TD 293 OPERATING MANUAL
SmartGuard
5100/5120/5300/5320
May 2014

SMARTGUARD

AANDERAA
a xylem brand

Preliminary version	7 July 2011
Preliminary version	28 September 2011
1st version	17 February 2012
2nd version	20 December 2012
3rd version	14 May 2014

Table of content

Introduction

Purpose and scope

This document is intended to give the reader knowledge of how to operate and maintain the Aanderaa SmartGuard 5100/5120/5300/5320. All versions are described in a single manual since their basic functions are the same. They are similar when it comes to configuration of sensor and other device connections, and communication with the data logger. 5100 is the basic version. 5120 has the same features as 5100 plus capacity to connect Aanderaa SR-10/VR-22 sensors. 5300 is similar to 5100 but with an expansion module with extra connectors for analog, digital and serial sensors. 5320 is identical to 5300 plus the capacity to add Aanderaa SR-10/VR-22 sensors.

Document overview

CHAPTER 1 gives a short description of the AADI SmartGuard

CHAPTER 2 gives a description of the SmartGuard design and basics

CHAPTER 3 describes how to get started with your SmartGuard

CHAPTER 4 describes SmartGuard configuration

CHAPTER 5 describes SmartGuard recording

CHAPTER 6 gives a description of how to add a new sensor to your SmartGuard system

CHAPTER 7 gives a description of the SmartGuard display and its functionality

CHAPTER 8 gives a description of real-time data transfer and local data storage

CHAPTER 9 describes the procedure for upgrading image

Appendix 1 describes the pin configuration of the SmartGuard connectors

Appendix 3 gives an example of a typical Hyd/Met system using SmartGuard

Requirements

AADI Real-Time Collector

Applicable documents

TD 268	Operating manual for AADI Real-Time Collector
TN 313	Technical note for AADI Real-Time Viewer
TD 291	Operating manual for AADI GeoView
TN 362	SmartGuard serial sensor configuration
TN 363	SmartGuard supported protocols

Data sheets for AADI sensors, refer page 8 and 9

SmartGuard versions

Basic version-5100

Extended version-5300

Meteorology version with SR10/VR22-5120

Extended Meteorology version with SR10/VR22-5320

Figure 0-1-1 SmartGuard versions

Version comparison Sensor capabilities	AADI Smart Sensors (AiCaP)	# Serial sensor channels	SR10,VR22 channels	Analog channels	Digital channels
Basic version, 5100	20+	2	0	3	2
Basic version with SR10/VR22 , 5120	20+	2	11	3	2
Extended version, 5300	20+	6	0	6	4
Extended version with SR10/VR22, 5320	20+	6	11	6	4

Table 0-1 SmartGuard versions

IMPORTANT! The number of AiCaP sensors depends on which AiCaP sensor you connect, as the total peak current drain for all AiCaP sensors added together must be less than 2A.

SmartGuard sensors from Aanderaa

Table 0-2 lists Aanderaa hydrological sensors that can be connected to SmartGuard. Please refer the sensor data sheet for specifications and other details.

Refer next page for a list of Aanderaa meteorology sensors for SmartGuard.

Hyd-sensor	Number	Data sheet	RS-232	RS-422	AiCaP	Analog	SR10/ VR22
Conductivity sensor	4319	D 369	x		x		
Conductivity sensor	3919	D 344	x				x
ZPulse Doppler Current Sensor	4420/4520 4830/4930	D 367	x		x		
ZPulse Doppler Current Sensor	4420R/4520R 4830R/4930R	D 367		x			
Doppler Current sensor	4100	D 359					x
Doppler Current sensor	4100R	D 359	x				x
Oxygen Optode	4330/4330F	D 378	x		x		
Oxygen Optode	4835	D 385	x		x		
Oxygen Optode	4831	D 403	x			x	
Oxygen Optode	4531	D 404	x			x	
Oxygen Optode	3830	D 335	x				x
Oxygen Optode	3835	D 355	X				x
Pressure sensor	4017	D 357	x				x
Pressure sensor	4117	D 362	x		x		
Temperature sensor	4050	D 360	x				x
Temperature sensor	4060	D 363	x		x		
Tide sensor	5217	D 405	x		x		
Tide sensor	5217R	D 405		x			
Turbidity sensor	4112	D 377				x	
Turbidity sensor	3612	D 316					x
Vented Pressure sensor	4425/4426/4427	D 402	x		x		
Vented Pressure sensor	4425R/4426R/4427R	D 402		x			
Vented Tide sensor	4445/4446/4447	D 402	x		x		
Vented Tide sensor	4445R/4446R/4447R	D 402		x			
Vented Wave and Tide sensor	4428/4429	D 402	x		x		
Vented Wave and Tide sensor	4428R/4429R	D 402		x			
Wave and Tide sensor	5218	D 407	x		x		
Wave and Tide sensor	5218R	D 407		x			

Table 0-2 Aanderaa hydrological sensors.

The table below lists Aanderaa met-sensors that can be connected to SmartGuard. Please refer the sensor data sheet for specifications and other details.

Met-sensors	Number	Data sheet	SR10 /VR22	Digital
Wind speed and gust	2740	D 151	x	
Wind direction	3590	D 300	x	
Air temperature	3455	D 276	x	
Air Pressure	2810	D 161A	x	
Solar radiation	2770	D 159	x	
Net radiation	2811	D 169	x	
Mira visibility	3544	D 294	x	
Relative humidity	3445	D 271	x	
Temperature sensor	3444	D 277	x	
Rainfall	3864	D 327	x	
Rainfall	4628	D 408		x
Road condition sensor	3565	D 298	x	
Road temperature sensor	3304	D 247	x	

Table 0-3 Aanderaa meteorological sensors.

CHAPTER 1 Short description of SmartGuard

SmartGuard is the next generation sensor- and instrument HUB for Ocean, Lake, Reservoir, Estuary and River Hydrometric stations.

SmartGuard is targeted to integrate new and existing sensors into an Aanderaa observatory node with modern self-describing data format, real-time communication and large data storage capacity.

SmartGuard takes all Aanderaa sensors, including subsea and meteorology sensors, as well as most 3rd party sensors. You can connect a GPS receiver to the logger and transmit data via LAN, AIS, modems or satellite communication.

SmartGuard has great flexibility with data registration from a vast number of sensors subsea and air, making the SmartGuard well suited for a variety of applications such as e.g. Automatic Weather Stations, Road Weather Stations, Wind Monitoring Systems, Water Level Measuring Systems and more.

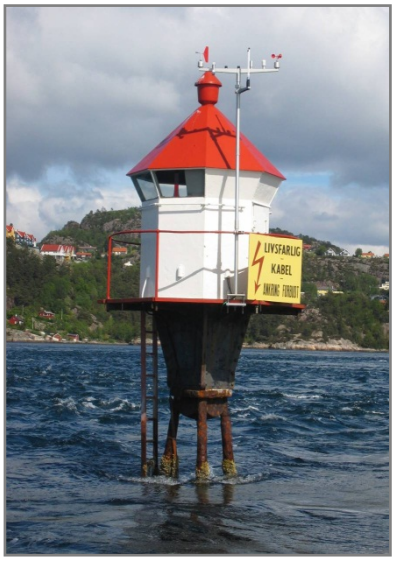
SmartGuard is easy setup from up to date PC Software, and it is fully integrated with AADI real-time system.

Features of SmartGuard:

- Great flexibility: Basic and Extended versions to handle air and water sensors
- Flexible easy configuration and setup using PC software
- XML data records with complete metadata; traceable and with status info on individual parameters
- Low power consumption
- Easy readable display and 6 key operator panel
- Fully integrated with AADI real-time system
- RS-232 communication port with controlled power supply for communication equipment
- Large onboard data storage capacity on a removable SD memory card
- External power supply 11- 30V, internally regulated
- Full AiCaP bus compatibility, including 150 m string with up to 25 sensors
- Plug-n-play Aanderaa Smart sensor interfaces: Current speed and direction, Oxygen, Conductivity, Temperature, Pressure, Wave and Tide
- Aanderaa SR10 and VR22 meteorological sensor interfaces: Wind speed and direction, Temperature, Relative Humidity, Visibility, Air Pressure and more
- Interfaces for most 3rd party RS-232/RS-422 sensors, analog sensors, digital sensors
- Up to 6 double ended analog sensor input (0-5V, 24 bit)
- Individual power control for attached sensors

1.1 Description of some typical SmartGuard systems

Hyd-Met station



A typical Hyd-Met station with SmartGuard uses an Aanderaa mast equipped with air sensors and subsea sensors measuring e.g. current and waves. A Real-Time communication device, e.g. a GPRS modem provides on-line connection to a receiving location.

Aanderaa can also provide in-line moorings, bottom mooring frame, and data buoy installations with current profiler instrument.

Refer Appendix 3 for an example of a SmartGuard hyd-met station system drawing.

Road-station

A typical Road station with SmartGuard uses an Aanderaa Road Condition Sensors and a mast equipped with air sensors, and a rainfall sensor. A Real-Time communication device, e.g. a GPRS modem provides on-line connection to a receiving location.

Automatic Weather Station (AWS)

A typical AWS installation uses an Aanderaa mast equipped with air sensors and a rainfall bucket sensor. The SmartGuard can be installed inside the Weather Station housing. A Real-Time communication device, e.g. a GPRS modem provides on-line connection to a receiving location.

Wind and Tide Station

A simple wind and tide monitoring system for e.g. small harbours/marinas uses an Aanderaa mast equipped with wind sensors, and a tide sensor with temperature reading. A UHF/VHF radio provides data transmission to a receiving location.

CHAPTER 2 SmartGuard basics

This chapter describes the design idea and basics of SmartGuard addressing the system from configuration of attached devises till actual data collection and transfer/storage of data. Please refer CHAPTER 4 for details on how to connect, configure and record data using AADI Real-Time Collector software.

Note! You can start/stop recordings, view data and system status directly from the SmartGuard display. You will need the AADI Real-Time Collector software to connect additional sensors and to configure systems and sensors.

SmartGuard is designed to integrate a variety of sensors from simple analog sensors to advanced smart sensors (from Aanderaa as well as from 3rd party vendors).

All connected sensors must appear as smart sensors to the system: simple sensors that are not 'smart' needs to be given a correct set of parameters/layout for the SmartGuard to identify the sensor and to present sensor data correctly. This is done in the AADI Real-Time Collector's Device Layout. Next, the user can perform ordinary sensor configuration.

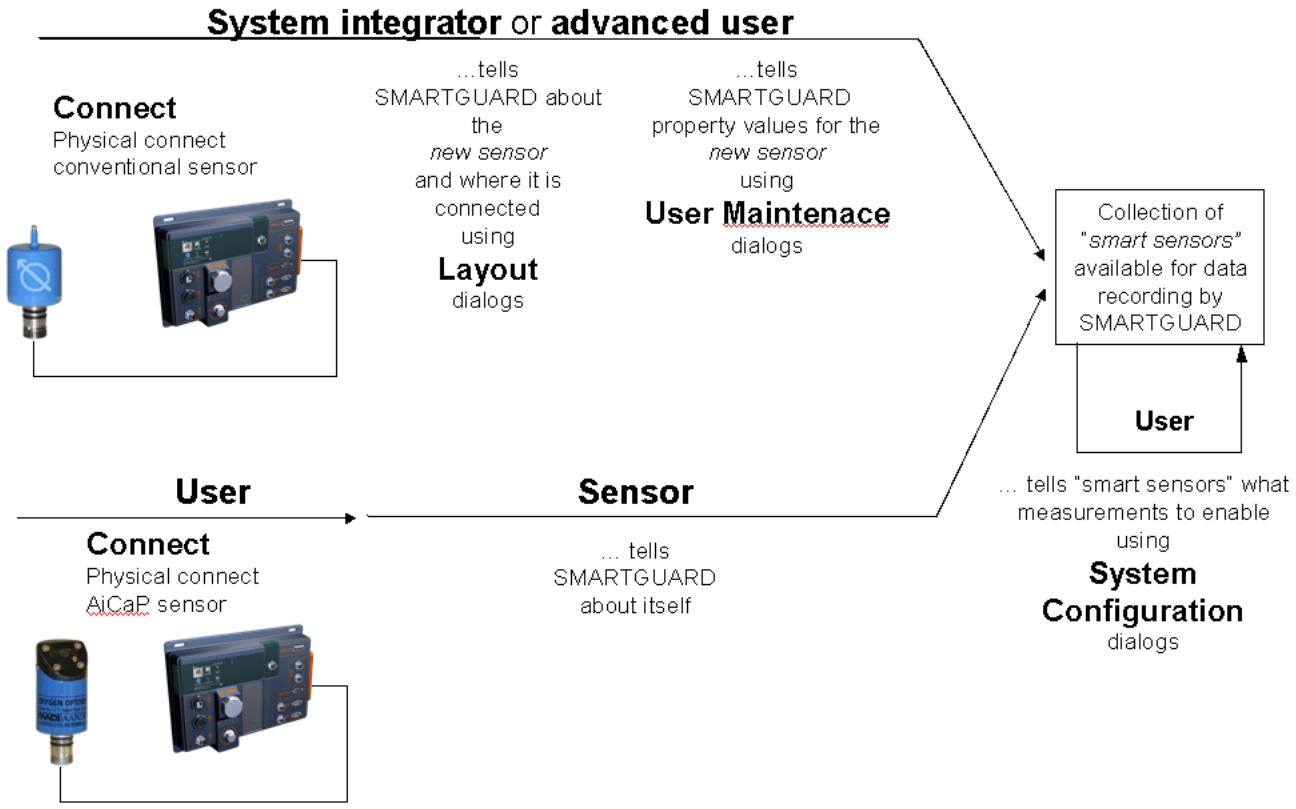


Figure 2-1 Sensor integration with SmartGuard.

When using AADI Real-time collector SmartGuard settings are divided into three levels: **Device Layout, Device Configuration, and Recording Panel**. These setting are available in the **Control Panel**:

- The **Device Layout** level binds the actual connected sensor to the physical port that it is connected to. It holds 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 SmartGuard at power up. For all other sensors the information is stored in the SmartGuard
- The **Device Configuration** level 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 altered using AADI Real-time collector. A new configuration will then be stored in the sensor and used at next power up. For all other sensors the configuration is stored in the SmartGuard. Device Configuration is categorized into three different levels: Deployment Settings, System Configuration and User Maintenance.
  - **Deployment Settings** deals with settings connected to the location and the particular measurements that are to be reordered following the setup.
  - **System Configuration** settings deals with settings that are usually not changed between deployments/recording sessions like e.g. sensor output parameter, timing for power control etc.
  - **User Maintenance** deals with advanced settings that are rarely changed in a system setup. The user needs a certain level of sensor skills and system understanding to make correct settings.
- The **Recorder Panel** is where you start and stop data recording, monitoring data and enables real-time distribution of data. Each parameter value appears as being measured by a smart sensor, traceable to the individual sensors serial number, linearized and presented in engineering units, checked against set limits and more.

Use AADI Real-Time Collector to configure the system and sensors. Settings and configuration can be saved and stored on your computer for backup; these files can be restored to the SmartGuard using the SD-card or real-time transfer.

The configuration setup is kept unchanged during recording. Thus for every recording session you will have a complete unaltered configuration file in order to keep full integrity and traceability of your dataset.

2.1 Collecting data with SmartGuard

Data collection is controlled by the **Multi Group Recorder** available from the **Control Panel > Device Configuration > Deployment Settings** menu. Sensors are organized in up to 3 separate groups. Each group has its own recording interval and will generate its own set of data files. The groups will also generate its own real-time data message.

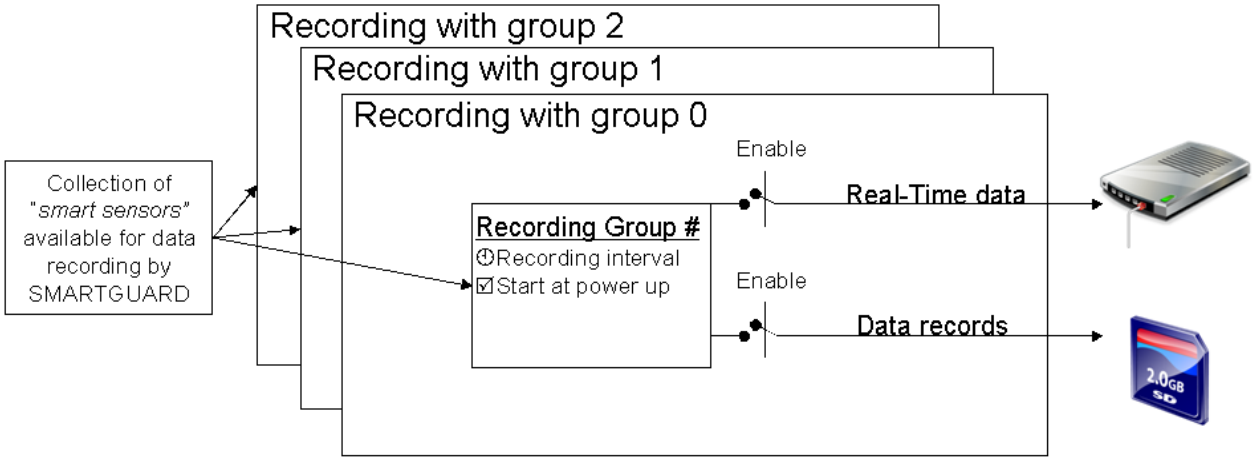


Figure 2-2 Recording group structure.

Data collecting is perceived as recording sessions started and stopped by the user. The recording session can start at power up if enabled. Recording groups can be started and stopped individually or all together. A recording session starts when the first group is started and ends when the last one is stopped.

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. You will then secure the full integrity of your data and connected configuration.

2.2 Real time data transfer with SmartGuard

When enabled for real-time data transfer each new data record will be transmitted through the communication port immediately.

SmartGuard 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 SmartGuard.

SmartGuard also supports cabled real-time transfer via Ethernet.

The data format is AADI Real-Time XML protocols.

2.3 Connecting and operating SmartGuard

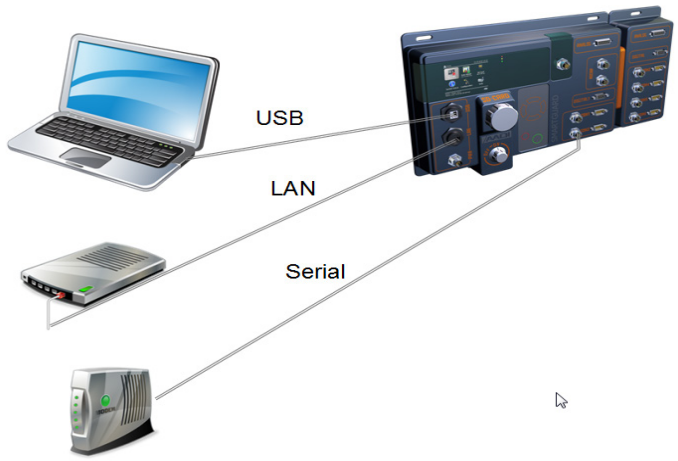
SmartGuard is closely mated with the AADI Real-Time System. Setup of a SmartGuard system is done from a connected PC running the AADI Real-Time Collector application. Control and data monitoring is also handled there. More limited functionality is although available on SmartGuard's front panel.

For configuration purpose we recommend to connect the SmartGuard to your PC via USB. However the PC may be locally connected through a serial or Ethernet cable or through a remote connection of any suitable type. In the default configuration serial and LAN communication is not enabled. To enable these ports and to configure the associated communication protocol you need to connect your PC running AADI Real-Time collector to the SmartGuard via USB.

NOTE!

When using an USB connection, you also need to download Windows Mobile Device Center (Windows Vista, and Microsoft Windows 7) or Microsoft ActiveSync (Windows XP or earlier operating systems).

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



SmartGuard has a colour display and a keypad.

The user can view current configuration and settings, view recorded data, as well as performing recording operations.

CHAPTER 7 describes operation of SmartGuard directly from the display.

Figure 2-3 Alternative SmartGuard connections for configuration.

CHAPTER 3 Getting started

At delivery the SmartGuard system will, in most cases, already be assembled, all system parts included, the attached devices and sensors defined and configured. The system may have been partly disassembled for transport purposes and may need to be reassembled according to the system drawing. In both cases the complete system has been tested to verify the correct functionality.

Connect and/or check all system parts and connections according to the system drawing.

Connect the power cable (11-30V), refer Figure A 2 in Appendix 1 - 1 and turn the power switch ON to power the SmartGuard; the instruments needs approximately 30 seconds to start.

Figure 3-1 SmartGuard power switch.

Note! If your SmartGuard is not initialized and/or you have other sensors than just AADI Smart sensors (AiCaP), or when you add additional sensors to the system at a later time then refer CHAPTER 6 for a description of Device Layout to define your system.

3.1 View settings and start recording directly from the SmartGuard display

Figure 3-2 SmartGuard main menu.

SmartGuard colour display provides information and basic operational functionality to a local user.

Refer CHAPTER 7 for a detailed description of operating the SmartGuard display.

Note! ***Navigate using the keypads and press the green ring to open.***

View settings and start recording:

- Press green ring to activate display
- Move to **Configuration** using keypad
- Press green ring to open
- Open **System Configuration** to view current configuration
- Return to ***Main Menu*** using red ring.
- Open ***Recorder*** to set recording interval and to start recording
- Return to ***Main Menu*** using red ring.
- Open ***Data Viewer*** to verify incoming data: Data must be viewed for one sensor at a time

Procedure to view incoming data:

- Open **Data Viewer**
- Select a recording group. Press green ring to open
- Select a sensor. Press green ring to open. You can inspect the most recent records by using the right/left navigation keys on the keypad. The number of availabale records is default 10, but may be set to any value between 1 and 20 in **Device Configuration > User Maintenace > Storage Manager > History Records,** refer chapter 4.3.1

3.2 View settings and start recording using the AADI Real-Time Collector

- Connect SmartGuard to the PC (USB, Com port or LAN)
- Start or bring up the AADI Real-Time Collector, refer TD 268 AADI Real-Time Collector Operating Manual

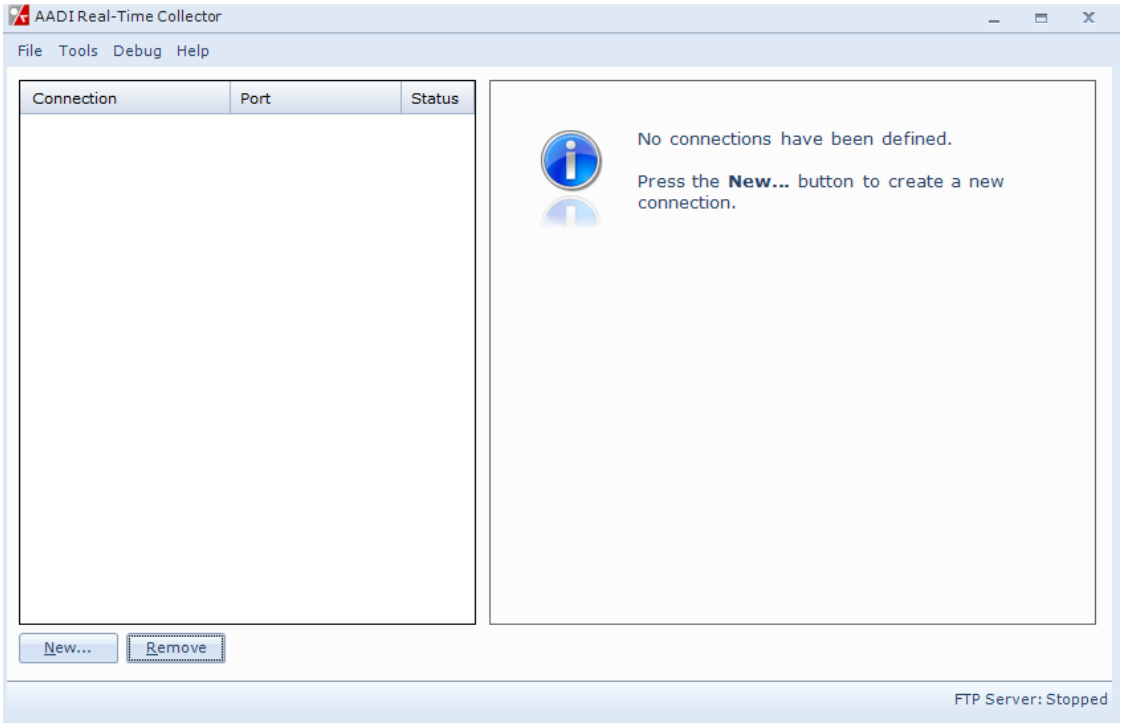


Figure 3-3 Configuring the SmartGuard using AADI Real-Time Collector.

