TD 303 OPERATING MANUAL
SEAGUARD II Platform
May 2016


# SEAGUARDII PLATFORM

AANDERAA
a xylem brand

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# 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.

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 (refer **Figure 1-2**). The hub card has to 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. 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.

**Document overview**

CHAPTER 1 gives a short description of the SeaGuardII

CHAPTER 2 gives an overview of supplied parts

CAHPTER 3 describes SeaGuardII configuration using AADI Real-Time Collector (not in real time)

CHAPTER 4 describes the configuration for real time communication and real time requirements

CHAPTER 5 describes procedures for connection of new devices; sensors, modems

CHAPTER 6 describes real time and stored data

CHAPTER 7 SeaGuardII Operating instructions

CHAPTER 8 gives SeaGuardII maintenance instructions

CHAPTER 9 describes the procedure for upgrading image

**Requirements**

AADI Real-Time Collector, Data Studio 3D and configuration cable.

**Applicable documents**

| | |
|---|---|
| D409 | SeaGuardII Platform Data Sheet |
| Form 135 | Instrument Service Order |
| TD 267 | AADI Real-Time Output Protocol |
| TD 268 | AADI Real-Time Data Collector |

**Abbreviations**

| | |
|---|---|
| ADC | Analog to Digital Converter |
| AiCaP | Automated idle lined CANbus based Protocol |
| ASCII | American Standard Code for Information Interchange |
| CAN | Controller Area Network - sometimes referred to as CANbus |
| DSP | Digital Signal Processor |
| DCPS | Doppler Current Profiler Sensor |
| EPROM | Erasable Programmable Read Only Memory |
| GMT | Greenwich Mean Time |
| GPRS | General Packet Radio Service |
| HUB | Connection Point for Network Devices |
| LCD | Liquid Crystal Display |
| RAM | Random Access Memory |
| ROM | Read-Only Memory |
| RTC | Real Time Clock |
| SD card | Secure Digital (Memory) card |
| UART | Universal Asynchronous Transmitter and Receiver |
| UNESCO | The United Nations Educational, Scientific and Cultural Organi sation |
| USB | Universal Serial Bus |

# CHAPTER 1 Short description of SeaGuardII

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 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 6m for AiCaP sensors and 5m for analog sensors, for longer cable refer to the SeaGuard 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.

Real-Time (Licensed Feature):

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 can be equipped with a watertight receptacle and underwater mateable plug (refer **Figure 1-1**) that enables external configuration via PC and transmission of real-time data in non-polled mode. Some system examples are available in the **Appendix 1**.

**Figure 1-1 An example of the SeaGuardII Platform with DCPS and oxygen sensors mounted on the top-end plate and external cable for real time communication**

## 1.1 Front view of the SeaGuardII Platform

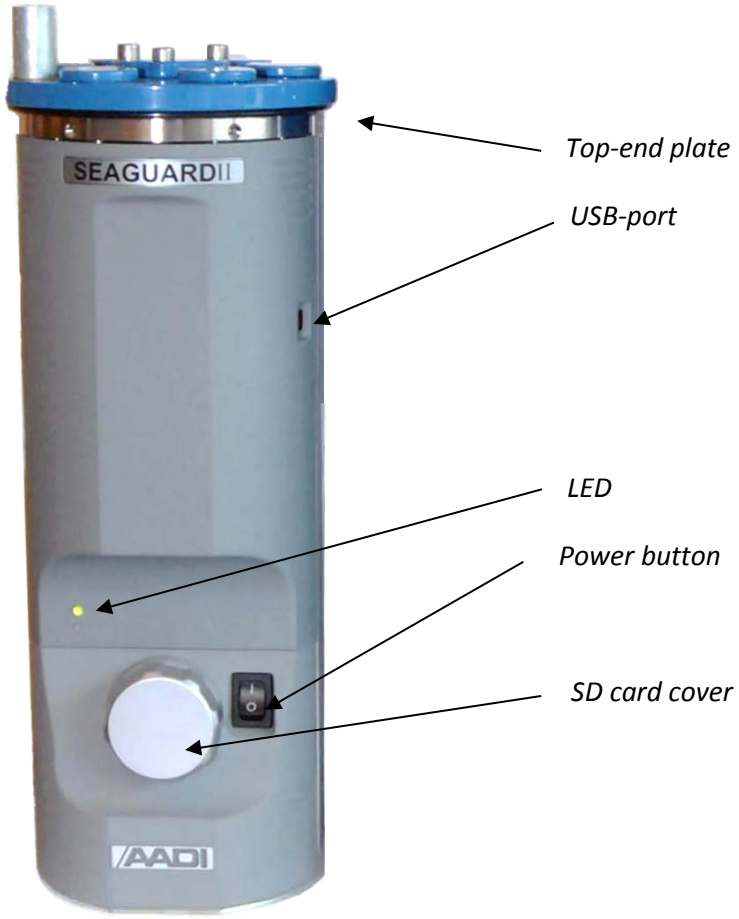



**Figure 1- 2 Front view of the SeaGuardII**

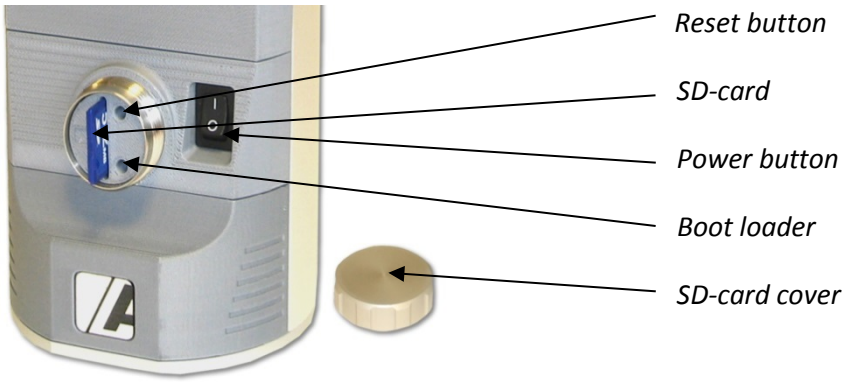



**Figure 1- 3 SD-card slot**

## 1.2 Side/Rear view of the SeaGuardII Platform

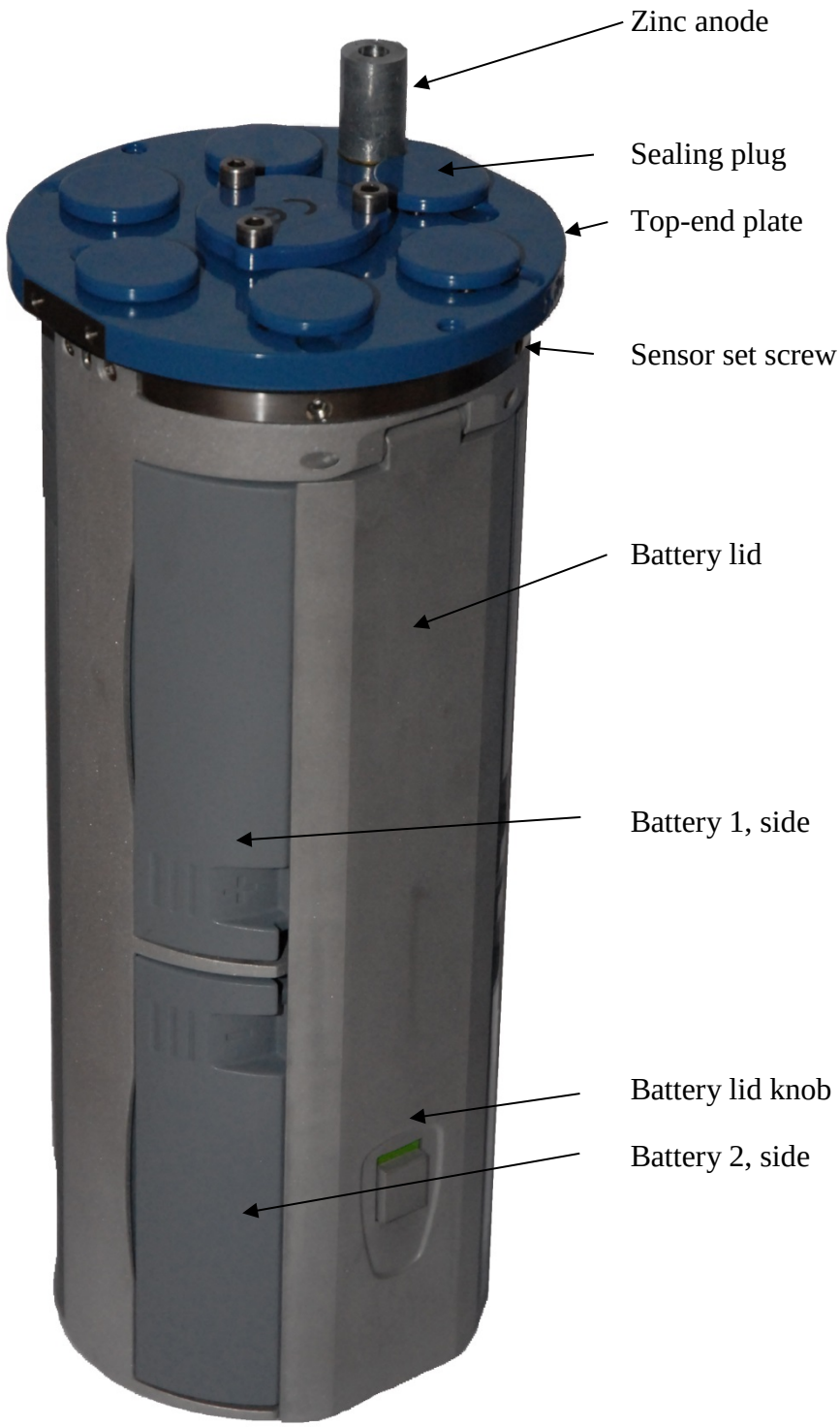



**Figure 1-4 Side/Rear view of the SeaGuardII**

## 1.3 Available sensors for connection to the SeaGuardII Platform

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

| Hyd-sensor | Number | Data sheet | RS-232 | RS-422 | AiCaP | Analog |
|---|---|---|---|---|---|---|
| DCPS Doppler Current Profiler Sensor | 5400 | D 411 | x | | x | |
| Conductivity sensor | 4319 | D 369 | x | | x | |
| ZPulse Doppler Current Sensor | 4420/4520<br>4830/4930 | D 367 | x | | x | |
| Oxygen Optode | 4330/4330F | D 378 | x | | x | |
| Oxygen Optode | 4835 | D 385 | x | | x | |
| Pressure sensor | 4117 | D 362 | x | | x | |
| Temperature sensor | 4060 | D 363 | x | | x | |
| Tide sensor | 5217 | D 405 | x | | x | |
| Turbidity sensor | 4112 | D 377 | | | | x |
| Wave and Tide sensor | 5218 | D 407 | x | | x | |

**Table 1-1 Aanderaa hydrological sensors.**

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

# CHAPTER 2 Getting started

**Typical minimum delivery:**

- The SeaGuardII platform with up to three different recording groups
- Down to 30sec recording interval for current profiles measurements
- Down to 2s for other sensors
- 2GByte storage capacity
- Real Time Collector software (for Windows®XP, Windows®7) for instrument configuration and real time data collection (if instrument used in real time)
- USB cable for connection from SeaGuardII to PC
- Data Studio 3D Windows based software for data post processing, export of data and vizualisation of the measurements in customized graphs
- Power calculator; to calculate the deployment duration according to the configuration based on internal power
- Shipping box
- Electronic documentation

**Selectable features:**

- Additional sensors
- Alkaline or lithium batteries (from 15Ah up to 70Ah)
- Pressure case
- 3rd party analog or serial sensors
- Real time communication
- Mooring frames

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, refer **Figure 1-4**.


**Figure 2-1 SeaGuardII with USB-configuration cable**


**Figure 2-2 SeaGuardII with Real-Time cable**

# CHAPTER 3 Preparing the instrument for deployment without real time

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 4 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.

## 3.1 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 2-1**)
- Install and start the AADI Real-Time Collector software on your PC (provided on the CD delivered with the instrument). 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

**NOTE!**

**When using a USB connection, you also need to install Windows Mobile Device Center (Windows Vista, and Microsoft Windows 7) if not already installed on your computer. It can be downloaded from Microsoft website.**

Windows Mobile Device Center acts as device management and data synchronization between a Windows Mobile-based device and a computer.

Once the USB connection has been established, Windows Mobile Device Center will start automatically:


**Figure 3-1 Windows Mobile Device Center**

Select "**Connect without setting up your device**"

At first connection with AADI Real-Time Collector, it will generate the following interface:

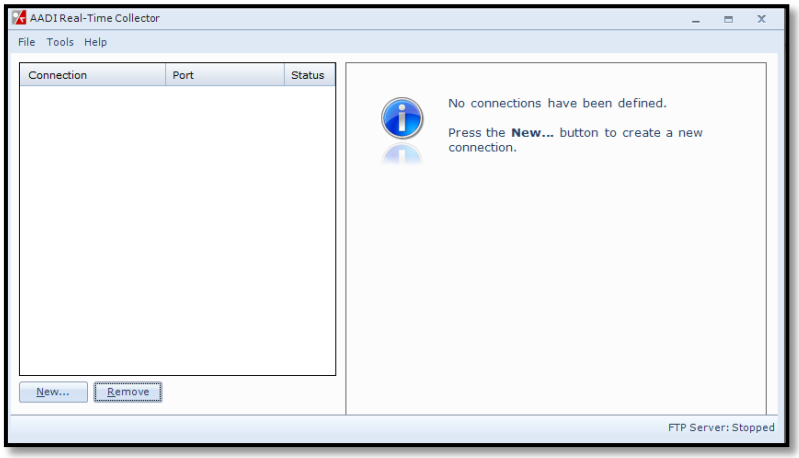



**Figure 3-2 AADI Real-Time Collector start up menu**

- Press ***New*** and write a name in the ***Connection Name*** box (for i.e. SeaGuardII)
- Select ***USB*** from the ***Port Settings*** drop down menu;

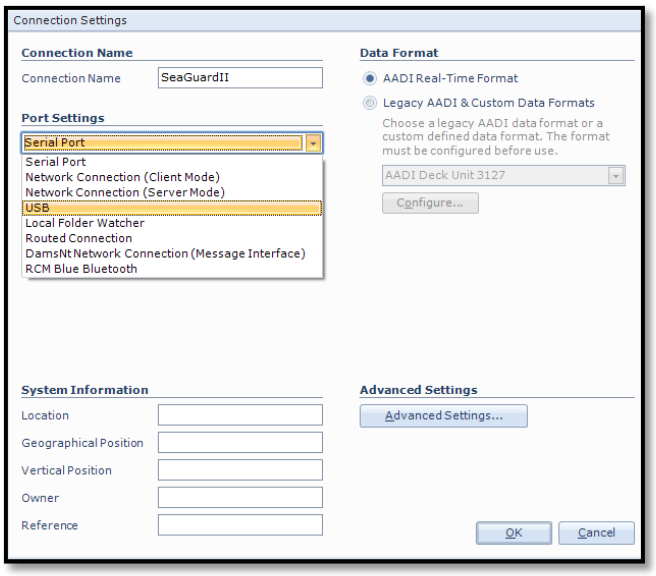



**Figure 3-3: AADI Real time Collector connection settings**

- Press ***OK.***

NOTE: This only needs to be done once. AADI real time Collector will automatically reconnect to the instrument at next connection.

- Press ***Open Port*** and the connection to the SeaGuardII should be established within a few seconds and the status turn to green (refer **Figure 3-4**).

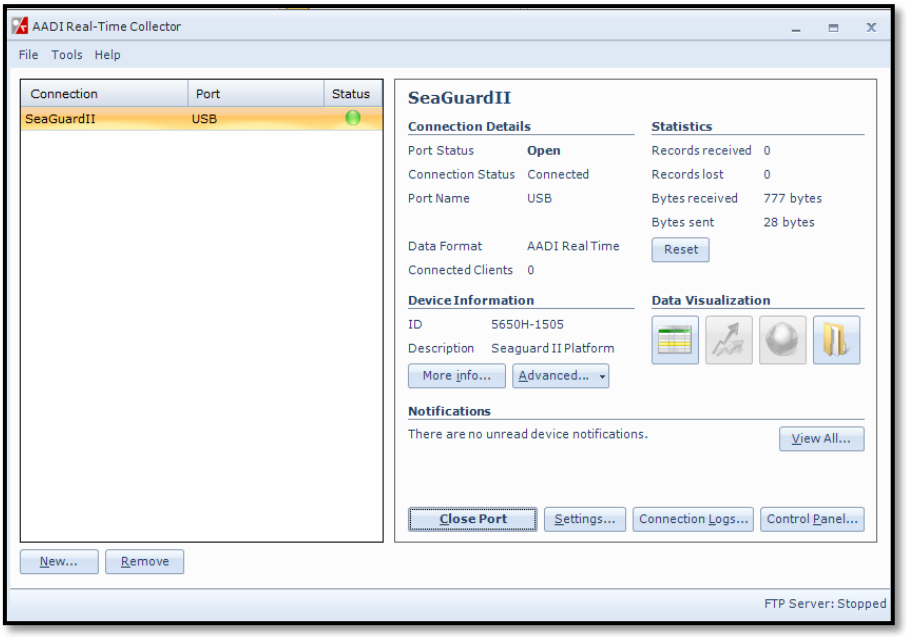



**Figure 3-4 AADI Real-Time Collector main menu**

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

## 3.2 SeaGuardII configuration steps

Open ***Control Panel*** (refer **figure 3-4**)

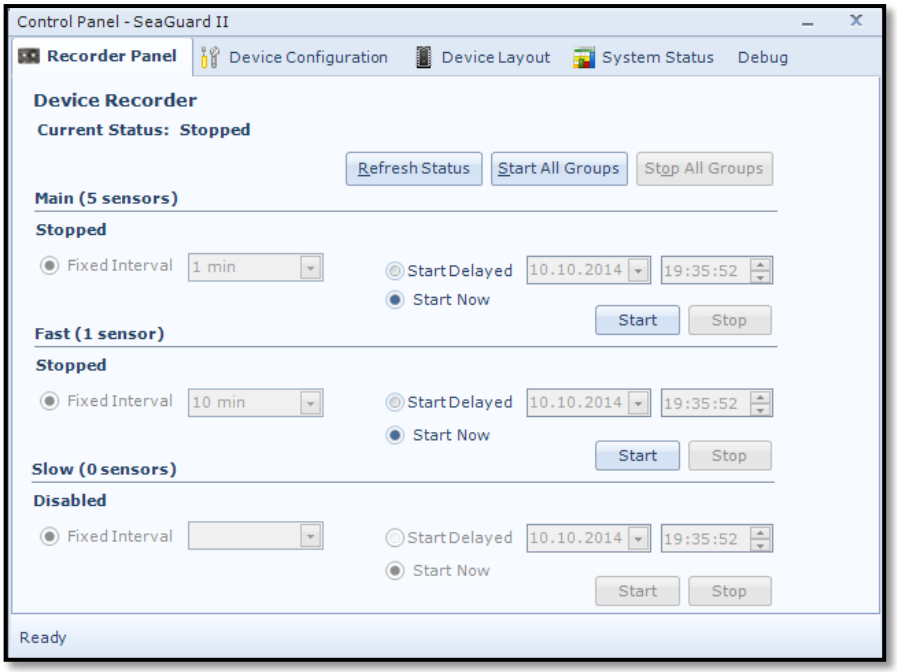
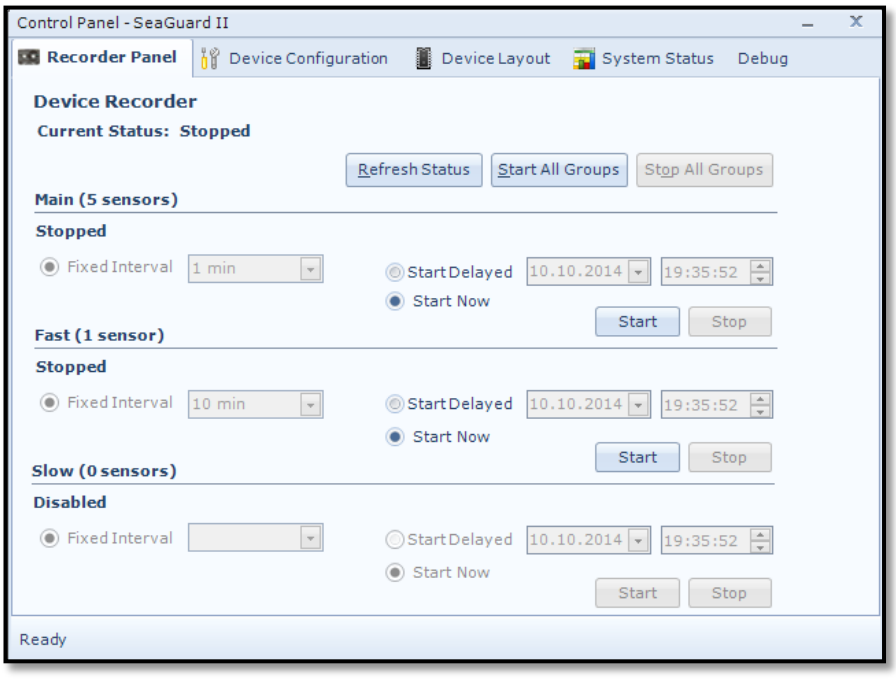



**Figure 3-5: Control panel**

The control panel has 4 tabs or menus:

- ***Recorder Panel***; to start and stop recordings, set recording interval
- ***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 sensors the configuration is stored in the SeaGuardII. Device Configuration is categorized into three main levels: Deployment Settings, System Configuration and User Maintenance.
  - **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.
- ***Device Layout*** is used to specify the 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***, to check hardware and software versions, memory use, battery and power status, communication status and more.

