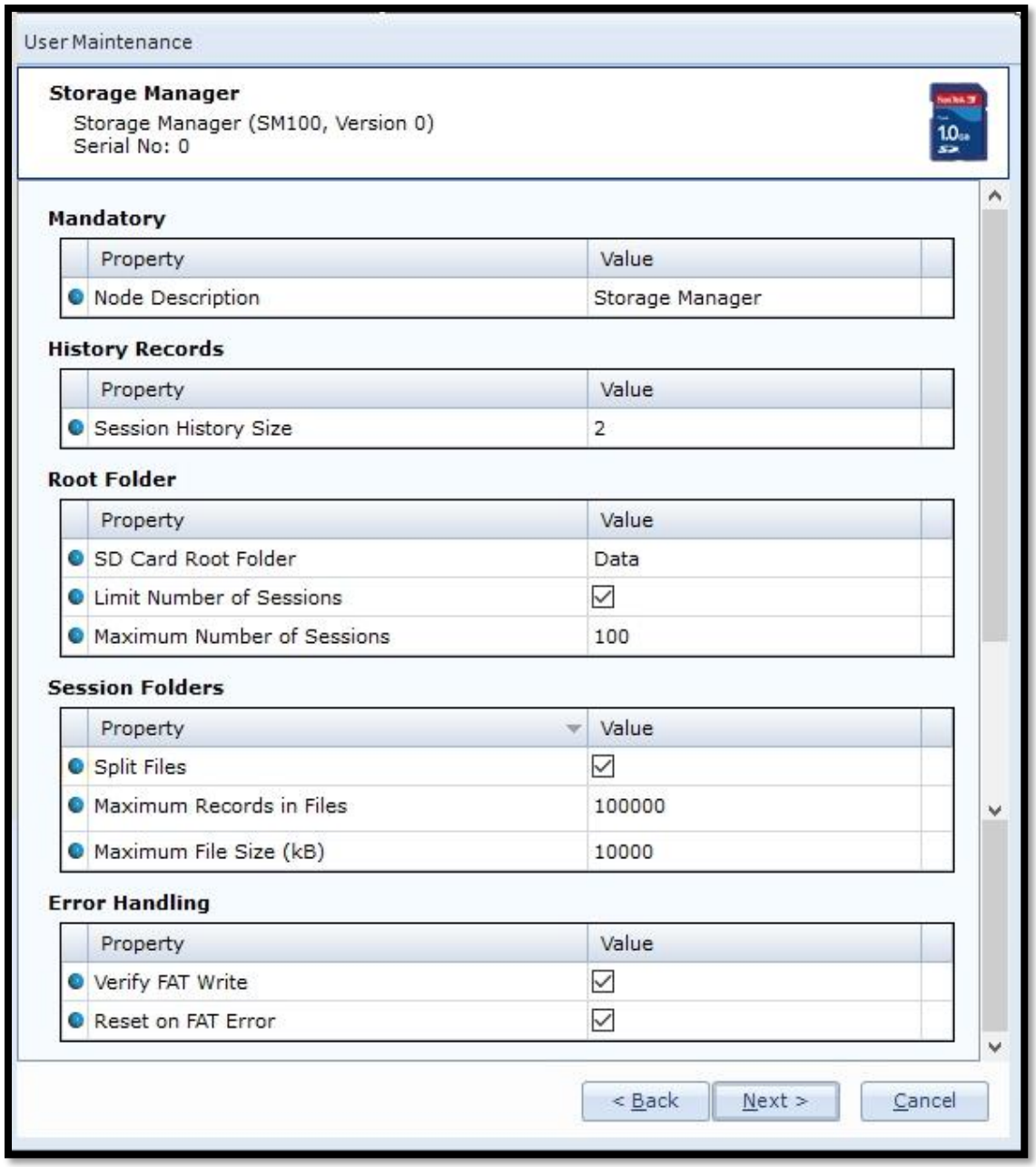


Figure 5-48: Storage Manager

We do not recommend changing any of these settings as it can alter the functioning of the instrument. For information:

Open ***Device Configuration > User Maintenance > Storage Manager***

This menu contains 5 groups.

5.17.1 Mandatory

Figure 5-49: Mandatory

All sensors and Platforms are given a ***Node Description*** text like ***Storage Manager***. The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

5.17.2 History Records

Figure 5-50: History Records

Session History Size refers to the buffer storage.

5.17.3 Root Folder

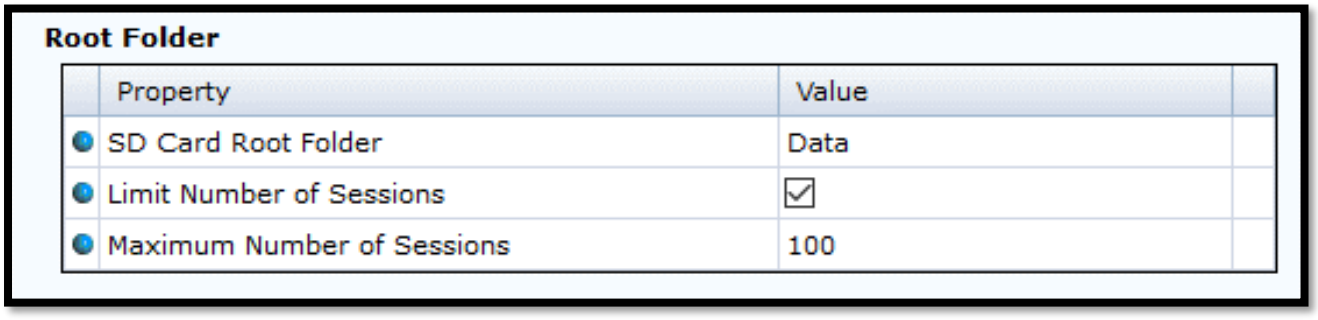


Figure 5-51: Root Folder

SD Card Root Folder is the folder name where data are stored

If ***Limit Number of Sessions*** is selected then ***Maximum Number of Sessions*** is the number of sessions before old data folders is deleted.

Maximum Number of Sessions
is the number of sessions before old data folders is deleted.

5.17.4 Session Folders

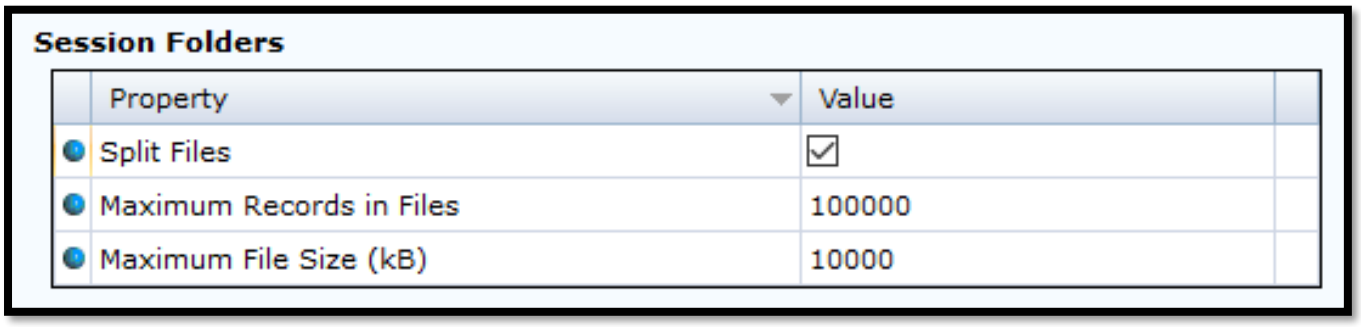


Figure 5-52: Session Folders

Split Files enables control with the file size either based on number of records in file or maximum file size.

Maximum Records in Files will be the maximum number of records for each file

Maximum File Size (kB) will be the maximum file size in kB for each file.

5.17.5 Error Handling

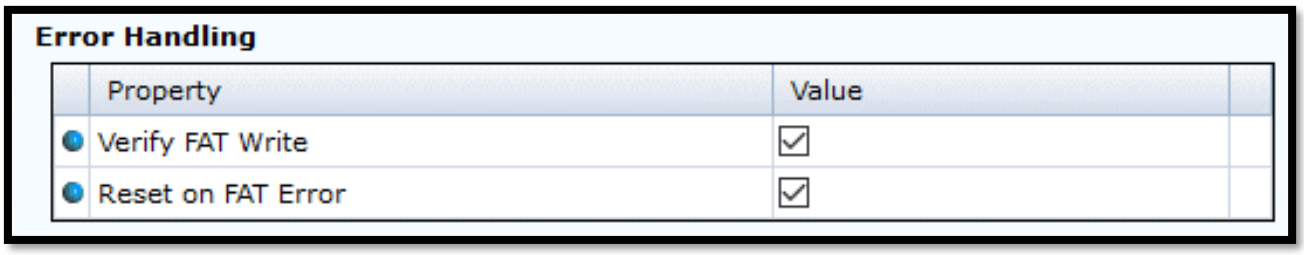
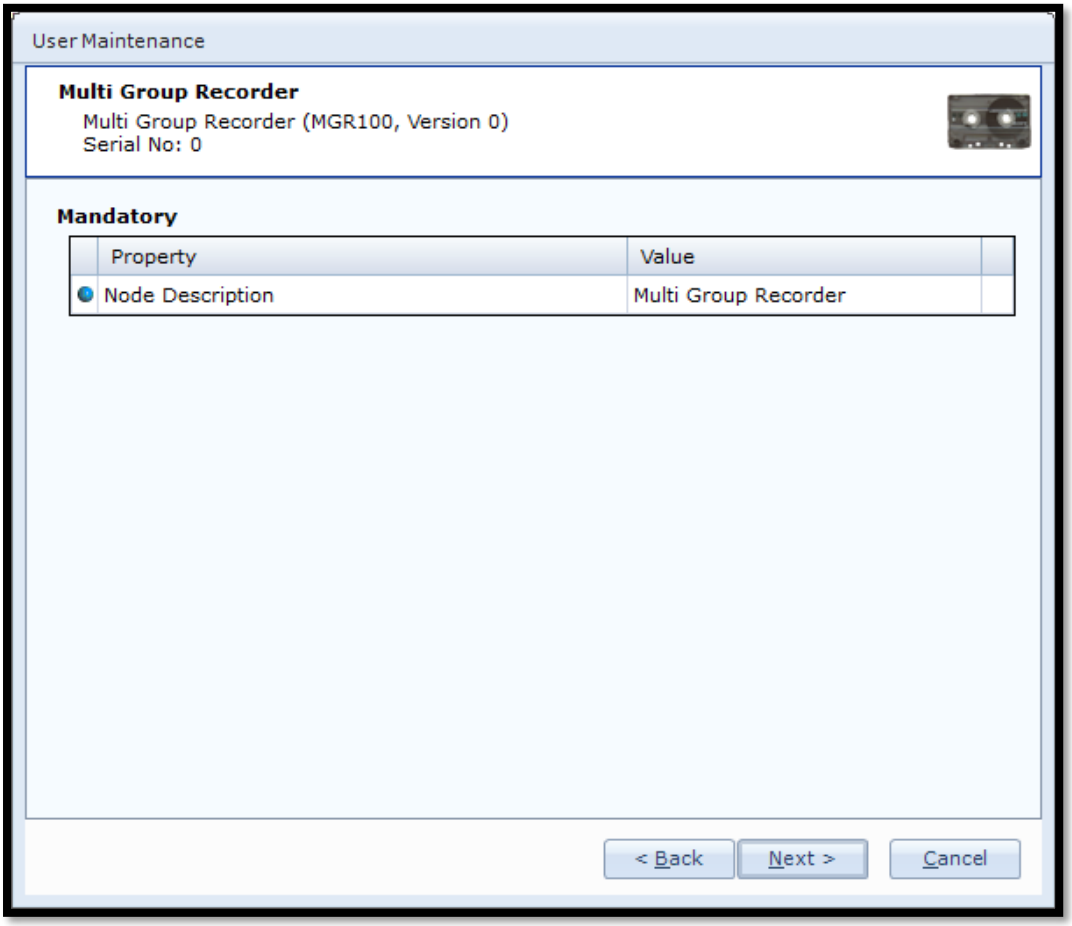


Figure 5-53: Error Handling

Verify FAT Write are used to check the writing to SD-card. In normal operation always leave on.

Reset on FAT Error if check above fails this reset and continue to log. In normal operation always leave on.

5.18 User Maintenance Multi Group Recorder



User Maintenance Multi Group Recorder has only one setting.

Figure 5-54: Multi Group

5.18.1 Mandatory

Figure 5-55: Mandatory

All sensors and Platforms are given a ***Node Description*** text like. The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

5.19 User Maintenance Real-Time Server

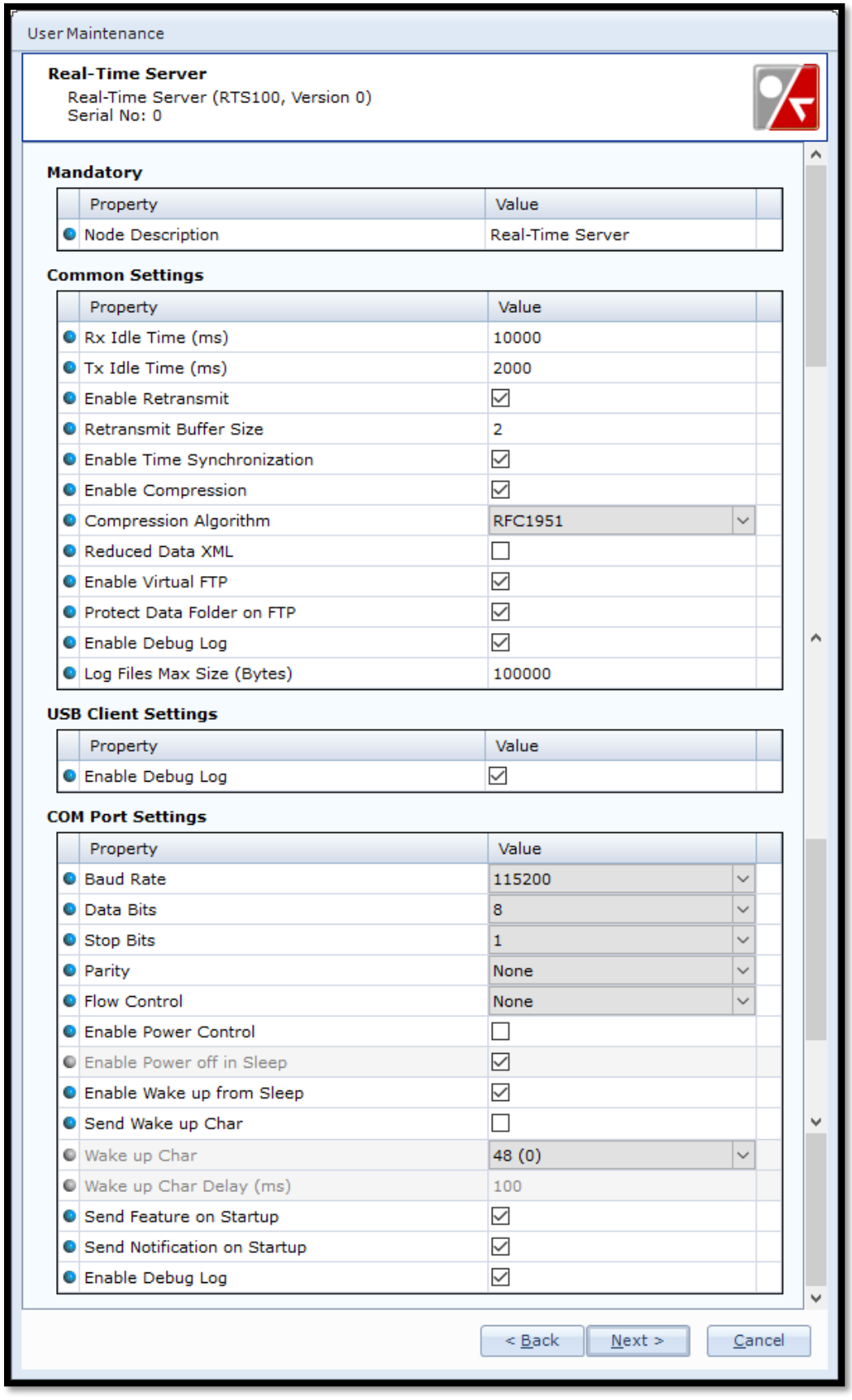


Figure 5-56: User Maintenance Real-Time Server

Real-Time Server is used to configure the ***Real-Time Output***.

The first 3 sessions will always be available while ***COM Port Settings*** are only available if one of the ***COM Port*** are set as output in ***Device Layout.***

5.19.1 Mandatory

Figure 5-57: Mandatory

All sensors and Platforms are given a ***Node Description*** text like. The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

5.19.2 Common Settings

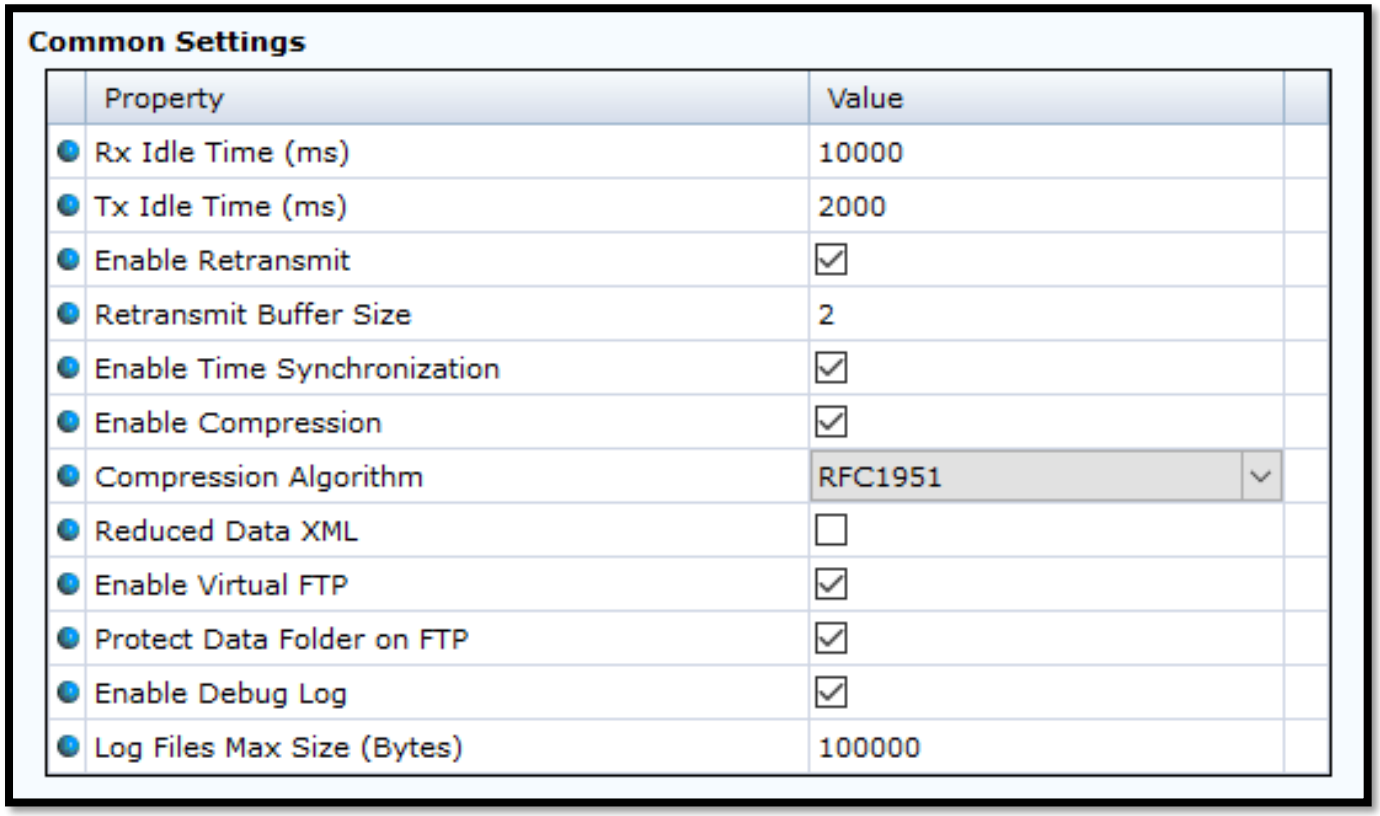


Figure 5-58: Common Settings

Rx Idle Time (ms) is the required time before entering sleep after receiving.

Tx Idle Time (ms) is the time communication is possible after transmitting.

Enable Retransmit if selected, the instrument will resend data if transmission failed.

Retransmit Buffer Size is the number of messages stored for retransmit if transmission failed.

Enable Time Synchronization If enabled it is possible to adjust the clock from an external source.

Enable Compression If selected the output message will be compressed.

Compression Algorithm Select the type of compression used.

Reduced Data XML if selected the sensor attributes are removed from the Xml output and leave it with only Sensor ID and Point ID.

Enable Virtual FTP If selected data on SD-card is available via FTP.

Protect Data Folder on FTP if enabled it is not possible to download current folder when recording.

Log Files Max Size (Bytes) is the maximum files size for debug log in Bytes.

5.19.3 USB Client Settings

Figure 5-59: USB Client Settings

Enable Debug Log If enabled debug information is stored. This is information in addition to the error log.

5.19.4 COM Port Settings

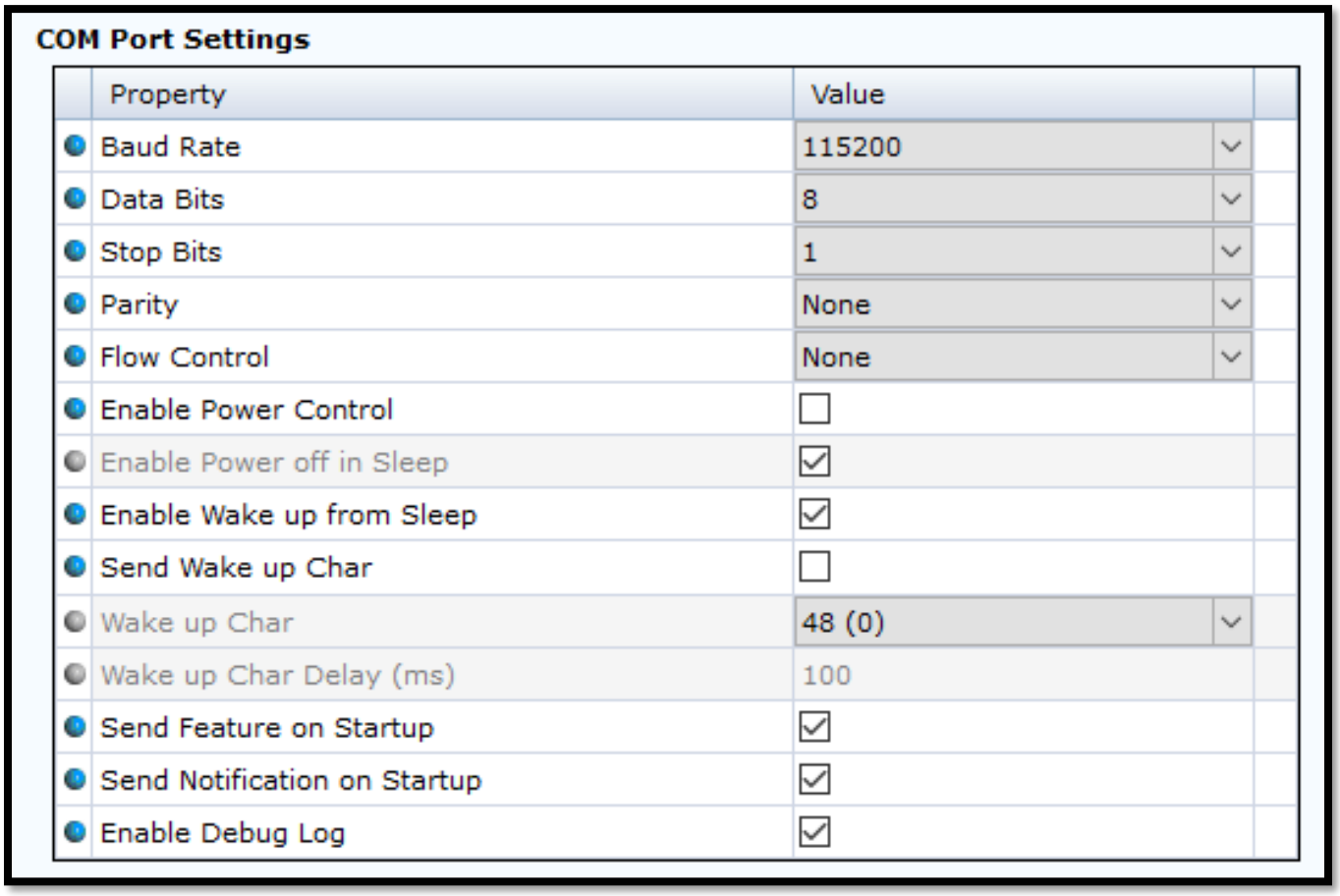


Figure 5-60: COM Port Settings

Baud Rate: Select in the range 2400 to 115200 (the baud rate must be equal to the receiver baud rate e.g. the AADI Real-Time Collector.

Data Bits: Set the number of Data Bits to 7 or 8. Set the value to *8* when the receiver is the AADI Real-Time Collector.

Stop Bits: Select between 1, 1.5 and 2 stop bits. Set the value to *1* when the receiver is the AADI Real-Time Collector

Parity*:* Select between None, Even and Odd parity. Set the value to *None* when the receiver is the AADI Real-Time Collector.

Flow Control*:* Select between None, Xon/Xoff and hardware (RS-232). Set the value to Xon/Xoff when the receiver is the AADI Real-Time Collector. Xon/Xoff priorities the communication with control unit at make it easier to communicate with the instrument even at fast intervals.

Enable Power Control Enable SeaGuardII to control sensor power or power to transmission.

Enable Power off in Sleep enable the modem or other transmissions to switch of power when in sleep.

Enable Wake up from Sleep enable the modem or other transmissions to switch of power when in sleep.

Send Wake up Char sends the character selected in ***Wake up Char.***

Wake up Char Select a wakeup character.

Wake up Char Delay (s) gives the possibility to set a time delay between ***Send Wake up Char*** and the actual sending of character.

Send Feature on Startup Send an identification message on startup. The message is used by Real-Time Collector to determine the type of device and capabilities.

Send Notification on Startup Send a notification message on startup. The message is stored in the Real-Time Collector notification log and signals the user that a startup or a reboot has occurred.

Enable Debug Log If enabled debug information is stored. This is information in addition to the error log.

5.20 User Maintenance AiCaP Sensors

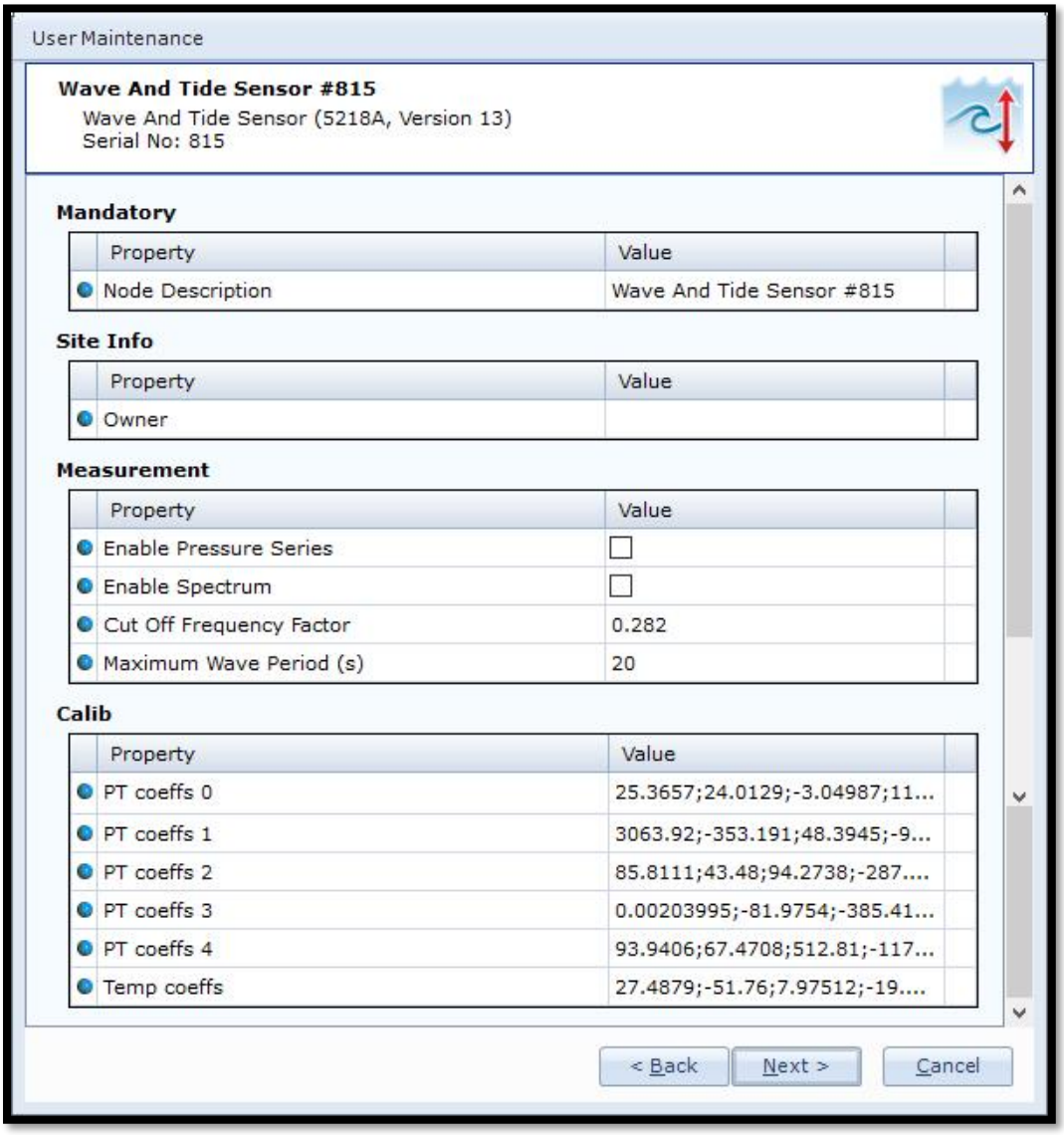


Figure 5-61: AiCaP Sensor - User Maintenance

This image is just one example of ***User Maintenance*** available settings for the ***Wave & Tide Sensor***.

Another ***AiCaP*** sensor will show totally different categories so please refer to the individual Operation Manual for each sensor.

5.20.1 Mandatory

Figure 5-62: Mandatory

All sensors and Platforms are given a ***Node Description*** text like ***Wave And Tide Sensor #xxx*** (where xxx is the serial number of the sensor). The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

5.20.2 Site Info

Figure 5-63: Site Info

Owner: Name of owner or other information that can be useful to store with the data.

5.20.3 Measurement

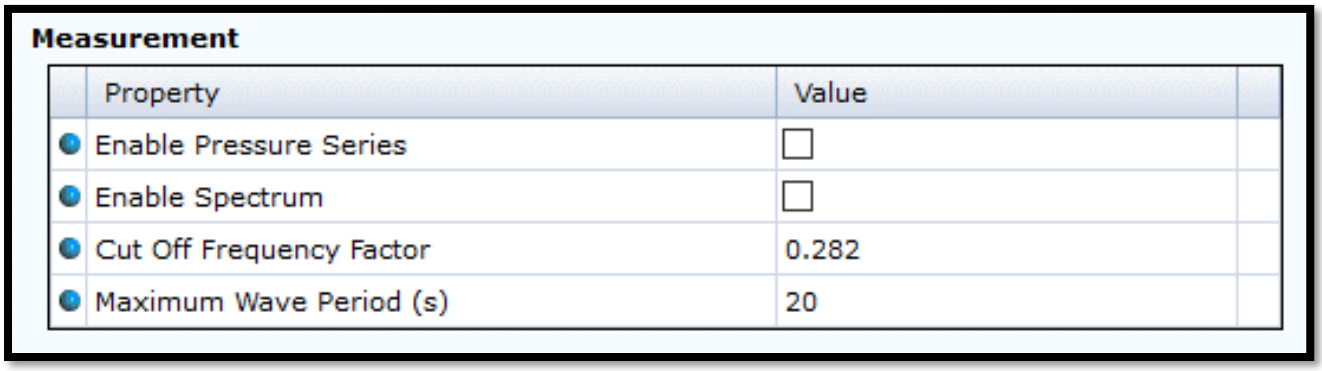


Figure 5-64: Measurement

Enable Pressure Series controls inclusion of the measured hydrostatic pressure in the output string. This series holds a large amount of data, hence occupies a large part of the storage capacity. The pressure series can be used as raw data input for e.g. other spectra or wave calculations

Enable Spectrum controls inclusion of spectrum elements in the output string. Spectrum should only be recorded in special occasions.

Cut Off Frequency Factor Is a factor used to calculate Cut Off Frequency together with the gravitational coefficient and d the deployment depth as measured by the pressure sensor.

Maximum Wave Period (s) is the maximum wave period to be measured.

NOTE! The Pressure time series/spectrum parameter holds a large amount of data, hence occupies a large part of the storage capacity. Pressure time series/spectrum should only be recorded in special occasions.

