UM1010
User manual

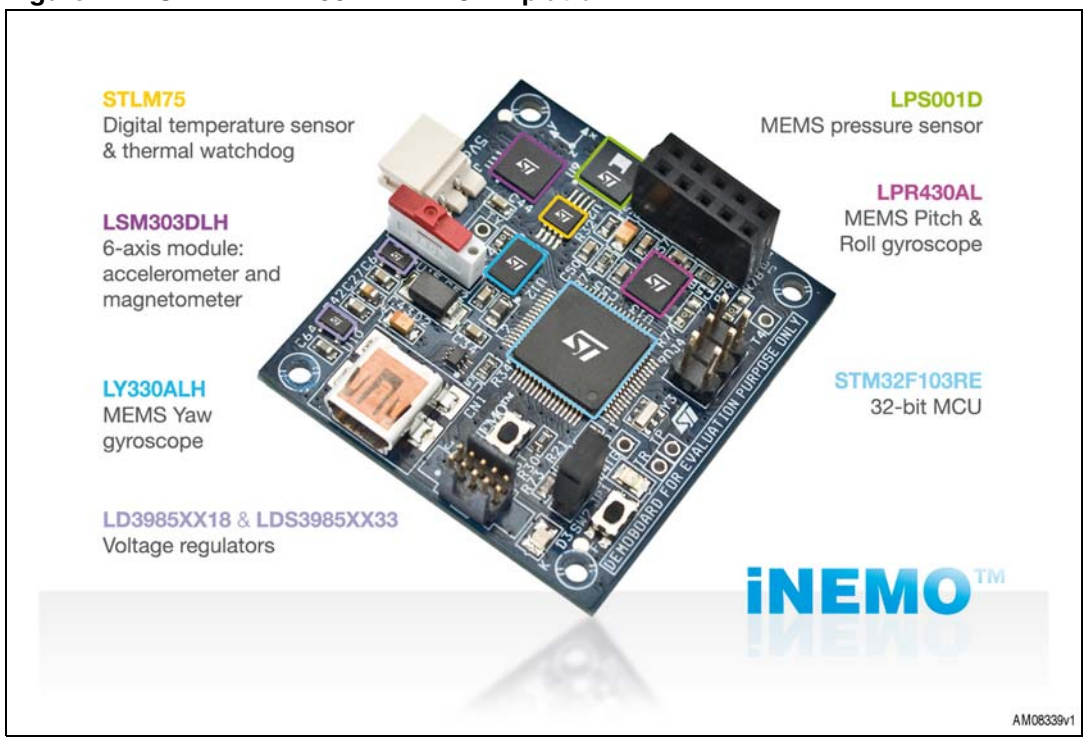
Getting started with the iNEMO™ STEVAL-MKI062V2

Introduction

The STEVAL-MKI062V2 is the second generation of the iNEMO modules family. It combines accelerometers, gyroscopes, and magnetometers with pressure and temperature sensors to provide 3-axis sensing of linear, angular, and magnetic motion, complemented with temperature and barometer/altitude readings, representing the new ST 10-degrees of freedom (DOF) platform.

This document provides a quick start guide for iNEMO PC software and graphical user interface (GUI).

Figure 1. STEVAL-MKI06V2 iNEMO V2 platform



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1 iNEMO V2 GUI installation

The installation of the graphical user interface (GUI) requires the following two steps:

1. Install the PC software delivered with the demonstration kit
2. Install the virtual COM driver needed to use the board

1.1 PC system requirement

- Microsoft Windows XP® Service Pack 2, or higher
- Microsoft.NET Framework 2.0 (or higher)

1.2 PC software installation

To install the iNEMO suite, run the setup file and follow the instructions.

Note: The latest setup file is available on st.com.

1.3 Virtual Com driver installation

To install the virtual COM driver, plug the iNEMO board into a free USB port, an icon should appear in the “Notify Bar”, as in *Figure 2*. Wait for the “Hardware Update Wizard” window and follow the instructions in *Figure 4*.

Figure 2. STEVAL-MKI062V2 notification icon

Note: If, after a few seconds, the “Hardware Update Wizard” doesn`t appear, follow the instructions given in Figure 3 and then in 4.