- Connect to SmartGuard:
- Press ***New*** and select the actual port:

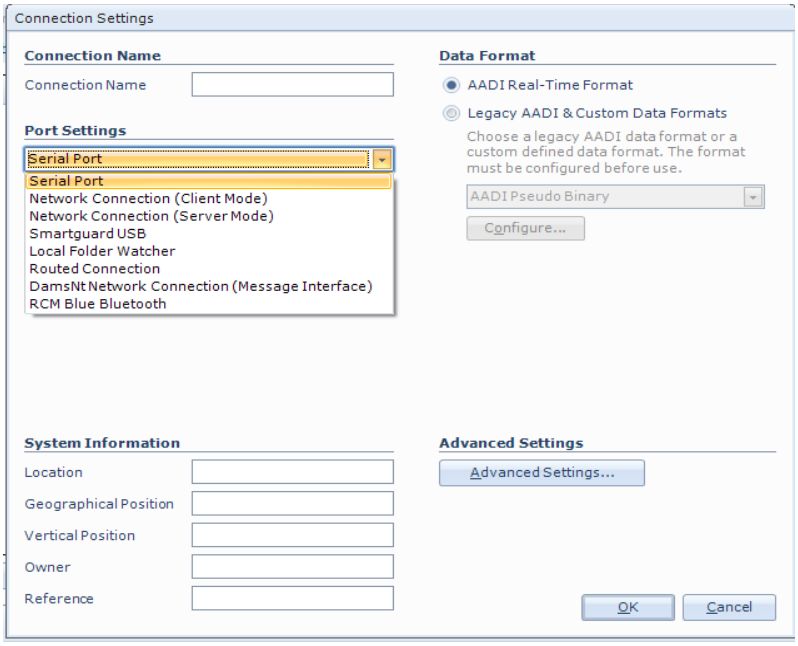


Figure 3-4 Selecting port settings

3.2.1 Connection using USB

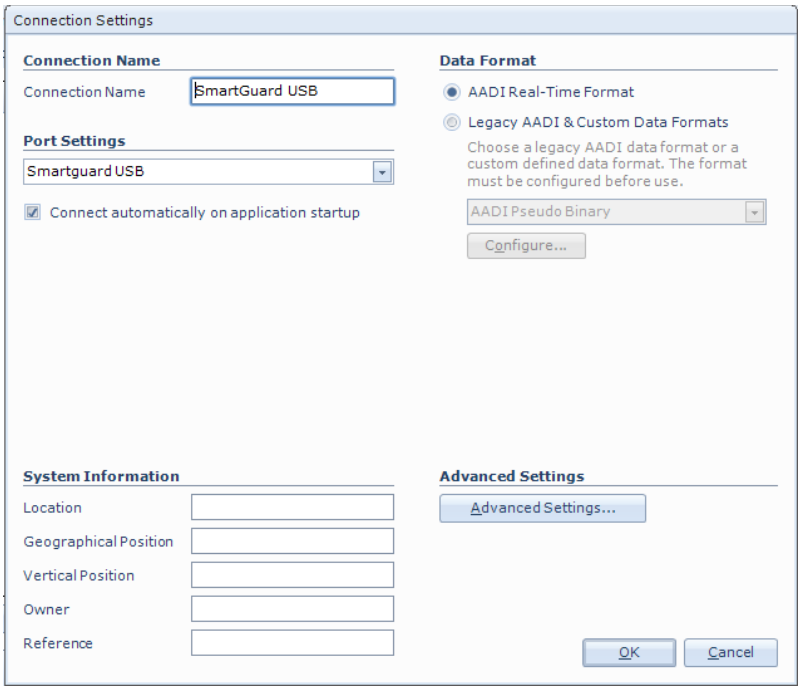


Figure 3-5 Connection via USB

- Write a name in the ***Connection Name*** box.
- Select ***SmartGuard USB*** from the ***Port Settings*** drop down menu
- Press ***Open Port*** and the connection to the SmartGuard should be established within a few seconds. (If not make sure that "Windows Mobile Device Center" or "Microsoft ActiveSync is installed on your PC.

3.2.2 Connection using Serial port

Only to be used if you already using serial port as communication channel.

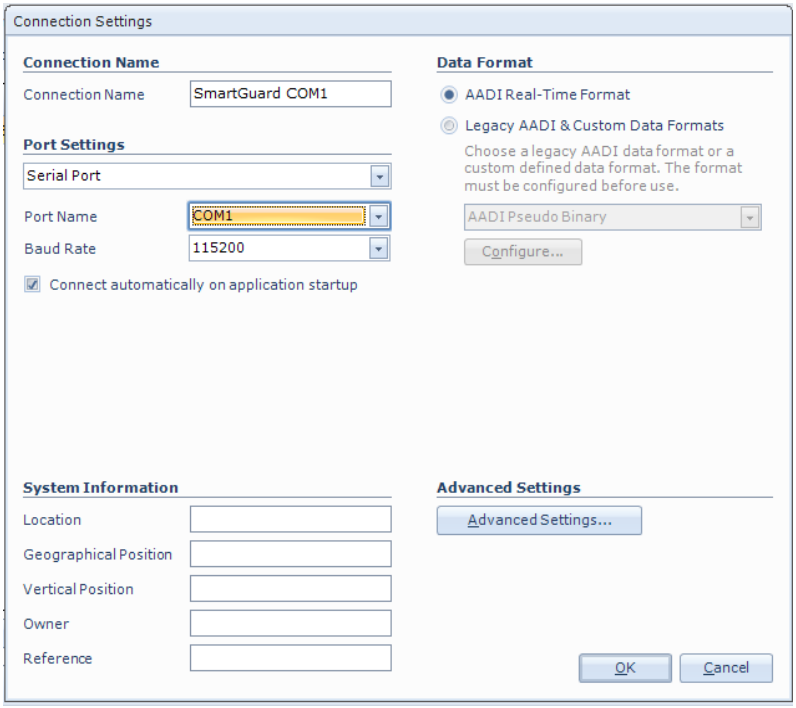


Figure 3-6 Connection via Serial Port

- Write a name in the ***Connection Name*** box.
- Select ***Serial Port*** from the ***Port Settings*** drop down menu
- Select the correct COM port from drop down list
- Select the baud rate, refer chapter 3.3
- Press ***OK***
- Press ***Open Port*** and the connection to the SmartGuard should be established within a few seconds (If not then check that correct port and port settings are used)

3.2.3 Connection using LAN

Only to be used if you already using LAN as communication channel.

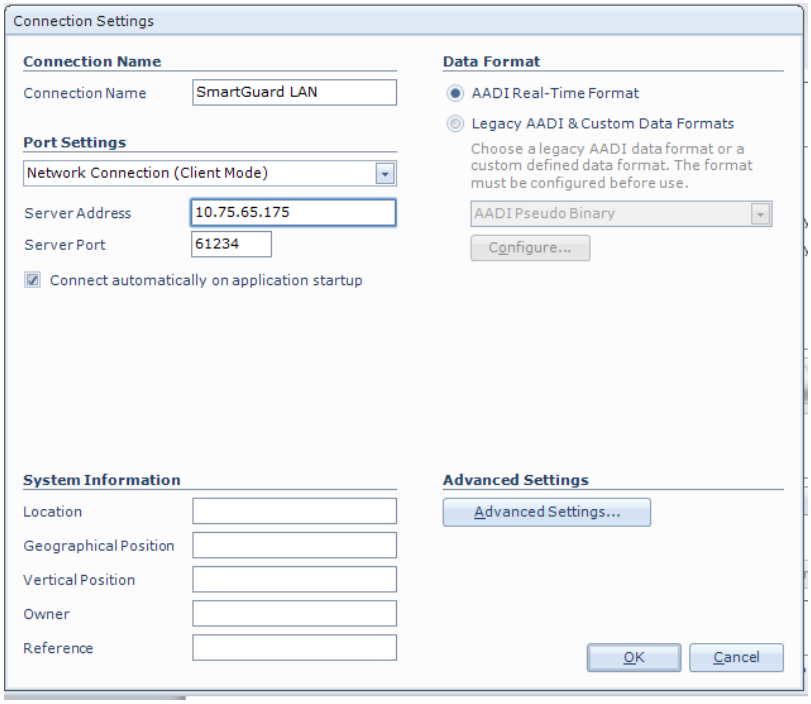


Figure 3-7 Connection via LAN

- Write a name in the ***Connection Name*** box.
- Select ***Network Connection (Client Mode)*** from the ***Port Settings*** drop down menu
- Select the correct IP address, refer chapter 3.3
- Select the Server port, refer chapter 3.3
- Press ***OK***
- Press ***Open Port*** and the connection to the SmartGuard should be established within a few seconds (if not then check that correct port and port settings are used)

3.2.4 View and edit settings using AADI Real-Time Collector

- Open ***Control Panel*** and select the ***Device Configuration*** tab, refer Figure 4-2
- Press ***Get Current Configuration*** (do not tick the Include User Maintenance box since this require a password, refer chapter 4.3
- Open ***System overview*** to verify the device settings
- Open ***System Configuration*** to verify/edit output parameters from each device, refer chapter 4.2
- Open ***Deployment Settings*** to verify/edit specific deployment settings, refer chapter 4.1

3.2.5 Start recording using AADI Real-Time Collector

- Return to Main menu
- Open ***Control Panel*** and select the ***Recorder Panel*** tab
- Set the recording intervals for each individual group if enabled in Deployment Settings, refer chapter 4.1
- Start individual groups or Start all Groups

3.2.6 Verify data and recording operation using AADI Real-Time Collector

- Return to the Main menu
- Click the spreadsheet image/text viewer located under the Data Visualization header to view real-time data in a stylesheet format.
    - Use the tabs in the top row to select the recording group to display data from one group or scan trough all active groups.
    - Tick Auto Refresh to receive updated data
- Click the graph image under the Data Visualization header to use the chart viewer.
    - Select up to 4 parameter to display on the Y axis

3.3 Communication settings

Communication settings can then be changed in ***Device Configuration, User Maintenance, Real-Time Server*** heading, to access the ***User Maintenace*** you need to enter the password, refer chapter 4.3. Most communication settings should not be changed. Default values are settings for communication with AADI Real-Time Collector.

Settings for serial connection:
To access this settings you need to add a Real-Time COM Port in the Communication menu, refer chapter 6.6.

Baud Rate: The default baud rate is 11500. Select a baud rate in the range 2400 to 115200 (the baud rate must equal 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 and Xon/Xoff. Set the value to Xon/Xoff when the receiver is the AADI Real-Time Collector.

USB and LAN connection:

The ***Lan Server Settings*** are only accessible if LAN is activated in ***Instrument Setup***, refer chapter 6.9.

Enable ***Keep Alive*** in order to keep a connection continuously open. The client sends Keep Alive messages and the server will keep the connection open as long as the Keep Alive messages are received within the specified interval; if not the server will disconnect the client. Default ***Keep Alive*** settings are given below.

USB communication requires no settings; you can adjust the ***Keep Alive*** parameters (we recommend the default setting).

USB Client Settings

Property	Value
Port	60104
Send Keep Alive	☑
Keep Alive Char	0 (Null)
Keep Alive Interval (ms)	5000
Enable Wake up	☑
Enable Debug Log	☐

Network communication settings:
You can adjust the ***Keep Alive*** parameters (we recommend the default setting). If conflicting with other systems, you can change the default port 61234 for the IP connection (very rear).

LAN Server Settings

Property	Value
Port	61234
Enable Keep Alive Detect	☑
Keep Alive Char	0 (Null)
Keep Alive Time out (ms)	60000
Enable Debug Log	☐

3.4 Real time data and storage

Data received by the AADI Real-Time Collector are distributed to overlaying applications like e.g. AADI's GeoView. GeoView store received data in a database and offers a variety of real-time display panels.

Optionally data may also be stored to files directly by the Collector. These data may be exported to Excel readable formats for analysis or post processing or read by other applications.

The application interface for receiving real-time data provided by the Collector is easy to access and to use by third party or other customer applications. The application interface is well documented.

3.5 Overview of configuration settings

The complete configuration consists of sensor settings, presentation of data, typing fixed parameters, site information, recording settings etc. refer for a brief overview of Table 3-1.

Table 3-1 Overview of configuration settings for SmartGuard

Panel/Heading	Heading	Settings	AADI RTC	SG display
Recorder Panel				
		Start/stop recording Set recording interval (if enabled, refer chapter 4.1.1)	x x	x x
Device Configuration				
Get Current Configuration		Get current configuration	x	
Deployment Settings	SmartGuard Platform	Type site info	x	
	Multi Group Recorder	Place sensors in each group Set recording interval Enable real-time output Enable storing to SD card	x x x x	
	Sensors	Sensor deployment settings	x	
System Configuration	Real-Time Server	Communication port settings Enable communication properties	x x	
	Sensors	Enable sensor parameters Set calculation values	x x	
User Maintenance	SmartGuard Platform	Sleep settings Display power settings	x x	
	Multi Group Recorder	Enable debug file	x	
	Real-Time Server	Communication port Transmit/receive settings File compression and transfer	x x x	
	Sensors	Sensor user maintenance settings	x	
System Overview		View deployment settings	x	x
Save configuration to file		Save configuration to file	x	
Device Layout				
Device Layout	Sensors	Set layout for new sensor	x	
	Instrument Setup	View instrument layout	x	x
Save layout to file		Save current layout to file	x	
System Status				
		View key information like: battery voltage, storage capacity, memory capacity	x	x

3.6 Interpretations of the LED on the front panel

The ***lower LED*** describes SmartGuard device status during power up and during data transmission:

- The colour is red at power up and for about 10 seconds. Next, the LED gives a green flash and then switches off. The display turns active after approximately 10-15 seconds.
- Yellow light indicates data transmission.

The ***middle LED*** describes the recording status: the colour is flashing green when recording (approximately 1 Hz).

The ***upper LED*** is used to describe the Network connection; the colour is yellow when LAN is enabled and physically connected.

CHAPTER 4 SmartGuard configuration

SmartGuard must be connected and operated through AADI Real-Time Collector in order to have access to the full set of operations and information available with the device, refer chapter 3.3 for communication settings.

Refer TD 268 Operating manual for AADI Real-Time Collector for a complete description of how to install and use the application.

Select the AADI Real-Time Collector SmartGuard connection, and press ***Connect*** to open the connection.

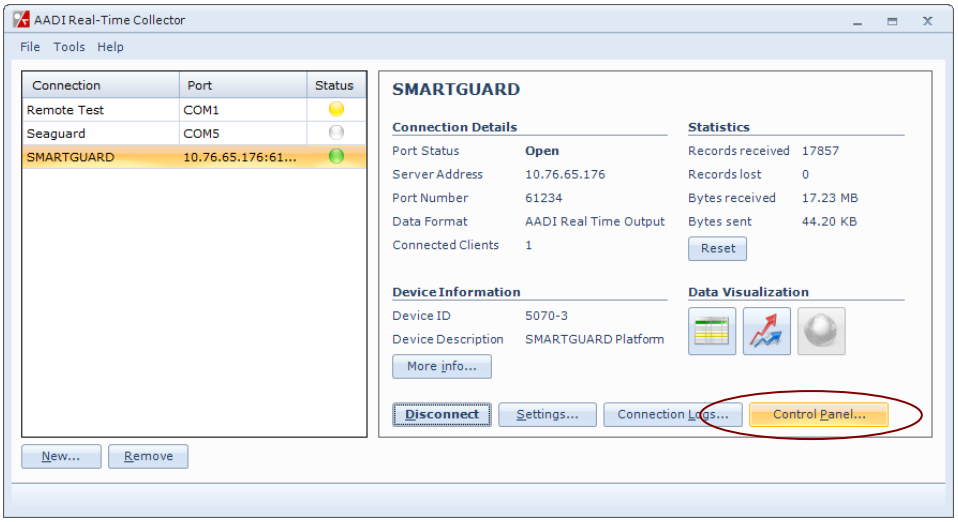


Figure 4-1 Configuring the SmartGuard using AADI Real-Time Collector.

- Open ***Control Panel, Recorder Panel*** and ***Stop All Groups*** recording.

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

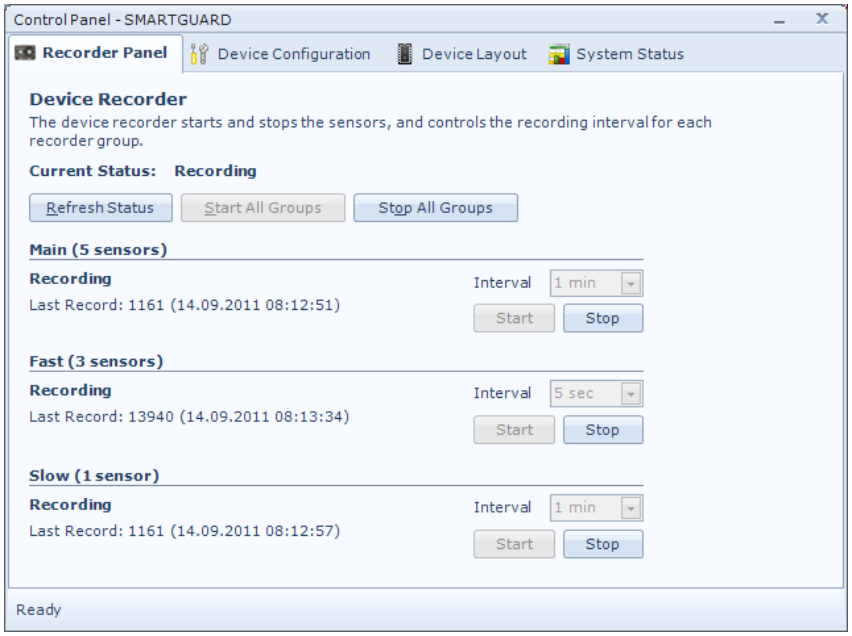


Figure 4-2 Control Panel.

Control panel has 4 tabs:

- ***Recorder Panel***, to start and stop recordings, set recording interval
- ***Device Configuration***, to edit settings for SmartGuard and connected sensors
- ***Device Layout***, to specify which sensors and other devices that are connected to the SmartGuard. Configure settings when replace, remove or add sensors
- ***System Status***, to check hardware and software versions, memory use, battery and power status, communication status and more

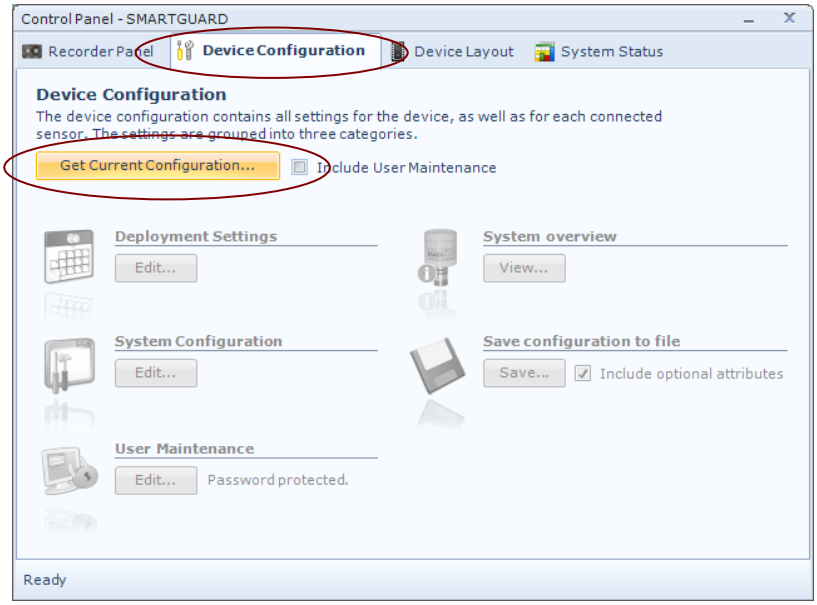


Figure 4-3 Current Device Configurations.

- Select the ***Device Configuration*** tab in the top row
- Press ***Get Current Configuration..*** in order to receive the current configuration from the SmartGuard

Note! We recommend that you verify the system settings prior to starting a recording session.

The configuration is separated into ***Deployment settings*** (refer chapter 4.1), ***System Configuration*** (refer chapter 4.2), ***User Maintenance*** (refer chapter 4.3), and ***System overview***. You can save current settings to a backup file by pressing ***Save…*** under the heading ***Save configuration to file***.

Edit the name for your file and press ***Save…*** to save the new configuration to file in .xml formate.

4.1 Deployment Settings

Deployment settings deals with settings related to the location and the particular measurements that are to be reordered following the setup.

- Open ***Device Configuration***, press ***Edit…*** in the ***Deployment Settings*** heading.
- Run the deployment settings wizard to view/edit current settings, or select a device node then ***Configure Selected...*** to view/edit selected item.

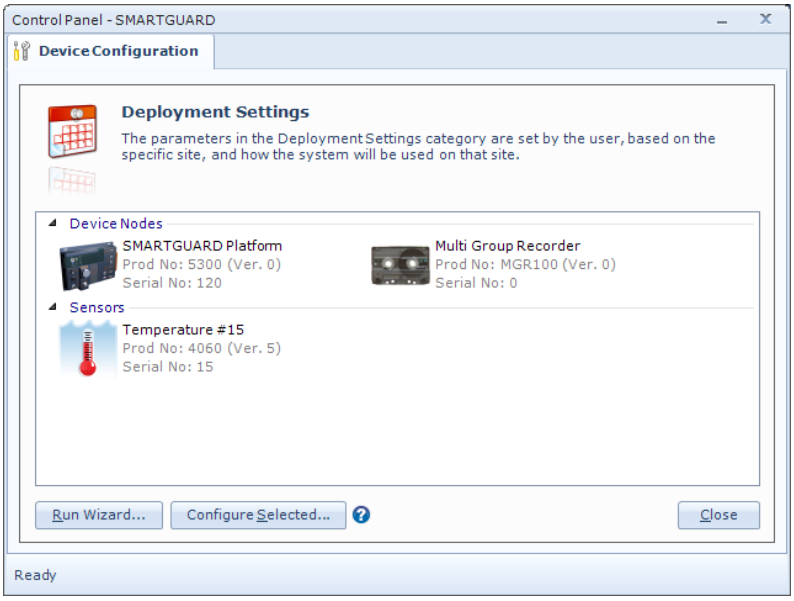


Figure 4-4 Deployment settings.

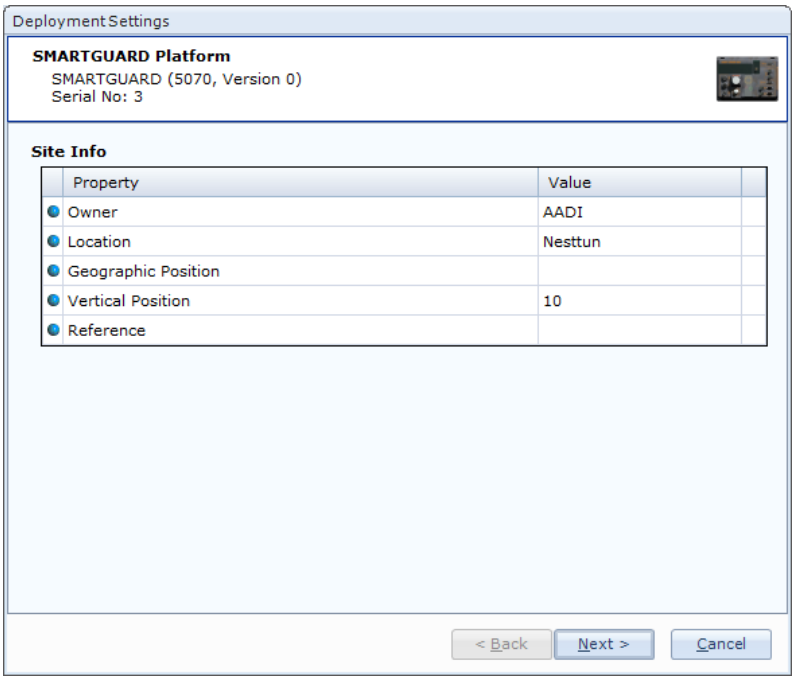


Figure 4-5 Example of deployment settings SmartGuard: Site info.

The deployment settings include:

- SmartGuard Platform
- Multi Group Recorder settings
- Sensor settings

For each node, click the value-field and type the property value to modify. Press ***Next*** to continue.

A new window displays your changes. Press ***Next*** to confirm changes, and to start the update process.

Open ***Device configuration > Deployment Settings > SmartGuard Platform*** to view Site Info

4.1.1 Multi Group Recorder

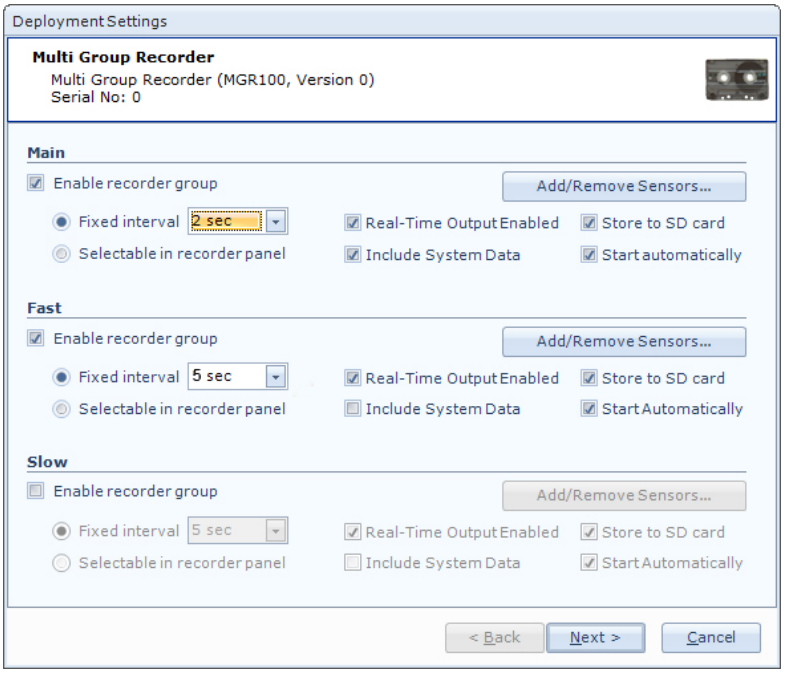


Figure 4-6 Multi group recorder.