5.20.4 Calib

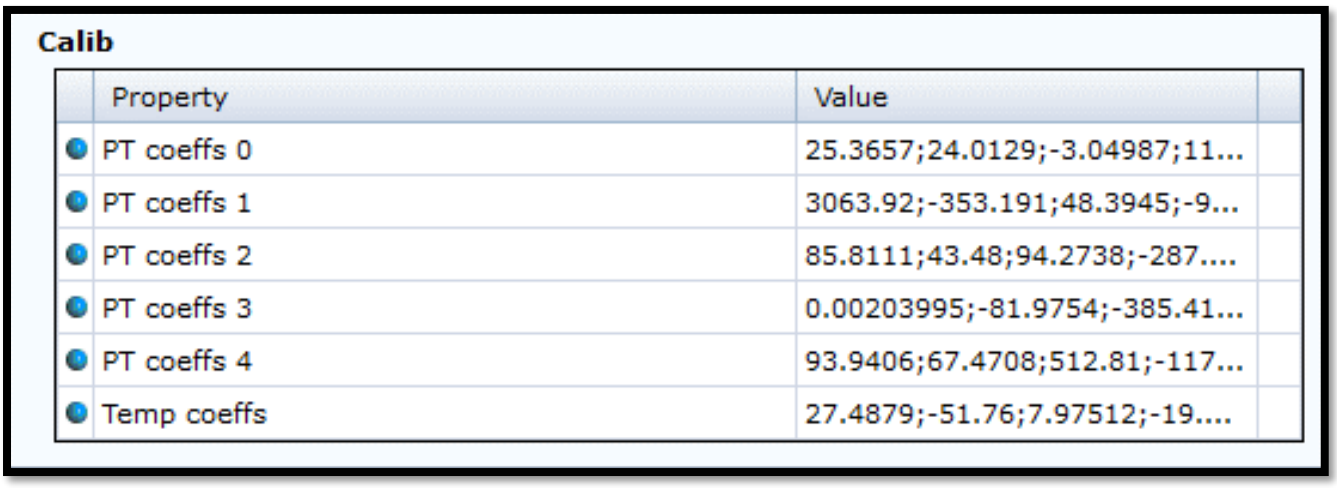
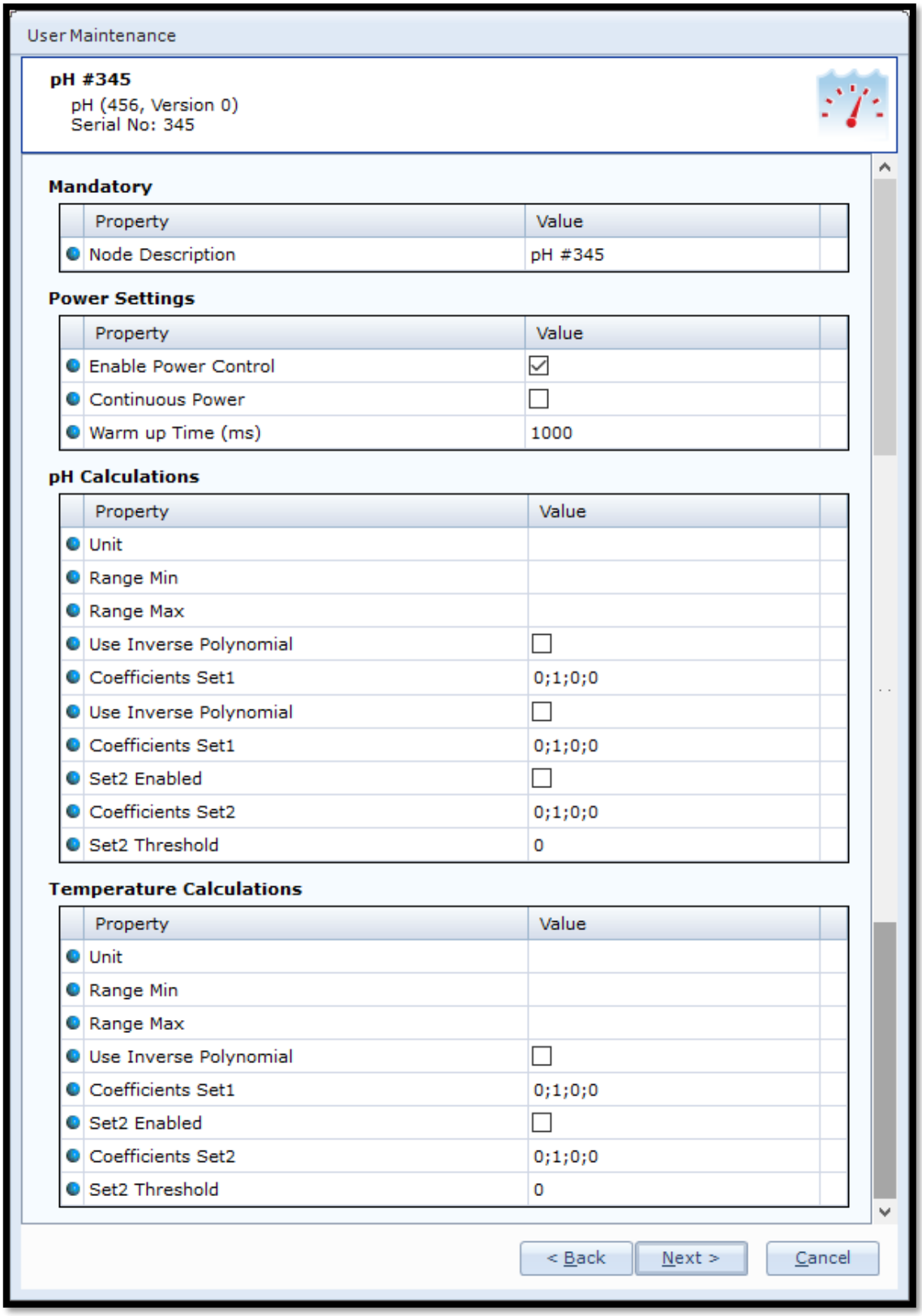


Figure 5-65: Calibration Coefficients

The Calibration coefficients should for most of our sensor normally not be changed unless the sensor is recalibrated. However for Oxygen Optode sensor the Foil coefficient must be changed if you change to a foil with different batch number. For both our Oxygen Optode sensors and Conductivity sensors a one poin adjustment might be necessary between each recalibration dependent on use.

Please note that changing these setting might influence the performance of the sensor. Refer the individual operating manual before changing the values.

5.21 User Maintenance Analog Sensors



User Maintenance settings for Analog sensors depend on the type of analog sensor connected and configured under ***Device Layout***.

In this example an analog pH sensor with two output channels are shown.

Figure 5-66: Example of Analog Sensor

NOTE!

Refer each sensor/device operating manual for individual settings.

5.21.1 Mandatory

Figure 5-67: Mandatory

All sensors and Platforms are given a ***Node Description*** text like ***Analog Sensor #xxx*** (where xxx is the serial number of the sensor). The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

5.21.2 Power Settings

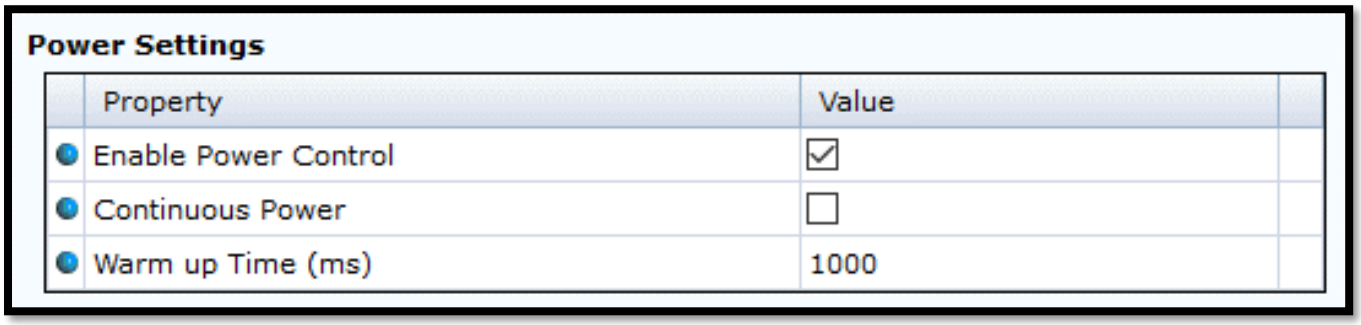


Figure 5-68: Power Settings

Enable Power Control If enabled power will be switched on to the sensor according to ***Warm up Time*** and switched off again after data is received by the instrument. This is done to save power.

Continuous Power when selected a continuous 10V power is supplied to the analog sensor connected to the hub card.

Warm up Time (ms) is set to control the switch on time for the analog sensor power supply. In this example it is set to 1000ms (1 seconds). This means that the instrument switch on power 1 second before the measuring instant. The power is switched off immediately after the measurement is taken. Select an appropriate value for the ***Warm up Time (ms)***; the value must cover the longest time required by the analog sensors.

5.21.3 pH Calculations

These are settings for a pH sensor enabled under ***Device Layout>Analog sensors***. A different sensor will give another set of settings.

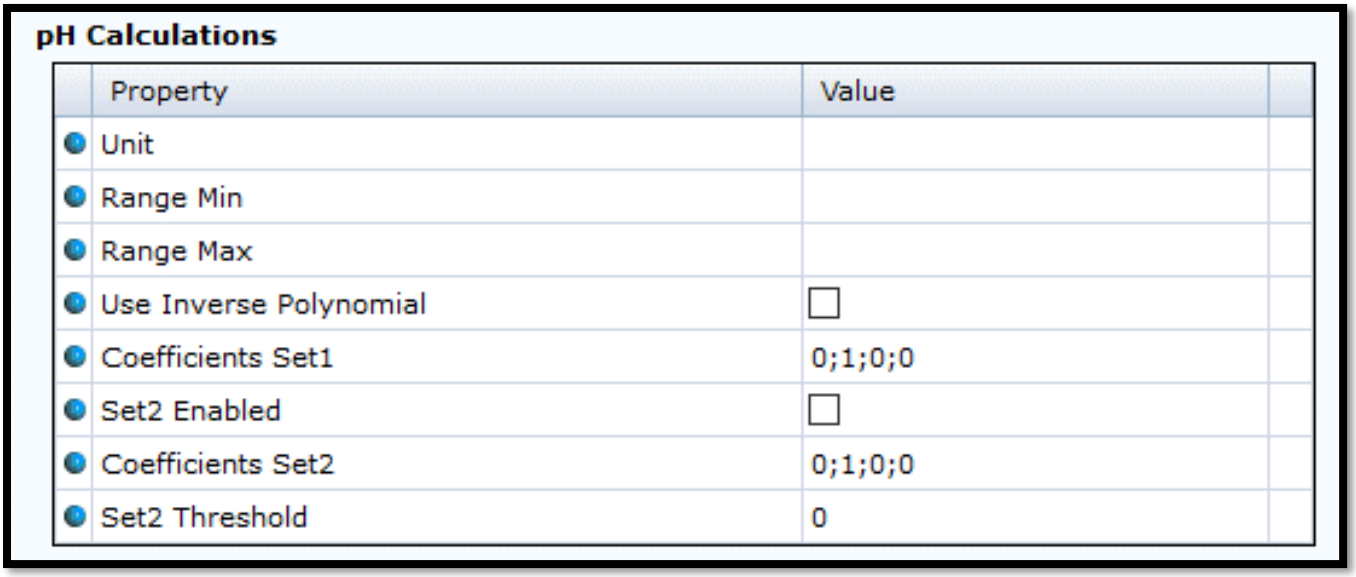


Figure 5-69: pH Calculations

Unit Set the Unit for the scaled/linearized value such as pH.

Range Min Set the Range Min for the scaled/linearized value

Range Max Set the Range Max for the scaled/linearized value

Use Inverse Polynomial used if a sensor using inverse polynomial such as 1/n.

Coefficients Set1 *Type* polynomial coefficients for Set 1. The raw digitized value can be scaled and linearized using one or two 3rd order polynomials as shown in the figure below. Using two polynomials is suitable when the sensor has different calibration for lower and upper range, Four coefficient a;b;c;d giving the formula $a+bn+cn^2+dn^3$ where N is the raw data reading from sensor.

Set2 Enabled Check if a second polynomial is to be used

Coefficients Set2 *Type* polynomial coefficients for Set 2. Four coefficient a;b;c;d giving the formula $a+bn+cn^2+dn^3$ where N is the raw data reading from sensor.

Set2 Threshold *Type* the Set2 Threshold value for the point above which the second polynomial shall be used

Figure 5-70: Two polynomials analog sensor

5.21.4 Temperature Calculations

Some analog sensors may have multiple output channels. In this case also Temperature is measured as a second parameter.

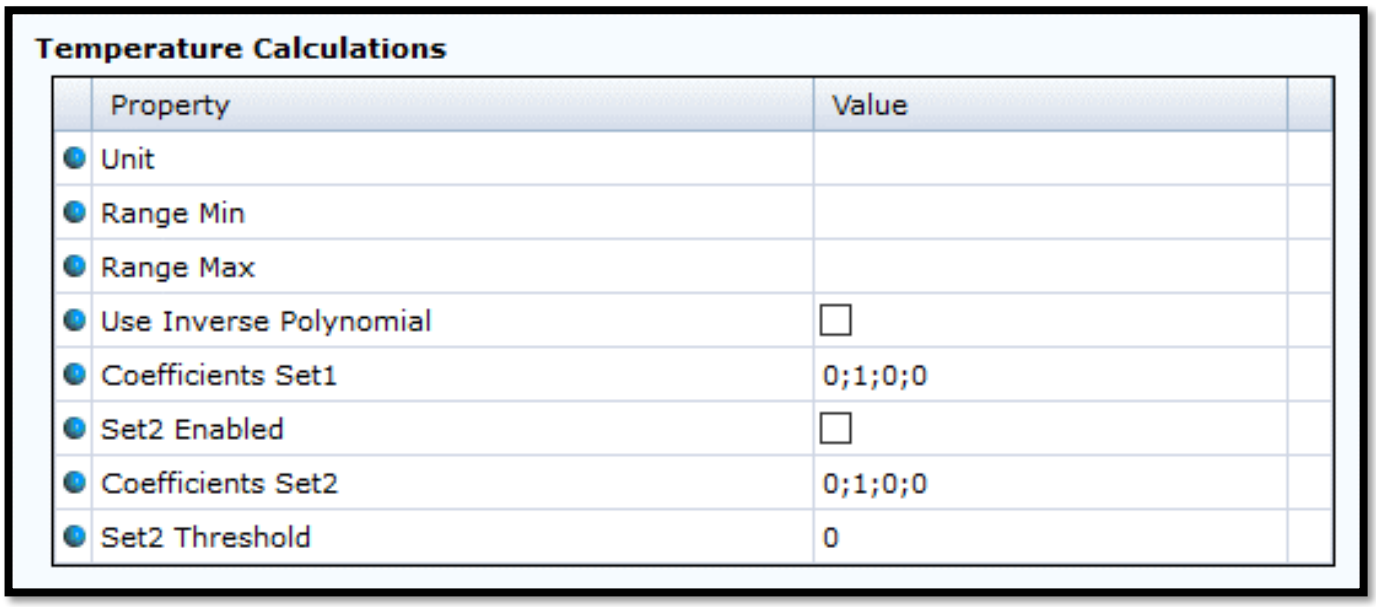


Figure 5-71: Temperature Calculations

Unit Set the Unit for the scaled/linearized value

Range Min Set the Range Min for the scaled/linearized value

Range Max Set the Range Max for the scaled/linearized value

Use Inverse Polynomial used if a sensor using inverse polynomial such as 1/n.

Coefficients Set1 *Type* polynomial coefficients for Set 1. The raw digitized value can be scaled and linearized using one or two 3rd order polynomials as shown in the figure abowe. Using two polynomials is suitable when the sensor has different calibration for lower and upper range. Four coefficient a;b;c;d giving the formula $a+bn+cn^2+dn^3$ where N is the raw data reading from sensor.

Set2 Enabled Check if a second polynomial is to be used

Coefficients Set2 *Type* polynomial coefficients for Set 2. Four coefficient a;b;c;d giving the formula $a+bn+cn^2+dn^3$ where N is the raw data reading from sensor.

Set2 Threshold *Type* the Set2 Threshold value for the point above which the second polynomial shall be used.

5.22 System Overview

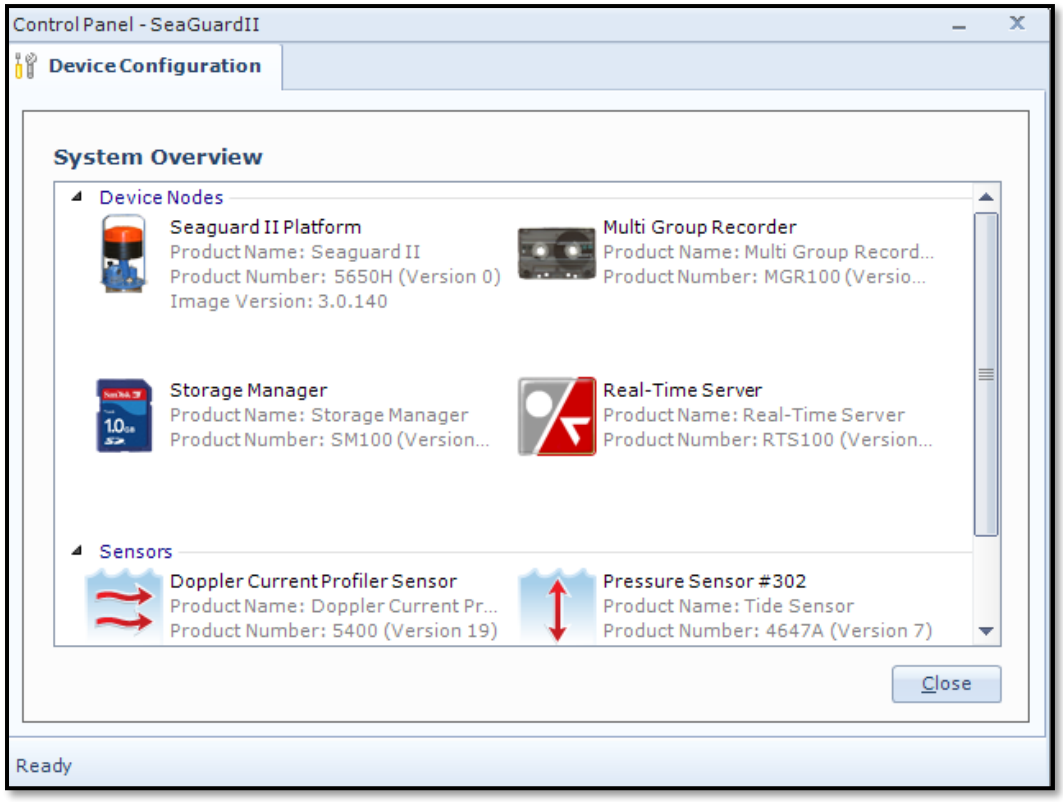


Figure 5-72:System Overview

The ***System Overview*** under ***Device Configuration*** provides an overview of the nodes, serial numbers, product number and firmware image version for each part.

If you scroll down using the bar on the right side you will also see a list of all connected sensors with ***Product Name, Product Number, Serial Number*** and ***Software Version***.

5.23 Save configuration to file

Once you have defined the deployment settings and system configuration in the device configuration, it is recommended to save current settings to a backup file by pressing "***Save…"*** under the heading ***Save configuration to file*** in the ***Device Configuration*** menu.
Edit the name for your file and press "***Save…"*** to save the new configuration to file in .xml format. This configuration file will keep full integrity and traceability of your dataset configuration.

The example below shows a small excerpt of a saved configuration. All information and settings related to both SeaGuardII and all connected sensors are found in the full file.

Figure 5-73: Example of saved .xml

5.24 System Status

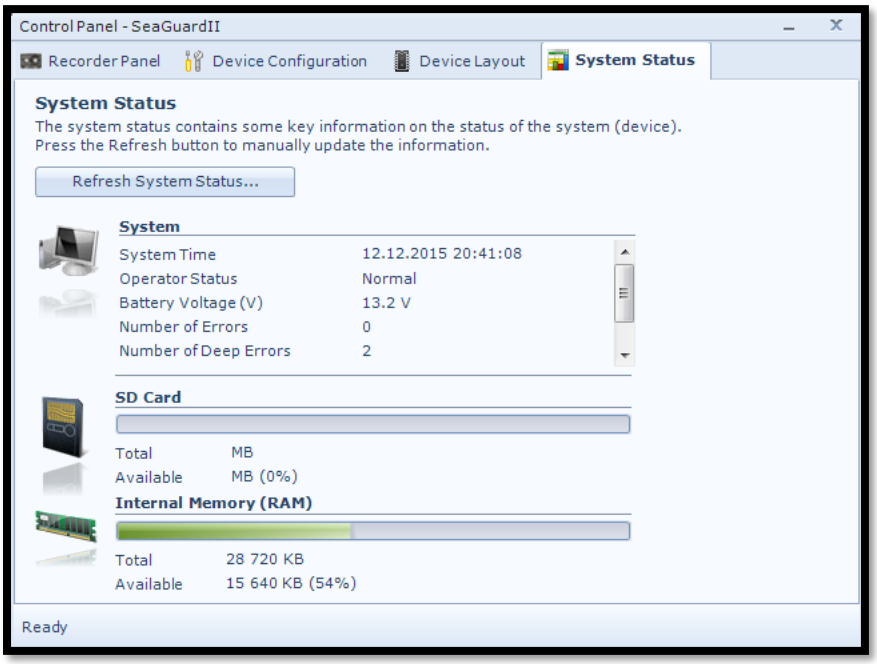


Figure 5-74: System Status

System Status provides information about the status of the ***System***, ***SD Card*** and ***Internal Memory.***

Please note that if you add to many sensors to one ***SeaGuardII*** You might reach a limit where ***Internal Memory(RAM)*** is full.

5.25 Interpretations of the LED on the front panel

The ***lower LED*** describes the transmission status: yellow light indicates data transmission.

The ***upper LED*** describes the recording status: the color is flashing green when recording (approximately 1 Hz). Red blinking indicates an error. If this happens please first check and if necessary delete files from SD-card. Also try to restart the instrument since a missing sensor at power up might also cause red blink.

5.26 Time change

If you would like to adjust the time, in the main window of ***AADI Real Time Collector***.
Under ***Device Information*** click "***Advanced…"*** and then "***Time Sync…"***

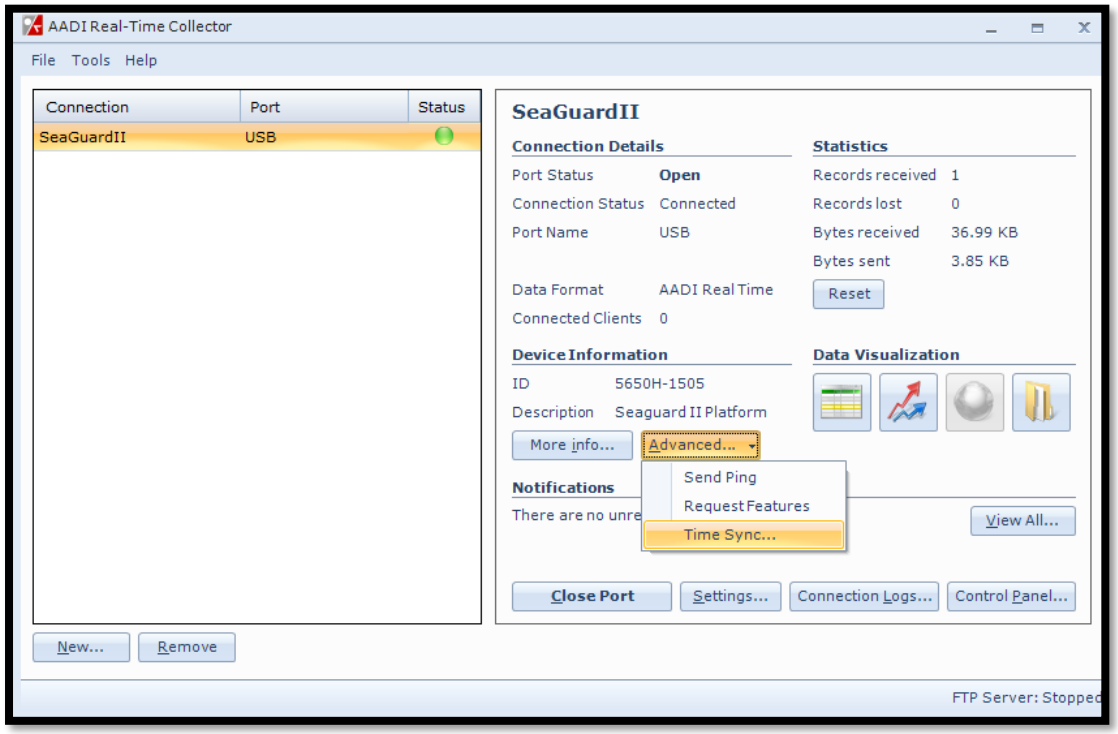


Figure 5-75: access Time Sync functionality

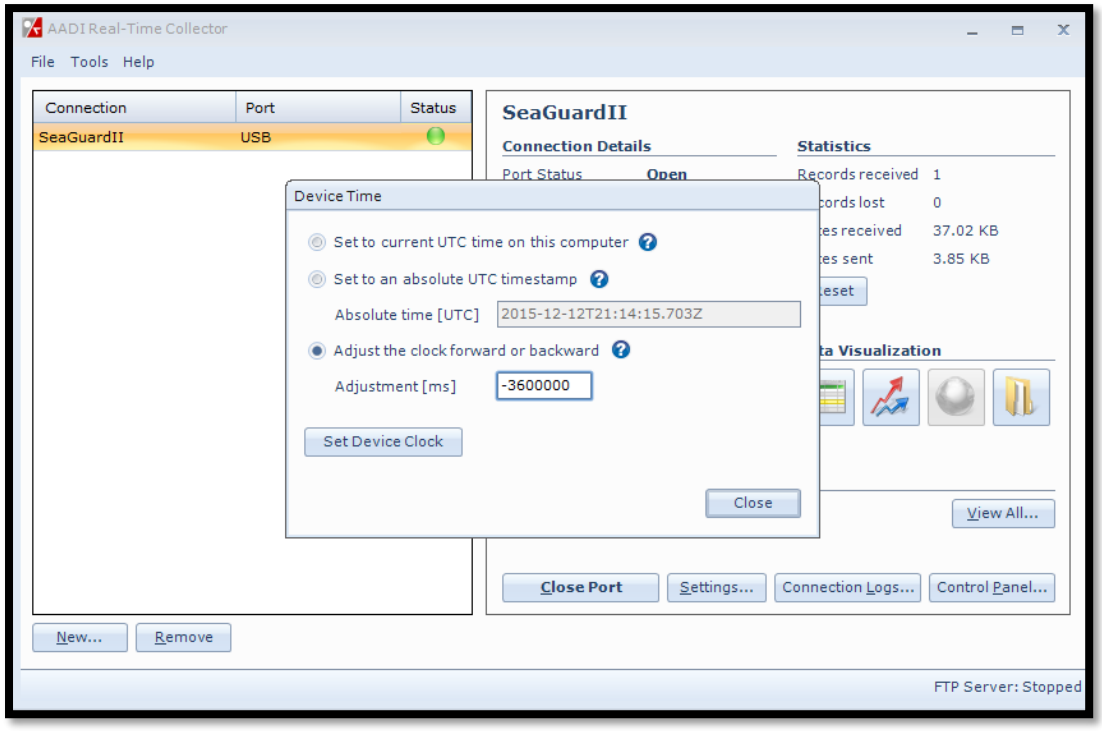


Figure 5-76: Set device Time

Select ***Device Time*** and then one of the three alternatives.

The clock will always refer to ***UTC time***.

We recommend checking and adjust clock before and after a deployment.

Set to current UTC time on this computer will use the current clock on your computer and set SeaGuardII clock to UTC time regardless of which time zone your computer is set to.

Set to an absolute UTC timestamp will use the adjustable time from Absolute time (UTC) below the setting. It will use the current clock on computer. If using this, please note that time will not be set before you enter Set Device Clock.

Adjust the time forward or backward are used if you want an offset to computer clock or just adjust the selected setting note that you need to enter the time in milliseconds.

Then click on **"*Set Device Clock*"**

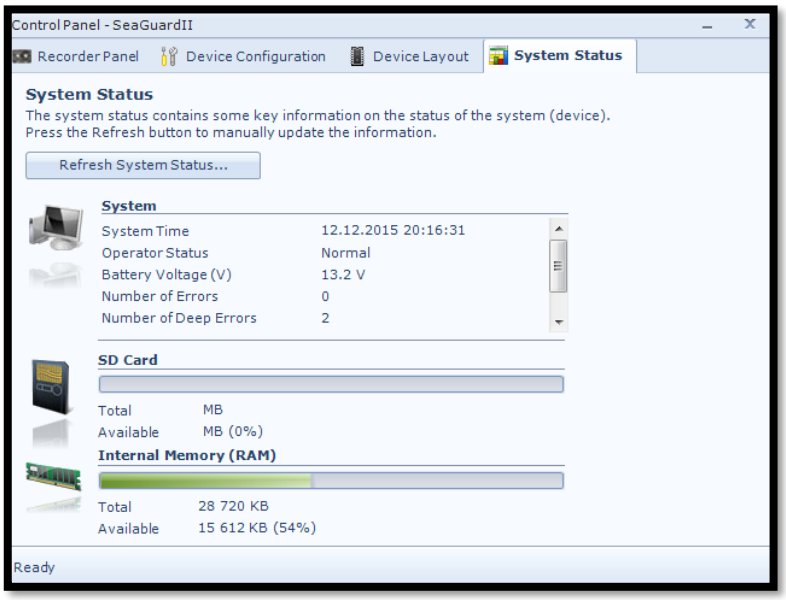


Figure 5-77: Check the time in the System Status

To check that the time is correct, open ***Control Panel > System Status***, click **"*Refresh System Status…",** under ***System*** you will find the SeaGuardII clock as the ***System Time*****,** updated each time you push the ***Refresh System Status…*** button.

CHAPTER 6 Logging data via AADI Real-Time Collector

6.1 Real-time data viewing using RTC

Data received by the ***AADI Real-Time Collector*** are distributed to overlaying applications like e.g. AADI's ***GeoView*** or ***Hydrosphere***. These are optional software solutions that stores received data in a database and offer a variety of real-time display panels.

You can view incoming data directly in real-time using the ***AADI Real-Time Collector***

6.2 Text Viewer

Text Viewer displays the most recent sensor data in text format. No historical data is available. The screen updates automatically when a new data message arrives if ***Auto Refresh*** is selected

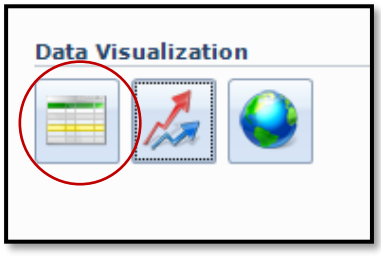


Figure 6-1: Text viewer

Please note that ***Real-Time Output Enabled*** in ***Deployment Settings > Multi Recorder Group*** need to be set and the group you want to show need to be enabled in ***System Configuration > USB Client Data Options*** to display the data.

Press the ***Text Viewer*** icon in the ***AADI Real-Time Collector*** main window to open the text viewer.

When we start the recorder, data is coming with new data set according to interval. If you start more than one group each group will create its own ***Style sheet***.

All Groups Record folder will show the last data from the last measured group. The other folders will show the last measurement from each individual group.

Yellow background for some data indicates that data is not ready, the sensor/instrument has not enough info to do a calculation. In this case with the ***Wave & Tide Sensor*** the wave parameters cannot be calculated before the sensor has made 1024 samples (dependent on configuration).

Red background indicates that the instruments do not receive any data from this sensor. In this case because there is no sensor connected to this COM port.

Analog sensors will typically show data even if no sensors are connected.