Figure 3. Manual installation of the STEVAL-MKI062V2 driver

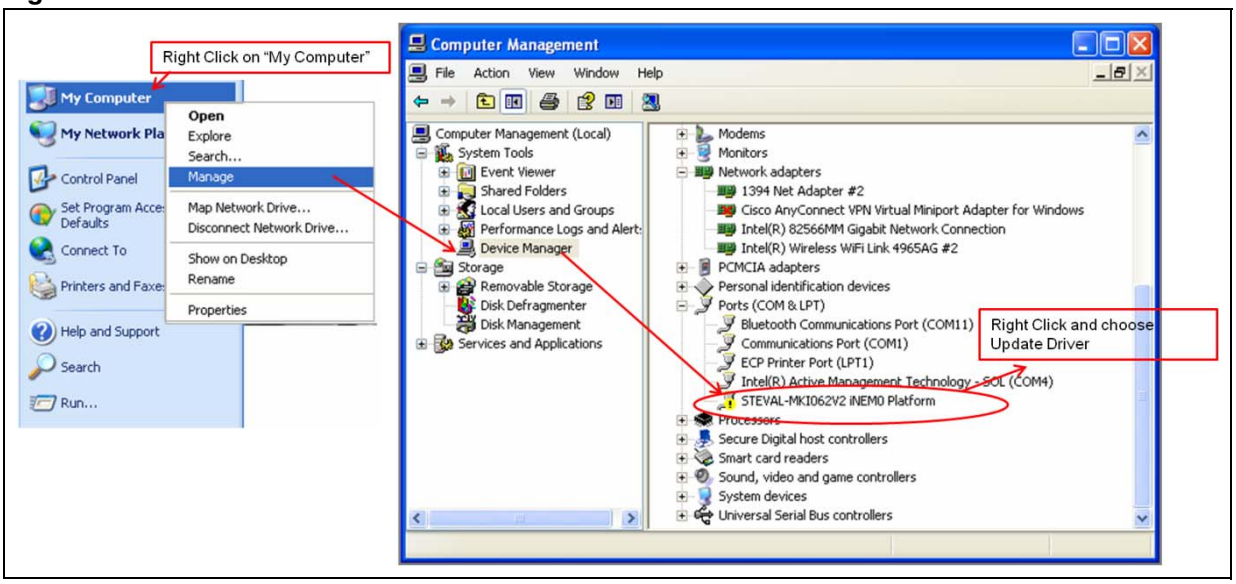
