OPERATING MANUAL
SEAGUARD® PLATFORM
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INTRODUCTION

Purpose and scope

This Operating Manual describes the SeaGuard Instrument: configuration of the SeaGuard Instrument with sensors, Operating Instructions and Maintenance. Further it gives you an introduction to SeaGuard Studio - how to import and visualise your measured data.

SeaGuard is the latest of our oceanographic instruments. It can be used both in the sea and in fresh water. 3 versions are available: SeaGuard Light Weight with depth rating of 300m, SeaGuard Intermediate Water with a depth rating of 2000m, and finally the 6000m depth version.

The SeaGuard instrument consists of a platform with sensors attached to it. Aanderaa sensors are all smart sensors, which are automatically detected and recognised by the platform when the instrument powers up. Up to 4 analog sensors can be used with the instrument. The SeaGuard Platform is adding a correct configuration dialog for the attached sensors.

The most common ways of deploying the instrument is in an ordinary string mooring, in a bottom frame, or mounted underneath a buoy.

SeaGuard is a self-recording instrument; data is stored on a Secure Digital card, SD card, for later post-processing and analysis.

Data can be output Real-Time in a non-polled mode.

Applicable Documents

<table>
<thead>
<tr>
<th>Document Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>D366</td>
<td>SeaGuard Platform Data Sheet</td>
</tr>
<tr>
<td>B150</td>
<td>SeaGuard Concept Brochure</td>
</tr>
<tr>
<td>Form 135</td>
<td>Instrument Service Order</td>
</tr>
<tr>
<td>TN262b</td>
<td>SeaGuard RCM Operating Manual</td>
</tr>
<tr>
<td>TD 208</td>
<td>Operating Manual for Data Reading Program 5059</td>
</tr>
<tr>
<td>TD 267</td>
<td>Aanderaa Real-Time Output Protocol</td>
</tr>
<tr>
<td>TD 268</td>
<td>Aanderaa Real-Time Data Collector</td>
</tr>
</tbody>
</table>

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADC</td>
<td>Analog to Digital Converter</td>
</tr>
<tr>
<td>AiCaP</td>
<td>Automated idle lined CANbus based Protocol</td>
</tr>
<tr>
<td>ASCII</td>
<td>American Standard Code for Information Interchange</td>
</tr>
<tr>
<td>CAN</td>
<td>Controller Area Network - sometimes referred to as CANbus</td>
</tr>
<tr>
<td>DSP</td>
<td>Digital Signal Processor</td>
</tr>
<tr>
<td>EPROM</td>
<td>Erasable Programmable Read Only Memory</td>
</tr>
<tr>
<td>GMT</td>
<td>Greenwich Mean Time</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>HUB</td>
<td>Connection Point for Network Devices</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>ROM</td>
<td>Read-Only Memory</td>
</tr>
<tr>
<td>RTC</td>
<td>Real Time Clock</td>
</tr>
<tr>
<td>SD card</td>
<td>Secure Digital (Memory) card</td>
</tr>
<tr>
<td>SR10</td>
<td>This signal corresponds to the digital signal obtained when the contents of a 10-bit</td>
</tr>
<tr>
<td></td>
<td>shift register are clocked out in serial format. This signal is used when the parameter to</td>
</tr>
<tr>
<td></td>
<td>be measured is digital, e.g. a frequency or a number of pulses.</td>
</tr>
<tr>
<td>UART</td>
<td>Universal Asynchronous Transmitter and Receiver</td>
</tr>
<tr>
<td>UNESCO</td>
<td>The United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
</tbody>
</table>
Front view of the SeaGuard

- Electrical terminal
- Top-end plate
- LCD Display
- Stylus
- Reset button
- SD card
- Power button
- Boot loader
- SD card cover

Figure 0-1 Front view of the SeaGuard Instrument
Side/Rear view of the SeaGuard

Figure 0 - 1 Side/Rear view of the SeaGuard Instrument
CHAPTER 1 Description

The SeaGuard Instrument

The Aanderaa SeaGuard is a module based concept. It consists of a platform with datalogger and communication protocol. Sensors can be attached to the Top-end plate. The platform is highly flexible.

The SeaGuard Platform is configured from the factory to optimize the recording situation in which the instrument is to be used: either as a SeaGuard RCM or a SeaGuard CTD.

The SeaGuard design and technology is new and modern. Among the advantages of the SeaGuard product family are their ease of handling and deployment, and that they have no moving parts. The instruments are highly robust and produce high quality data. The instruments are equipped with a watertight receptacle that enables external triggering and testing of a fully assembled instrument. Connect standard cable 4299 between the SeaGuard receptacle and your PC to access the installed SD card (on shore only). The SeaGuard Platform used together with Aanderaa AiCaP sensors shows low system noise.

The SeaGuard is a self recording instrument with storage on a small SD card.

Measurement data can be sent Real-Time in non-polled mode.

A CANbus based protocol, AiCaP, has been chosen as a two way communication bus between the datalogger module and the nodes. AiCaP ensures low power drain, short sampling intervals, and fast response time.

6 sensors can be fitted to the SeaGuard Platform Top-end plate. Aanderaa sensors to go with the SeaGuard are all smart sensors; based on the smart sensor technology with high accuracy and low response time. 4 of the sensors can be analog sensors (0-5V).

Smart sensors are connected to a hub underneath the Top-end plate: just plug the sensor onto the Top-end plate, fasten a set screw, start the instrument, and the sensor is automatically detected and recognized.

Figure 1-1 An example of the SeaGuard Platform with a selection of sensors mounted to the Top-end plate
Sensors can be connected to the Top-end plate via a cable. Maximum cable length for AiCaP sensors is 6m and the maximum cable length is 5m for analog sensors.

Adaptive software is automatically adding a correct configuration dialog for the new sensor. The SeaGuard Platform responsibilities are to collect data from the sensors/nodes.

In the core of the SeaGuard is a new data logger based on the Intel PXA 255 embedded ARM processor and the real time operating system Windows CE 5.0. This system topology is not compatible with Aanderaa positive ground based SR10, VR22 and PDC4 format.

A modern Windows based post processing system for PC, SeaGuard Studio, comes with the SeaGuard. SeaGuard Studio holds the deployment configuration and measurement data lists. SeaGuard Studio also arranges for export of data and visualisation of the measurements in customised graphs.

### Real-Time Output (Licensed Feature)

The SeaGuard Instrument can output Real-Time data in XML-format over an RS422 transmission line. The Real-Time Output Protocol is described in TD 267 and can be used as a guide to a skilled engineer into creating an application that utilizes the data from the SeaGuard Instrument.