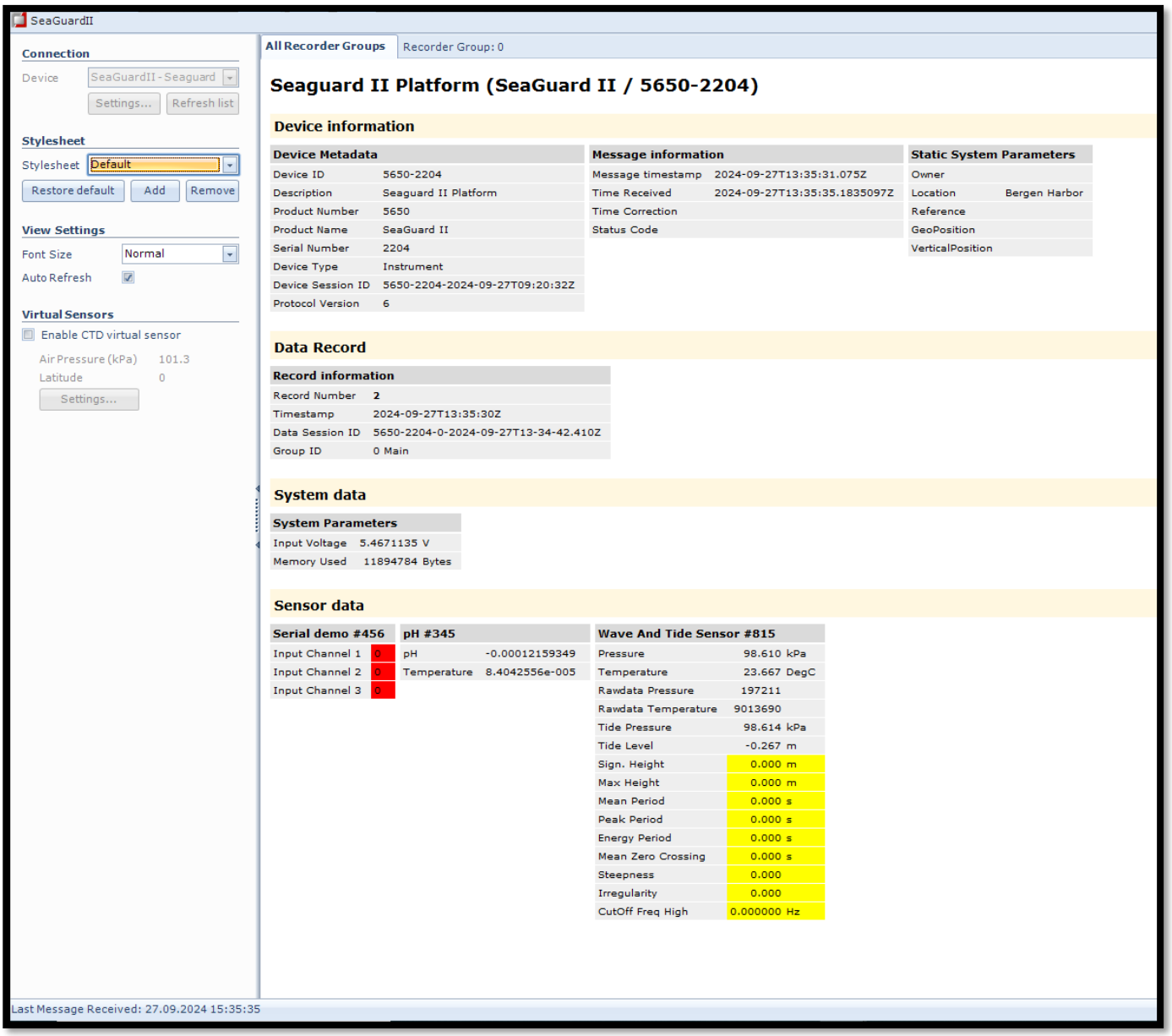


Figure 6-2: Style Sheet

Text viewer settings are in the left part of the window:

- ***Recorder Group:*** select all or individual SeaGuardII recording group data to view.
- ***Connection***: Not in use when the Text Viewer is opened from the Collector.
- ***Stylesheet***: The selected style sheet determines the layout of the view. New style sheets may be added; unused style sheets may be removed (.xlst format).
- ***View Settings: Font Size*****:** Set the text font size. ***Auto Refresh*****:** Select for automatic update as new messages arrive.
- ***Virtual Sensors*****:** Select to add a CTD virtual sensor to the view. The virtual sensor data is calculated using the UNESCO equation of state for sea water, given that enough input data is available (such as a pressure reading). Press the ***Settings*** button to set the air pressure and latitude used in the calculations.

6.3 Chart viewer

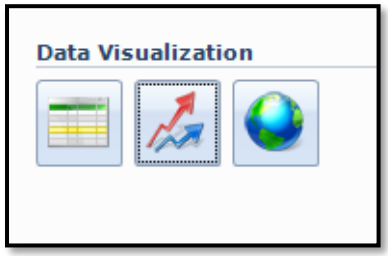


Figure 6-3: Chart viewer.

Press the ***Chart Viewer*** icon in the ***AADI Real-Time Collector*** main window to open the ***Create New Chart*** window

(**NOTE: not usable with the current profile data**)

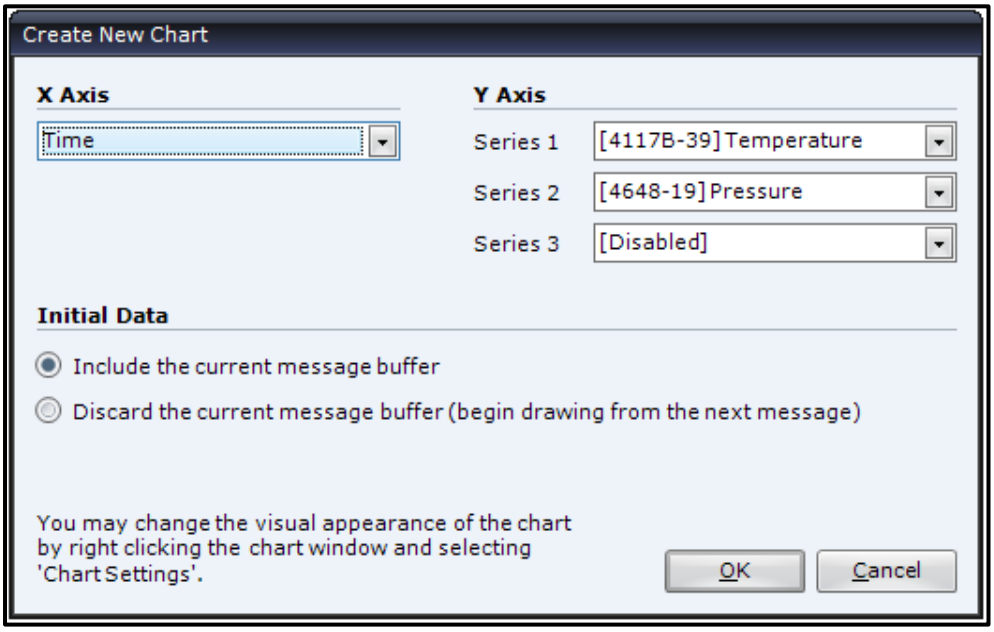


Figure 6-4: Create a new chart view.

Select parameters from the drop-down menu for both the X- and Y- axis. It is possible to display up to three data series on the Y-axis.

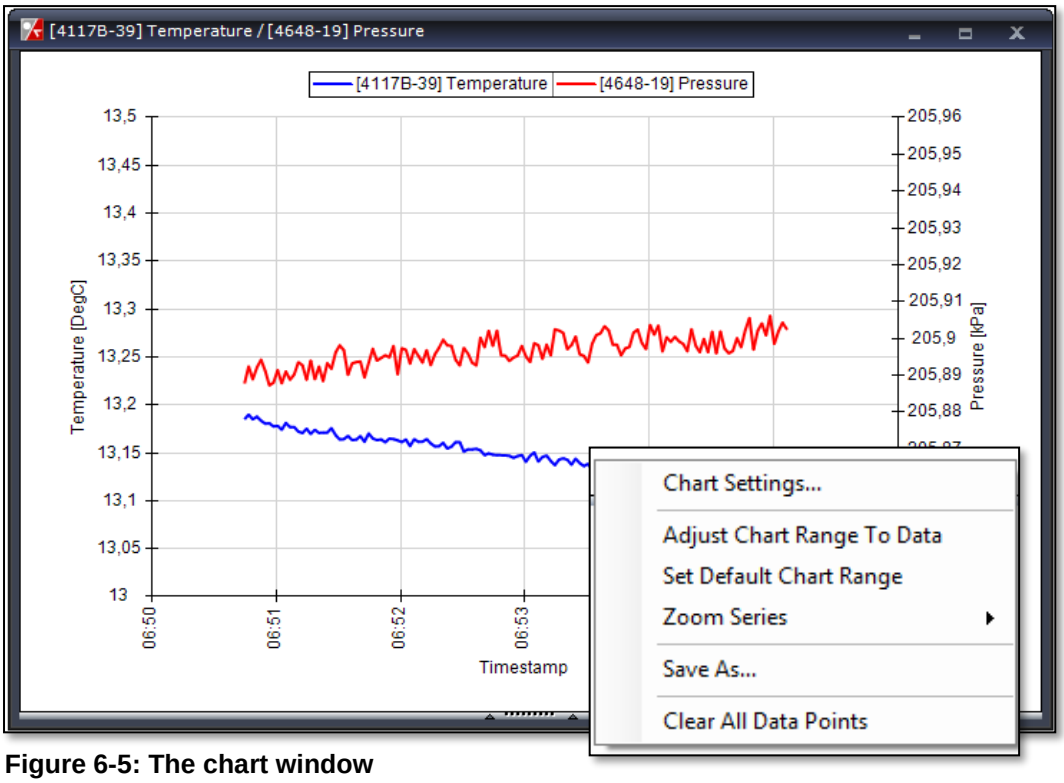
Select ***Include the current message buffer*** if you want to show data since last power reset or since ***Clear All Data Points*** has been used.

Select ***Discard the current message buffer (begin drawing from the next message***
If you don't want to include historical data since last power reset.

Press ***OK*** to save the settings and open the chart window.

The chart is automatically updated as new data messages arrive.

Please note that ***Real-Time Output Enabled*** in ***Deployment Settings > Multi Recorder Group*** need to be set and the group you want to show need to be enabled in ***System Configuration > USB Client Data Options*** to display the data.



Right click in the chart to bring up a chart options menu:

Figure 6-5: The chart window

- ***Chart Settings***: Open a chart settings window where you can specify the view range of the X- and Y-axis, grid lines, left/right Y axis location, and graph line color. You can also set the ***Max data points*** to be drawn before the oldest data are removed.

  Note! Displaying many data points (500 – 1000) may affect the computer performance, depending on the actual recording interval.

- ***Adjust Chart Range To Data***: Adjust the Y axis range to the current dataset. Because of performance considerations, this is not automatically repeated when new data arrives. If subsequent data points are located outside the chart range, select this option again to readjust the range.

- ***Set Default Chart Range:*** Set the Y axis range to the default value. Range is stored for each parameter in the sensor configuration.

- ***Zoom Series:*** Select which data series to zoom when operating the mouse inside the chart area.

- ***Save As:*** Save a snapshot of the current view to file.

- ***Clear All Data Points***: Clear all data points and start drawing from the next data message.

6.4 Logging data on PC

The ***Real-Time Collector*** program can save the incoming data to file, either to a txt-file or to xml-files. For instructions see the following chapters.

6.4.1 Enabling file output

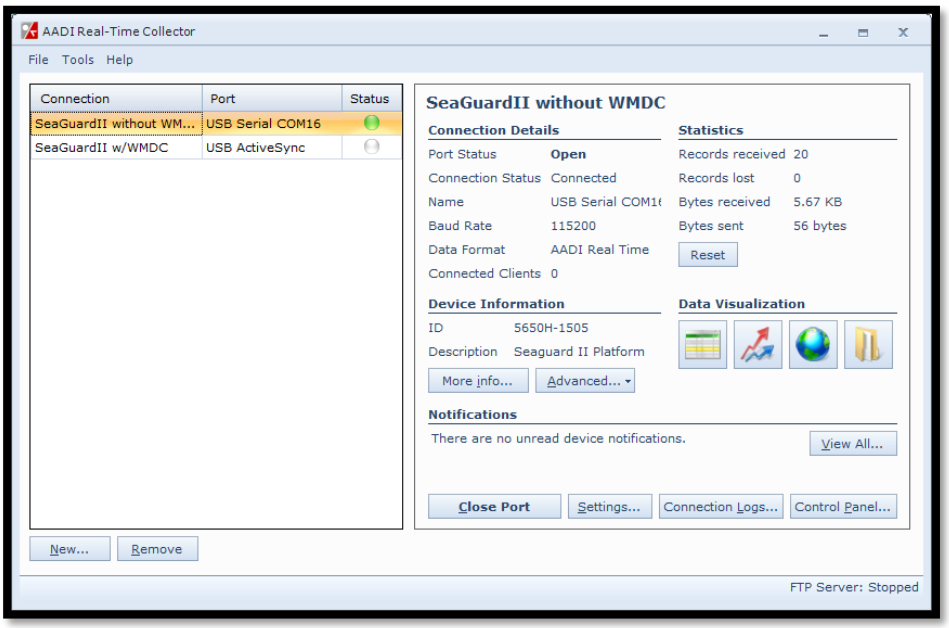


Figure 6-6: AADI Real-Time Collector start up menu

If your connection is ***open (status green in the AADI Real Time Collector*** main menu) then first press ***Close Port***.

When the port is closed then highlight the SeaGuardII connection and. click on the "***Settings…"*** button next to ***Open Port.***

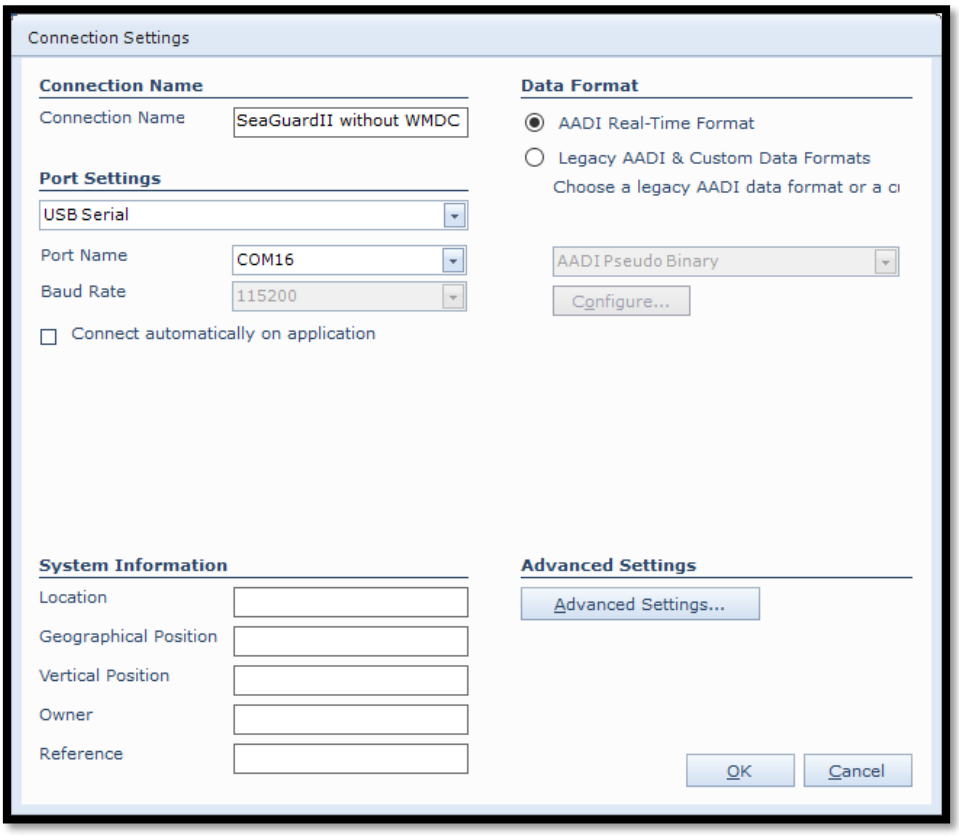


Figure 6-7: Connection Settings

Under ***Advanced Settings*** select ***Advanced Settings…***

Please note that ***Real-Time Output Enabled*** in ***Deployment Settings > Multi Recorder Group*** need to be set and the group you want to show/Save need to be enabled in ***System Configuration > USB Client Data Options*** to display the data.

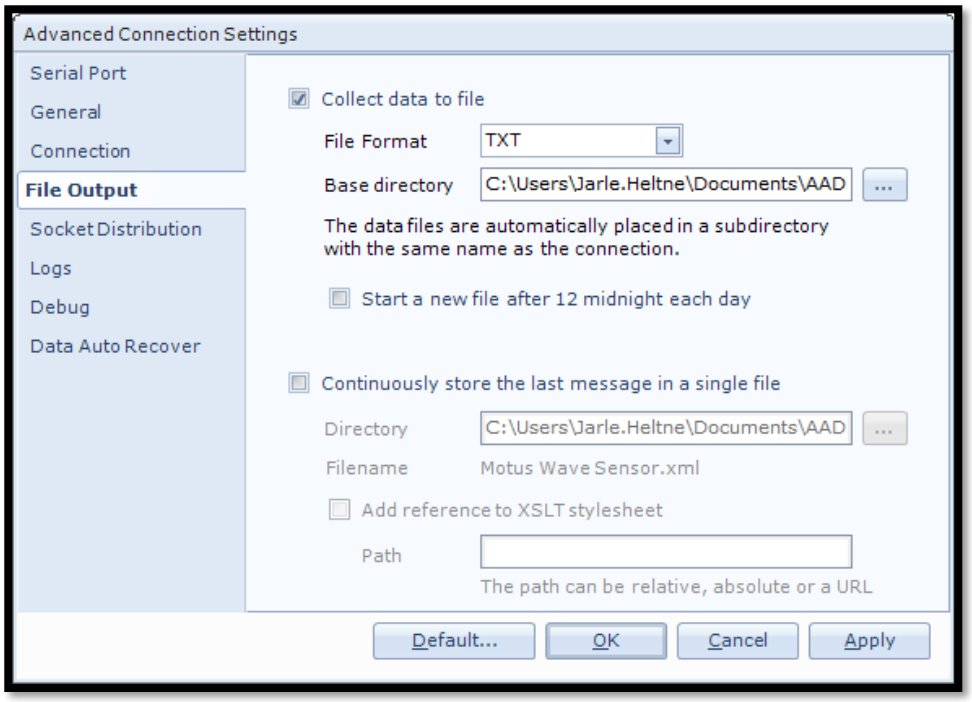


Figure 6-8: Advanced connection settings / File Output

Choose ***File Output*** from the list on the left side. Check the ***"Collect data to file"*** box to enable file output. Select a file format and choose a base directory where you want the file to be saved.

Alternatively you may select "Continuously store the last message in a single file".

Click "***OK"*** in the Advanced Connection Settings window, and ***"OK"*** in the Connection Settings window.

6.4.2 Starting the SeaGuardII and logging to file

In ***AADI Real-Time Collector*** start menu click on the selected connection and ***"Open Port"***. The Status turns green when the port is opened and connected. Click on the ***"Control Panel…"*** button in the lower right corner.

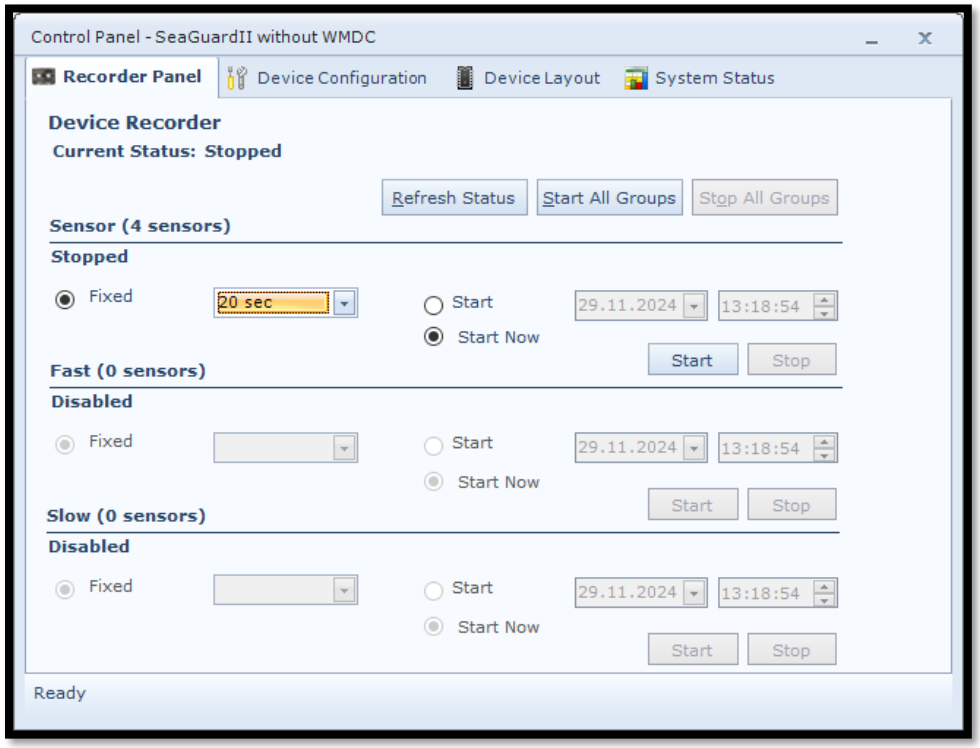
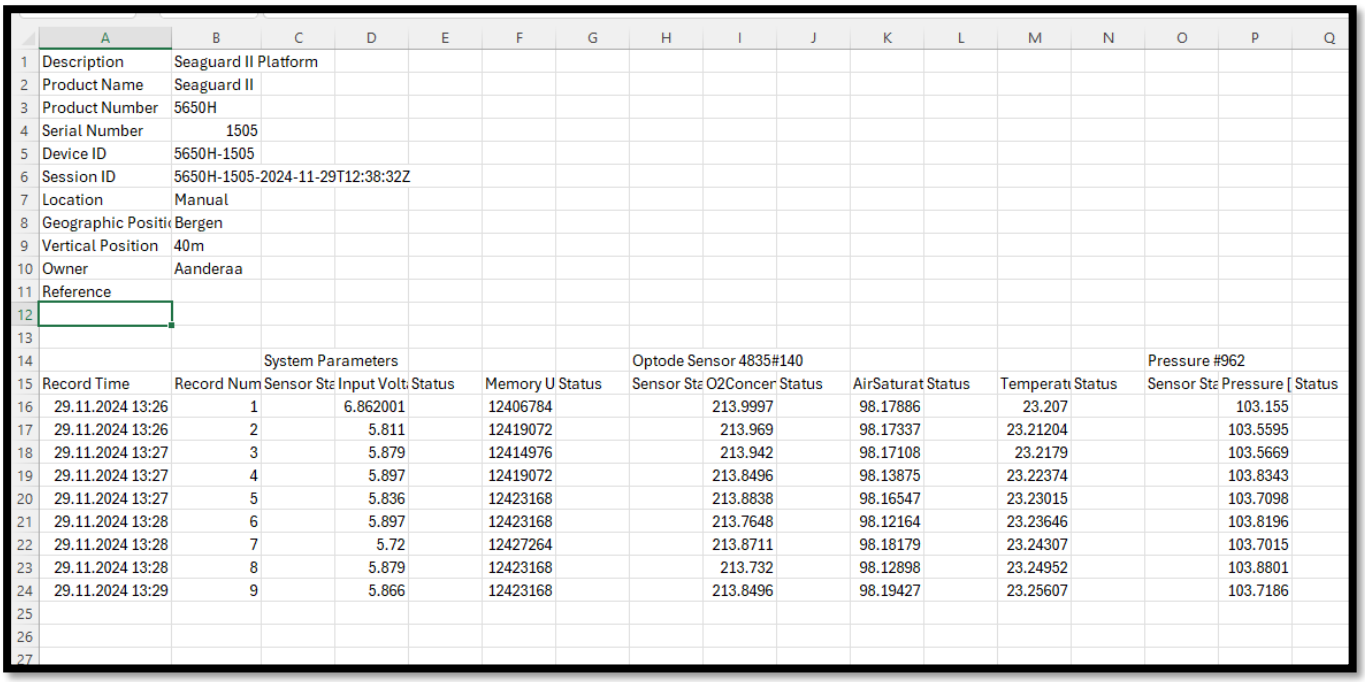


Figure 6-9: Recorder panel

In the ***Recorder Panel*** you may either ***Start All Groups*** or ***Start*** each group individually. A Group is only available if it's activated in ***Device Configuration > Multi Group Recorder***

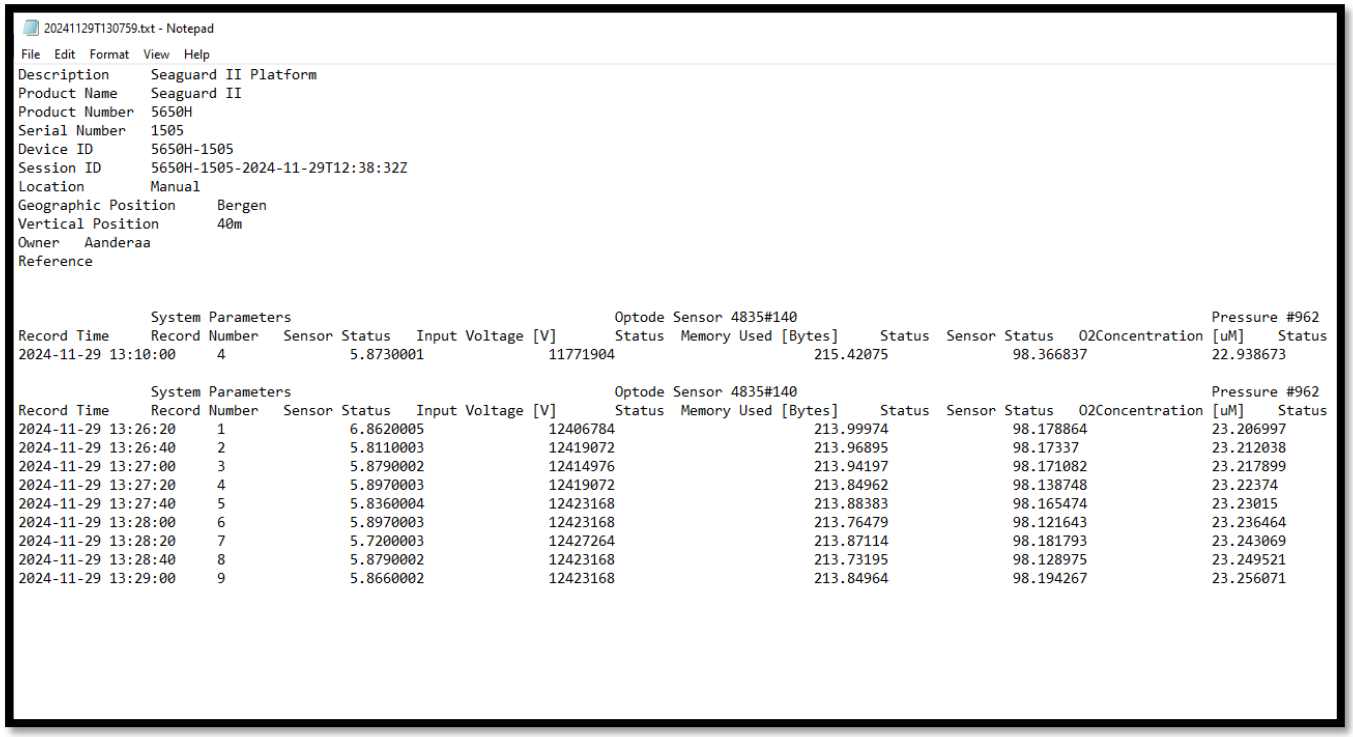
The shortest interval available depends on the sensor configuration.

Data will start logging in the defined directory. If it is a txt-file, the easiest way to view it is in Excel, Notepad or similar. In Notepad it might be difficult to link the header to each column.



Description	Seaguard II Platform															
Product Name	Seaguard II															
Product Number	5650H															
Serial Number	1505															
Device ID	5650H-1505															
Session ID	5650H-1505-2024-11-29T12:38:32Z															
Location	Manual															
Geographic Positi	Bergen															
Vertical Position	40m															
Owner	Aanderaa															
Reference																
		System Parameters						Optode Sensor 4835#140						Pressure #962		
Record Time	Record Num	Sensor Sta	Input Volt	Status	Memory U	Status	Sensor Sta	O2Concer	Status	AirSaturat	Status	Temperati	Status	Sensor Sta	Pressure [	Status
29.11.2024 13:26	1		6.862001		12406784			213.9997		98.17886		23.207			103.155	
29.11.2024 13:26	2		5.811		12419072			213.969		98.17337		23.21204			103.5595	
29.11.2024 13:27	3		5.879		12414976			213.942		98.17108		23.2179			103.5669	
29.11.2024 13:27	4		5.897		12419072			213.8496		98.13875		23.22374			103.8343	
29.11.2024 13:27	5		5.836		12423168			213.8838		98.16547		23.23015			103.7098	
29.11.2024 13:28	6		5.897		12423168			213.7648		98.12164		23.23646			103.8196	
29.11.2024 13:28	7		5.72		12427264			213.8711		98.18179		23.24307			103.7015	
29.11.2024 13:28	8		5.879		12423168			213.732		98.12898		23.24952			103.8801	
29.11.2024 13:29	9		5.866		12423168			213.8496		98.19427		23.25607			103.7186	

Figure 6-10:Example of a txt-file obtained from the sensor using Real-Time Collector with Excel



```
20241129T130759.txt - Notepad
File  Edit  Format  View  Help
Description      Seaguard II Platform
Product Name     Seaguard II
Product Number   5650H
Serial Number    1505
Device ID        5650H-1505
Session ID       5650H-1505-2024-11-29T12:38:32Z
Location         Manual
Geographic Position      Bergen
Vertical Position        40m
Owner    Aanderaa
Reference


                 System Parameters                                    Optode Sensor 4835#140                                                    Pressure #962
Record Time      Record Number    Sensor Status    Input Voltage [V]       Status  Memory Used [Bytes]     Status  Sensor Status    O2Concentration [uM]     Status
2024-11-29 13:10:00      4               5.8730001               11771904                        215.42075               98.366837               22.938673

                 System Parameters                                    Optode Sensor 4835#140                                                    Pressure #962
Record Time      Record Number    Sensor Status    Input Voltage [V]       Status  Memory Used [Bytes]     Status  Sensor Status    O2Concentration [uM]     Status
2024-11-29 13:26:20      1               6.8620005               12406784                        213.99974               98.178864               23.206997
2024-11-29 13:26:40      2               5.8110003               12419072                        213.96895               98.17337                23.212038
2024-11-29 13:27:00      3               5.8790002               12414976                        213.94197               98.171082               23.217899
2024-11-29 13:27:20      4               5.8970003               12419072                        213.84962               98.138748               23.22374
2024-11-29 13:27:40      5               5.8360004               12423168                        213.88383               98.165474               23.23015
2024-11-29 13:28:00      6               5.8970003               12423168                        213.76479               98.121643               23.236464
2024-11-29 13:28:20      7               5.7200003               12427264                        213.87114               98.181793               23.243069
2024-11-29 13:28:40      8               5.8790002               12423168                        213.73195               98.128975               23.249521
2024-11-29 13:29:00      9               5.8660002               12423168                        213.84964               98.194267               23.256071
```

Figure 6-11: Example of a txt-file obtained from the sensor using Real-Time Collector with Notepad

Each Sensor output data according to their individual configuration. The different parameters are organized in columns.

6.5 Viewing incoming data in real-time

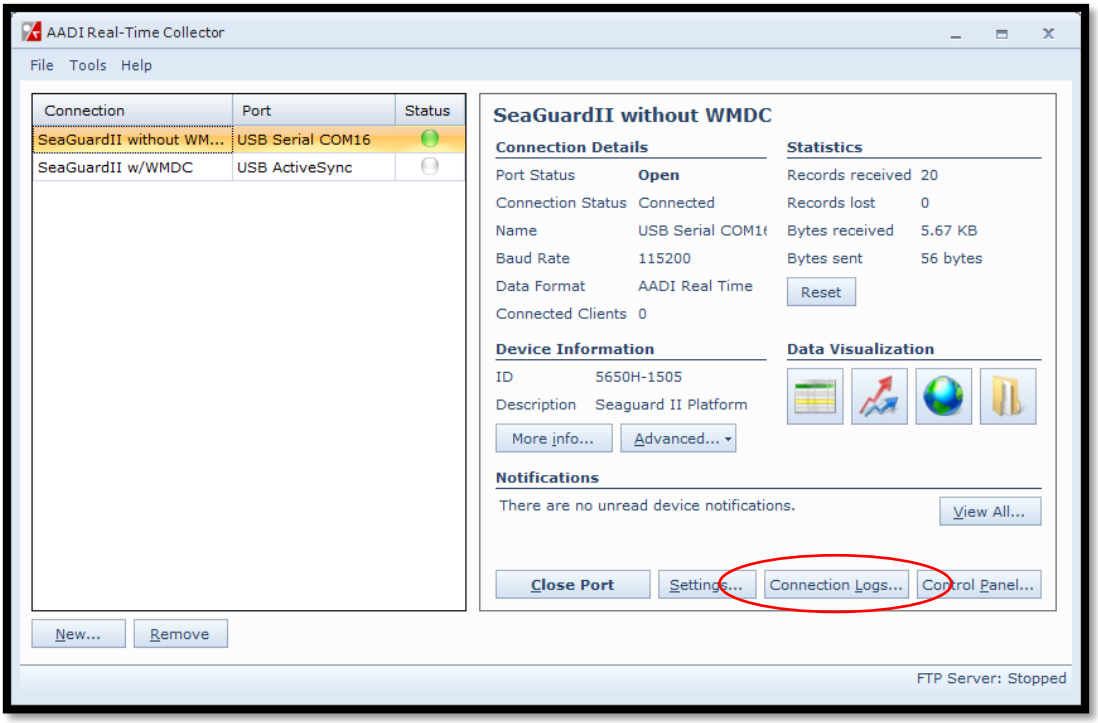


Figure 6-12: Open the Connection Logs...

When the sensor is running, the incoming data can be viewed by selecting ***"Connection Logs…"*** in the ***AADI Real-Time Collector*** start menu.