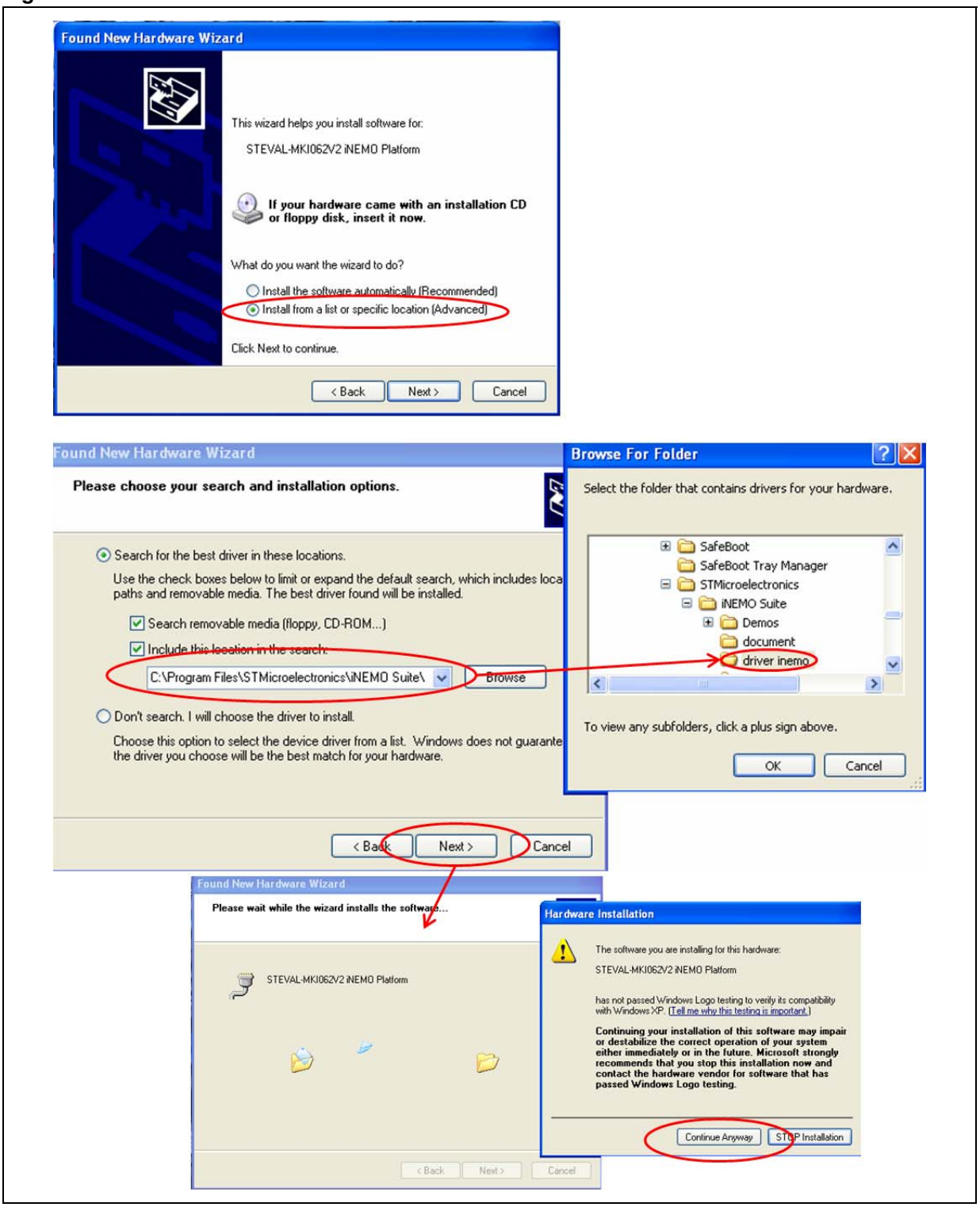
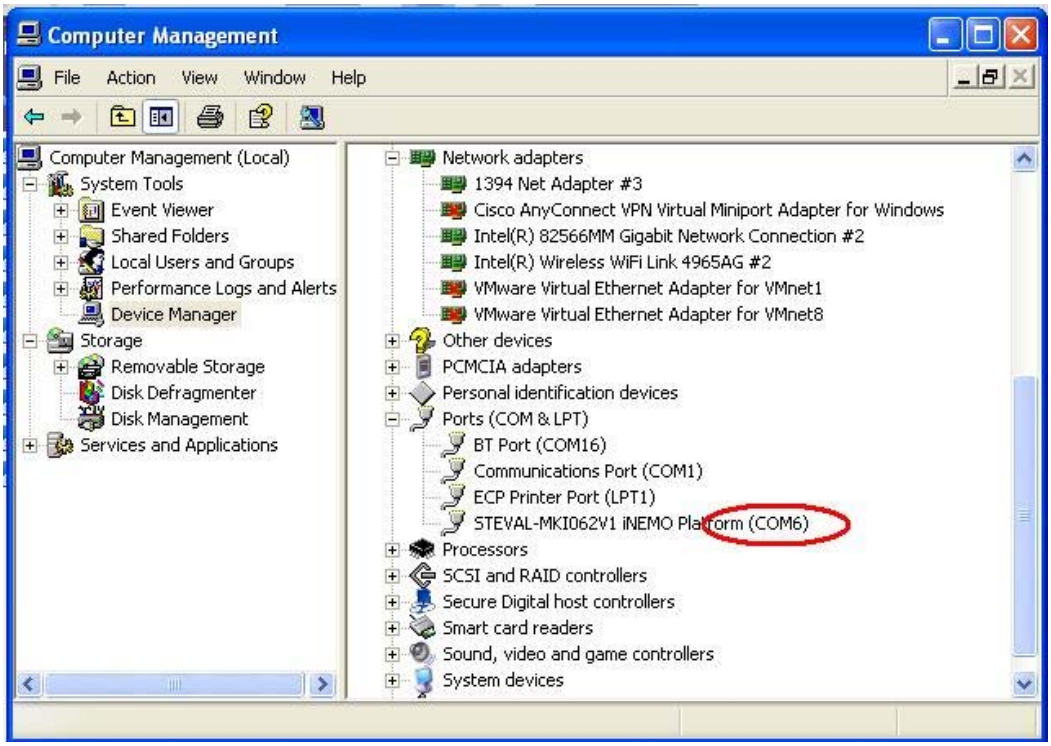