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

Install the license key in *Administrative Tools*.

The *communication settings* for RS422 are found in *System Configuration*.

The Real-Time Output of data is *enabled* in the *Deployment Settings*.

The *Recorder Panel* provides information about the Real-Time output status (enabled/disabled).

### Instrument and Sensors

You will find that some menus separate the settings/configurations into two categories: *Instrument* and *Sensors*. 
The items in the Instrument category can be *Platform, Recording, Storage Manager, and Communication Server*.

The items in the Sensor category are *Analog Sensors* and connected *external sensors*.

**Symbols**

Main symbols used in the SeaGuard display and setup menus.

- Platform
- Recorder
- Storage Manager
- Real-Time/Communication Server
- System Parameters
- Analog Sensors
- Sensor

*Figure 1-3 Symbols used in SeaGuard Display and the menus.*

**Internal Sensors**

The SeaGuard contains two internal sensors, *System Parameters* and *Analog Sensors*. The internal sensors are always present in the system.
System Parameters

The System Parameters measures parameters which can be used for system monitoring and diagnostics. The *System Parameters* is not configurable.

System Parameters has the following parameters:

- **Battery Voltage**: Monitors the battery voltage during recording.
- **Memory Used**: Monitors the use of available system memory during recording.
- **Interval**: Monitors the time to next measurement.

Analog Sensors (Licensed Feature)

The *Analog Sensors* consists of four input channels, each of which can measure 0 to 5V, and are supported with a common 10V power supply output. This enables the user to connect external sensors with analog outputs.

User settings for the analog sensor node are power related: select either continuous power to the analog sensors or set a stabilisation time, which tells the instrument to power the analog sensors before each recording (drains less power).

When installing analog sensors to your SeaGuard Instrument, you must perform some sensor configurations like sensor/parameter name, engineering units, power drain, calibration coefficients, etc. These sensor settings do not have to be changed between deployments.

Install the license key in *Administrative Tools, Option Module*, refer CHAPTER 4.

The configuration of the analog sensor is found in *Administrative Tools, User Maintenance*, refer CHAPTER 4.

In the *System Configuration* you must remember to enable/disable measurement parameters form the attached analog sensor.
CHAPTER 2 The SeaGuard Platform

Start the instrument by pressing the power button in the front of the instrument. Wait for a few seconds before the LCD display at the front of the instrument is activated.

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. Connect the AC/DC power cable 4499 to the electrical terminal on the Top-end plate, refer Figure 2-1.

*Important! Ensure that the protective cap is fitted and tightened to the electrical terminal before deployment.*

Connection between the SeaGuard Instrument and a local PC

For connection between the PC and the SeaGuard, use cable 4573; install a RS422 to RS232 Converter between the standard cable and the PC if your PC does not come with a RS422 Serial Port. The 10-pin plug is to be connected to the SeaGuard Electrical Terminal, refer Figure 2-1. Standard cable 4299 also has plugs for connection to the PC USB port and for connection to the AC/DC Adapter 3786.

![Diagram of SeaGuard Instrument and connections](image-url)
When connected to your local PC you are able to make backup of your data by transferring files from the SD card to the PC.

For connection between the Instrument and your local PC: Download and install Microsoft ActiveSync version 4.1 or later; connect the standard connection cable to the instrument’s electrical terminal and the USB end of the cable to the PC. At instrument start up, ActiveSync will respond with a short sound from the PC, and an Icon appears on the Instrument, refer Figure 3-1.
CHAPTER 3 Preparing the Instrument for a Deployment

Your SeaGuard Platform has been configured from the factory to optimize the recording situation in which the instrument is to be used, refer CHAPTER 1.

Before each deployment, you must consider configuration properties that determine how the sensors and the Data logger collect data. Examples of configuration properties are recording interval, calibration coefficients, enabling/disabling of measurement parameters, real-time output etc. During configuration of the Data logger, the Configuration Properties are modified by the user.

This chapter guides you through the SeaGuard Menu for preparing the instrument for deployment.

*Important! We recommend that you select the Recorder options Allow sleep between recordings and Turn display off if sleep is unavailable, refer CHAPTER 4, Figure 4-5. Refer each sensor manual for power consumption issues.*

*Note! Some sensors are rated down to 300m and 2000m. Make sure your sensors are rated for the operating depth that you require.*

**Keyboard**

Use the keyboard function to type your configuration on the LCD display, refer Figure 3-1.

1. Tap the *keyboard* icon in the bottom left corner to activate the keyboard.

2. Next, tap the letters one by one to type appropriate names.

3. Hide the Keyboard function by tapping the *Keyboard* icon once more.

**Icon for Active Sync**

**SeaGuard Start Menu**

The SeaGuard Start Menu holds the key entries for the configuration and use of the instrument.

Tapping the *Menu* button in the lower left corner of the LCD display activates the menu.
The four primary menu items for configuration and use of the instrument are:

- **Sensor Identification**: Create descriptive names for each node e.g. a sensor.
- **System Configuration**: Enable/disable individual node parameters.
- **Deployment Settings**: Enable and disable nodes/recorder settings.
- **Recorder Panel**: Start or Arm the instrument.

**Administrative Tools** holds special applications that are used for instrument diagnostics, testing and hardware setup.

The **Control Panel**: Here you can view the status on the SD card and battery, delete the content of the SD card, and adjust date and time.

**Active Programs** displays a list of currently active programs.

The **Programs** panel displays a list of all programs available on the system. This is mainly Windows CE programs. We recommend the user not to run any of these programs.

**Important! We recommend that you do not run programs that are not described in the manual.**

Always scan through all the options in each page to make sure your configuration is correct.

Always store your correct settings; a progress bar is visible on the LCD screen. When the settings have been stored, the software takes you back one level.

Tapping the ‘X’ in the upper right corner of each window takes you back one level without storing the changes.

If power is lost during settings or during storage of the settings, the configuration must be repeated and stored.

**Sensor Identification**

Each node/sensor has got its unique description; consisting of a product name, serial number and a product number, refer Figure 3-3, **Details** in the lower part of the window.
**Sensor Identification** gives you the possibility to rename the sensor, without changing the original description. You are then able to edit a customised name, which makes it easy for you to recognise it later. The customised sensor name will then be the sensor identity in the configuration until the sensor name is changed.

Tap the **Sensor Identification** in the SeaGuard Start Menu, refer Figure 3-2. The display will show a list of sensors, refer Figure 3-3. **System Parameters** and **Analog Sensors** are internal sensors. The other sensors listed are external sensors connected to the SeaGuard Instrument.