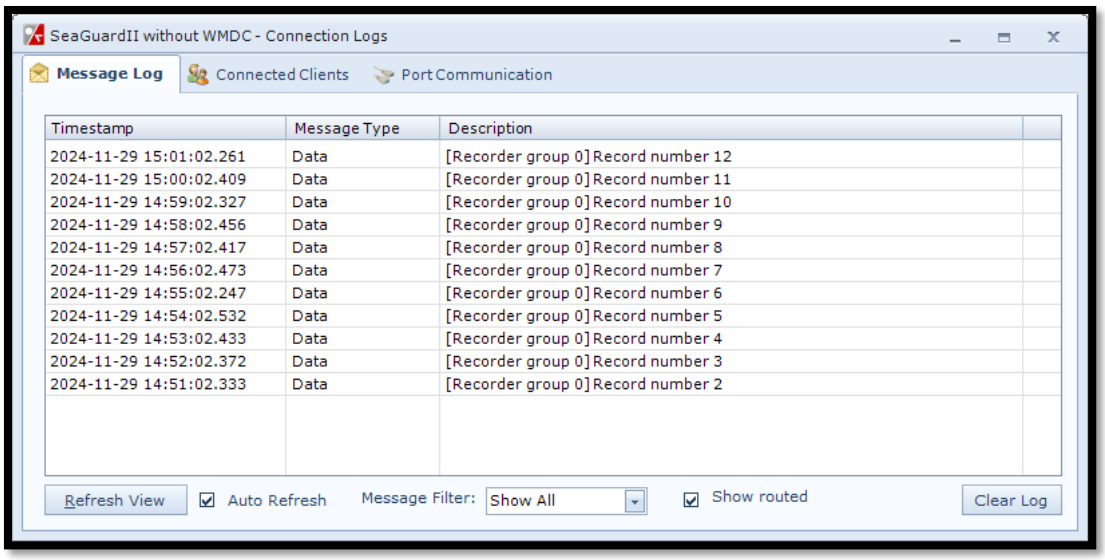
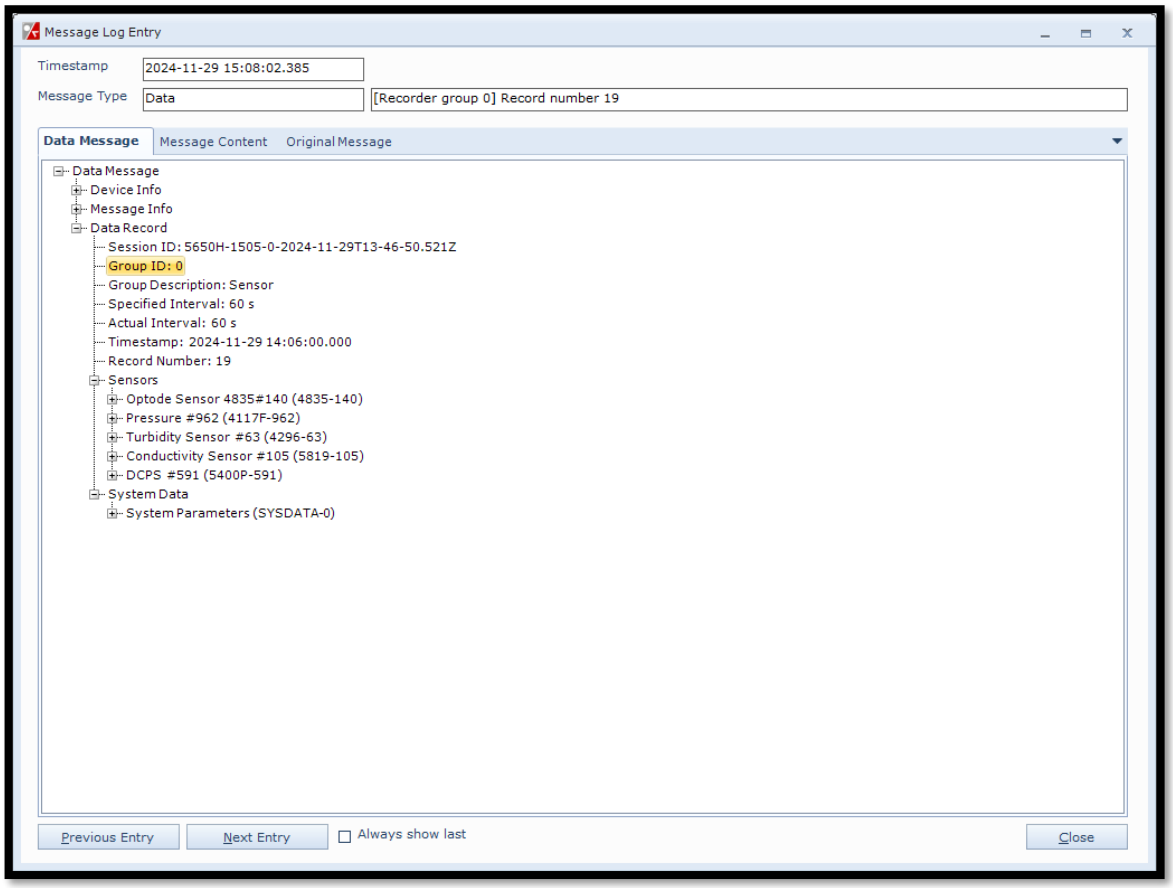


Figure 6-13: Connection Logs

Each ***Record number*** contains data from one recording period.

Double-click on one of the ***Record numbers*** to look at the data.

In this menu you will also find useful information about instrument status such as warnings and Port Communications.

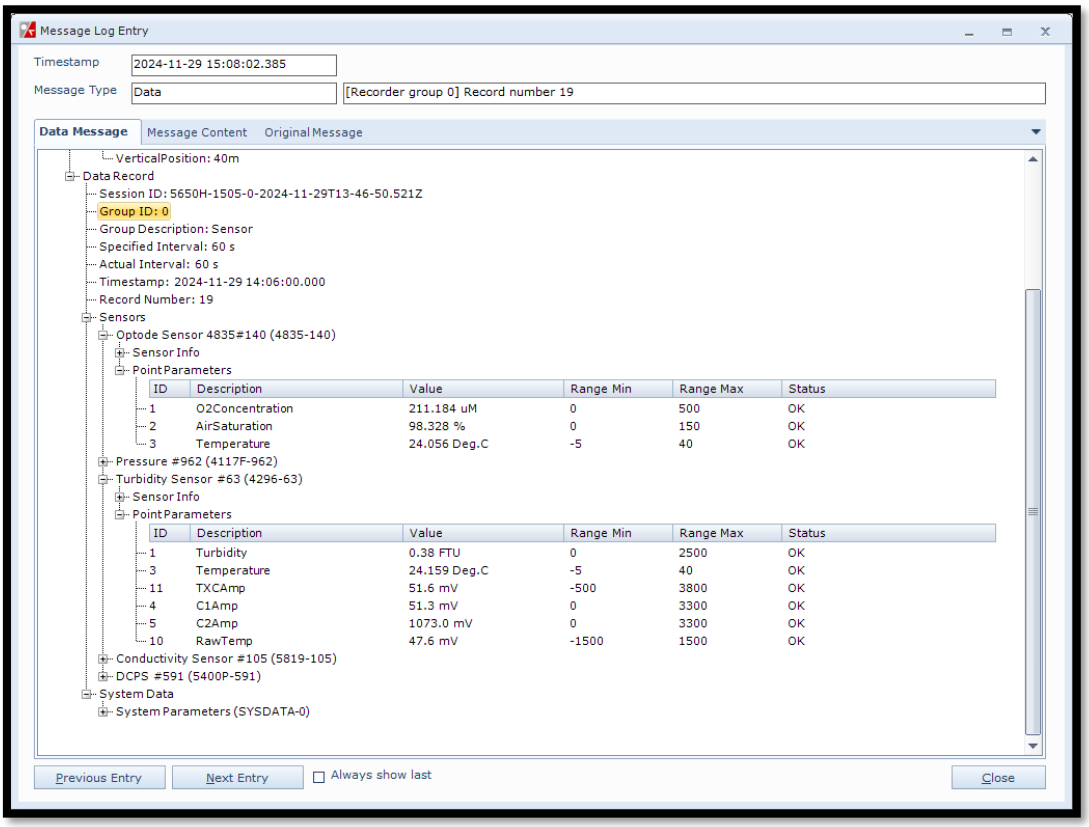


Click on the **+** signs to open and see all the data in the message. Previous records or newer records can be viewed by clicking on ***Previous Entry*** button or ***Next Entry*** button.

Figure 6-14: Visualization of incoming data from the sensor in real time

An automatic update to the last data message can be enabled by checking the ***Always show last*** check box. Note that also other messages such as ***Notification Message*** will show up both in the ***Connection Log*** and in the ***Message Log*** when they or if they are produced.

The original message content can be seen if clicking on the ***Original Message*** tab.



Each sensor has a ***Sensor Info*** part and ***PointParameters***.

Each ***Parameter*** is given in a table with ***Parameter ID*** and additional info.

Figure 6-15: Sensor Data

6.6 Data storage on SD card

Recorded data can be stored on the SD card inserted on the front panel of ***SeaGuardII***. Select to store recorded data in the ***Multi Group Recorder*** panel under ***Deployment Settings***.

SeaGuardII stores one data file for each recording session and each recording group. To subsequently view and analyses the recorded data use ***Data Studio*** *or* ***Data Studio 3D*** *to analyze data and* convert the data file(s) into excel format if needed. Both ***Data Studio*** *and* ***Data Studio 3D*** is available from our website. ***Data Studio*** is recommended if your ***SeaGuardII*** has no 3D data. This means ***SeaGuardII*** without ***DCPS*** or ***Motus***. In cases where ***DCPS*** or ***Motus*** is connected to your ***SeaGuardII*** you need to use ***Data Studio 3D***.

The data format is binary but flexible and can also be extracted to ***AADI Real-Time Output XML*** format.

Each recording session is assigned a folder referring to the date (YYYYMMDD) and time (HHmm) when the recording started: ***DataSessions_YYYYMMDDHHmm***

Within each recording session folder the files for the recording groups are denoted ***GroupN_YYYYMMDDHHmm***, referring to the date and time as above. N is the recording group number (0, 1 or 2).

6.6.1 Event log data storage on SD card

During execution of the internal software on ***SeaGuardII*** several internal events are monitored. If the SD card is inserted these events are logged to files in the root folder.

6.7 On-line retrieval of files from SeaGuardII using FTP

You can utilize an external FTP client to transfer files between ***SeaGuardII*** and the ***PC*** through the ***AADI Real-Time Collector***.

6.7.1 Setting up SeaGuardII for FTP in Real-Time Collector

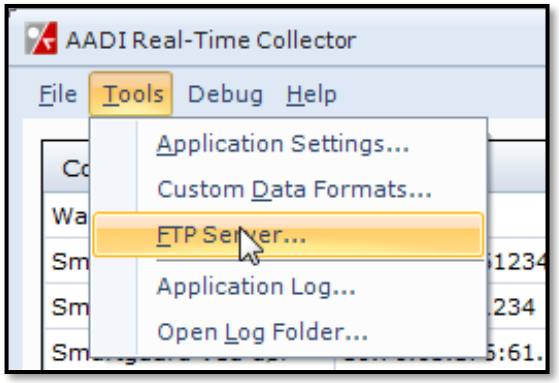


Figure 6-16: FTP Server

Open ***Tools > FTP Server*** in the main window of ***AADI Real time Collector.***

SeaGuardII does not allow anonymous logon so you must create an account.

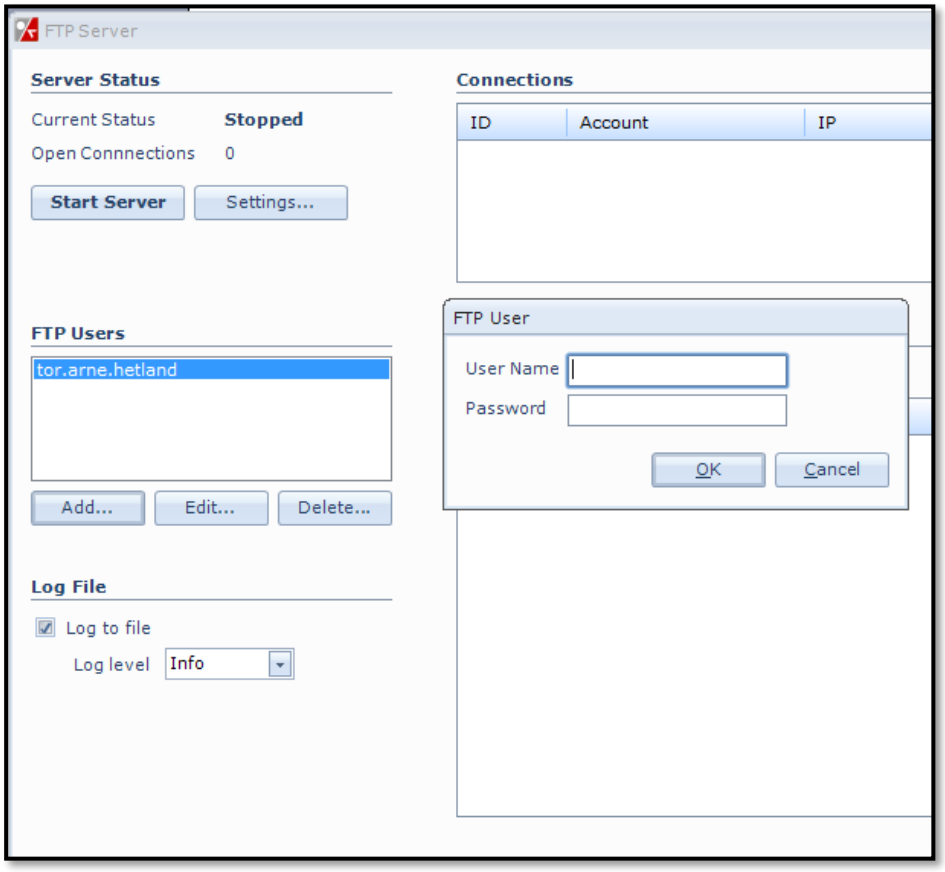


Figure 6-17: FTP User

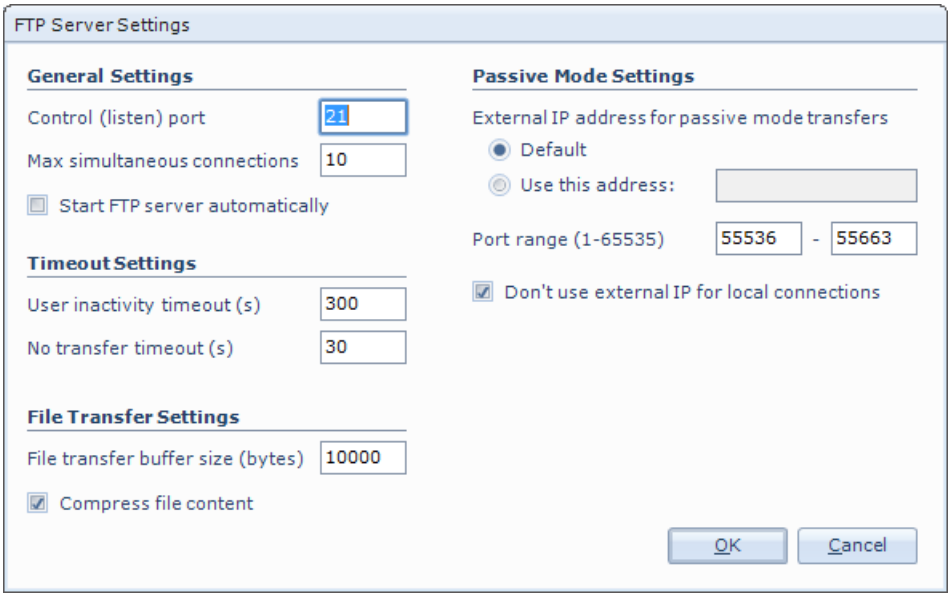
Press ***Add*** in the ***FTP Users*** heading and assign a ***User Name*** and ***Password*** to the account.

Press ***Settings*** in the ***Server Status*** heading to configure the FTP server.

Usually the default settings can remain unchanged

Enable ***Start FTP*** server automatically if you want this feature to be available all the time.

Press ***OK*** and then press ***Start Server***



Usually the default settings can remain unchanged

Select ***Start FTP server automatically*** if you want this feature to be available all the time.

Press ***OK*** and then press ***Start Server.***

Figure 6-18: Settings for FTP server.

6.7.2 Access data

To access the SD card remotely you can use most stand-alone FTP clients.

Type ***ftp://localhost*** in the address field and connect by using the account created above.

CHAPTER 7 Sensors, modem, and auxiliary devices

You can connect all Aanderaa sensors, as well as many 3rd party sensors, modem/auxiliary devices to the ***SeaGuardII. SeaGuardII*** is targeted to integrate devices into an ***Aanderaa*** observatory node with modern self-describing data format, manually add required information when connecting other devices than ***Aanderaa AiCaP*** sensors:

Aanderaa AiCaP sensors are “smart sensors”. These sensors hold information about their identity, individual calibration coefficients and linearization data. ***AiCaP*** sensors provide measurement data in engineering units as well as metadata to track the origin of the data. **NOTE:** sensors need framework 3 implemented to be used with ***SeaGuardII***. Contact the factory for further information.

When connected to an ***Aanderaa*** measurement system, such as e.g. ***SeaGuardII, AiCaP*** sensors are “plug and play” sensors which provide the system with all its individual parameters automatically at sensor power up. The user may specify sensor deployment settings such as output parameters etc.

When connecting ***Serial sensors, Analog sensors*** and ***modems/auxiliary devices*** to the ***SeaGuardII***, the device identity, individual calibration coefficients and linearization data, port settings etc. are easily entered using the ***AADI Real-Time Collector*** through:

Device layout; holds general information about the device/sensor, like product- and serial number, data format, device type and channel for data presentation, COM port, and modem description.

User Maintenance; which holds device specific information like description, calibration coefficients, power settings and AD channel names.

System Configuration; to target the sensor/modem to your particular use.

The system will then provide engineering data and metadata to track the origin of the data. The sensors are only visible in ***User Maintenance*** and ***System Configuration*** if the sensor is enabled in ***Device Layout***.

7.1 Sensor connection

In the following chapters we will describe how to enable a non-smart sensor or communication device. But you also need to physical connect the sensor or device to your ***SeaGuardII*** and this is normally done with one of the ***Aanderaa*** standard cables, but also special designed cables are available from factory. We do not recommend using 3rd party cables since this will normally increase the risk of leakage.

7.2 Device layout

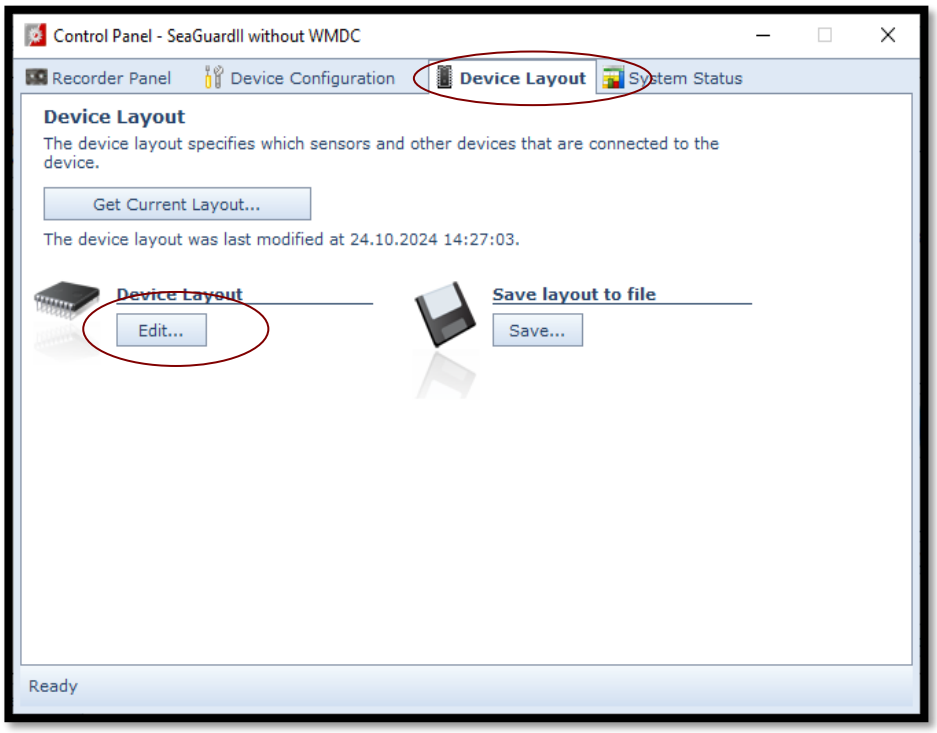


Figure 7-1: Device Layout panel

Open ***Control Panel*** and select the ***Device Layout*** tab, and press ***"Get Current Layout..."***.
Note! The password is: 1000

Select ***Save layout to file*** and press ***Save…*** to save current layout to file.

Select ***Device Layout*** and press ***"Edit…"*** to add new sensors/modem or edit existing layout.

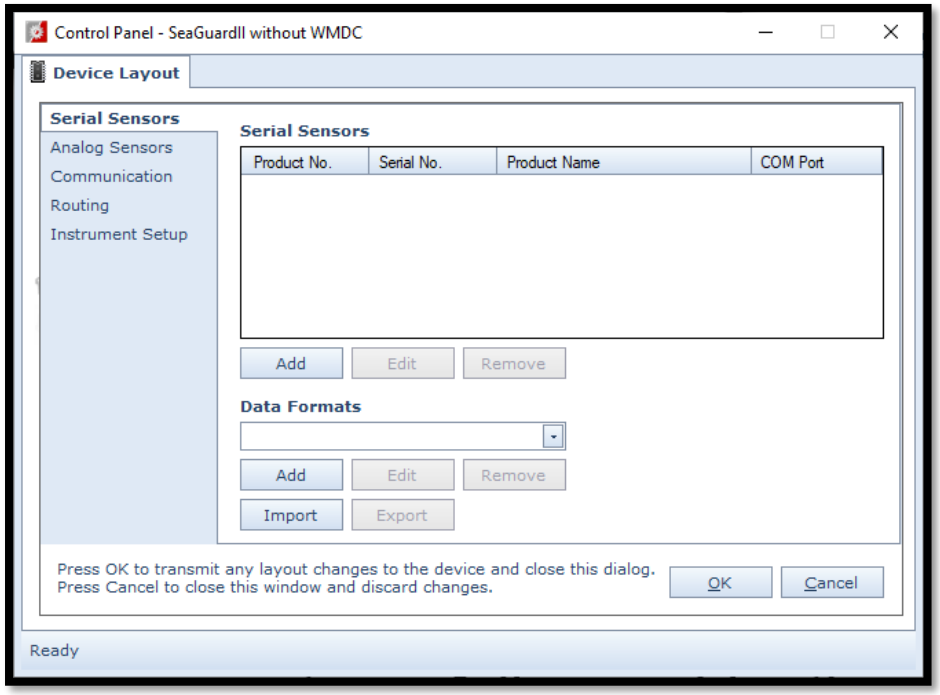


Figure 7-2: Device Layout

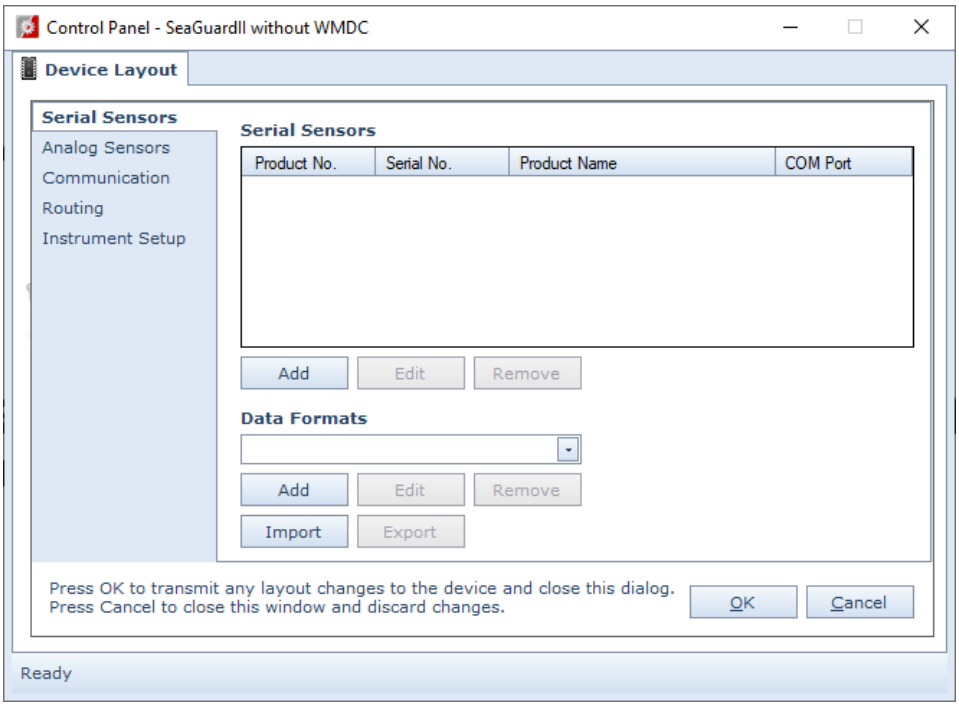
Device Layout holds five different sub menus.

- ***Serial sensors***
- ***Analog sensors***
- ***Communication***
- ***Routing***
- ***Instrument Setup***

7.3 Serial sensors

When adding a new serial sensor, you must carefully consider the sensor data format:

- If the data formats list already contains a file format that fits the actual sensor data stream, then you can select that data format in the drop-down menu. Refer following chapter to continue when the data format is defined.
- If the data format is not already in the list you must define a new format to fit the data stream from the sensor. Refer following chapter for defining a data format that fits the actual sensor.



Open ***Serial Sensors*** in the ***Device Layout*** folder.

IMPORTANT!
Refer the sensor operating manual for configuring the sensor to present an output that subsequently can be defined.

IMPORTANT! Please read the data format description below before adding a new data format.

Figure 7-3: Serial sensor layout

7.3.1 Specifying a data format for the serial sensor

Serial sensors transmit their data as an ***ASCII*** text string. To interpret this string ***SeaGuardII*** needs to know the format, which parameter to catch and its meaning. Thus the first thing to consider when preparing to add a new serial sensor is its data format.

Use the sensor manual to pre-set/configure the sensor for an operational mode where the measured data are transmitted (as a single line of text, or multiline), either automatically after power up or following a request command issued by the user.

Given the exact format of the data text line transmitted from the sensor a corresponding data format definition must be created for the ***SeaGuardII*** under ***Device Layout > Serial sensors > "Add…"*** under ***data format***. The ***'New Custom Data Format'*** dialog box opens.

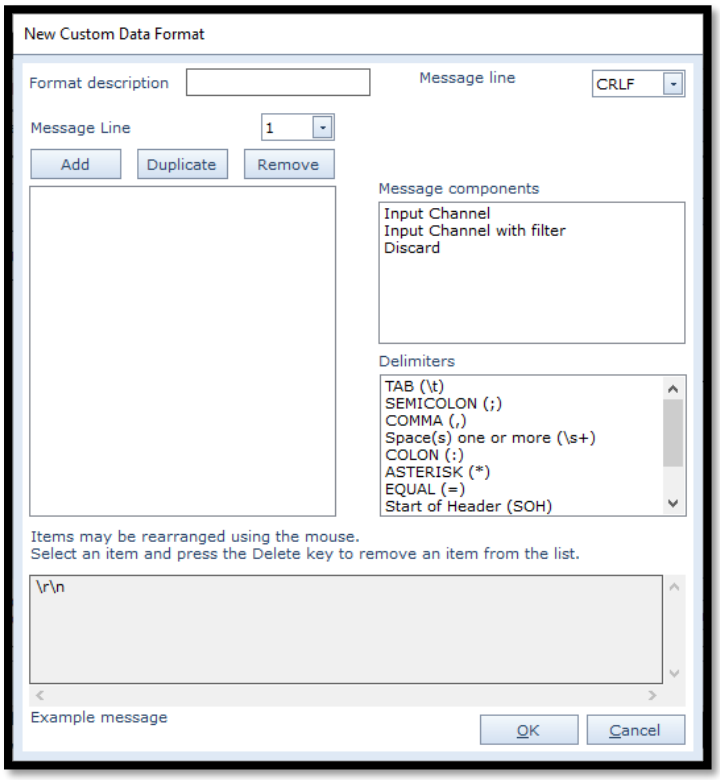


Figure 7-4: New Custom Data Format

The ***Format description*** must have a unique name and must be stored in the layout. If two or more sensors happen to have equal format for their transmitted data the same data format can be applied to both.

Edit the format name in the ***Format description*** text box at the top of the windows.

Predefined ***Message Components*** are arranged in the same sequence as in the data string from the sensor. The delimiters used by the sensor must be equal positioned in the format. Values or text not interpretable by ***SeaGuardII*** or not used can be skipped using the ***"Discard"*** component. To catch one or more measured parameter value use the ***Input Channel*** element, once for each value.

The ***Input Channel*** component matches actual data values from the device.

The ***"Discard"*** component matches any element in the data format that cannot be properly matched or that simply should not be saved, e.g. a description text or some other data that cannot be used.

Measured data can be transmitted as multiline; Press ***"Add"*** to add a line, press ***"Duplicate"*** to duplicate the selected line, or press ***"Remove"*** to delete the selected line.

A complete data message (data format) can be built up from elements in the ***Message components*** list and the ***Delimiters*** list.

Verify the message line number.

- Select elements from these message components and delimiters; drag-and-drop them into the larger list box to the left. The order of the elements is crucial.
- Rearrange elements by *select drag-and-drop* within the list box.

  When the complete message is defined:
- Press the ***"OK"*** button save the data format when the complete message is defined.
- Press ***"Cancel"*** to discard your changes.

The ***Example message*** field in the bottom of the window shows an example string using the current setting.

The example bellow shows a wind sensor with following data output from manufacturer operating manual. First decide which parameters you want to use as input channels. Drag and drop elements from ***Message components*** and ***Delimiters*** to specify which parameters to discard or keep.

Double click on an item or mark and press delete to remove one item from list. Give a descriptive name in the Format description box.

<STX>A,M15,270,002.02,M,253,002.83,00,<ETX>4D

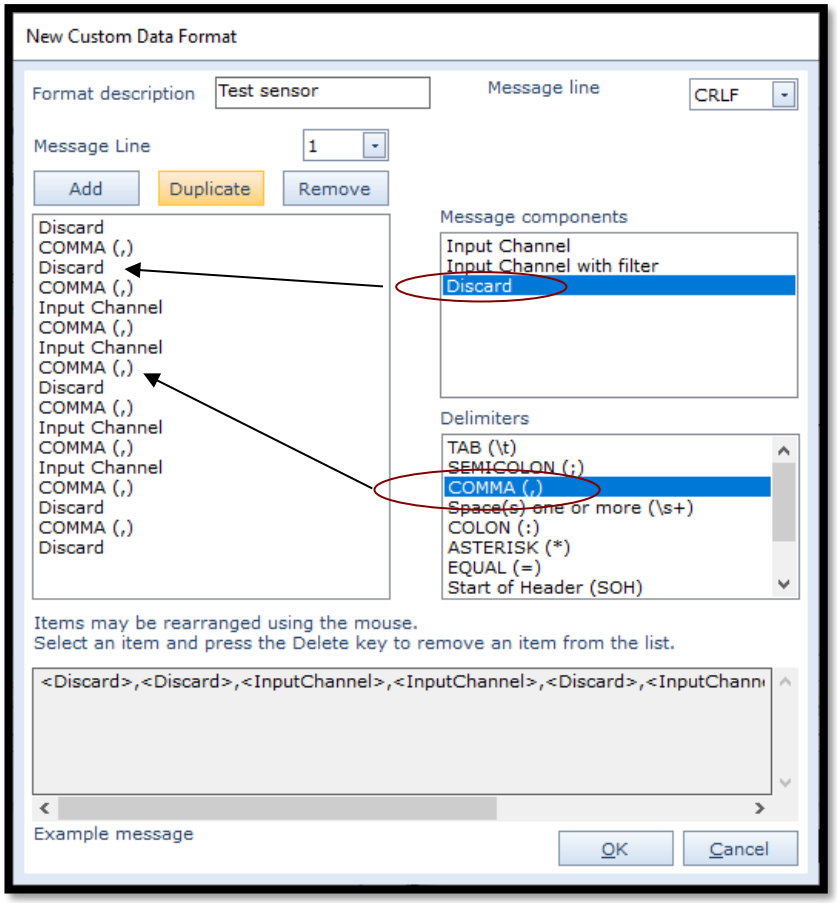


Figure 7-5: Example using Wind Sensor

<STX>A = Start of string

M15 = Continuous Output Averaging

270 = Wind Direction in degrees.

002.02 = Wind Speed

M = Units in Meter per Second

253 = Direction Gust in degrees

002.83 = Max Gust Speed

00 = Status Value Status 00 OK

<ETX>4D = End of string

Figure 7-5 shows the complete data format for this sensor.

Press ***OK*** and ***OK*** to store the data format.

7.4 Serial sensor layout

Note! The sensor data format must be defined before you perform sensor layout.

The ***Serial Sensor's*** product identification together with its parameter definitions (name, unit, data type, max and min limits) are stored in the layout.

Select ***Add*** under ***Serial Sensors***

SeaGuardII supports both ***RS232*** and ***RS422*** sensors; ***COM1***, ***RS-232*** and ***COM3***, ***RS-422***. Be sure to use what is required for the actual sensor.

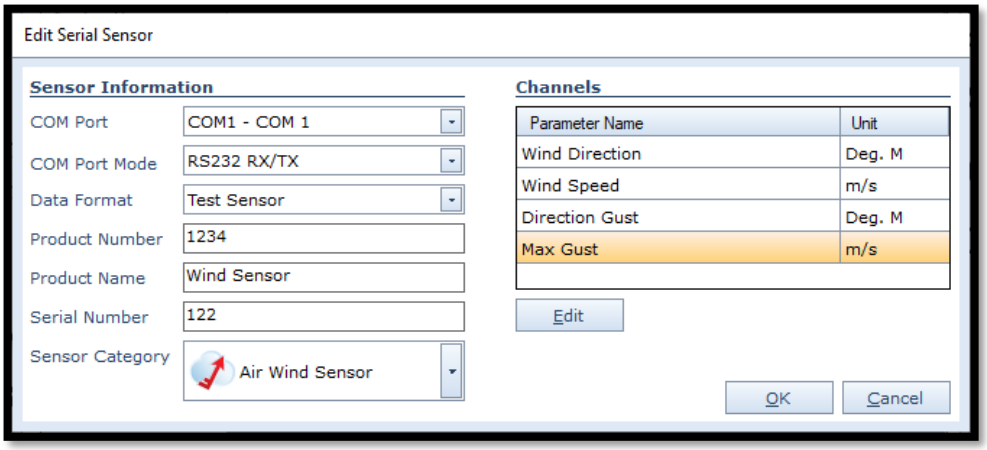
To save power ***SeaGuardII*** controls the power for each individual sensor. Sensors may need a certain warm up time from power up before measured parameters are within specified accuracy. This must be specified in the configuration under ***User Maintenance*** for ***SeaGuardII*** to take this into account when the recording sequence is arranged internally. Also sensor requirement for a minimum time with power off can be set. A ***Command Polled*** sensor may be set to be continuously powered if this is required for a proper operation.