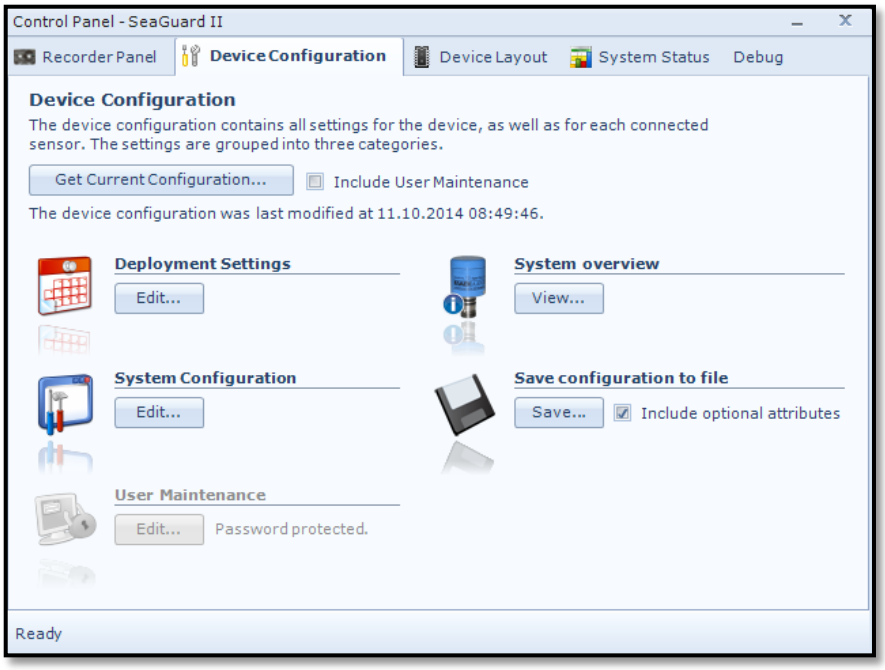
## 3.3 Device configuration




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

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

**Figure 3-6 Recorder Panel**



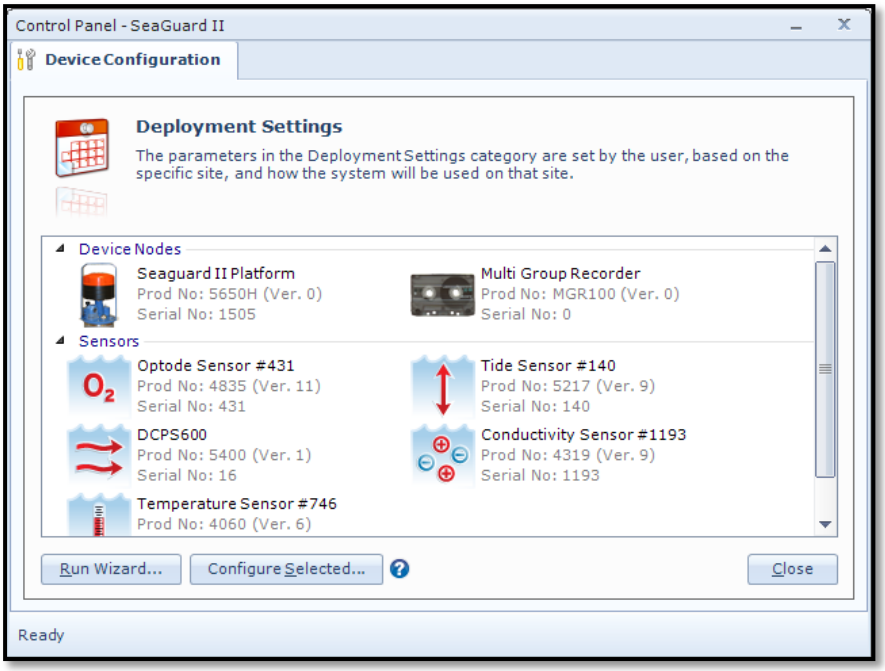

To start configuring the instrument, select the ***Device Configuration*** tab on the top row in the Control Panel, press "***Get Current Configuration...***" in order to get the actual configuration from the SeaGuardII.

The configuration includes ***Deployment settings*** (refer chapter 3.3.1), ***System Configuration*** (refer chapter 3.3.2), ***User Maintenance*** (refer chapter 3.3.3), and ***System overview***.

**Figure 3-7 Device Configuration**

### 3.3.1 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 3-7**). The deployment settings can be changed using either; a wizard ("***Run Wizard…"- Figure 3-8***) 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…***"

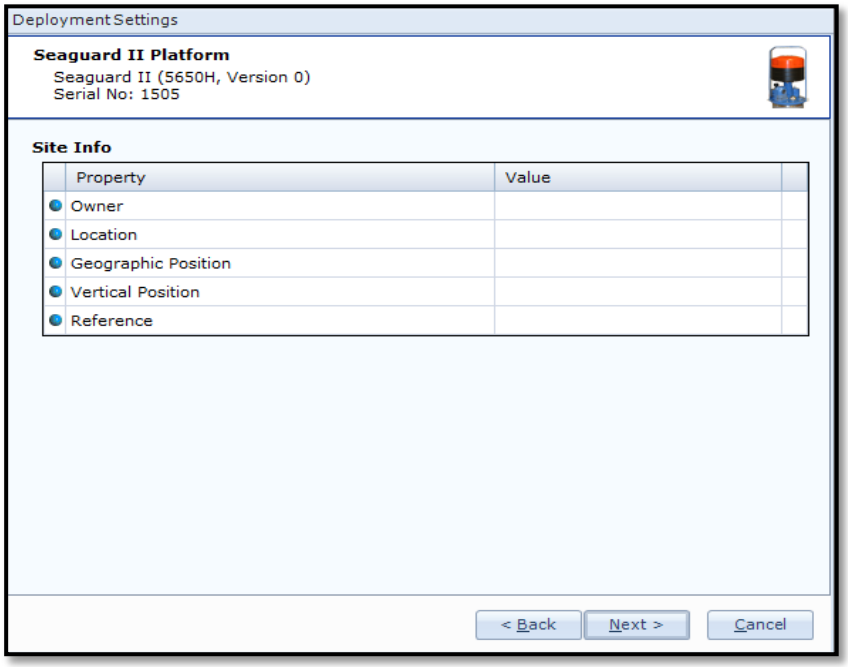
The deployment settings concern:

- Platform
- MultiGroup Recorder
- Sensors

**Figure 3-8 Deployment Settings**

***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.




To enter a value click the value box for your selected property and enter the value.

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

**Figure 3-9 Deployment Settings for the platform**

### *Multi Group Recorder*

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 (refer **Figure 3-10**).

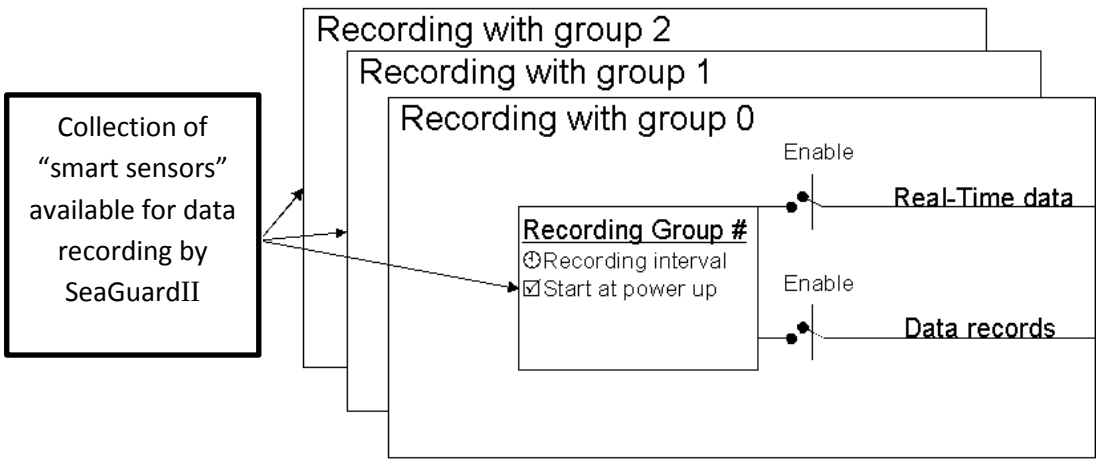



**Figure 3-10 Recording group structure**

To configure the Multi Group Recorder; refer to **Figure 3-11**: First select the groups you want to use by checking "**enable recorder group**"

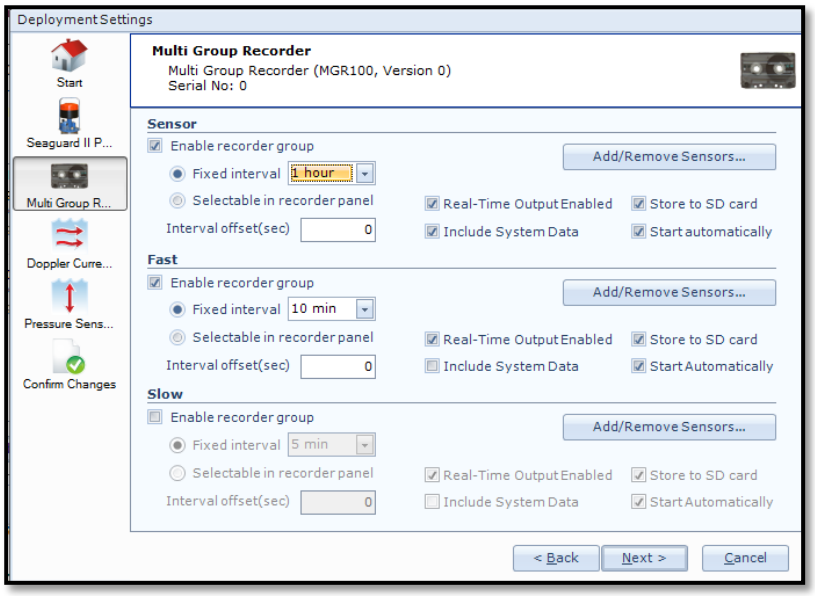



**Figure 3-11 Device configuration > Deployment settings > Multi Group Recorder**

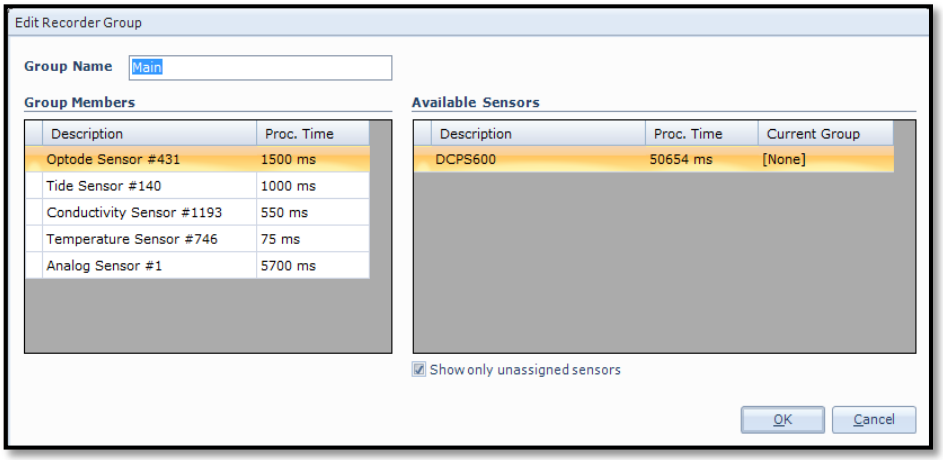
- Select if you want a ***Fixed Interval*** or ***Selectable in recording panel*** for each group***.*** If you select the first, interval will not be able to be changed in the ***recorder panel***. Any changes of recording interval made directly in the recording panel could thus not be kept in the configuration 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 configure 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 includes the following:
  - *Battery Voltage*: Monitors the battery voltage during recording.
  - *Memory Used*: Monitors the use of available system memory during recording.

which can be used for system monitoring and diagnostics. The System Parameters are not configurable.

- 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.
- 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 (refer **Figure 3-12**).




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***".

**Figure 3-12 Recording group members**

The processing time for each sensor is displayed in the ***Multi Group Recorder*** window (**Figure 3-13**). 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.

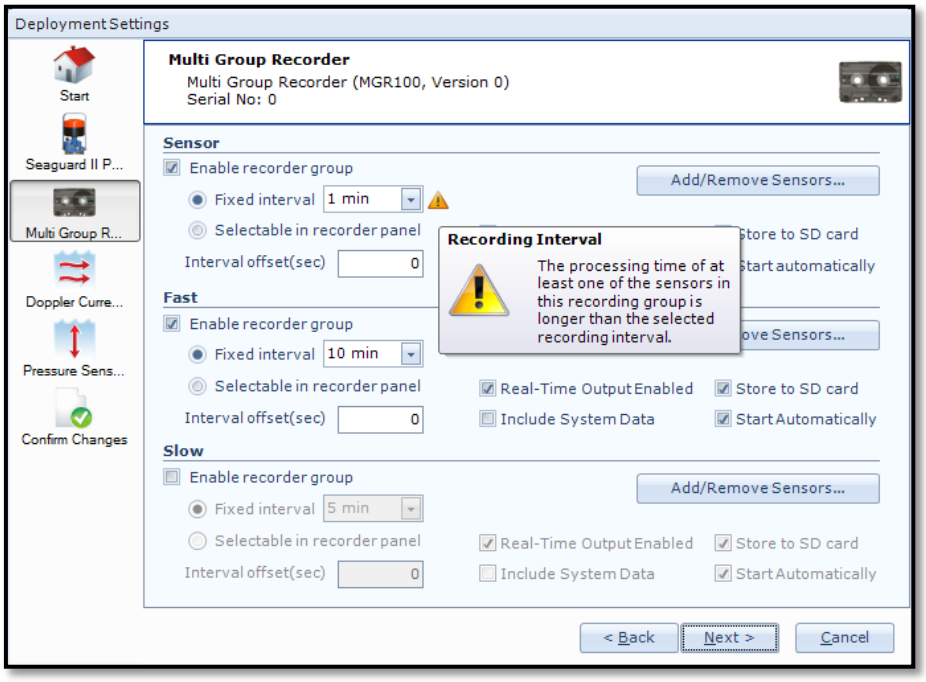
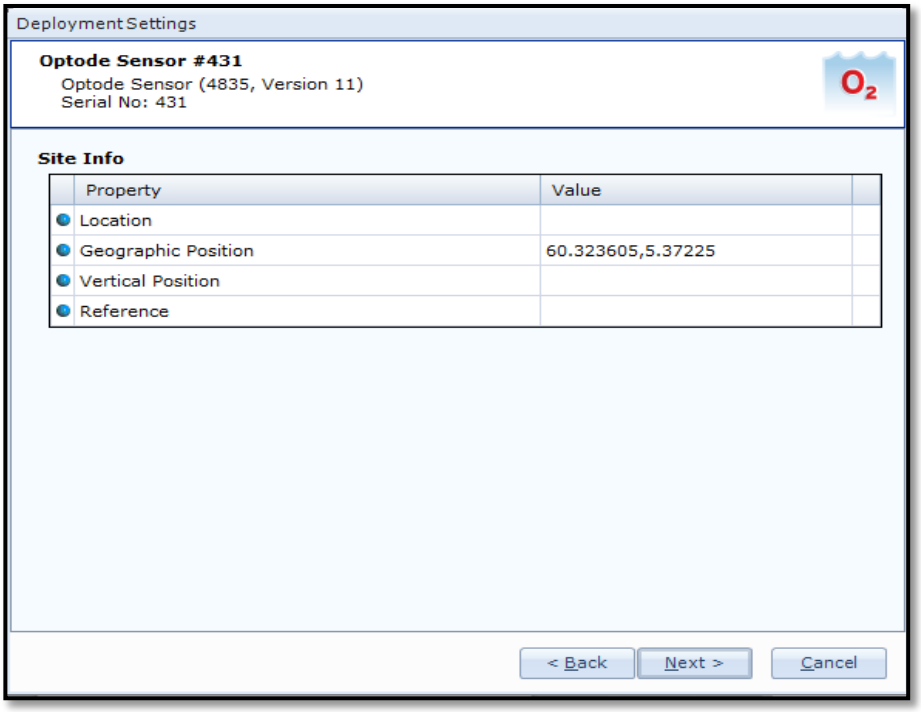



**Figure 3-13: Multi Group recording interval setting**

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.

***Sensors deployment settings***




The Sensor settings hold information about the deployment site for each sensor.

This setting is important if the sensor is used as stand alone or in a string system to state the vertical position in the string.

**Figure 3-14 Example of sensor settings (oxygen optode)**

Once the parameters related to the deployment settings are modified, AADI Real Time Collector will display an overview of the made changes. If you agree, click next and the software will transmit information to the SeaGuardII and sensors.

A new window displays your changes:

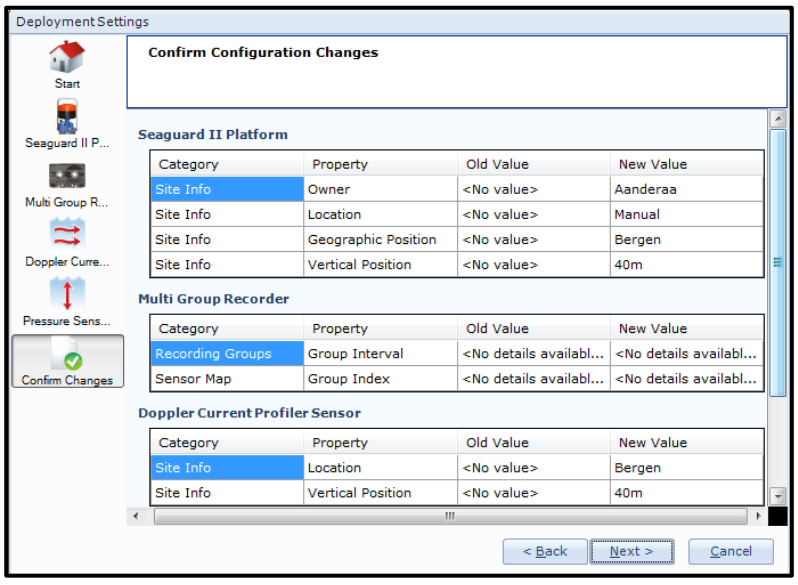



**Figure 3-15: Overview of the changes made in the deployment settings**

Press ***Next*** to confirm changes, and to start the update process.