Select the sensor you want to rename, e.g. Pressure #13, refer Figure 3-3.

Tap the **Edit Description** button to rename the desired node. Click **Save and Exit** to store the new name. If you want to rename more than one node, you are able to edit all of them and click **Save and Exit** after the last editing.

**System Configuration**

In the system configuration you can enable or disable measurement parameters from each sensor.

Open the **System Configuration** from the SeaGuard Start Menu. System Configuration is divided in two categories: Instrument and Sensors. Refer Figure 3-4 and Figure 3-6.

Tap **Run Wizard** to perform system configuration on all nodes in the category, or select a specific item from the list in the lower part of the window. Tap **Configure** to enable/disable the specific node properties.

The **Instrument** configuration holds settings for Real-Time communication with the Instrument, refer Figure 3-5.

The **Sensors** configuration holds sensor settings. Each sensor has its own set of properties.
The Communication Server settings for Real-Time communication with the instrument are Baud Rate, Data Bits, Stop Bits, Parity and Flow Control, refer Figure 3-5.

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

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

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

**Flow Control:** Select between None and XonXoff. Set the value to Xon/Xoff when the receiver is the Aanderaa Real-Time Collector.

Note! Each sensor has got a default parameter (in engineering units) which can not be disabled (e.g. raw data measurements necessary to calculate the engineering units). Parameters that are not default can be enabled/disabled.

The property of a sensor is e.g. to enable/disable Raw data.

The property value Yes means enabled, while No means disabled.

The property of the Analog Sensors is to enable/disable measurements parameters from each of the four input channels, refer Figure 3-7.

Note! Refer CHAPTER 4 for configuration of the Analog sensor properties.
To enable/disable an analog channel, you must select the appropriate Channel, press View/Edit in the right, lower part of the window, and change the setting, refer Figure 3-7. Alternatively, click in the property value field, and change the value.

Press Finish to store the settings, or Cancel to undo changes.

**Note!** If you enable measurement parameters from an Analog Channel that is not actually in use (Analog switch Off, refer Figure 7-9) then the channel will be visible in SeaGuard Studio. The measurement parameter from this channel will be an approximately constant value.

We recommend that you disable Analog Sensors channels that are not in use.

**Note!** Refer CHAPTER 4 for setting descriptive channel names and other analog sensor properties.

---

**Deployment Settings**

In the deployment settings you can set site details like location, owner etc (Platform), recorder options like time between records and enabling/disabling nodes (Recorder). You can also set storage (Storage Manager) and Real-Time options (Communication Server), refer Figure 3-8.

Open Deployment Settings in the SeaGuard Start Menu. The deployment settings are divided in two categories: Instrument and Sensors.

The Sensors list is empty, since you can not perform deployment settings on individual sensors when used with the SeaGuard Instrument.

---

**Figure 3-7 Example: System Configuration of the Analog Sensors.**
The Instrument list holds settings for the Platform, the Recorder, the Storage Manager and the Communication Server.

You can either be guided through the Deployment setup via Run Wizard, or you can choose to configure each specific item.

For configuring one specific item, without going through the wizard, select the item from the list in the lower part of the window, refer Figure 3-8, and tap Configure. Follow the guide below!

Note! We recommend using the wizard to configure your instrument.

Refer Figure 3-9 to Figure 3-17 for details regarding deployment settings for the Platform, the Recorder, the Storage Manager and the Communication Server.

Site Information (Platform)

The Platform settings hold information about the deployment site, refer Figure 3-9.

Select the property, and press View/Edit to set the description. Tap OK to return to Figure 3-9.

Note! There are no constrains on how to type the position, but the instrument keyboard does not have a typical degree symbol. The NMEA Global Positioning System GGA uses the notation:

\[ xxmm.dddd,<N|S>,yyymmm.dddd,<E|W>, \]

where

- \( xx \) is latitude degrees
- \( yyy \) is longitude degrees
- \( mm \) is minutes
- \( dddd \) is decimal part of minute

Press Finish to store the settings when complete.
### Time between records (Recorder)

In the **Recorder** menu, you can set the Timing method; choose between **Fixed Interval** or **Advanced sequence**.

#### Fixed Time Interval (Recorder)

*Fixed Interval*: choose a recording interval from the list given in the timing settings.

Tap **Next** to store the configuration and continue with Node settings (enable/disable nodes).

If the recording interval is configured shorter than the longest processing time of the enabled nodes, a warning sign (an exclamation mark) will appear in the Enabled Node list, refer Figure 3-11.

You can select a longer interval, or click **Next** to disable the limiting nodes, refer Figure 3-11.

If you like to start recording when the instrument is powered, select the **Select Start When Powered Up**.

*IMPORTANT! Always use the Start When Powered Up if the instrument is powered from ashore via cable.*
Note that it may be possible to change the sensors configuration (e.g. adjusting the ping setting in the ZPulse, so that the node can operate at a shorter processing time.

The node processing time is given in the right column, named P.time. The processing time is the time that the node needs to provide the data.

For Analog Sensors node, the processing time is the user configured stabilization time plus 0.5s (refer *Configure Analog sensor Properties* on page 34).

Advanced Recording Sequence (Recorder)

To use an advanced sequence, tap *Advanced sequence*, refer Figure 3-12.

To choose a predefined sequence select from the drop-down list.

Click *Next* to continue, or configure/view sequences by pressing *Setup sequence*.

If the selected timing sequence contains shorter interval than the actual node combination can operate, a warning sign will appear. You can select a longer interval, or click *Next* and disable the limiting nodes, refer Figure 3-11.

If you like to start recording when the instrument is powered, select the *Select Start When Powered Up*.

*IMPORTANT! Always use the Start When Powered Up if the instrument is powered from ashore via cable.*
Advanced Recording Sequence – for set up of timing sequences (Recorder)

You can either edit an already existing sequence or create a new sequence.

If you want to add a new sequence, type Add in the upper right corner of the window.

If you want to edit an existing sequence, mark the sequence entry you want to edit and tap Edit in the lower left corner of the window.

Use the keyboard function to write the preferred values in the Interval and Repeat cells, refer Figure 3-13.

Tap Add in the lower part of the window to add a sequence entry.

Tap Delete in the lower part of the window to delete selected sequence entry.

Press OK to store, or Cancel to undo settings.

The sequence entry duration is calculated for each set of interval/repetitions, refer Figure 3-14.

When the sequence setup is completed, press Ok to go back to Figure 3-10. Press Next to continue with the recorder settings, which is to enable/disable nodes.
**Enable/Disable Nodes for a Deployment (Recorder)**

Disable nodes that are not needed in the deployment. Select the node and tap the downward pointing arrow to disable it.