Press ***"Add"*** below the list of serial sensors and enter serial sensor information.

To edit an existing sensor layout:

- Select the sensor from the list
- Press ***Edit*** below the list of serial sensors to edit existing layout.

Note! *Some changes in the layout will change the sensor identity and hence the sensor must be reconfigured. Open the device configuration to reconfigure the sensor.*



Select your ***COM Port*** where this sensor is physically connected to ***SeaGuardII***

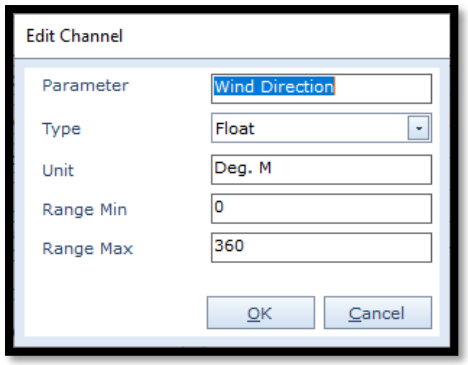
Select ***COM Port Mode***: ***RS232*** or ***RS422*** as appropriate

Select a defined ***Data Format*** from the drop-down list

Figure 7-6: Edit serial sensor information.

Type the ***Product Number*** and ***Product Name***, and the actual sensor's ***Serial Number.***

Select an appropriate icon from the drop-down list



Select each parameter's data channel in the ***Channels*** list and press ***Edit*** to set parameter name (e.g. Wind Speed), measurement unit (e.g. m/s) and max (e.g. 40) and min value (e.g. 0) limits.

Press ***OK*** and ***OK*** to complete or ***Cancel*** to exit without updating changes.

SeaGuardII will restart automatically and the layout will be changed.

Figure 7-7: Edit channel

7.5 Serial Sensors in User Maintenance

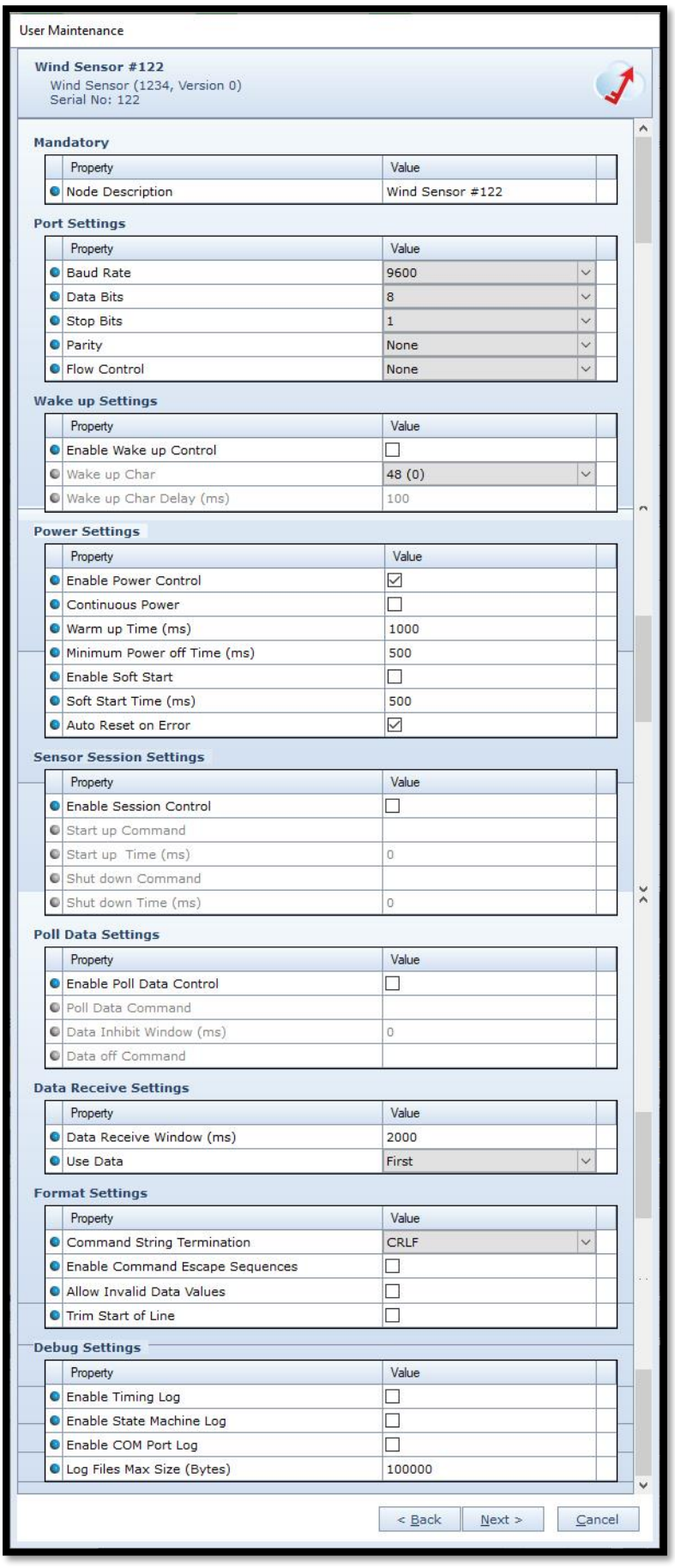


Figure 7-8: User Maintenance > sensor

Restart ***SeaGuardII*** to update sensor layout in the system.

Open ***AADI Real-Time Collector > Device Configuration.***

Check ***Include User Maintenance*** and press ***"Get Current Configuration…"*** Enter ***(password=1000).***

Press ***"Edit.."*** under the ***User Maintenance*** heading.

Select and double click the actual sensor in the sensors list.

The settings in ***User Maintenance*** are used to ensure reliable communication between logger and sensor.

Please refer to individual sensor operation manual to select the proper value for each setting.

7.5.1 Mandatory

Figure 7-9: Mandatory

All sensors and Platforms are given a ***Node Description*** text like ***Sensor Name #xxx*** (where xxx is the serial number of the sensor). The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

7.5.2 Port Settings

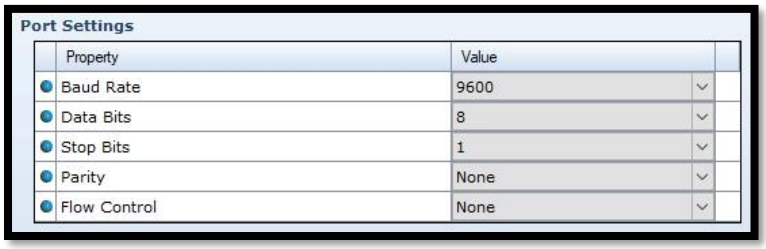


Figure 7-10: Port Settings

This port setting must be the same as set in the sensor to secure reliable communication. Most sensors have a configurable port setting and then both sensor and logger must be synchronized.

Baud Rate: Select in the range 2400 to 115200 (the baud rate must be equal to the receiver baud rate e.g. the AADI Real-Time Collector. For longer cables use a lower baud rate.

Data Bits: Set the number of Data Bits to 7 or 8. Set the value to *8* when the receiver is the AADI Real-Time Collector.

Stop Bits: Select between 1, 1.5 and 2 stop bits. Set the value to *1* when the receiver is the AADI Real-Time Collector

Parity*:* Select between None, Even and Odd parity. Set the value to *None* when the receiver is the AADI Real-Time Collector.

Flow Control*:* Select between None, Xon/Xoff and hardware (RS-232). Set the value to Xon/Xoff when the receiver is the AADI Real-Time Collector.

7.5.3 Wake up Settings

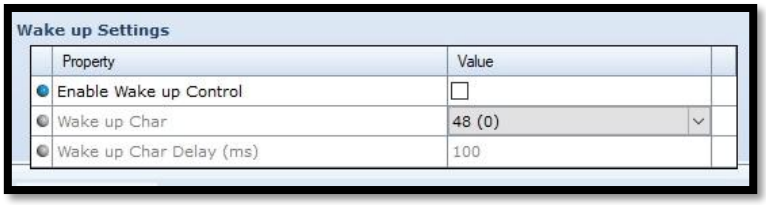


Figure 7-11: Wake up Settings

Enable Wake up Control if selected a wake-up character can be used to wake up the sensor from sleep.

Wake up Char Select a wakeup character.

Wake up Char Delay (s) gives the possibility to set a time delay between ***Send Wake up Char*** and the actual sending of character.

7.5.4 Power Settings

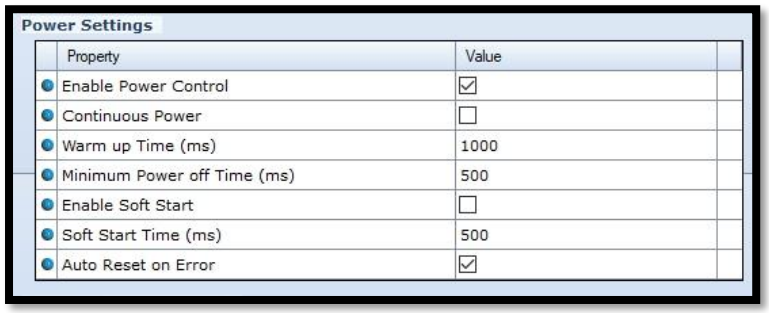


Figure 7-12: Power Settings

Enable Power Control If enabled power will be switched on to the sensor according to ***Warm up Time*** and switched off again after data is received by the instrument. This is done to save power.

Continuous Power when selected a continuous 10V power is supplied to the analog sensor connected to the hub card.

Warm up Time (ms) is set to control the switch on time for the analog sensor power supply. In this example it is to 5000ms (5 seconds). This means that the instrument switch on power 5 second before the measuring instant. The power is switched off immediately after the measurement is taken. Select an appropriate value for the ***Warm up Time (ms)***; the value must cover the longest time required by the sensors to be ready.

Minimum Power off Time (ms) is the minimum time in sleep needed for the sensor to enter sleep. If the available time is shorter the sensor will stay awake if enable power control is selected.

Enable Soft Start is a gradually power switch on. From zero to operation power input.

Soft Start Time (ms) is the time used for the gradually power on from 0 to max when Enable Soft Start is selected.

Auto Reset on Error If selected and an error occur, the SeaGuardII will reset the sensor by powering it off and on.

7.5.5 Sensor Session Settings

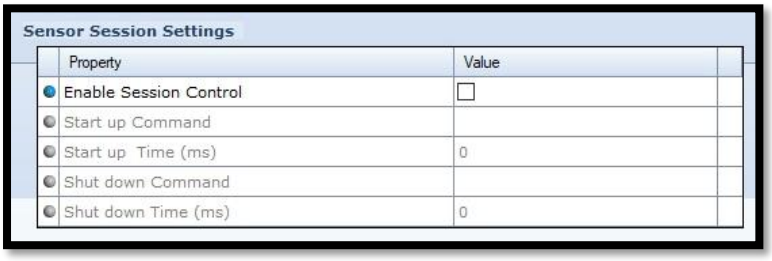


Figure 7-13: Sensor Session Settings

Enable Session Control Enable the session control if the sensor needs to be started (and/or stopped) with a command.

Start up Command Type a command to be transmitted after each power up

Start up Time (ms) Time required for the sensor to be ready after the start up command

Shut down Command Type a command to be transmitted after last received data in a recording interval (if continuous power or not enabled power control)

Shut down Time (ms) Time required to shut down

7.5.6 Poll Data Settings

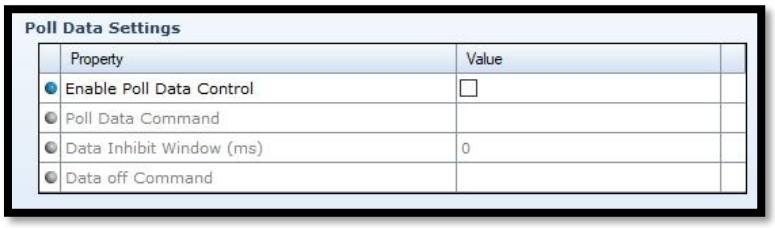


Figure 7-14: Poll Data Settings

Enable Poll Data Control if not selected the sensor will output data either in regular recording interval or after power up. If enabled the sensor will output data every time a Poll Data Command are sent.

Poll Data Command Type the Command String that must be transmitted to the sensor in order to receive the data message. E.g. Get

Data Inhibit Window (ms) Set the length of a time window in which to neglect transmitted data just after a poll command (a time window between poll command and data receive window).

Data off Command is a command to stop sensor from output data.

7.5.7 Data Receive Settings

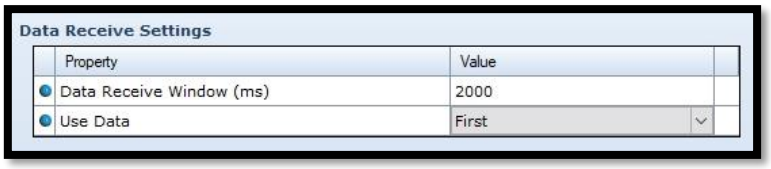


Figure 7-15: Data Receive Settings

Data Receive Window (ms) Set the length of the time window for the SeaGuardII to receive data from sensor

Use Data Select to use the first or last data in message (if multiple data in receive window)

7.5.8 Format Settings

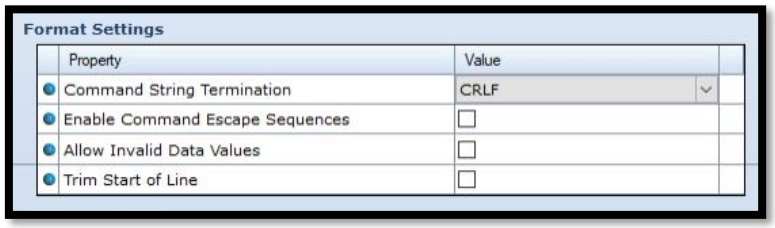


Figure 7-16: Format Settings

Command String Termination Select the string termination for command sent to the sensor. Available options: None, CRLF (carrier return + line feed), LF (line feed) or CR (carrier return).

Enable Command Escape Sequences Enable the possibility to send non-printable ascii characters in command string. The command string needs to use escape sequence notation for non-printable characters.

Allow Invalid Data Values Accept the data string from the sensor even if one or more values are missing (as long as all delimiters are present).

Trim Start of Line Remove any preceding white space character from the sensor data string before parsing it.

7.5.9 Debug Settings

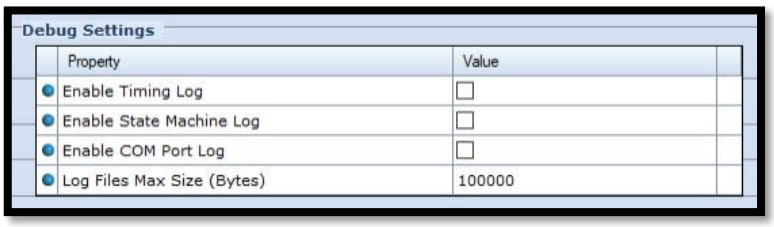


Figure 7-17: Debug Settings

Enable Timing Log creates a Timing.txt file on SD-card with information about timing.

Enable State Machine Log creates a States.txt file on SD-card with information about status on running operations.

Enable COM Port Log creates a Comport.txt file on SD-card with information about status and activity on used COM-port

Log Files Max Size (Bytes) sets the maximum size for Log Files stored on SD-card.

7.6 Serial Sensors in System Configuration

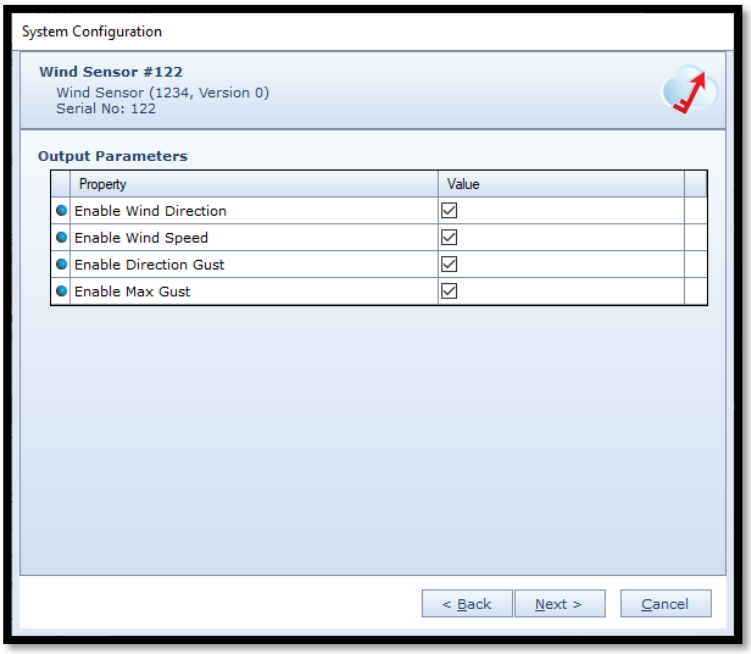


Figure 7-18: Serial Sensors in System Configurations

In ***System Configuration*** you will be able to enable or disable each individual sensor output parameter.

Open ***Device Configuration*** tab, and press ***"Edit…"*** in the ***System Configuration*** heading.

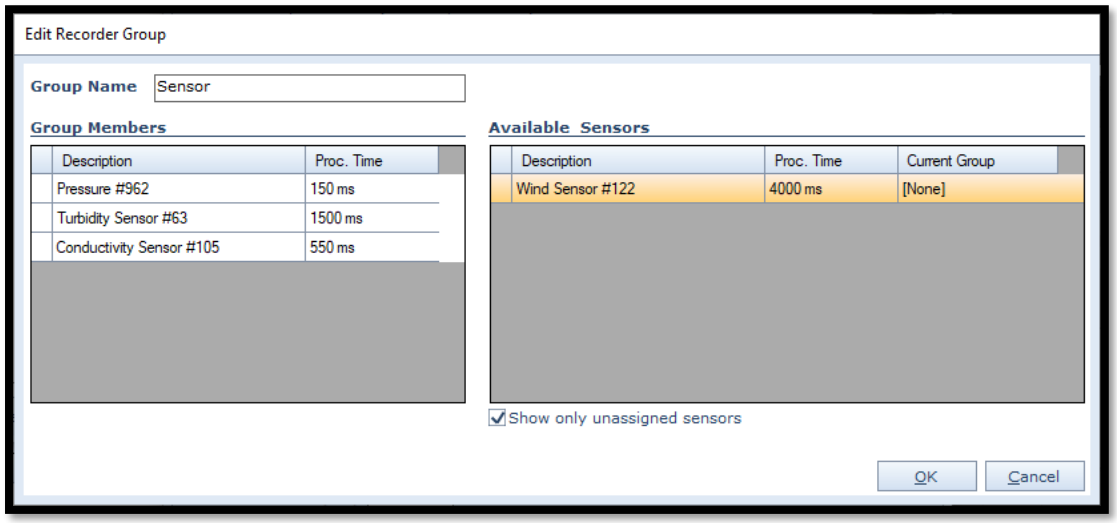
Select the actual sensors under Sensors.

7.7 Serial Sensor Deployment Settings

In ***Deployment Settings*** there is no group for serial sensors. However after enable the sensor you need to add the sensor to the correct recording group in ***Multi Group Recorder***.

Drag and drop the actual sensor from ***Available Sensors*** to ***Group Members***.

If you want to move the sensor from one ***Group*** to another first move the sensor from the ***Group Members*** to ***Available Sensors*** and then go to the new ***group*** and move sensors from ***Available sensors*** to ***Group Members***.

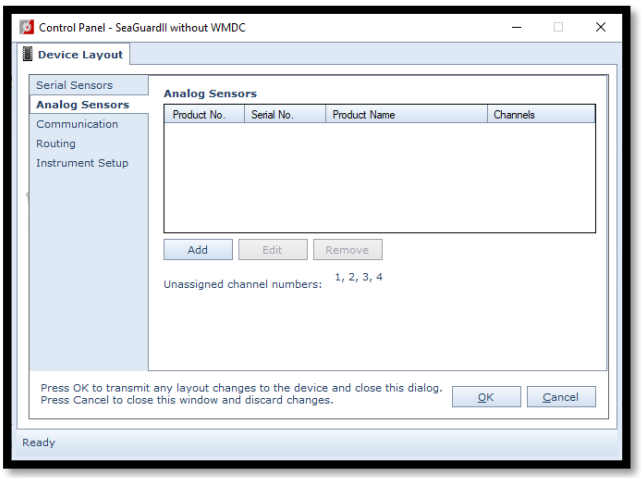


Your sensor configuration will now decide how much time the sensor need to do a recording and hence the fastest possible recording interval for that group.

Figure 7-19: Edit Recorder Group

7.8 Analog sensors

There a four analog input available but since all four channels use the same power also power control needs to be common for all channels.

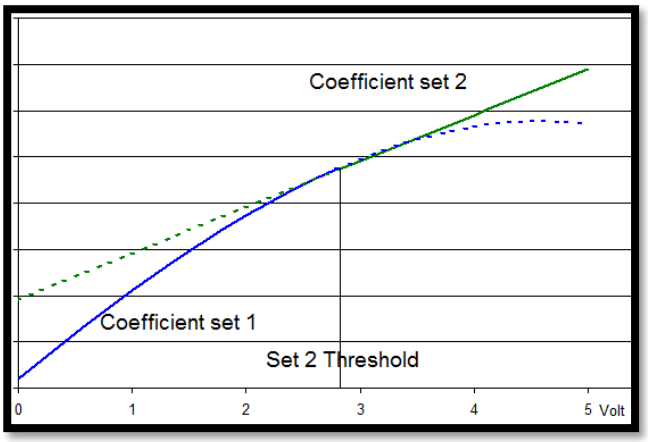


Open ***Analog Sensors*** in the ***Device Layout***. Each analog channel has an input range of 0 to 5V where the digitized range is 24 bits.

Scaling to desired units is specified in the ***User Maintenance*** section.

The raw digitized value (2^{24} / 5 bit/Volt) can be scaled and linearized using one or two 3rd order polynomials as shown in the figure below.

Figure 7-20: Analog Sensors.



Using two polynomials is suitable when the sensor has different calibration for lower and upper range,

Figure 7-21: Two polynomials analog sensor

7.8.1 Analog Sensor layout

The ***Analog Sensor's*** product identification together with its parameters name and physical connection (channel) are input to ***SeaGuardII***.

Press ***"Add"*** below the ***Analog sensors*** list and enter analog sensor information

Press ***"Edit"*** to change existing layout.

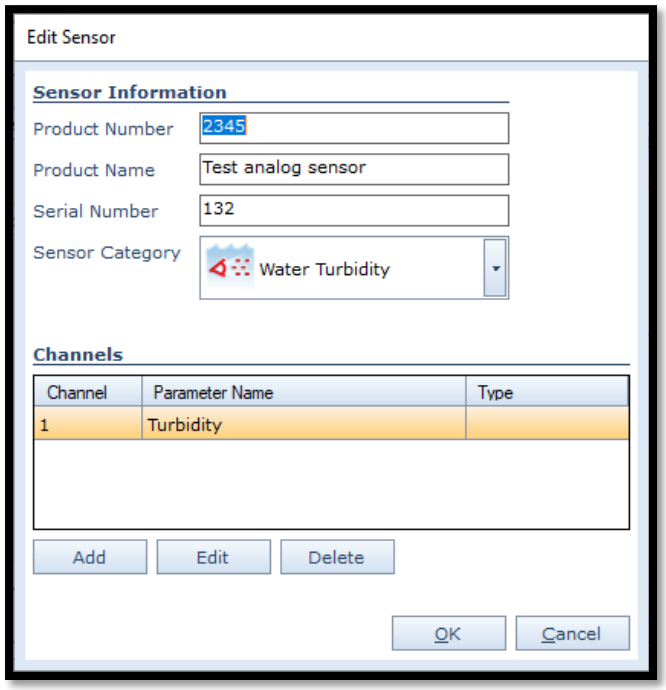


Figure 7-22: Edit Sensor whit one sensor

Example with only one sensor connected. Type the manufacturers' product number and name.

Type the actual sensors serial number and select an appropriate icon from the ***Sensor Category*** drop-down list.

Press ***"OK"*** to complete, or ***"Cancel"*** to exit without updating changes.

Press ***"Add"*** in the ***Channels*** heading to open a dialog where you can add the AD-channel on which the sensor is connected, or press ***"Edit"*** to change existing channel.

One sensor may have more than one output channels.

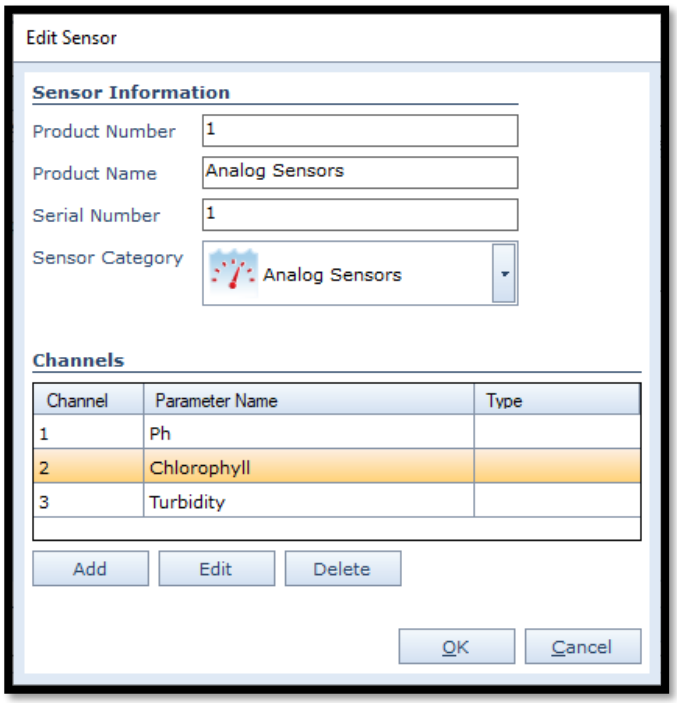


Figure 7-23: Edit Sensor whit more than one sensor

Example with three sensors connected. Type Analog Sensors or another general name as product name.

Press ***"OK"*** to complete, or ***"Cancel"*** to exit without updating changes.

Press ***"Add"*** in the ***Channels*** heading to open a dialog where you can add the AD-channel on which the sensor is connected, or press ***"Edit"*** to change existing channel.

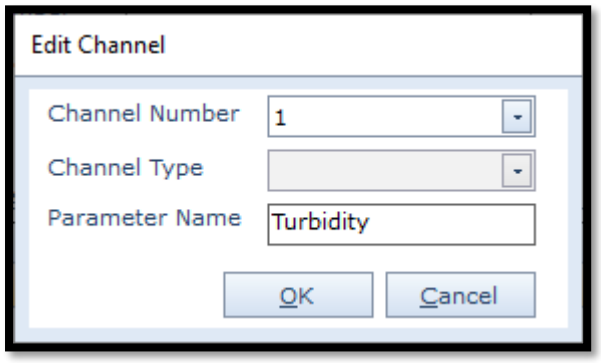


Figure 7-24: Edit Channel

In the ***Edit Channel*** dialog: Select the ***Channel Number*** according to the sensor connection.

In the ***Parameter Name*** box describe the parameter by its physical name; the name you will associate with the actual value provided.

Note! Channel Type is currently not used for analog channels.

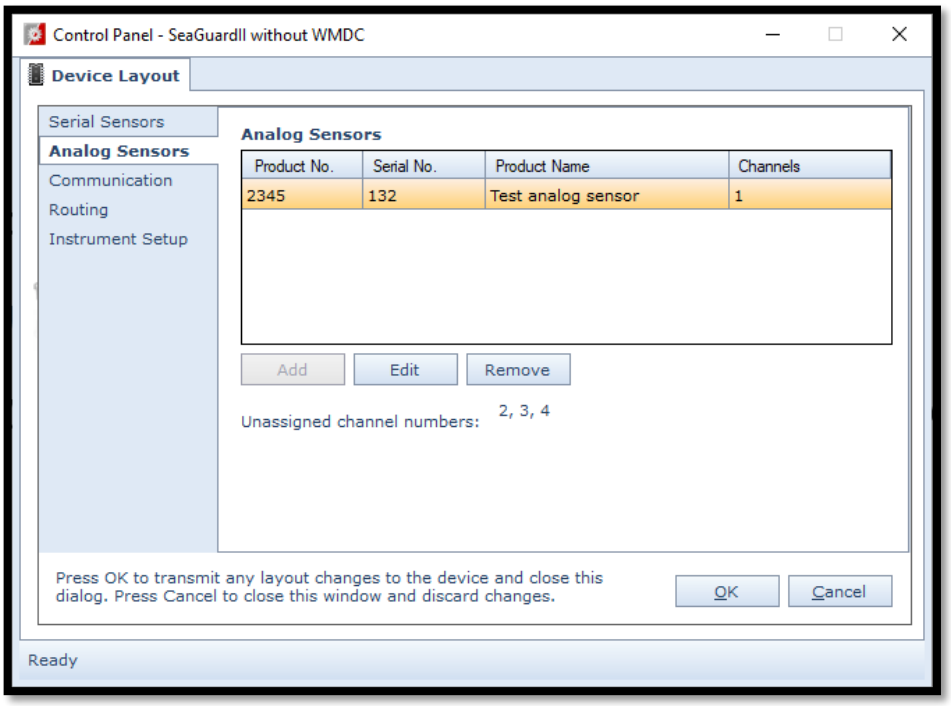


Figure 7-25: Device Layout

Press ***"OK"*** and ***"OK"*** to complete, or ***"Cancel"*** to exit without updating changes.

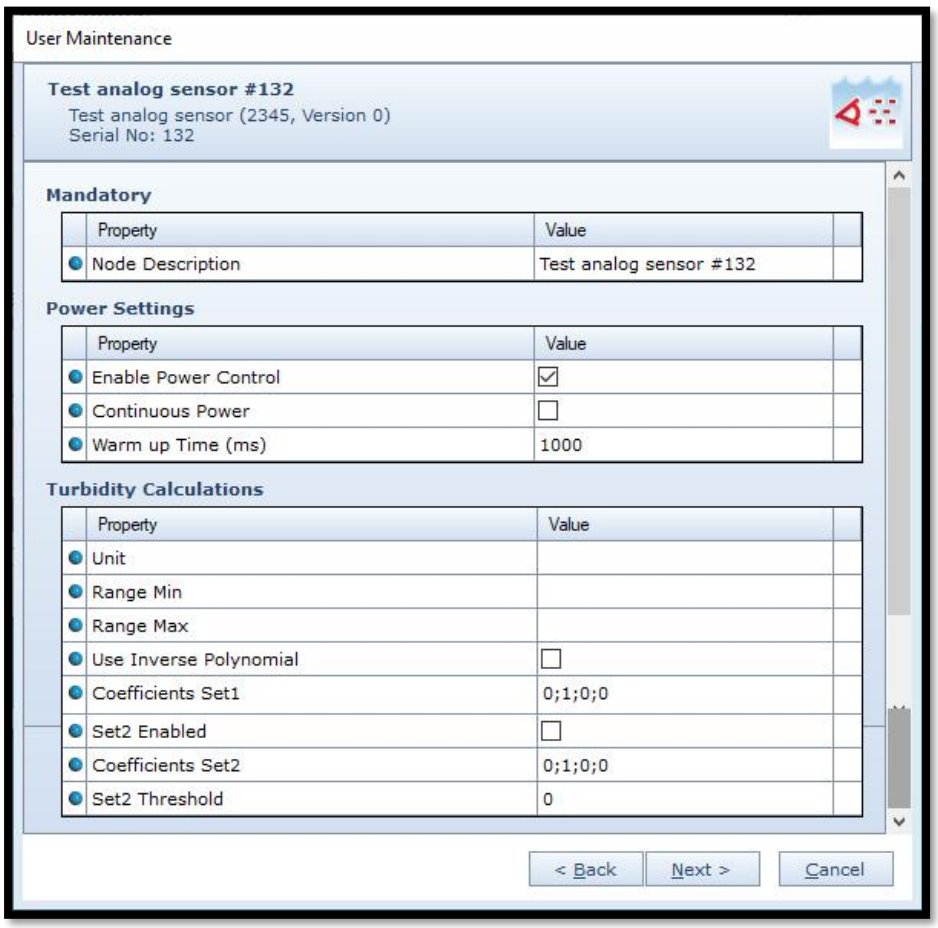
SeaGuardII will restart automatically when you press ***"OK"*** the second time. A spinning wheel will start and the layout will be changed.

After enabling the sensor in ***Device Layout*** you also need to configure the sensor in ***User Maintenance, System Configuration*** and ***Deployment Settings***.

7.9 Analog sensor in User Maintenance

Open ***Device Configuration*** tab, check ***Include User Maintenance*** and press ***Get Current Configuration***.

password = 1000



When config is loaded select ***Edit*** under ***User Maintenance***.

These settings are used to control power to the analog sensor and calibration information to convert analog 0-5V to engineering units.

This menu is just an example and will vary depending on what sensor connected and number of channels used.

Figure 7-26: Analog User Maintenance

7.9.1 Mandatory

Figure 7-27: Mandatory

All sensors and Platforms are given a ***Node Description*** text like ***Sensor Name #xxx*** (where xxx is the serial number of the sensor). The user can modify this node description text if required. Be aware that the node description changes to ****Corrupt Configuration*** if it has lost the configuration in flash. Contact the factory if this happens. The configuration is saved in two sectors in flash memory. A flash sector can be corrupted if the power is lost during the saving of new configuration. The double flash sector saving ensures that it does not lose the configuration. If one of the sectors is corrupted, the other sector is used and saved to the corrupt sector.

