1 EVK features

- PCI or USB connectivity to PCs/ laptops
- Up to 2000Hz sampling rate supported
- Temperature measurements supported
- Service mode access
  - Full IMU information
  - Full IMU configuration capability
  - Detailed IMU diagnostics
  - Help section
- Measure panel
  - Data presentations and save data to file capability
  - Custom scale and zoom functions
  - CRC check
- Logging panel
  - Support for any measurement duration, only limited by HD memory and processor capacity of PC
  - Various stop criteria for measurements available ('Manually', 'No of samples' or 'Time elapsed')
- Measurements on 2 IMUs simultaneously supported (requires either one or two additional cables depending on the kit in use)

STIM300 EVK PCI
(the preferred solution)

USB-kit – important notice!
The USB kit supports certain distinct bit rates only. The following bit rates have been tested with STIM:

Approved bit rates w/USB kit
3 000 000 bps
2 000 000 bps
1 500 000bps
1 411 765 bps
Most settings below 1 300 000 bps

General descriptions

The STIM300 evaluation kits provide measurement and configuration access to STIM300 inertial measurement units (IMUs). IMU configuration, graphical result presentation and save data to file functions are supported. The single voltage supply required for IMU operation is provided from any PC or laptop USB port.

Two alternative evaluation kits are available. Features are highlighted in the following table

Table 1: Features of USB vs PCI-kit

	USB	PCI
Portability across PC-s	Yes (custom SW installation required)	No
Hardware installation required?	No	Yes
Gyro, Acc, Inc & AUX-out available?	Yes	Yes
TOV, AUX-in, External trigger available?	No	Yes (break-out cable)
Transmission rate supported	Up to 3Mbit/s	Up to 9.55Mbit/s

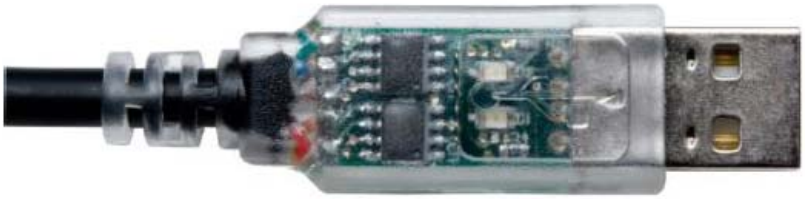
1.1 STIM300 EVK PCI

The evaluation kit with PCI connectivity is the preferred solution for thorough characterization. This kit is in the following referred to as "*PCI kit".* See also the picture on the front page.

1.2 STIM300 EVK USB

The evaluation kit with USB connectivity provides the alternative solution, e.g. for laptops, and is an excellent choice for IMU configuration and shorter measurement series. This kit is in the following referred to as "*USB kit".*

The kit contains a USB-RS422 converter from Future Technology Devices International, integrated with the communication and power supply cable.



The USB-RS422 converter cable is a USB to RS422 levels serial UART converter cable incorporating FTDI's FT232RQ USB to serial UART interface IC device which handles all the USB signalling and protocols. The cable provides a fast, simple way to connect devices with a RS422 interface to USB.

Each USB-RS422 cable contains a small internal electronic circuit board, utilising the FT232R, which is encapsulated into the USB connector end of the cable. The integrated electronics also include the RS422 transceiver plus Tx and Rx LEDs which give a visual indication of traffic on the cable.

1.3 Configurable and readable parameters

Configurable IMU parameters:

- Output format (angular rate, increment angle, etc.)
- Datagram format (standard, extended, etc.)
- Sampling rate (125 samples/s, 250 samples/s, etc.)
- Bandwidth/ Low pass filter frequency (16Hz, 33Hz, etc.)
- RS422 transmission bit rate (374400 bits/s, 460800 bits/s, etc.)
- Number of stop bits in datagram (1 or 2 stop bits)
- Parity bit (no parity, odd parity, even parity)
- Line/ Datagram termination (on/off, None/ <CR><LF>)

Readable IMU parameters:

- Unit part number
- Serial number
- Firmware revision
- Hardware revision
- Guro module diagonistics

Detailed IMU diagnostic information includes RAM and flash checks, stack handling checks, status of internal voltage supply references, and various parameter reports for each measurement axis are available from the supported SERVICE mode.

Note: Time of Validity (TOV) and external trigger functionalities of STIM300 are not supported by the EVK PC-software.

2 Kit contents

- PCI kit only:
  - PCI to RS422 interface card, "the PCI card", for the PCI kit
  - STIM300 communication and power cable
- USB kit only
  - USB to RS422 interface cable
- Memory stick with
  - PC software,
  - FTDI CDM20824 serial driver for Windows and
  - EVK PC sotware User manual
- Allen Wrench for fixing connector of communication and power cable to IMU
- Hard copy of User manual

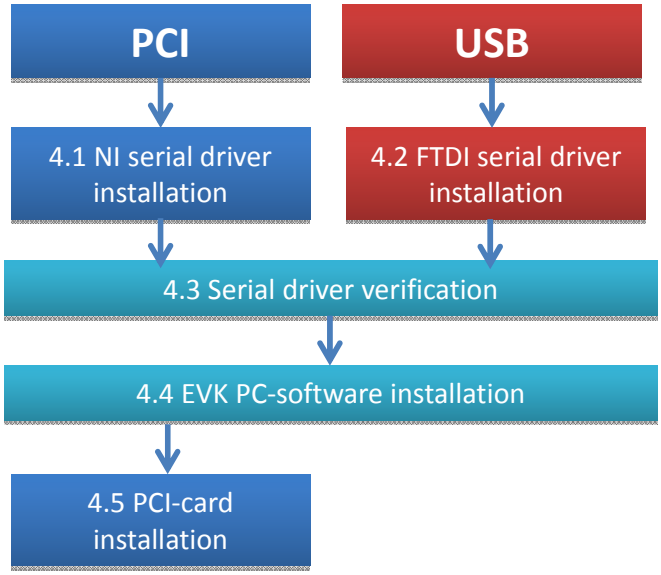
Note that the evaluation kits does not include the IMU. (The IMU is to be ordered separately.)

3 System requirements

- Windows XP SP2 (or later), Windows Vista, Windows 7 (32/ 64bit)
- 1 free USB port and 1 free PCI slot for the PCI kit
- 2 free USB ports for the USB kit
- Quad core processor recommended (when simultaneously logging data from two IMUs)

4 Getting started

Preparing your system involves the following steps, depending on type kit:



4.1 PCI-kit Installation of NI serial driver

Install the National Instruments (NI) serial driver from the memory stick included in the kit. This process is self-instructive. Follow the on-screen messages without doing any configuration changes.

Figure 1 and Figure 2 show two of the messages that appear during serial driver installation.

The NI serial driver can also be found from the Sensonor support site. Use this site to regularly check for updates.

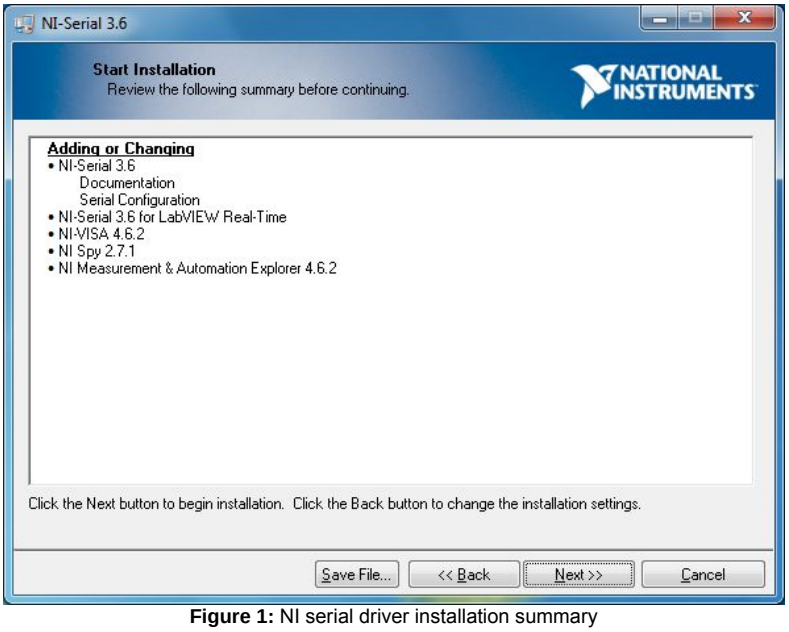


Figure 1: NI serial driver installation summary

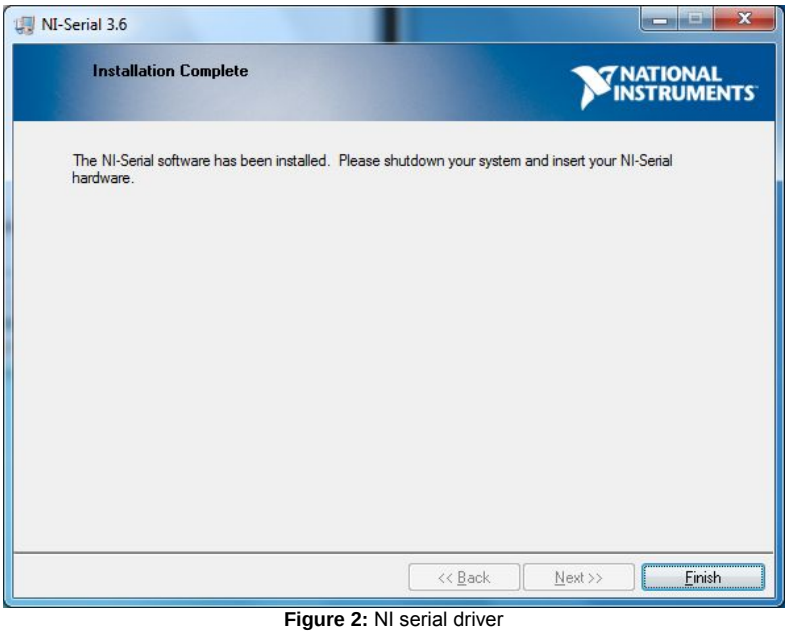


Figure 2: NI serial driver

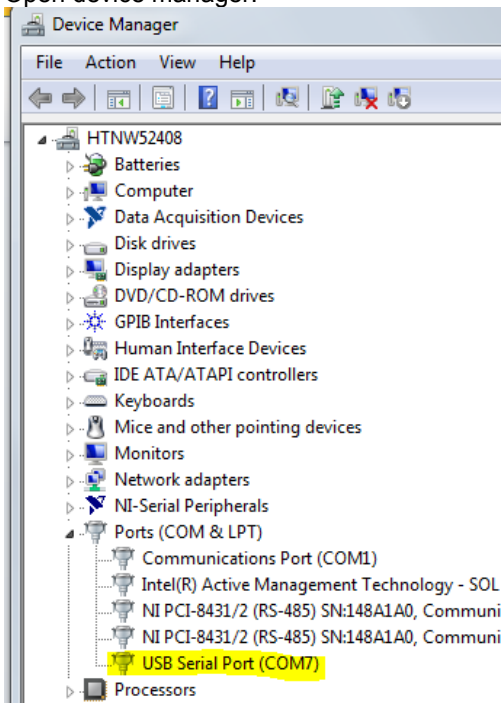
4.2 USB kit Installation of FTDI serial driver