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

First enable which of the groups you want to use by ticking ***Enable recorder group***.

For each recorder group you may select to enable real-time output, storage to SD card, start recording automatically at power up, and to include system parameters. Select also if changing interval shall be allowed from the recorder panel, refer chapter 2.1.

Press ***Add/Remove Sensors…*** to move a sensor to or from that group: select the sensor, hold and drag the sensor into the ***Group Members*** list or to the ***Available Sensors*** list.

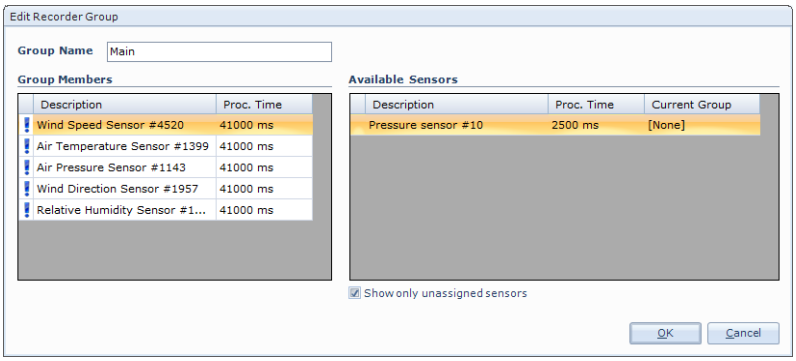


Figure 4-7 Edit recorder group.

Note! Sensors that are moved from one recorder group must be placed into another group to be recorded.

Each sensor presents its processing time, to help you set the right recording interval for each group.

Some sensors may be tied together so that they must be moved as a group; e.g. all the legacy AADI –sensors will appear as one united group of sensors.

4.2 System Configuration

System configuration deals with settings that are usually not changed between deployments/recording sessions like e.g. sensor output parameter, timing for power control etc.

- Open ***Device Configuration***, press ***Edit…*** in the ***System Configuration*** heading.
- Run the system configuration wizard to view/edit current configuration, or select a device node/sensor. Press ***Configure Selected...*** to view/edit selected item.

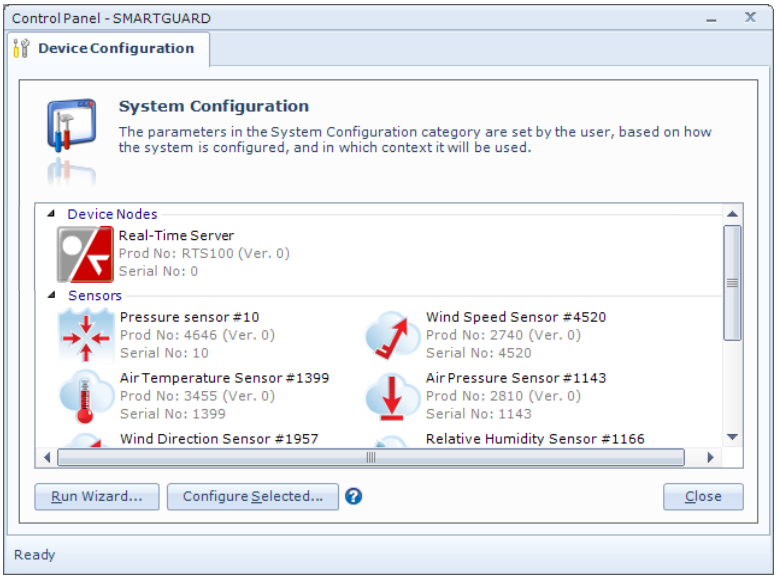


Figure 4-8 Edit system configuration.

The system configuration includes:

- Properties and data options for Real-Time Server (communication settings)
- Sensor configurations

4.2.1 Real-Time server

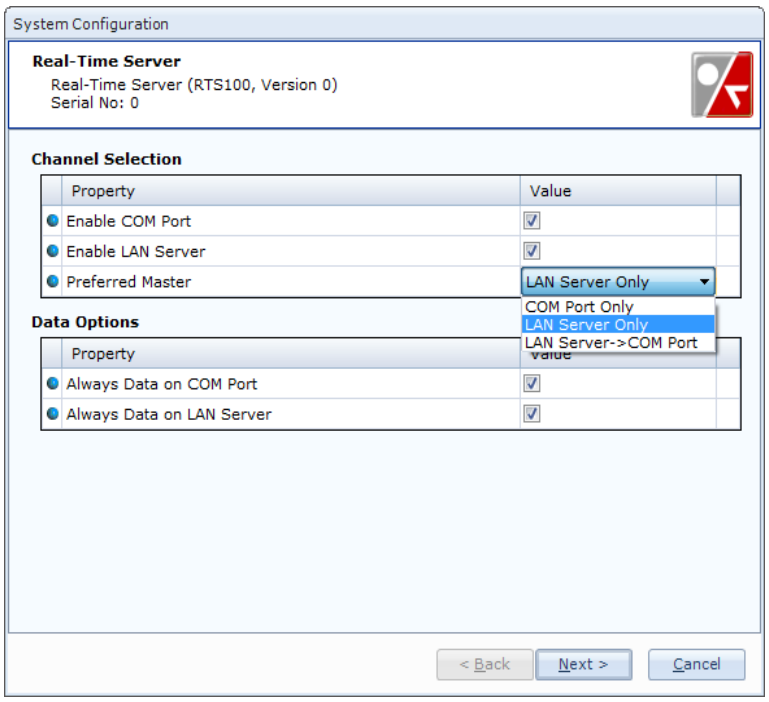


Figure 4-9 Real-Time server.

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

Select and set property values. Press ***Next*** to continue.

Preferred Master:

- Select ***COM Port Only*** to configure the SMARGUARD for remote operation through the COM port.
- Select ***LAN Server Only*** to configure the SmartGuard only using LAN.
- Select ***LAN Server ->COM Port*** to configure for remote operation through LAN if there is a connection, else through COM Port.

Either selection allows USB configuration. As long as USB is connected it will prevent configuration through any other connection.

When using an USB connection, you also need to download Windows Mobile Device Center (Windows Vista, and Microsoft Windows 7) or Microsoft ActiveSync (Windows XP or earlier operating systems).

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

Note! Changing the setting from remote (not USB) may result in loosing the configuration connection, e.g. at a COM configuration connection to switch to LAN server only. If you don't have LAN you need to use USB to reset to the COM port.

A new window displays your changes. Press ***Next*** to confirm changes, and to start the update process.

4.2.2 Communication device

Only accessible if activated in ***Device Layout < Device Layout < Communications***, refer chapter 6.7 and TN363 for more information,
Open ***Device Configuration > System Configuration***. Select the communication device to be configured.

Which settings that applies depends on the selected protocol, refer protocol description.

AADI Real-Time protocol:

Select recorder group index for the sensors to be transmitted. Next, check to enable data, refer Figure 4-10.

Figure 4-10 AADI Real-Time protocol

AADI Pseudo-binary Protocol/AADI Ascii Protocol:

Select recorder group index for the sensors to be transmitted. Next, check to enable data. The number of parameters to be transmitted is given as the last digit below the data parameter lists, refer Figure 4-13. To add a new parameter: press ***New***, select sensor source and parameter from the lists. Press the ***First/Previous/Next/Last*** button to view selected data parameters to be transmitted. Press ***Remove*** to delete data parameter. Do similar for system parameters to be transmitted.

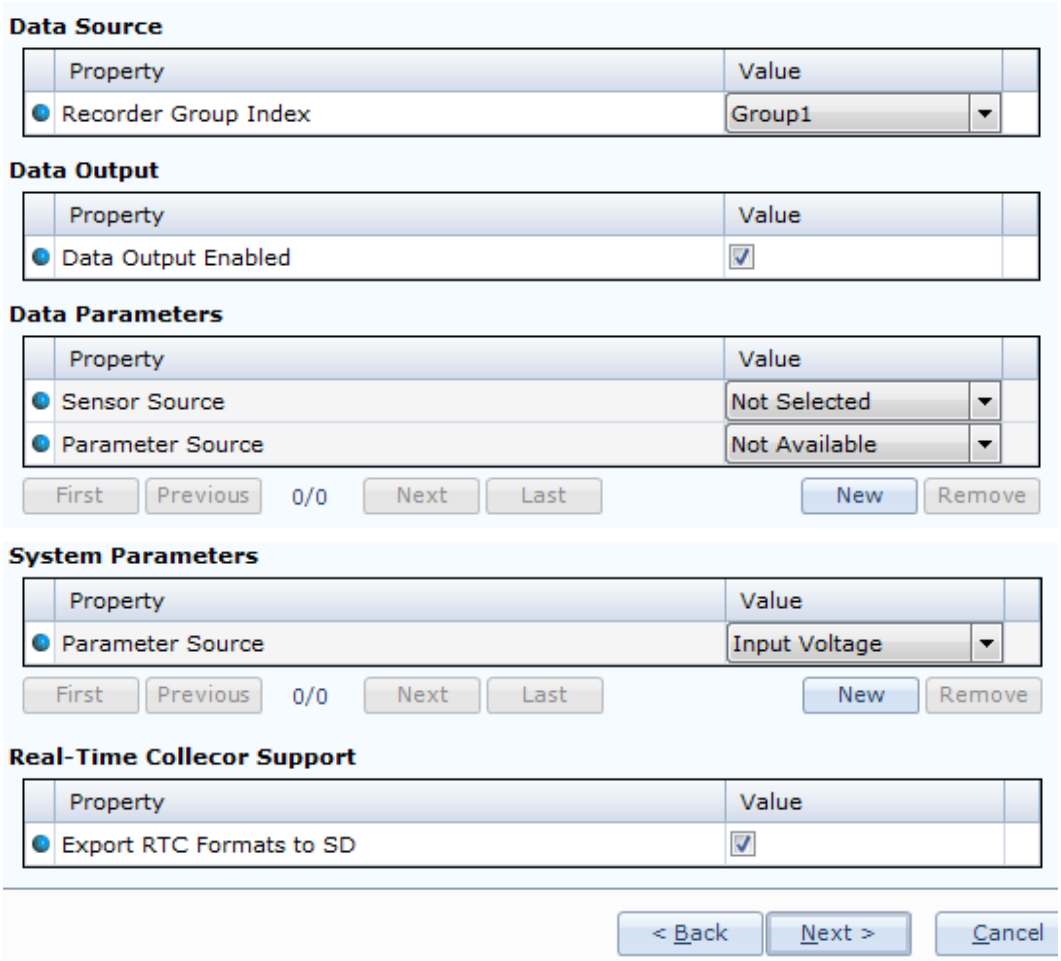


Figure 4-11 AADI Pseudo-binary Protocol/AADI Ascii Protocol

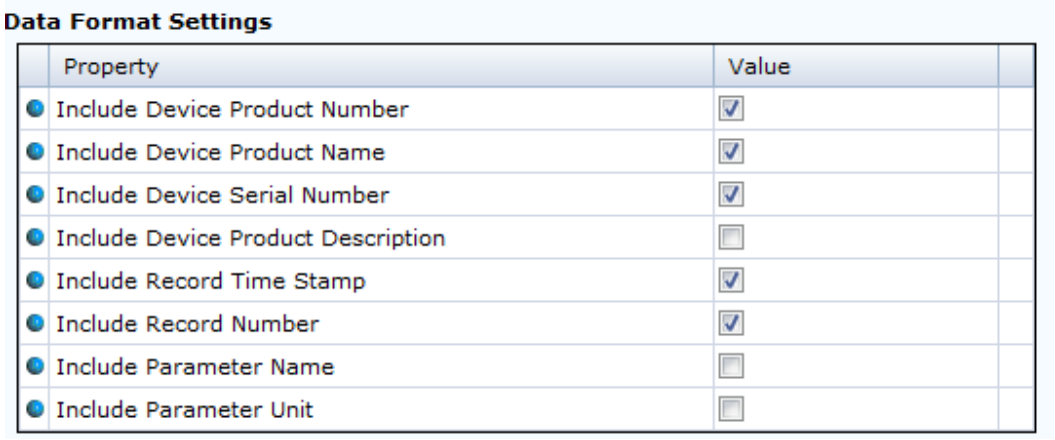


Figure 4-12 AADI Additional settings for AADI Ascii Protocol

Parameter source is not available until a sensor source has been selected, refer Figure 4-13

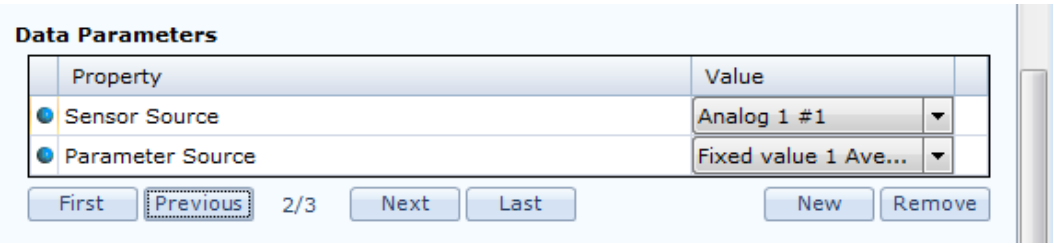


Figure 4-13 Data parameters.

NMEA Output Protocol/AIS Message 8, FI 31 Protocol: Select recorder group index for the sensors to be transmitted. Next, check to enable data. Select available sensors and parameters from a drop down list.
Note! A sensor source must be selected before a parameter is available.

4.2.3 Sensor property settings

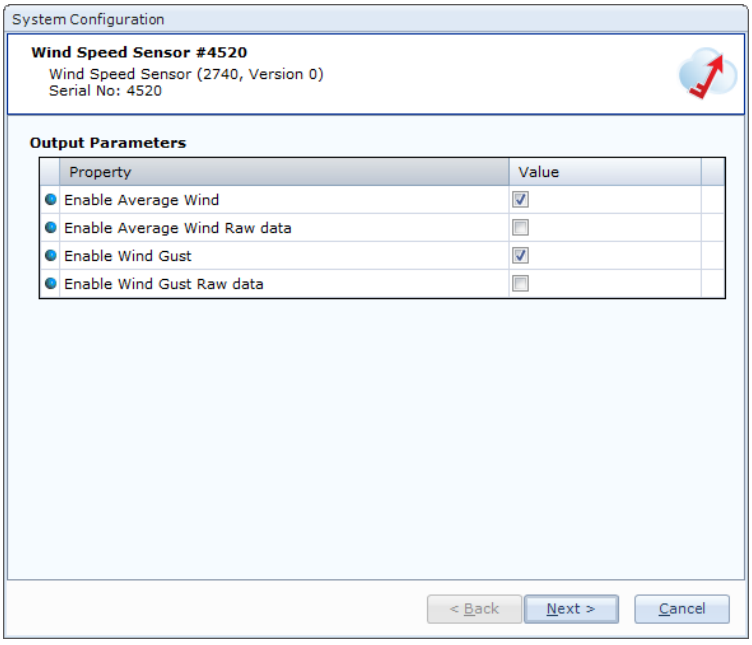


Figure 4-14 Sensor property settings.

Open ***Device Configuration > System Configuration***. Select the sensor from the list.

Each sensor has a default parameter which can not 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 off to enable). Press ***Next*** to continue.

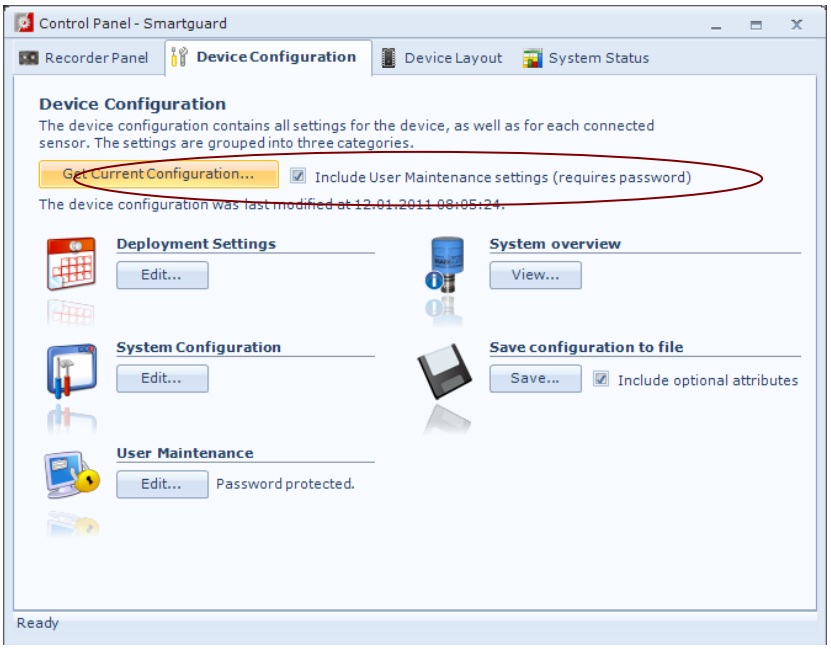
A new window displays your changes. Press ***Next*** to confirm changes, and to start the update process.

Note! Refer each sensor/modem/device operating manual for individual settings.

4.3 User maintenance

Open ***Device Configuration***, press ***Edit…*** in the ***User Configuration*** heading.

In *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.



Check ***Include User Maintenance settings***, then click ***Get Current Configuration***, refer Figure 4-15.

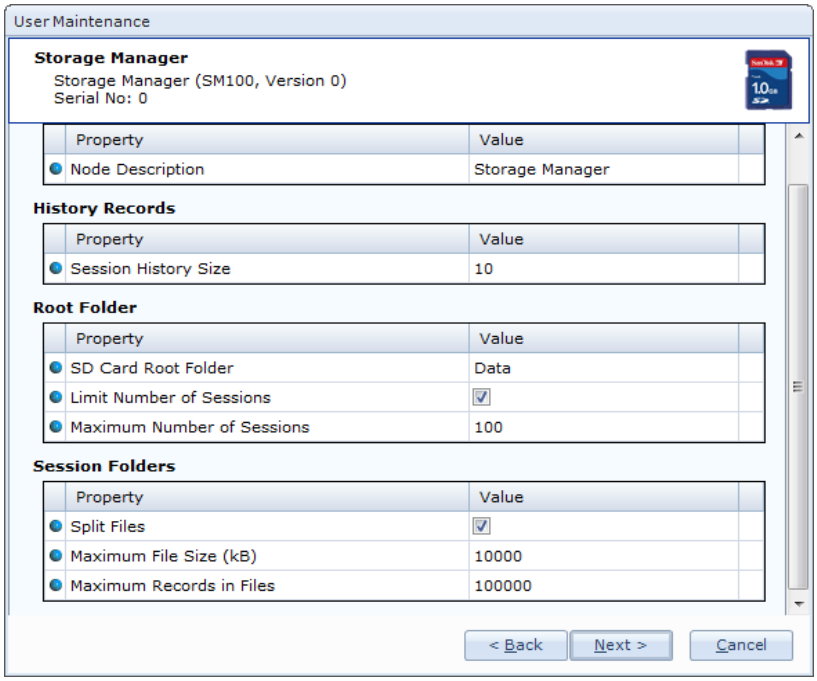
Note! The password is: 1000

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*** in the lower part of the window.

Figure 4-15 Include user maintenance.

4.3.1 Storage Manager



Open **Storage Manager.**

In **History Record** select the number of records to be available in the data viewer.

In the **Root Folder** menu you may select the maximum number of sessions to be stored on the SD card. Each time you start the record a new session is generated.

In the **Session Folder** menu you may select the maximum file size and number of record in each session. When these number is reached a new file will be generated in the same session folder.

Note!

Refer each sensor/device operating manual for individual settings.

Refer Table 6-1 for user maintenance settings for serial sensors.

Refer Table 6-2 for user maintenance settings for analog sensors.

Refer Table 6-3 for user maintenance settings for Digital Rainfall sensors.

Refer Table 6-4 for user maintenance settings for Digital Frequency sensors.

Refer Table 6-5 for user maintenance settings for Digital Logic sensors.

Refer Table 6-6 for user maintenance settings for AADI SR10/VR22 sensors.

CHAPTER 5 Recording start and stop from AADI Real-Time Collector

You can start each recorder group individually or at the same time, and you can change the recording interval individually for each group. Refer chapter 4.2 for a description of how to add/remove a sensor from a recording group, and how to find the minimum recording interval in each group.

The AADI real-time protocols define a recording session as the time series of data collected between user generated start- and stop commands. All data recorded within one session will share an identical session tag. The system guarantees that no changes in configuration have occurred within a recording session and this particular configuration is saved together with the data. Thus full traceability is secured. For the same reason any change of configuration will require a stop and subsequent restart of the recorder.

Between each recording SmartGuard will enter low power mode (sleep) in order to conserve power. When battery operated this is usually the single most important key to sustain long operating time. Consequently the choice of interval must be traded against length of deployment or charging capacity in e.g. a solar panel equipped system.

There are currently no power calculations, embedded or stand alone, for SmartGuard due to the high degree of complexity associated with the large flexibility of alternative sensors and configurations.

Select the AADI Real-Time Collector SmartGuard connection, and press ***Open Port*** to open the connection. Open ***Control Panel…*** to access the Recorder Panel.

Note! Configuration and settings can not be changed during a recording session.

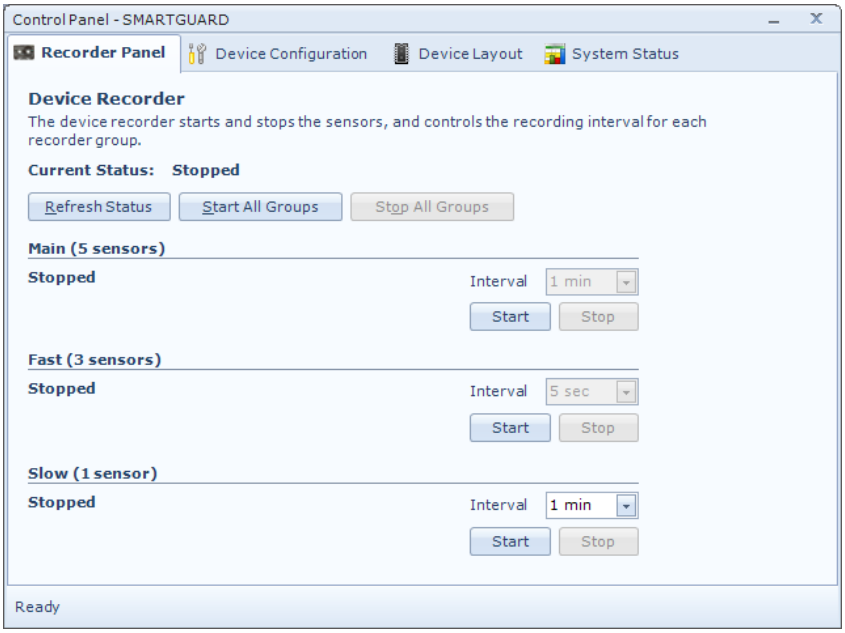


Figure 5-1 Recorder panel.

To edit recorder options press ***Stop All Groups*** recording.

- Set the recording ***Interval*** for each recording group if '*Interval selectable at startup*' has been selected in ***Device Configuration < Deployment Settings < Multi Group Recorder***

- Press ***Start All Groups*** to start all recording groups at the same time, or press ***Start*** for each group for an individual start

Press ***Stop All Groups*** to stop all recording groups at the same time, or press ***Stop*** for each group individually.

CHAPTER 6 Connecting new sensors, modem, and auxiliary devices

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

- ***AADI 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.

  When connected to an AADI measurement system, such as e.g. SmartGuard, 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.

  Note! When connecting AiCaP-sensors: remember always to terminate the cable in both ends:

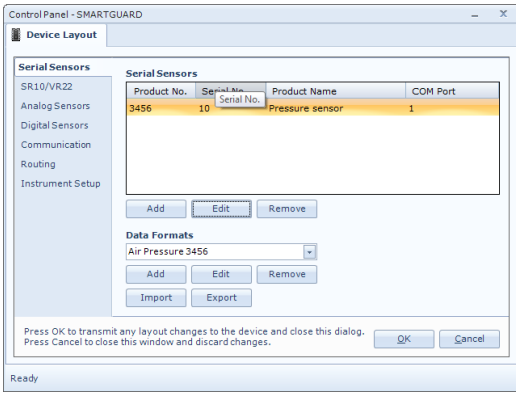
  If one AiCaP cable: Connect the sensor to the lower AiCaP connector on the SmartGuard. The connected cable must be terminated in the sensor end. Place AiCaP termination plug 0975318 in the upper AiCaP connector on the SmartGuard.

  If two AiCaP cables: Both connected cables must be terminated in the sensor end.

- When connecting ***Serial sensors, SR10/VR22 sensors, Analog sensors, Digital sensors*** and ***modems/auxiliary devices*** to the SmartGuard, the device identity, individual calibration coefficients and linearization data, port settings etc. are easily entered using the AADI Real-Time Collector:

  1. Perform ***Device layout***, which holds general information about the device/sensor, like product- and serial number, data format, device type and channel for data presentation, COM port settings, modem description. SmartGuard will restart automatically when complete. Press ***Get Current Layout..*** to update sensor/device layout in the system
  2. Open AADI Real-Time Collector ***Device Configuration*** and press ***Get Current Configuration…*** New added sensors are now included.
  3. Perform ***User Maintenance***, which holds device specific information like description, calibration coefficients, power settings and AD channel names.
  4. Perform ***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.