7.9.2 Power Settings

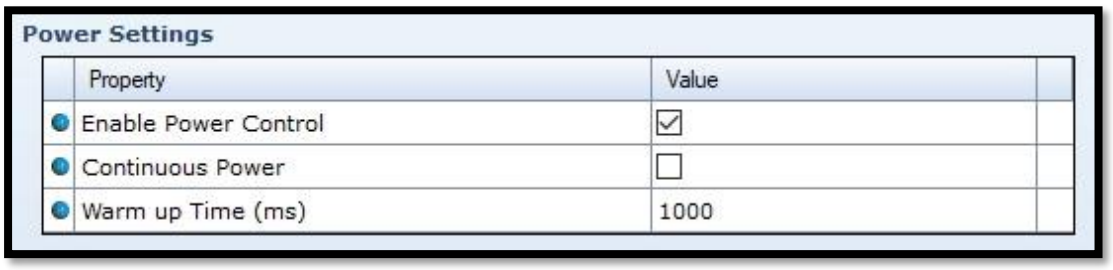


Figure 7-28: Power Settings

Enable Power Control If enabled power will be switched on to the sensor according to ***Warm up Time*** and switched off again after data is received by the instrument. This is done to save power.

Continuous Power when selected a continuous 10V power is supplied to the analog sensor connected to the hub card.

Warm up Time (ms) is set to control the switch on time for the analog sensor power supply. In this example it is set to 5000ms (5 seconds). This means that the instrument switch on power 5 second before the measuring instant. The power is switched off immediately after the measurement is taken. Select an appropriate value for the ***Warm up Time (ms)***; the value must cover the longest time required by the analog sensors.

7.9.3 Calculations

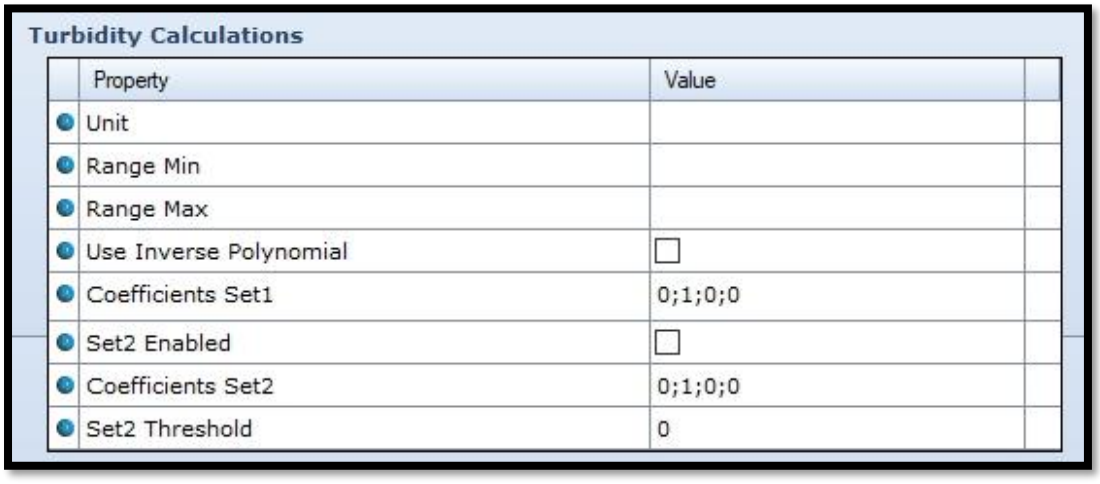


Figure 7-29: Turbidity Calculations

Unit Set the Unit for the scaled/linearized value such as NTU.

Range Min Set the Range Min for the scaled/linearized value

Range Max Set the Range Max for the scaled/linearized value

Use Inverse Polynomial used if a sensor using inverse polynomial such as 1/n.

Coefficients Set1 *Type* polynomial coefficients for Set 1. The raw digitized value can be scaled and linearized using one or two 3rd order polynomials. Using two polynomials is suitable when the sensor has different calibration for lower and upper range, Four coefficient a;b;c;d giving the formula $a+bn+cn^2+dn^3$ where N is the raw data reading from sensor.

Set2 Enabled Check if a second polynomial is to be used

Coefficients Set2 *Type* polynomial coefficients for Set 2. Four coefficient a;b;c;d giving the formula $a+bn+cn^2+dn^3$ where N is the raw data reading from sensor.

Set2 Threshold *Type* the Set2 Threshold value for the point above which the second polynomial shall be used

7.9.4 Analog Sensor in System Configuration

In ***System Configuration*** you will be able to enable or disable each individual sensor output parameter and Raw data reading from each sensor, specially used if sensor is post calibrated and you want to use a different set of calibration coefficients.

Open ***Device Configuration*** tab, and press ***"Edit…"*** in the ***System Configuration*** heading.

Select the actual sensors under Sensors.

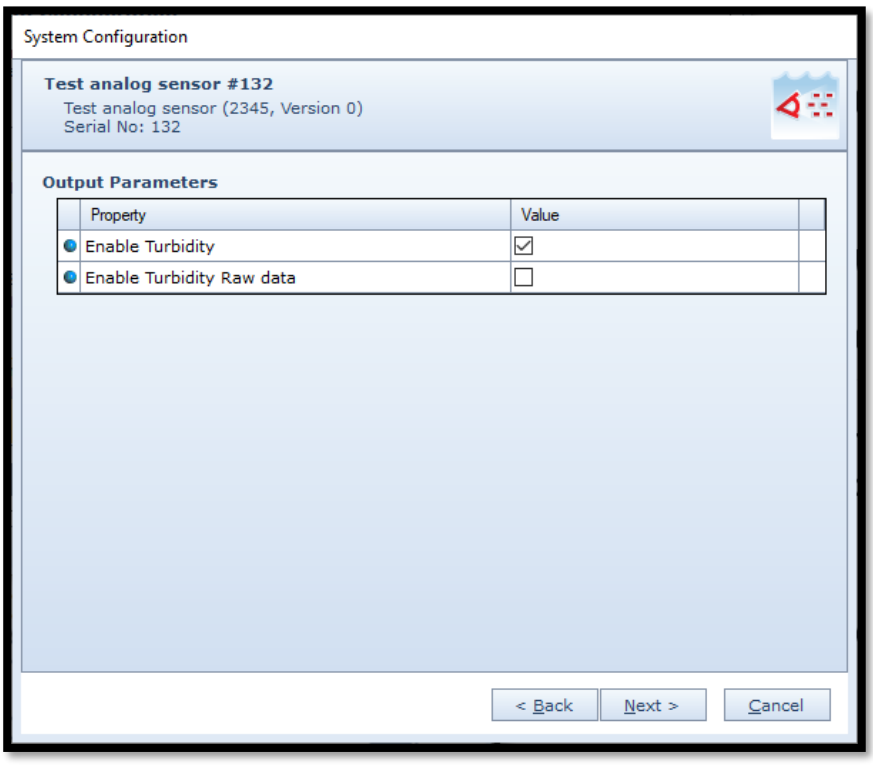


Figure 7-30: Analog Sensor System Configuration

Open ***Device Configuration*** tab, and press ***"Edit…"*** in the ***System Configuration*** heading.

Select the actual sensors under Sensors.

7.9.5 Analog Sensor Deployment Settings

In ***Deployment Settings*** there is no group for analog sensors. However after enable the sensor you need to add the sensor to the correct recording group in ***Multi Group Recorder***.

Your sensor configuration will now decide how much time the sensor need to do a recording and hence the fastest possible recording interval for this group.

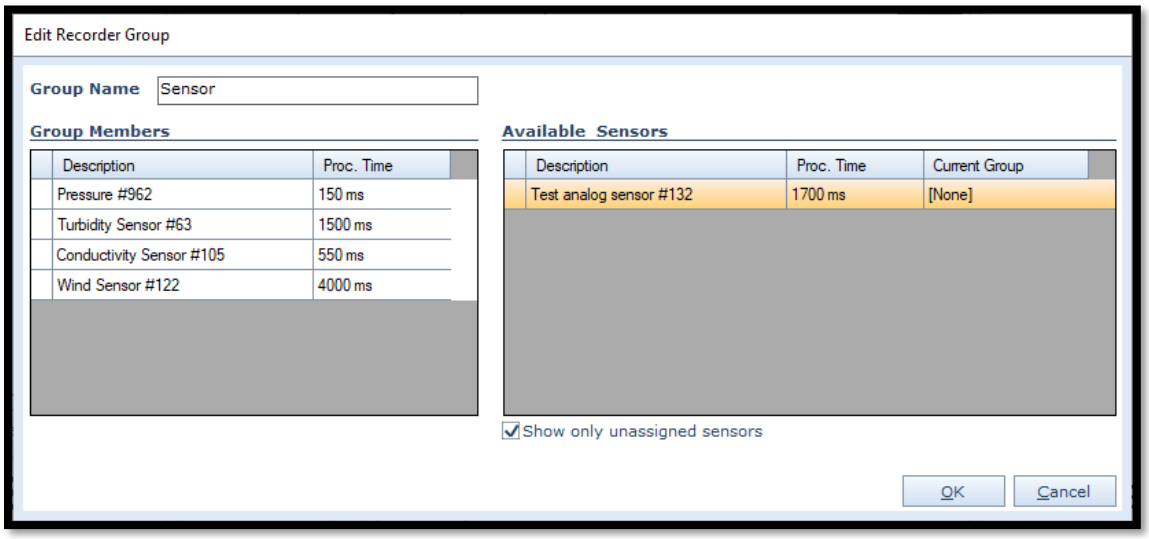


Figure 7-31: Analog Sensor Multi Group Recorder

Drag and drop the actual sensor from ***Available Sensors*** to ***Group Members***.

If you want to move the sensor from one ***Group*** to another first move the sensor from the ***Group Members*** to ***Available Sensors*** and then go to the new ***group*** and move sensors from ***Available sensors*** to ***Group Members***.

7.10 Communication: set up modem, GPS, auxiliary device

A wide range of communication devices can be connected to ***SeaGuardII*** for real-time communication.

You first need to decide which com port to use. ***COM 1*** is ***RS-232*** and ***COM 3*** is ***RS-422***. If any of them are used for serial sensor input they will not be available.

In ***Control Panel*** select ***Device Layout***. Press ***Get Current Layout*** and enter password ***1000***.

Press ***Edit*** under ***Device Layout***

Select ***Communication***

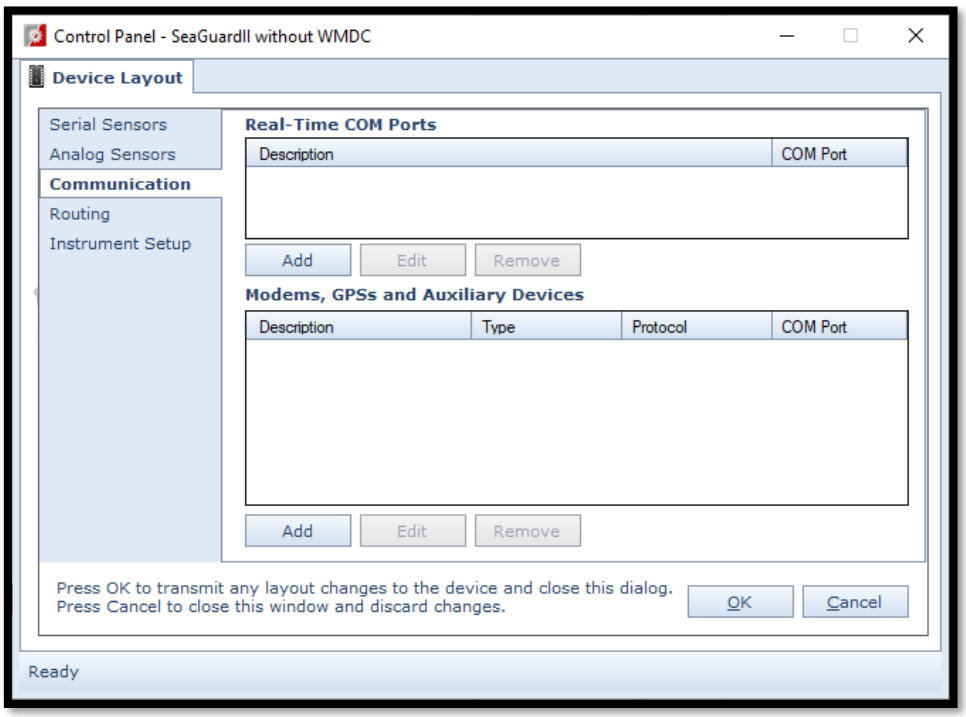


Figure 7-32: Communications

If the ***COM*** port is already defined, press ***Edit*** to view or change settings.

If the ***COM*** port isn't defined, press ***Add*** below the list of real-time ***COM*** ports.

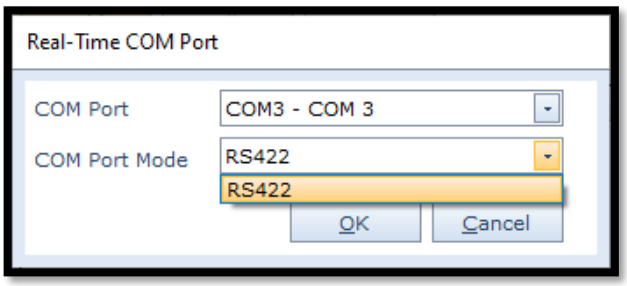


Figure 7-33: Real-Time COM Port

Enter ***COM*** port description and select actual ***COM*** port

Press ***"Add"*** below the list of ***Modems, GPSs and Auxiliary Devices***

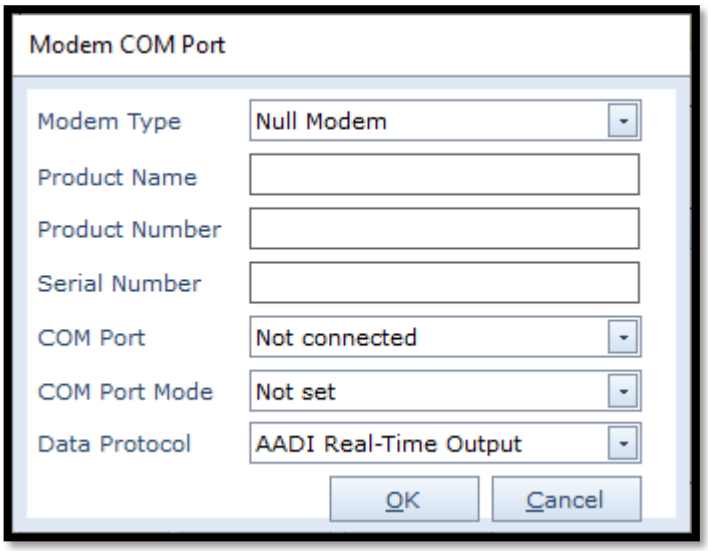


Figure 7-35: Modem COM Port

Enter device information:

Modem Type from the drop-down list

Product Name, Product Number and Product ***Serial Number***

Set the ***COM Port*** number that the Modem is connected to

Select the ***COM Port Mode***

Select the ***Data Protocol***: ***AADI Real-Time Out, AADI Pseudo-Binary, AADI ASCII, NMEA Output, AIS AtoN Met/Hyd***. Please refer ***TN 363*** for a description of ***SeaGuardII*** supported protocols.

Note! SeaGuardII *supports GPS with NMEA RMC output (Recommended Minimum sentence C). If you connect more than one GPS source you must specify which one to read. Ref User Maintenance ->* SeaGuardII *Platform.*

Example of Pseudo Binary output:

AZ`@@@@@A@@@UUUUu[Wsxt@R`@@@@ABA\vuBByZpaCP@@@@@@@@@@@@@@@@@@@@PGQ
DBrKSuCBE~syAf@C@{P@CLOgEB@kLJm@poD
The output is ASCII compliant binary coded data for use in satellite communication.

Example of ASCII output:

5100 16 2011-11-15T12:47:20Z 5 68.220596 184.589996 1406.700073 -41.680000 83.699997
372.000000 11.890541 15171584 60.311272 5.349652

The output is ASCII message with tabulator separated values.

Example of NMEA output:

$WICUR,A,0,0,0.000000,295.695587,T,5.222386,0.000000,0.000000,T,B*6F
$WIMTW,31.031031,C*3F
$WIDPT,0.198722,0.000000,1000.000000*5A
$WIMWV,69.265198,R,0.151037,K,A*19
$WIXDR,C,9.624000,C,3455-1:0,P,2.218390,B,2810-1:0,H,441.000000,P,3445-1:0,G,0.000000,,R1234-1:0*4A

NMEA output for sentences CUR, MTW, MWV, DPT and XDR.
Example of AIS binary message:

!WIBBM,1,1,,0,8,05t2LfRKVsnNjgwwe5`P1UOGwswu3wu`wsAwwe7wwvlOwu`muOwt00,2*12
The output is meteorological and hydrographic data binary broadcast for AIS.

Note! Perform required settings in system configuration and deployment settings when connecting a modem.

Restart ***SeaGuardII*** to update sensor layout in the system

Open AADI Real-Time Collector ***Device Configuration*** and press ***"Get Current Configuration…"*** New added devices are now included

Open ***Device Configuration*** tab, check ***Include User Maintenance*** and press ***"Edit..."*** in the ***User Maintenance*** heading. Refer device operating manual for a description of settings.

Perform ***System Configuration.*** Which settings that applies depends on the selected protocol, refer protocol description. Press ***"Edit..."*** in the ***System Configuration*** heading.

7.11 Routed device configuration

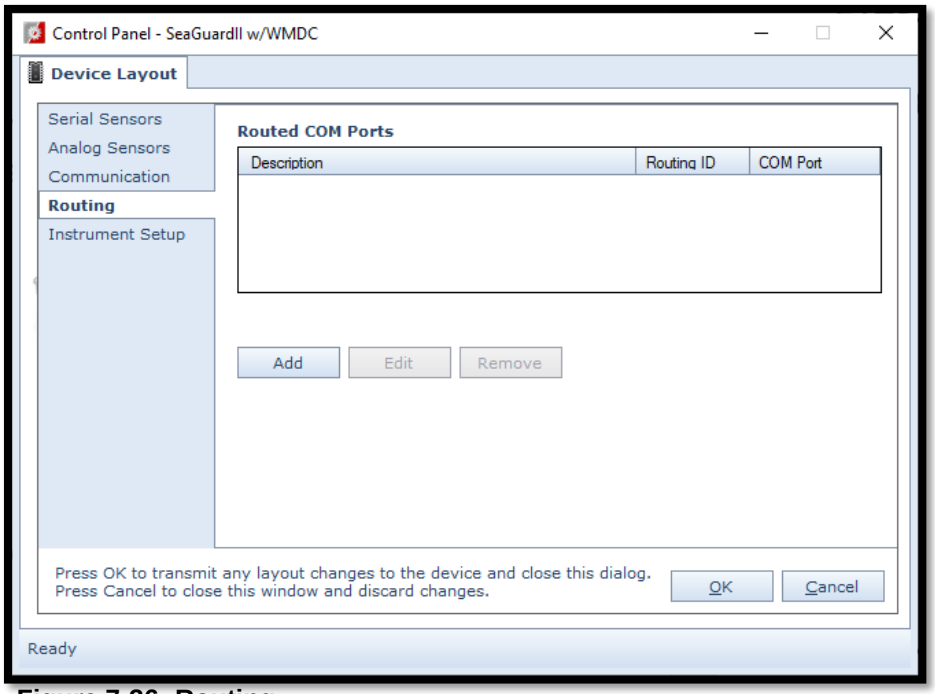


Figure 7-36: Routing

Press ***"Add"*** below the list of ***Routed COM Ports***

Note! Perform required settings in user maintenance when connecting a routed connection.

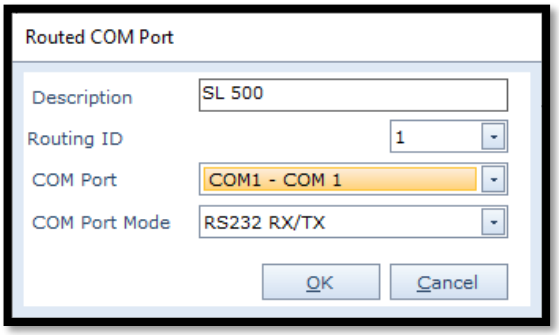


Figure 7-37: Routed COM Port

Enter device information:
Type a description

Set the ***Routing ID***. The number will ID the connection in Real-Time Collector.

Set the ***COM Port*** number that the routed device is connected to.

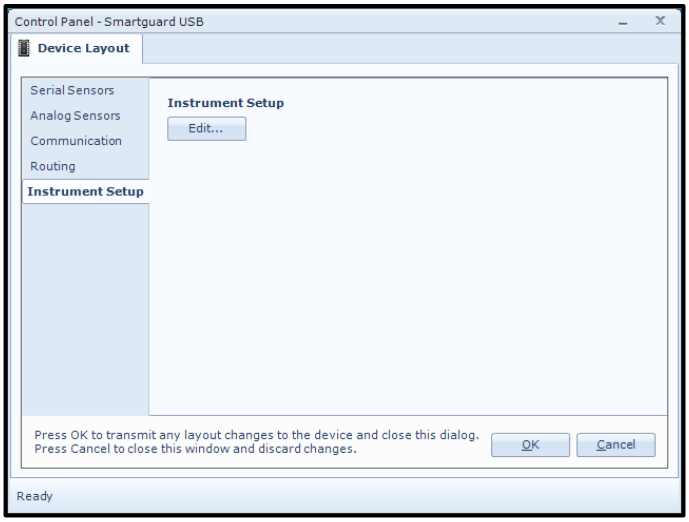
Select the ***COM Port Mode***

Restart ***SeaGuardII*** to update sensor layout in the system

Open ***AADI Real-Time Collector Device Configuration*** and press ***"Get Current Configuration…"*** New added devices are now included

Open ***Device Configuration*** tab, check ***"Include User Maintenance"*** and press ***"Edit…"*** in the ***User Maintenance*** heading. Refer device operating manual for a description of settings.

7.12 Instrument setup



Instrument Setup holds information about the ***Instrument layout***.

Figure 7-38: Device Layout-Instrument Setup

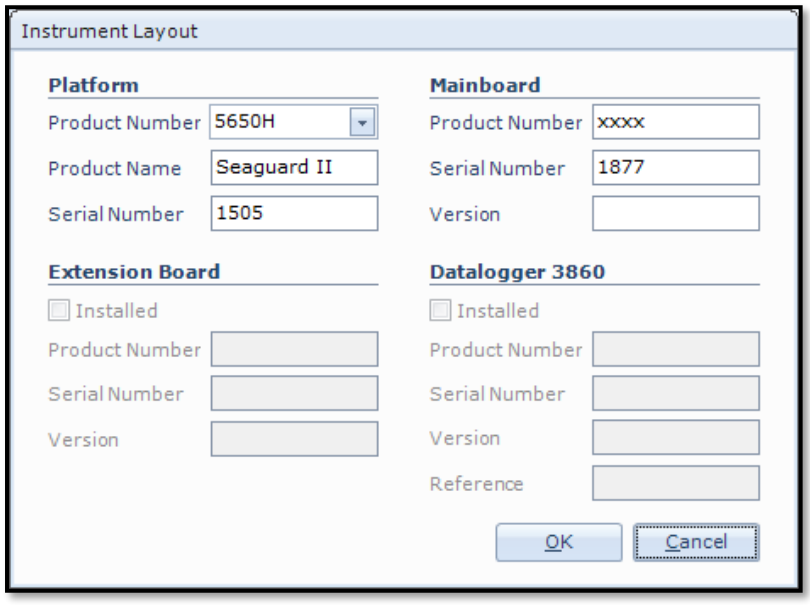


Figure 7-39: Instrument Layout

Press ***Edit…*** below the Instrument Setup heading to open the instrument layout.

Note! Instrument setup for ***SeaGuardII*** is for information only. ***Settings*** can be viewed, but not edited.

7.13 RS-422 transmission line explained.

RS-422 has differential transmission lines with twisted pairs. The sensor signals are less influenced by external noise than with RS-232 serial communication, which makes it possible to use longer cables.

RS-422 has one balanced signal pair for the transmitted signal, TxD (also called TxD+ and TxD-) and one balanced signal pair for the received signal, RxD (also called RxD+ and RxD-).

RxD+ and TxD+ are often named B and called non-inverting input and output, respectively.

RxD- and TxD- are often named A and called inverting input and output, respectively.

The EIA standard uses the notation A and B as described above; many manufacturers of signal converters uses the opposite naming (A for non-inverting input/output, and B on inverting input/output) which is not correct.

Note! Always ensure which signal is non-inverting and which is inverting.

Figure 5-1 illustrates the balanced signals of a RS-422 line during transmission of a byte. The non-inverting signal is called TxD+ while the inverting signal is called TxD-.

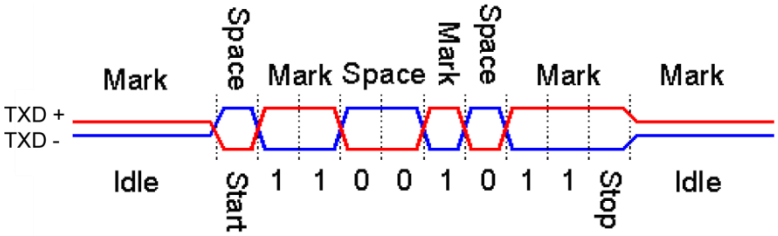


Figure 7-40: RS-422 transmission of a byte

CHAPTER 8 **Status codes**

8.1 Status Codes

The logger and each sensor produce some status codes if there are some errors with senor or quality of collected data. These status codes are either shown in the data string or when using post-processing software. Each status code has both a hexadecimal value and a decimal value shown in table below. The status codes are separated in three groups. ***Ok*** is when everything is normal and this status code will not be visible. An ***Error*** status code is critical state and requires normally a service and repair on the sensor. ***Warnings*** are more temporary errors that may reduce the data quality for a shorter period and normally don't need a factory service but it still important to investigate and remove the cause.

OK

Parameter	***Hex value***	***Status Code***	***Description***
Ok	0	0	Ok

Errors

Parameter	***Hex value***	***Status Code***	***Description***
InvalidVectorError	41	65	Internal use only
AccessError	42	66	Access error
RequestTimeError	43	67	Input time is shorter than the processing time
NotValidError	44	68	Some internal fails
CopyDataError	45	69	Recorder error

Warnings

Parameter	***Hex value***	***Status Code***	***Description***
OutOfMeasureRange	51	81	Data outside range. The data is not reliable
OutOfCalibRange	52	82	Data Outside Calibration range. The data can be reliable, but out of calibration range
ReducedQuality	53	83	e.g. supply voltage to low
NotReady	54	84	e.g., timeseries is not finish to the first recording
NotImplemented	55	85	Not a valid parameter
StoredDataWarning	56	86	e.g. Storing data that reduce precision
LowQuality	57	87	Indicates lower quality than reduced quality
DiscardData	58	88	Data useless, can be discarded

CHAPTER 9 **Use of External Compass**

9.1 General information

An important input parameter for calculation of wave and current parameters is the heading information. If the magnetic distortion at the location where the instrument is to be installed is too large the heading should be provided by an external compass placed at an undistorted location, for instance in the mast.
In a system with SmartGuard/SeaGuardII logger the external compass can be connected directly to the logger.

- External compass reading input to SeaGuardII.
  - In cases where the instrument is equipped with sensors giving heading information directly to the logger the heading information can be distributed by the logger to other sensors connected to the same AiCaP bus. This feature enables the current or wave sensor to receive heading information from other connected sensor in the system via SeaGuardII.

When using an external compass the orientation angle between the current or wave sensor and the compass must be taken into account. This angle must be set in the ***Ext Compass Alignment Offset (Deg.M)*** - property in the ***Sensor Configuration***. By default this is set to zero which means that if the external compass can be aligned to the orientation arrow of the sensor the direction will be correct. A self-leveling crossline laser might be a god tool for aligning the two sensors. If the installation does not allow for alignment, the angle between the sensors should be measured and the ***External Compass Offset*** updated accordingly.

9.2 External compass types

9.2.1 Airmar H2183

Figure 9-1: Airmar H2183

- Airmar H2183 Heading sensor

- Mounting Bracket:
  - Included in delivery of compass sensor.

- Connecting cable:
  - Cable between sensor and SeaGuardII

- Data output (RS-232):
  - NMEA HDG
  - Baud rate: 4800 , 8N1

9.3 Input format for external compass

$HC**HDG**

Summary
NMEA 0183 standard Heading, Deviation and Variation.
Syntax
$HCHDG,<1>,<2>,<3>,<4>,<5>*hh<CR><LF>
Fields
<1> Magnetic sensor heading, degrees, to the nearest 0.1 degree.
<2> Magnetic deviation, degrees east or west, to the nearest 0.1 degree.
<3> E if field <2> is degrees East
W if field <2> is degrees West
<4> Magnetic variation, degrees east or west, to the nearest 0.1 degree.
<5> E if field <4> is degrees East
W if field <4> is degrees West

$HC**HDT**

Summary
NMEA 0183 standard Heading relative to True North
Syntax
$HCHDT,<1>,<2>*hh<CR><LF>
Fields
<1> Heading relative to True North
<2> T = True

$HC**HDM**

Summary
NMEA 0183 standard Heading in degrees Magnetic derived from the true heading calculated
$HCHDM,<1>,<2>*hh<CR><LF>
Fields
<1> Current Heading in degrees
<2> M = Magnetic heading

$HC**HCC**

Summary
NMEA 0183 standard Compass Heading , which differs from magnetic heading by the amount of uncorrected magnetic deviation.
$HCHCC,<1>*hh<CR><LF>
Fields
<1> Compass Heading in degrees

$GP**HDT**

Summary
NMEA 0183 standard Heading relative to True North
Syntax
$HCHDT,<1>,<2>*hh<CR><LF>
Fields
<1> Heading relative to True North
<2> T = True

$GP**HDM**

Summary
NMEA 0183 standard Heading in degrees Magnetic derived from the true heading calculated
$HCHDM,<1>,<2>*hh<CR><LF>
Fields
<1> Current Heading in degrees
<2> M = Magnetic heading

CHAPTER 10 **Electro Magnetic Compatibility and Cables**

For a manufacturer to legally produce and sell a product, it has to apply for CE marking. This means that the commercialized product is conform to the CE applicable standards and can freely circulate within the EFTA (European Free Trade Association) & European Union countries. The applicable directive for the SeaGuardII is the EU EMC 89/336/EMC (all electrical and electronic appliances) which mainly focus on the electromagnetic disturbances the sensor can generate, which should not exceed a level allowing radio and telecommunication equipment to operate as intended, and that the sensor has an adequate level of intrinsic immunity to electromagnetic disturbance to be able to operate as intended.
This chapter describes the requirements for the Electromagnetic Compatibility (EMC) of the sensor. And also addresses the different cables available for use with the sensor.

10.1 EMC Testing

The Sea
GuardII Platform with sensors has been tested at an accredited test laboratory to verify that the instrument fulfils the requirements in the EU EMC directive (89/336/EMC).

Applied standards

- EN 55011 (2009)+A1
- EN 61326-1 (2013)

Applied tests

- Conducted Emissions
- Electrostatic Discharge Immunity
- Surge Immunity
- Conducted RF Disturbance Immunity

10.2 Cables

Different cables are available for stand-alone use with free end and connectors. The cables have both power and signal lines. See ***chapter 15.1*** for more information on cables that is best suited for use in the actual application. When delivered, system drawings/cable drawings give details on parts connection and installation overview with best EMC performance (best noise and surge immunity).

10.3 Power – Voltage range

The input voltage range is from 6 to 14Vdc for Battery Input and 12-30Vdc for external power. When using long cables the voltage should be as close to 30V as possible. The peak current while the sensor is measuring (after power on) is normally well below, but it varies dependent on how high the input voltage is and how large the voltage drop is in the cable (lower voltage on the sensor gives higher peak current).

10.4 SeaGuardII used with the Doppler Sensor; requirement for Electro Magnetic Compatibility Filter and protection

The Doppler Current Profiler Sensor is designed to have an extremely high amplification in the Doppler frequency range around 600 kHz. This also means that severe common mode noise on the power lines may affect the Doppler measurements if the noise frequencies are close to 600 kHz.
The Doppler Current Sensor is designed to have an extremely high amplification in the Doppler frequency range around 2 MHz. This also means that severe common mode noise on the power lines may affect the Doppler measurements if the noise frequencies are close to 2 MHz.

To protect the sensor; two different options can be delivered from the factory, one for underwater/buoy systems and one for cable to land systems.

10.4.1 Underwater/Buoy systems

A common mode line filter on the power lines must be inserted between the instrument and the system. This filter should be as close as possible to the cable output from the system and the ground connection on the filter must be connected to the common chassis ground of the system or a common ground structure. The chassis ground serves as a return path for noise currents decoupled by the common mode filter. This is necessary since the noise currents should have a low impedance path back to the noise source in the system.
This common mode filter may be left out if the system designer knows (from EMC emission tests) that the system does not emit any noise on the cable to the sensor in the range around 600 kHz.

10.4.2 Cable to land systems

A Filter Box with surge protection on all lines (one with Subconn connectors PN 0975639 and one without Subconn PN 0975564) is delivered together with the cables. This box also has the same built in common mode filter as delivered for underwater systems. This box needs a good connection to earth to divert any large surge currents to earth. Cable screen from seaside cable and landside cable needs a good connection to the chassis of the box.
Surge currents are generated from nearby lightning and can cause surge currents in the kilo-ampere range on a cable. The sensor has some protection built-in but the safest is to remove as much as possible of these large surge currents on the land side of the cable.