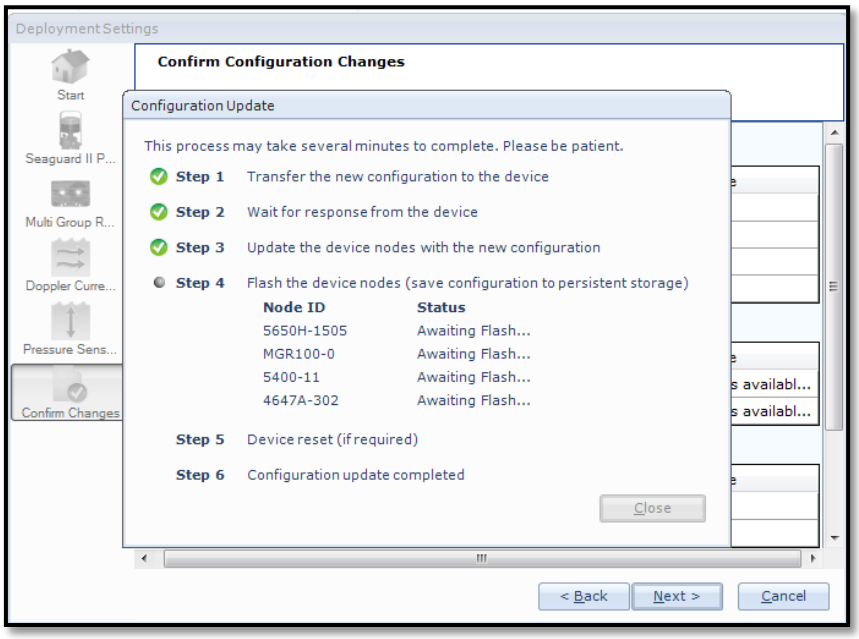
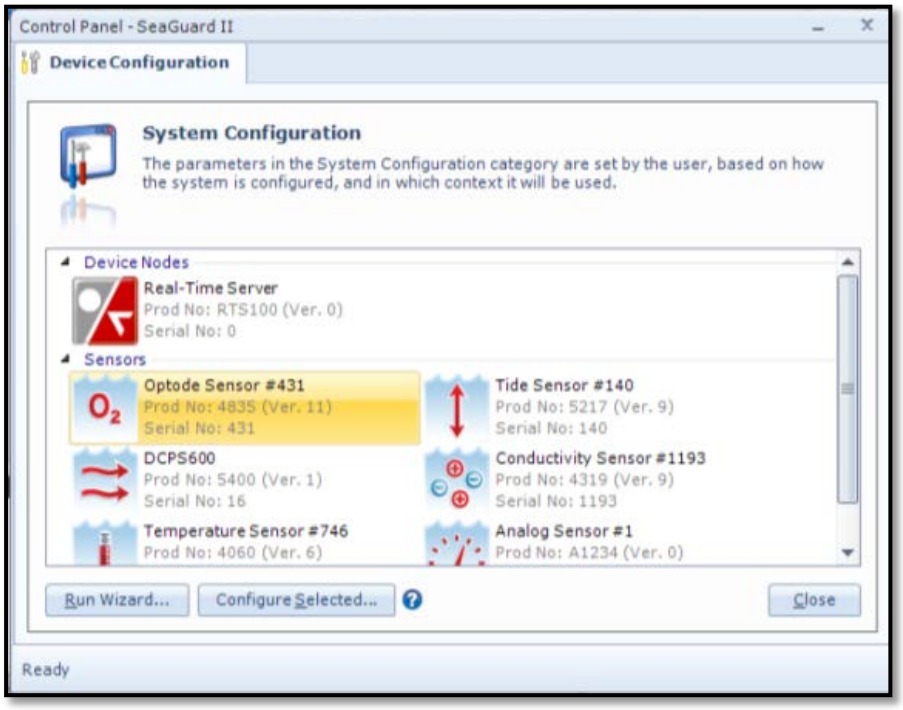



**Figure 3-16: Deployment settings configuration update**

### 3.3.2 System Configuration

Once the deployment settings have been defined, 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** 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…***"

The system configuration includes:

- Sensors
- Real time server (for real time operations)

**Figure 3-17 Control Panel > Device configuration > System Configuration**

### *Analog Sensors*

If analog sensors are connected to the SeaGuardII:

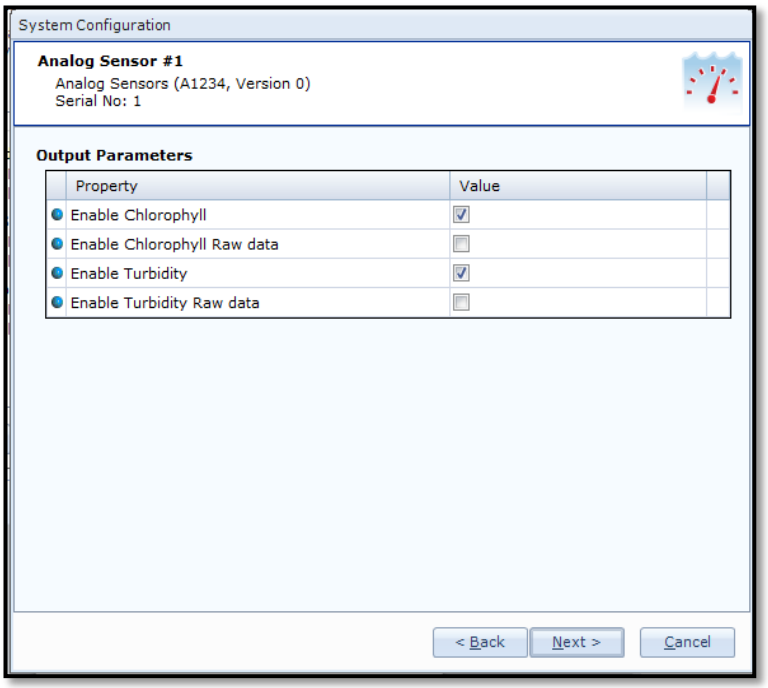



**Figure 3-18 Analog Sensor**

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

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 5.

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

### *AiCaP sensor*s

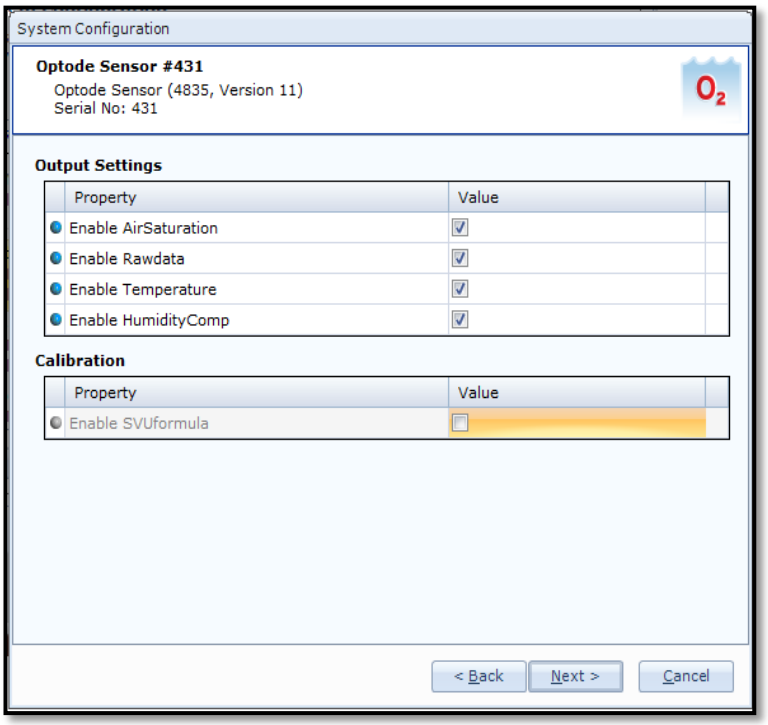



**Figure 3-19 Sensor property settings.**

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.

Example: Pressure data are by default enabled for the pressure sensor. You can select to enable/disable temperature and raw data readings.

To disable the pressure data (without physically disconnecting the sensor), you must remove the sensor from the recording groups.

Set property values (tick to enable). Press "***Next"*** to continue.

A new window displays your changes. Press ***Next*** to confirm changes, and to start the update process (refer **Figure 3-15, 3-16**)

***NOTE! Refer each sensor operating manual for individual settings.***

### 3.3.3 System Overview

The system overview under Device Configuration > System overview provides an overview of the nodes; serial numbers, product number and firmware image version; refer **Figure 3-20**.

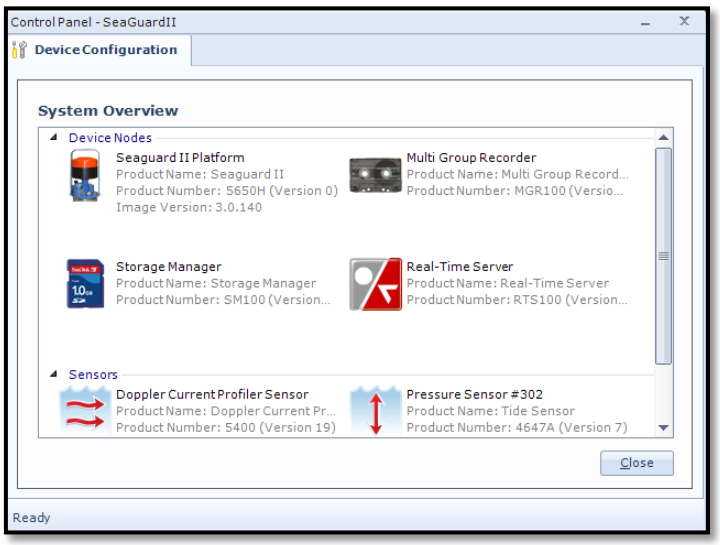



**Figure 3-20: System Overview**

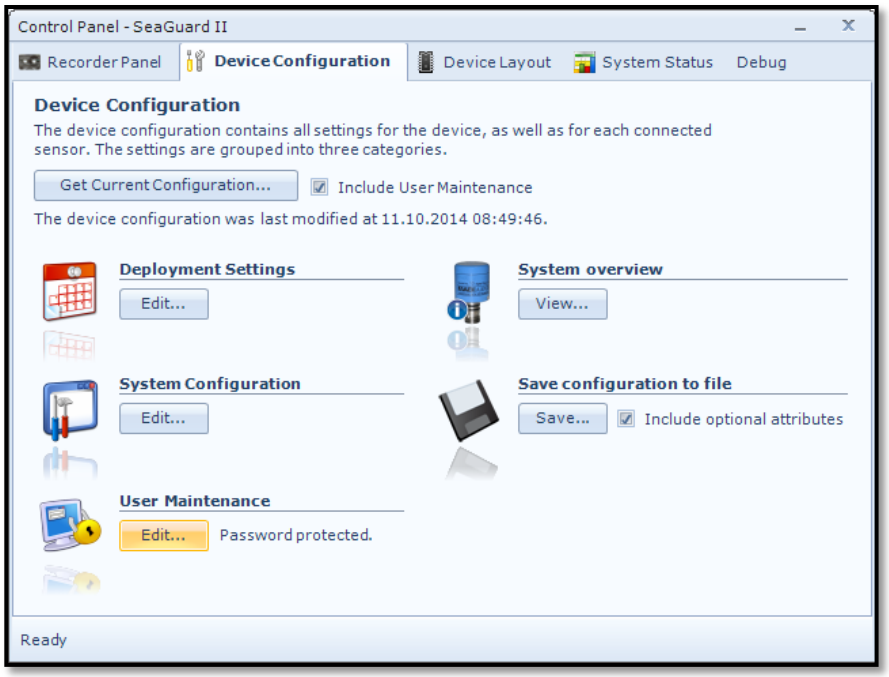
### 3.3.4 Save configuration to file

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.

### 3.3.5 User maintenance

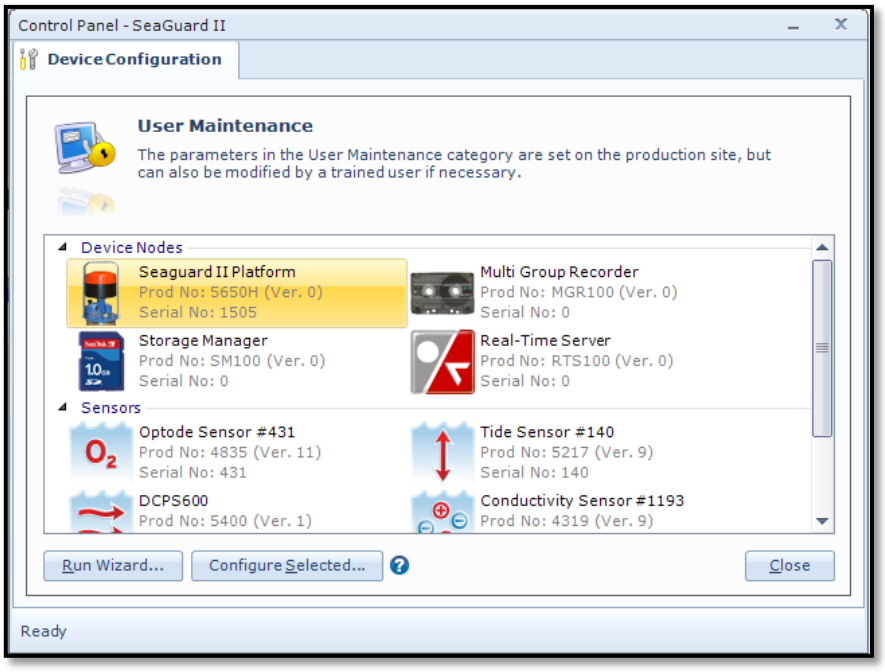
Under ***User Maintenance***, you find properties that are password protected and are set/altered by a **trained** user. These properties are not changed during normal operation. They have been set up at the factory to optimize the instrument performances and **it is not recommended to change properties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




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***

Figure **3**-21 Include User Maintenance




***User Maintenance*** is divided in two categories: ***Device Nodes*** and ***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.

**Figure 3-22 User Maintenance Menu**

***Platform***

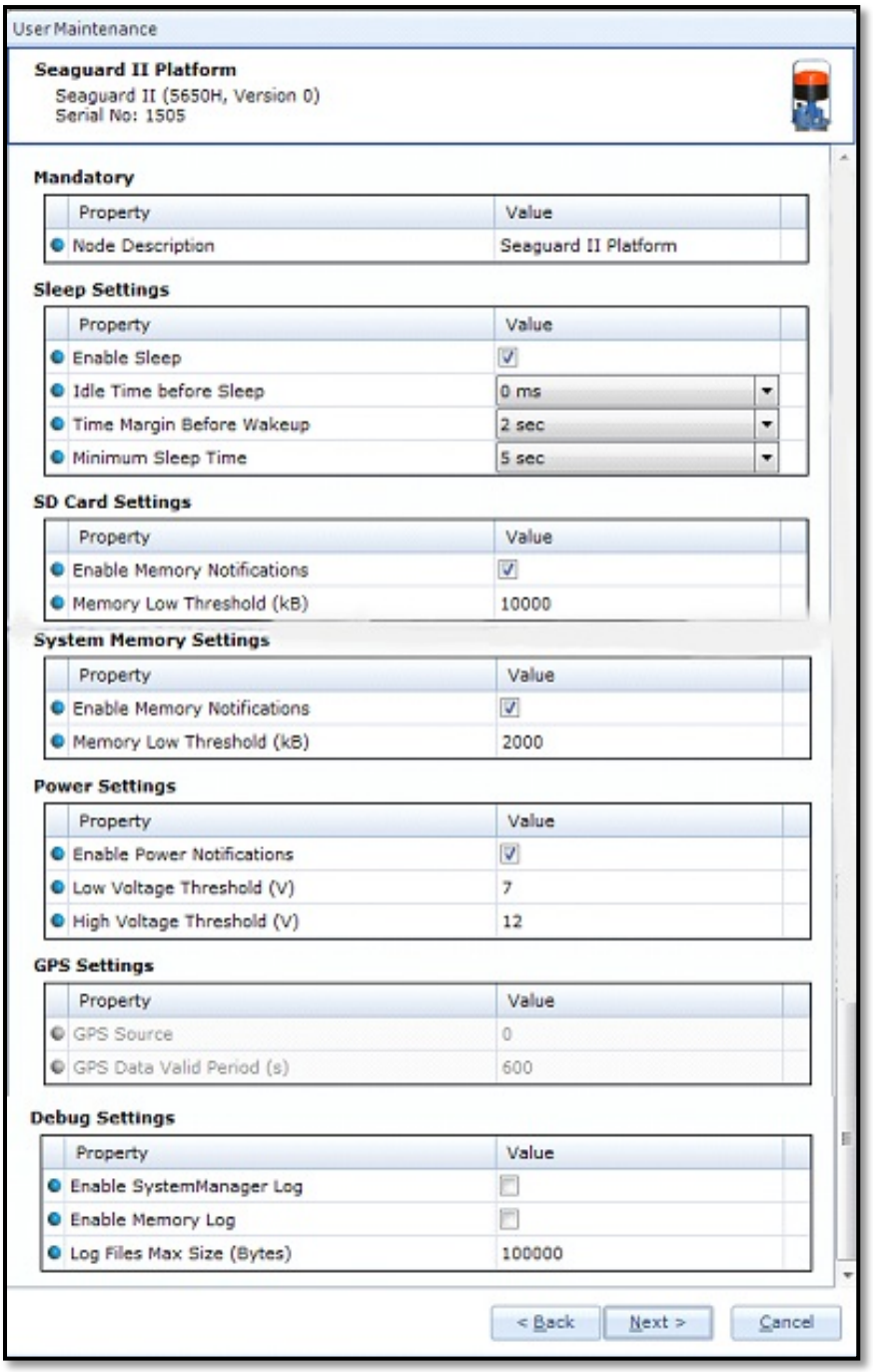


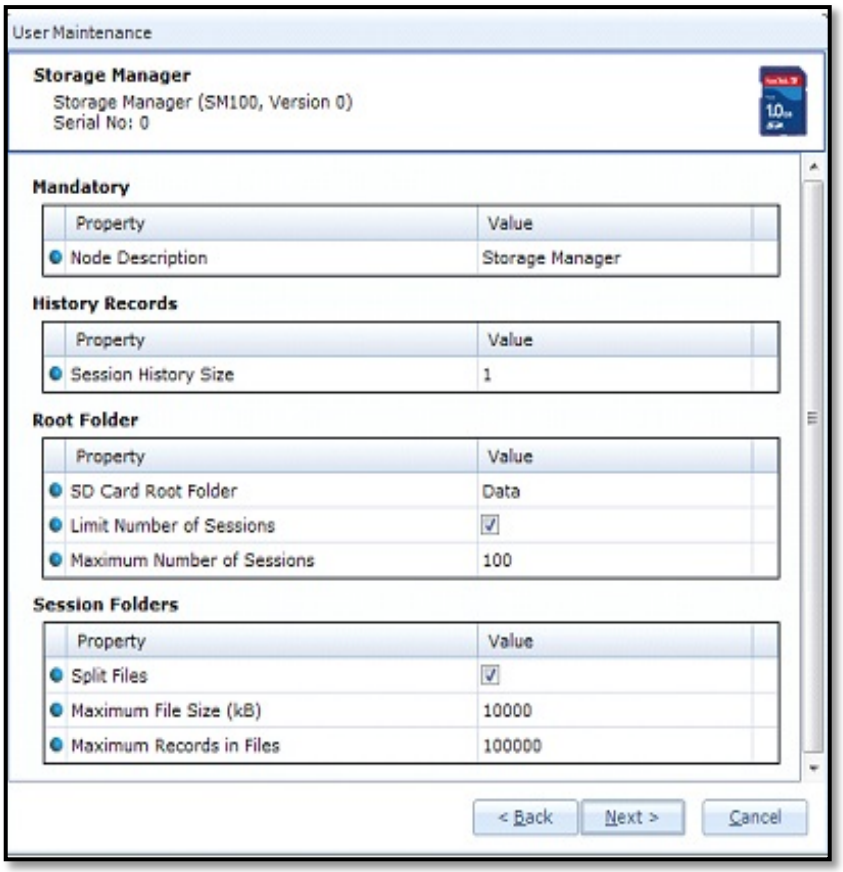

**Figure 3-23 User Maintenance Platform**

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

***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.
***SD Card Settings*** and ***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.
***Power Settings:*** If ***Enable Power Notification*** is selected ***Low Voltage Threshold (V)*** will be the lower limit and ***High Voltage Threshold (V)*** will be the higher limit when a warning is sent.
***GPS Setting:*** Select to include GPS settings if GPS source available.
***Debug Settings:*** For factory use only.