To install the drivers for the FTDI serial driver under Windows, follow the instructions below:

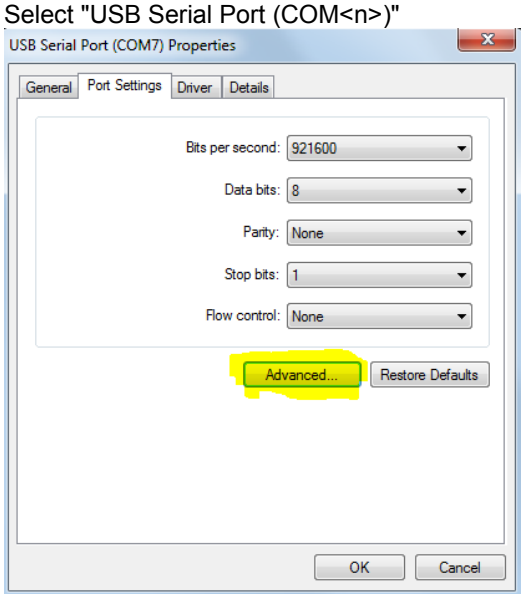
- Connect the USB-RS422 plug to a spare USB port on your PC.
- If there is an available Internet connection, some Windows versions will silently connect to the Windows Update website and install any suitable driver it finds for the device.
- In the event that no automatic installation takes place, please refer to the set-up guide from FTDI: http://www.ftdichip.com/Support/Documents/InstallGuides.htm

Then modify the port configuration as follows:

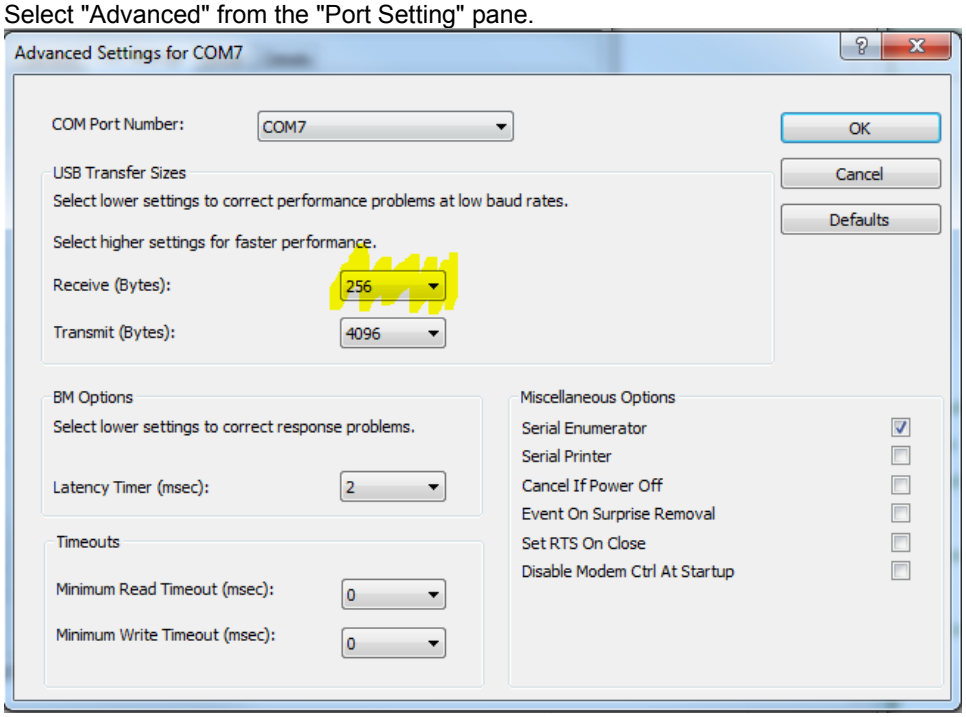
Open device manager:



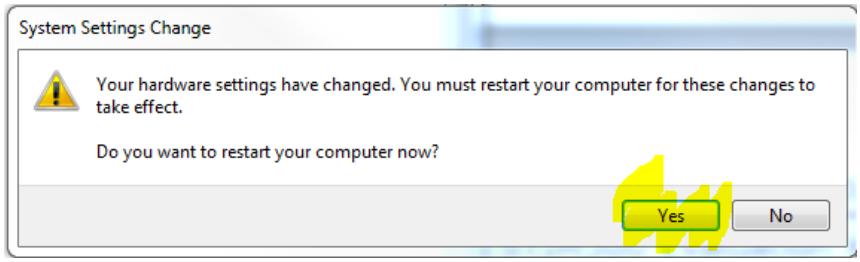
Select "USB Serial Port (COM<n>)"



Select "Advanced" from the "Port Setting" pane.



Reduce the "Receive (Bytes)"-setting to a small value, such as 256. Other settings may be left untouched. Press OK twice.



Remember to restart the computer after making this change.

4.3 Verification of serial driver set-up

Using your PC, launch *Device Manager* Device Manager. See *Control Panel -> Hardware and Sound*.

Verify that the serial driver installation has completed successfully. Examples are shown in Figure 3a (PCI) and Figure 3b (USB).

Notice at this point the assigned COM port value(s) as this information is needed later for connecting to the IMU(s) from the PC software

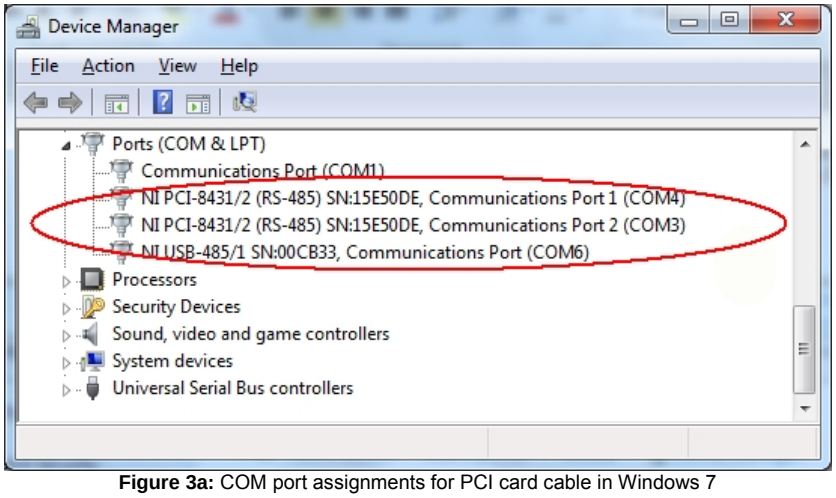


Figure 3a: COM port assignments for PCI card cable in Windows 7

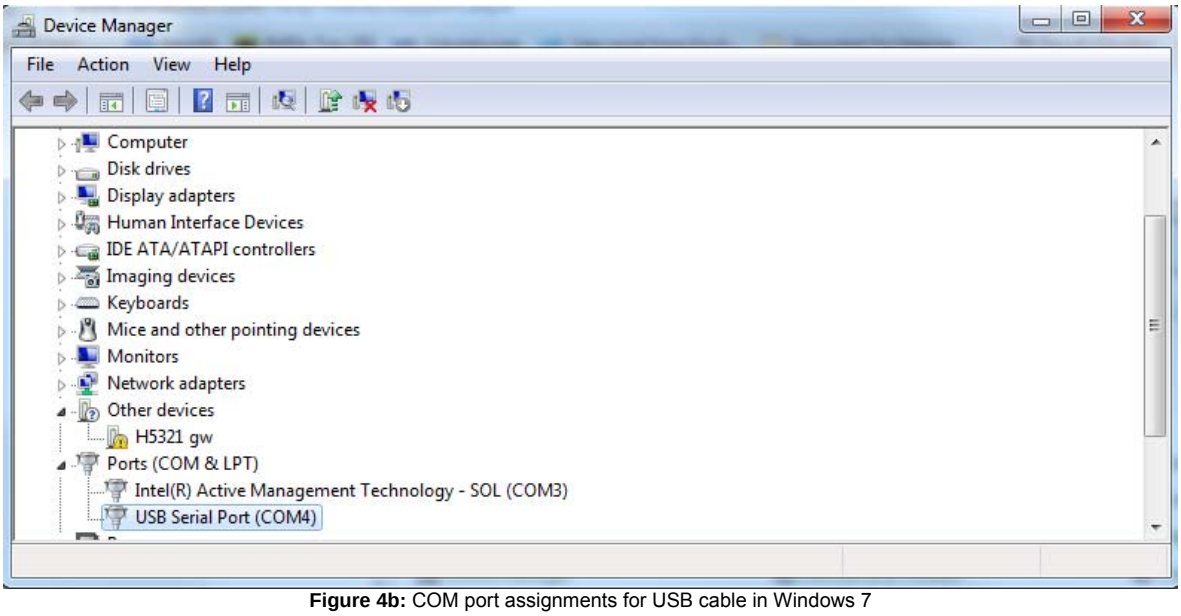


Figure 4b: COM port assignments for USB cable in Windows 7

4.4 Installation of PC software

Install the PC software by running "setup.exe" found on the included memory-stick. Follow the on-screen instructions to complete the installation. See the following figures for guidance.