Figure 4. iNEMO driver installation



Once the installation has finished, a COM port number is assigned to the ST virtual COM driver (*Figure 5*). Knowledge of this number is required to correctly run the iNEMO GUI.

Figure 5. How to see the STEVAL-MKI062V2 COM port number



2 iNEMO suite

The iNEMO suite application allows the user to work both with the iNEMO V1 and iNEMO V2 platform. At the startup of the application, the kit selector window appears, to choose the platform used (*Figure 6*).

The iNEMO suite application is based on the software development kit (SDK) iNEMO_SDK.dll (for STEVAL-MKI062V1) and iNEMO2_SDK.dll (for STEVAL-MKI062V2).

Only for the STEVAL-MKI062V2 is the iNEMO suite application also a TCP/IP server for external/remote demo applications; when the server starts, in the log bar a message shows the availability of the server. Each client may be connected to the server on port 31001(default) to receive data from the device through the iNEMO suite (server).

Every time a client is connected to the server the log bar shows the IP address of the client just connected.

Each demo (client) could elaborate and show these data. (The structure of the data sample sent to all clients is the FrameData_t defined in the iNEMO2_SDK.h).

The TCP/IP server may be enabled/disabled from the Tools->Communication->Settings menu (its state is shown on the status bar below). From this dialog box, the user can change the communication port (default 31001). Pay close attention to this information in order to avoid a communication block from an installed firewall.

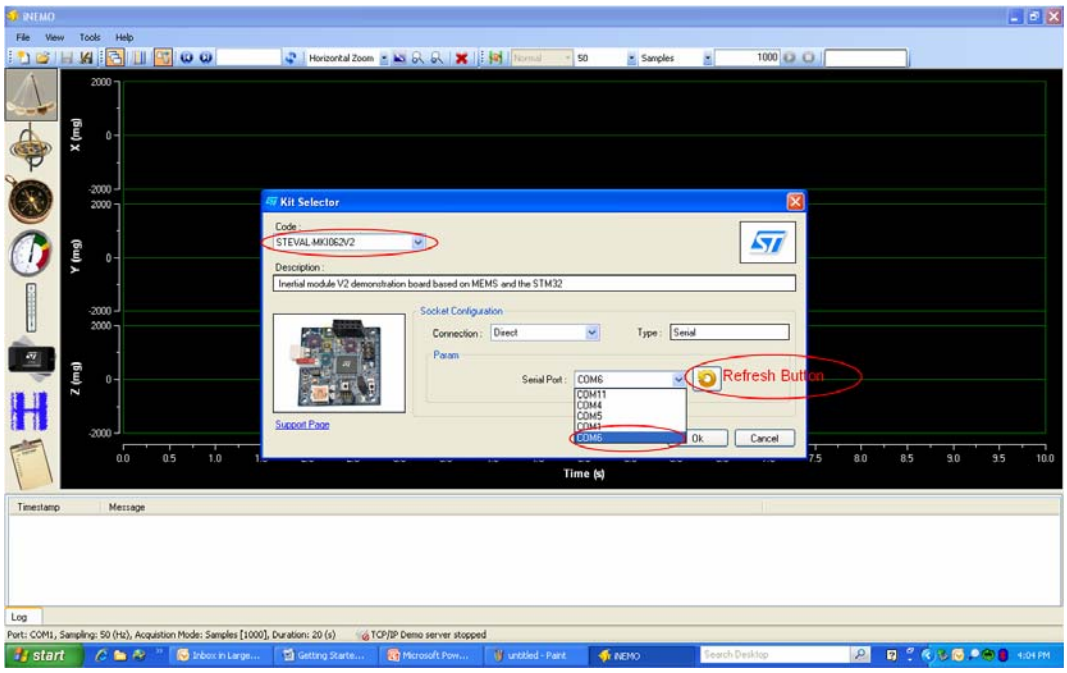
To run the INEMO suite:

1. Click on Start > All Programs > STMicroelectronics > iNEMO Suite > iNEMO Suite Application
2. Launch the program iNEMO software tool (Goldfish Icon)
3. At first, the “Kit Selector” window appears (*Figure 6*). Select STEVAL-MKI062V2
4. Check that the serial port number is correct (see *Figure 5*). Otherwise click the refresh button and choose the right COM port.

It is preferable to connect the iNEMO board to a free USB port before launching the GUI. In this way, the GUI directly finds the COM port into which the board is plugged.

To change COM port press the “New” button on the toolbar or from the menu File/New and the kit selector dialog appears.