6.1 Accessing the Device layout

Select the AADI Real-Time Collector SmartGuard connection, and press ***Open Port*** to open the connection. Open ***Control Panel < Recorder Panel*** and stop recording.

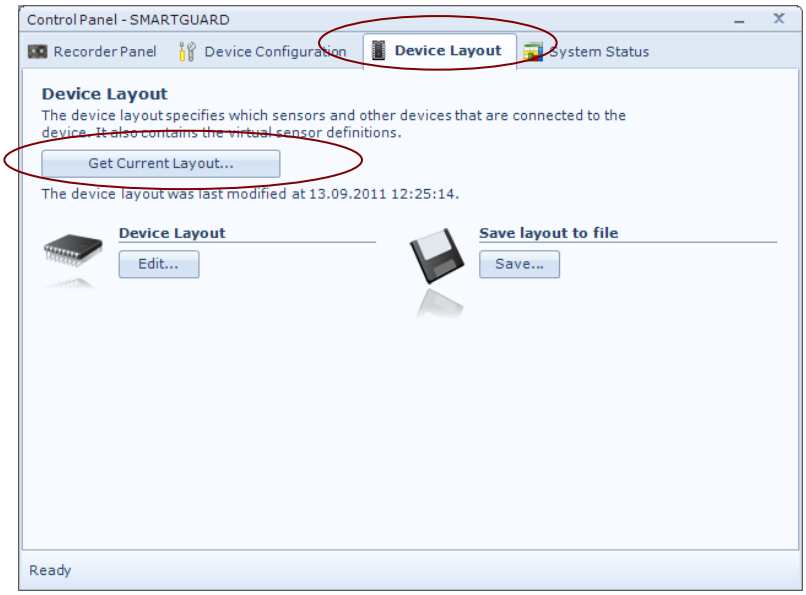


Figure 6-1 Device Layout panel.

Select the ***Device Layout*** tab, and press ***Get Current Layout...*** to view the current device layout on the PC.

Note! The password is: 1000

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

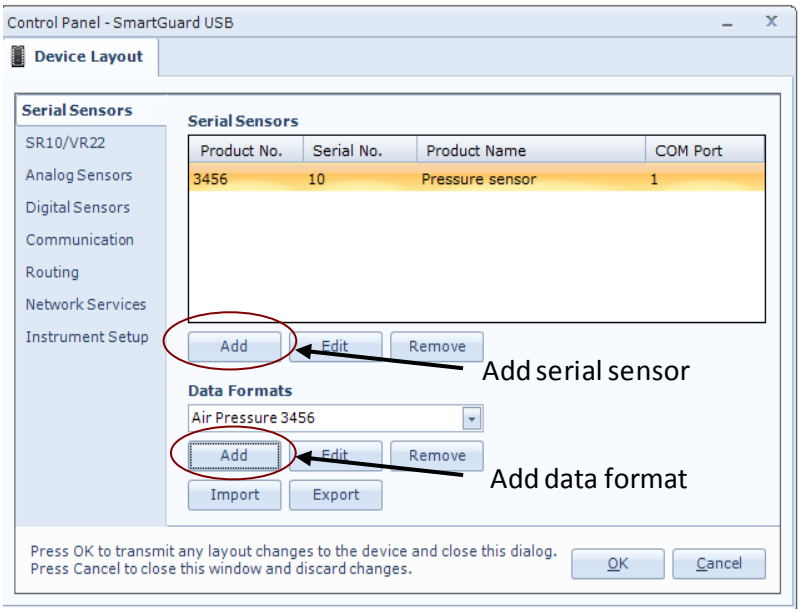
Select ***Device Layout*** and press ***Edit...*** to add new sensors/modem or edit existing layout. Refer chapters 6.2 to 6.5 for a description of layout for different type of sensors and modem:

- Serial sensor
- SR10/VR22 sensor
- Analog sensor
- Digital sensor
- Communication
- Routing

6.2 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 chapter 6.2.2 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 chapter 6.2.1 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 6.2.1.

Figure 6-2 Serial sensor layout.

6.2.1 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 SmartGuard 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 SmartGuard using the '***New Custom Data Format'*** dialog, refer Figure 6-3. 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.

Predefined **Message Components** (refer Figure 6-4) 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 SmartGuard 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.

Procedure for adding a new data format:

Press **Add** underneath the Data Formats list to enter the dialog '**New Custom Data Format'**, refer Figure 6-2.

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

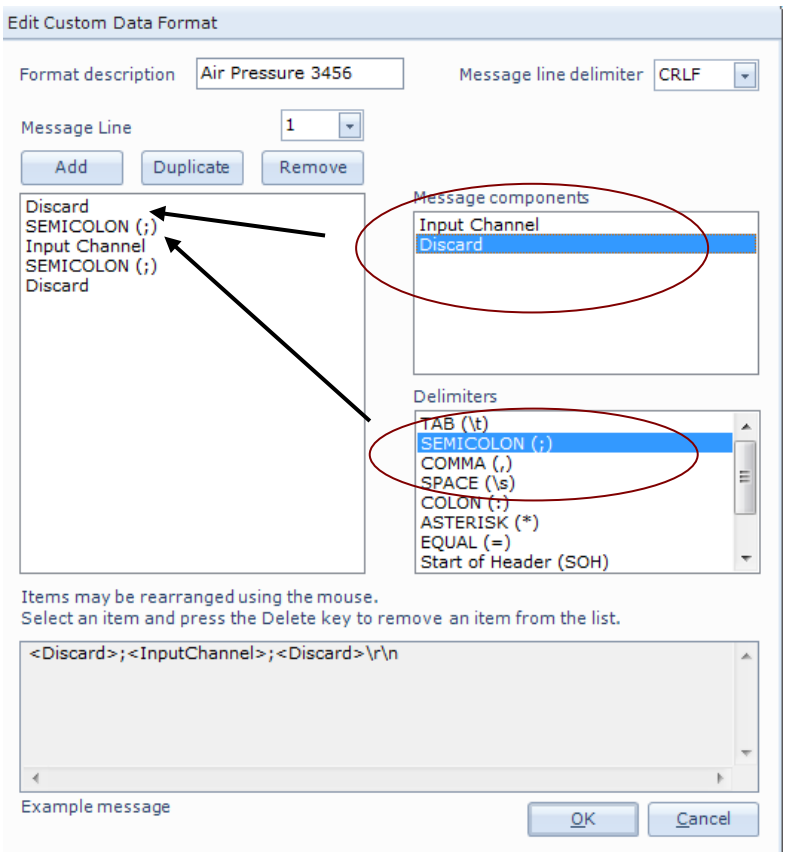
Figure 6-3 New Custom DataFormat.

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, refer Figure 4-2

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.
- ***IMPORTANT! Refer the data format description on page 38 for more details in arranging the elements.***

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 6-4 Specifying serial sensor data format.

6.2.2 Serial sensors layout

Note! The sensor data format must be defined before you perform sensor layout. Refer chapter 6.2.1 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.

SmartGuard supports both RS232 and RS422 sensors; COM1 can be set for either of the two. Be sure to use what is required for the actual sensor.

In order to save power SmartGuard 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, refer chapter 6.2.3, in order for SmartGuard 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.

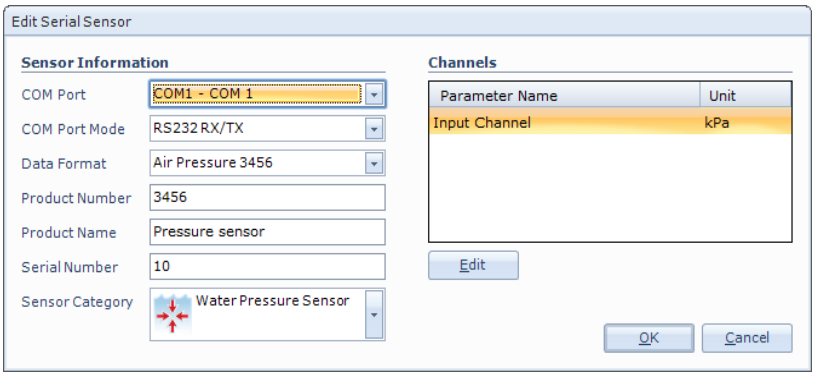


Figure 6-5 Edit serial sensor information.

Press Add below the list of serial sensors, refer Figure 6-2, and enter serial sensor information as shown in Figure 6-5.

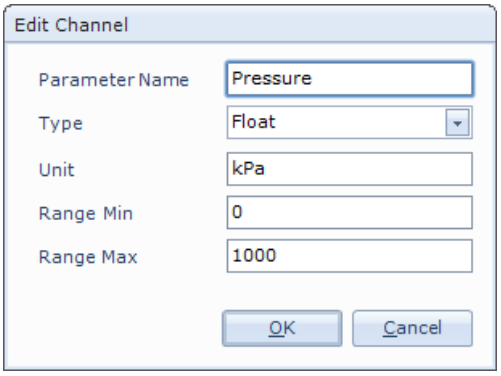
To edit an existing sensor layout:

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

Note! Some changes in the layout will change the sensors identity and hence the sensor must be reconfigured. Open the device configuration the reconfigure the sensor, refer CHAPTER 4.

Procedure for Serial Sensors layout:

- Select ***COM Port*** where this sensor is physically connected to SmartGuard
- Select ***COM Port Mode****:* RS232 or RS422 as appropriate
- Select a defined data format from the drop down list, refer chapter 6.2.1
- 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, refer Figure 6-6. By filling in a format specification you can decide number of digits etc. when this value is presented in e.g. the collectors numerical viewer.



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

IMPORTANT! Refer chapter 6.2.3 for a description of completing the sensor configuration.

Figure 6-6 Edit channel

6.2.3 Completion of serial sensor configuration

- Restart SmartGuard 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
- Perform sensor ***User maintenance*** settings: Refer chapter 4.3 for a short description. User Maintenance holds 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 **Get Current Configuration** then press ***Edit..*** in the User Maintenance heading, select the actual sensor in the sensor list and press **Configure Selected…**. Refer Figure 6-7 User Maintenace > sensorFigure 6-7 and Table 6-1 for a description of settings; refer TN 362 for some sensor examples.

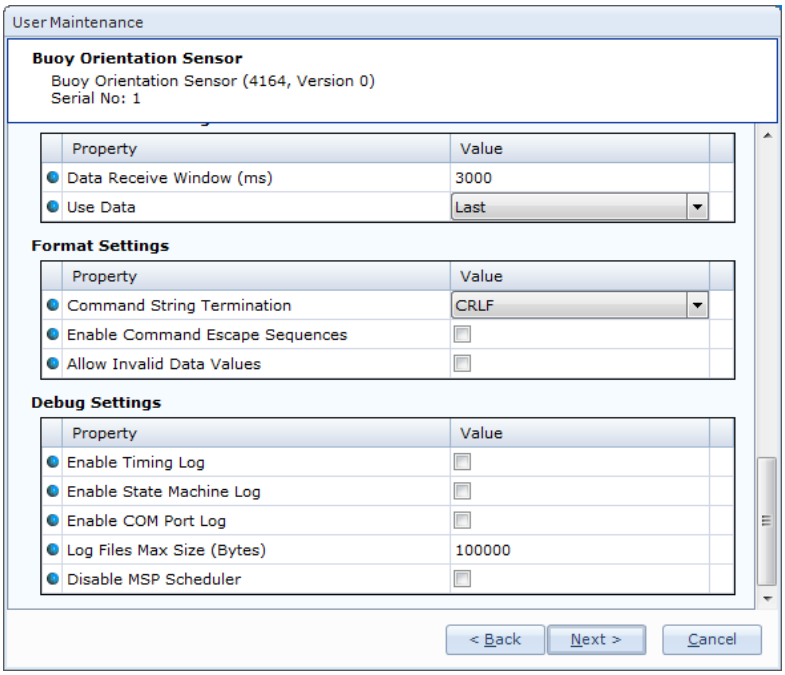


Figure 6-7 User Maintenace > sensor

- Perform sensor ***System Configuration*** to enable sensor output parameters: Refer chapter 4.2.3 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 4.1.1.

Table 6-1 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 SmartGuard 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
Minumum 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 power up
Start up Time (ms)	Time required for the sensor to be ready after the start up command
Shut down Command	Type a command to be transmitted after last received data in a recording interval (if continuous power or not enabled power control)
Shut down Time (ms)	Time required to shut down
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 SmartGuard 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

6.3 Analog sensors

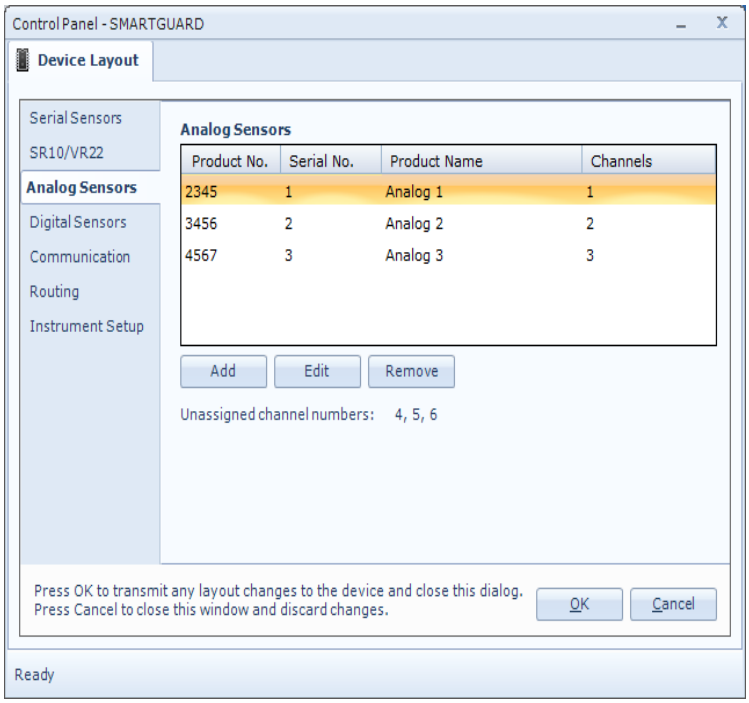


Figure 6-8 Analog Sensors.

Open ***Analog Sensors*** in the ***Device Layout***.

Analog signals are connected through the Analog 1 and Analog 2 connectors on the Basic and Extended parts of SmartGuard respectively. Refer Appendix 1 for connector pin out details.

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 6-9

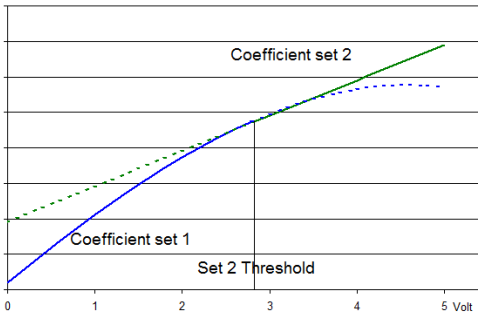


Figure 6-9 Two polynomials analog sensor

6.3.1 Analog Sensor layout

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

An analog sensor will usually use one single channel. Some may however have more than one output. In that case the channel for each sensor output must be added to the same sensor layout in order to define a sensor with multiple parameters and a common power control.

Press ***Add*** below the list of analog sensors, and enter analog sensor information as shown in Figure 6-10. Press ***Edit*** to change existing layout.

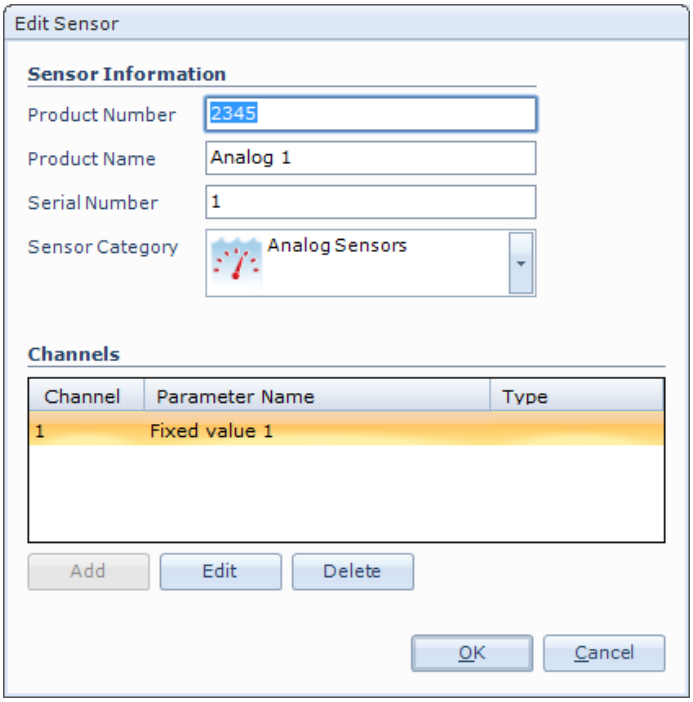


Figure 6-10 Edit Sensor.

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.

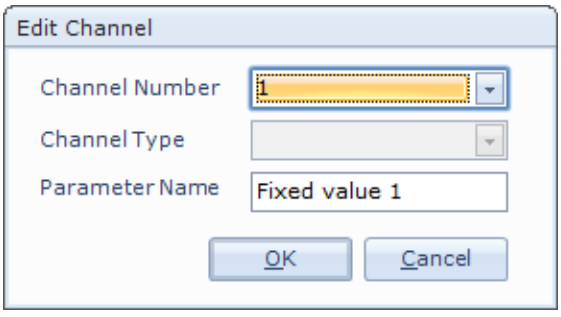


Figure 6-11 Edit Channel.

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. SmartGuard will restart automatically when you press OK and the layout has been changed.

IMPORTANT! Refer chapter 6.3.2 for a description of completing the sensor configuration.

6.3.2 Completion of Analog sensor configuration

- Perform sensor ***User maintenance*** settings: Refer chapter 4.3 for a short description. User Maintenance holds 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..*** in the User Maintenance heading. Refer Table 6-2 for a description of settings.
- Perform sensor ***System Configuration*** if necessary to enable sensor output parameters: Refer chapter 4.2.3 for a short description: open ***Device Configuration*** tab, and press ***Edit..*** in the System Configuration heading.

- Statistics can be calculated for each channel/parameter. Type ***No Of Samples*** for the statistics. Use minimum 2 samples per recording interval, and maximum 5 samples per 10 seconds recording interval (e.g max 30 samples per 1 minute recording interval). The sensor warm up time may reduce the maximum samples per recording interval. If time series is enabled (configuration settings) maximum 63 first values will be available for readout.
- Check desired output: ***Average***, ***MinMax*** and ***TimeSeries***. The latter will include statistics into the recorded dataset.

- Add the sensor to the correct recording group, refer chapter 4.1.1.

Table 6-2 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
Power Channel	Select power channel (if more than one channel)
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

6.4 Digital sensors

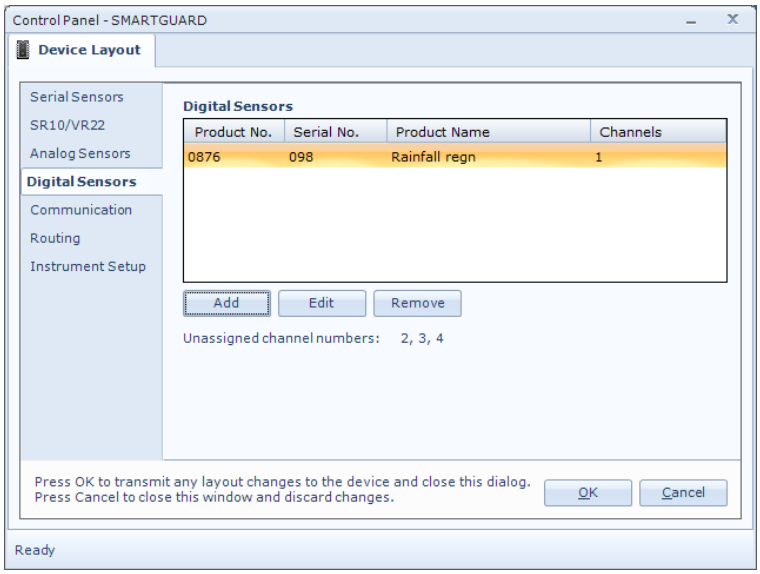


Figure 6-12 Digital Sensors.

Open ***Digital Sensors*** in the ***Device Layout***.

Press ***Add*** below the list of sensors, refer Figure 6-12, and enter sensor information.

Digital signals are connected through the Digital 1 and Digital 2 connectors on the Basic and Extended parts of SmartGuard respectively. Refer Appendix 1 for connector pin out details.

- Digital 1 is non-insulated. It reads 0 when input voltage is < 1V and 1 when > 3V and has an input frequency range of 1 to 5000 Hz, ±1.5Hz or 0.1% whichever is larger.
- Digital 2 is opto-insulated. It reads 0 when input voltage is < 0.5V and 1 when > 3V and has an input frequency range of 1 to 500 Hz, ±1.5Hz or 0.1% whichever is larger.

Each digital channel has the capability to be:

- **Digital Logical** input
- **Pulse Rain Fall** sensor which is a tipping bucket counter input
- **Frequency** input in the range as valid for the selected channel

The frequency input can be scaled and linearized using a 3rd order polynomial in the User Maintenance section below. Coefficients are provided by the sensor manufacturer or equal calibration. The raw value is in Hz, pulses pr second.

The Logical parameters are:

- Level which is 1 (true) for high level input signal
- Low Edge which is 1 (true) when the last transition detected is from low to high (0V to 10V)
- High Edge which is 1 (true) when the last transition detected is from high to low (10V to 0V)

The Pulse Rainfall input is scaled by typing the factor in User Maintenance. The scaling factor is provided by the sensor manufacturer or equal calibration. The raw value is pulse count accumulated over a user selectable interval of either 10 minutes, 1 hour, or 24 hours. The accumulated value is zeroed at start of each interval. For the 24 hours interval the default time reset value is 06:00 (AM) but may be changed by the user.

6.4.1 Digital sensor layout

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

A digital sensor will usually use one single channel. Some may however have more than one output. In that case the channel for each sensor output must be added to the same sensor layout in order to define a sensor with multiple parameters and a common power control.

Press ***Add*** below the list of digital sensors, and enter digital sensor information as shown in Figure 6-13. Press ***Edit*** to change existing layout.

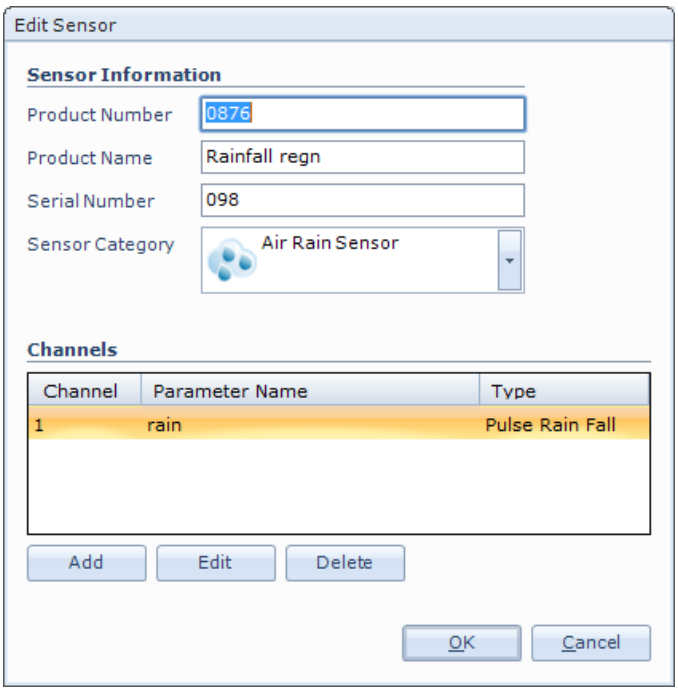


Figure 6-13 Edit digital sensor layout.

Procedure for Digital Sensors layout:

- Type the manufacturer's product number and name. Describe the parameter by its physical name; the name you will associate with the actual value provided
- Type the actual sensors serial number, and select an appropriate icon from the drop-down list
- Press ***Add*** in the Channels heading to open a dialog where you can add Digital-channel on which the sensor is connected, or press ***Edit*** to change existing channel.

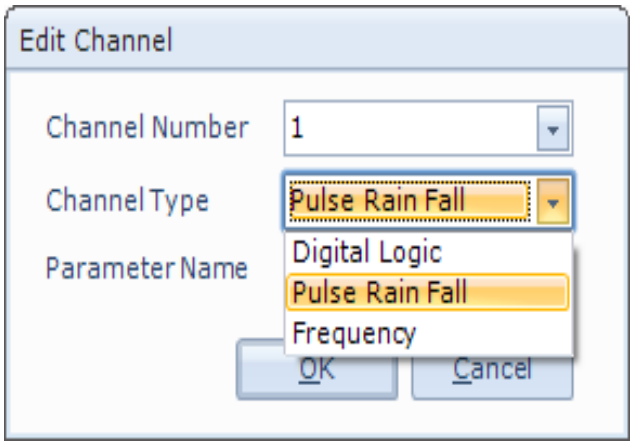


Figure 6-14 Edit Channel.

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.

Select the appropriate ***Channel Type***

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

SmartGuard will restart automatically when you press OK and the layout has been changed.

IMPORTANT! Refer chapter 6.4.2 for a description of completing the sensor configuration.