Notice that the PC software also can be downloaded from the Sensonor support site. Use this site regularly to check for updates.

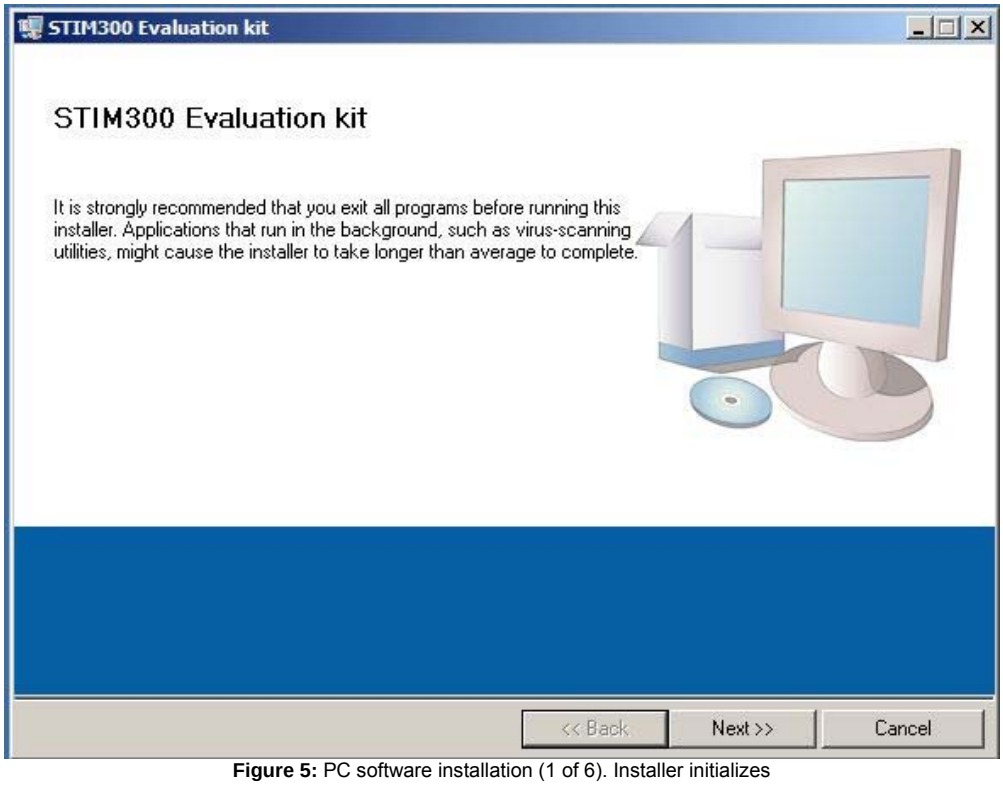


Figure 5: PC software installation (1 of 6). Installer initializes

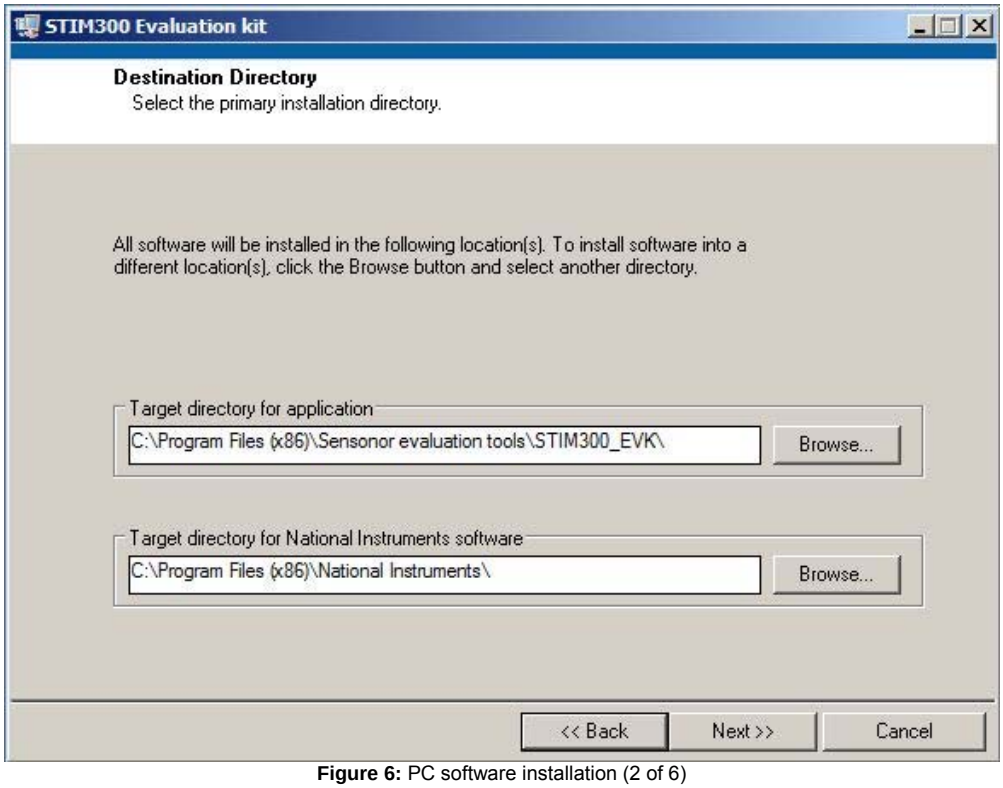


Figure 6: PC software installation (2 of 6)

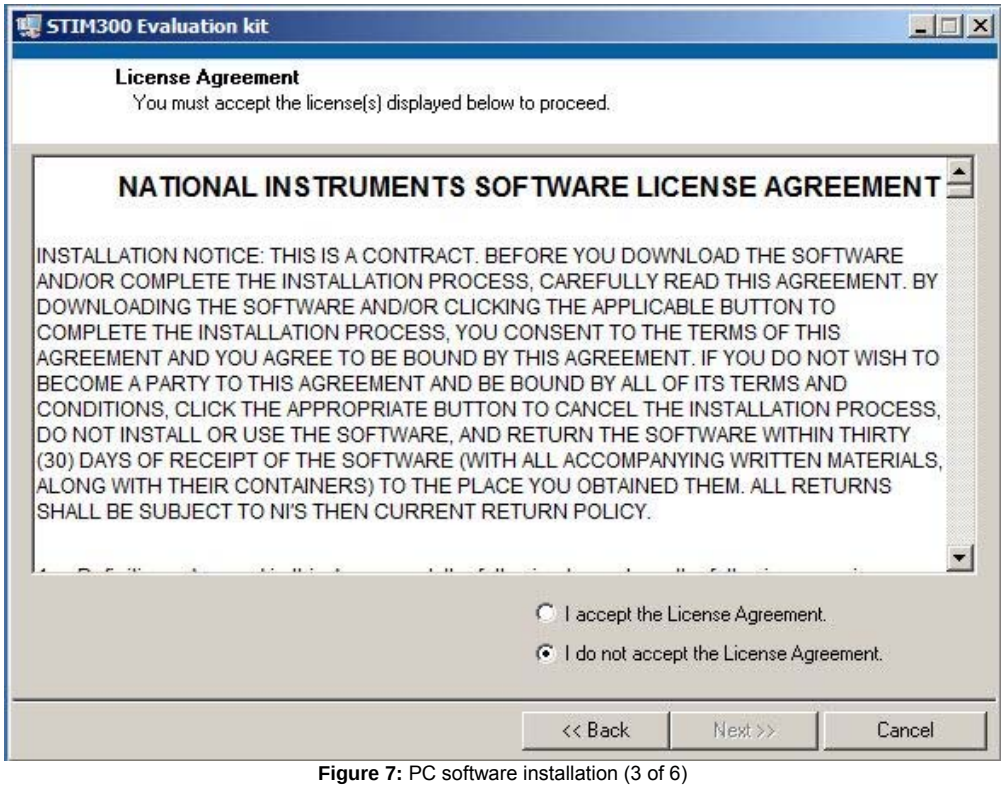


Figure 7: PC software installation (3 of 6)

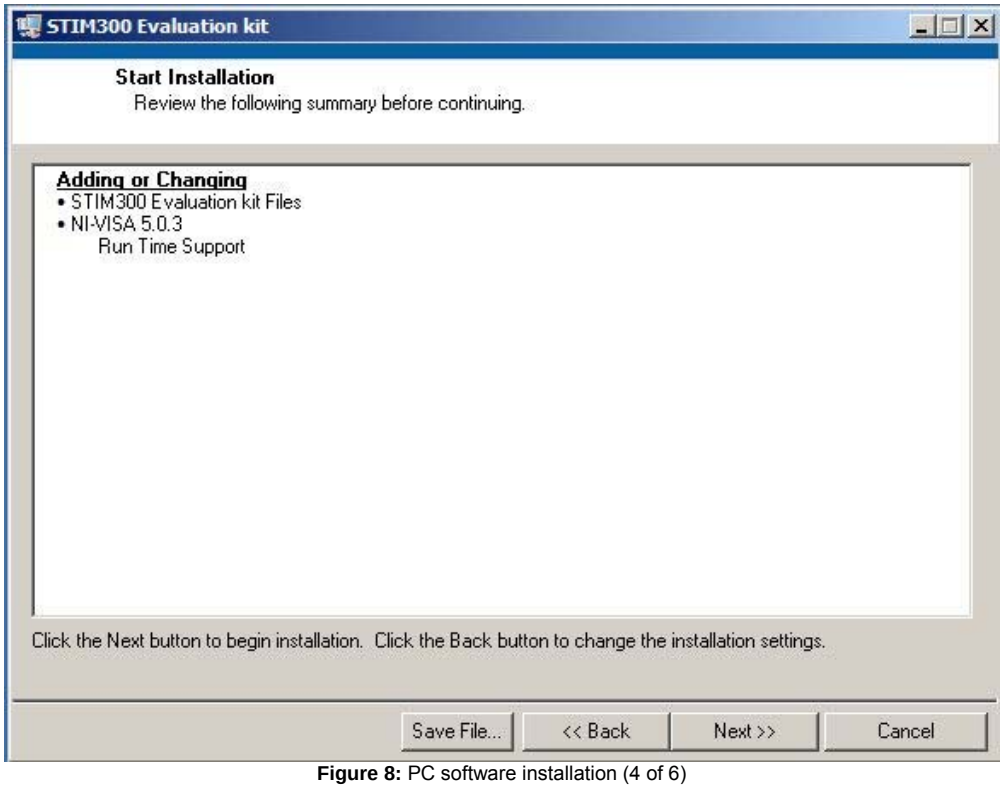


Figure 8: PC software installation (4 of 6)