***Storage Manager***

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




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

***History Records: Session History Size*** refers to the buffer storage

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

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

***Session Folders:*** If ***Split Files*** is selected then ***Maximum File Size (kB)*** will be the maximum file size in kB or ***Maximum Records in Files*** will be the maximum size in number of records for each file

**Figure 3-24 Storage Manager**

### *AiCaP Sensors*

Example of User Maintenance available settings for the oxygen optode sensor:

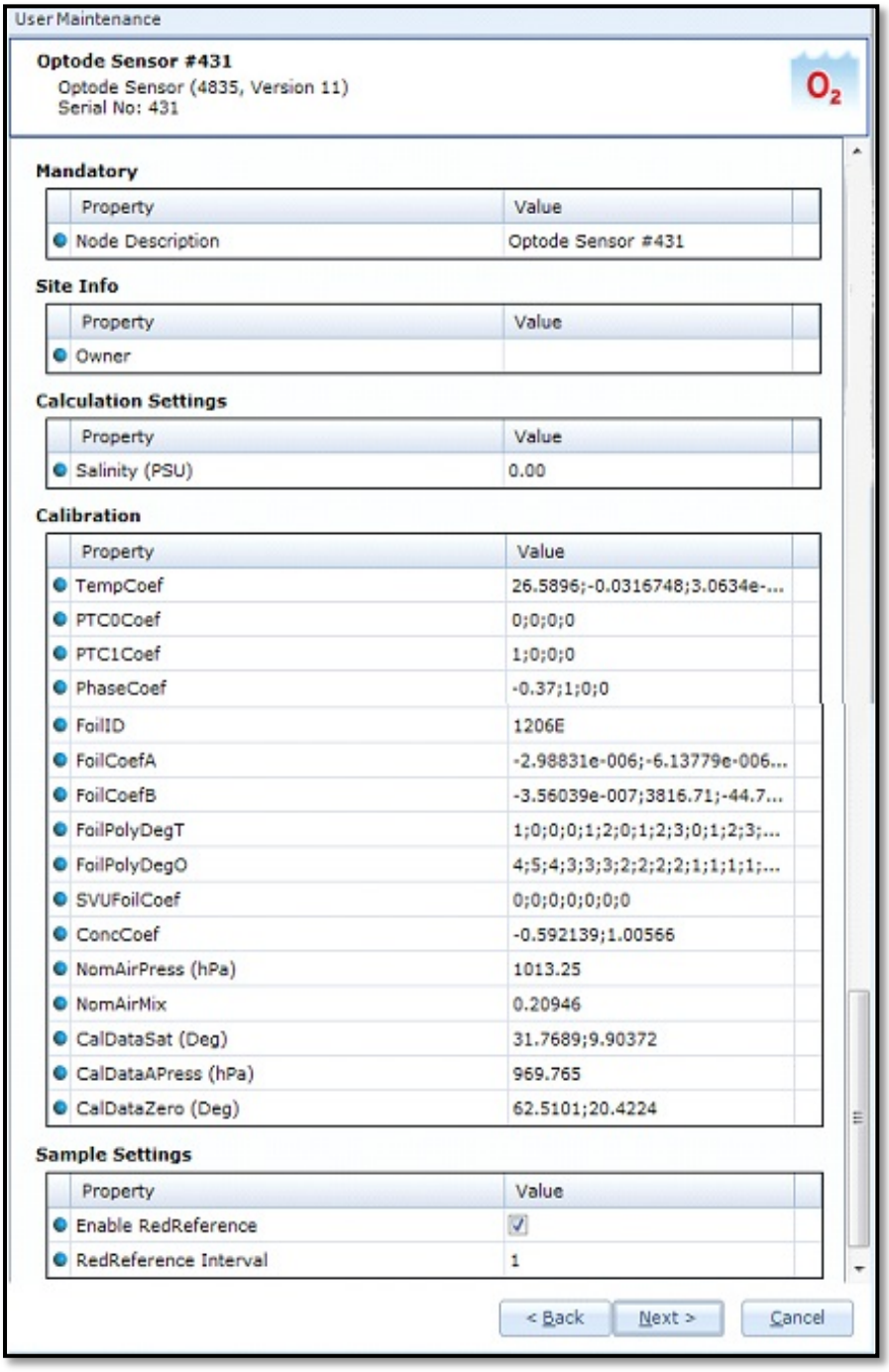


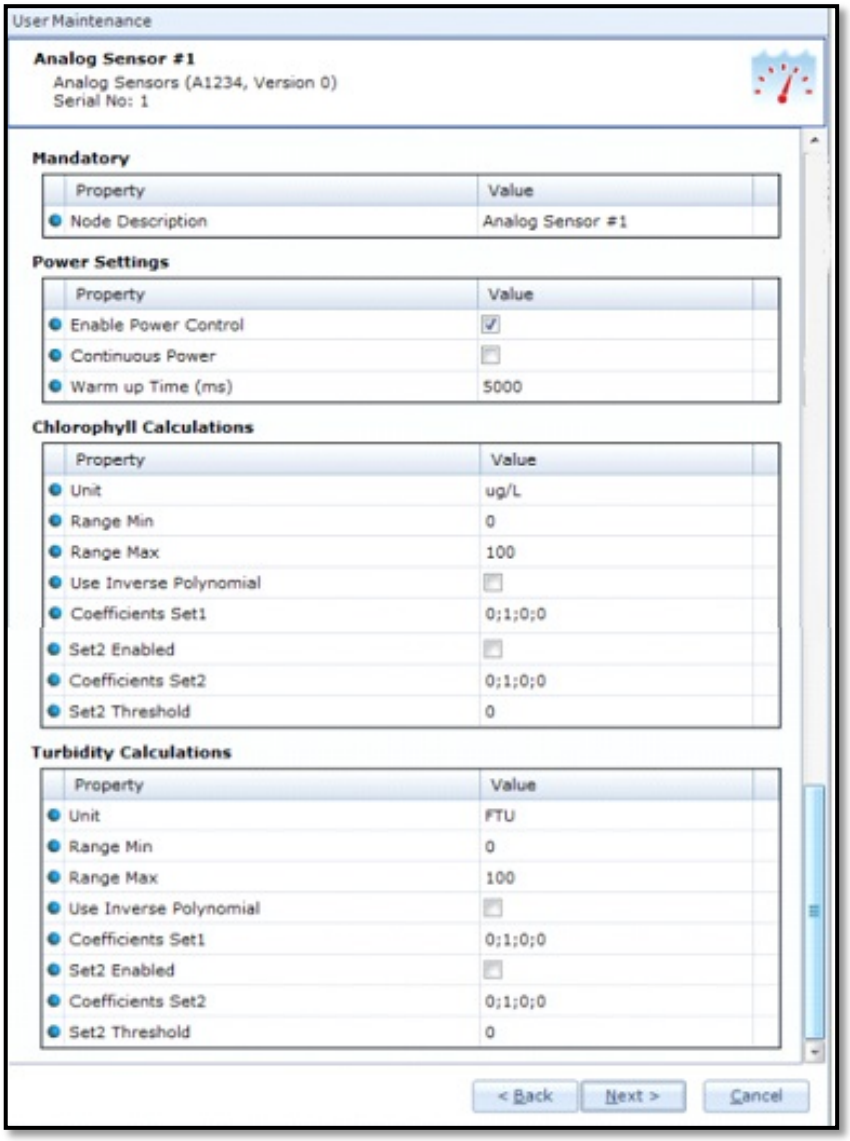

**Figure 3-25 Example of AiCaP Sensor**

***Salinity(PSU)*** is a fixed setting for salinity used to compensate for salinity in the Oxygen calculation.

The Calibration coefficients should normally not be changed unless the sensor is recalibrated. The Foil coefficient must be changed if you change foil to a foil with different batch number.

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

***Analog Sensors***




User Maintenance settings for Analog sensors depend on the type of analog sensor connected and configured under ***Device Layout*** (refer to CHAPTER 5)

***Power Settings:*** When ***Continuous Power*** is selected the 10 V power is kept on continuously during recording.

When ***Continuous Power*** is deselected the selected ***Warm up Time (ms)*** decides when the instrument will deliver power (10V) to the sensor. Select an appropriate value for the ***Warm up Time (ms)***; the value must cover the longest time required by the analog sensors.

The ***Warm up Time (ms)*** is set in this example 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.

**Figure 3-26 Example of Analog Sensor**

***NOTE!***

***Refer each sensor/device operating manual for individual settings.***

## 3.4 System Status

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

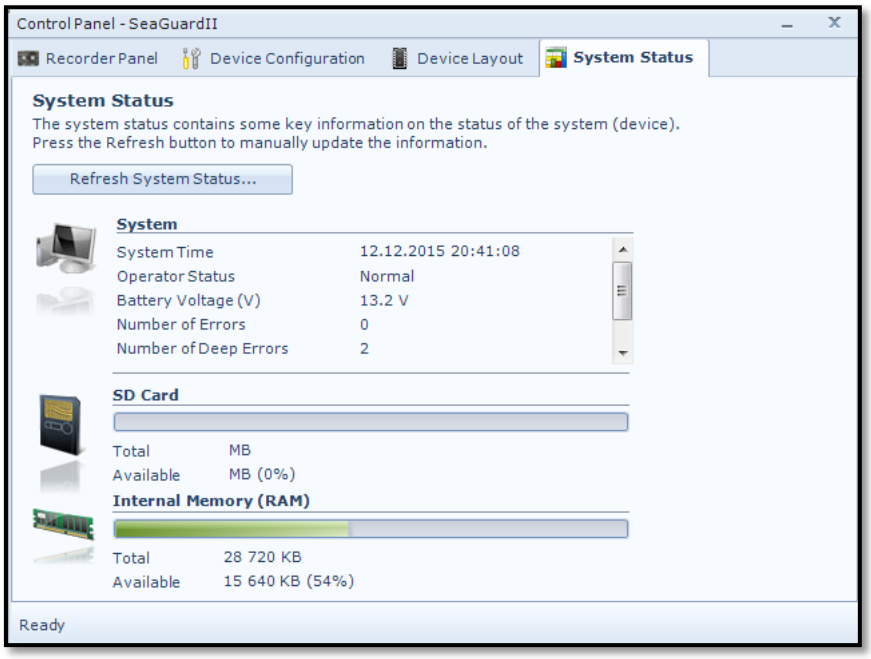
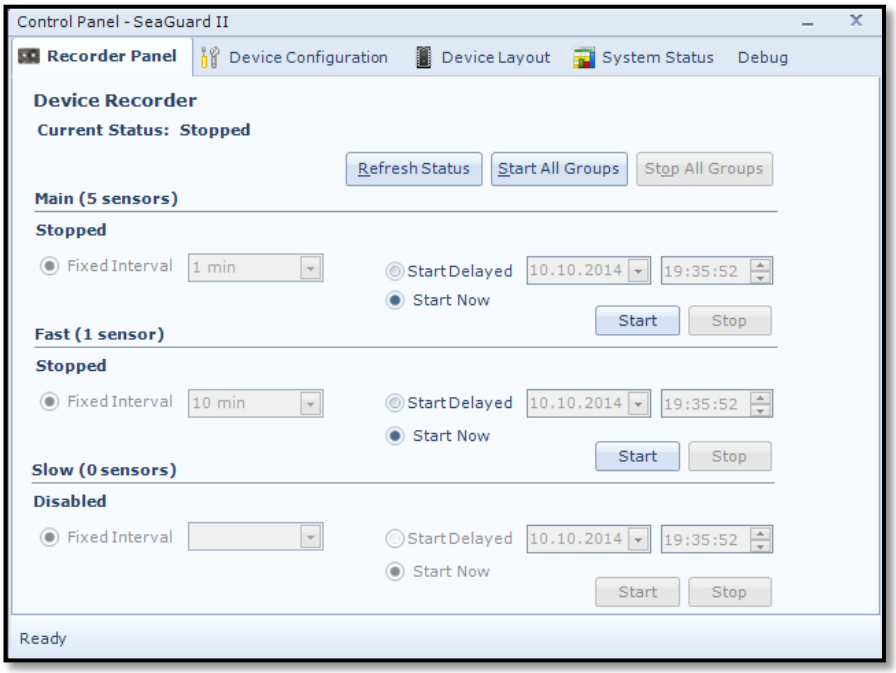



**Figure 3-27: Control Panel > System status**

## 3.5 Recorder panel




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

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

**Figure 3-28: Recorder panel**

The recording session can start at power up if enabled (selected under **Device Configuration > Deployment Settings > Multi Group Recorder**). Recording groups can be started and stopped individually or all together.

By selecting "**Start Delayed**", you can enter the date and time you would like the instrument to start recording. Do not forget to click on Start to activate the start.

NOTE: If you did not select under **Device Configuration > Deployment Settings > Multi Group Recorder "selectable in the recorder panel",** you will not be able to define a sampling interval.

## 3.6 Summary of configuration settings

The configuration steps described in CHAPTER 3.2/3.3/3.4 and 3.5 are summarized in the table 3-1.

**Table 3-1 Overview of configuration settings for SeaGuardII**

| Panel/Heading | Heading | Settings |
|---|---|---|
| **Recorder Panel** | | |
| | | Start/stop recording<br>Set recording interval |
| **Device Configuration** | | |
| Get Current Configuration | | Get current configuration |
| Deployment Settings | SeaGuardII Platform | Type site info |
| | Multi Group Recorder | Place sensors in each group<br>Set recording interval<br>Enable real-time output<br>Enable storing to SD card |
| | Sensors | Sensor deployment settings |
| System Configuration | Real-Time Server | Communication port settings<br>Enable communication properties |
| | Sensors | Enable sensor parameters<br>Set calculation values |
| User Maintenance | SeaGuardII Platform | Sleep settings |
| | Multi Group Recorder | Enable debug file |
| | Real-Time Server | Communication port<br>Transmit/receive settings<br>File compression and transfer |
| | Sensors | Sensor user maintenance settings, typical settings and calibration |
| System Overview | | View image and SW-version |
| Save configuration to file | | Save configuration to file |
| **Device Layout** | | |
| Device Layout | Sensors | Set layout for new sensor |
| | Instrument Setup | View instrument layout |
| Save layout to file | | Save current layout to file |
| **System Status** | | |
| | | View key information like: battery voltage, storage capacity, memory capacity |

## 3.7 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).

## 3.8 Time change

If you would like to adjust the time, in the main window of AADI Real Time Collector, refer **Figure 3-29**. Under Device Information click "***Advanced…***" and then "***Time Sync…***"

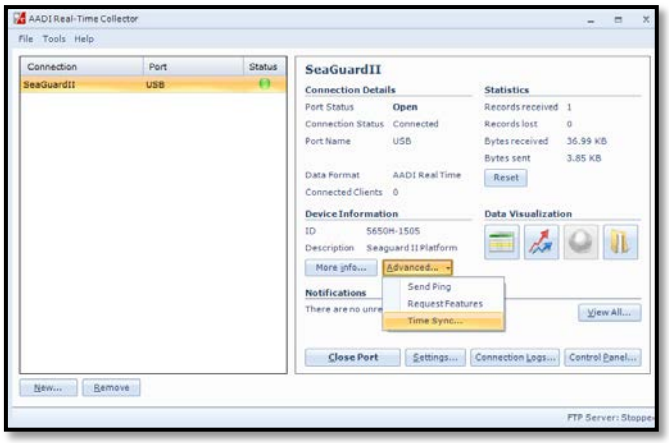



**Figure 3-29; access Time Sync functionality**

Select Device Time and if you would like to adjust the time forward or backward, note that you need to enter the time in milliseconds. Refer **Figure3-30.** Then click on **"*Set Device Clock*"**

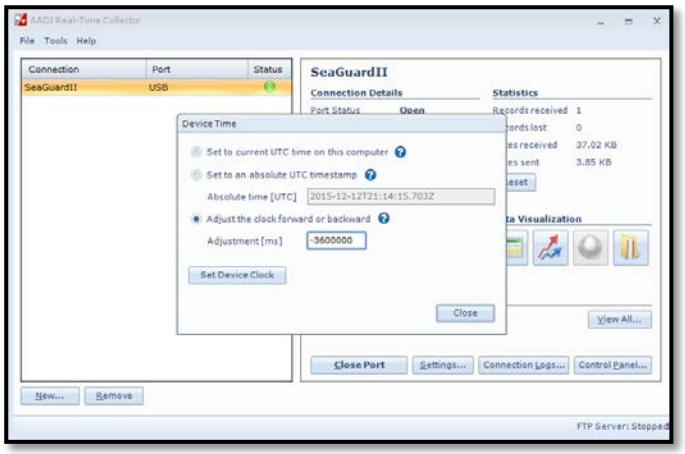



**Figure 3-30: Set device Time**

To check that the time is correct, open ***Control Panel > System Status***, click **"Refresh System Status…"**, under System it is indicated the system time (refer **Figure3-31**)

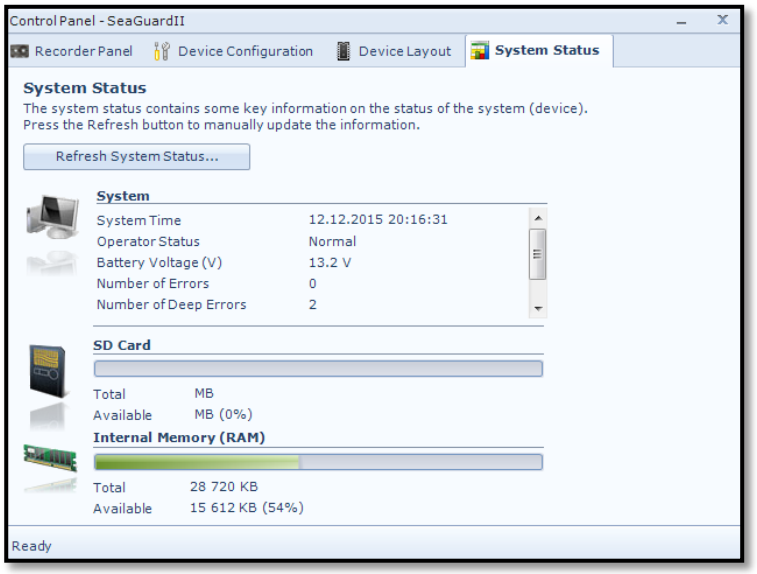



**Figure 3-31: Check the time in the System Status**

# CHAPTER 4 Real time configuration

## 4.1 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

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

For connection between the PC and the SeaGuardII, use watertight connection cable 4784C and real-time cable 5071/5072; 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 4-1 SeaGuardII with Real-Time cable**

## 4.3 Establish contact with SeaGuardII using the AADI Real-Time Collector via real-time cable

- Connect SeaGuardII to the PC (Com port)
- Start AADI Real-Time Collector, refer TD 268 AADI Real-Time Collector Operating Manual
- Press ***New*** and write a name in the ***Connection Name*** box (only necessary at first connection)
- Select ***Serial Port*** from the ***Port Settings*** drop down menu
- Select the correct COM port from drop down list
- Select the baud rate; the defautls baud rate is 115200. Select a baud rate in the range 2400 to 115200 (the baud rate must equal the receiver band e.g. the AADI Real-Time Collector)
- Press ***OK***
- Press ***Open Port*** and the connection to the SeaGuardII should be established within a few seconds (If not then check that correct COM port and port settings are used)

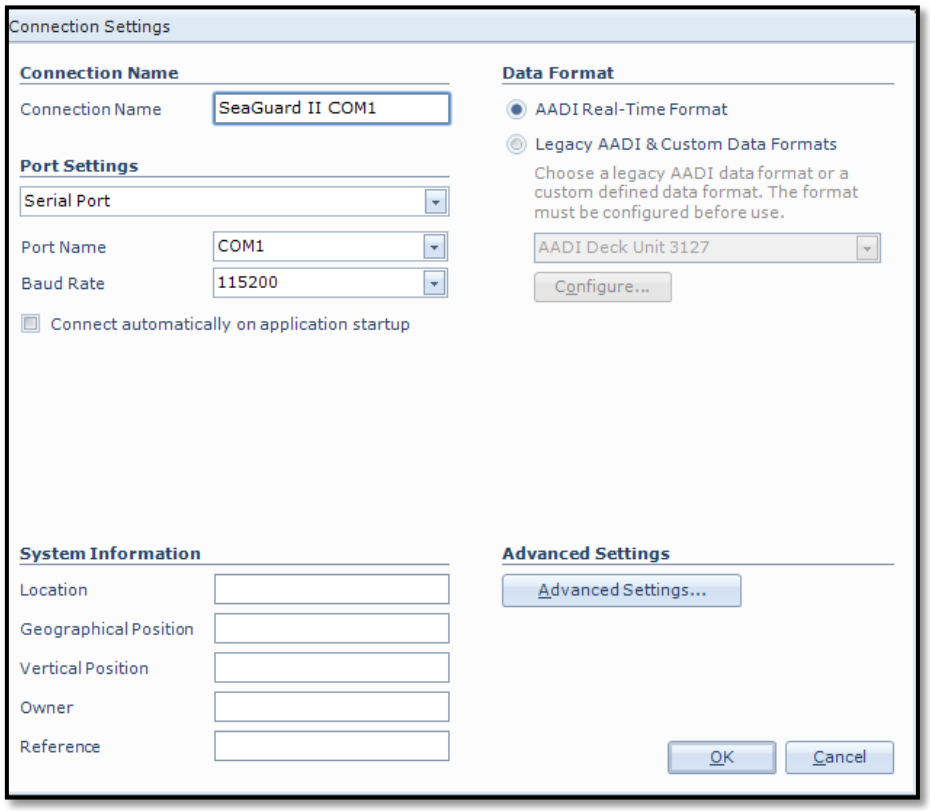
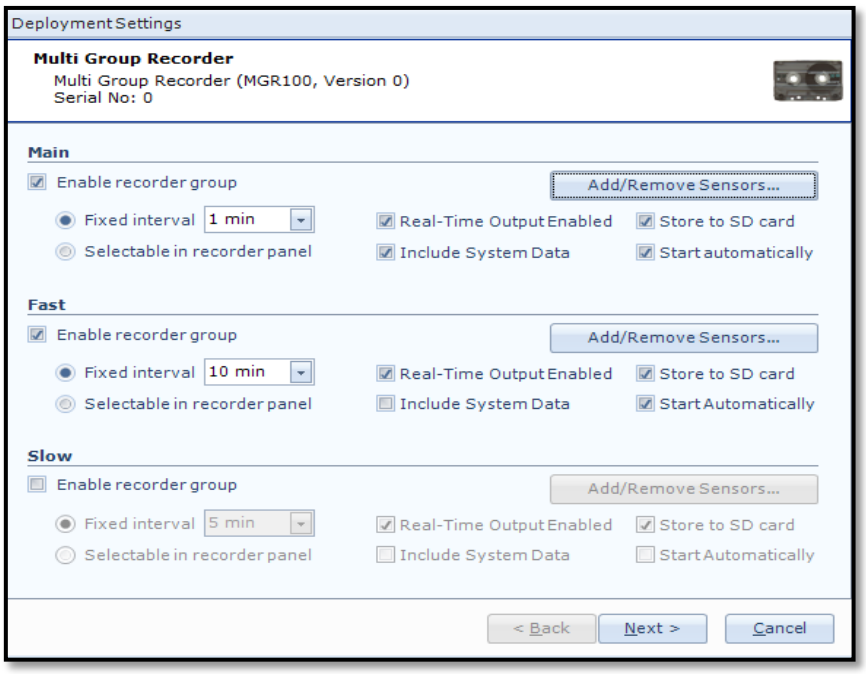



**Figure4-2 Connection via Serial Port**

Once the connection is established, you can configure the instrument as instructed in CHAPTER 3.