6.4.2 Completion of Digital sensor configuration

- Perform sensor ***User maintenance*** settings: Refer chapter 4.3 for a short description. User Maintenance holds settings needed 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..*** in the User Maintenance heading. Refer Table 6-3, Table 6-4, and Table 6-5 for a description of settings.
- Perform sensor ***System Configuration*** to enable sensor output parameters: Refer chapter 4.2.3 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 4.1.1.

Table 6-3 User Maintenance settings for Digital sensors of type Rain Fall.

Property	Comment
Mandatory:	
Node description	Type a description. Default is product name and serial number
Filter	
Minimum Pulse Spacing (ms)	Set appropriate value in accordance with manufacturer's specification in order to do ripple filtering on the signal
Calculations:	
Unit	Set the Unit for the scaled/linearized value, e.g. mm
Range Min	Set the Range Min for the scaled/linearized value
Range Max	Set the Range Max for the scaled/linearized value
Unit/Pulse	*Type* the scaling Unit/Pulse according to the manufacturer's calibration, e.g. 0.2 mm/pulse

Table 6-4 User Maintenance settings for Digital sensors of type Frequency.

Property	Comment
Mandatory:	
Node description	Type a description. Default is product name and serial number
Filter	
Minimum Pulse Spacing (ms)	Set appropriate value in accordance with manufacturer's specification in order to do ripple filtering on the signal
Calculations:	
Unit	Set the Unit for the scaled/linearized value, e.g. m/s
Range Min	Set the Range Min for the scaled/linearized value
Range Max	Set the Range Max for the scaled/linearized value
Coefficients	*Type* polynomial coefficients for Set 1**.** Refer explanation in the beginning of the chapter

Table 6-5 User Maintenance settings for Digital sensors of type Digital Logic.

Property	Comment
Mandatory:	
Node description	Type a description. Default is product name and serial number

6.5 AADI SR10/VR22 sensors

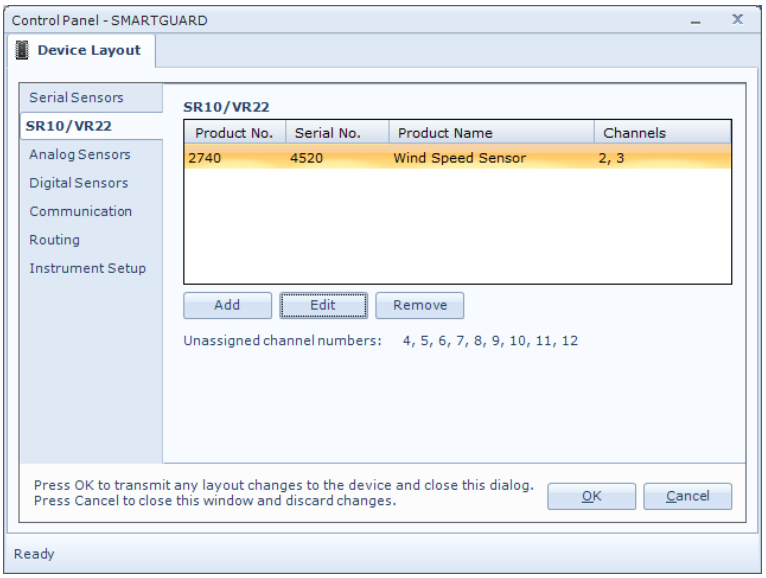


Figure 6-15 SR10/VR22 Sensors.

Open ***SR10/VR22 Sensors*** in the ***Device Layout***.

Press ***Add*** below the list of sensors, refer Figure 6-15, and enter sensor information.

AADI SR10/VR22 sensors require the 5120 or 5320 versions of SmartGuard which are equipped with electronic interface for these sensors.

There is one connector capable of connecting up to 11 SR10/VR22 sensors through a variety of different cables depending on the actual application, refer page **Error! Bookmark not defined.**.

The signals are connected to Channel 1 through 11 by the cable layout and the user must keep track of which parameter appears on which channel. All actual SR10 and VR22 sensors are preconfigured in SmartGuard. The user only needs to tell which channel to read and the actual sensors serial number.

All SR10/VR22 sensors are power controlled as one unit which implies that those sensors cannot be distributed over multiple recording groups; they must all be included in the same recording group.

6.5.1 AADI SR10/VR22 Sensor layout

Press *Add* below the list of SR10/VR22 sensors, and enter sensor information as shown in

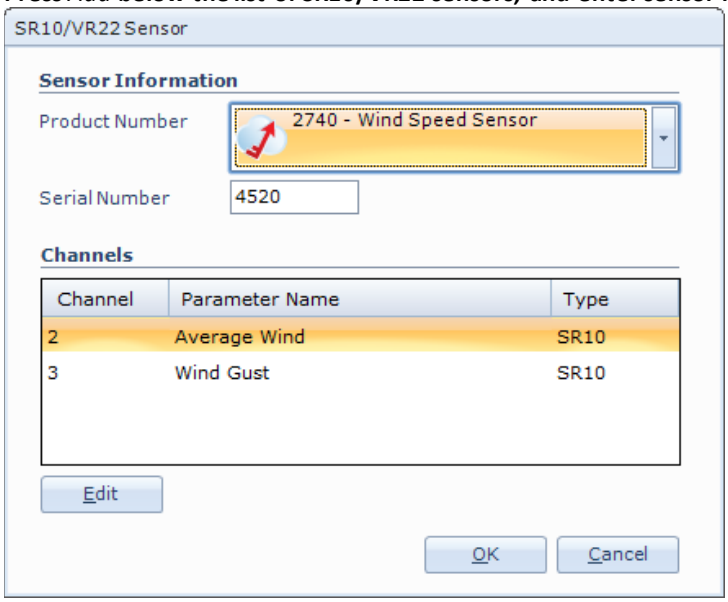


Figure 6-16. Press ***Edit*** to change existing layout.

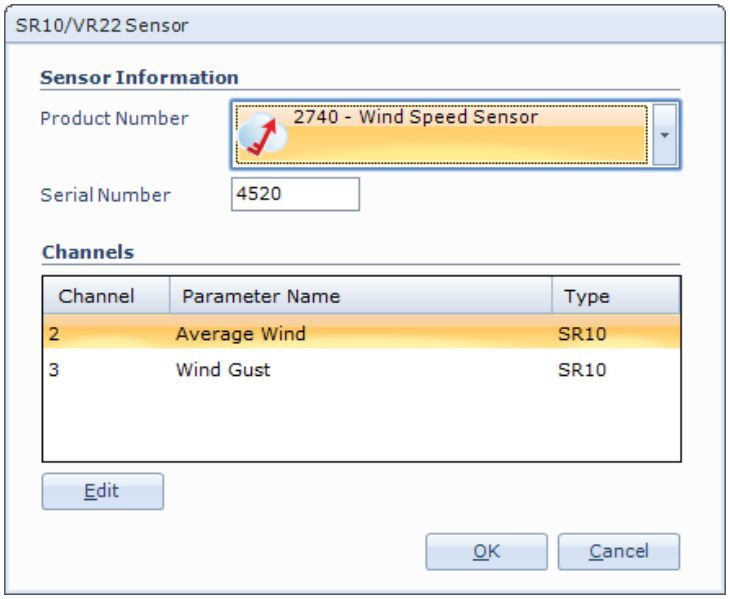


Figure 6-16 SR10/VR22 Sensor layout.

Procedure for SR10/VR22 Sensors layout:

- Select the actual sensor product number from the list and input its serial number
- Enter serial number for the connected sensor
- Press ***Edit*** to select channel according to the physical connection
- SmartGuard will restart automatically when you press OK and the layout has been changed

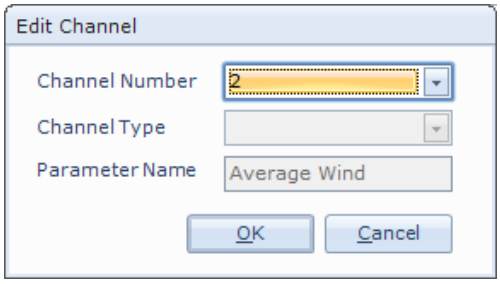


Figure 6-17 Edit channel.

IMPORTANT! Refer chapter 6.5.2 for a description of completing the sensor configuration.

6.5.2 Completion of SR10/VR22 sensor configuration

- Perform sensor ***User maintenance*** settings: Refer chapter 4.3 for a short description. User Maintenance holds parameters 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..*** in the User Maintenance heading. Refer Table 6-6 for a description of settings.
- Perform sensor ***System Configuration*** to enable sensor output parameters: Refer chapter 4.2.3 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 4.1.1.

Table 6-6 User Maintenance settings for SR10/VR22 sensors.

Property	Comment
Mandatory:	
Node description	Type a description. Default is product name and serial number
<parameter> 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	Set coefficients

6.6 Communication: set real-time COM port

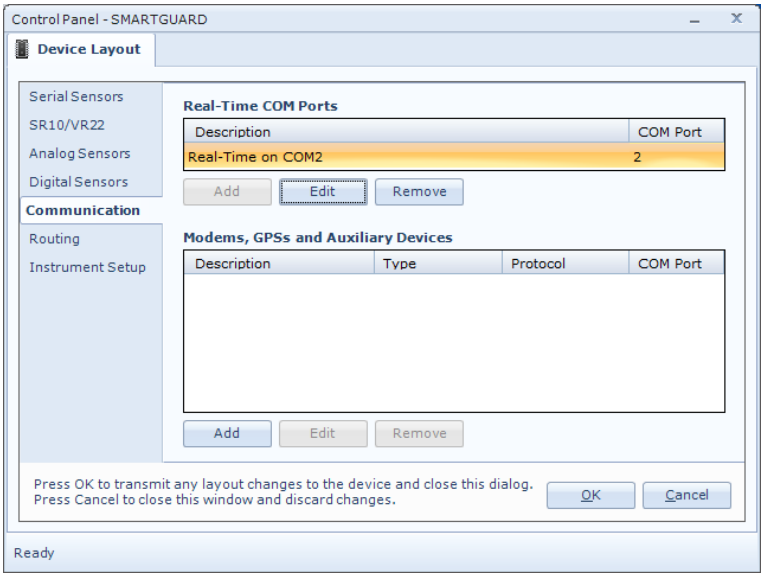


Figure 6-18 Real-time COM port setting.

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

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

If the COM port isn't defined, press ***Add*** below the list of real-time COM ports, refer Figure 6-18. Enter COM port description and select actual SmartGuard COM port.

Select COM port mode.

.

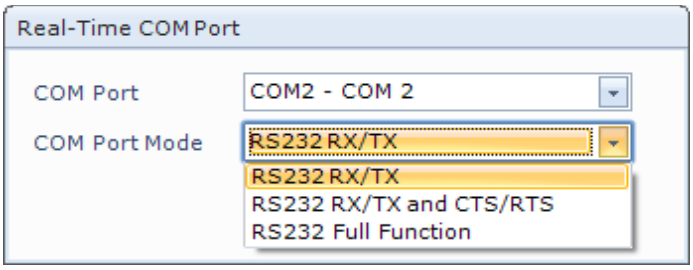


Figure 6-19 Real-time COM port setting.

6.7 Communication: set up Modem, GPS, auxiliary device

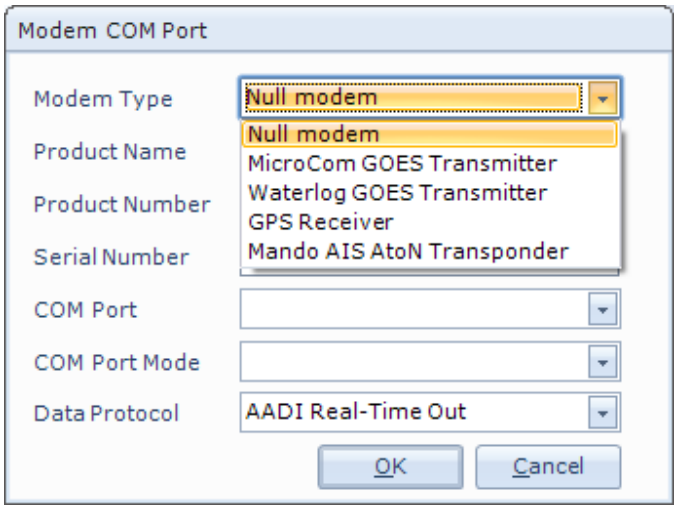


Figure 6-20 Modem settings.

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

Press ***Add*** below the list of ***Modems, GPSs and Auxiliary Devices***, refer Figure 6-18.

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 SmartGuard supported protocols.

Note! SmartGuard 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 -> SmartGuard 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.

6.7.1 Completion of modem, GPS, auxiliary device configuration

- Restart SmartGuard 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
- Perform ***User maintenance*** settings: User Maintenance holds properties necessary to operate the device in accordance with the way the user has chosen to apply the actual device: 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.

6.8 Routed devices

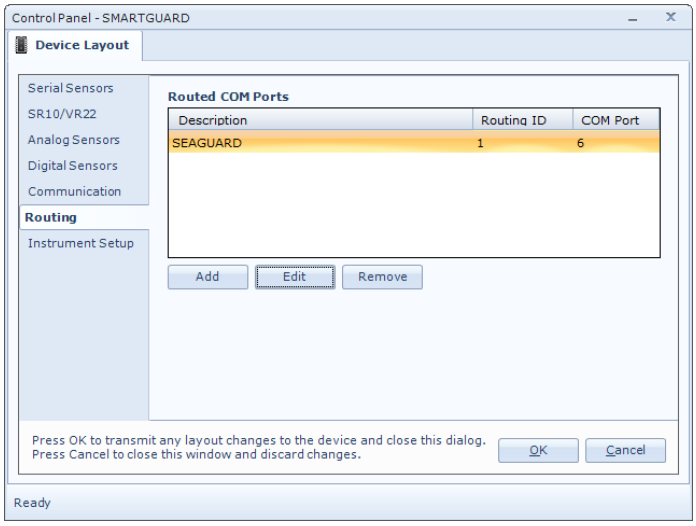


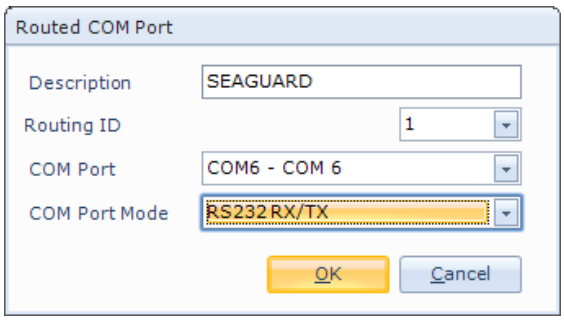
Figure 6-21 Modem settings.

Press ***Add*** below the list of ***Routed COM Ports***, refer Figure 6-21.

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.



6.8.1 Completion of routed port configuration

- Restart SmartGuard 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
- Perform ***User maintenance*** settings: User Maintenance holds properties necessary to operate the routed device, like COM port settings and channel- and message settings: 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.

6.9 Instrument setup

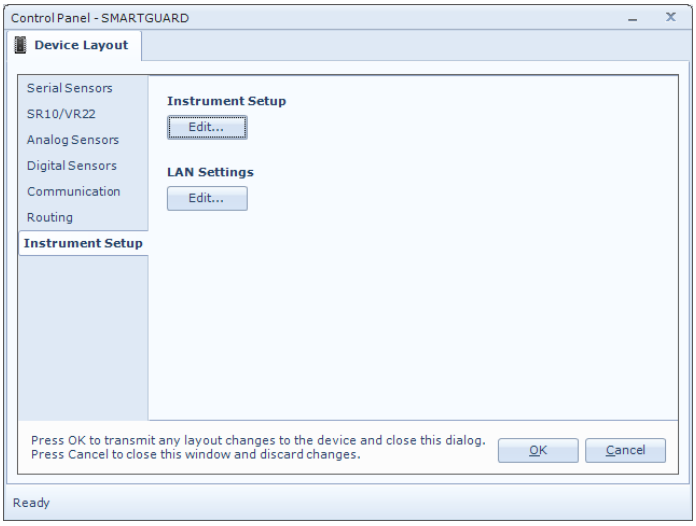


Figure 6-22 Instrument layout

Instrument Setup holds information about the ***Instrument layout*** and ***LAN settings***.

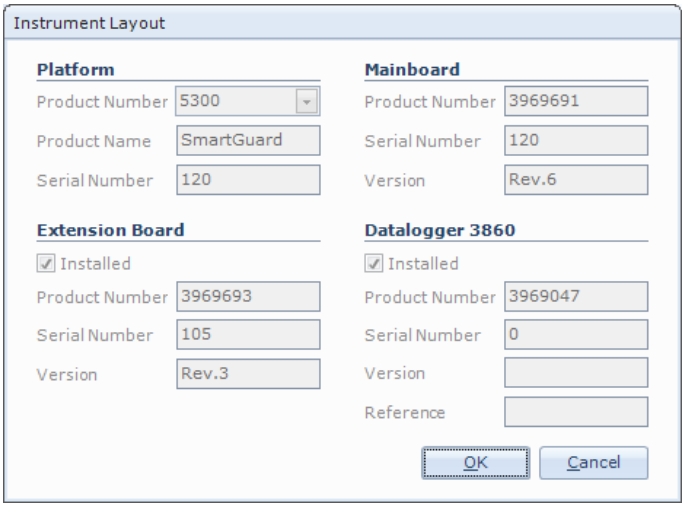


Figure 6-23 Instrument layout

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

Note! Instrument setup for SmartGuard is for information only. Settings can be viewed, but not edited. Refer chapter 6.9 for an illustration.

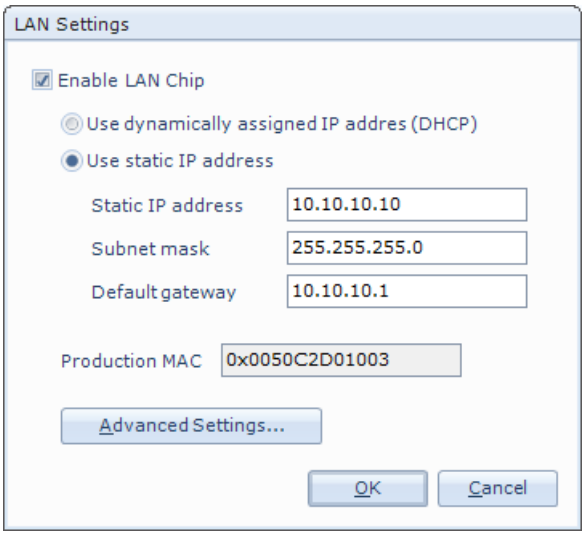


Figure 6-24 LAN settings

Press ***Edit…*** below the ***LAN Settings*** heading to open the LAN layout.

- Select dynamic or static IP address

Press ***Advanced Settings…*** to view more LAN information.

CHAPTER 7 SmartGuard device menu

SmartGuard has a colour display and a navigation keypad to provide information and basic operational functionality to a local user.

The device has 6 navigation keys for moving left, right, up and down in the display, a green ring to select/enter and a red ring to return to the previous menu. The field at the bottom of each screen gives more information about the function of the keypads.

Note! Connect to AADI Real-Time Collector to access the full set of operations and information available with the device, refer CHAPTER 4.

7.1 Overview of the SmartGuard menu

The main menu provides access to the:

Recorder	Start and stop current recording sessions. Set recording interval if enabled during *Configuration*. If the recorder is running a red spot will show at the icon
Data Viewer	View recorded data, most recent and up to 8 previous readings. Number of recordings in current session is displayed on the icon
System Status	Battery, Communication, Event log and Memory. Number of errors and warnings during the current session is displayed on the icon
Configuration	View part of current configuration
Tools	Sensor info
Storage	View status and instructions for replacement of SD card

Figure 7-1 SmartGuard main menu.

Display off:

The display is automatically switched off after a pre-set idle time, or when pressing the red ring from the main window. Switch the display back on by pressing any button on the SmartGuard.

The display will switch off automatically when the temperature inside the unit reaches -20ºC in order to protect the display.

The menu system map is shown in Figure 7-2.

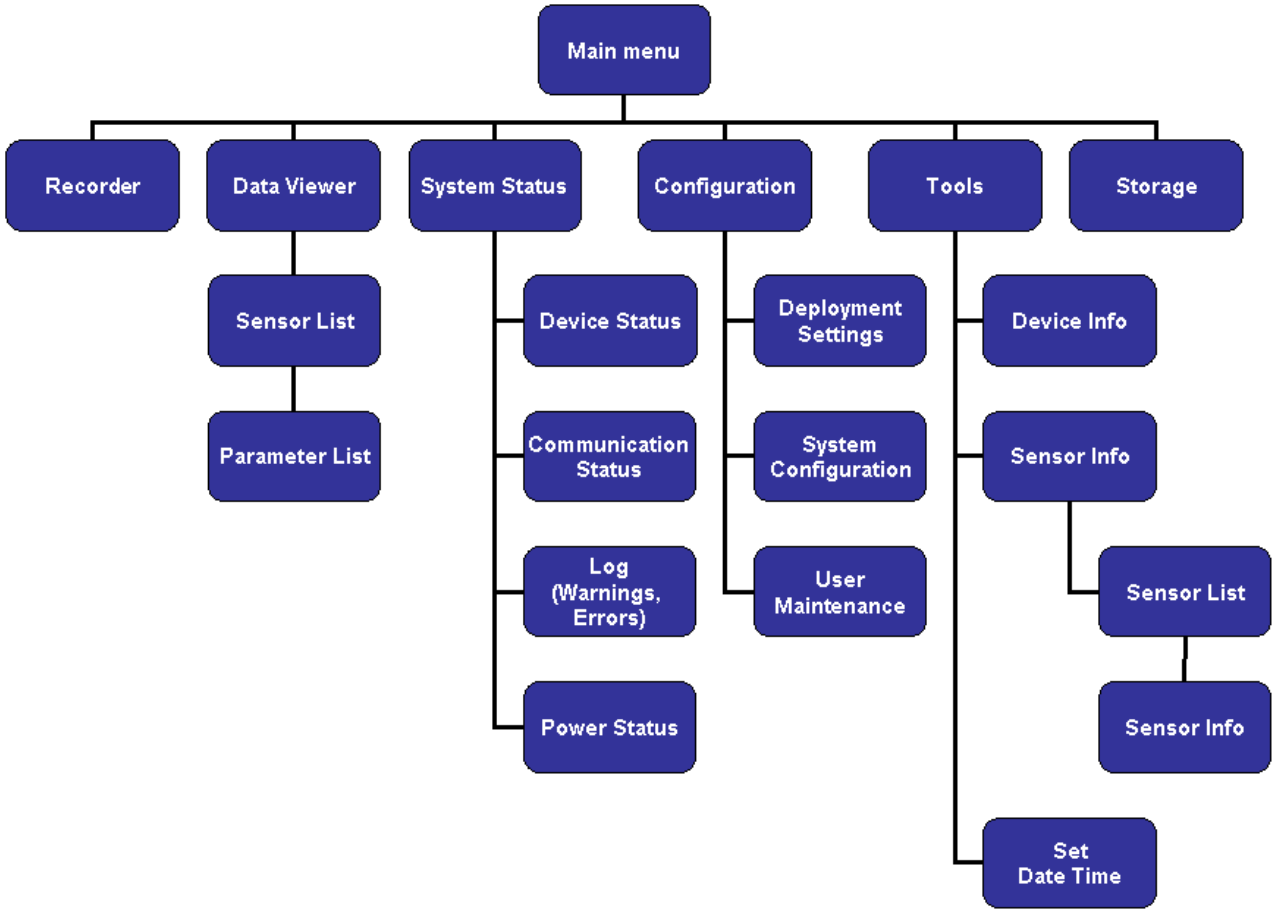


Figure 7-2 System map of the SmartGuard menu.

Display layout:

The left part of the top line always shows the current position in the menu hierarchy.

The right part of the top line always displays current date and time. The time should always be UTC.

The leftmost part of the bottom line always shows the name of the level above the current screen and the key to use to or return there.

The middle part of the bottom line displays, when applicable, the action possible for the current menu selection and the key to press to execute.

To the right on the bottom line the following status information is displayed in all screens:

- Yellow triangle if a warning is issued
- Red circle with a white cross if an error is issued
- A recorder icon. A red dot is present on the icon if recording is active; a green dot is flashed when a recording takes place
- Current input power voltage
- Communication status displaying two blue dots indicates no activity on the line. Yellow lower dot indicates that SmartGuard is transmitting. Yellow upper dot indicates that SmartGuard is receiving

7.2 Recorder

From the ***Recorder*** menu you can start/stop recordings. You can also edit the recording interval if enabled in the **Deployment Settings** (Multi Group Recorder):

- **Start and stop** all groups or individual groups. Select the correct button using the navigation keys and press the green ring to execute. ***Note! The selected button adapts a light grey color.***
- Edit **recording intervals**, if enabled during Configuration (Multi Group Recording).
  - Select the group recording interval individually using the up/down navigation keys
  - Press the green ring to display a drop down list of intervals. Use the up/down navigation keys to select the correct recording interval
  - Press the green ring to set the new recording interval

Figure 7-3 Recorder menu.

IMPORTANT!

When a recording session is started in one or all groups, recording starts on the nearest alignable point in time depending on the specified interval, e.g. 5 minutes interval are aligned to hh:0, hh:5, hh:10 etc.

When you set a new recording interval, the value is not stored until the recorder is started. If you change the recording interval and restarts SMARGUARD without stating a recording, SmartGuard will return to the last interval value.