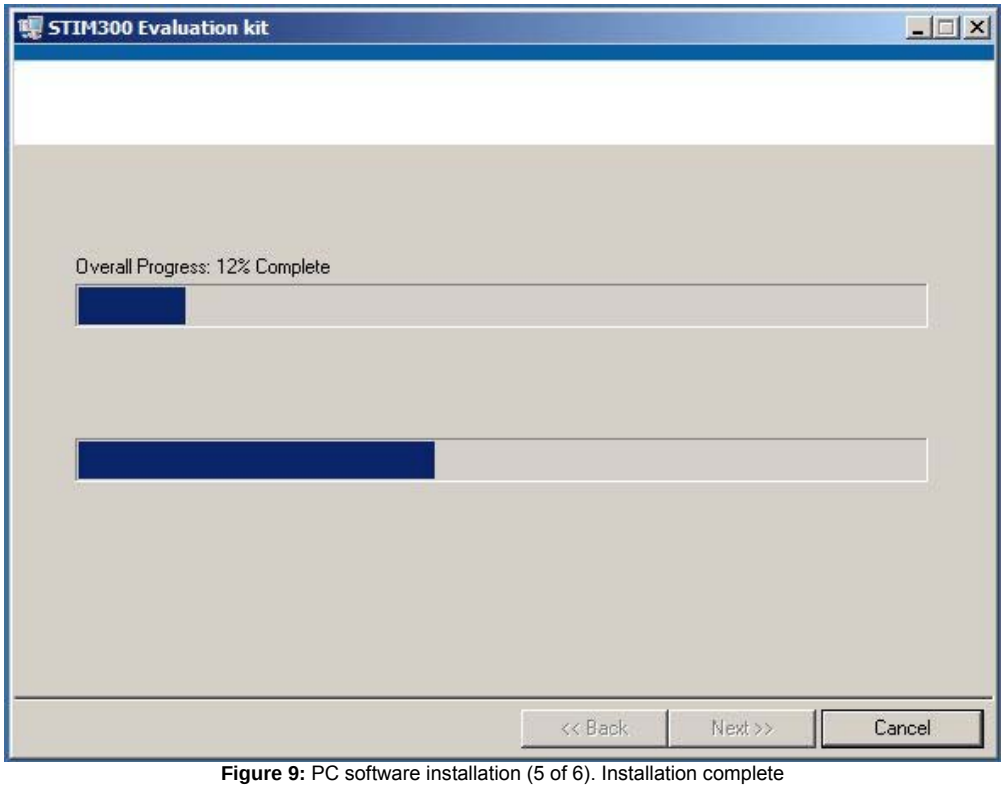


Figure 9: PC software installation (5 of 6). Installation complete

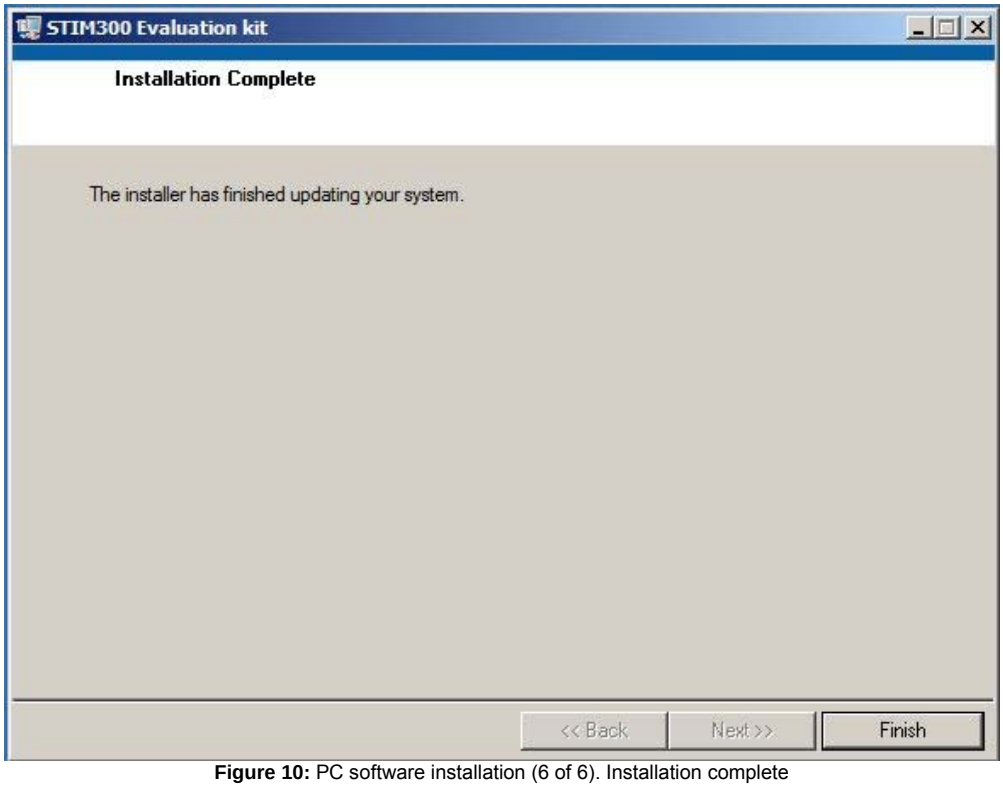


Figure 10: PC software installation (6 of 6). Installation complete

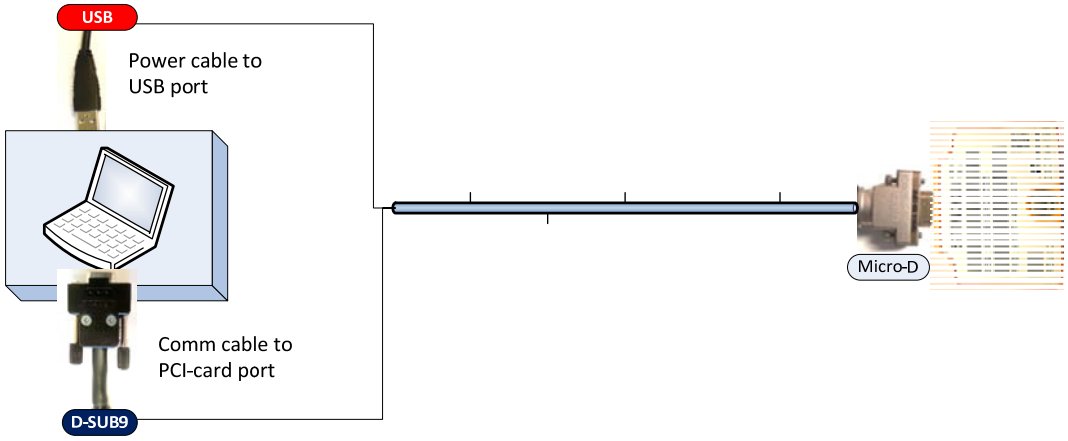
4.5 Installation of PCI card

Disconnect AC and battery power from your computer before attempting installation.

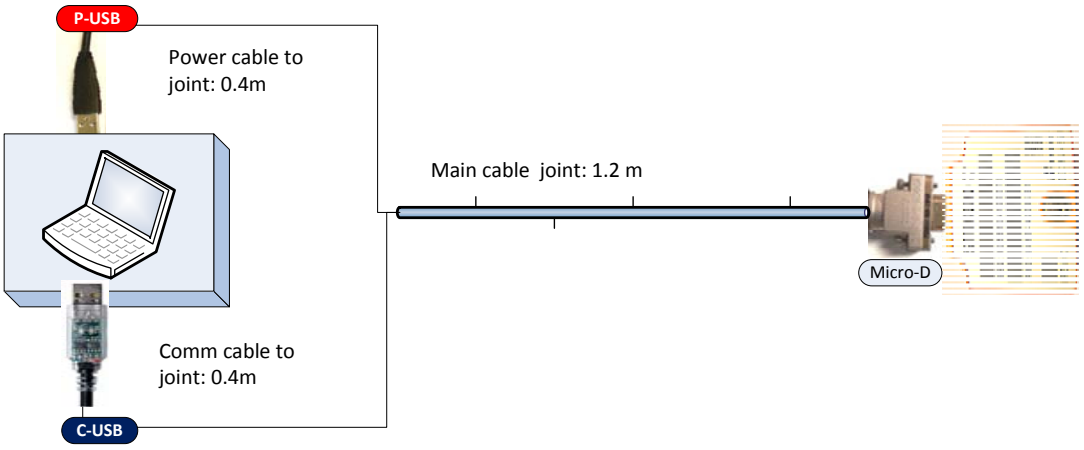
Following your computer manufacturer's directions, install the *PCI card* into a free PCI slot of the PC cabinet.