CHAPTER 11 **Operating Instructions**

11.1 Preparation for Use

Perform deployment configurations and recording configurations

1. Check Deployment Settings set the recording interval and enable/disable nodes.
2. Check the *System Configuration* menu and enable/disable node parameters to be measured.
3. Check the *User Maintenance*
4. Configure Analog and Serial sensors settings if any of these sensors are attached.
5. Activate the *Recorder* Panel to start the instrument instantly or at a postponed time.

   Important!

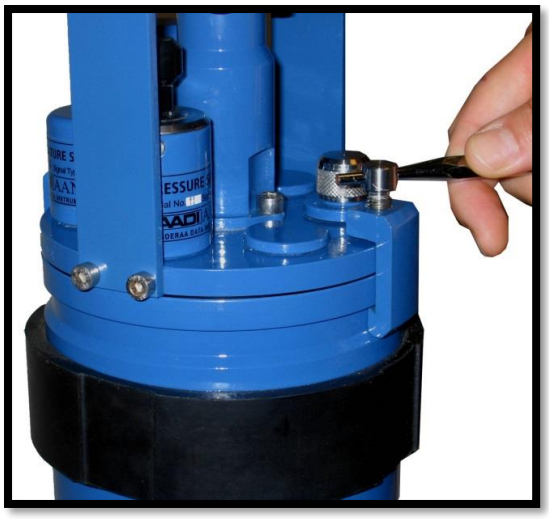
   If your instrument is equipped with a pressure sensor, make sure you do not deploy the instrument at a greater depth than the maximum depth for the pressure sensor, unless a pressure stopper is installed on the pressure inlet.

6. Check that any transport protection is removed from sensors before deployment
7. Inspect O-ring grooves and replace O-rings before deployment. Make sure that the O-ring on the Top-end plate is clean and greased.
8. Make sure that the protective cap is installed on the electrical terminal.
9. When the system is armed and ready for deployment, the main switch must stay switched on.
10. When placing the instrument into its pressure case we recommend that you insert the instrument 90° off orientation mark. When the instrument is resting on the O-ring, spin the instrument towards orientation.
11. Tighten the C-clamps until the Top-end plate rests against the top of the case. Avoid over tightening, as this will damage the C-clamp.

11.2 Illustrations of deployment preparations

Note! Lower the instrument carefully straight down into the pressure case, do not pinch or nick O-ring. With the instrument Top-end plate seated into pressure case, turn the Top-end plate assembly 180º on the O-ring in order to seat the O-ring and remove any possible contamination from between the O-ring and its sealing surfaces.

Figure 11-1: Insert Instrument into Pressure Case.



Use included tool to tighten C-clamps until the pressure case rotates on the floor. Avoid over tightening as this will bend the C-clamps and reduce the tension in the material.

Figure 11-2: Tighten C-clamp

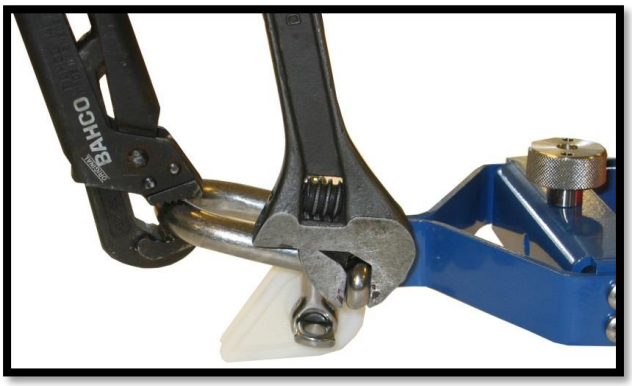


Figure 11-3: Fasten shackle

Fasten shackle in frame. Tighten thoroughly.

Important! When connecting one shackle to another, remember to use shackles of same type of metal to avoid corrosion.

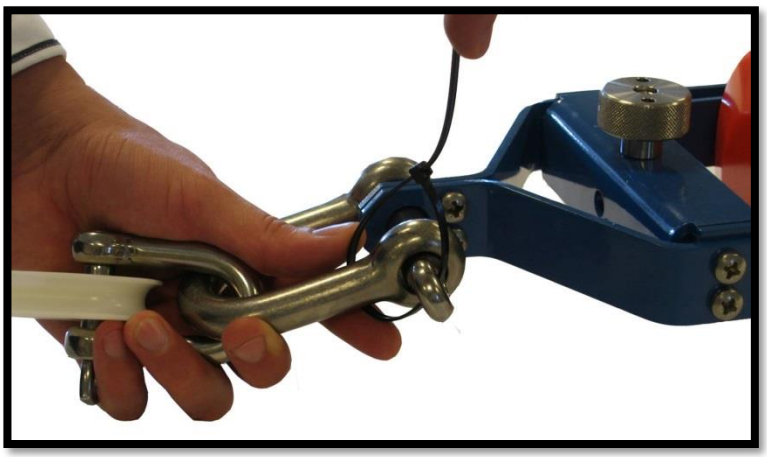
Avoid using magnetic shackles close to DCS/DCPS.

Figure 11-4: Splice the rope

Splice the rope

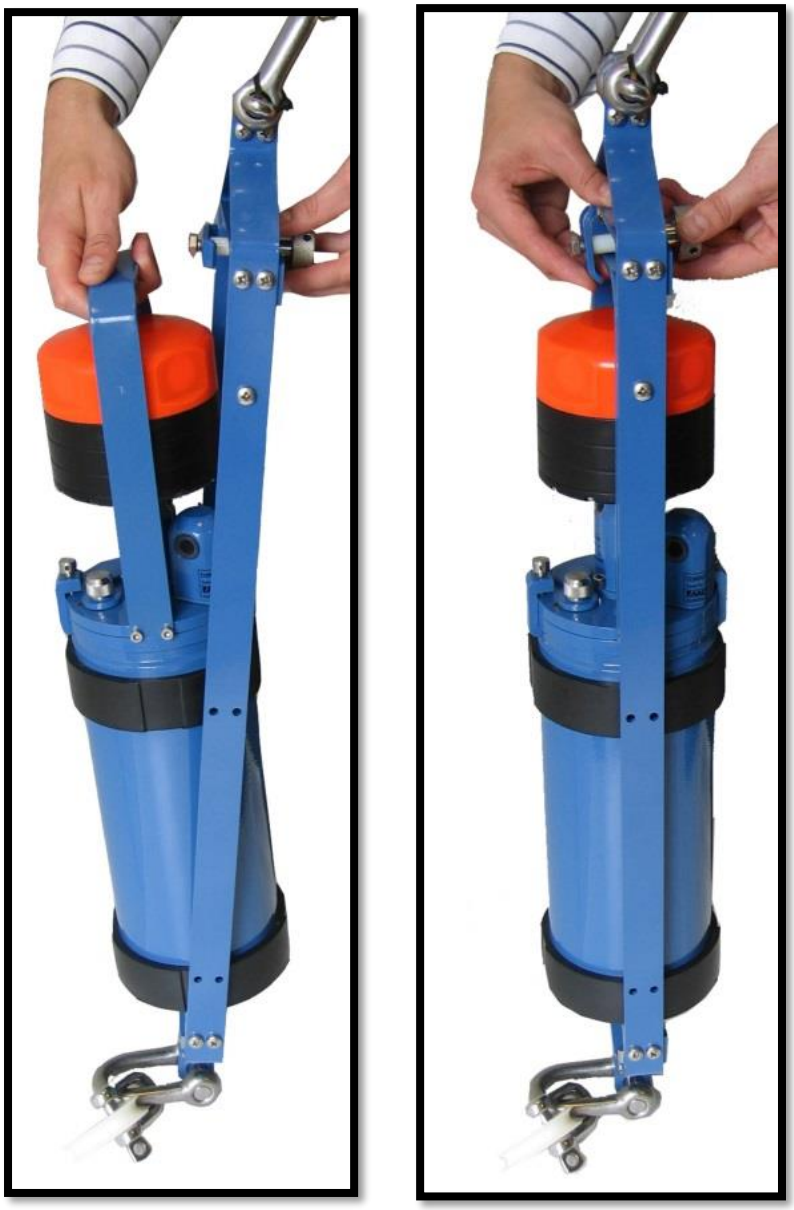
Figure 11-5: Thimble connected to shackle

Fasten the rope to the thimble attached to the shackle



Lock the shackle with strips or locking wire. Locking wire is recommended for higher security in long deployments.

Figure 11-6: Lock the shackle



Place the instrument inside the Mooring Frame and lock it.

This is showing frame 4144 but similar procedure is also valid for other available frames.

Figure 11-7: Instrument in In-line mooring frame 4144.

11.3 Retrieval of the Instrument

Clean the Instrument and sensors after each deployment.

The sensors and platform housing will tolerate most cleaning agents. Often 30% Hydrochloric acid (HCL) (Muriatic acid) or acetic acid will be useful for removing barnacles and similar fouling.
Be sure to follow the safety precaution for such acids.

When the instrument is retrieved after deployment, remove marine growth and barnacles from the sensor(s) using a hand scrub. To remove seashells or corals use plastic handle or similar tools.

Note! Do not use any kind of steal brush or any sharp objects; this might damage the acoustic element for DCS/DCPS, Sensor foil on Oxygen Optode and Optical window on the Turbidity sensor.

When inspecting, look for corrosion on connector's cracks on the potting of connectors and scratches on protecting cable(s) jacket.

Rinse the instrument in fresh water and dry it. The unit can then be opened and the instrument removed from its pressure container.

When removing or disconnecting the sensor from attached cables always protect connectors on sensor and cables with appropriate dummy plugs. Always apply grease on connectors and sealing plugs if earlier applied grease is dried out.

11.4 Retrieving measurement data

Figure 11-8: SD-Card slot

Write down the time of the last recording.

Turn off the power switch in the front of the instrument.

Remove the data storage unit, the SD card, from the recording unit by releasing the screw cover below the display and press the card in to have it released.

Put the SD card into an SD reader connected to your PC and copy the measurement data.

Open your Explorer and copy the measurement data from the SD card folder in the *mobile device*.

For data post processing refer to Data Studio or Data Studio 3D manual.

11.5 Connection and disconnection of sensors

11.5.1 Procedure for connecting a sensor on top-end plate

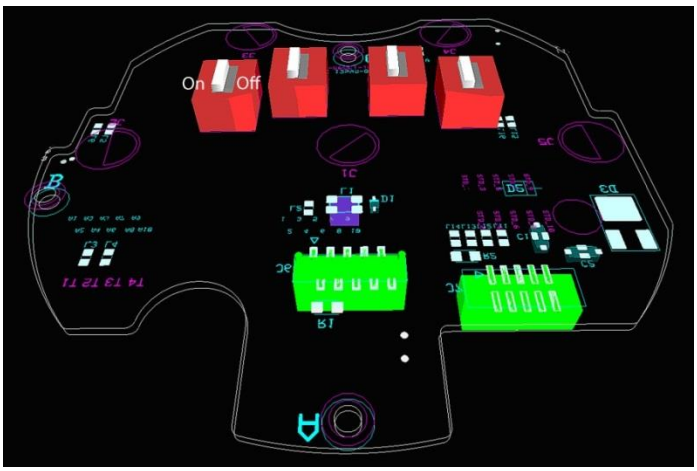
Important! Do not twist the sensor to connect it. Gently push down the sensor.

AiCaP sensors can be connected in sensor position 1-6 Analog sensors (0-5V) must be connected in sensor position 6. AiCaP sensors in position 1,2,3,4,5 are connected directly onto the HUB, while AiCaP sensors in position 6 must be connected to the sensor board using a ribbon cable. Inspect and replace sensor O-rings if necessary. Align the orientation pin for correct orientation of the sensor.

For connections of the sensors, please follow the listed procedure (steps 1 to 8):

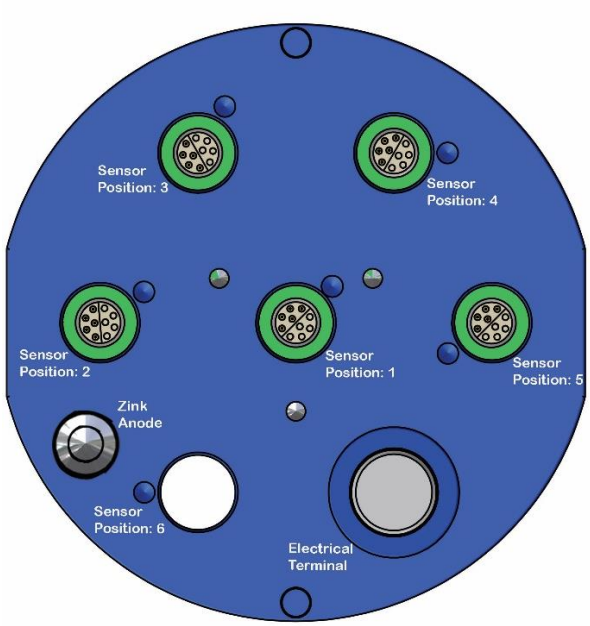
1. Remove the instrument from the pressure case by releasing the two C-clamps at the Top-end plate and lift the instrument.
2. Switch OFF the instrument.
3. Loosen the set screw that goes with the sensor position. Do not unscrew the set screw completely and remove it, as it might be lost.
4. Pull up the sealing plug. Clean the boreholes without scratching the surface.
5. Inspect the O-rings of the new sensor. Follow option a - c depending on the type of sensor to connect/the sensor position on the Top-end plate:
    a. AiCaP sensor in position 6: Disconnect the upper battery. Unscrew and remove the two screws that hold the top cover. Remove the top cover. Thread the ribbon sensor cable through the borehole. Align the orientation pin for correct orientation of the sensor. Gently push down the sensor. Connect the sensor cable to J6 on the HUB-card.
    b. AiCaP sensor in position 1,2,3,4,5: Gently push down the sensor. Ensure that the red dip switch on the HUB is in *off* position which is the default setting.
    c. Analog sensor with Aanderaa plug or Aanderaa analog cable in position 6: Gently push down the connecting end of the cable. Attach the analog sensor to the adapter end of the cable.
6. Fasten the sensor position set screw.
7. Remount the top front cover, reinsert the upper battery, and tighten the battery lid.
8. Make sure that all set screw is tightened before you put the instrument back into the pressure case.

Important! Make sure that the sensors and the C-clamps are well tightened to prevent water to infuse the system. Do not over tight, as this will damage the sensors and the clamps.



Drawing of HUB with 4 red Dip Switches at the back. AiCaP sensors installed: Switch to the right (off-position), Analog sensors: Switch to the left (on-position).

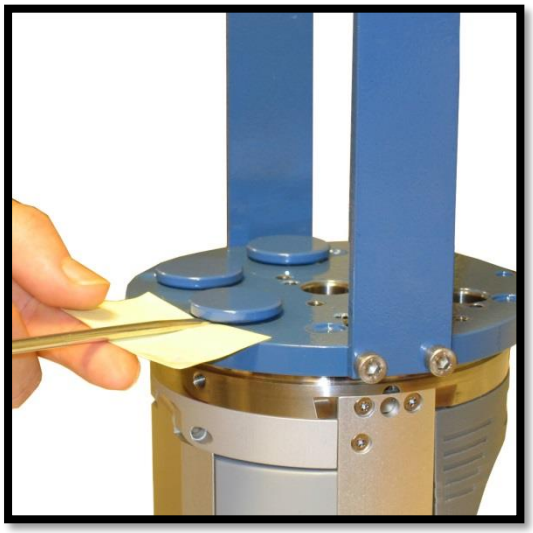
Figure 11-9: HUB-card



AiCaP Sensor in position 1,2,3,4 and 5:

Figure 11-10: Top-end Plate; Sensor position

11.6 Illustration of a sensor connection



Removal of sealing plug. Loosen the set screw. Use a small bit of paper/cardboard to protect the top end plate

Figure 11-11: Removal of Sealing Plug

Place the sensor according to the orientation pin. Push down the sensor and fasten the set screw.

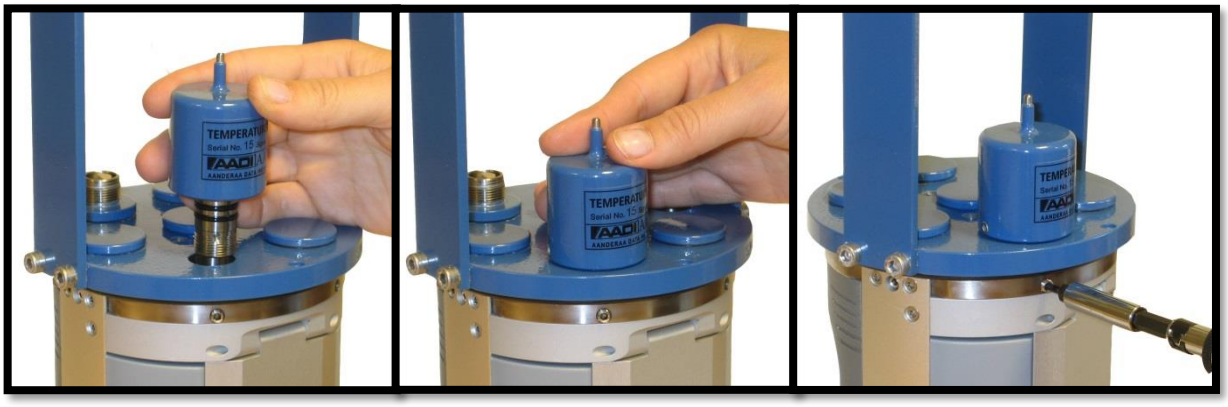


Figure 11-12: Installing a new sensor

11.6.1 AiCaP Sensor in position 6:

Open the battery lid, remove the upper battery, and unscrew the two top screws that holds the top front cover. Turn the instrument and pull off the top front cover.

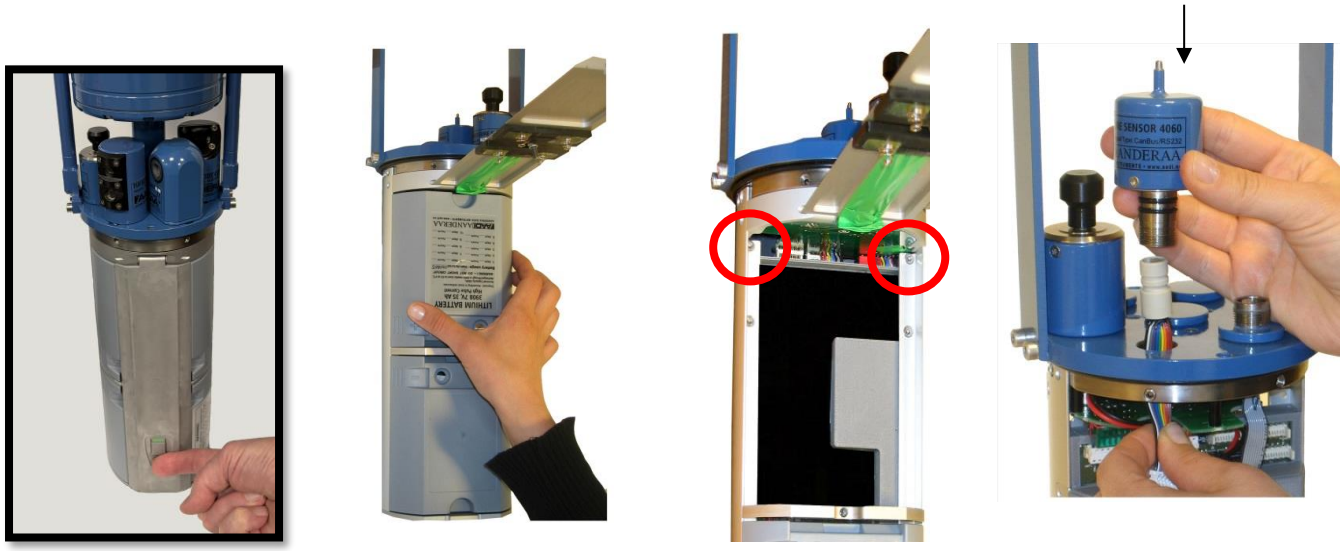


Figure 11-13: Connecting the sensor to Position 6

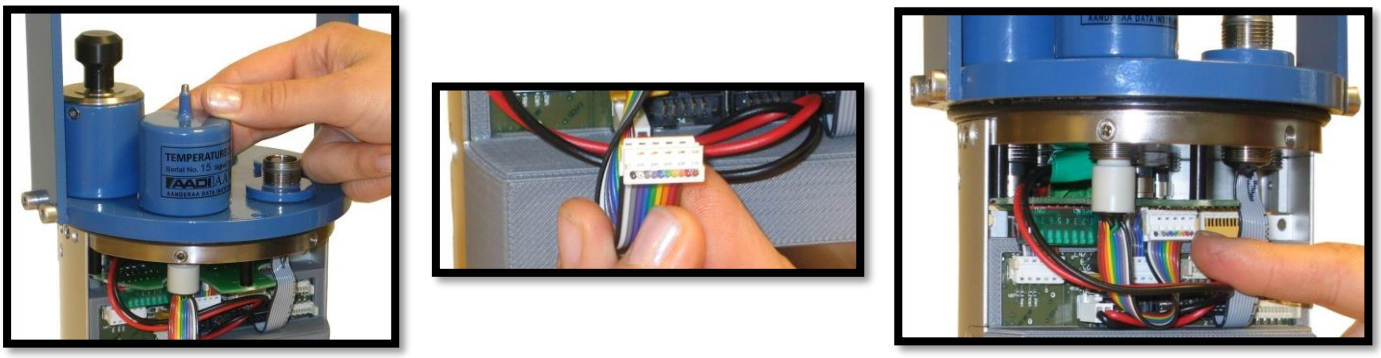


Figure 11-14: Connect the patch cable to HUB-card Plug J6

11.7 Procedure for connecting cable 5587C

5587C Cable is a watertight connection between instrument and external cable/battery case with 10-pin Subconn underwater mateable plug. To install this cable on Instrument follow the steps below.

1. Remove the top front cover.
2. Remove sealing plug on top end plate marked with Electrical terminal.
3. Clean and inspect o-ring groove and o-ring on cable.
4. Install cable on top end plate with orientation pin and set screw.
5. Connect plug to socket on Hub-card.
6. Connect plug to socket on Main Board

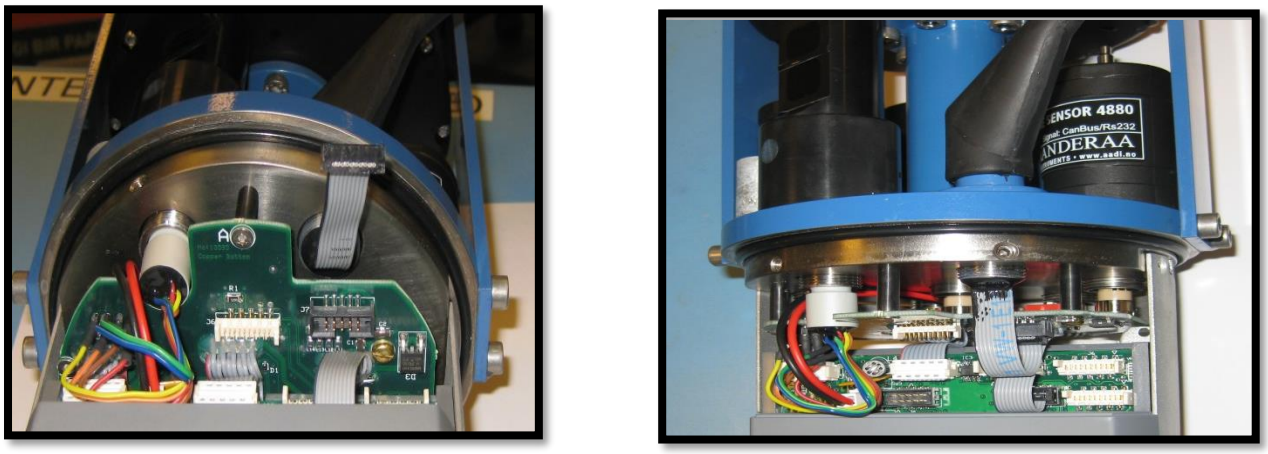


Figure 11-15: Connecting the 5384C Cable

11.7.1 Procedure for disconnecting a sensor

Important! Do not twist the sensor to disconnect it. Pull the sensor straight up until released.

For disconnection of the sensors, please follow the listed procedure:

1. Remove the instrument from the pressure case by releasing the two C-clamps at the Top-end plate and lift the instrument.
2. Switch OFF the instrument.
3. Loosen the set screw that goes with the sensor position. Do not unscrew the set screw completely and remove it, as it might be lost.
4. Disconnect the upper battery**,** unscrew and remove the two screws that hold the top front cover. Remove the top front cover. Follow option a or b depending on the type of sensor to disconnect/the sensor position on the Top-end plate :

a. Sensor in position 1,2,3,4, and 5: pull up the sensor or the Analog sensor cable. If the removed sensor is an analog sensor: switch *off* the corresponding dip switch.

b. Sensor in position 6: Disconnect the sensor cable from the HUB. Disconnect the sensor from the patch cable and pull up the sensor.

5. Clean the borehole. Inspect and replace the O-ring of the sealing plug if necessary and insert it into the sensor connection position. Fasten the set screw that goes with the sensor position.
6. Remount the top front cover, insert the upper battery and tighten the battery lid.

Important! Make sure that the sealing plug and the C-clamps are tightened to ensure that no water will infuse the system. Do not over tighten as this will damage the sensors and the clamps.

11.8 Battery

The battery compartment, at the rear of the SeaGuardII, has room for two batteries. You may select to use our Alkaline Battery 3988, Lithium Battery 3908 or our empty battery shell if you want to make your own battery pack. The Instrument can also use external power through the 5587C cable.

11.8.1 Removal and insertion of the Battery

To remove a battery from the SeaGuardII instrument, follow the instructions below.

1. Place the instrument on the desk with the front facing down.
2. Release the Battery Lid Lock by pushing the knob upwards.
3. Flip up the battery cover.
4. Lift the battery straight out.

To insert the battery, follow these instructions:

1. Place the instrument on the desk with the front facing down.
2. Release the Battery Lid Lock by pushing the knob upwards.
3. If using Alkaline together with DCS/DCPS check potential magnetism before use in upper battery compartment.
4. Place the battery with the connection pins towards the center.
5. Let down the battery cover.
6. Puch the Battery cover down and Push the Battery Lid Lock downwards until its in locked position and showing green.

Figure 7-17 The battery compartments are in the rear of the instrument.

11.8.2 Rejuvenating of Lithium batteries

Figure 7-18 Check the manufacture date

If the manufacture date of your lithium battery has expired one month, or you have not used the instrument the last month, you probably have to rejuvenate the battery to remove oxidizing.
The rejuvenating can be done in two ways. Either start the instrument and wait for about 10 minutes while the battery is recharging or use a 100 Ω resistor up to 6.3 V

Figure 11-16: Use a 100 Ω resistor up to 6.3 V to rejuvenate the battery.

CHAPTER 12 **Installation**

When instrument is used in Bottom Mooring Frame always use the titanium pressure case and not SW pressure case since the weight is needed to make sure the instrument is stable pointing upwards.

Figure 12-1: Bottom Mooring Frame 3448

If you want to install the instrument away from the bottom our in-line frame 5744 is a popular choice. This frame may be used with instrument pointing upwards or downward dependent on which part of the water column you want to measure. 5744 is designed for use with SeaGuardII with attached sensors.

The frame is also available with Protecting Rod Kit 3967 for extra protection especially during deployment and recovery.

The third alternative is to mount the sensor underneath a buoy. Then we recommend the sensor rack that is designed for use with DB1750. For more information please contact Aanderaa.sales@xylem.com

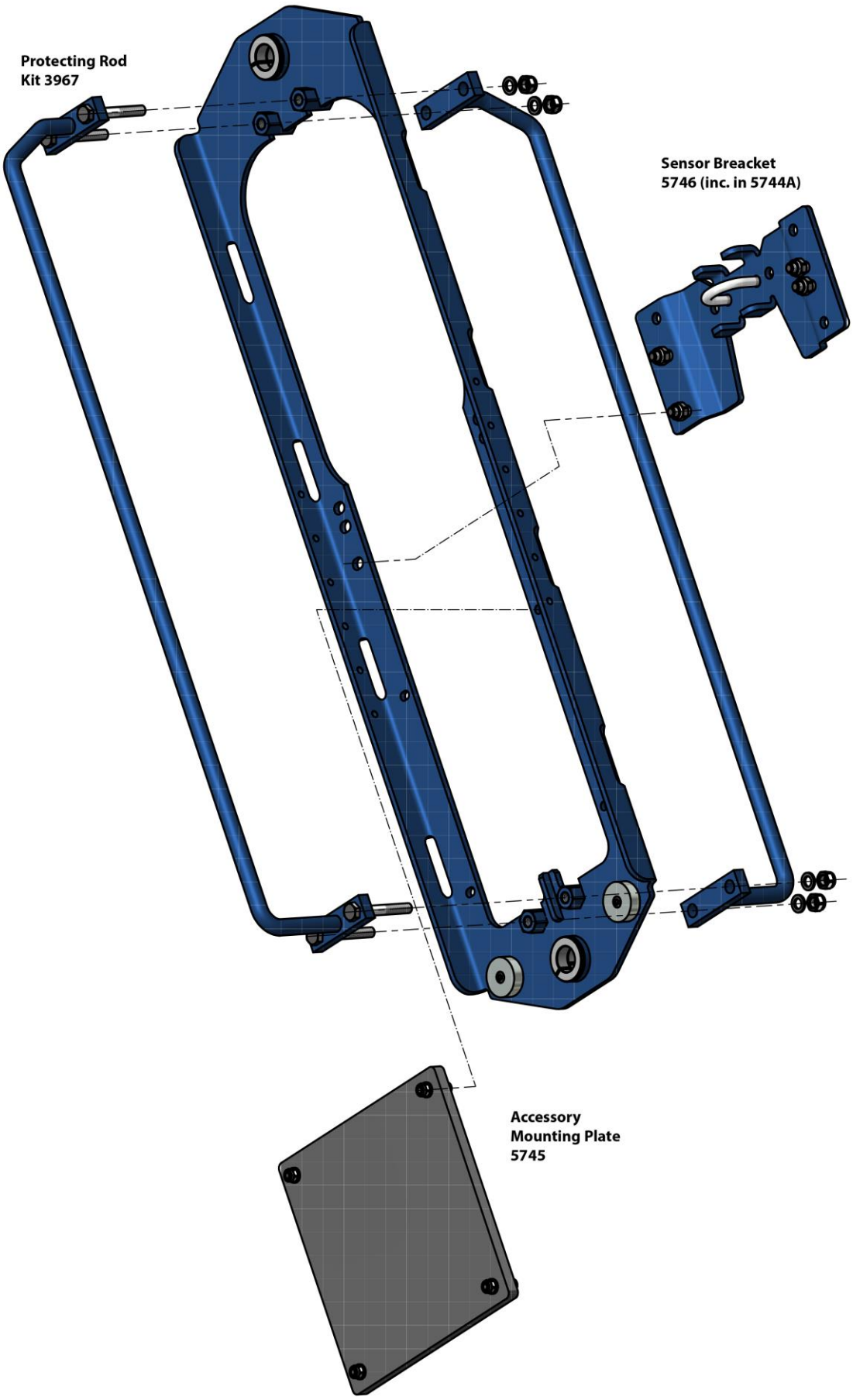


Figure 12-2: Inline mooring frame 5744A

12.1 Mounting considerations

When installing the sensor please make sure that there is no object in front of the transducer or one of the optical sensors. Use each sensor in their recommended position to avoid any disturbance. When using one of our frames the orientation will make sure that there is open space in front of the transducers but it's also important to make sure that any cables or rescue line is secured to avoid any disturbance. It also important to add enough weight to the bottom of the mooring and enough buoyancy to make use that the sensor is as stable as possible. The choice of material is also important to avoid any magnetic disturbance on the internal compass.

If your sensor is used close to one of the magnetic poles you might need to add a declination angle to compensate for the difference between magnetic north and true north.

CHAPTER 13 **Maintenance**

With more than 60 years of instruments design and production for the scientific community, in use around the world, you can count on our reputation for designing the most reliable products available.
We are guided by three underlying principles: quality, service, and commitment. We take these principles seriously, as they form the foundation upon which we provide lasting value to our customers. Our unmatched quality is based on a relentless program of continuous monitoring to maintain the highest standards of reliability.
To assure the quality of this instrument, critical properties are tested during production. A special form, named 'Test and Specification Sheet' (delivered with the sensor/instruments) lists the tests and their results and checkpoints.

13.1 General

Fouling of the SeaGuardII Instrument will occur during deployment, especially at low latitudes. The use of anti-fouling paint must be considered based on your own experience.

Many different antifouling products are used with success, such as UV-light. Copper tape etc. but its important to use this in a way that you make sure that this is not disturbing any of the sensors.

13.2 Yearly maintenance

The procedure below indicates the minimum maintenance that must be carried out each year or every time the SeaGuardII has been retrieved, two to four times a year for fixed installations depending on the environmental conditions, and every 3 years for factory service.

1. For instruments with marine fouling we recommend to put the full instrument in a bath with vinegar over night to make the cleaning easier.
2. Remove marine growth and barnacles from the sensor(s) using a hand scrub. To remove seashells or corals use plastic handle or similar tools.
3. When inspecting, look for corrosion on connector's cracks on the back potting of connectors and scratches on protecting cable(s) jacket.
4. Rinse the exterior of the instrument in fresh water and let dry.
5. Clean the transducer head.
6. Open the instrument and check for leakage through the transducer head or in the pressure case.
7. If leakage, locate the source of the leakage and correct it.
8. Replace the zinc anodes and corroded parts if necessary.
9. Remove the O-rings.
10. Make sure that the O-ring seatings have a clean and smooth surface.
11. Lubricate the O-rings with grease (Klüber Lubrication Syntheso Glep 1 or similar synthetic grease).
12. Replace the O-rings and pressure inlet.
13. Replace the silica gel bags.
14. Always install new O-rings on plugs that have been disconnected.