7.3 Data Viewer: view sensors and parameters

Data Viewer accesses each recording group and displays the status of active recording sessions: Start time, last record number and time and number of past record currently available for inspection. The menu also includes a sensors list and sensor parameter list, refer overview in Figure 7-2.

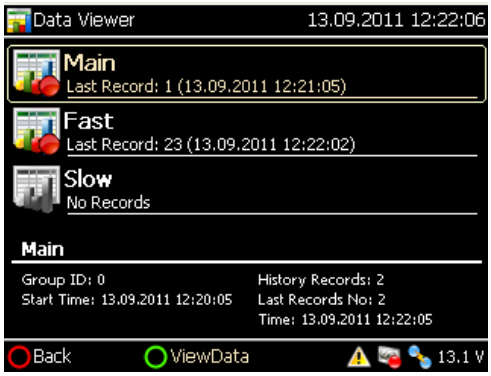


Figure 7-4 Data Viewer.

- Use the up/down navigation keys to select the recorder group
- Press the green ring to show the list of active sensors in the selected group, refer Figure 7-5.

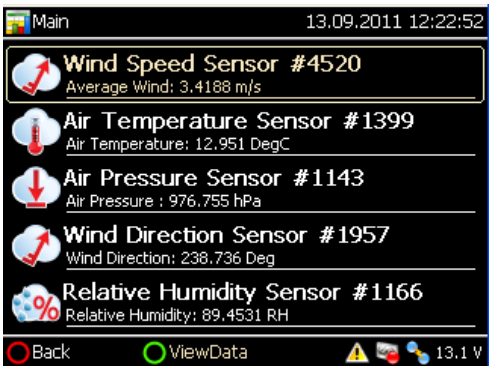


Figure 7-5 Sensor List.

The ***Sensor List*** is a list of all sensors in the selected group. For each sensor the associated icon, the name, serial number and the value of the first parameter are displayed:

- Select the correct sensor using the up/down navigation keys
- Press the green ring to view the sensors ***Parameters List***, refer Figure 7-6.

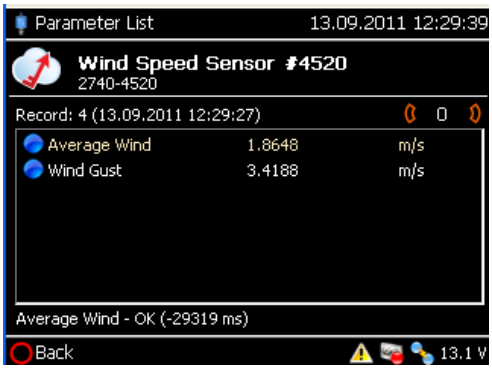


Figure 7-6 Parameter List.

The ***Parameter List*** displays all data in the most recent record from the selected sensor. Use the right navigation key to scroll to less recent values and the left key to move back to more recent values.

If a new recording happens while inspecting the data the viewed record will be updated since the display is on the selected index relative to the most recent data.

7.4 System Status

System Status accesses status information about SmartGuard device, the communication channel(s), power supply and consumption as well as a log where events, warnings and errors are recorded. Primary information is shown for each item in the list.

Figure 7-7 System Status.

Use the up/down navigation keys to select each item and press the green ring to view further details.

7.4.1 Device Status

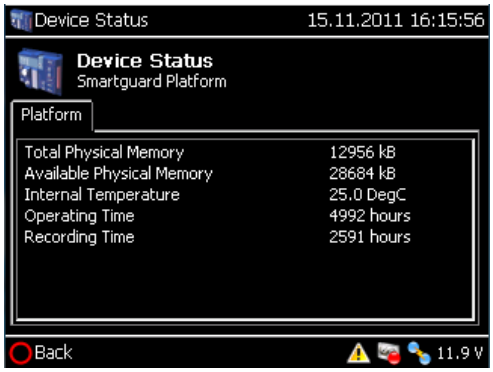


Figure 7-8 Device Status.

The ***Device Status*** menu shows the device memory, the internal temperature, operating time and recording time.

7.4.2 Communication Status

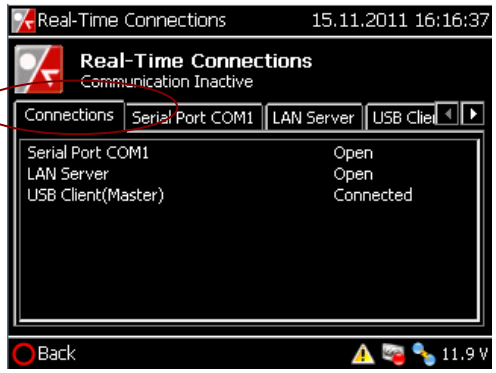
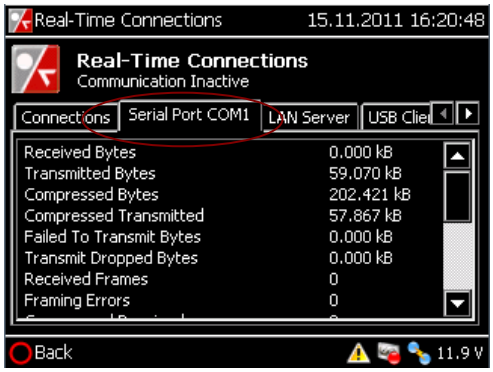
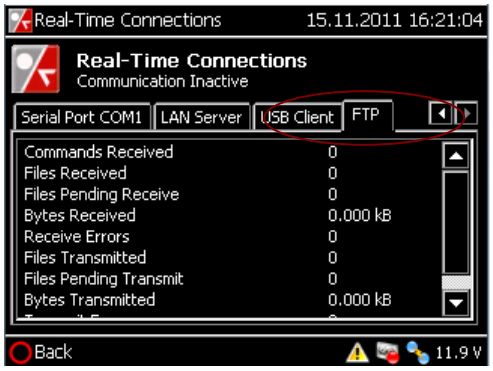


Figure 7-9 Communication Status.

The ***Communication Status*** shows info on open connections since power up.





7.4.3 Error Log

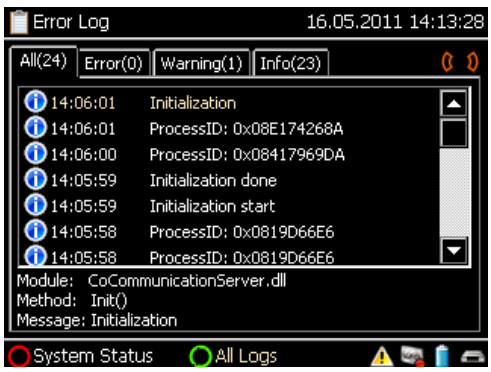


Figure 7-10 Error Log.

The ***Error Log*** holds a record of incidents that can be of importance when searching for causes of unpredicted system behavior and customer support.

If an error or warning occurs the content in the ***Info*** list may be read out to supply additional information to solve the case.

Information messages can usually be ignored by the user as long as no errors or warnings are present.

Refer Figure 7-10 for an illustration of an error log.

7.4.4 Power Status

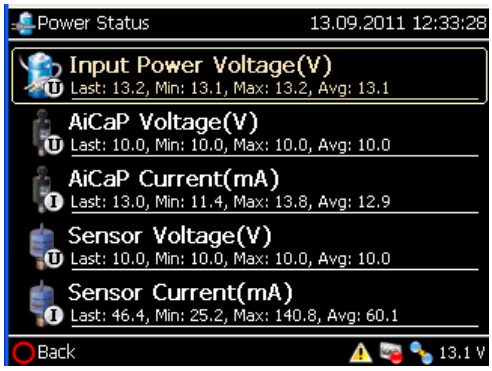


Figure 7-11 Power Status.

The ***Power Status*** menu shows the current input voltage, including max, min and average voltage since last power up.

The menu also shows the voltage and current provided for the AiCaP bus (AiCaP PWR) and for the external sensors supplied from SmartGuard (Sensor PWR). Max, min and average values since last power up are also shown

Note! 5 entries are visible at a time; navigate down to find more entries. Use the up/down navigation keys to move up and down in the list.

7.5 Configuration

Open the Configuration menu to view the current configuration (read only).

Figure 7-12 Configuration.

Note! Connect to AADI Real-Time Collector to edit the configuration, refer CHAPTER 4.

The ***Configuration*** menu shows the same categories as the control panel: ***Deployment Settings***, ***System Configuration*** and ***User Maintenance***.

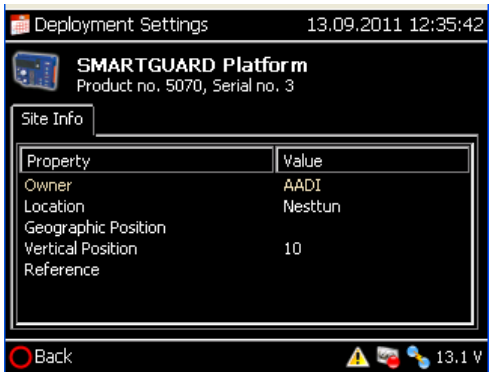
Navigate to each category and press the green ring to view the current configuration.

Note! Factory Maintenance is for AADI only.

7.5.1 Deployment Settings

Figure 7-13 Deployment Settings.

The ***Deployment Settings*** include: SmartGuard Platform site info, recording and storage information and sensor/modem/deployment settings.



Open ***SmartGuard Platform*** to view site information.

Figure 7-14 SmartGuard Settings.

Open ***Multi Group Recorder*** to view recording information for each recording group.

Use the right navigation key to explore more tags: ***Sensor Map*** holds a list of sensors in each recording group.

Figure 7-15 Multi Group Recorder.

7.5.2 System Configuration

The ***System Configuration*** shows serial port settings for the communication server and incoming communication and sensor configurations.

7.6 Tools

The ***Tools*** menu gives access to serial number and version number for hardware and software that comprise the SmartGuard system, including sensors. This menu also holds LAN settings. Date and time settings can be changed in this menu, refer chapter 7.6.3

Use the up/down navigation keys to select each item and press the green ring to view further details.

Figure 7-16 Tools.

7.6.1 Device Info

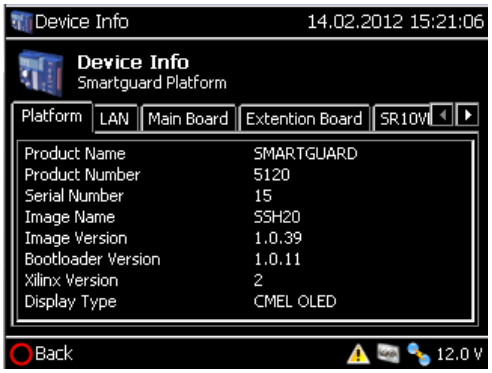


Figure 7-17 Device Info.

The ***Device Info*** menu shows the device hardware and software identification and LAN settings.

7.6.2 Sensor Info

Figure 7-18 Sensor List.

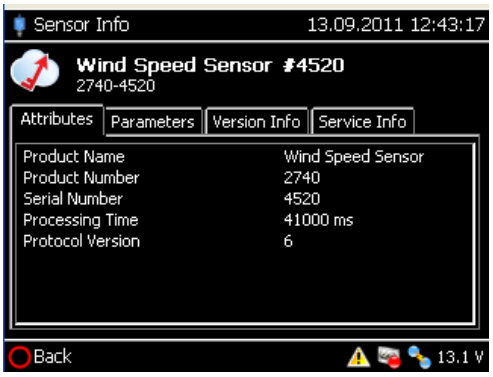


Figure 7-19 Example of sensor information.

The ***Sensor List*** menu shows hardware and software identification for connected sensors in the current SmartGuard system. View more sensor details by selecting and open a sensor: navigate using the up/down keys. Press green ring to open.

7.6.3 Set Date and Time

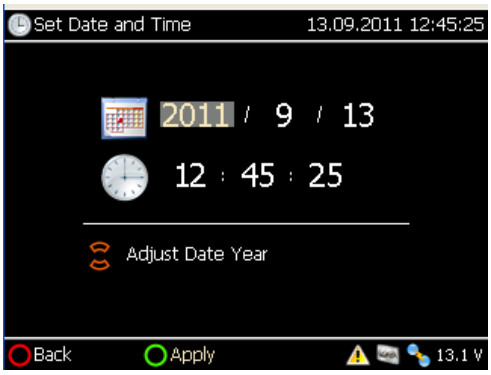


Figure 7-20 Set Date and Time.

Procedure for setting date and time*:*

- Open ***Tools*** menu and select ***Set Date and Time***
- Select each number using the left/right navigation keys
- Adjust the value using the up/down navigation keys
- Press the green ring to apply the changed date and time.

Note! Pressing the right navigation key when positioned in the date field the highlight is moved to the hour field at the beginning of the second line.

7.7 SD-card storage and exchange

The ***Storage*** menu presents the total and the available storage capacity of the SD card.

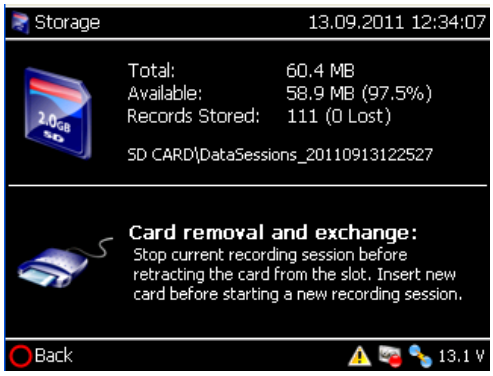


Figure 7-21 Storage.

Navigate to ***Card removal and exchange*** using the up/down key. Press green ring to safely remove/exchange the SD card.

IMPORTANT! The SD card should not be removed or replaced while the recorder is running.

CHAPTER 8 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 offers a variety of real-time display panels.

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

- ***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 8.1 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 8.2 for a short description of chart viewer.

8.1 Text Viewer

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

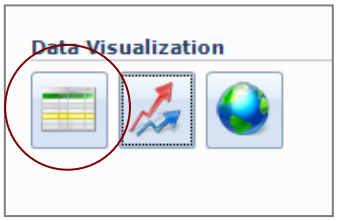


Figure 8-1 Text viewer.

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 SmartGuard recording group data to view.
- ***Stylesheet***: The selected stylesheet determines the layout of the view. New stylesheets may be added; unused stylesheets 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.

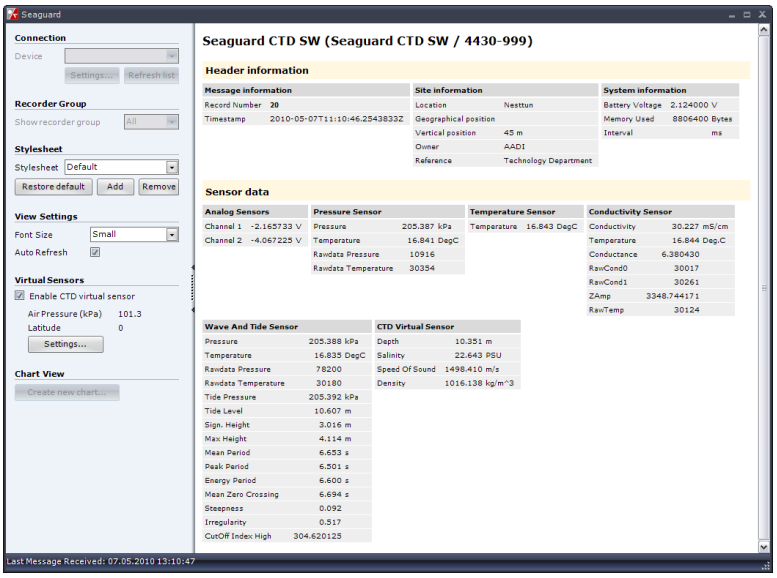
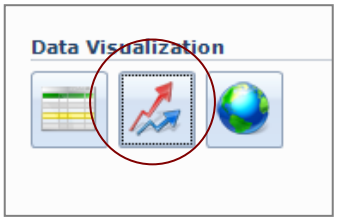


Figure 8-2 The Text Viewer.

8.2 Chart Viewer



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

Figure 8-3 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.

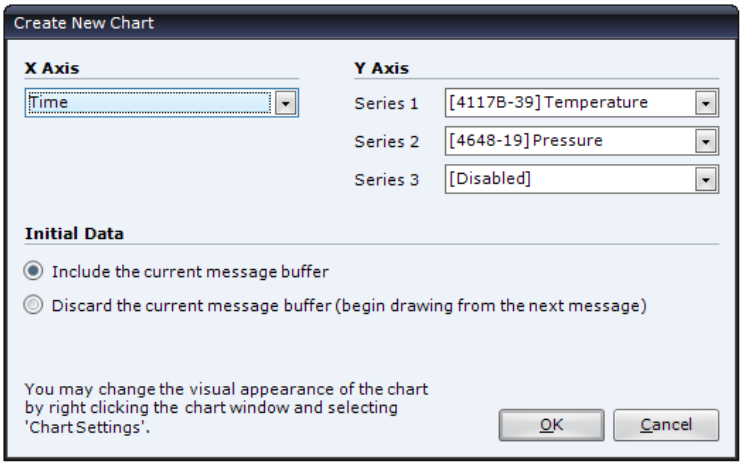


Figure 8-4 Create a new chart view.

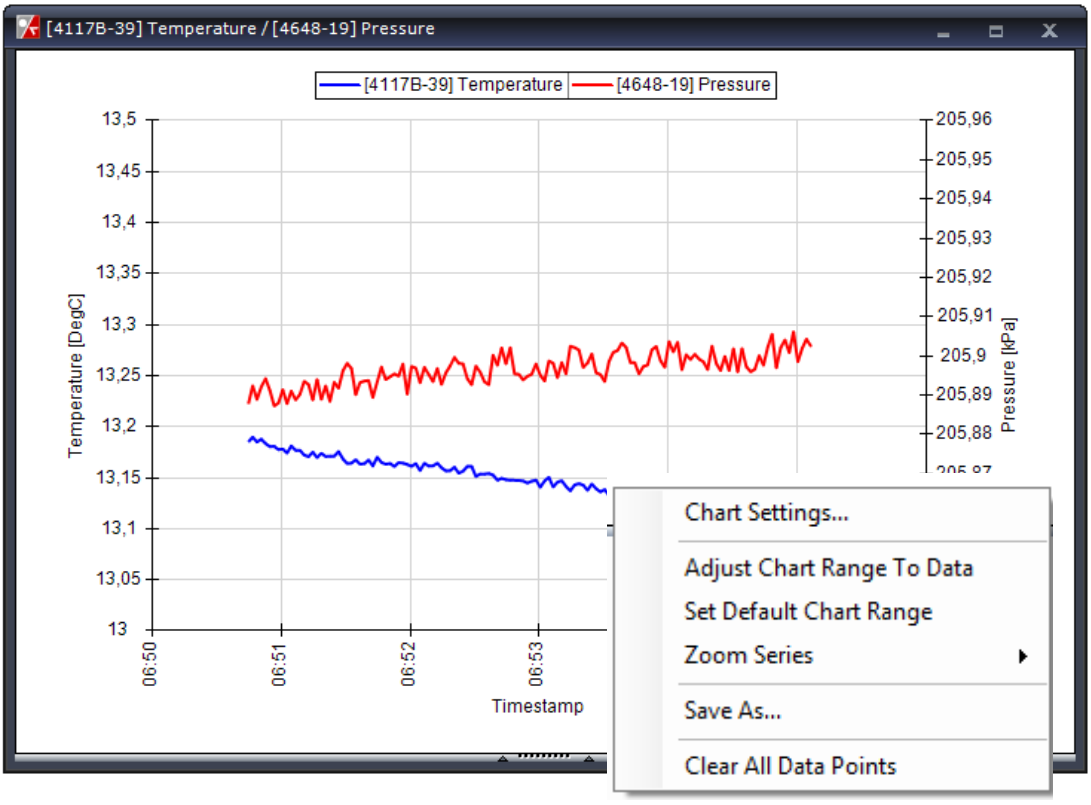


Figure 8-5 The chart window.

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.

8.3 Data storage on SD card

Recorded data can be stored on an SD card inserted on the front panel of SmartGuard. Select to store recorded data in the ***Multi Group Recorder*** panel, refer chapter 4.1.1.

SmartGuard stores one data file for each recording session and each recording group. To subsequently view and analyse 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).

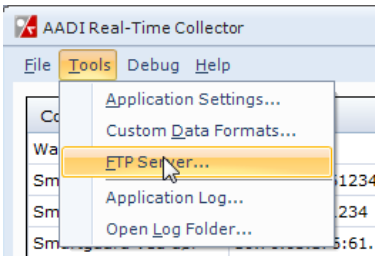
8.4 Event log data storage on SD card

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

8.5 On-line retrieval of files from SmartGuard using FTP

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

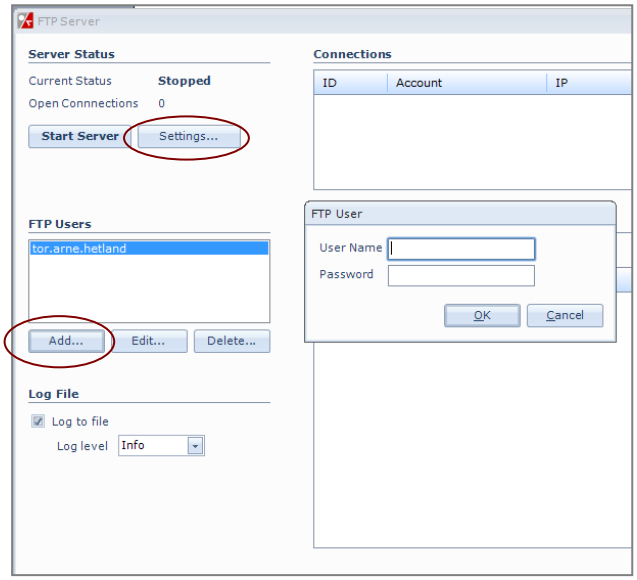
8.5.1 Setting up SmartGuard for FTP in Real-Time Collector



Open ***Tools*** > ***FTP Server***

SmartGuard 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 Figure 8-6.



Press ***Settings*** in the Server Status heading to configure the FTP server. Usually the default settings can remain unchanged, refer Figure 8-7.

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

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

Figure 8-6 Add FTP Users account.

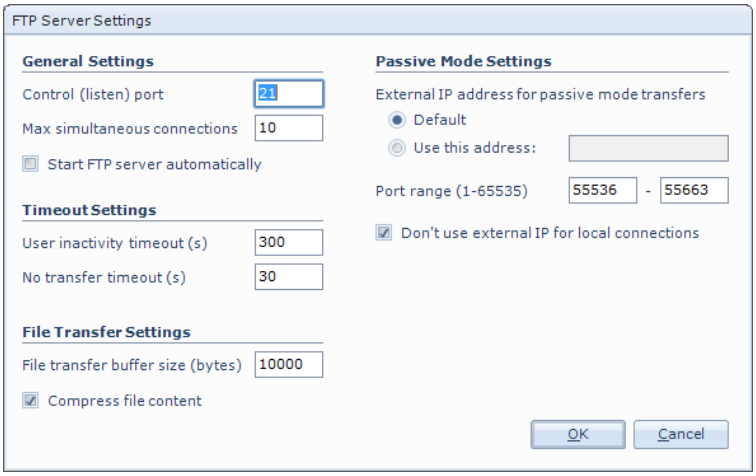


Figure 8-7 Settings for FTP server.

8.5.2 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.:

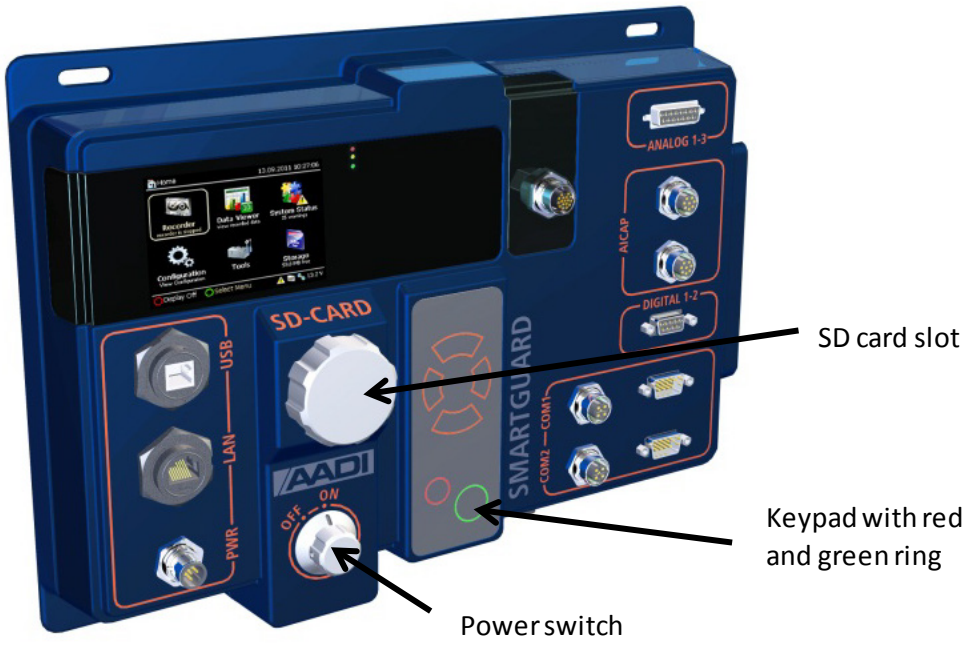
- Open Internet Explorer
- In the Tools menu, select Internet Options
- In the new dialog, select the Advanced tab
- In the settings list, there is a sub-section called Browsing. One of the last entries in this section is "Use Passive FTP". ***Note! Make sure that this checkbox is un-checked***
- Click 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 9 Image update

Procedure to update SmartGuard image:

- Format SD card as FAT (FAT16).
- Copy latest version of the SmartGuard image file, NK.nb0, to SD card.
- Switch OFF the SmartGuard.
- Insert SD card in slot.
- Press and hold both the green and red ring on the SmartGuard keypads while:
    - Switch ON the SmartGuard.
    - Wait for LED to switch from red to green.
- Release the red and green button (retry previous step if green LED goes OFF).
- Press and release green button only. The image is now being installed; the yellow LED is blinking until installation is complete, approximately 3 minutes.
    - (Repress green button if the yellow blinking does not start, check SD card if red LED is blinking).
    - (COM1 and COM2 cables may disturb installation of new image; disconnect cable if so happens).
- Wait until the main menu is shown in the display.
- Insert the SD card cover.