The disabled node will now appear in the lower part of the window, coloured grey, marked with a red cross over the icon.

To enable a disabled node, select the node from the **Disabled Node** list and click on the upward pointing arrow.

Tap *Finish* to store your configuration.

---

**Storage Manager**

Select *Deployment Settings* on the Start Menu and select *Storage Manager*.

In the *Storage Manager* you can set the store to internal storage property to *Yes* or *No*; tap the value field to the right of the node name, or select the node and tap edit in the lower part of the window.

*Yes*: Measurement parameters are stored on the internal storage card, SD card.

*No*: Measurement data are not stored and will be lost.

Tap *Finish* to store your configuration.
Real-Time Output (Communication Server)

The **Communication Server** setting is to enable/disable the RS422 Real-Time output.

Select the property. Tap **View/Edit** and set **Yes** to enable or **No** to disable RS422 Real-Time output for the deployment.

Tap **Finish** to store the settings.

---

**Recorder Panel**

The Recorder is responsible for collection of data from the sensors and delivering it to the Storage Manager. The Recorder is operated by the Recorder Panel and configured by the Recorder Deployment Settings/User Configuration.

The Storage Manager will receive data from the Recorder and store it on the SD Card. The operation of the Storage Manager can be configured in the Storage Manager Deployment Settings.

When opening the Recorder Panel you will get information about:

- The recording status
- Which nodes are enabled/disabled and the number of measurement parameters that has been enabled for each node
- Recording interval and storage information

Refer the next subchapter for further description.
Before the instrument has been armed or started, the status information says *Ready*, and reports number of nodes and parameters that are enabled, refer Figure 3-18.

![Figure 3-18 Status information before start of recording.](image1)

During a recording session, the status says *Running*, and reports number of nodes and parameters that are enabled, how many records that have been performed, and the time schedule for the next recording, refer Figure 3-19.

![Figure 3-19 Status information during recording.](image2)
The **Nodes** window holds information about enabled/disabled nodes and the number of measurement parameters.

Tap **View Parameters** to view details about the parameters, refer Figure 3-20.

![Figure 3-20 The Nodes window.](image)

![Figure 3-21 View Parameters. Green bullet in front of parameter name means active.](image)
The Setup window holds information about the timing interval/sequence, storage information, and Real-Time output.

**Important!** If the selected timing interval is too short for the enabled nodes to provide the measurements, you will get a warning.

Press Recorder Deployment Settings (in the lower part of the window) to adjust the timing or to disable the node(s) that prevents the selected recording interval, refer Figure 3-10 and Figure 3-11.

![Figure 3-22 The Setup window](image)

**If there are mismatch between the set timing interval and the node processing time, the instrument will automatically increase the timing interval to match the enabled nodes capabilities.**

**Sensor Sampling**

ZPulse DCS operates in two modes: spread mode and burst mode. In spread mode the user configured number of pings is evenly spread out in the recording interval. While in burst mode, the pings are sent out during the last part of the recording interval (the time depends on the selected number of pings), for illustration refer Figure 3-23 a).

Other Aanderaa AiCaP sensor readings are collected during the last second of the recording interval. The sensor processing time, $\partial t$, is found in the sensors manuals and in the recorder menu on the SeaGuard Instrument, for illustration refer Figure 3-23 b).
Start Recording

The SeaGuard Instrument is started from the Recorder Panel. Press Record in the upper left part of the Recorder panel, refer Figure 3-22.

Either Arm the instrument for a delayed start (select date and time), or select Start now to start the instrument immediately. A recording icon appears in the lower part of the LCD screen.

A short red light signal indicates every recording sample being performed.

Figure 3-24 The Start Recording window
Immediately after being armed or started, the instrument will go through a checking routine:

- If you have checked the storage facility, and a storage card is missing an error message will appear on the screen, and the instrument will not start recording.

Correct the error and arm/start once more.

Put the instrument into its pressure container and deploy. When the SeaGuard Platform is armed and before it starts measuring data, it has the lowest possible current drain for the instrument with that specific sensor configuration (CTD or RCM).

*Note! The current configuration is automatically stored in the Data Session folder on the SD card when the recording is started. The file format is xml, and the file is stored in a folder holding the start up time of the recording. The configuration file can be imported later using the Import/Export function found in Administrative Tools, refer CHAPTER 4 page 41 for a description of Import/Export.*

*Important! If touching the display when the Platform is armed, the display will not be switched off until recording starts or the instrument is re-armed. Re-arm the instrument and avoid touching the display until the instrument starts recording.*
CHAPTER 4 Administrative Tools

The Administrative Tools menu holds special applications which are used for instrument diagnostics, testing and hardware setup. It also holds configuration of analog sensors, refer page 34.


User Maintenance

In User Maintenance you find properties that are password protected and are set/altered by the ‘advanced user’. Those properties are therefore not changed during normal operation.

**Note! The password is: 1000**

User Maintenance is divided in two categories: Instrument and Sensors.

Select Run Wizard to start the user maintenance wizard for each category, or configure specific items by choosing from the list and tapping configure in the lower part of the window, refer Figure 4-2.

The items in the Instrument list are: Platform, Recorder and Communication Server. Refer pages 32 to 33 for a description.
The items in the *Sensors list* are available smart sensors (on the instrument), and the internal sensor Analog sensors.

This menu is for setting sensor configuration that does not usually change between deployments.

Refer each smart sensors operating manual for information about the sensor configuration.

Refer page 34 in this manual for information about configuring an analog sensor.

---

**Platform**

Select the property in the list and set the value.

Press *Finish* to store the settings.
Recorder

The Recorder options are Allow sleep between recordings and Turn display off if sleep is unavailable, refer Figure 4-5. Select the Time margin before sleep from the drop-down menu. Set these options to reduce the battery consumption.

Important! We recommend these options to be selected. The recording interval must be longer than 5 seconds for the instrument to go to sleep between recordings.

Communication Server

For Real-Time output, select if the first message at Instrument start up will be a full version XML message or a reduced XML message. Refer TD267 for a description of the Aanderaa Real-Time Output Protocol.

The first message at Instrument startup contains all instrument/sensor configurations; measurement parameters are dummy values.

Select if the following messages are full version or reduced version XML messages.

IMPORTANT! A reduced XML version of the message is not yet available for non-polled mode.

Tap Next to continue the Communication server settings.
Set *Yes* to *Show Taskbar Icon* for the Real-Time icon to show when the messages actually are transmitted. A blue frame surrounds the icon during transmission.