## 4.4 Enable real time data – Multi Group Recorder

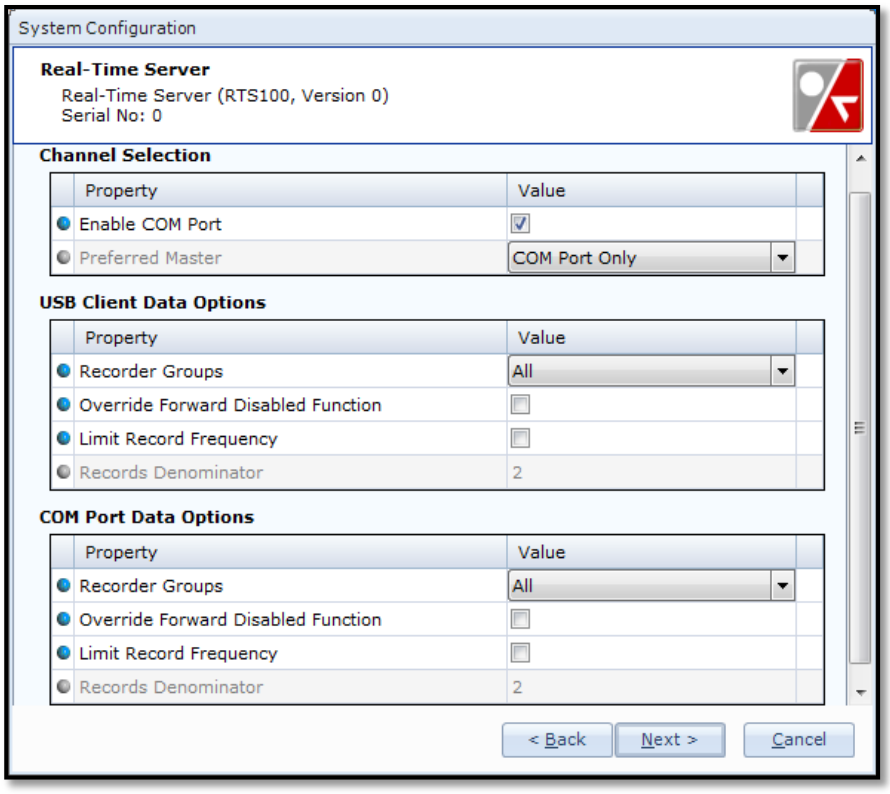



Under ***Device configuration > Deployment Settings > Multi Group Recorder***

Select ***Real-Time Output Enabled*** if you want data from this group to be transmitted in real time

**Figure4-3: Real time output enable in Multi Group Recorder**

## 4.5 Real-Time Server specifications




Open ***Device Configuration > System Configuration > Real-Time Server***.

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

***USB Client Data Options*** refer to real time data sent through the USB connection

**COM Port Data Options** concerns data sent in real time through COM port

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

**Figure 4-4 Real-Time server**

***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 (either through USB if selected under the USB Client Data Options or COM port if selected under COM port data options).

***Limit Record Frequency*** gives you the opportunity to not transmit every record in real-time. If the ***Record Denominators*** is set to 2, every second record will be transmitted but all records will be stored to SD card if enabled. ***COM Port Data Options*** refer to real time through serial connection.

## 4.6 Real-Time Server transmission

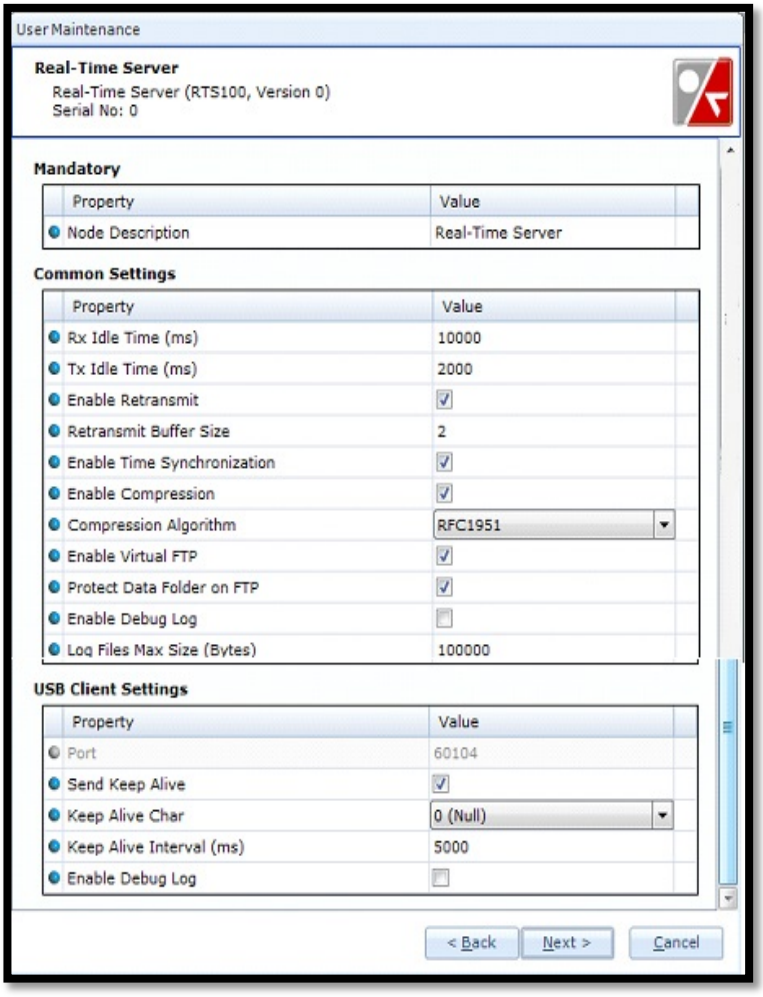



**Figure 4-5: Real-Time Server**

Open ***Device Configuration > User Maintenance > Real-Time Server (Password=1000)***

***Common Settings:***

***Rx Idle Time*** is the required time before entering sleep after receiving.

***Tx Idle Time*** is the time communication is possible after transmitting.

If ***Enable Retransmit*** is 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 enable 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.

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

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

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

## 4.7 SeaGuardII used with the Doppler Current Profiler Sensor; requirement for ElectroMagnetic Compatility 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.

In order 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.

### *4.7.1 Underwater/Buoy systems*

A common mode line filter (PN 0975519) on the power lines has to 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 has to 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.

### *4.7.2 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 sea side cable and land side cable needs a good connection to the chassis of the box.

Surge current 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.

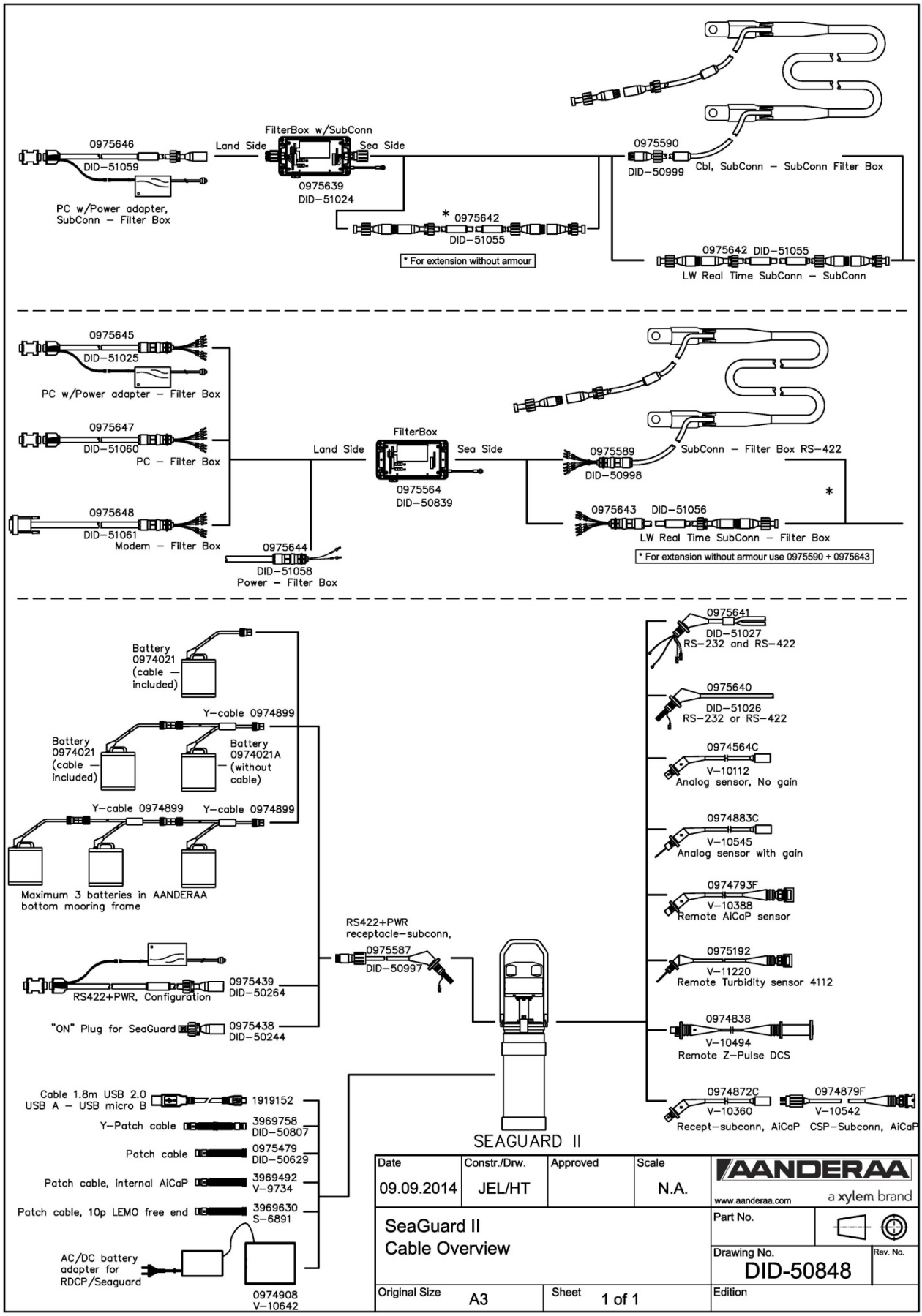



**Figure 4-6: SeaGuardII cable overview**

# CHAPTER 5 Connecting new sensors, modem, and auxiliary devices

You can connect all Aanderaa sensors, including subsea and meteorological sensors (except VR22/SR10 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 must have 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 must specify sensor deployment settings.

- 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:

  1. ***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.
  2. ***User Maintenance***; which holds device specific information like description, calibration coefficients, power settings and AD channel names.
  3. ***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.

## 5.1 Device layout

Open ***Control Panel > Device Layout***.

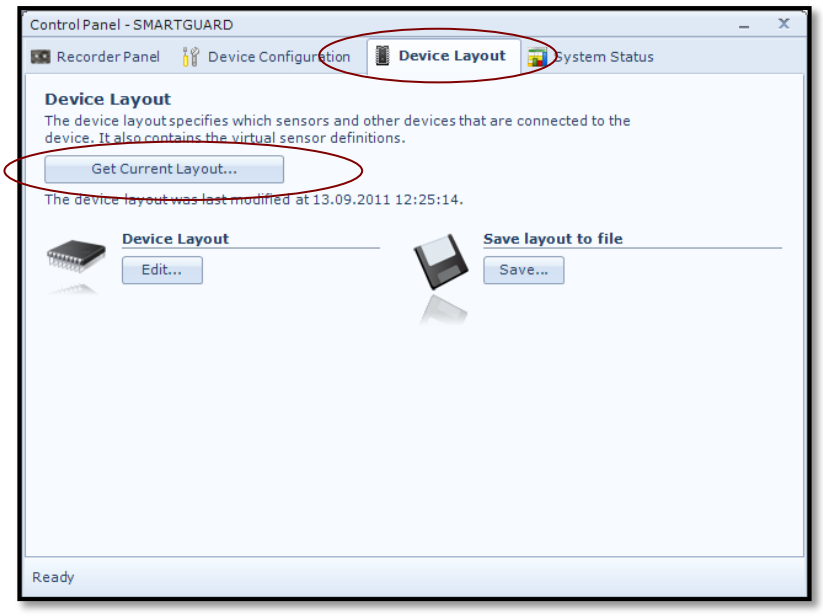



**Figure 5-1 Device Layout panel.**

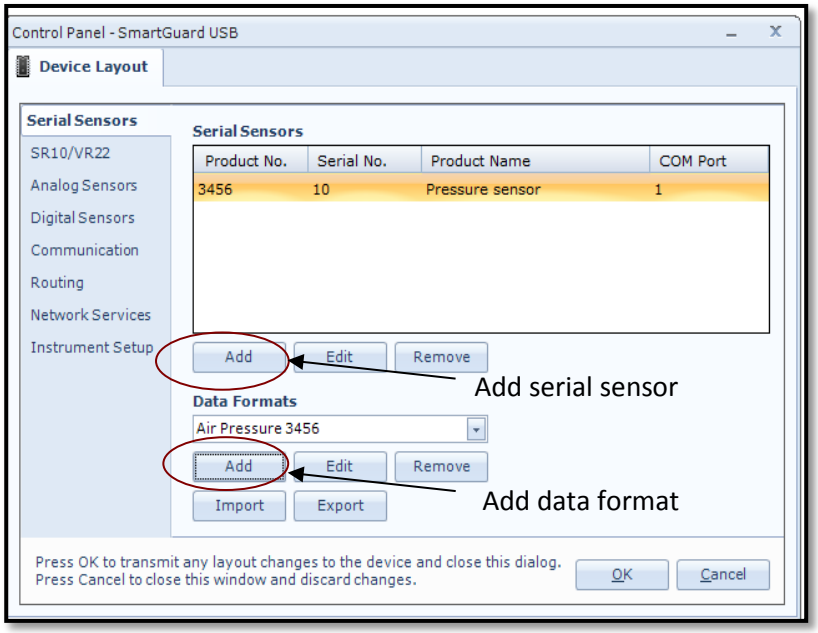
Select the ***Device Layout*** tab, and press "***Get Current Layout...***". ***Note! The password is: 1000***
Select ***Save layout to file*** and press ***Save…*** to save current layout to file.
Select ***Device Layout*** and press "***Edit…***" to add new sensors/modem or edit existing layout. Refer Chapter 5.2 to 5.6 for a description of layout for different type of sensors and modem:

- Serial sensor
- Analog sensor
- Communication
- Router

## 5.2 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. Refer following chapter to continue when the data format is defined.
- If not, 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***.

***IMPORTANT!***
***Refer the sensor operating manual for configuring the sensor to present an output that subsequently can be defined Refer also chapter 5.2.1.***

**Figure 5-2 Serial sensor layout.**

### 5.2.1 Specifying a data format for the serial sensor

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

**Data format description:**

Serial sensors transmit their data as an ASCII text string. In order to interpret this string SeaGuardII needs to know the format, which particular value 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 particular sensor's operator's 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 on the SeaGuardII under **Device Layout > Serial sensors > "Add…"** under **data format**, the '***New Custom Data Format'*** dialog box opens, refer **Figure 5-3**. The format 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** (refer **Figure 5-3**) 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.

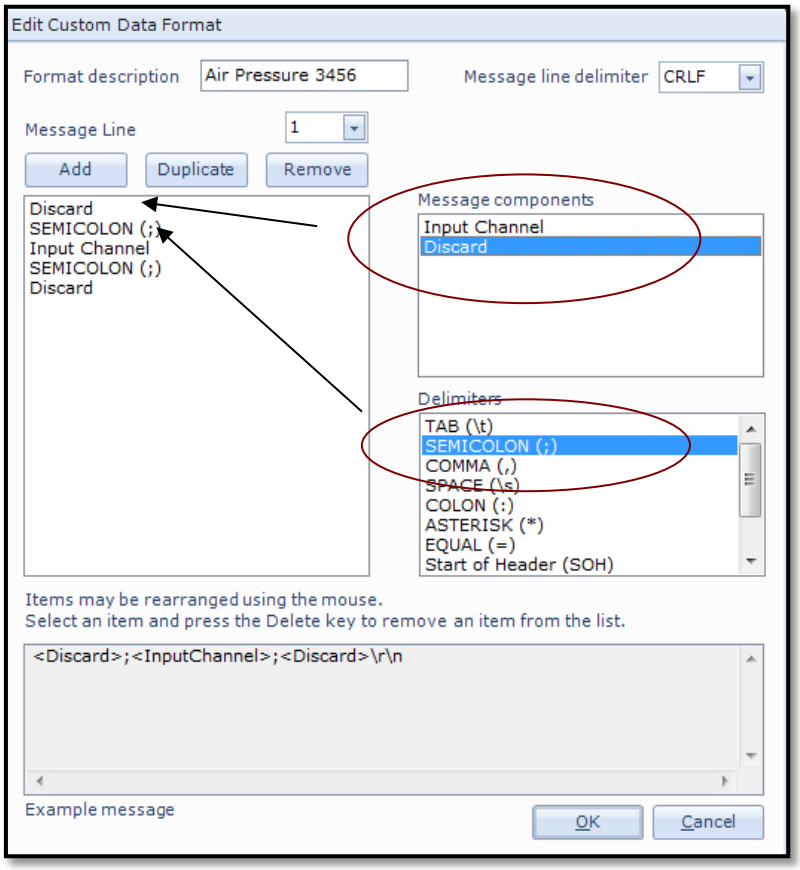
The ***Input Channel*** component matches actual data values from the device.

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 build up from elements in the ***Message components*** list and the ***Message 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.

**Figure 5-3 Specifying serial sensor data format.**

### 5.2.2 Serial sensor layout

***Note! The sensor data format must be defined before you perform sensor layout. Refer chapter 5.2.1 for a description of specifying a data format. Refer the sensors operating manual for sensor specific parameters. Refer TD 268 for more details about sensor layout using AADI Real-Time Collector.***

**General description:**

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

SeaGuardII supports both RS232 and RS422 sensors; COM1, RS-232 and COM2, RS-422 can be set for either of the two. Be sure to use what is required for the actual sensor.

In order to save power SeaGuardII controls the power for each individual sensor. The serial sensors can be powered through pin 9 in the DSUB connector or through the separate M12 connector adjacent to the DSUB connector if higher currents are drawn by the 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.

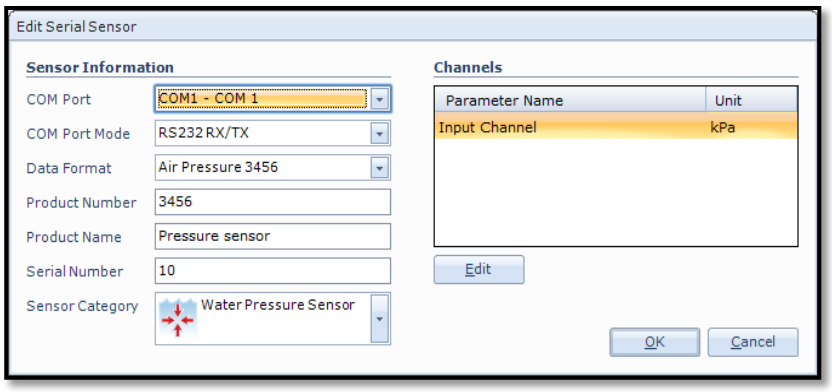



**Figure 5-4 Edit serial sensor information.**

Press "***Add"*** below the list of serial sensors, refer Figure 5-2, and enter serial sensor information as shown in **Figure 5-4**.

To edit an existing sensor layout:

- Select the sensor from the list
- Press ***Edit*** below the list of serial sensors to edit existing layout (refer **Figure 5-5**)

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

- Select the right ***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
- Type the product number and 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*** to complete, or ***Cancel*** to exit without updating changes.
- SeaGuardII will restart automatically when you press OK and the layout is changed.