Appendix 1 SmartGuard pin configuration

This chapter describes the pin configuration of the SmartGuard connectors.

IMPORTANT!

Refer page *Error! Bookmark not defined.* ***for an overview of all SmartGuard cable connections.***

SmartGuard extension version (5300 and 5320) is equipped with 1 more analog connector, 1 more digital connector, and 4 more COM connections compared to the standard versions (5100 and 5120)

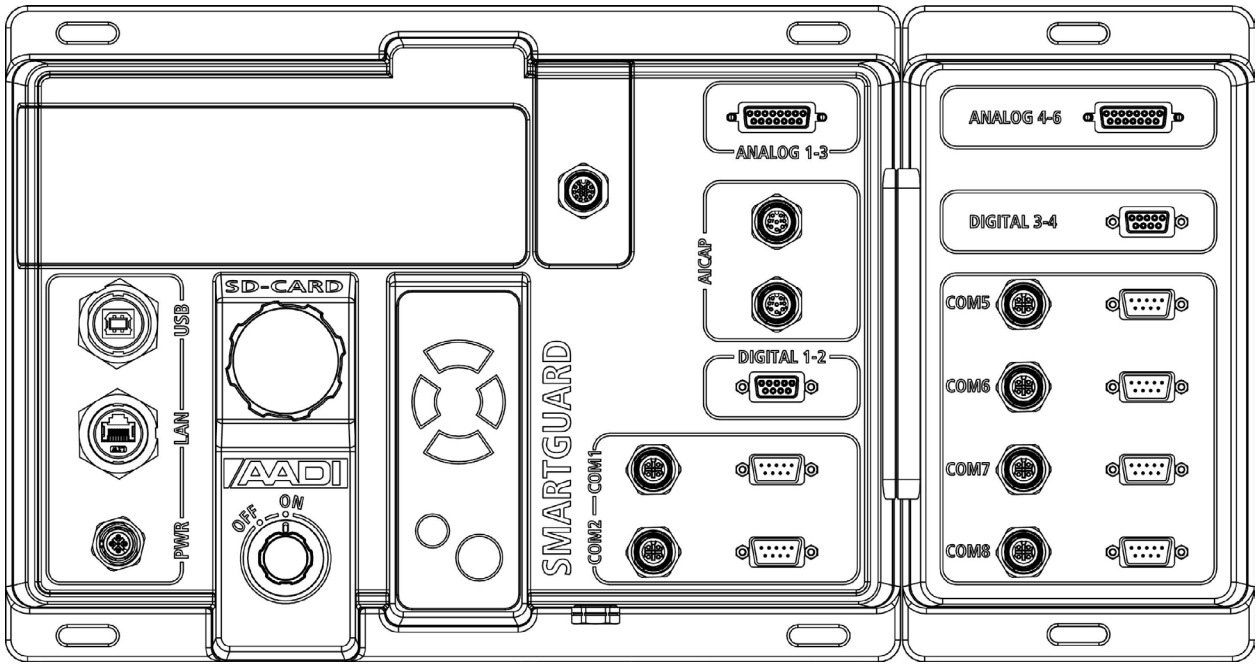


Figure A 1 The SmartGuard extended version connection plugs.

Appendix 1 - 1 Plug for device power

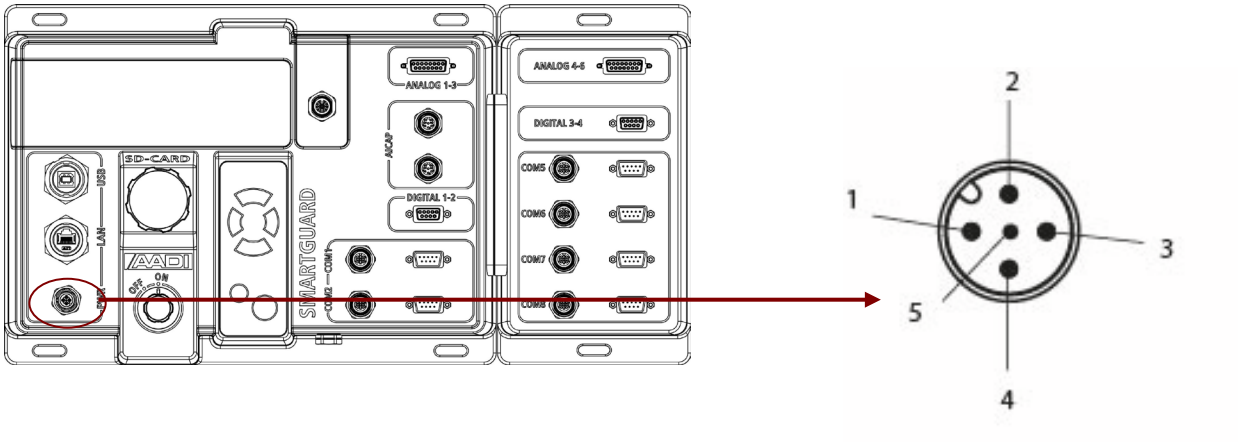


Figure A 2 4-pin M12 power plug. Refer Table A 2 for signal wiring.

Table A 1 Signal wiring 4pin M12 for device power.

Wiring	Signal	Description
1	External power GND	
2	External power GND	
3	External power +	11-30V DC
4	External power +	
5	Not connected	

Appendix 1 - 2 COM1 connection plug for RS-232/422 sensor and controlled power supply for sensor

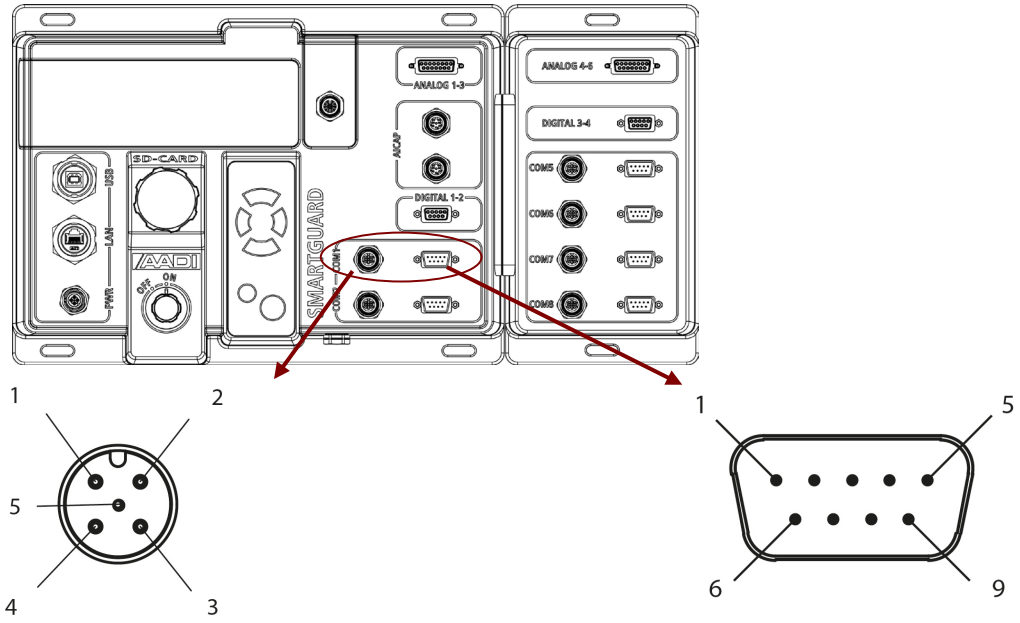


Figure A 3 4-pin M12 and 9-pin D sub connection plug. Refer Table A 2 - Table A 4 for signal wiring.

Table A 2 Signal wiring 4pin M12 connection plug for sensor and sensor power.

Wiring	Signal	Description
1	Sensor PWR out	Controlled power for sensor. 10V, Max 2 A total for all Sensor PWR
2	Sensor PWR out	
3	Sensor power GND	Not to be physically grounded
4	Sensor power GND	
5	Not connected	

Table A 3 Signal wiring 9pin D sub connection plug for, RS-232 sensor.

Wiring	Signal, RS-232	Description
1	(do not use)	
2	Rx	Serial input to SmartGuard
3	Tx	Serial output from SmartGuard
4	(do not use)	
5	Sensor power GND	Internally connected to M12 pin 3,4. Not to be physically grounded
6	Not connected	
7	Not connected	
8	Not connected	
9	Sensor PWR out	Internally connected to M12 pin1,2 Max 0.5A

Table A 4 Signal wiring 9pin D sub connection plug for, RS-422 sensor.

Wiring	Signal, RS-422	Description
1	Rx-	Serial input to SmartGuard. Not terminated. See below.
2	Rx+	
3	Tx-	Serial output from SmartGuard
4	Tx+	
5	Sensor power GND	Internally connected to M12 pin 3,4. Not to be physically grounded
6	Not connected	
7	Not connected	
8	Not connected	
9	Sensor PWR out	Internally connected to M12 pin1,2 Max 0.5A

Terminating resistor R=120 ohm must be mounted in the cable connector between Rx+ and Rx- / pin 2 and 1 in order to have a proper line termination as desired by the RS-422 specification.

AADI cables for SmartGuard RS-422 connection will be terminated as required.

Appendix 1 - 3 COM2 connection plug for modem and controlled power for modem

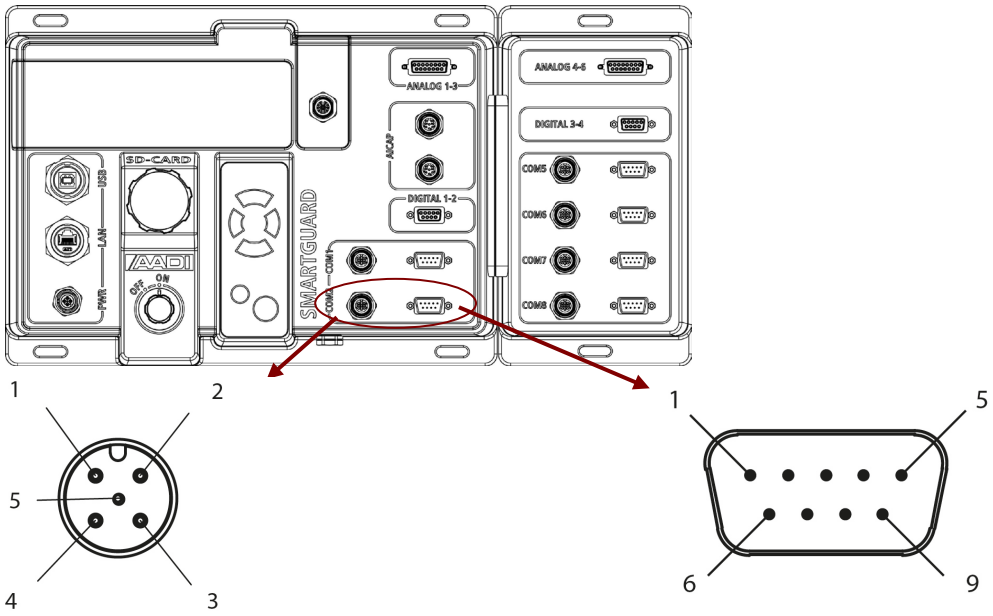


Figure A 4 4-pin M12 and 9-pin D sub connection plug. Refer Table A 5 and Table A 6 for signal wiring.

Table A 5 Signal wiring 4pin M12 connection plug for modem power.

Wiring	Signal	Description
1	Modem or Sensor power + (Software selectable)	Controlled power for modem or sensor. GND not to be physically grounded. Output voltage. Select either of: • Modem PWR equals actual PWR input – diode drop, Max 2.5 A • Sensor PWR: 10V, Max 2 A total for all Sensor PWR
2		
3	Modem power GND	
4		
5	Not connected	

Table A 6 Signal wiring 9pin D sub connection plug for, RS-232 sensor.

Wiring	Signal, RS-232	Description
1	DCD	Input signal to SmartGuard
2	Rx	Serial input to SmartGuard
3	Tx	Serial output from SmartGuard
4	DTR	Output signal from SmartGuard
5	Modem or Sensor power GND	Internally connected to M12 pin 3,4
6	DSR	Input signal to SmartGuard
7	RTS	Ouput signal from SmartGuard
8	CTS	Input signal to SmartGuard
9	RI	Input signal to SmartGuard

Appendix 1 - 4 Digital 1 – 2 connection plug for digital I/O, digital sensors

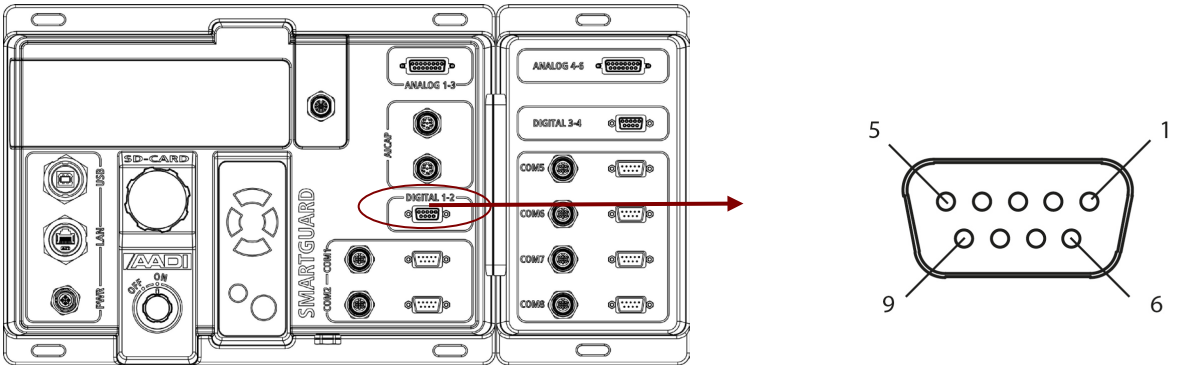


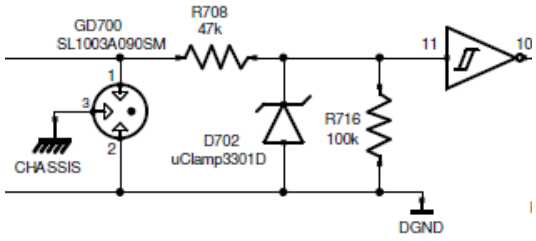
Figure A 5 9-pin D sub connection plug. Refer Table A 7 for signal wiring.

Table A 7 Signal wiring 9pin D sub connection plug for digital sensor.

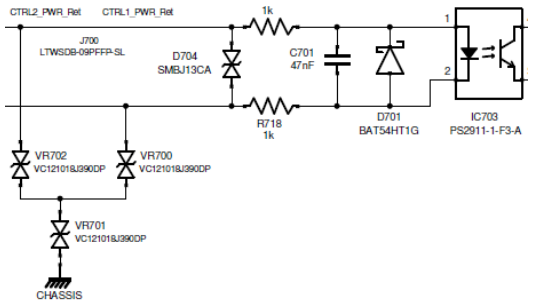
Wiring	Signal	Description
1	Digital in 1 +	0-10V input, max 5 kHz
2	Digital out 1 +	0/10V output. Max 1A. Adds to Sensor PWR total.
3	Not connected	
4	Digital out 2 +	0/10V output. Max 1A. Adds to Sensor PWR total
5	Digital in 2 -	Ref pin 9. Refer Note
6	Digital in 1 -	Ref pin 1
7	Digital out 1 -	Ref pin 2
8	Digital out 2 -	Ref pin 4
9	Digital in 2 +	Differential. Opto insulated. max 0.5 kHz. Refer Note

Note: Max 20V relative to GND

Digital in 1 schematics



Digital in 2 schematics



Appendix 1 - 5 Analog 1 – 3 connection plug for analog sensors

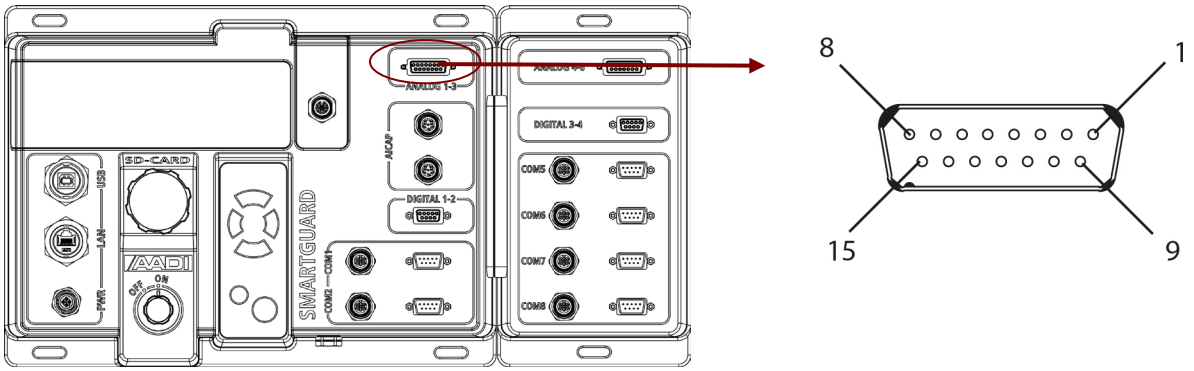


Figure A 6 9-pin D sub connection plug. Refer Table A 8 for signal wiring.

Table A 8 Signal wiring 9pin D sub connection plug for analog sensor.

Wiring	Signal	Description
1	Analog In 1+	Diff. input 0-5V, 24 bit resolution. Raw value is V
2	Analog In 2+	CFV typically 10nA, Rin >100MΩ. at 1V,
3	Analog In 3+	
4	Sensor power GND, Analog 1	Ref pin 5. Not to be physically grounded.
5	Sensor power +, Analog 1	Controlled, 10V, Max 1A. Adds to Sensor PWR total
6	Sensor power +, Analog 2	Controlled, 10V, Max 1A. Adds to Sensor PWR total
7	Sensor power GND, Analog 3	Ref pin 8. Not to be physically grounded.
8	Sensor power +, Analog 3	Controlled, 10V, Max 1A. Adds to Sensor PWR total
9	Analog In 1-	Ref pin 1
10	Analog In 2-	Ref pin 2
11	Analog In 3-	Ref pin 3
12	Sensor power GND, Analog 1	Ref pin 5. Not to be physically grounded.
13	Sensor power GND, Analog 2	Ref pin 6. Not to be physically grounded.
14	Sensor power GND, Analog 2	Ref pin 6. Not to be physically grounded.
15	Sensor power GND, Analog 3	Ref pin 8. Not to be physically grounded.

Appendix 1 - 6 Connection plug for AiCaP sensor

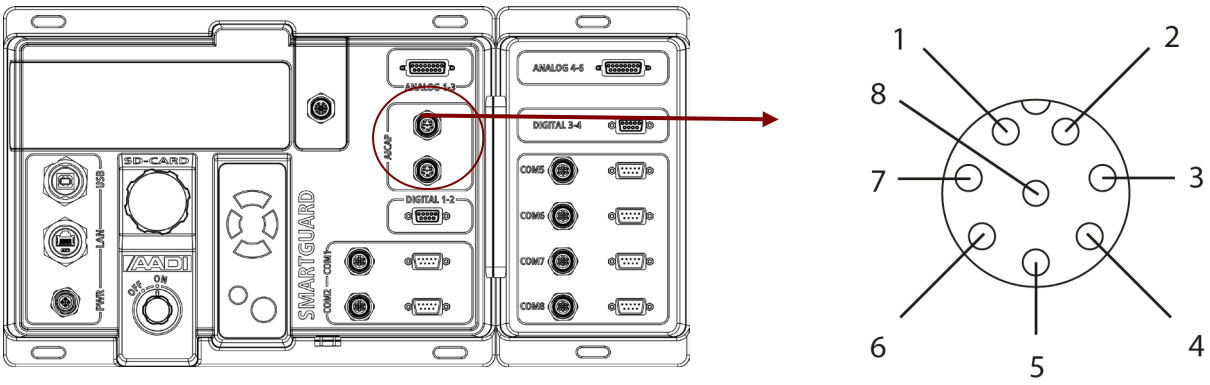


Figure A 7 8-pin M12 connection plug. Refer Table A 9 for signal wiring.

Table A 9 Signal wiring 8pin M12 connection plug for AiCaP sensor.

Wiring	Signal	Description
1	CAN_L	CAN signal. Compliant to CAN standard.
2	NCG1	NCR and NCE signal ground
3	NCR	Node Communication Request (input)
4	AiCaP power +	Power for AiCaP bus (output). 10V, Max 2A
5	AiCaP power GND	Power return for AiCaP bus
6	NCG2	NCR and NCE signal ground
7	CAN_H	CAN signal. Compliant to CAN standard.
8	NCE	Node Communication Enable (output)

Appendix 1 - 7 Connection plug for split sensor arm and mast cable adapter

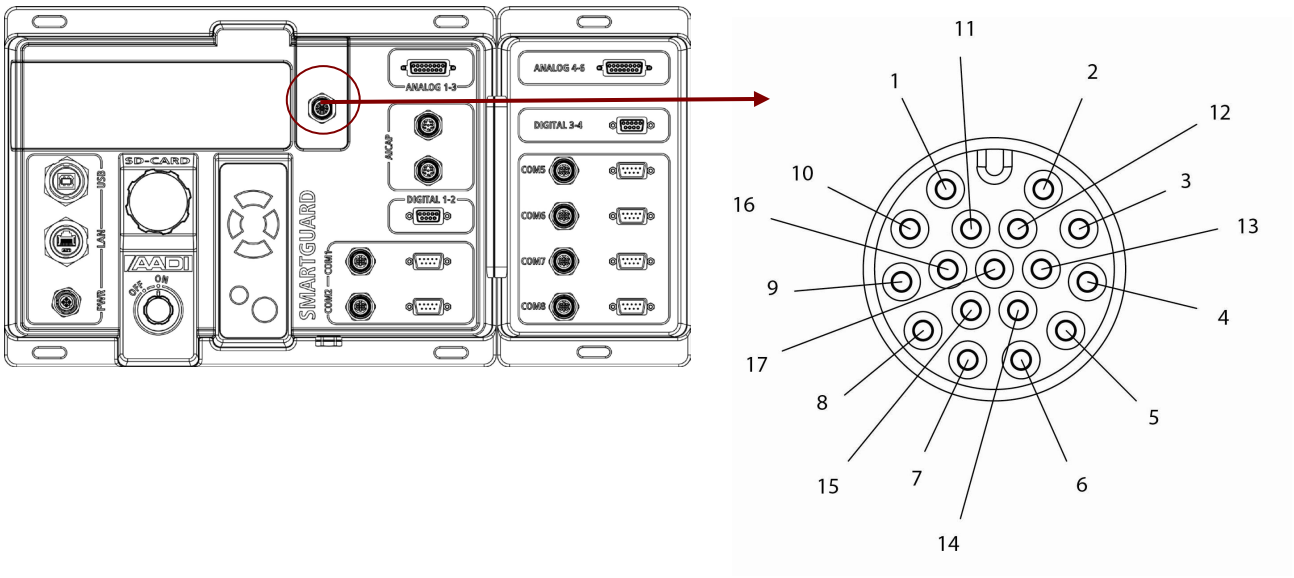


Figure A 8 17-pin M12 connection plug. Refer Table A 10 for signal wiring.

Table A 10 Signal wiring 17pin M12 connection plug for split sensor arm and mast cable adaptor.

Wiring	Signal	Description
1	-9V	Power return for sensors, Adds to Sensor PWR total
2	System Ground	Power output for sensors, Adds to Sensor PWR total
3	Not connected	
4	Control Voltage	
5	Bridge Ground	
6	Bridge Voltage	
7	Channel 12	
8	Channel 11	
9	Channel 10	
10	Channel 9	
11	Channel 8	
12	Channel 7	
13	Channel 6	
14	Channel 5	
15	Channel 4	
16	Channel 3	
17	Channel 2	

Appendix 1 - 8 Connection plug for ethernet

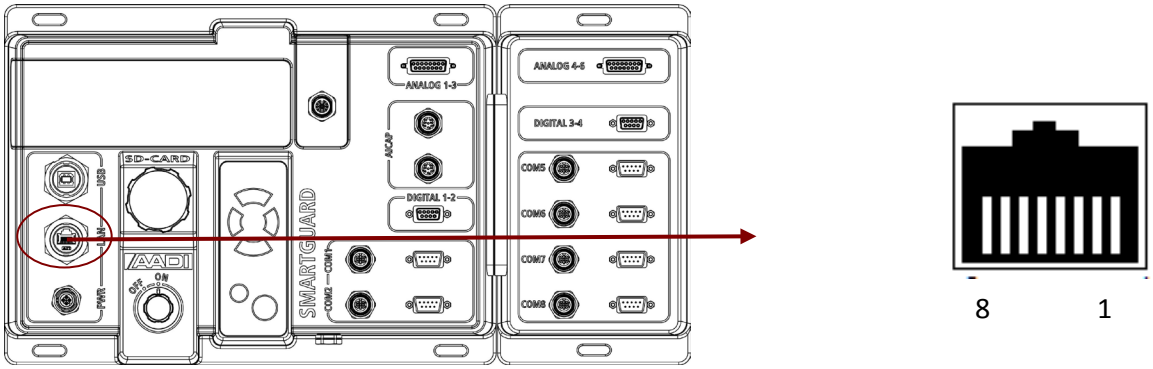


Figure A 9 RJ45 connection plug. Refer Table A 11 for signal wiring.