Figure 6. Kit selector window

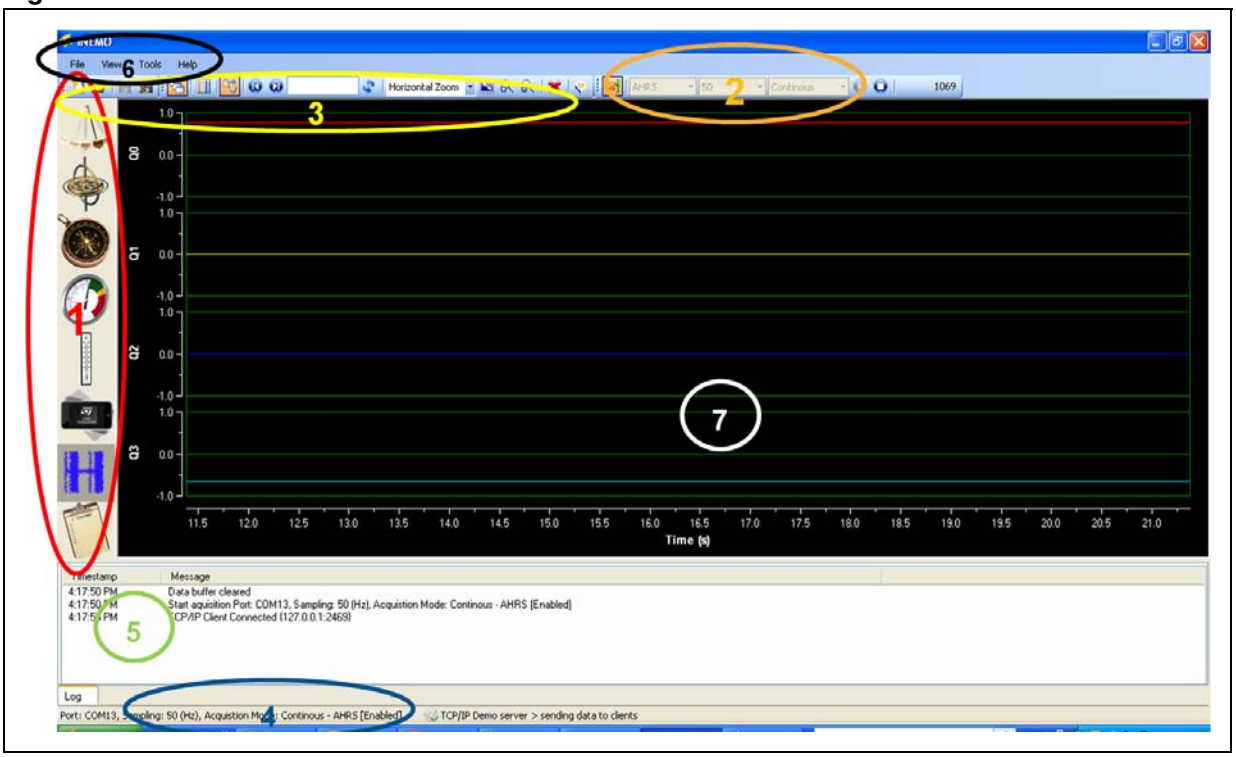


2.1 iNEMO suite main window

The main window is made up of the following main sections (*Figure 7*):

1. Sensor selector, where the user can move to a different sensor data view
2. Toolbar for data acquisition setting, to set frequency, acquisition mode, etc.
3. Toolbar for graphic management, helps the user to explore in the graphic window. It allows to zoom the graph, enabling cursors, save data, and so on
4. Status bar shows the acquisition info
5. Log window
6. Default menu bar
7. The graphical panel, where the data are graphically represented

Figure 7. iNEMO Suite main window

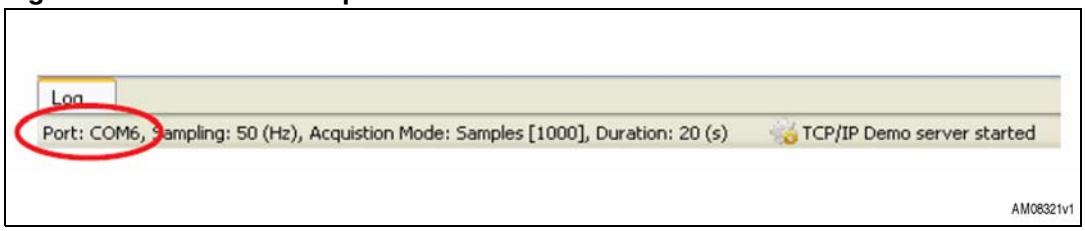


2.2 Connecting iNEMO

Before starting the acquisition, it is necessary to open the connection between the iNEMO and the PC. It is preferable to connect the iNEMO board to a free USB port before launching the GUI. In this way, the GUI directly finds the COM port into which the board is plugged.

On the bottom part of the GUI main window the COM port number is reported, *Figure 8*:

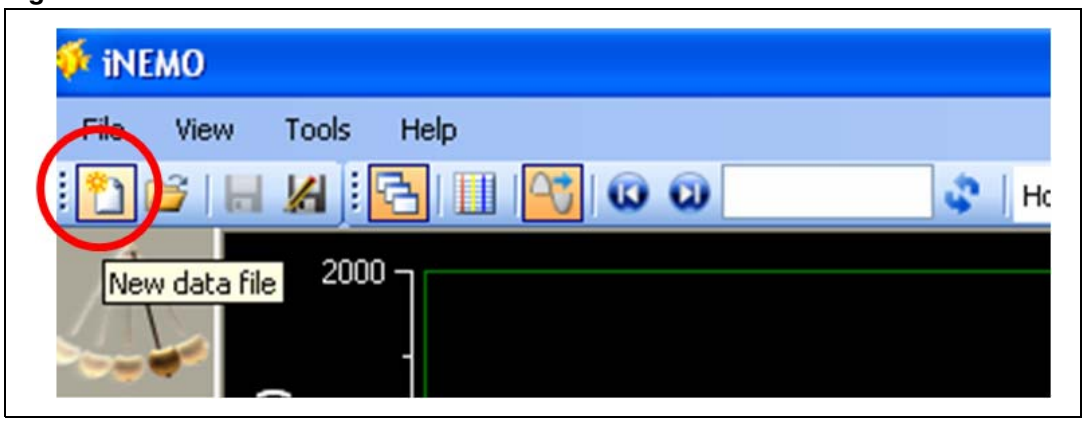
Figure 8. Selected COM port number



The user must check if the COM port number is the same as the one shown in the device manager (*Figure 5*).

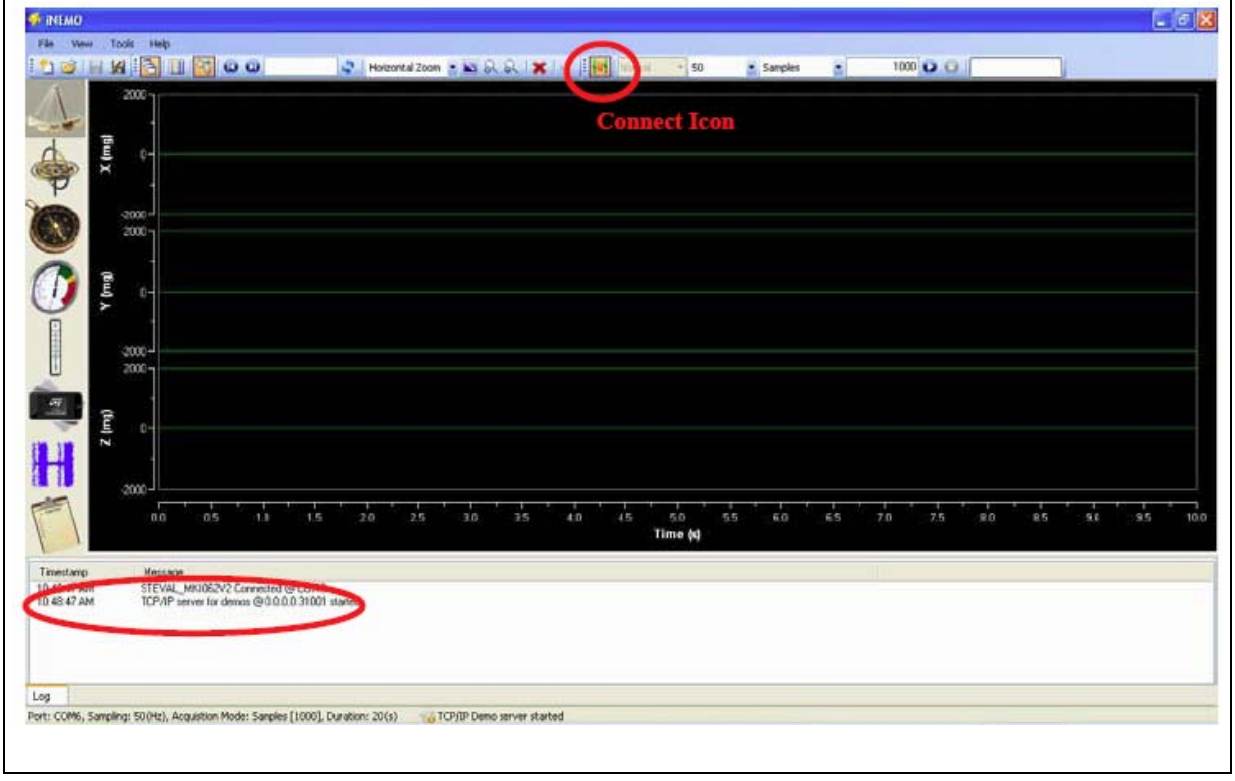
If the COM number is different, it is necessary to set the right number. By clicking the new data file icon (*Figure 9*) the kit selector window appears and it is possible to select the COM port number as in *Figure 6*.

Figure 9. New data file icon



When the correct COM number is set, click on the connect icon to open the communication and, in the log window, a connection message appears (*Figure 10*).