Tap *Finish* to store the settings.

Configure Analog sensor Properties

To configure the Analog sensor properties: open *Administrative Tools* $\rightarrow$ *User Maintenance* $\rightarrow$ *Analog Sensors* and press *Configure* in the lower part of the window.

User settings for the Analog sensors are related to power and current drain, descriptive names, engineering units and calibration coefficients. These settings provide correct visualisation of the measurement data in SeaGuard Studio.

Power settings for Analog sensors:

When *Continuous Power* is set to *Yes* the 10 V power is kept on continuously during recording.

When Continuous Power is set to *No* the selected *Stabilization Time* decides when the instrument will deliver power (10V) to the sensor. Select an appropriate value for the Stabilization Time; the value must cover the longest time required by the analog sensors.

In Figure 4-8 the Stabilization Time is set to 3000ms (3 seconds). This means that the instrument switch on power 3 second before the measuring instant. The
power is switched off immediately after the measurement is taken.

Set the total *Current drain* as the sum of the current drain from each analog sensor; the instrument can calculate the current drain for the deployment.

*Note!* The total current drain is an input to the calculator.

Tap *Next* to continue the configuration.

 Rename the Analog sensor’s Channel names for easy recognition later. The default names are Channel 1, Channel 2, Channel 3, and Channel 4, respectively.

Select the Channel, press View/Edit and type the name as the *Value* setting.

Tap *Next* to enter calibration coefficients.

Tap *Next* to type the engineering unit for the sensor measurements; the engineering unit will appear in SeaGuard Studio. In the example given in Figure 4-10, the channel unit has been set to V (Voltage).

Tap *Next* to enter calibration coefficients.
To set the sensor calibration coefficients:

1. Select the sensor channel, refer Figure 4-11, press **View/Edit** in the lower part of the window; a window similar to Figure 4-12 appears.

2. Select and **Edit** each Index; Index 0 and Index 1 are values in an equation forming a linear relationship between the raw data readings and the measurements in engineering units:
   
   \[ \text{Index 0} + \text{Index 1} \times \text{N} \]
   
   Where \( \text{N} \) is the raw data readings.

Tap **OK** to return to the window shown in Figure 4-22.

Tap **Finish** to store the configuration. The configured name will appear e.g. in the SeaGuard Studio.
Sensor Monitor

Open Administrative Tools-> Sensor Monitor.

Sensor Monitor can be used as a direct reading of the sensor, the function is mainly used for test purposes.

Select a sensor from the list, and press Start, refer Figure 4-13.

The next window shows sensor information like the Node Description, Product name and number and Serial number, refer Figure 4-14.

The number of sensor parameters and the processing time is also viewed in the window.

Select an Update Interval for the sensor monitoring, and press Start to start monitoring the sensor readings.
The parameter reading in engineering units is shown as illustrated in Figure 4-15. The reading updates according to the update interval. Press Freeze to temporarily stop the update, Press Start to restart the monitoring (Start is the same button as Freeze).

Press Cancel to stop the monitoring.

Calculations of Power and Storage Capacity

In Calculator you can find the Instruments estimated Battery and Storage capacity based on the current configuration. Refer Figure 4-16 Summary page.

You can also see more details regarding the power drain and storage, refer Figure 4-17 and Figure 4-18.

Select the applied battery from the list in the Summary page. The calculations are shown in the lower part of the window, refer Figure 4-16 Summary page.

Press Add to define a new battery in the list. Refer page 40 for a description. Press Delete to remove a battery from the list.

Note! Power calculations are not available when Real-Time Output is enabled.
In the **Power** page, you can see the average current drain for the deployment, and the number of records the battery can supply (based on the capacity of the battery that you selected in the summary page).

You can also see the individual power drain of each sensor in the system, refer Figure 4-17.

![]()

**Figure 4-17 Power Calculations.**

In the **Storage** page, you can see the size of the installed SD card, the available storage, the total record size and the number of records that can be stored based on the available storage capacity, refer Figure 4-18.

You can also see the storage requirements of each sensor in the system per recording.

*Note! Sensors that provide several measurement parameters also take up more storage.*
Define/Add new Battery details

You can specify your own battery; refer the Summary page shown in Figure 4-16.

Press Add and type a Battery Description, Normal Voltage, Empty Voltage and the Battery Capacity; refer Figure 4-19.

Press OK to store the changes. The defined battery will show in the battery list; refer Figure 4-20.

Figure 4-19 Define a new Battery.

Figure 4-20 The new Battery in shown in the list.
Import/Export Configuration

The Import/Export Configuration offers import and export of configuration settings from the Deployment Settings and System Configuration categories.

Applications for Import/Export:

- Backup (export) current configuration to the SD card.
- Restore (import) a previously saved configuration.
- Restore (import) a configuration used in a previous recording (the configuration is automatically stored to the data session folder when a recording is started, refer CHAPTER 3, page 29).
- Copy (import) a configuration from another instrument.
- Import a configuration that was modified or created with the SeaGuard Offline Configuration PC software.

Press Export to save the current configuration to the SD card.

Press Import to get a configuration file from the SD card and start the Import Wizard.

Figure 4-21 Import/Export Configuration.
Export: Type a file name to store current configuration to the SD card. A message box appears with the message Export OK if the export succeeded.

Import: Select the correct configuration file from the SD card. If the file contains a valid configuration, the import wizard will start.

If the configuration file is not valid, you will get a warning.
The product number and configuration version are used as criteria to match a node configuration in the file against a node on the instrument. Import is available if both the product number and configuration version are equal.

All nodes that are available for import are checked by default. Uncheck a node’s checkbox to de-select the import.

A **Node Mismatch** means that the configuration file does not contain any matching configuration. Import is therefore not available for this node.

A **Node Warning** indicates an ambiguity between the source and target nodes due to serial number mismatch or multiple source selection. If the configuration of a node with a warning symbol is selected for import, the wizard will guide you through these warnings to enable import, refer Figure 4-25 and Figure 4-26.

The **Accept Serial Number 0** checkbox is displayed if one of the node serial numbers in the file is 0, and the corresponding node on the instrument is different from 0. If checked, serial number 0 will be accepted without any warnings displayed (refer TD275 SeaGuard Offline Configuration, for the usage of serial number 0).

Press **Next** to continue or **Cancel** to abort the import wizard.

**Note:** Some sensors with an early software version do not support configuration version handling and will be given configuration version 0. If the configuration structure in the file differs from the one on the instrument, there is a possibility that import is unavailable for sensors with configuration version 0.
The **Serial Number Mismatch** warning appears when the matching node in the configuration file has a different serial number than the node on the instrument. The import must be confirmed by checking *Please confirm import*.