***IMPORTANT! Refer next chapter for a description of completing the sensor configuration.***

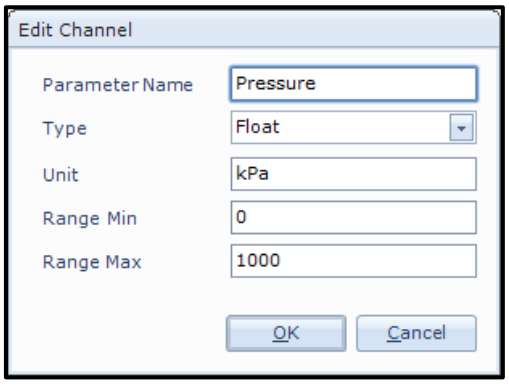



**Figure 5-5: Edit channel**

### 5.2.3 Completion of serial sensor configuration

- Restart SeaGuardII to update sensor layout in the system
- Open AADI Real-Time Collector > ***Device Configuration*** and press "***Get Current Configuration…"*** New added sensors are now included
- Select "***User maintenance"*** settings: open ***Device Configuration*** tab, check ***Include User Maintenance*** and press "**Get Current Configuration…"** then press "***Edit.." (password=1000)***. in the User Maintenance heading, select the actual sensor in the sensor list and press "**Configure Selected…"**. Refer **Figure 5-6 User Maintenance > sensor** and Table 5-1 for a description of settings; refer TN 362 for some sensor examples.

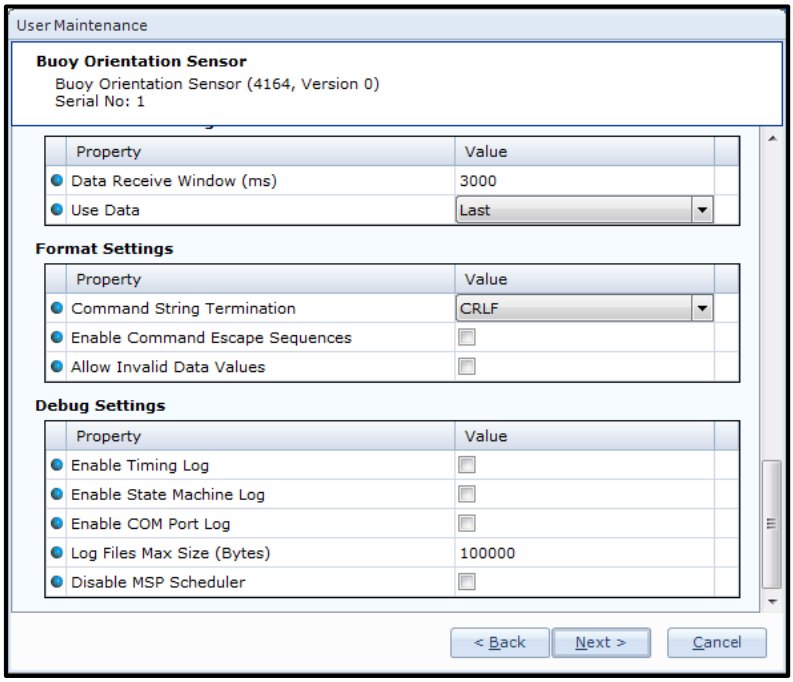



**Figure 5-6 User Maintenance > sensor**

- Under ***System Configuration*** to enable sensor output parameters: Refer chapter 3.3.2 for a short description: open ***Device Configuration*** tab, and press "***Edit…"*** in the System Configuration heading.
- Add the sensor to the correct recording group, refer chapter 3.3.1.

**Table 5-1 User Maintenance settings for Serial sensors. Some settings are not applicable for all sensor applications; please refer your sensor operating manual.**

| **Property** | **Comment** |
|---|---|
| **Mandatory:** | |
| Node description | Type a description. Default is product name and serial number |
| **Port Settings:** | |
| Baud Rate | Set appropriate value for the sensor |
| Data Bits | Set appropriate value for the sensor |
| Stop Bits | Set appropriate value for the sensor |
| Parity | Set appropriate value for the sensor |
| Flow Control | Set appropriate value for the sensor |
| **Wake up Settings:** | |
| Enable Wake up Control | Check if a wakeup char is required to put the sensor into operation |
| Wake up Char | Select a wakeup character |
| Wake up Char Delay (ms) | Type the delay time (0ms – 1000ms) |
| **Power Settings:** | |
| Enable Power Control | Enable SeaGuardII to control sensor power. |
| Continuous Power | Check if continuous power is required |
| Warmup Time (ms) | Set the time required from power up until the sensor is ready |
| Minimum Power off Time (ms) | Set value for minimum time power needs to be off before repowered |
| Enable Soft Start | Enable Soft Start to increase power slowly to full power setting |
| Soft Start Time (ms) | Type the time needed for soft start |
| **Sensor Session Settings:** | |
| Enable Session Control | Check to enable session control |
| Start up Command | Type a command to be transmitted after each recording start |
| 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 |
| **Polled Data Settings:** | |
| Enable Poll Data Control | Check to enable polled data |
| 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 | Command to stop sensor from output data |
| **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) |
| **Debug Settings:** | |
| Enable Timing Log | Check to enable |
| Enable State Machine log | Check to enable |
| Enable COM Port Log | Check to enable |
| Disable MSP Scheduler | Check to disable |

NOTE: ***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 Bit***: 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.

## 5.3 Analog sensors

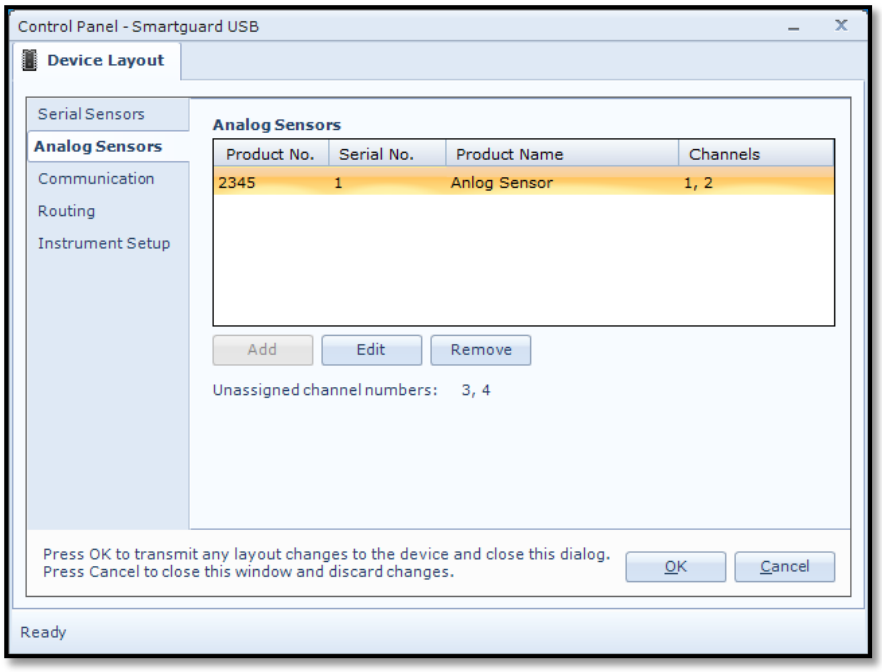



**Figure 5-7 Analog Sensors.**

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 polynomial as shown in the figure below. Using two polynomials is suitable when the sensor has different calibration for lower and upper range, refer **Figure 5-8**


**Figure 5-8 Two polynomials analog sensor**

### 5.3.1 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 list of analog sensors (**Figure 5-7**), and enter analog sensor information as shown in **Figure 5-9**. Press "***Edit"*** to change existing layout.

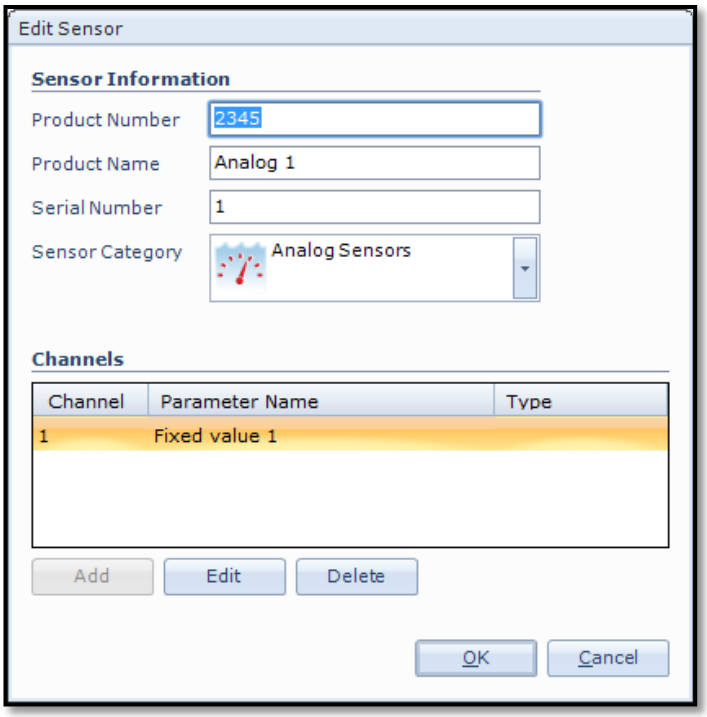



**Figure 5-9 Edit Sensor.**

**Procedure for Analog Sensors layout:**

- Type the manufacturers' product number and name
- Type the actual sensors serial number, and select an appropriate icon from the 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.

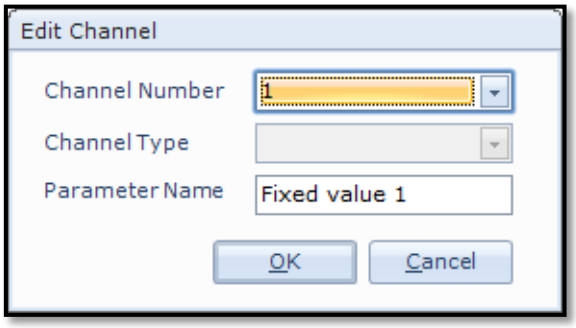



**Figure 5-10 Edit Channel.**

In the ***Edit Channel*** dialog: Select the ***Channel Number*** (from the drop down list) on which the actual signal is connected. Refer the pinout of the connector and the cable used to attach this particular sensor

Type the ***Parameter Name***; 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.***

Press "***OK"*** to complete, or "***Cancel"*** to exit without updating changes. SeaGuardII will restart automatically when you press OK and the layout has been changed.

***IMPORTANT! Refer chapter 5.3.2 for a description of completing the sensor configuration.***

### 5.3.2 Completion of analog sensor configuration

- Under ***User maintenance*** settings: **to define** the properties necessary to operate the sensor in accordance with the way the user has chosen to apply the actual sensor: open ***Device Configuration*** tab, check ***Include User Maintenance*** and press "***Edit..." (password = 1000)*** in the ***User Maintenance*** heading. Refer Table 5-2 for a description of settings.

- Under ***System Configuration*** to enable sensor output parameters: Refer chapter 3.3.2 for a short description: open ***Device Configuration*** tab, and press "***Edit…"*** in the ***System Configuration*** heading.

- Check desired output: ***Average***, ***MinMax*** and ***TimeSeries***. The latter will include statistics into the recorded dataset.

- Add the sensor to the correct recording group.

**Table 5-2 User Maintenance settings for Analog sensor.**

| **Property** | **Comment** |
|---|---|
| **Mandatory:** | |
| Node description | Type a description. Default is product name and serial number |
| **Power Settings:** | |
| Continuous Power | Check if the sensor needs to be constantly powered |
| Warmup Time (ms) | Set value |
| **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 |
| Coefficients Set1 | *Type* polynomial coefficients for Set 1. Refer explanation in the beginning of the chapter |
| Set2 Enabled | Check if a second polynomial is to be used |
| Coefficients Set1 | *Type* polynomial coefficients for Set 2. Refer explanation in the beginning of the chapter |
| Set2 Threshold | *Type* the Set2 Threshold value for the point above which the second polynomial shall be used |

## 5.4 Communication: set up modem, GPS, auxiliary device

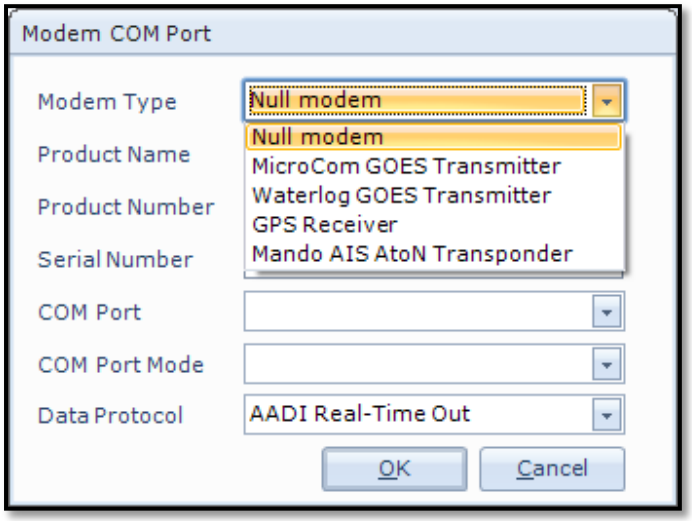



**Figure 5-11 Modem settings.**

Open ***Communication*** in the ***Device Layout***.

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

Enter device information:

- Modem type, Product name and number, 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@@@@@@@@@@@@@@@@@@@@PGQDBrKS
uCBE~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.

## 5.5 Routed device configuration

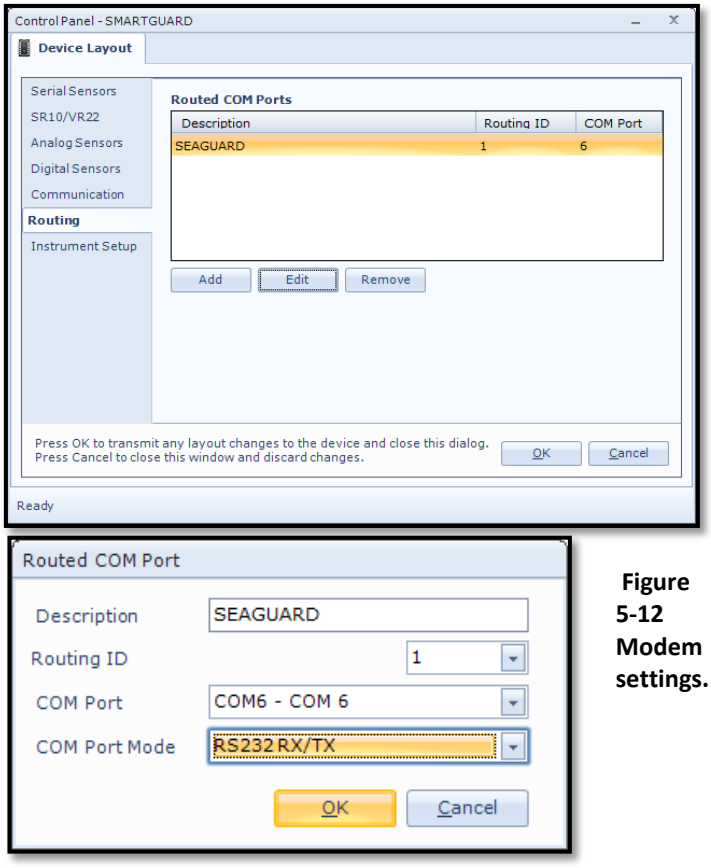



**Figure 5-12 Modem settings.**

Press "***Add"*** below the list of ***Routed COM Ports***, refer **Figure 5-12**.

Enter device information:

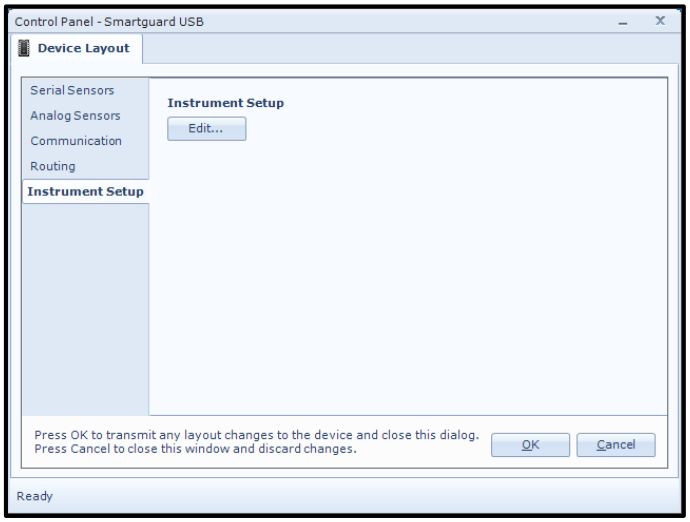
- Type a description
- Set the routing ID. The number will ID the connection in Real-Time Collector.
- Set the COM Port number that the routed device is connected to.
- Select the COM Port Mode

***Note! Perform required settings in user maintenance 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.

## 5.6 Instrument setup




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

**Figure 5-13 Instrument layout**

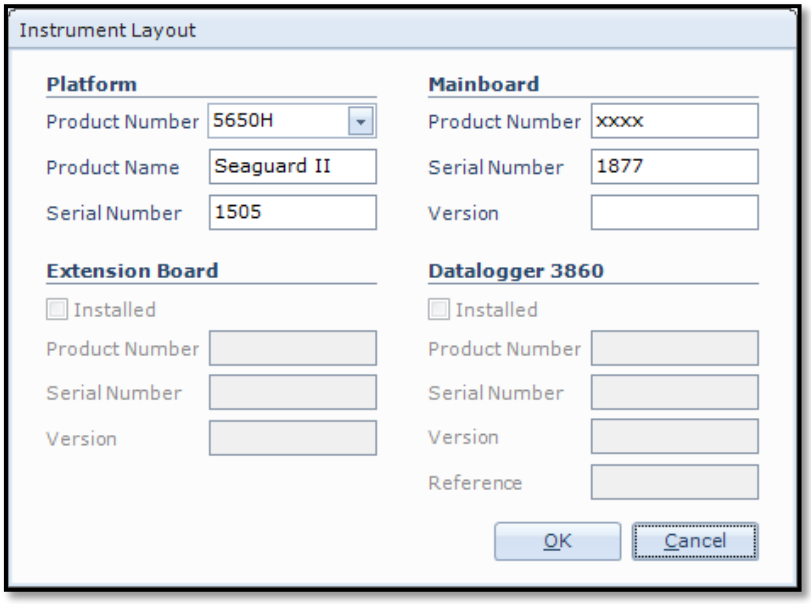



**Figure 5-14 Instrument layout**

# CHAPTER 6 Real-time data and file data storage

Data received by the AADI Real-Time Collector are distributed to overlaying applications like e.g. AADI's GeoView. GeoView 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 (For data coming from the DCPS, refer to the TD 304 Operating Manual for the DCPS)

- ***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. Refer Chapter 6.1 for a short description of text viewer.
- ***Chart viewer*** displays sensor data in a chart. The chart drawing can include buffered data. Incoming data append as new data messages arrive. Refer Chapter 6.2 for a short description of chart viewer.

## 6.1 Text Viewer

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

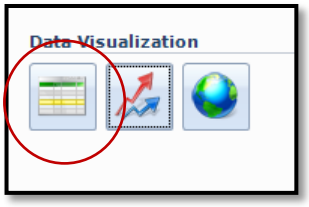



**Figure 6-1 Text viewer.**

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

- ***Connection***: Not in use when the Text Viewer is opened from the Collector.
- ***Recorder Group:*** select all or individual SeaGuardII recording group data to view.
- ***Style sheet***: The selected style sheet determines the layout of the view. New style sheets may be added; unused style sheets may be removed (xlst format).
- ***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.
- ***Chart View*****:** Not in use when the Text Viewer is opened from the Collector.

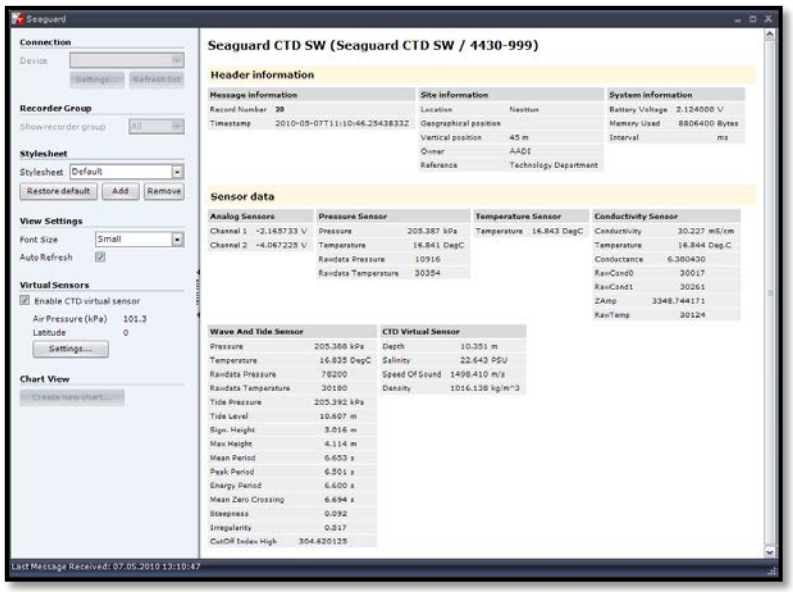
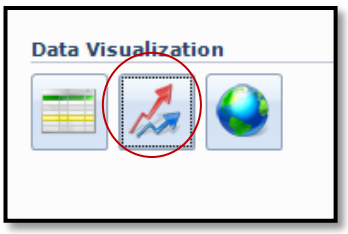



**Figure6-2 The Text Viewer.**

## 6.2 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**)

**Figure6-3 Chart viewer.**

Select data for 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* or *Discard the current message buffer*. Press ***OK*** to save the settings and open the chart window.