15. Check for deformation of the C-clamps. Replace if necessary.
16. Check for scars on the EPOXY coating, the Top-end plate and the frame.
17. Check each individual sensor according to their manual.
18. Apply Repair Lacquer to repair the scars.

13.3 Illustrations of maintenance procedure

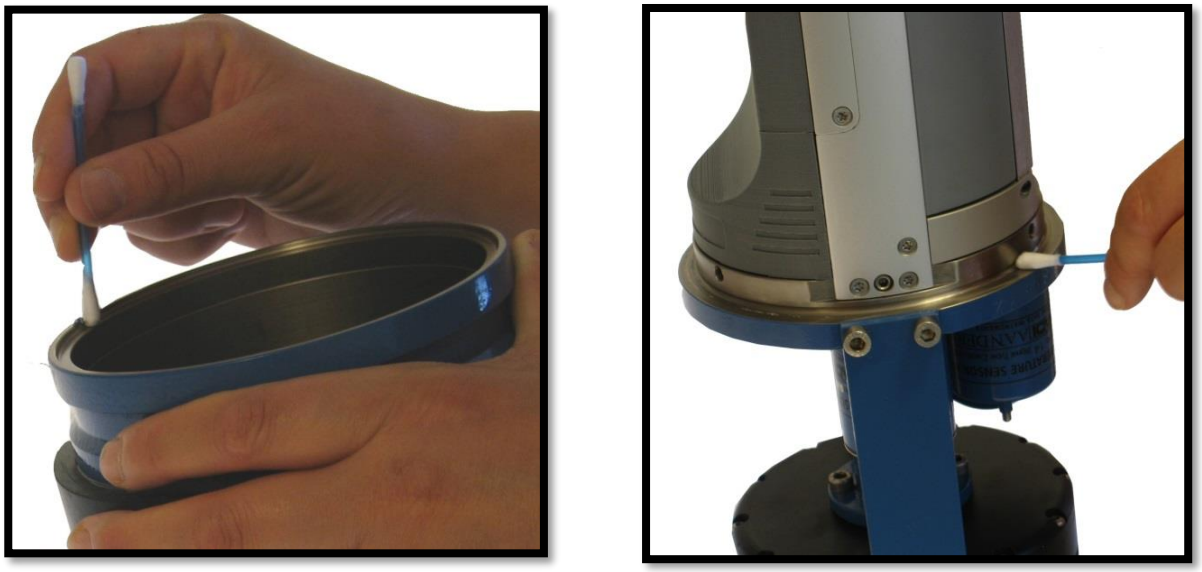
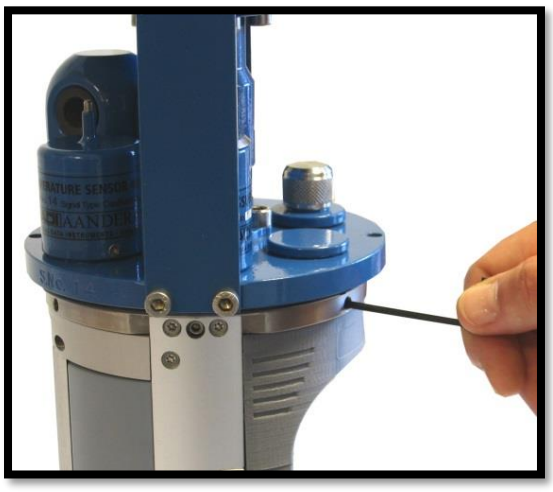


Figure 13-1: Clean o-ring slot using cotton swab



Always remember to tighten all set screw before putting the instrument back into the pressure case. The set screw will otherwise damage the O-ring groove.

Figure 13-2: Tighten all set screws before placing the instrument back into the pressure case

13.4 Factory Service

Factory service is available for maintenance, repair or calibration of instrument and parts.

Before returning the sensors to factory please contact Aanderaa.support@xylem.com for an RMA number and needed paper.

When returning instrument or parts for service, always include the *Instrument Service Order*, Form No. 135, see our web pages under 'Support and Training'.
Normal servicing time is four to six weeks, but in special cases the service time can be reduced.

A main overhaul and service is recommended at the factory every three years.

13.5 Tools- and Maintenance Kit

The manufacturer always keeps a stock of spare parts, accessories and consumable parts for quick delivery. Please contact Aanderaa.support@xylem.com for assistance or ordering. See table below for SeaGuardII Tool Kit list, kit no. 3986A.

13.5.1 Tool kit

Table 13-1: Tool kit for SeaGuardII

Part. no	Description	Pieces
913013	Allen Key, NV 5 mm	1
913002A	Allen Key, NV 4 mm	1
913022	Allen Key, NV 3 mm	1
913009	Allen Key, NV 2.5 mm	1
913035	T-10 Torx Screwdriver	1
913036	Flat Screwdriver (5 mm)	1

13.5.2 Maintenance kit

Table 13-2:Maintenance Kit 3813/3813A for SeaGuardII

Part. no	Description	Pieces 3813(LW/IW)	Pieces 3813A(DW)
963352	Zinc Anode, Ø16	1	1
865001	O-Ring, SOR 71 (109.5 x3.0mm)		2
865000	O-Ring, SOR 72 (114.5x3.0mm)	2	
863008	O-Ring, SOR 131 (18.1x1.6)	2	2
862011	O-Ring, SOR 125 (12.1x1.6)	2	2
963384	Pressure Inlet.	1	1
260087	Kluber, Syntheso GLEP l.	1	1
972579A	Repair Lacquer, Jotun Blue.	1	1
972577	Tectyl 506. 10cl.	1	1

This kit, part no. 3813, can be ordered from the manufacturer.

Two kits are available depending on the depth range.

Figure 13-3: Grease for Subconn plug

CHAPTER 14 Image Upgrade of main board

Instructions for uploading SeaGuardII Image and descriptions around the procedures are given below.

14.1 Upload SeaGuardII Image and Update New Registry

This section covers the task of upgrading a SeaGuardII image (the main software of the unit) and the instrument database (the Registry).

The Registry is a vital part of the SeaGuardII software. The registry holds information that the Instrument software applies to obtain information about different software components the system loads and unloads during an execution.

There are actually three copies of the Registry in the system. One is stored together with the image and is called the ROM version. Another is stored in Flash and is called the Flash version. None of these are lost when power is switched off. The third one is stored in RAM and called working Registry

When the instrument is switched ON, the operating system first looks for a copy of the Registry in the Flash; this version of the Registry is then copied into RAM and becomes the working Registry.

If it does not find a valid Registry in the Flash, it copies the default ROM version (which is always present) into RAM and makes this one the working Registry.

When uploading an image from a SD card, this will erase the Flash version of Registry and force the instrument to use the ROM version that came with the new image.

14.2 Instructions for Uploading SeaGuardII Image

Note! If you already have a SD card with a SeaGuardII Image ready, jump to step 5.

1. Preferably use the SD card you received with the instrument or a replacement from Aanderaa.
2. Insert the SD Reader into the USB slot. Make sure a disk named *Removable Disk* appears in *Explorer.*
3. Erase all content of the SD card. Make sure that the file system is *FAT* in the properties command in *Explorer*. If you prefer to erase the card using the *Format* command, use *FAT* file format (not FAT32 or NTFS).
4. Copy the file named ***NK.nb0*** to the SD card. You will find the latest version at https://www.aanderaa.com/media/software/seaguardii-latest-firmware.zip
   a) Select the file in the PC directory.
   b) Right-click and select *Copy.*
   c) Move to the *Removable Disk* folder, right-click and select *Paste.*

d) It takes some time to transfer the file (32 MB). However, *Explorer* will report *finish* before the complete transfer has taken place. Thus, monitor the yellow light on the SD Reader for blinking. When the blinking stops, **wait an additional minute**.

e) Remove the SD card from the reader.

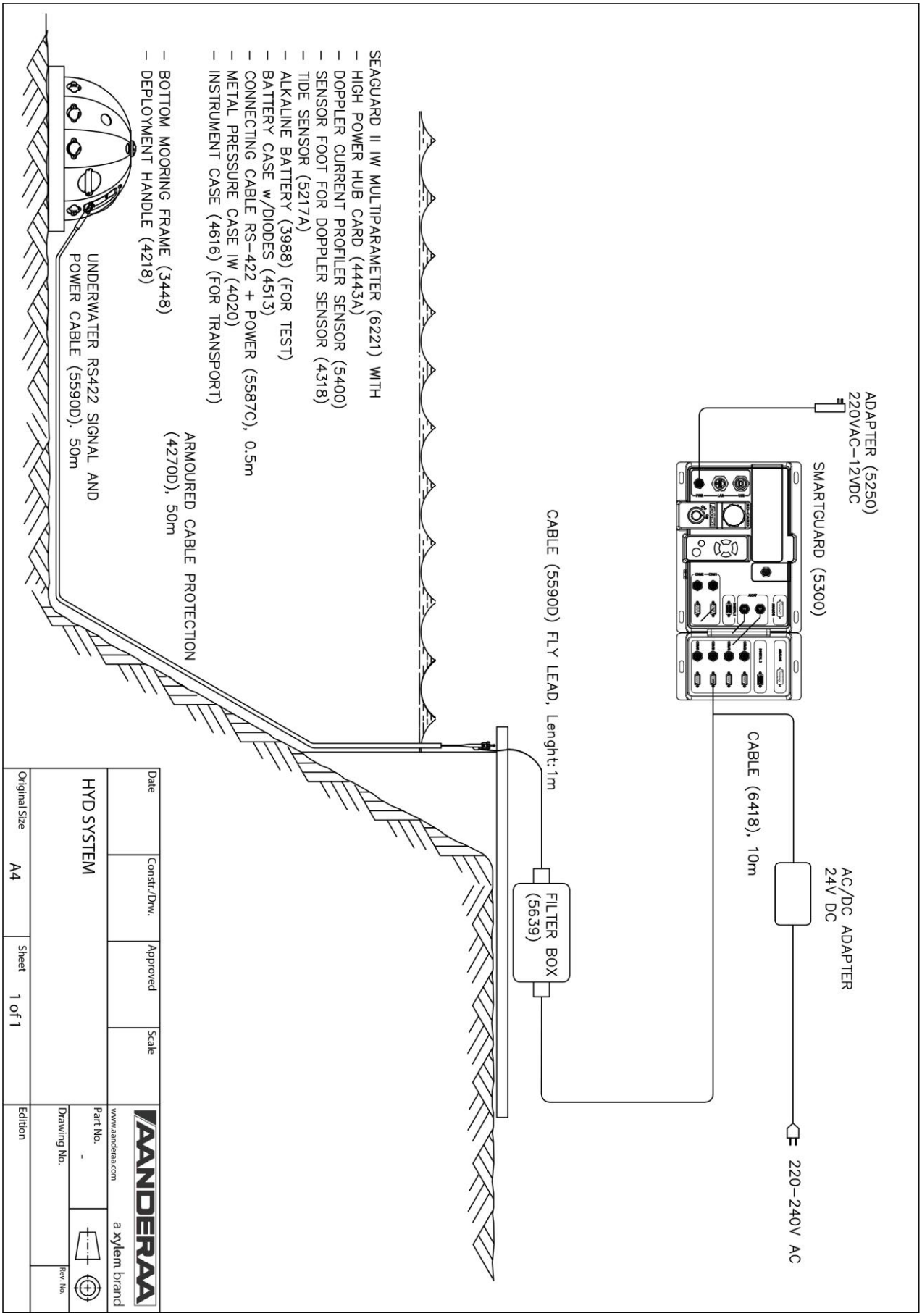
f) Click *Refresh* in *Explorer* (or go to another directory and back to *Removable Disk*) and confirm that there is no card in the reader.

g) Insert the SD card again and confirm that the file ***NK.nb0*** exists on the card.

5. Install the SD card in the SeaGuardII SD slot.
6. Open the SD card Housing in the SeaGuardII.
7. Use a pencil or similar to press and hold down the lower boot button in the SD card Housing; Switch *ON* the SeaGuardII before releasing the boot button.
8. Release the boot button.
9. Tap the boot button once more.
10. Release the boot button once more; the new image is about to be transferred.
11. The upper yellow light will now start blinking
12. The image is large and will take approximately 10 minutes to install.
13. When the download has finished, yellow light stops blinking switch *OFF* the instrument using the power switch, and then switch it back *ON* to confirm that the new image has been installed.

To check the image version, connect the SeaGuardII to AADI Real-Time Collector system overview where you will find information about the image version.

CHAPTER 15 **System-based examples and cables**



The drawing above represents a system solution where the SeaGuardII is deployed in a bottom frame collecting current profile data and wave, tide and pressure data. Data are relayed to the surface using a cable to land, 525m long, where a station collects meteorological data powered by solar panels.

The SmartGuard acts as a data hub collecting data from the SeaGuardII and the Weather Station and sending those data in real time using a radio communication.

The system presented in the drawing DID-50832 includes a sub-surface mooring using the Aanderaa SmartSub observatory using the SeaGuardII with sensors to measure currents profiles, turbidity, conductivity, pressure, oxygen, chlorophyll and CDOM.

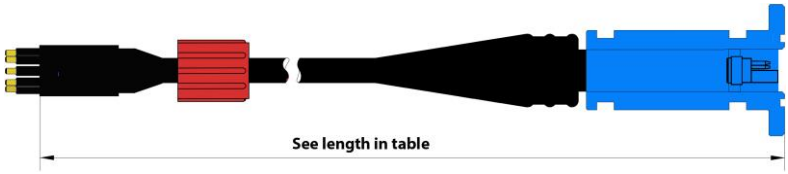
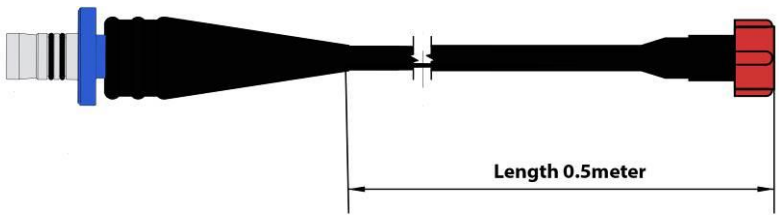
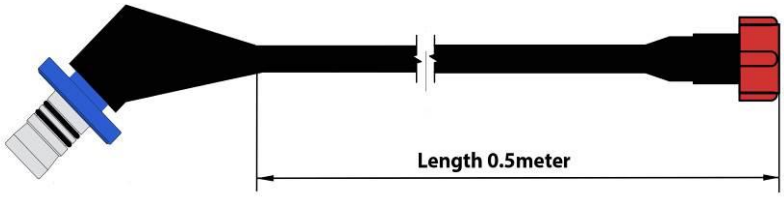
Data are transmitted in real time using an acoustic communication towards a surface buoy. The surface buoy will collect data from the underwater observatory and also collect data from the surface including; meteorological data, wave height, turbidity, conductivity, oxygen, chlorophyll and CDOM.

The buoy will transmit further to land all data collected from the SmartSub observatory and from the buoy sensors.

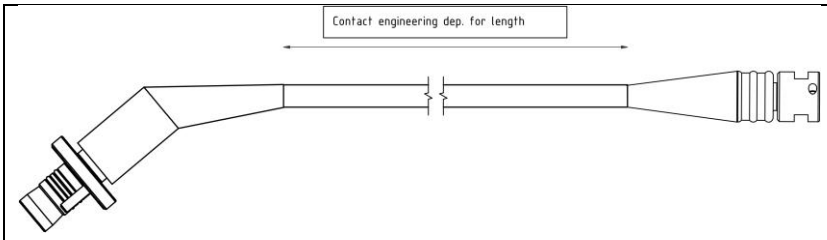
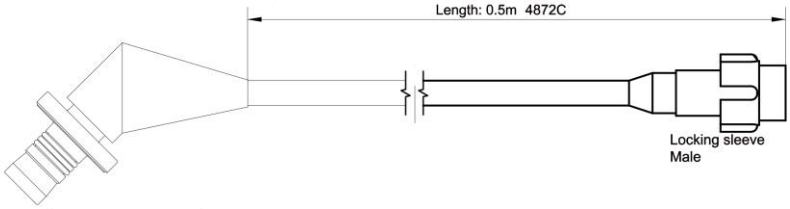
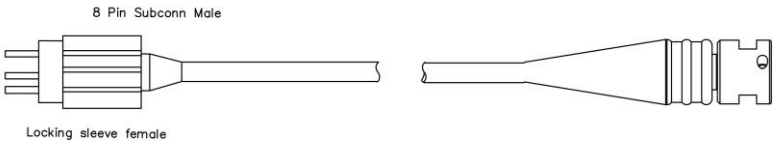
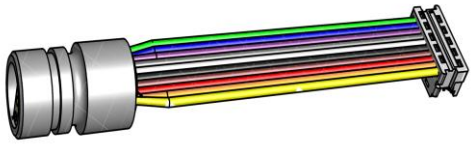
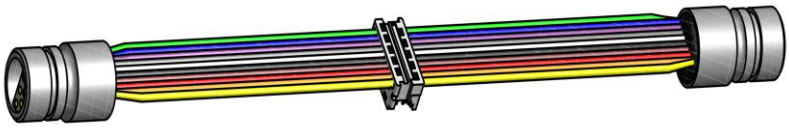
15.1 Connecting Cables

Aanderaa offers a wide range of standard cables. In the list bellow we only show some of the most used once. If you have any needs, please contact Aanderaa.support@xylem.com for assistance.

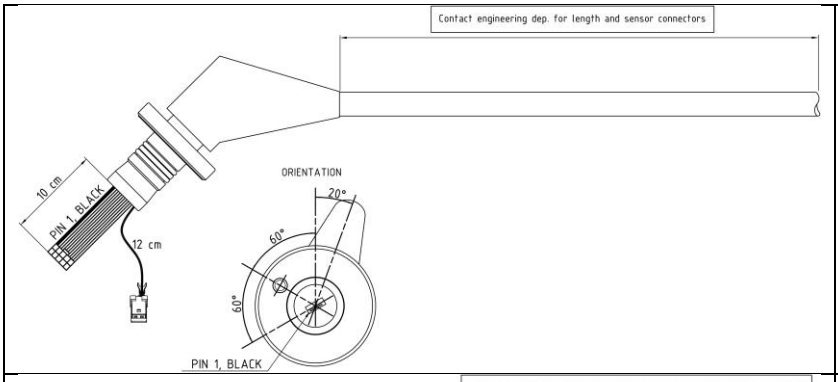
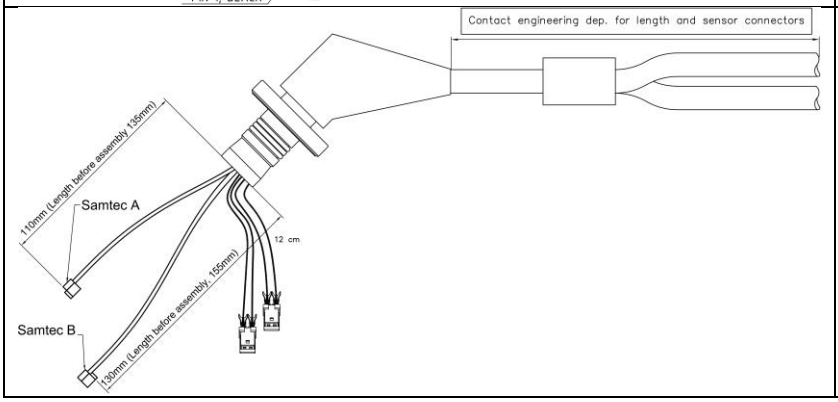
15.1.1 For AiCaP DCS/DCPS

	• 4318 Sensor Foot AiCaP • Used to connect DCS/DCPS to SeaGuardII top-end plate • Only for use in center hole
	• 4838 Sensor Cable AiCaP • Used for remote connection of DCS/DCPS, between sensor and SeaGuardII top-end plate • Only for use in center hole
	• 5340 Sensor Cable AiCaP • Used for remote connection of DCS/DCPS, between sensor and top-end plate via male 8pin Subconn • Needs 5662 or 4872 for connection to SeaGuard top-end plate
	• 5662 Connection Cable AiCaP • Connection between straight plug on SeaGuardII top-end plate using sensor hole and 8pin Subconn on 5340 cable • Needs 5340 cable for connection
	• 4872 Connection Cable AiCaP • Connection between angular plug on SeaGuardII top-end plate using sensor hole and 8pin Subconn on 5340 cable • Needs 5340 cable for connection

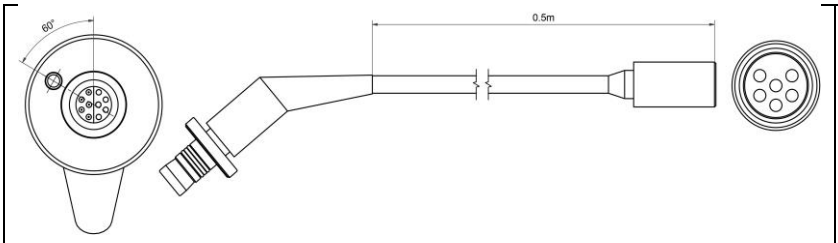
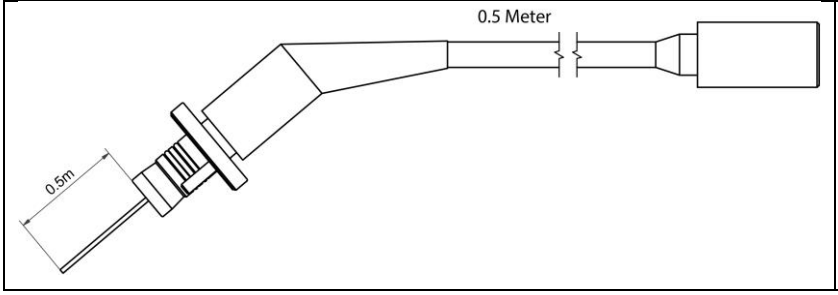
15.1.2 For AiCaP Sensors except DCS/DCPS

	• 4793 • For AiCaP sensors • SeaGuardII top-end plate to CSP Sensor plug • If used in pos 6 patch cable is needed
	• 4872 Connection Cable for AiCaP sensors • To be used with 4879 for connection to Sensor CSP • SeaGuardII top-end plate to Subconn • If used in pos 6 patch cable is needed
	• 4879 • For AiCaP sensors • Subconn to Sensor CSP • Needs 4872 for connection to Top-end Plate • If used in pos 6 patch cable is needed
	• 5479 • With resistor • For single sensor or cable
	• 5558 • With resistor • For more than one sensors/cable

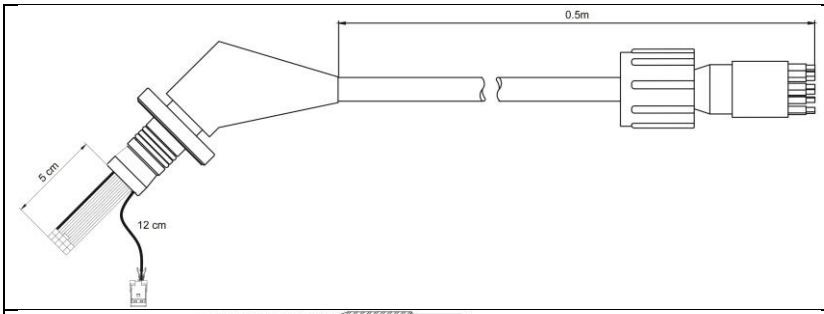
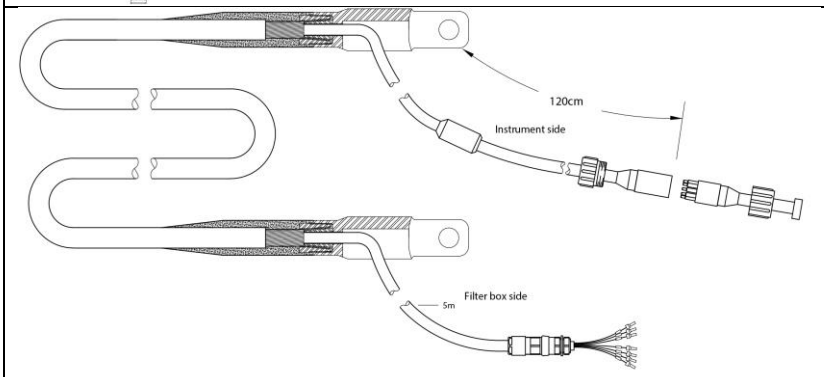
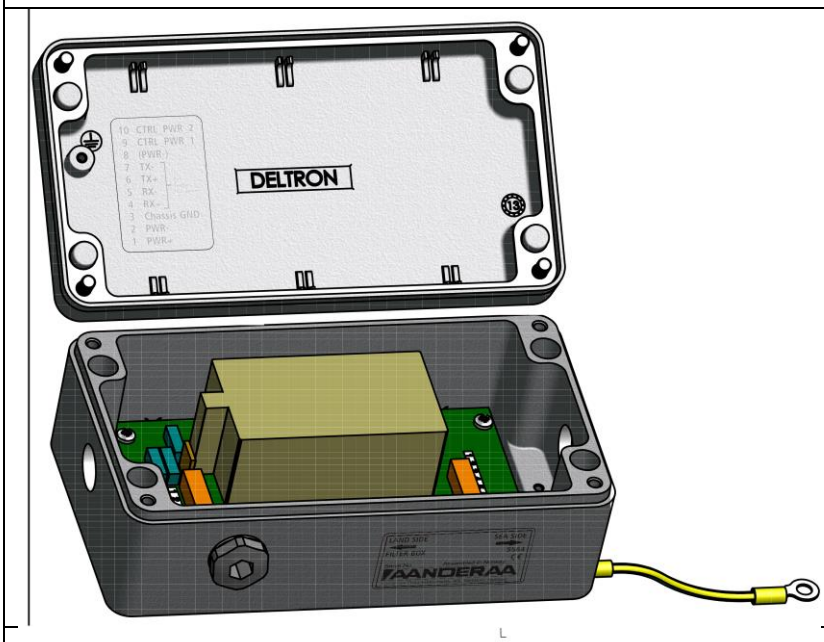
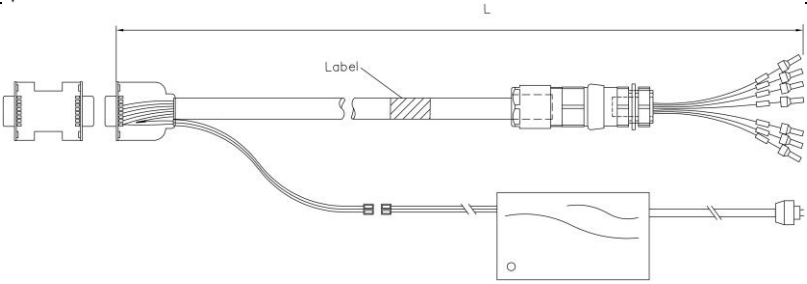
15.1.3 For RS-232/RS-422 Serial Sensors

	• 5640 • Serial Sensor RS-232 or RS-422 • SeaGuardII top-end plate to free-end • To be used in pos 6
	• 5641 • For Two Serial Sensor RS-232 and RS-422 • SeaGuardII top-end plate to free-end • To be used in pos 6

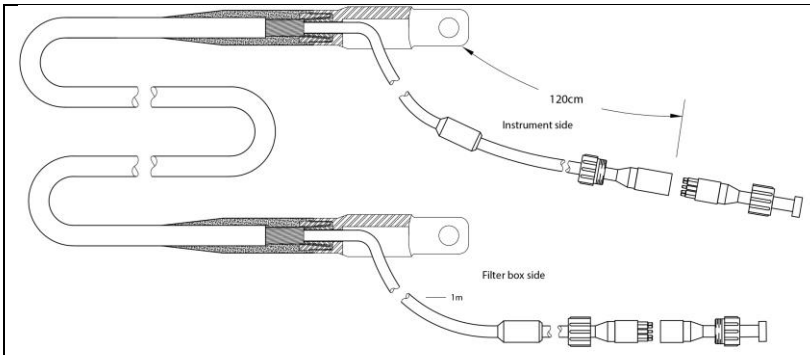
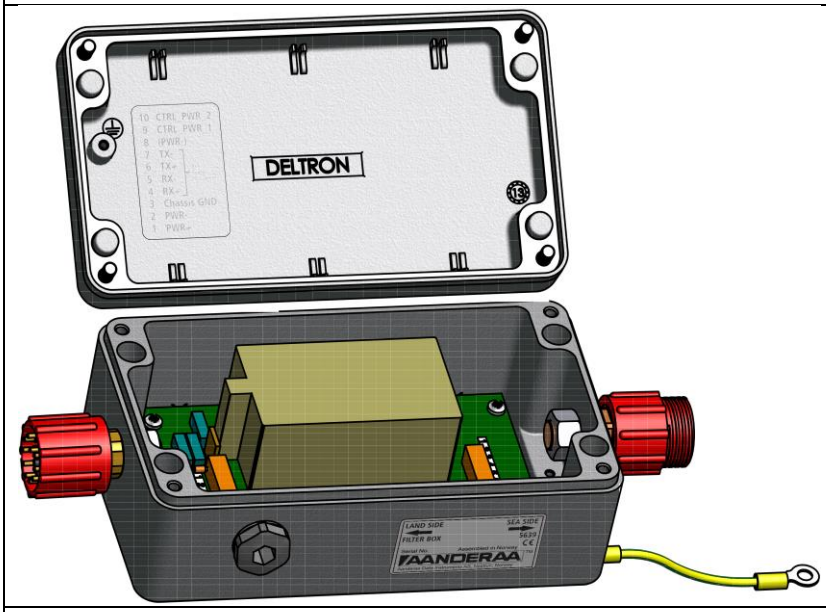
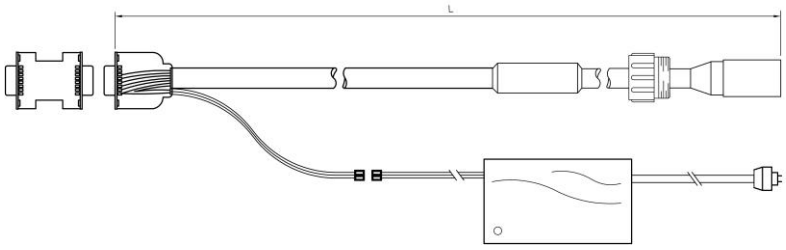
15.1.4 For Analog Sensors

	• 4564C • Analog Sensor without gain • SeaGuardII top-end plate to Subconn • If used in pos 6 patch cable is needed
	• 4883C • Analog Sensor with gain • SeaGuardII top-end plate to Subconn • To be used in pos. 6

15.1.5 Real-Time Cable and Filterbox with terminal block

	• 5587 Real-Time connector cable • From Top-end Plate to Power/Communication
	• 5589 Real-Time cable RS-422 + Power • From filterbox with terminal block to 5587 cable
	• 5564 Filterbox with terminal blocks • Used with 5589 Real-Time cable from SeaGuardII and 5645 cable to PC
	• 5645 cable with power adapter • Used with filterbox 5564

15.1.6 Real-Time Cable and Filterbox with Subconn

	• 5590 Real-Time cable RS-422 + Power • From filterbox with Subconn to 5587 cable
	• 5564 Filterbox with Subconn • Used with 5590 Real-Time cable from SeaGuardII and 5646 cable to PC
	• 5646 • PC to Filterbox w/Power Adapter and Subconn • Used with filterbox 5564

15.2 Example of Test & Specifications sheet and Certificates

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 847, Oct 2014

Product: SeaGuard II 5650 IW
Serial No: Demo

Component	Serial No.	Remarks
Main Assembly SeaGuard II 5655	xxxx	
Doppler Current Sensor 4520	xxxx	
Conductivity Sensor 5819	xxx	
Pressure Sensor 4117D	xxxx	

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 (only if installed)
- 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 Real-Time Collector
- 2.3. Analog channels configured if used
- 2.4. Battery indicator calibrated
- 2.5. SD card operation
- 2.6. S-Flash operation
- 2.7. USB Connection to PC
- 2.8. Clock adjusted to correct UTC
- 2.9. Analog switch in correct position

3. Performance test
- 3.1. Current drain idle (max 30 mA) 13.7 mA
- 3.2. Current drain in Power Down Mode (max 1.4 mA) 0.7 mA
- 3.3. Pressure test
- 3.4. Field test and data analysis
- 3.5. Operation test, -5□C to +35□C (all sensors, 16 hours, data on SD)

Windows CE License-Key : Demo

Date: 15 Apr 2024

Sign:

Bjarte Johannessen, System Engineer

Figure 15-1: Test and Specification Sheet 1

AANDERAA a xylem brand

TEST & SPECIFICATIONS

Form No. 728, Oct 2007

Product: SeaGuard II 5650 SW
Serial No: Demo

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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: 3988
   b) Open loop voltage: 9.6 V
   c) Voltage with 100 ohms load: 8.9 V
1.10. Battery in upper slot,
   d) Type:
   e) Open loop voltage: V
   f) Voltage with 100 ohms load: V

Date: 03 Apr 2024

Sign:

Yngve Instefjord

Yngve Instefjord, Production Engineer

Figure 15-2: Test and Specification Sheet 2

AANDERAA a xylem brand

PRESSURE CERTIFICATE

Form No. 667, Sept 2009

Product: SeaGuard II 5650 IW
Serial No: Demo
Date: 08.04.2024

Certificate No: 225225307Demo

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: 08 Apr 2024

Sign:

Bjarte Johannessen, System Engineer

Figure 15-3: Pressure Test Certificate

Aanderaa Data Instruments AS is a member of RENAS

To address environmental concerns Aanderaa Data Instruments AS has joined the industry's own recycling company for electric and electronic waste - RENAS AS. All EE products sold are part of a system for collecting and processing and can be delivered to the dealer or municipal waste treatment plant.

As a member of RENAS we take responsibility for the environment!
More information on return policies can be found at renas.no.

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We’re a global team unified in a common purpose: creating advanced technology solutions to the world’s water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com

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