5 Connecting the STIM to your PC

5.1 PCI kit



5.2 USB kit



6 First PC software start-up

1. Navigate to the 'Sensonor evaluation tools' folder from Windows start menu. Click on the shortcut named "STIM300 EVK" to start the PC software. Ensure to run program as administrator (as this is needed for full function)

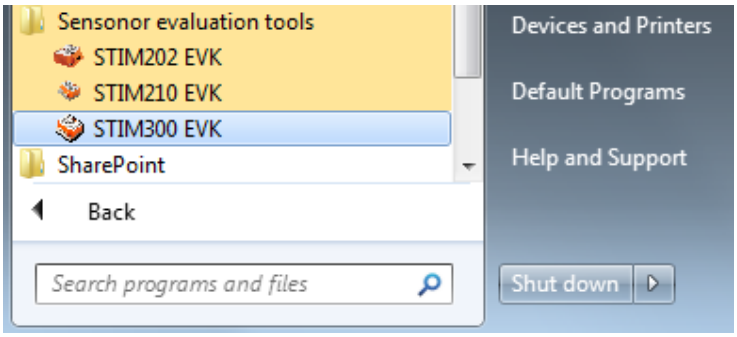


Figure 11: Starting PC software from Windows 7 start menu

2. A pop-up box for software registration appears. Fill in four open fields and click "Submit". The default email client opens. Press "Send" in order to complete this step (and the user information is sent back to Sensonor)

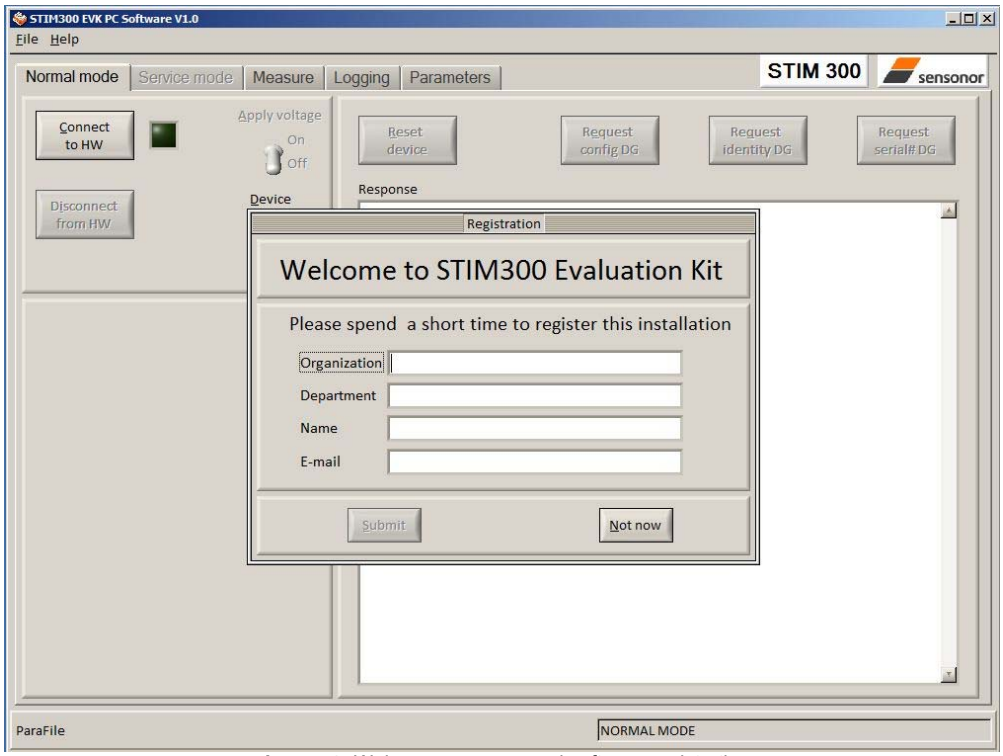


Figure 12: Welcome message and software registration

3. A pop-up box appears, asking for a parameter (.INI) file. Select the INI-file (available in the installation folder by default) and click "Load"

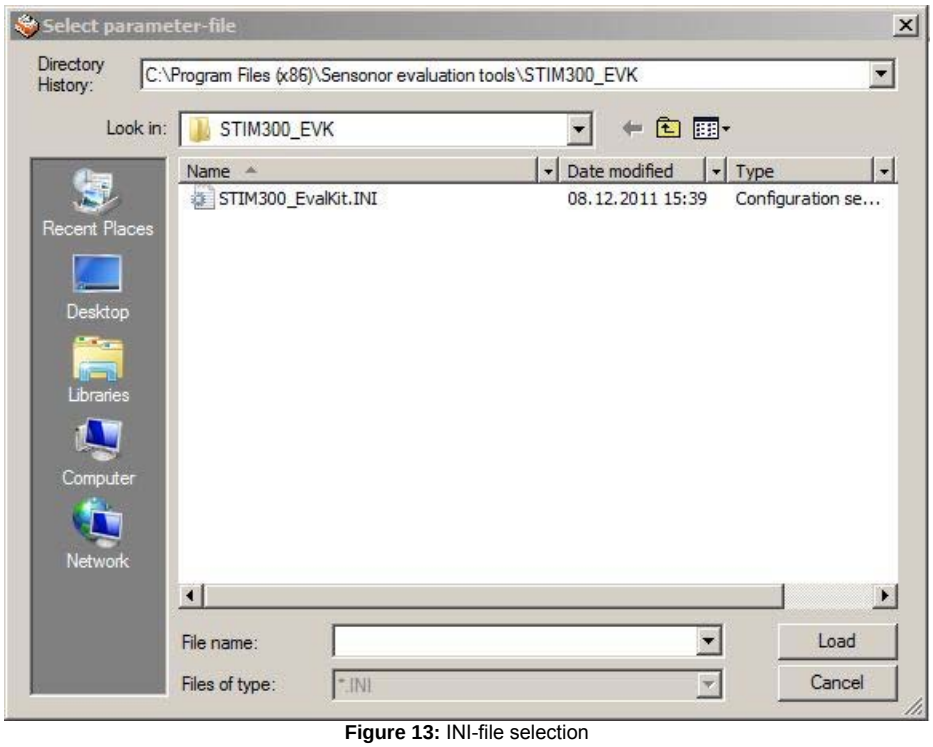


Figure 13: INI-file selection

4. The Normal mode panel is shown

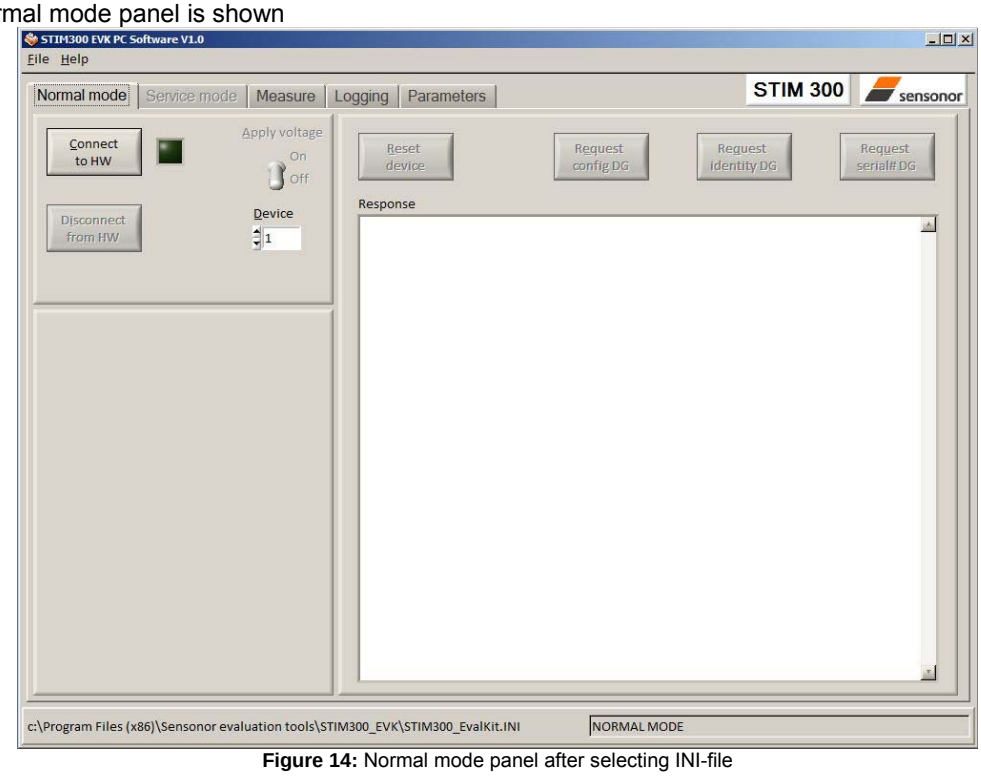


Figure 14: Normal mode panel after selecting INI-file

5. Verify the correct COM port settings in the Parameters view. Password to edit is ‘stim’. If needed change the existing setting by double clicking on the value '4'