The chart is automatically updated as new data messages arrive.

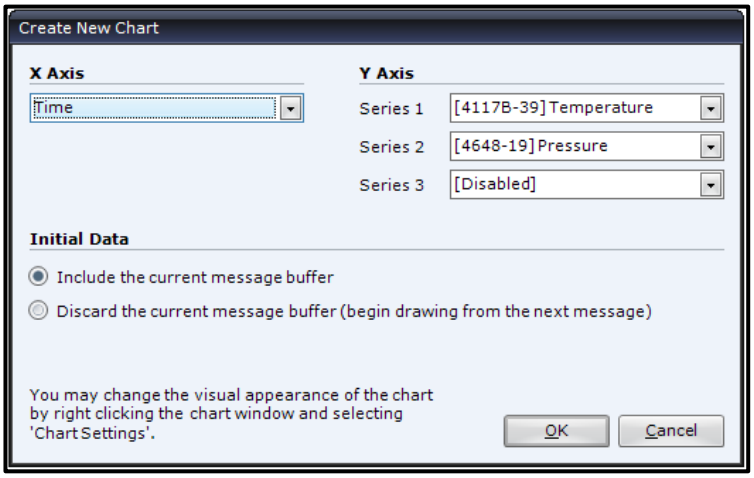



**Figure6-4 Create a new chart view.**

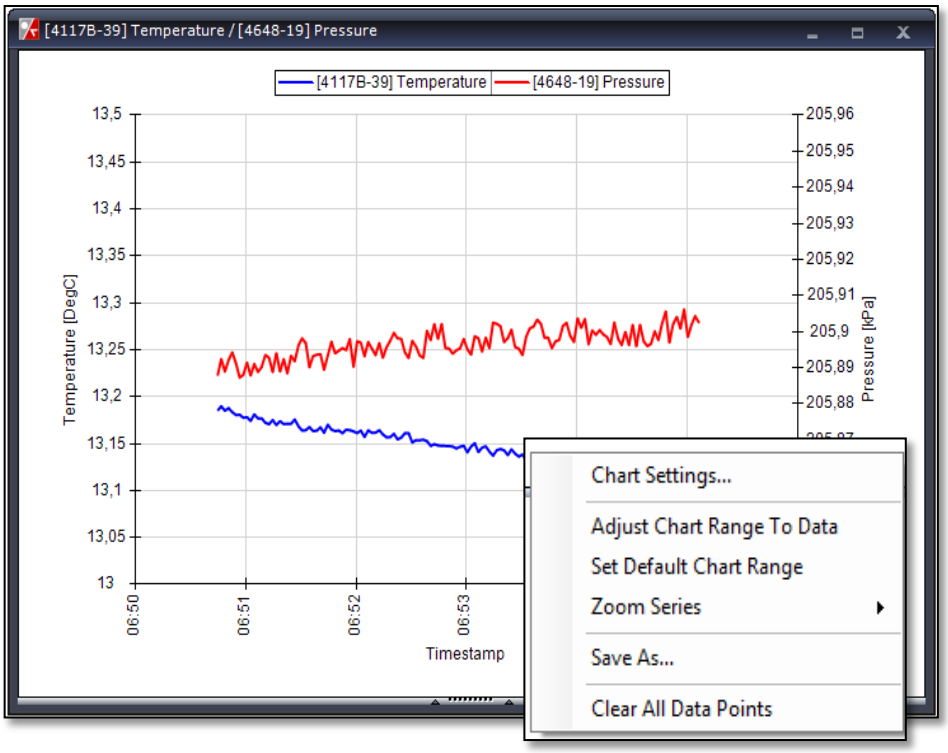



**Figure6-5 The chart window.**

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

- ***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 a large number of 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.
- ***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.

## 6.3 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, refer chapter 3.3.1, under ***Multi Group Recorder***.

SeaGuardII stores one data file for each recording session and each recording group. To subsequently view and analyses the recorded data use *AADI Real-Time Data Format Converter* to convert the data file(s) into excel format and use Excel.

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).

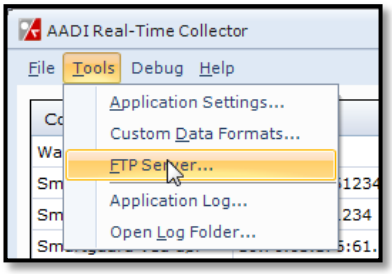
**Event log data storage on SD card**

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

## 6.4 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.

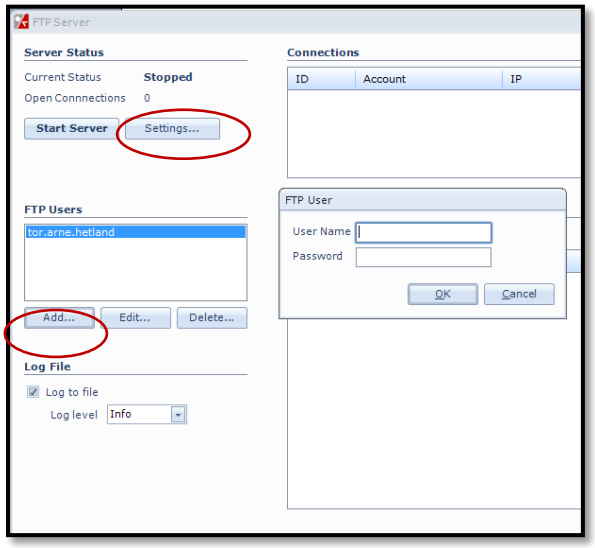
### 6.4.1 Setting up SeaGuardII for FTP in Real-Time Collector




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.

Press ***Add*** in the ***FTP Users*** heading and assign a user name and password to the account, refer **Figure6-6**.




Press ***Settings*** in the Server Status heading to configure the FTP server. Usually the default settings can remain unchanged (**Figure6-7**): Settings for FTP server

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

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

**Figure6-6 Add FTP Users account.**

### 6.4.2 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.
**If you want to use Internet Explorer you need to do a minor change in the default configuration of IE.:**

- Open Internet Explorer
- In the Tools menu, select Internet Options
- In the new dialog, select the Advanced tab
- In the settings list, there is a sub-section called Browsing. One of the last entries in this section is “Use Passive FTP”. ***Note! Make sure that this checkbox is un-checked***
- Click OK to store the settings

You should now be able to use IE as FTP and also use IE’s possibility to transfer the opened FTP connection to a standard Explorer window.

# CHAPTER 7 Operating Instructions

## 7.1 Preparation for Use

- ❑ Perform deployment configurations and recording configurations (described in CHAPTER 3):

  1. Customize the *Node Descriptions*.
  2. Open the *System Configuration* menu and enable/disable node parameters to be measured.
  3. Open the *Deployment Settings*: set the recording interval and enable/disable nodes.
  4. Configure Analog sensors settings if analog sensors are attached; refer CHAPTER 5.
  5. Activate the *Recorder* menu. View the deployment settings and select to start the instrument instantly or at a postponed time.

  *Important!*

  *When disconnecting the instrument from external AC Power, remember always to screw the Cover Cap tightly onto the electrical terminal to avoid water intrusion in the instrument when deployed!*

  *Make sure the O-ring inside the Cover Cap is clean and undamaged. Always grease the O-ring before deployment.*

  *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.*

- ❑ 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.
- ❑ Make sure that the protective cap is installed on the electrical terminal.
- ❑ When the system is armed and ready for deployment, the main switch must stay switched on.
- ❑ 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.
- ❑ Tighten the C-clamps until the Top-end plate rests against the top of the case. Avoid over tightening, as this will damage the clamp.

## 7.2 Illustrations of deployment preparations

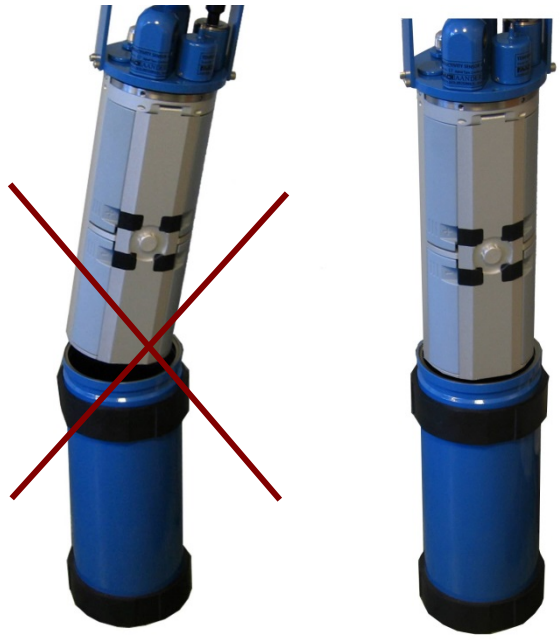


**Figure7-1 Insert Instrument into Pressure Case.**

*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, sin 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.*

**Figure7-2 Tighten C-clamps until the pressure case rotates on the floor. Avoid over tightening as this will bend the C-clamps.**


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

**Figure7-3 Fasten shackle in frame. Tighten thoroughly.**

**Figure7-4 Splice the rope and fasten it to the thimble attached to the shackle.**

**Figure7-5 Lock the shackle with strips or locking wire. Locking wire is recommended for higher security in long deployments.**

**Figure7-6 Mount the instrument into the frame.**

## 7.3 Retrieval of the Instrument

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 elements.*

When inspecting, look for corrosion on connector's cracks on the back 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.

**Figure7-7 SD card**

Procedure for retrieving measurement data from a deployment:

- ❑ Switch off the instrument.
- ❑ Write down the time of the last recording.
- ❑ Turn off the power switch in the front of the instrument.
- ❑ Connect the USB (CHAPTER 3.1) between the instrument and your PC. Open the Windows Explorer and copy the measurement data from the SD card folder in the *mobile device*.
OR via an SD card reader: 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.
- ❑ For data post processing refer to TD311 Data Studio 3D manual.

## 7.4 Connection and disconnection of sensors

### 7.4.1 Procedure for connecting a sensor

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

*AiCaP sensors can be connected in sensor position 1-6 (refer Figure 5-8); Analog sensors (0-5V) must be connected in sensor position 2,3,4 and 5. 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; refer **Figure7-11**, rightmost illustration. Do not unscrew the set screw completely and remove it, as it might be lost.
4. Pull up the sealing plug. Clean the boreholes (**Figure7-10**)
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. Refer **Figure7-12**. 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. Refer **Figure7-13**. Connect the sensor cable to J6 on the HUB; refer **Figure7-14**.

b. AiCaP sensor in position 1,2,3,4,5: Gently push down the sensor, refer **Figure7-11**. Ensure that the red dip switch on the HUB is in *off* position, refer **Figure7-9.**

c. Analog sensor in position 2,3,4,5: Gently push down the connecting end of the cable. Set the red dip switch on the HUB in *on* position, refer **Figure7-9**. 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.

*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.*

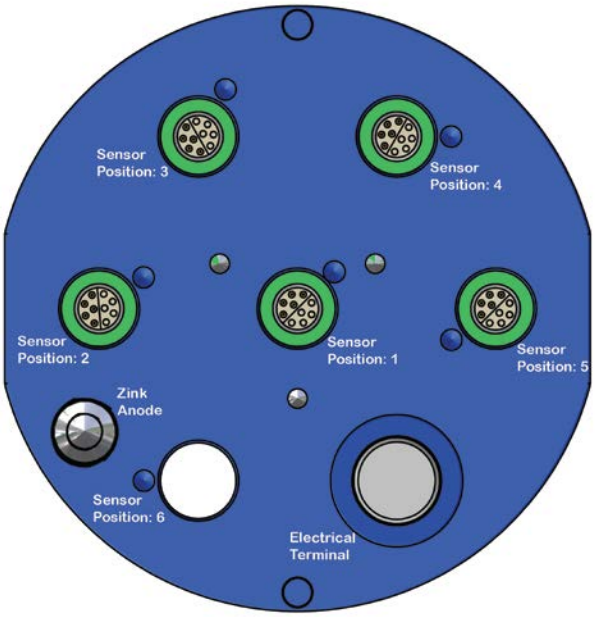



**Figure7-8 Top view of Top-end plate; Sensor Positions.**

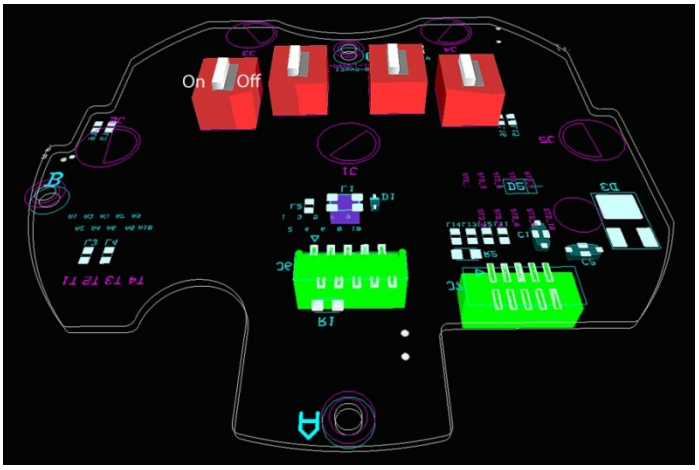



**Figure7-9 Drawing of HUB with 4 red Dip Switches at the back. AiCaP sensors installed: Switch to the right (off-position), Analog sensors: Switch to the left (on-position).**

### 7.4.2 Illustration of a sensor connection

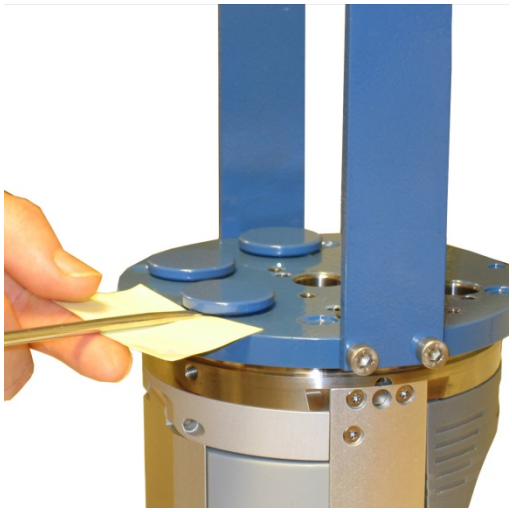


**Figure7-10 Removal of sealing plug. Loosen the set screw. Use a small bit of paper/ cardboard to protect the top end plate.**

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

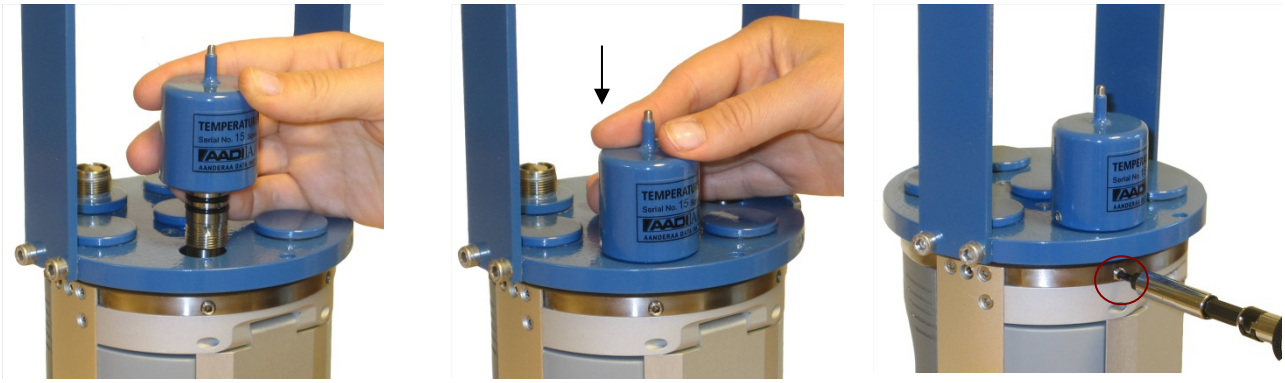


**Figure7-11 AiCaP sensors: Place the sensor according to the orientation pin. Push down the sensor and fasten the set screw.**

***AiCaP Sensor in position 6:***

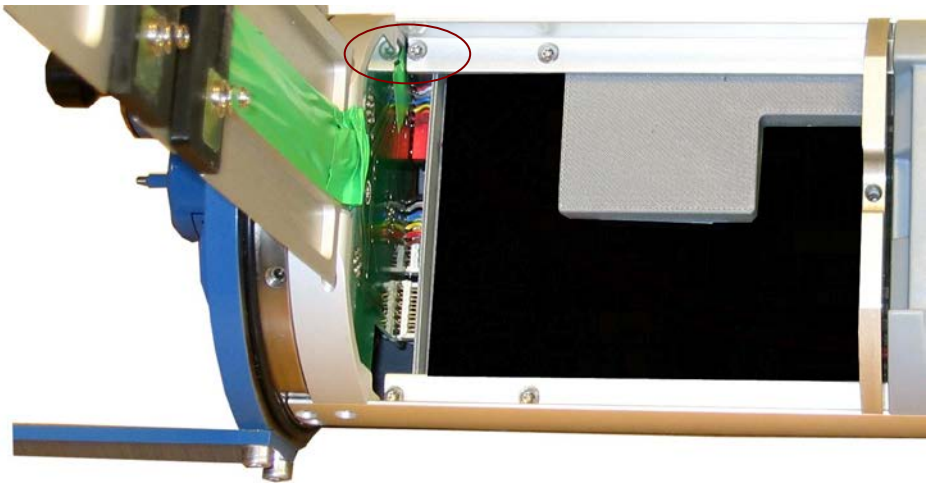


**Figure7-12 Open the battery lid, remove the upper battery, and unscrew the two top screws that holds the top front cover. Turn the instrument and pull off the top front cover.**

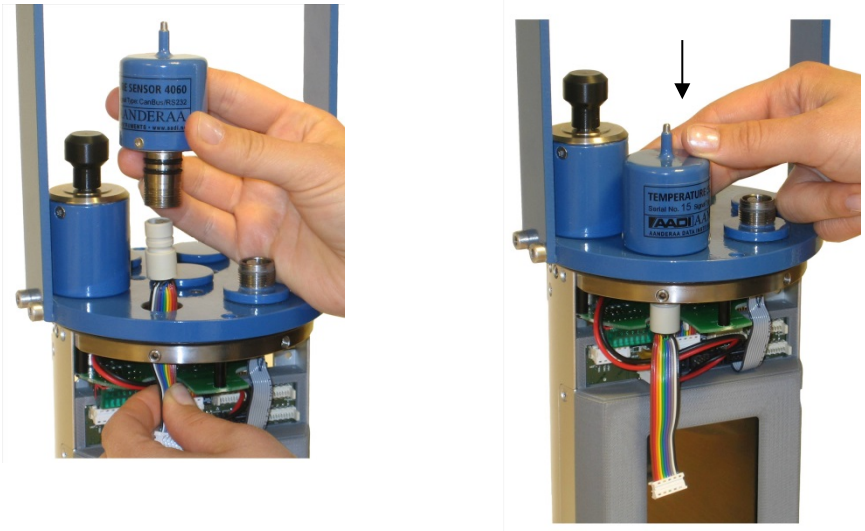



Figure7-13 Connect the sensor to the patch cable 3969492.

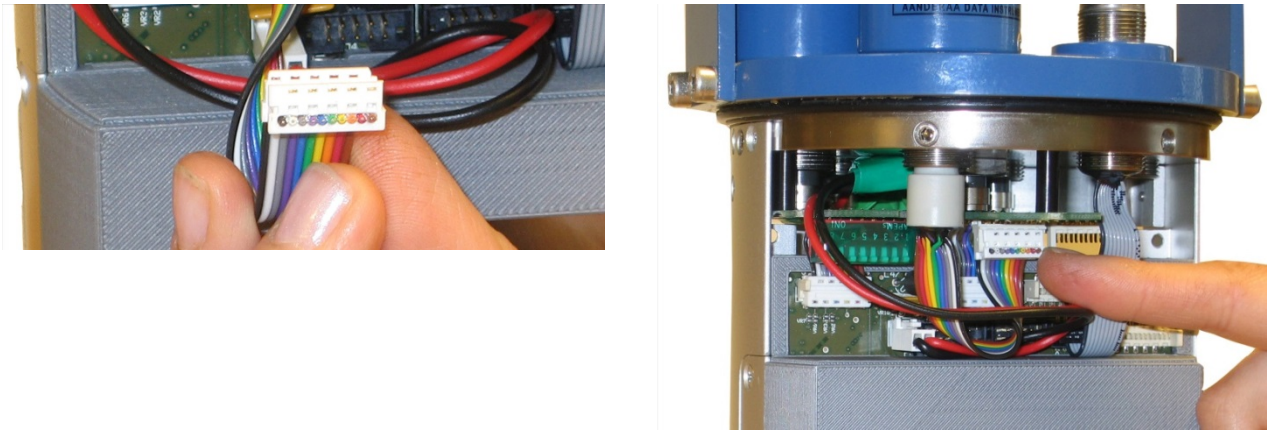


**Figure7-14 Connect the patch cable to HUB plug J6.**

**Figure7-15 Connect the ZPulse DCS / DCPS.**

### 7.4.3 Procedure for connecting cable 4784

4784 Cable is a watertight connection between instrument and external cable/battery case with 10-pin Subconn underwater meatable plug. To install this cable on Instrument

1. Remove the top front cover as illustrated in **Figure7-12**
2. Remove sealing plug on top end plate marked with Electrical terminal in **Figure7-10**
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, see **Figure7-16**.