*Note! If the serial number is 0, this warning can be avoided by checking the Accept Serial Number 0 on the Import Wizard Start Page, refer Figure 4-24.*

Press *Next* to continue, *Back* to go to the previous page or *Cancel* to abort the Import Wizard.

The **Multiple source selection** warning appears when there is more than one available configuration for a target node in the configuration file. The preferred source for import can be selected in the *Import Source* drop-down box. If one of the source nodes has a matching serial number, the node will be selected by default.

Press *Next* to continue, *Back* to go to the previous page or *Cancel* to abort the import wizard.

Example: Figure 4-26 shows that the sensor named Pressure # 18 on the instrument can choose to import the settings from either Pressure #18 or Pressure #19 in the configuration file.
The **Summary** page will list all changes that will be made to the current configuration if you press **Finish**.

Click **Finish** to apply the changes, **Back** to go to the previous page or **Cancel** to abort the Import Wizard.

**Instrument Identification**

*Instrument Identification* gives the instrument’s and the sensor’s identity, and is therefore mainly used when you have contact with factory for e.g. service reasons.

In the **Identity** pane you get information about the Instrument type and Serial number, refer Figure 4-28.
In the **Main Board** page, information about the CE Image is available; Image name, Image version, Image build, and Registry version, refer Figure 4-29.

CE Image is the Aanderaa version of the Instruments operating System.

Display off

*Display off* is used for minimizing current consumption.
Command prompt

Command Prompt is used for running DOS programs. It is mainly used when manually updates from SD card should be driven.

Licensed Features –Option Modules

A licensed feature is enabled by installing a license key. The license key can be installed from a license file on the SD card or entered directly as a 16 digits number code. The license key is Instrument unique (based on the product- and serial number) and can not be installed in multiple instruments.

Note! Make sure that the SeaGuard Image version supports the new option. An Image upgrade can be necessary.

Open Administrative Tools-> Option Modules.

The license key or the license file can be received by e-mail. Download the license file to the SeaGuard SD card and install the SD card in the instrument.

The installation procedure is independent of which module to enable; we will illustrate the installation with the Aanderaa Real-Time Module.

Figure 4-31 Information about the Nodes.
Start installing the license by either:

- Press **Install from SD card** to install the license key as part of the license file. All license files on the SD card are automatically detected and installed. When installed from the license file, the key is entered automatically.

- Or select the correct module and press **Enter Key** to enter the license key directly, refer Figure 4-33.

The license key number format is:

XXXX-XXXX-XXXX-XXXX.

If the license file/key is valid for the instrument/module you are asked *Do you wish to install the Module?* Press **Yes** to install or press **No** to abort the installation.

You are told to restart the instrument. Refer CHAPTER 1, page 10 and 12 for deployment configuration and setup issues.
When the license file has been installed from the SD card, you are notified with some installation requirements and setup issues. You are also notified if the SeaGuard Image version does not support the option module.

Read the instructions on screen. Press OK to finish the installation.

Figure 4-35 Installation from SD card provides the user with some Installation Information.

<table>
<thead>
<tr>
<th>Install Info</th>
<th>OK</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>- AADI: Real-Time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A restart is required.

After instrument reset run "System Configuration" to setup the RS-422 port settings.

Enable/disable Real-Time output in "Deployment Settings"
CHAPTER 5 Control Panel

The Control Panel mainly contains standard Windows CE Icons. Only specific SeaGuard icons are described below.

Date/Time, Network and Dial-up Co, Regional Settings, Storage Manager and Stylus are therefore not described any further.

Battery Capacity

The user can check the battery capacity by looking at the battery icon at the lower right end of the LCD screen. A more accurate reading is presented in the Battery Menu in the Control Panel.
Flash Registry

With *Flash Registry* you can store current registry content in persistent flash memory.

For more information of Flash Registry and updating of Flash Registry refer subchapter *Software update of Main Board* in CHAPTER 8.

SD Storage

In the *SD Storage* menu you find status about Storage Memory and you are able to Erase Storage on SD Card or Check Storage.
S-Flash

In the S-Flash menu you find status about the Serial Flash memory status.

You are also able to Erase or Check out the Serial Flash in the lower part of the window.

**Important!** Do not delete the S-Flash without consulting Aanderaa personnel. The Recorder, storage manager, analog configuration are stored in the S-Flash and will be lost if deleted.

![S-Flash Status](image)

**Figure 5-5 S-Flash Status**
CHAPTER 6 SeaGuard Studio

SeaGuard creates a data session folder containing several files. The complete folder must be imported into SeaGuard Studio. The folder name is automatically created based on the deployment date and time: Instrument_Serialno_yyyymmdd_hhmm, refer Figure 6-1.

This chapter guides you in SeaGuard Studio: how to import your measurement data folder, how to open and customise graphs for best visualisation of your data, and how to export graphs or data set.

Note! Install the SeaGuard Studio from the installation CD.

Important! Always use the latest version of the SeaGuard Studio Software. Download the latest version from our customer web site that you find at www.aanderaa.no, or contact your local representative or e-mail aanderaa.info@xyleminc.com

Import Data

Note! We recommend that you copy all of the data session folders from the storage device (SD card) to a directory with names that links to the deployments.

A new measurement set must be imported into SeaGuard Studio:

1. Connect your SeaGuard Instrument to the PC, refer the section Connection between the SeaGuard Instrument and a local PC, page 13. Copy your data session folder from the SD card to a folder on your PC. Refer Retrieval of the Instrument, page 64 for more information about importing data from SD card to PC.

2. Start SeaGuard Studio.

3. Click the import button or select Import in the file menu.

4. Browse for the data session folder in which you copied your data, and click OK, refer Figure 6-1.

A progress bar informs you the download status.

Figure 6-1 Browse for Folder
When the data session folder has been imported, the data list is seen in the main window, and a control panel is found to the left, refer Figure 6-2.

Each node has its separate sheet in the Data list; each Record is numbered and has a Time tag in GMT.

The Control panel consists of a Setup view, a Graph view and a Tasks view. Setup holds information about the deployment configuration and settings, Graphs View visualises your measurements, and you can import/export data set from the Tasks view. Refer the next pages for guides.

**Note!** Several data sets can be imported into SeaGuard Studio at the same time for comparisons between measured parameters from different deployments.

### Customising Graphs

To display a graph: click the Graphs tag at the bottom of the control panel, select Sensor Values versus Time under General Line Graphs, and start configuring, refer Figure 6-3.