Table A 11 Signal wiring RJ45 connection plug for Ethernet.

Wiring	Signal	Description
1	Tx+	Output
2	Tx-	Output
3	Rx+	Input
4	Not used, terminated	
5	Not used, terminated	
6	Rx-	Input
7	Not used, terminated	
8	Not used, terminated	

LAN cable should be shielded, CAT5 or higher.

Appendix 1 - 9 COM5 - COM6 connection plugs for RS-232 sensor and controlled power supply for sensor

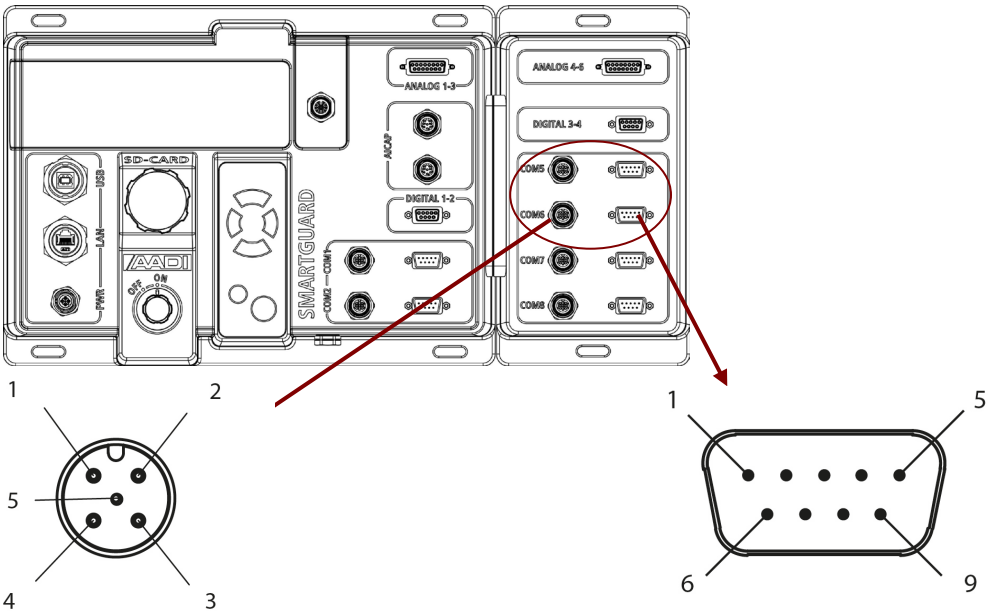


Figure A 10 4-pin M12 and 9-pin D sub connection plug. Refer Table A 12 and Table A 13 for signal wiring.

Table A 12 Signal wiring 4pin M12 connection plug for sensor and sensor power.

Wiring	Signal	Description
1	Sensor PWR out	Controlled power for sensor. 10V, Max 2 A total for all Sensor PWR
2	Sensor PWR out	
3	Sensor power GND	Not to be physically grounded.
4	Sensor power GND	
5	Not connected	

Table A 13 Signal wiring 9pin D sub connection plug for, RS-232 sensor.

Wiring	Signal, RS232	Description
1	(not connected)	
2	Rx	Serial input to SmartGuard
3	Tx	Serial output from SmartGuard
4	(not connected)	
5	Sensor power GND	Internally connected to M12 pin 3,4. Not to be physically grounded.
6	Not connected	
7	RTS	Signal output from SmartGuard
8	CTS	Signal input to SmartGuard
9	Sensor PWR out	Internally connected to M12 pin1,2 Max 0.5A

Appendix 1 - 10 COM7 - COM8 connection plugs for RS-232/422 sensor and controlled power supply for sensor

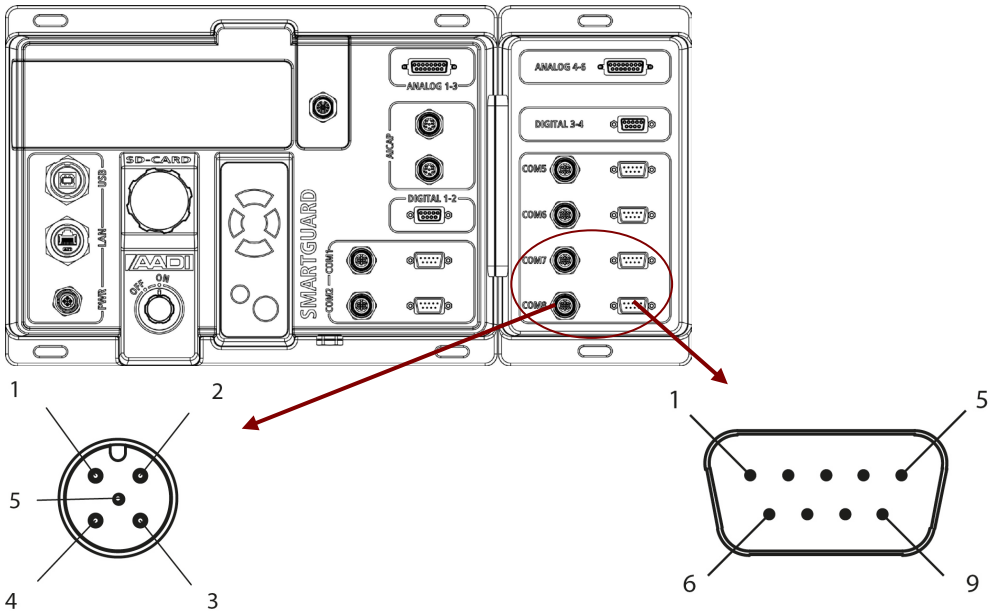


Figure A 11 4-pin M12 and 9-pin D sub connection plug. Refer Table A 14 - Table A 16 for signal wiring.

Table A 14 Signal wiring 4pin M12 connection plug for sensor and sensor power.

Wiring	Signal	Description
1	Sensor PWR out	Controlled power for sensor. 10V, Max 2 A total for all Sensor PWR
2	Sensor PWR out	
3	Sensor power GND	Not to be physically grounded.
4	Sensor power GND	
5	Not connected	

Table A 15 Signal wiring 9pin D sub connection plug for, RS-232 sensor.

Wiring	Signal, RS232	Description
1	(do not use)	
2	Rx	Serial input to SmartGuard
3	Tx	Serial output from SmartGuard
4	(do not use)	
5	Sensor power GND	Internally connected to M12 pin 3,4. Not to be physically grounded.
6	Not connected	
7	Not connected	
8	Not connected	
9	Sensor PWR out	Internally connected to M12 pin1,2 Max 0.5A

Table A 16 Signal wiring 9pin D sub connection plug for, RS-422 sensor.

Wiring	Signal, RS422	Description
1	Rx-	Serial input to SmartGuard. Not terminated. See below.
2	Rx+	
3	Tx-	Serial output from SmartGuard
4	Tx+	
5	Sensor power GND	Internally connected to M12 pin 3,4. Not to be physically grounded.
6	Not connected	
7	Not connected	
8	Not connected	
9	Sensor PWR out	Internally connected to M12 pin1,2 Max 0.5A

Terminating resistor R=120 ohm must be mounted in the cable connector between Rx+ and Rx- / pin 2 and 1 in order to have a proper line termination as desired by the RS422 specification.

AADI cables for SmartGuard RS422 connection will be terminated as required.

Appendix 1 - 11 Digital 3 – 4 connection plug for digital I/O, digital sensors

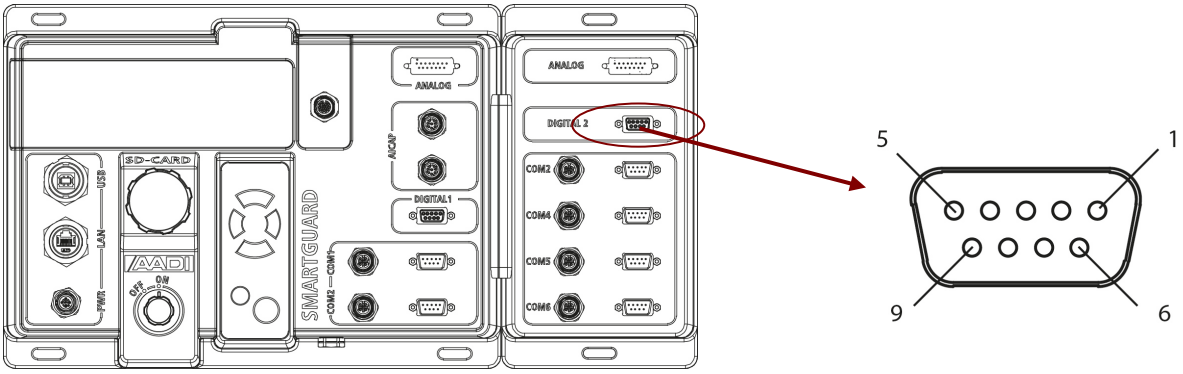
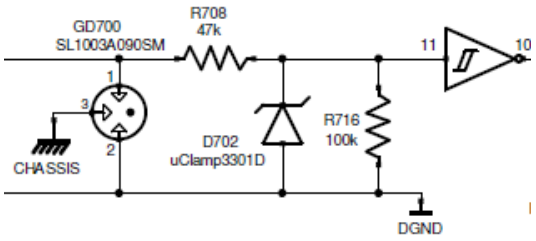


Figure A 12 9-pin D sub connection plug. Refer Table A 17 for signal wiring.

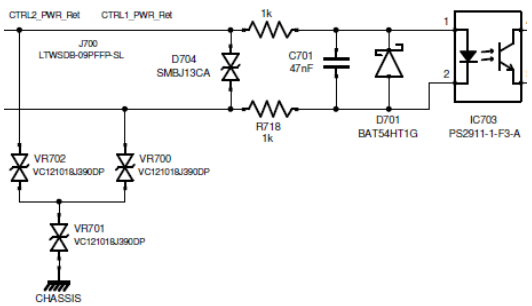
Table A 17 Signal wiring 9pin D sub connection plug for digital sensor.

Wiring	Signal	Description
1	Digital in 3 +	0-10V input, max 6 kHz
2	Digital out 3 +	0/10V output. Max 1A. Adds to Sensor PWR total.
3	Not connected	
4	Digital out 4 +	0/10V output. Max 1A. Adds to Sensor PWR total
5	Digital in 4 -	Ref pin 9
6	Digital in 3 -	Ref pin 1
7	Digital out 3 -	Ref pin 2
8	Digital out 4 -	Ref pin 4
9	Digital in 4 +	Differential. Opto insulated. max 1 kHz

Digital in 3 schematics



Digital in 4 schematics



Appendix 1 - 12 Analog 4 – 6 connection plug for analog sensors

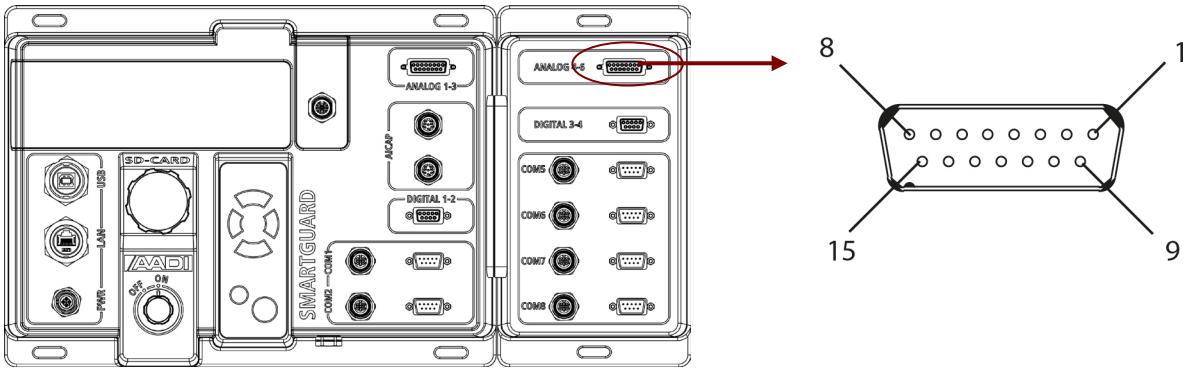


Figure A 13 9-pin D sub connection plug. Refer Table A 18 for signal wiring.

Table A 18 Signal wiring 9pin D sub connection plug for analog sensor.

Wiring	Signal	Description
1	Analog In 4+	Diff. input 0-5V, 24 bit resolution. Raw value is V CFV typically 10nA, Rin >100MΩ. at 1V,
2	Analog In 5+	
3	Analog In 6+	
4	Sensor power GND, Analog 4	Ref pin 5. Not to be physically grounded.
5	Sensor power +, Analog 4	Controlled, 10V, Max 1A. Adds to Sensor PWR total
6	Sensor power +, Analog 5	Controlled, 10V, Max 1A. Adds to Sensor PWR total
7	Sensor power GND, Analog 6	Ref pin 8. Not to be physically grounded.
8	Sensor power +, Analog 6	Controlled, 10V, Max 1A. Adds to Sensor PWR total
9	Analog In 4-	Ref pin 1
10	Analog In 5-	Ref pin 2
11	Analog In 6-	Ref pin 3
12	Sensor power GND, Analog 4	Ref pin 5. Not to be physically grounded.
13	Sensor power GND, Analog 5	Ref pin 6. Not to be physically grounded.
14	Sensor power GND, Analog 5	Ref pin 6. Not to be physically grounded.
15	Sensor power GND, Analog 6	Ref pin 8. Not to be physically grounded.

Appendix 2 SmartGuard some connection cables

Error! Reference source not found. gives a short description of SmartGuard cables and cable connections. Refer Appendix 1 for a description of each connector pin configuration.

AADI applies a standard system with a letter extension next to the cable product to indicating the cable length. Contact AADI before ordering your cable to ensure correct cable length.

Contact AADI for the latest version of all connection cables.

Prod no	Cable	Sensor/device	Connect to
0975314	Analog with d-sub to 6-pin Subconn	Analog sensor 0-5V, differensial, 24 bits	Analog
0975313	Analog with d-sub to 10-pin SP	Analog sensor 0-5V, differensial, 24 bits	Analog
0975390	Analog with d-sub to 8-pin Subconn	Analog sensor 0-5V, differensial, 24 bits	Analog
0975182 0975181 0975315	Analog with free end, 1 sensor Analog with free end, 2 sensors Analog with free end, 3 sensors	Analog sensor 0-5V, differensial, 24 bits	Analog
0975180	Modem/sensor RS-232 d-sub with separate power in	3rd party RS-232 sensors/modem	RS-232/ Serial PWR
0975184	Modem/sensor RS-232 d-sub	3rd party RS-232 sensors/modem	RS-232
0975238	Power for sensor/modem, free end	3rd party RS-232 sensors/modem	Serial PWR
0975183	Modem/sensor RS-232 with free end	3rd party RS-232 sensors	RS-232
0975317	Modem/sensor RS-422 with free end	3rd party RS-422 sensors	RS-422
0975275	RS-232 d-sub to 10-pin lemo	Vented sensor RS-232	RS-232
0975302	RS-422 d-sub to 10-pin lemo	Vented sensor RS-422	RS-422
0975389	Rs-232 d-sub to 8-pin Subconn	3rd party RS-232 sensors	Rs-232
0975186 0975185	Digital with free end, 1 sensor Digital with free end, 2 sensorS	3rd party sensors: 1 opto-isolated 500Hz, 1 non isolated 0/10V 5kHz	Digital
0975321	Digital d-sub to Amphenol	Rainfall sensor	Digital
0975318	AiCaP Termination plug	To be used if only one AiCaP terminal in use	AiCaP
0975236	AiCaP 10-pin SP to single sensor	Aanderaa AiCaP sensors	AiCaP
0975245	AiCaP string connection with Subconn	Aanderaa AiCaP sensors	AiCaP
0975241 0975242 0975243 0975244	Split sensor cable, 2 sensors Split sensor cable, 3 sensors Split sensor cable, 3 sensors Split sensor cable, 4 sensors	Aanderaa SR10/VR-22 hyd/met sensors	SR10
0975235	SmartGuard mast cable	Aanderaa SR10/VR22 sensor arm	SR10
0975237	SmartGuard adapter	Adapter to old mast cable 2933	SR10
0975240	Ethernet cable	LAN communication	LAN
0974061	USB cable	USB communication	USB
0975239	SmartGuard power in, free end	Battery, DC power supply	PWR
0975250	SmartGuard power in, AC/DC	AC/DC adapter 24V	PWR

Table A 19 SmartGuard cables

Appendix 3 Example of a SmartGuard hyd-met system

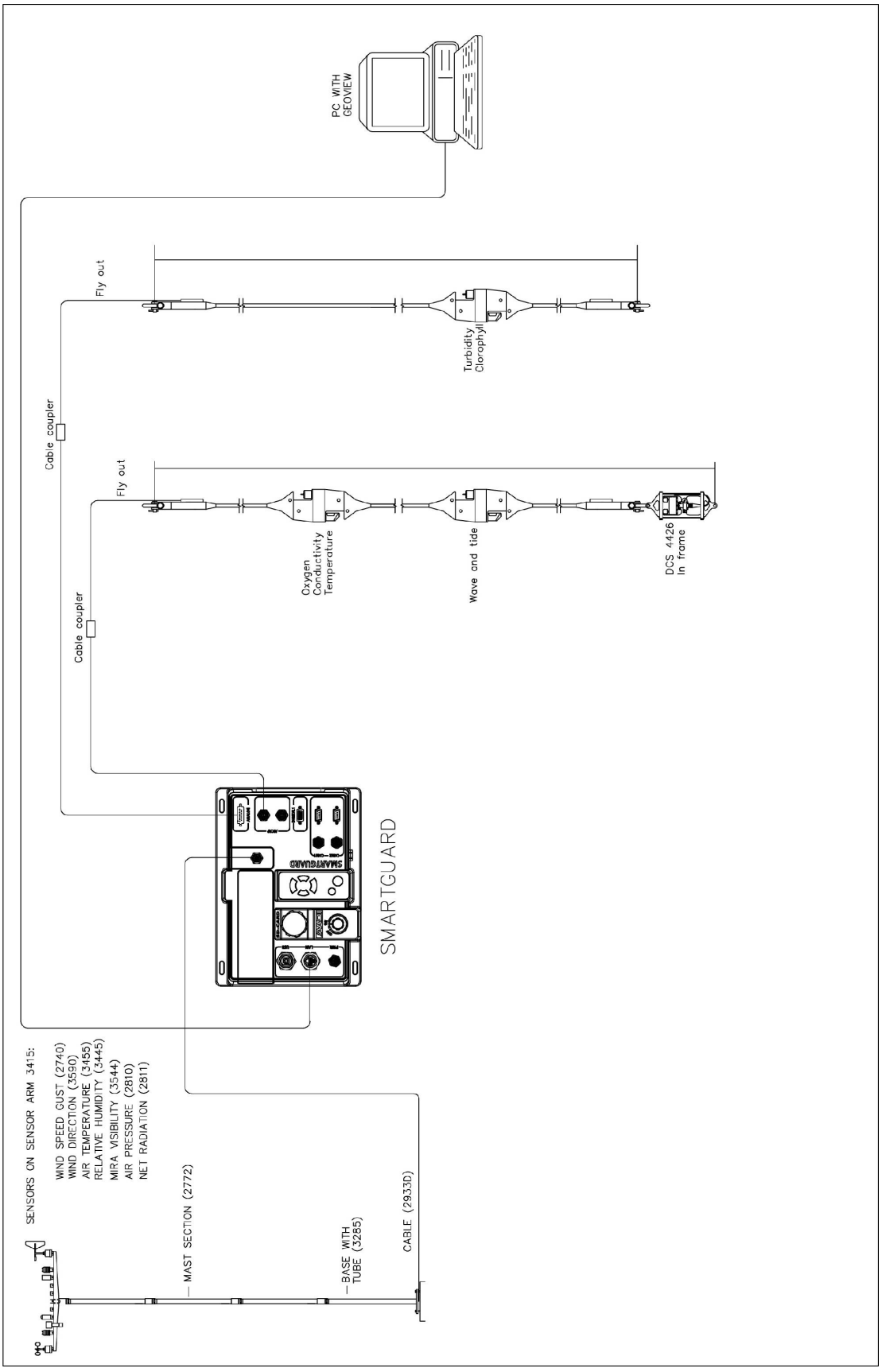


Figure A 14 Example of SmartGuard hyd-met system

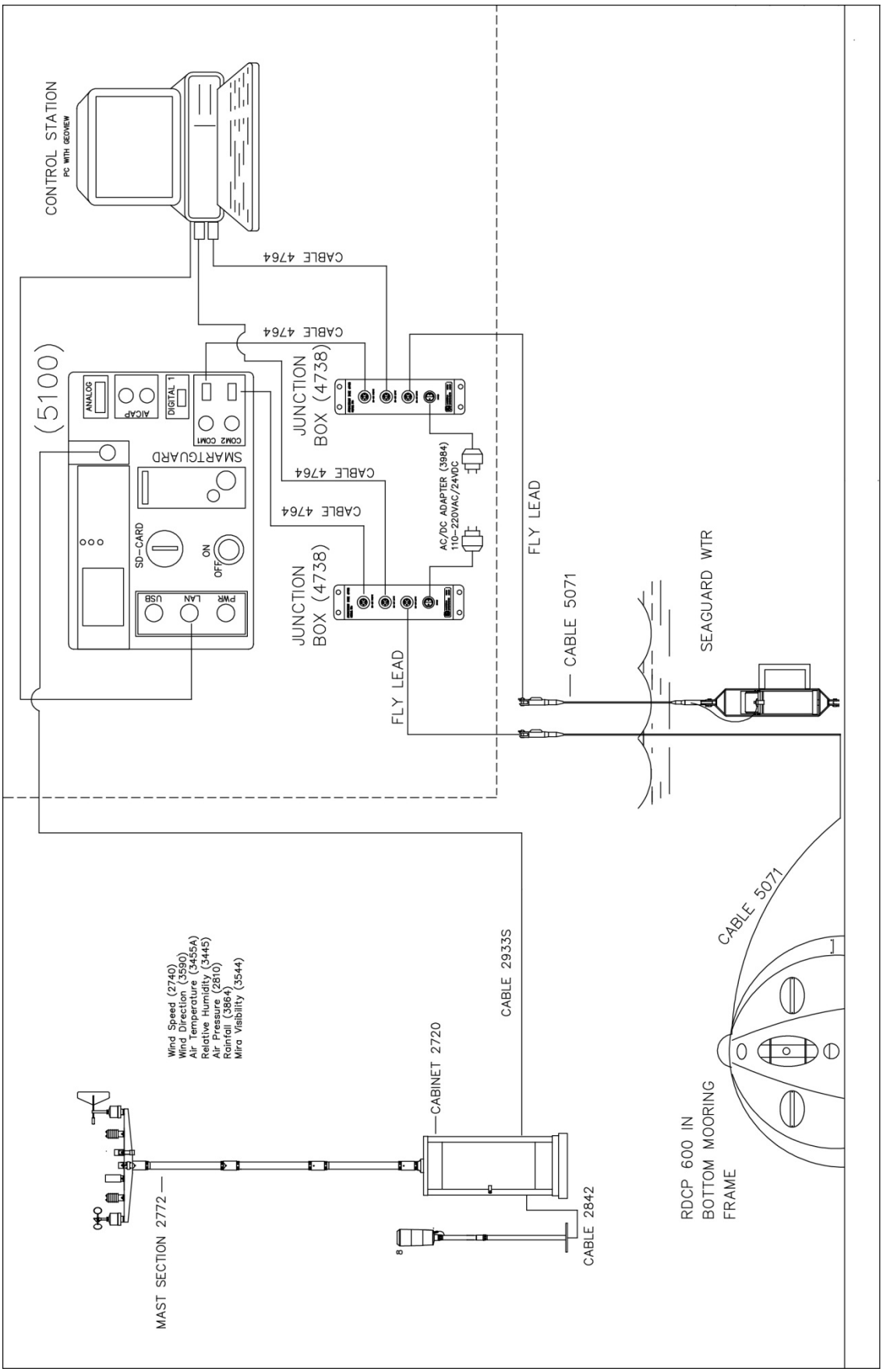


Figure A 15 Example of a SmartGuard hyd-met system with bottom frame mooring and current profiler.

Aanderaa Data Instruments AS
P.O.Box 34 Slåtthaug, Nesttunbrekka 97, N-5851 Bergen, Norway
Tel: +47 55 60 48 00 Fax: +47 55 60 48 01
email: aadi.info@xyleminc.com - www.aadi.no

xylem
Let's Solve Water