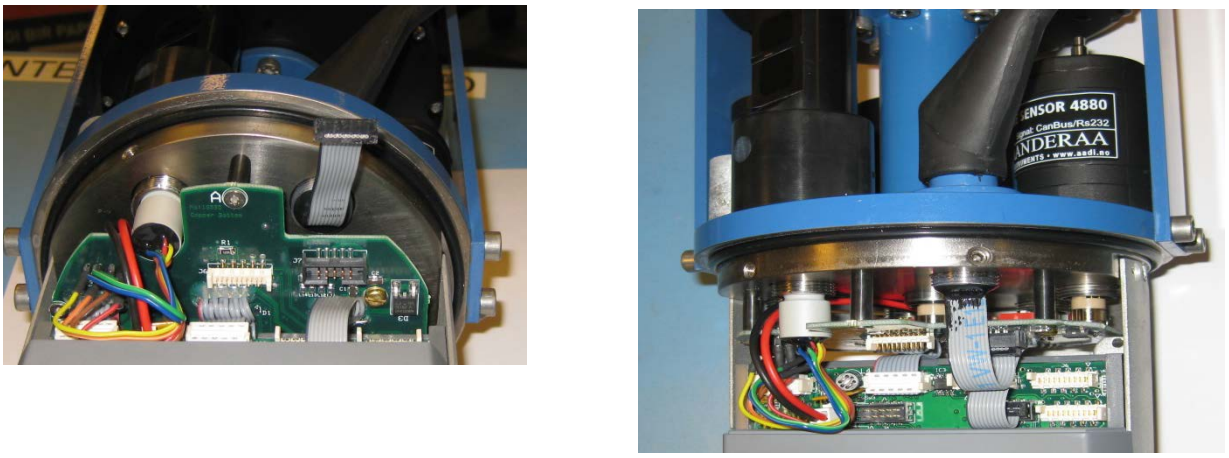


**Figure 7-16 Connecting the 4784 Cable**

### 7.4.4 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; refer **Figure7-11**, rightmost illustration. Do not unscrew the set screw completely and remove it, as it might be lost.
4. Disconnect the upper battery, refer procedure on **Figure7-11,** 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, refer **Figure7-9**.
    b. Sensor in position 6: Disconnect the sensor cable from the HUB. Disconnect the sensor from the patch cable and pull up the sensor, **Figure7-14**.
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.*

## 7.5 Battery

The battery compartment, at the rear of the SeaGuardII, has room for two batteries.

*Note! 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. 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 for rejuvenating.*

### 7.5.1 Removal and insertion of the Battery

To remove a battery from the SeaGuardII instrument, follow the instructions below. The procedure is illustrated in **Figure7-12**:

1. Place the instrument on the desk with the front facing down.
2. Loosen the center screw at the rear of the instrument. *NOTE! The screw cannot be completely removed.*

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. Open the rear cover and remove the battery to be replaced, refer the procedure listed above.
3. Place the battery with the connection pins towards the center, refer **Figure 7-17**.
4. Let down the battery cover.
5. Tighten the cover screw in the rear center of the instrument.


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

### 7.5.2 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, refer **Figure 7-19**.


**Figure 7-19 Use a 100 Ω resistor up to 6.3 V to rejuvenate the battery.**

## 7.6 SD card

Insert the *SD card* by first unscrewing the SD card-cover at the front of the instrument, refer **Figure7-7**. Secondly insert the card with the label to the right.

# CHAPTER 8 Maintenance

## 8.1 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.

The complete firmware in the SeaGuardII may be upgraded by means of the SD card.

## 8.2 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. Remove marine growth and barnacles from the sensor(s) using a hand scrub. To remove sea shells or corals use plastic handle or similar tools.
2. When inspecting, look for corrosion on connector's cracks on the back potting of connectors and scratches on protecting cable(s) jacket.
3. Rinse the exterior of the instrument in fresh water and let dry.
4. Clean the transducer head.
5. Open the instrument and check for leakage through the transducer head or in the pressure case.
6. If leakage, locate the source of the leakage and correct it.
7. Replace the zinc anodes and corroded parts if necessary.
8. Remove the O-rings.
9. Make sure that the O-ring seatings have a clean and smooth surface.
10. Lubricate the O-rings with grease (Klüber Lubrication Syntheso Glep 1 or similar synthetic grease).
11. Replace the O-rings and pressure inlet.
12. If the transducer head has been disconnected, replace the silica gel bags.
13. Always install new O-rings on plugs that have been disconnected.
14. Check for deformation of the C-clamps. Replace if necessary.
15. Always apply TECTYL® on screws before installation to avoid crevice corrosion. Add also TECTYL® around sensors and sealing plugs.
16. Check for scars on the EPOXY coating, the Top-end plate and the frame.
17. Clean the scars with Acetone.
18. Apply Repair Lacquer to repair the scars.
19. Control that the Electrical terminal is securely tightened.

## 8.3 Illustrations of maintenance procedure

Figure 8-1 Clean O-ring seating

Figure 8-2 Clean O-ring seating; instrument up-side-down.

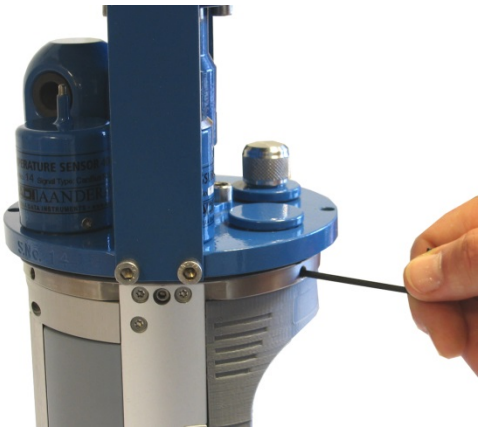


Figure 8-3 Fasten the set screws before putting on new O-ring.

Figure 8-4 Add Tectyl® around sensors and sealing plugs.


Figure 8-5 Lubricate O-rings with grease. (Klüber Lubrication Syntheso Glep 1 or similar synthetic grease).

## 8.4 Factory Service

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

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.

## 8.5 Tools- and Maintenance Kit

The manufacturer always keeps a stock of spare parts, accessories and consumable parts for quick delivery. Orders may be placed by fax, telephone or e-mail. See Table 8-1 for SeaGuardII Tool Kit list, kit no. 3986A.

### 8.5.1 Tool kit

**Table 8-1 Tool Kit for SeaGuardII, kit no. 3986A**

| 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 |

### 8.5.2 Maintenance kit

This kit, part no. 3813, can be ordered from the manufacturer, refer to Table 8-2.

**Table 8-2 Maintenance Kit 3813C/3813D for SeaGuardII**

| Part. no | Description | Pieces 3813C (LW/IW) | Pieces 3813D (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 |

# CHAPTER 9 Image Upgrade of main board

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

## 9.1 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 not lost when power is switched off.

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.

## 9.2 Instructions for Uploading SeaGuardII Image

**If you already have a SD card with a SeaGuardII Image ready, skip to step 5.**

1. Use a SD card of at least 64 MB. Preferably use the SD card you received with the instrument.
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.
   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*** actually exists on the card.

5. Install the SD card in the SeaGuardII SD slot.

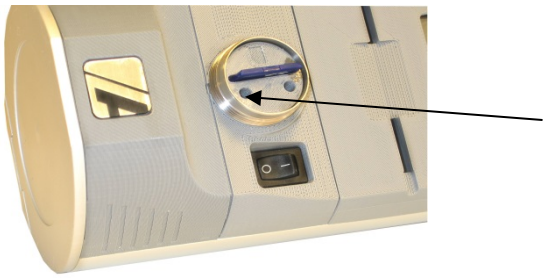


**Figure9-1 The SD card Housing**

6. Open the SD card Housing in the SeaGuardII.

7. Use the stylus 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.

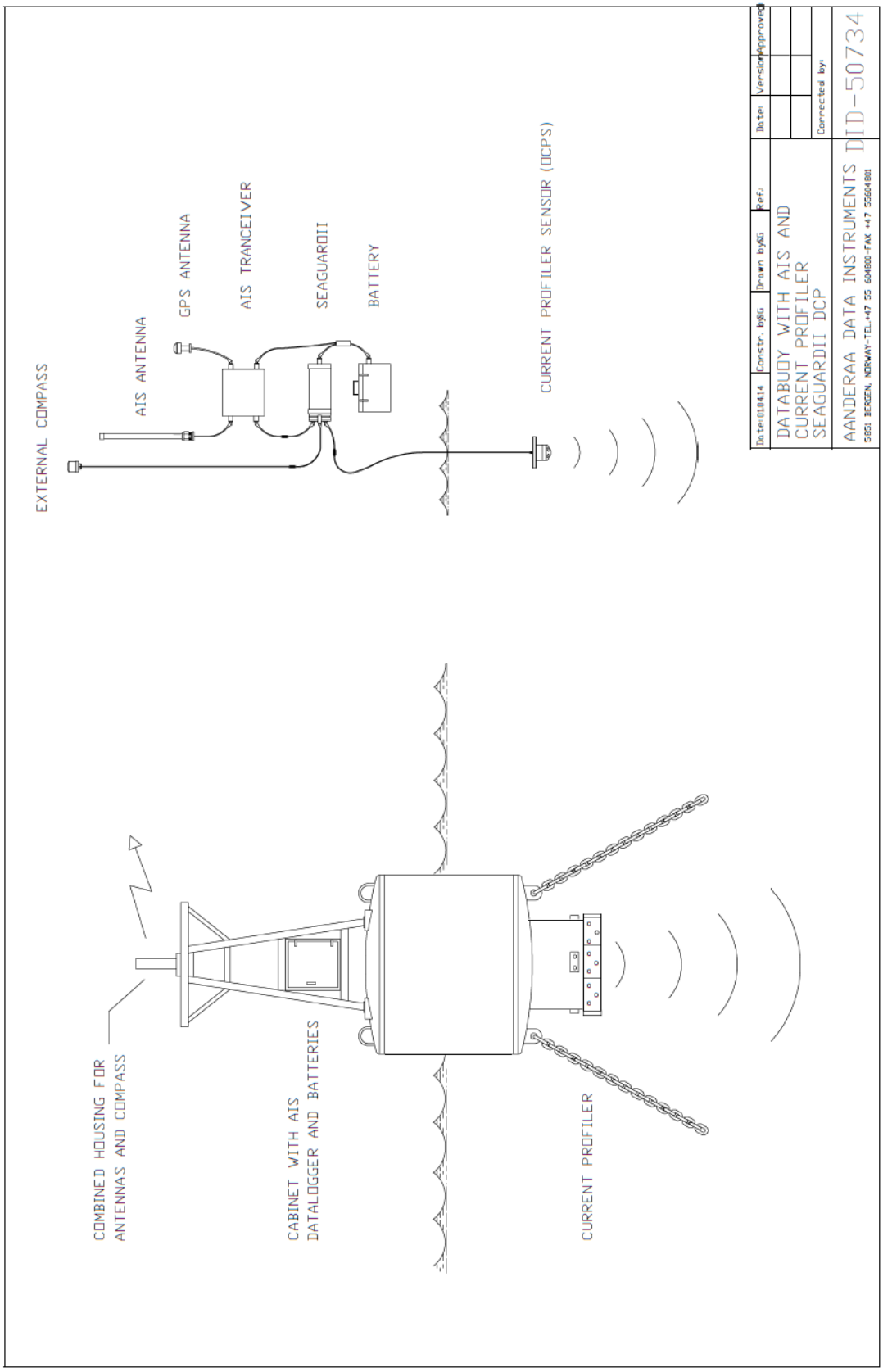
9. Tap the boot button once more.

10. Release the boot button once more; the new image is about to be transferred. The image is large in size, and will take approximately 10 minutes to download.

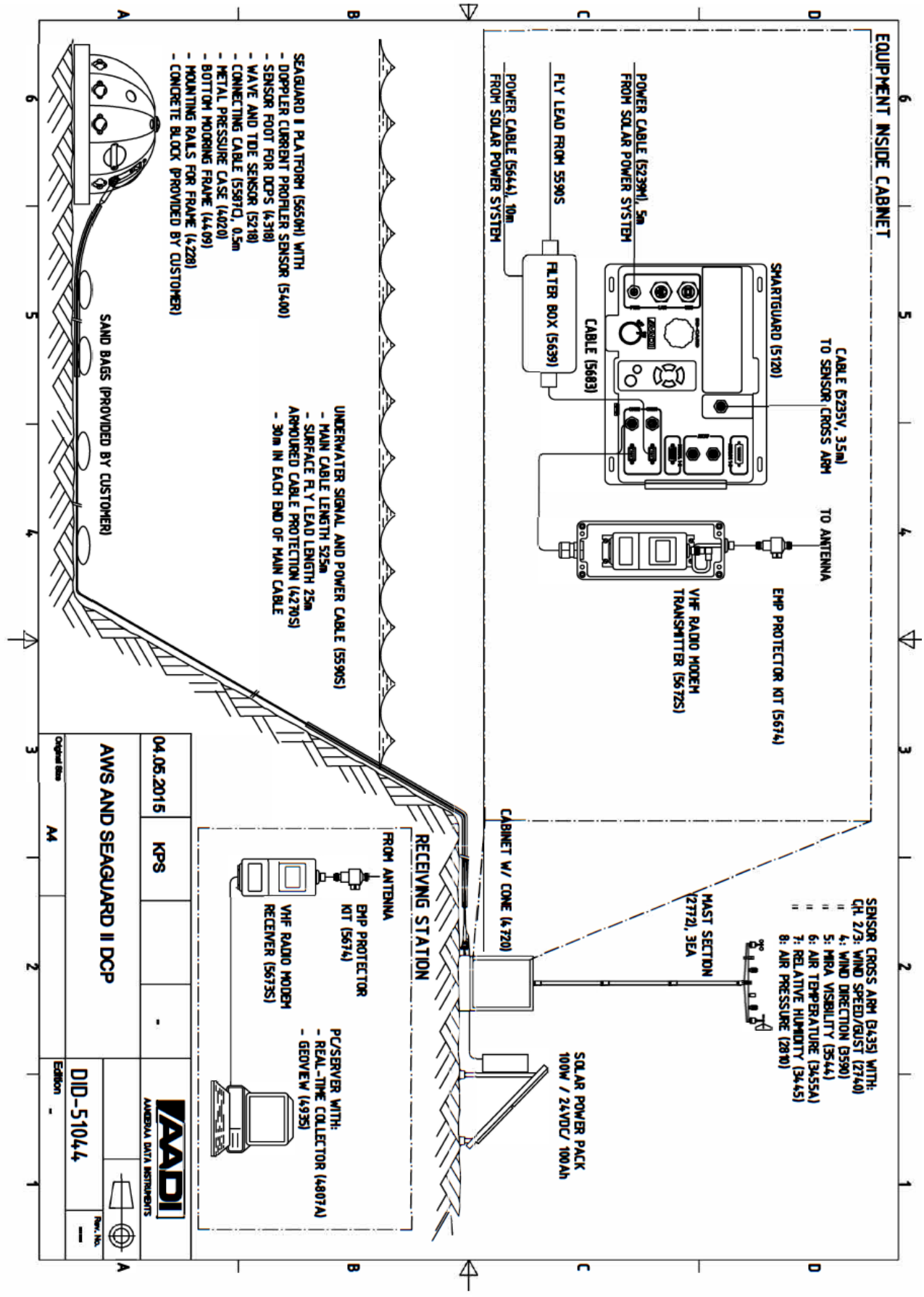
11. When the download has finished, Switch *OFF* the instrument using the power switch, and then switch it back *ON* to confirm that the new image has been installed.

To check the image version, connect the SeaGuardII to AADI RT Collector as instructed in Chapter 3.1, access the system overview (refer Chapter.3.3.3) where you will find information about the image version.

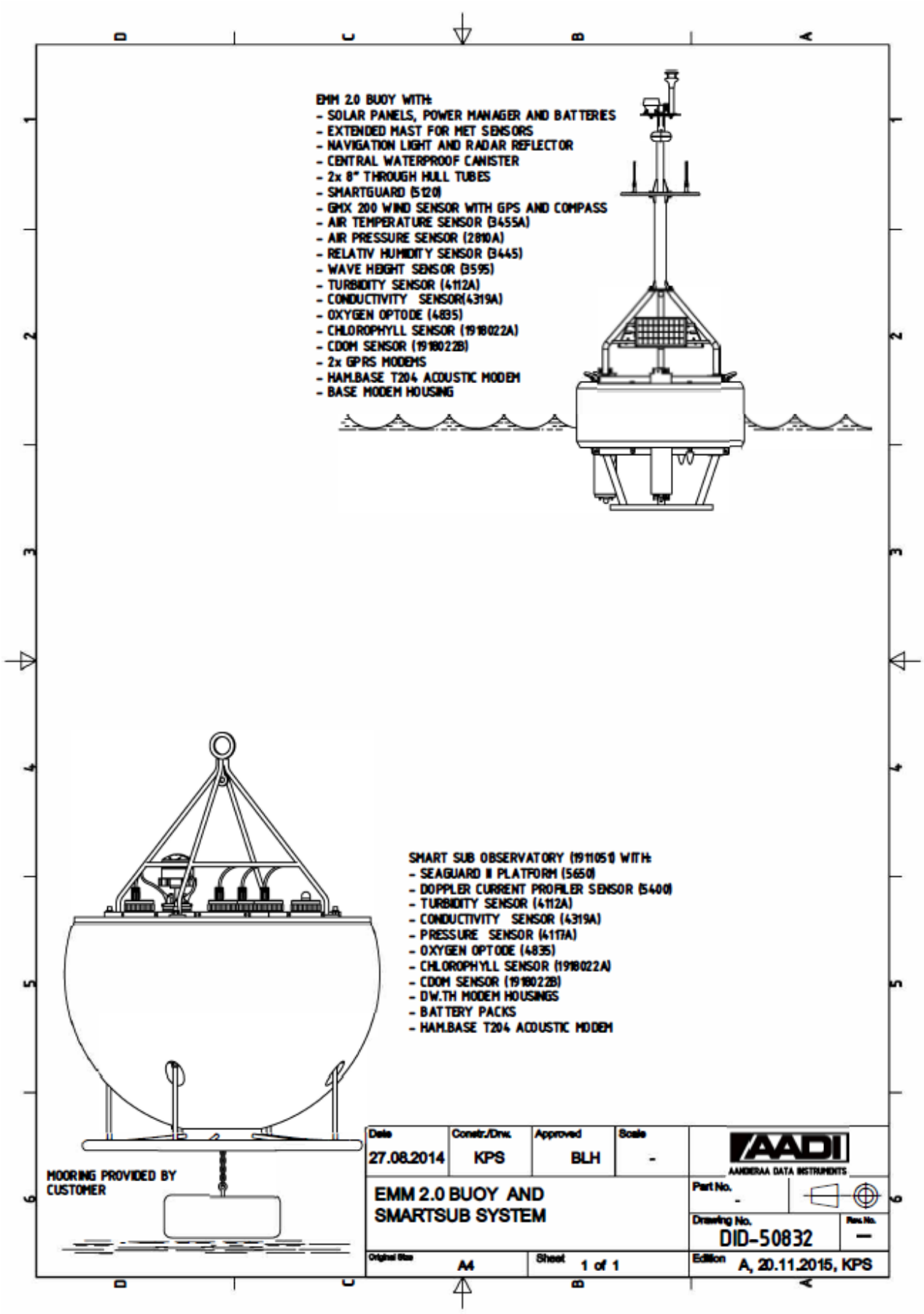
# APPENDIX 1 – SeaGuard**II** system based examples




**System Drawing DID-50734**




**System drawing DID-51044**




**System drawing DID-50832**

The system drawings DID-50734, DID-51044 and DID-50832 illustrate some possible system solutions based on SeaGuardII.

The system presented in the drawing DID-50734 represents a typical solution for current profile monitoring in harbor applications where data transmission through AIS is a requirement.

In this example the SeaGuardII acts as the buoy logger collecting and storing data and transmitting through AIS. Since the buoy is made of steel, it is not possible to use the DCPS internal compass and in order to provide accurate and corrected data, SeaGuardII uses an external compass, positioned on the mast of the buoy as input for data calculation.

The drawing DID-51044 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.

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