Expand the data set to view nodes and the measured parameters. Select one or more parameter from the listed nodes.

By default, none of the parameters are selected. When selected, the icon in front of the parameter name turns red, and a small mark will show next to the icon.
Note! When you expand a second node, the first nodes parameters are not longer listed; all selected parameters will show on the graph.

Figure 6-3 Graph Configuration; single data set

When the parameters have been selected, type Graph Title, add Legend, Time zooming sliders etc from the right part of the graph configuration window. Include time zooming sliders to confine the time interval without deleting records, refer Figure 6-4.

Right click the icons on the toolbar above the main window/control panel to reconfigure the graph setup, add cursor, reset graph, store graphs, etc. Hold down CTRL + left mouse button allows you to select a graph area to zoom in.
Data from all of the imported data sets are available in graphs; each data set has its separate sheet in the Graph Configuration window, refer Figure 6-5.
Full Screen View

Press the Alt + Enter key for a full screen view of the current graph or data list. Press Esc to return to the Main window/Control panel.

Exporting Graphs

The graph can be saved as it is currently displayed in either .jpg, .emf, or .bmp format by pressing the respective buttons in the toolbar above the main window/control panel.

Export Data

Click the Tasks tag at the bottom of the control panel, and select from the menu:

- Export value type data to text file, Export value type data to MatLab, Export value type data to DRP5059, Export array type data to text file, or Export array type data to MatLab.

If you select to export value type data, you can export parameters from all of the nodes in the deployment configuration.

If you select to export array type data, you can only export parameters generated from the ZPulse.

If you select to export value type data to DRP5059, Data List must be active, and only parameters from one single node can be exported at a time.

Note! The DRP5059 operates with sensor readings at 10 bit resolution, which is less than the sensor resolution.
Expand the data set to view nodes and the parameters from each node. Select the parameters to be exported from the list. The bullet in front of the parameter name turns red when checked. The Record number and Time Tag in GMT will also be exported. The exported files include headers.

Select Date format if export to Text file (not optional if export to MatLab has been selected).

Select start and end record; the default setting is to export all records. Press the Export button to start the export function.

Browse for the correct folder to save the file.

If exporting to text file, enter a file name; the file format will be .txt. One single file is generated; the parameters from the first node are listed at the top of the file, while parameters from the second node follows after the last record, etc. The .txt file can be viewed in e.g. MS Excel.

If exporting to MatLab, the file name will be the node name; the file format is .cvs. The Export to MatLab function generates one file for each node you choose to export parameters from. The .cvs file can be viewed in e.g. MS Excel. Import the .cvs file in Matlab using the Import File function.

If exporting to DRP5059, enter a file name. Two files will be generated: one .asc file with the measured parameters (in the raw data format used in DRP5059), and one .sti file with the calibration coefficients and other information required for import into DRP5059. Refer the operating Manual for DRP 5059, TD 208, for import of data set.

**Edit listed data**

When the data list is open, you can remove selected records, or remove all but selected records, refer Figure 6-8 top two options. Mark the desired records, right-click the mouse and select either to remove the selected records, or to remove all but selected records.
Graphs that are open during the editing session will be deleted.

**Figure 6-8 Edit the Data list**

*Note! To select more than one record, press and hold the shift button on your keyboard while marking the records with the mouse or the arrow button (on the keyboard).*

*Important! When saving the modified data set, make sure you use the save as option to avoid overwriting and loosing the original data.*

**Splitting one data series into several shorter data series**

Choosing one of these options *remove selected records*, or *remove all but selected records*, you can export a selection of your data set, either e.g. one week or one month, and save in separate folders for presentation or more analysis.

**Setup**

In the Setup page you can watch information about the instrument and sensors, as well as the Deployment Settings, refer Figure 6-9.
Figure 6-9 Setup
CHAPTER 7 Operating Instructions

Preparations for Use

- Perform deployment configurations and recording configurations (described in CHAPTER 3):
  1. Customise 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 3 and CHAPTER 4.
  5. Activate the Recorder menu. View the deployment settings and select to start the instrument instantly or at a postponed time.
  6. After being armed, the instrument will automatically shut off the LCD display.

The LCD may be reactivated by tapping the display.

However, before putting the instrument into the pressure container, make sure the display is switched off to conserve power. If not done automatically, tap the Display Off menu item in the Administrative Tools menu, refer CHAPTER 4.

Important!

When disconnecting the instrument from external AC Power, remember always to screw the Cover Cap tightly onto the electrical terminal to avoid water infusing 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.
Illustrations of deployment preparations

Figure 7-1 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 180° on the O-ring in order to seat the O-ring and remove any possible contamination from between the O-ring and its sealing surfaces.

Figure 7-2 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.

Figure 7-3 Fasten shackle in frame. Tighten thoroughly.

Figure 7-4 Splice the rope and fasten it to the thimble attached to the shackle.

Figure 7-5 Lock the shackle with strips or locking wire. Locking wire is recommended for higher security in long deployments.
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.
Procedure for retrieving measurement data:

- Stop the recorder if any battery capacity is left. Wait until the progress bar has completed.
- Write down the time of the last recording.
- Turn off the power switch in the front of the instrument.
- Connect the standard cable 4299 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.
- Start up the SeaGuard Studio and import your data as described in CHAPTER 4.

Connection and disconnection of sensors

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 Figure 7-11, 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.
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 Figure 7-12. 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 Figure 7-13. Connect the sensor cable to J6 on the HUB; refer Figure 7-14.
   b. AiCaP sensor in position 1,2,3,4,5: Gently push down the sensor, refer Figure 7-11. Ensure that the red dip switch on the HUB is in off position, refer Figure 7-9.
   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 Figure 7-9. 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.

8. Put the instrument back into the pressure case and tighten the C-clamps.

_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._

---

Figure 7-8 Top view of Top-end plate; Sensor Positions.
Figure 7-9 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.

Illustration of a sensor connection

Figure 7-10 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:

Figure 7-11 AiCaP sensors: Place the sensor according to the orientation pin. Push down the sensor and fasten the set screw.

AiCaP Sensor in position 6:

Figure 7-12 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.
Figure 7-13 Connect the sensor to the patch cable 3969492.