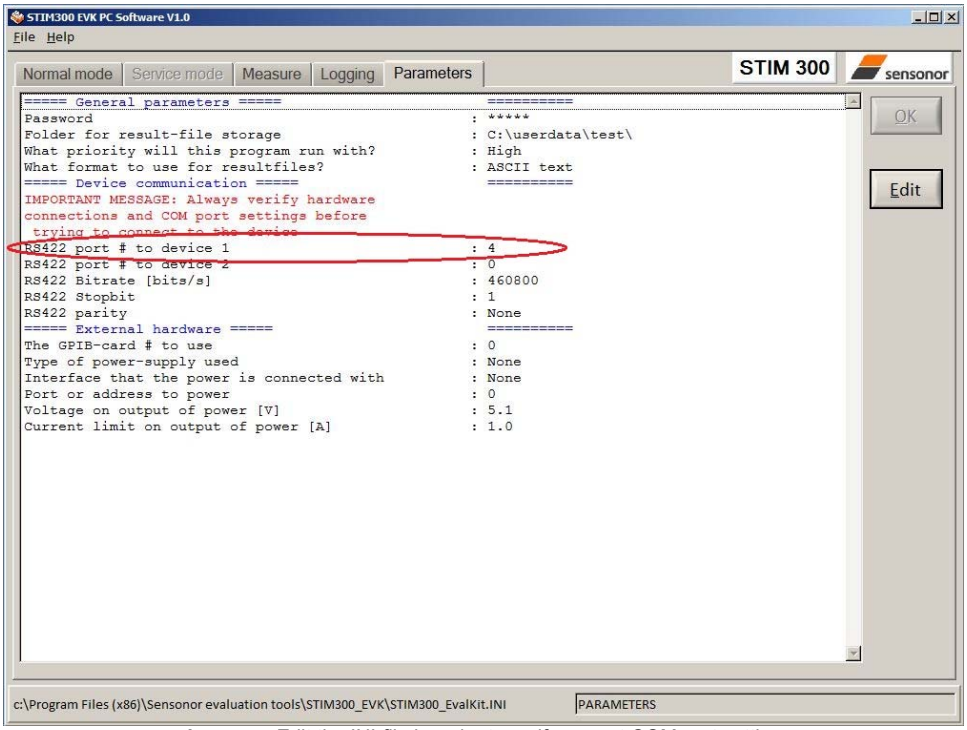


Figure 15: Edit the INI-file in order to verify correct COM port settings

6. Set the correct value for RS422 bit rate, according to the configuration of the STIM unit:

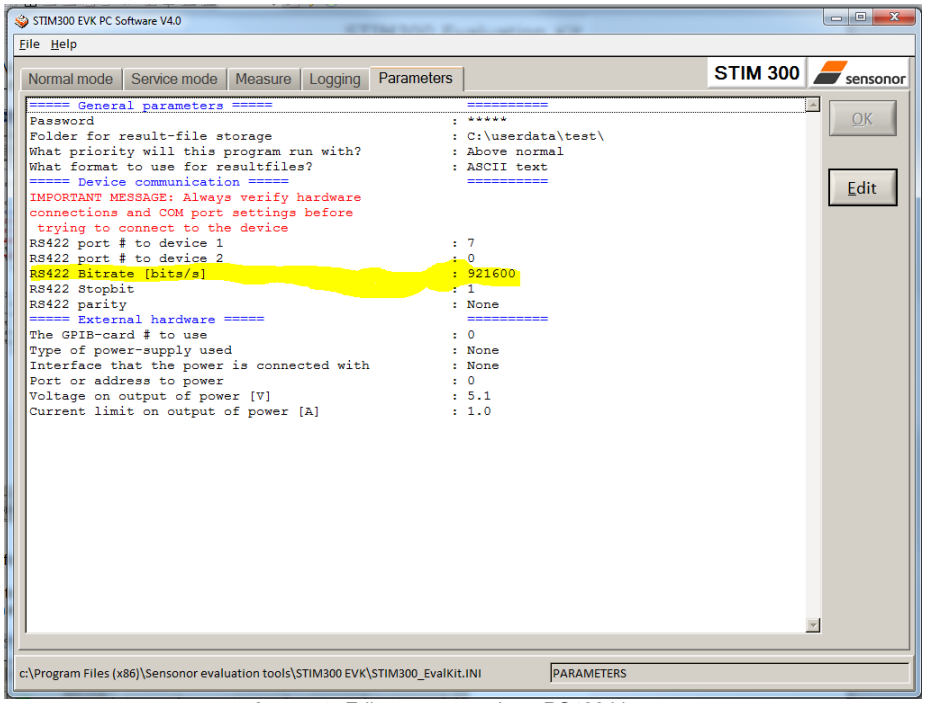


Figure 16: Edit parameters, here RS422 bit rate

USB-kit – important notice!
The USB kit support certain distinct bit rates only. The following bit rates have been tested with STIM:

Table 2: Service mode panel descriptions

Approved bit rates w/USB kit
3 000 000 bps
2 000 000 bps
1 500 000bps
1 411 765 bps
Most settings below 1 300 000 bps

7. Establish connection to module by clicking the 'Connect to HW' button in Normal mode panel. A green LED light appears, indicating that the COM port(s) is (are) opened.

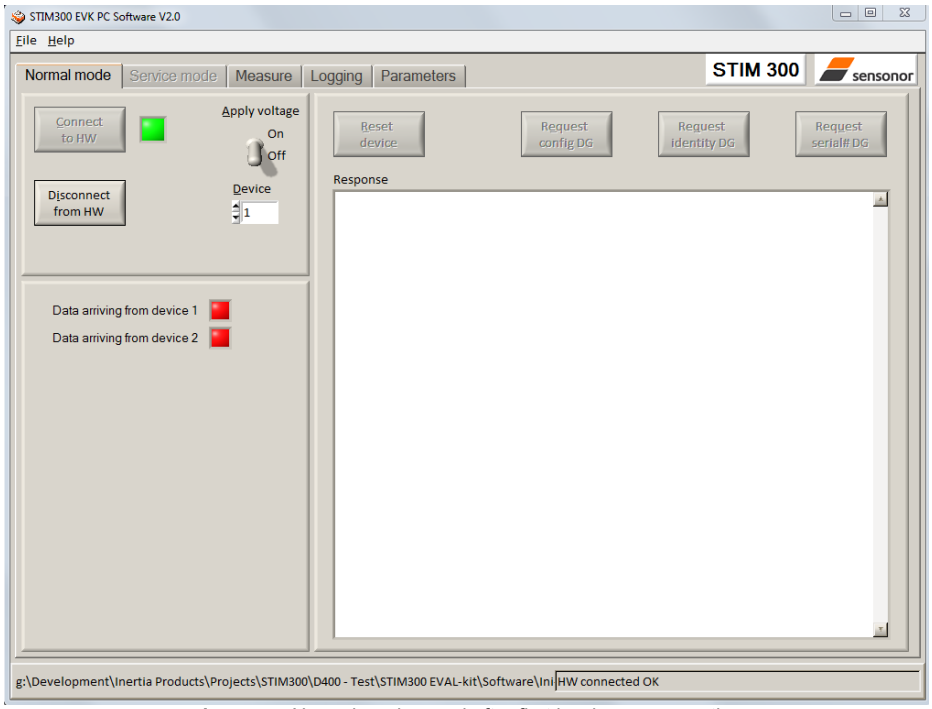


Figure 17: Normal mode panel after first hardware connection

8. Change the 'Apply voltage' control switch position to 'On'. The pop-up message telling "Turn on device supply voltage" appears. Do this by inserting the red "POWER" USB connector of the *STIM300 communication and power cable* into a free USB port of the PC/ laptop. Confirm the supply voltage applied by clicking 'OK' on the pop-up message

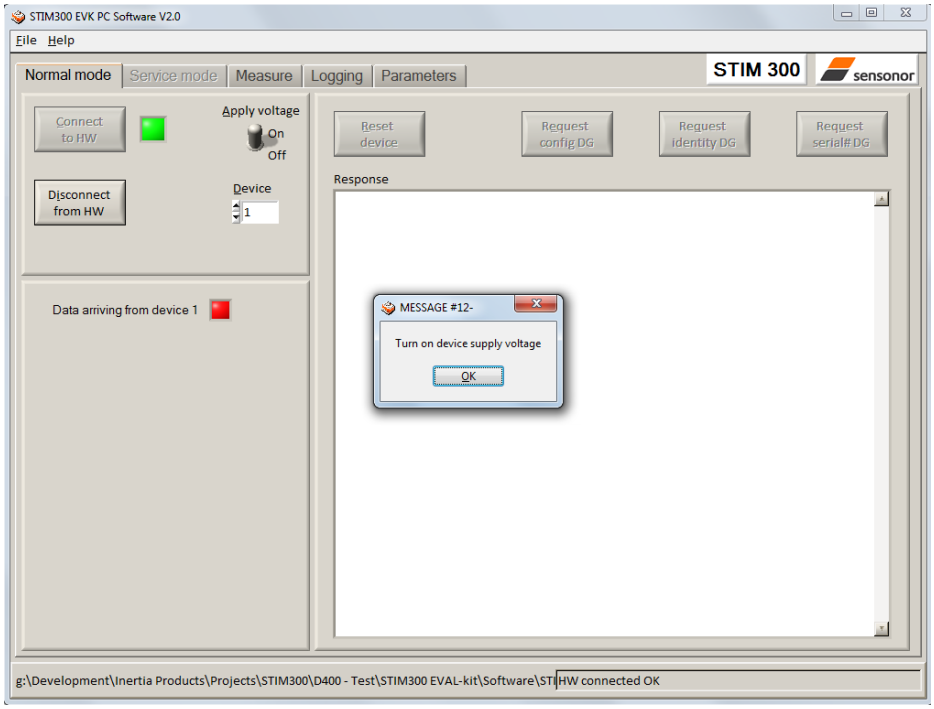


Figure 18: Normal mode panel when USB power connector of *STIM300 communication and power cable* is to be inserted

9. Verify the connection to module by clicking on the 'Request config DG' button. An example of such a result is shown in Figure 19. (The kit is now ready for use !)

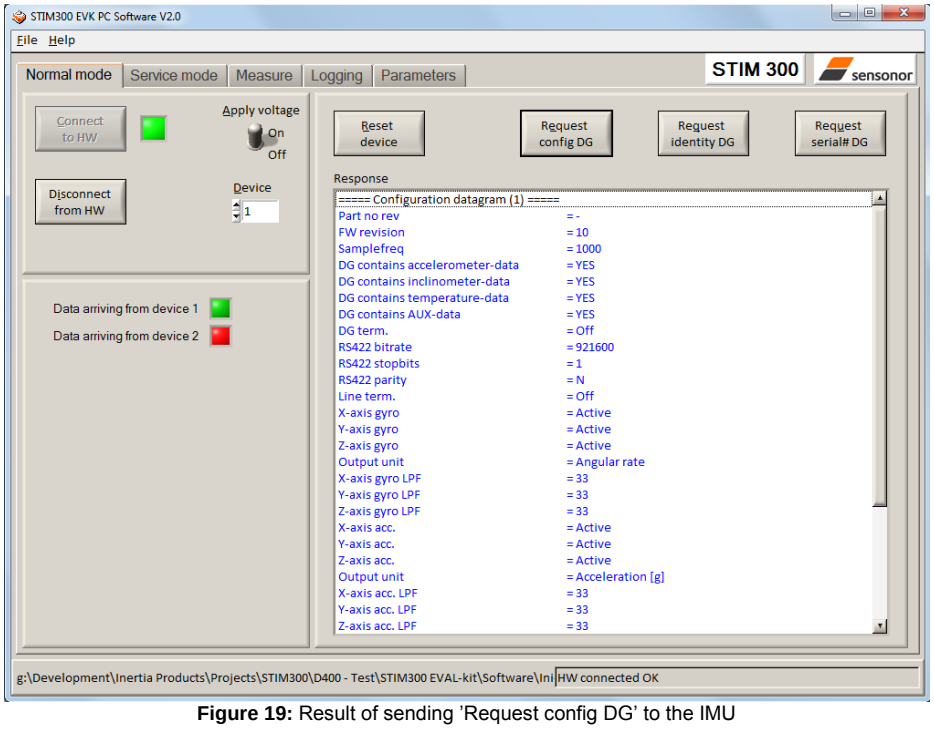


Figure 19: Result of sending 'Request config DG' to the IMU

7 Introduction to PC software

7.1 Panels overview

In addition to the panel already shown (Normal mode and Parameters panel), other panels are also available:

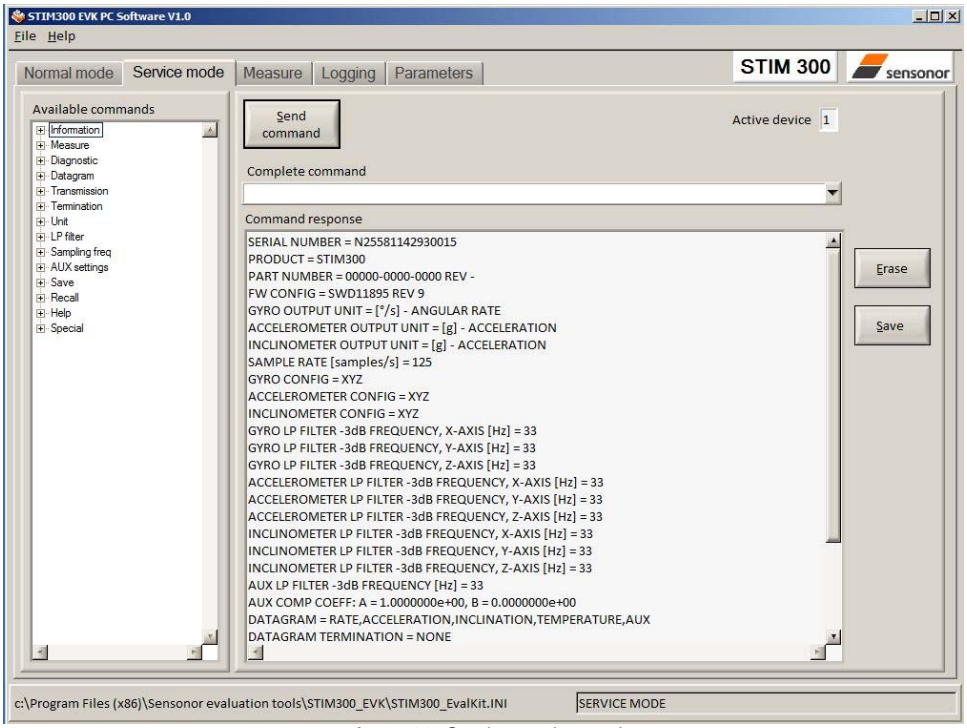


Figure 20: Service mode panel

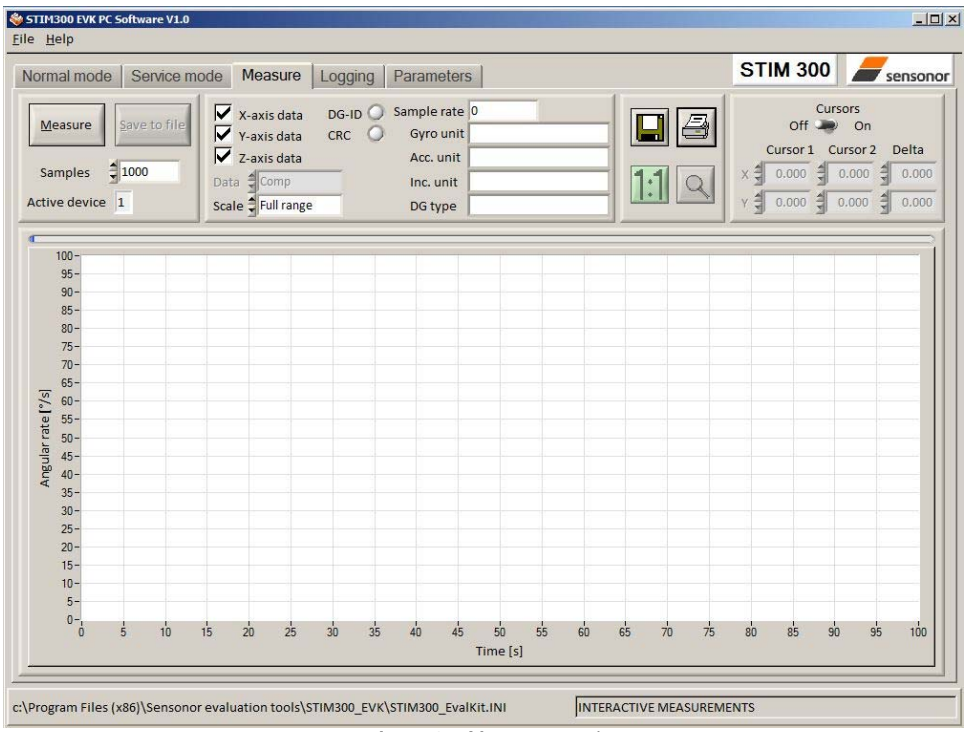


Figure 21: Measure panel

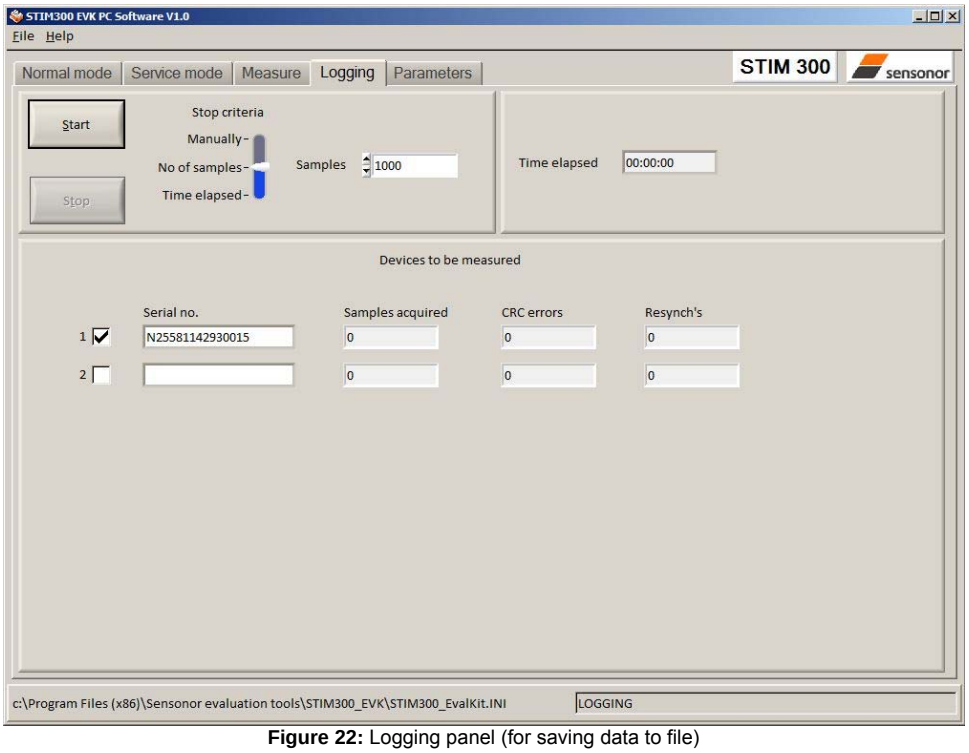


Figure 22: Logging panel (for saving data to file)

7.2 Main panel menus

Menu	Description
'File' → 'New parameter file'	For creating a new INI-file. Notice that this new INI-file also needs be edited by the user before taken into use. The content is not equal to any existing INI-files. Notice also that the Parameters view in the software is not updated with the new INI-file content until the user clicks the "Edit" button (this triggers an update of this view)
'File' → 'Open parameter file'	For opening and taking a specific INI-file into use
'File' → 'Save parameter file as'	To save current parameter settigs into a new INI-file
'File' → 'Print parameters'	For printing the current 'Parameters' content at the default printer
'File' → 'Edit parameters'	To edit the 'Parameters' content
'File' → 'Exit'	To exit program
'Help' → 'Check for updates'	Opens the Sensonor support site in a web browser. NI serial drivers, any PC software updates and new releases of User manuals can be obtained from here
'Help' → 'About'	About the program (Program name, publisher and software revision number)

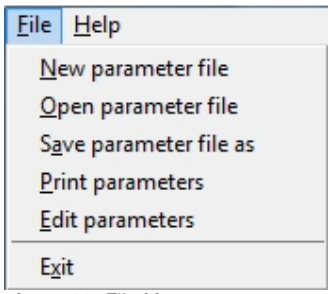


Figure 23: File Menu

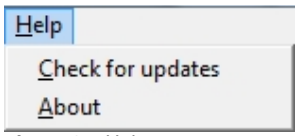


Figure 24: Help menu

7.3 Normal mode panel descriptions

Table 3: Normal mode panel descriptions

Panel unit	Functionality and description
Connect to HW	To connect to interface hardware. Opens PC COM port according to selections in active parameter file
LED	Indicator for hardware connection. A GREEN light indicates the corresponding COM port is opened
Disconnect from HW	To Disconnect from interface hardware. Closes the corresponding COM port
Apply voltage switch (On/Off)	To be switched manually (ON or OFF) by user when asked to. Controls certain functions of the PC software
Device box	Should hold the correct IMU (device) number according to active parameter file. Choice depends on which IMU and COM port the user wants to operate
Reset device button	Resets the IMU. Sends reset command (‘R’)
Request config DG button	Sends command (‘C’) to receive configuration datagram
Request identity DG button	Sends command (‘N’) to receive part number datagram
Request serial# DG button	Sends command (‘I’) to receive serial number datagram
Response window	Lists responses from the IMU

7.4 Service mode panel descriptions

Service mode is used for IMU configuration.