Figure 10. How to open the connection



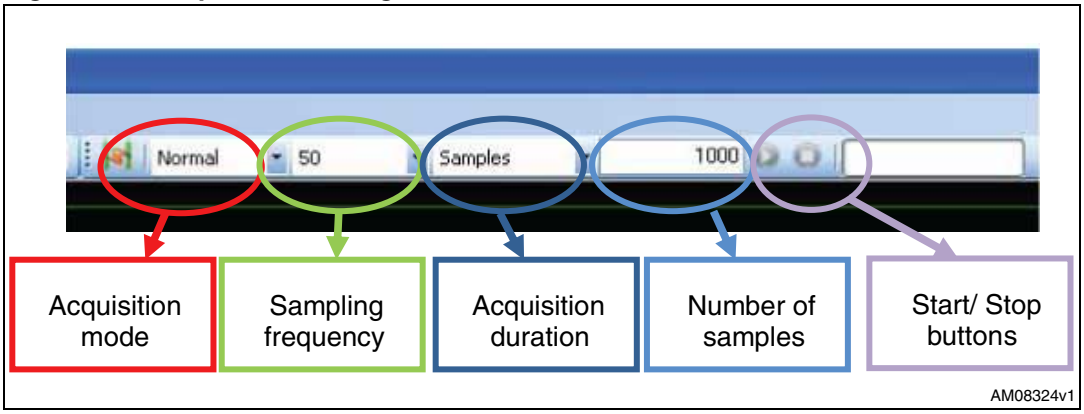
2.3 Acquisition settings

Before starting the acquisition it is possible to modify the acquisition setting (*Figure 11*):

- Acquisition mode:
  - Normal: only the sensor data is acquired
  - AHRS: this feature enables the attitude heading reference system algorithm based on the Kalman filter and sends sensor data plus orientation data
- Sampling frequency, it sets the sensors acquisition rate:
  - 50 Hz
  - 25 Hz
  - 10 Hz
  - 1 Hz
- Acquisition duration
  - Samples: the iNEMO acquires a limited number of sensors, set in the “number of samples” box
  - Continuous: the iNEMO acquires until the user stops the acquisition by clicking the Stop button

When the AHRS feature is enabled, the sampling frequency is automatically set to 50 Hz, and it can't be modified.

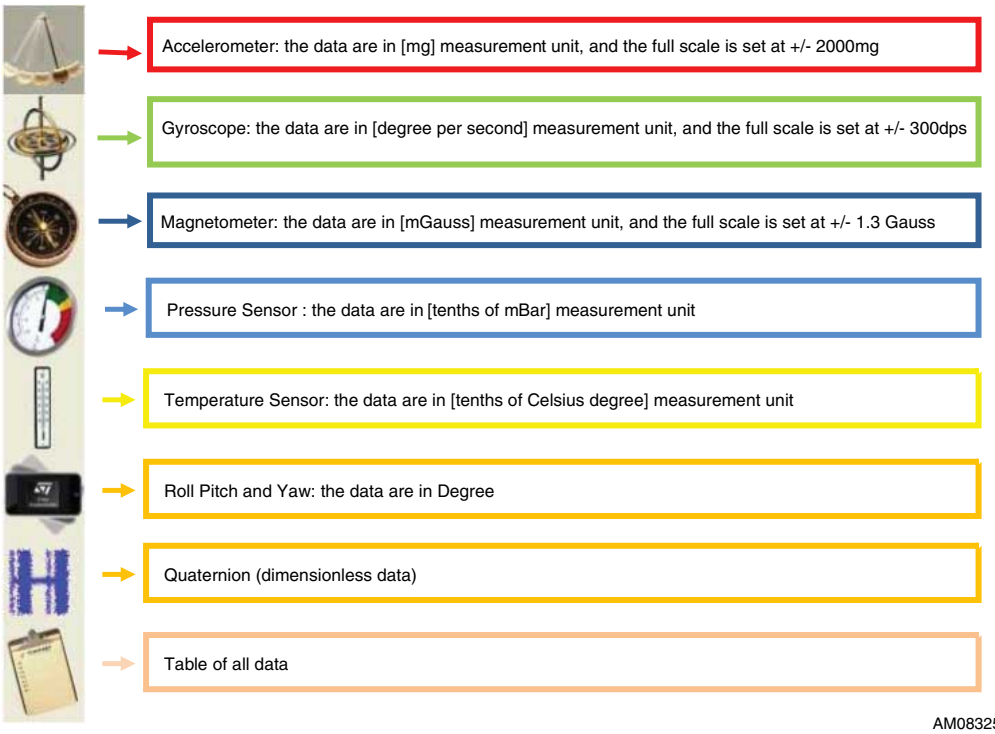
Figure 11. Acquisition settings icon



2.4 Start acquisition and data description

By clicking the “Start” icon, the acquisition starts. The user can view the sensor data in the graphics. Each sensor is acquired simultaneously but it has a dedicated graphic, the user can choose the sensor by the icons on left of the GUI *Figure 12*.