Figure 7-14 Connect the patch cable to HUB plug J6.
Procedure for connecting cable 4784

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

1. Remove the top front cover as illustrated in fig 7.12
2. Remove sealing plug on top end plate marked with Electrical terminal in Fig. 7.8
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 figure 7-16.
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 Figure 7-11, rightmost illustration. Do not unscrew the setscrew completely and remove it, as it might be lost.
4. Disconnect the upper battery, refer procedure on page 72 and Figure 7-11. Unscrew and remove the two screws that hold the top front cover, refer Figure 7-12. 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 (refer Figure 7-8):
   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 Figure 7-9.
   b. Sensor in position 6: Disconnect the sensor cable from the HUB. Disconnect the sensor from the patch cable and pull up the sensor.
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.
7. Put the instrument back into the pressure case and tighten the C-clamps.

*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.*
Battery

The battery compartment, at the rear of the SeaGuard, has room for two batteries, refer Figure 0-2.

*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.*

Removal and insertion of the Battery

To remove a battery from the SeaGuard instrument, follow the instructions below. The procedure is illustrated in Figure 7-12:

1. Place the instrument on the desk with the front facing down.
2. Loosen the centre screw at the rear of the instrument. *NOTE! The screw can not 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 centre, refer Figure 7-17.
4. Let down the battery cover.
5. Tighten the cover screw in the rear centre of the instrument.

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

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.

SD card

Insert the SD card by first unscrewing the SD card-cover at the front of the instrument, refer Figure 7-7. Secondly insert the card with the terminals to the right.
CHAPTER 8 Maintenance

General

Fouling of the SeaGuard 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 SeaGuard may be upgraded by means of the SD card.

Yearly Maintenance

The procedure below indicates the minimum maintenance that must be carried out each year or every time the SeaGuard 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. If leakage, locate the source of the leakage and correct it.
6. Replace the zinc anodes and corroded parts if necessary.
7. Remove the O-rings.
8. Make sure that the O-ring seatings have a clean and smooth surface.
9. Lubricate the O-rings with grease (Klüber Lubrication Syntheso Glep 1 or similar synthetic grease).
10. Replace the O-rings and pressure inlet.
11. If the transducer head has been disconnected, replace the silica gel bags.
12. Always install new O-rings on plugs that have been disconnected.
13. Check for deformation of the C-clamps. Replace if necessary.
14. Always apply TECTYL® on screws before installation to avoid crevice corrosion. Add also TECTYL® around sensors and sealing plugs.
15. Check for scars on the EPOXY coating, the Top-end plate and the frame.
16. Clean the scars with Acetone.
17. Apply Repair Lacquer to repair the scars.
18. Control that the Electrical terminal is securely tightened.
Illustrations of Maintenance Procedures

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

Factory Service

Factory service is offered 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.

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 SeaGuard Tool Kit list, kit no. 3986A.

Figure 8-5 Add Teetyl® around sensors and sealing plugs.
Table 8-1 Tool Kit for SeaGuard, kit no. 3986A

<table>
<thead>
<tr>
<th>Part. no</th>
<th>Description</th>
<th>Pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>913013</td>
<td>Allen Key, NV 5 mm</td>
<td>1</td>
</tr>
<tr>
<td>913002A</td>
<td>Allen Key, NV 4 mm</td>
<td>1</td>
</tr>
<tr>
<td>913022</td>
<td>Allen Key, NV 3 mm</td>
<td>1</td>
</tr>
<tr>
<td>913009</td>
<td>Allen Key, NV 2.5 mm</td>
<td>1</td>
</tr>
<tr>
<td>913035</td>
<td>T-10 Torx Screwdriver</td>
<td>1</td>
</tr>
<tr>
<td>913036</td>
<td>Flat Screwdriver (5 mm)</td>
<td>1</td>
</tr>
</tbody>
</table>

Maintenance Kit for SeaGuard

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

Table 8-2 Maintenance Kit 3813C/3813D for SeaGuard

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

Software update of Main Board

Instructions for uploading SeaGuard Image and descriptions around the procedures are given below.
Upload SeaGuard Image and Update New Registry

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

The Registry is a vital part of the SeaGuard 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.

Instructions for Uploading SeaGuard Image

If you already have a SD card with a SeaGuard 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 large 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 SeaGuard SD slot.
6. Open the SD card Housing in the SeaGuard.

7. Use the stylus to press and hold down the lower boot button in the SD card Housing; Switch ON the SeaGuard before releasing the boot button. Observe that the LCD screen turns on.

8. Release the boot button.

9. Tap the boot button once more; the LCD screen will now appear dark.

10. Release the boot button once more and wait until the LCD screen turns on again; 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, the ordinary start-up screen, with the Menu button appears.

12. Switch OFF the instrument using the power switch, and then switch it back ON to confirm that the new image has been installed.

**Time settings**

Greenwich Mean Time (GMT) is set as default time zone. It is not possible to change the default setting.

You can adjust the time settings. Tap Control Panel in the main menu. Double click on the Date/Time icon, and you will get the Date/Time Properties, refer Figure 8-7.

**Note! If possible we recommend to adjust the time every 3rd month.**

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**Figure 8-6 The SD card Housing**

**Figure 8-7 Date/Time Properties**
# Appendix 1 Technical Specifications

## SeaGuard Platform Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platform capability</strong></td>
<td>60 nodes can be connected to the platform</td>
</tr>
<tr>
<td><strong>Top-end plate capability</strong></td>
<td>Up to 6 sensors can be fitted onto the Top-end plate, of which 4 can be analog sensors (0-5V, requires the optional analog kit)</td>
</tr>
<tr>
<td><strong>Recording System</strong></td>
<td>Data Storage on SD card</td>
</tr>
<tr>
<td><strong>Storage Capacity</strong></td>
<td>512 MB</td>
</tr>
<tr>
<td><strong>Battery</strong></td>
<td>9V, 15Ah (nominal 12.5Ah; 20W down to 6V at 4°C) or Lithium 3677: 7.2V 30Ah</td>
</tr>
<tr>
<td><strong>Recording Interval</strong></td>
<td>From 2s, depending on the node configuration for each instrument</td>
</tr>
<tr>
<td><strong>Recording settings</strong></td>
<td>Fixed interval settings, Customized Sequence setting</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>AiCaP CANbus based protocol</td>
</tr>
<tr>
<td><strong>Depth Capacity</strong></td>
<td>300m/2000m/6000m</td>
</tr>
</tbody>
</table>
| **Platform Dimensions**     | 300m version: H: 356mm OD: 139mm  
2000m version: H: 352mm OD: 140mm  
6000m version: H: 368mm OD: 143mm |
| **External Materials**      | 300m version: PET, Titanium, Stainless Steel 316, Durotong DT322 polyurethane  
2000/6000m version: Stainless steel 316, Titanium, OSNISIL, Durotong DT322 polyurethane |
| **Weight**                  | Depend on node configuration |
| **Packing**                 | Depend on node configuration |