Service mode is entered by clicking on the Service mode tab next to the Normal mode tab. Panel units, functionalities and descriptions are listed in Table 4. Exit from IMU Service mode to Normal mode is done by pressing one of the other panel tabs (Normal, Logging, Service or Parameter panel tab).

Note: Changes made for the IMU in Service mode are only stored permanently in IMU flash memory when the save command (‘s’) is issued.

Table 4: Service mode panel descriptions

Panel unit	Functionality and description
Available commands window	Shows a list of available commands. See product datasheet for details
Complete command window	Contains the complete command to send. It is auto-completed by usage of the listings in the available commands window. Left click in the complete command window shows a list of earlier sent commands. Right click enables manual command entry
Send command button	Sends command to the IMU
Active device indicator	Informs about the active IMU (device). Corresponding COM port is according to the active parameter file
Command response window	Shows the responses from the IMU. See product datasheet for details
Erase button	Erases the content of the command response window
Save button	Saves the content of the command response window to a text file with a detailed date and time tag

7.5 Measure panel descriptions

Table 5: Measure panel descriptions

Panel unit	Functionality and description
Measure button	Starts a measurement series
Samples box	Defines the number of samples to be collected (max 50 millions)
Save to file button	Saves data from a completed measurement series to a result file. The file path defined in the active parameter file is proposed
X-, Y- and Z-axis check boxes	Selects which axis data to present in the graph area (up to 3 axes can be plotted)
Active device indicator	Informs about the active IMU (device). Corresponding COM port is according to the active parameter file
CRC and DG-ID LEDS	Confirms all CRC checks and DG-IDs as expected. Normally GREEN. LEDs turn RED if checks fail
Data box	Selects which datagram content to be shown. Several options are available, depending on the active datagram type. Use the arrows in the left side of box to scroll between available selections. The plot updates immediately if a measurement series has already been done.
Scale box	Enables user to select between different scales (Full range, User defined, or Auto)
Sample rate box	Informs what sample rate has been used for the measurements
Unit box	Indicated the active Output unit (Angular Rate, Incremental Angle, etc.)
DG type box	Shows the type of datagram received
Save to disk icon	Saves a picture of the plotted data to file
Print icon	Prints a picture of the plotted data to the default printer
1:1 icon	Resets zoom level to 1:1 (if ZOOM is active. See below)
Zoom icon	Enables a custom zoom of the presented results in the strip chart (graph area) according to placement of available cursors
Cursors (On/Off) switch	Enables usage of cursors (default is Off)
Cursor 1	Shows the location of cursor no 1
Cursor 2	Shows the location of cursor no 1
Delta	Shows the delta between the two cursor locations (X and Y values)
Progress bar	A blue continuous line shows the measurement series progress
Lower bar on panel	Shows the INI-file in use and the active mode (NORMAL MODE)

Save data to file from measure panel:
An example of a result file is shown in Figure 25, for a standard datagram measurement series of device # 1. A description of each of the columns of the data log file is found in the table that follows.

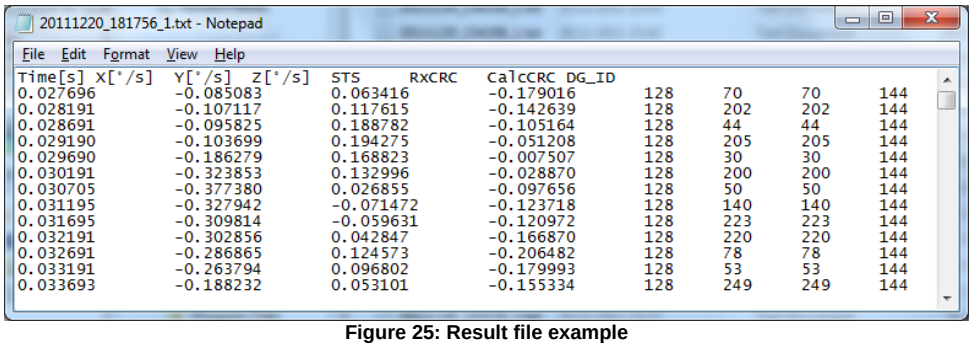


Figure 25: Result file example

Table 6: Result file example. (Standard datagram content written to file)

DG-type	Col. #	Heading	Comments
Standard	1	Time[s]	Time in seconds
	2	GYRO_X	Gyro signal X-axis
	3	GYRO_Y	Gyro signal Y-axis
	4	GYRO_Z	Gyro signal Z-axis
	5	STS	Status-byte
	6	RxCRC	Received CRC
	7	CalcCRC	Calculated CRC
	8	DG_ID	Datagram identifier

7.6 Logging panel descriptions

Table 7: Logging panel descriptions

Panel unit	Functionality and description
Start button	Starts data logging
Stop button	Stops data logging
Stop criteria slide	User selections between “manually”, “no of samples” and “Time elapsed” for stopping a measurement series
Samples box	In use when defining a series length with “no of samples”
Time elapsed	Shows the real time for the test running
Samples acq.	Shows number of samples acquired
CRC_errors	Shows number of CRC errors (normally 0, otherwise the user should consider to reject results data in any analysis)
Resynch’s	Increments from 0 to a number if any re-synchronisations are needed in order to re-establish data collections from module

Log to file capability:

- Quad core processor is recommended when measuring on two IMUs simultaneously
- The size of the log file is only limited by the free memory of the hard disk(s) in use
- The path for result file storage is defined in the active parameter file
- The program should be run as administrator to ensure the necessary rights to establish result files

7.7 Parameters panel descriptions

Table 8: Parameters panel descriptions

Panel unit	Functionality and description
===== General parameters =====	
Password	Current valid password to be able to edit the parameters list. The password is “stim”
Folder for result-file storage	“c:\userdata\test\
What priority will this program run with	Instructs the program priority for the PC operation system
What format to use for result files	ASCII text by default. Can be changed to 8 byte binary
===== Device communication ===== IMPORTANT MESSAGE: Always verify hardware connections and COM port settings before trying to connect to the device	
RS422 port # to device 1	Defining which COM port # to be assigned to IMU (device) # 1
RS422 port # to device 2	Defining which COM port # to be assigned to IMU (device) # 2
RS422 Bitrate [bit/s]	Manual RS422 bit rate selection. NOTE that USB cable that comes with the USB kit, supports only the default 460800 bits/s option, while the PCI card of the PCI kit supports all available bit rates
RS422 Stopbit	1 or 2. Default is “1”
RS422 parity	None, odd or even. Default is “None”
===== External Hardware =====	
The GPIB-card # to use	If card(s) are in use; the first card will be assigned to #0, second to #1, etc. Default value is “0”
Type of power supply used	Normally "None" (when not in use). Agilent E3631A, E3633A and E3644A supported. Default value is “None”
Interface that the power is connected with	Normally "None" (when not in use). RS232 (for Agilent E3631A only) and GPIB supported. Default is “None”
Port or address to power	Normally "0", when not in use. Selectable up to 31. Default is “0”
Voltage on output of power supply [V]	Default value is “5.1”. Can be neglected if not in use. Value should be within the supply voltage range of the IMU. Clicking on the arrow of the control unit when editing this parameter allows for voltages as high as 6.0V maximum. Manual entry allows even higher values, however with a warning. Note: The entered value/ voltage applied to the IMU should never exceed the absolute maximum ratings value for the supply voltage of the IMU (maximum 7.0V)
Current limit on output of power [A]	Default value is “1.0”. To limit the current consumption from the power source

7.8 Messages from the program

Messages that the program can display are listed in Table 9:

Table 9: Possible messages given by the program

#	Message	Description
1	This application is already running! Stop loading of 2. instance...	The program is already started, a second instance will not be allowed
2	Wrong password entered!	The password entered does not match the required one for this INI-file
3	No response to message was received	Did not receive the expected response to sent service-mode command
4	There is no measurement data available for storage	To be able to save measurement data, there must be data available
5	Unable to open the selected file	Saving of measurement data failed, unable to open or create the selected file
6	Unable to allocate the required memory	Failed to acquire the requested number of datagrams from the IMU due to error when trying to allocate memory for temporary storage
7	No product identification datagram received	Even after retries the, expected datagram is not received as response to command sent
8	No configuration datagram received	Even after retries the, expected datagram is not received as response to command sent
9	No serial number datagram received	Even after reties the, expected datagram is not received as response to command sent
10	No datagrams received	Failed to acquire the requested number of datagrams from the IMU, no recognizable datagrams received
11	Turn off device supply voltage	Instruction to user when running without controlled power-supply
12	Turn on device supply voltage	Instruction to user when running without controlled power-supply
13	Error encountered when trying to control voltage	Failed to control the specified power-supply
14	Unexpected DG-ID received !	When waiting for datagrams, unexpected datagrams are received
15	Unable to read config DG to determine output unit !	Unable to read configuration datagram to determine the output unit
16	Unable to synch with DG-stream !	Failed to acquire the requested number of datagrams from the IMU, unable to get in synch with datagram stream
17	Error encountered when trying to print, check configuration !	Failed to print the graph, check that a printer is configured
18	Unable to create result-folder specified by parameter !	The specified pathname can not be created, either due to access-rights or errors in the path specification
19	Unable to enter service-mode !	Unable to enter service-mode, does not receive expected response to command.
20	Unable to save parameters to active INI-file !	Error encountered when trying to save parameters onto INI-file
21	Edit-mode of parameters is active, unable to exit !	The edit-mode of parameters are active, unable to exit the program until edit mode is ended
22	You are about to change the RS422 bit rate. If are you using the USB kit hardware provided by Sensonor, please notice that you will not be able to communicate with the device if you change to something else than supported 460800 b/s! For the PCI card there are no worries - it supports all available bit rates	A warning to the user about limitations for certain RS422 hardware
23	Unable to create/save to selected file, check access rights to folder	Unable to open or create the specified file in the selected folder, try another filename and/or location. The reason may be lacking access rights to the folder, or illegal filename format
24	Unsupported datagram received	When trying to read datagrams into memory a datagram type not supported by the EVK is detected