Figure 12. Data icon description



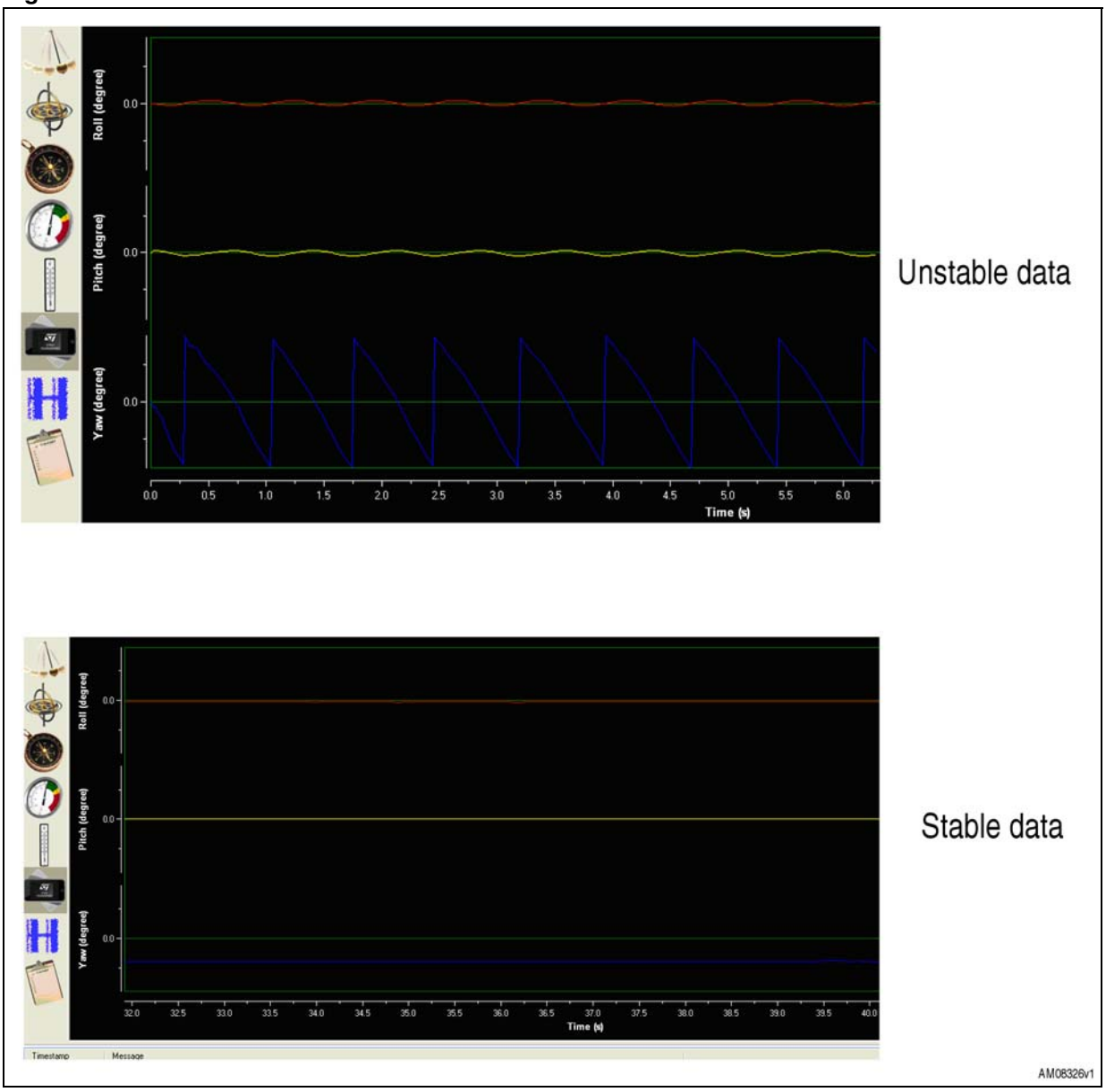
2.5 AHRS algorithm starting and settings

When the AHRS algorithm is enabled (see *Section 2.3* and *Figure 11*), the iNEMO MCU executes the extended Kalman filter to retrieve information about the board orientation starting from acceleration, angular rate, and magnetic field data.

The orientation data are sent to the PC in two ways, roll pitch and yaw (RPY) angles and quaternion.

When AHRS acquisition is started, the user must check if the data are stable. It means checking, in the RPY graphic, if the data are flat when the iNEMO is in a stationary position. If not, the user must strongly shake the board and, after that, leave the board in a motionless position waiting for flat data (sometimes it may be necessary to do this operation more than once). See *Figure 13*.

Figure 13. AHRS stabilization



2.6 AHRS 3D demo

If AHRS 3D is enabled, it is possible, by clicking on the 3D icon, to open a 3D window in which an orientation demo is performed.

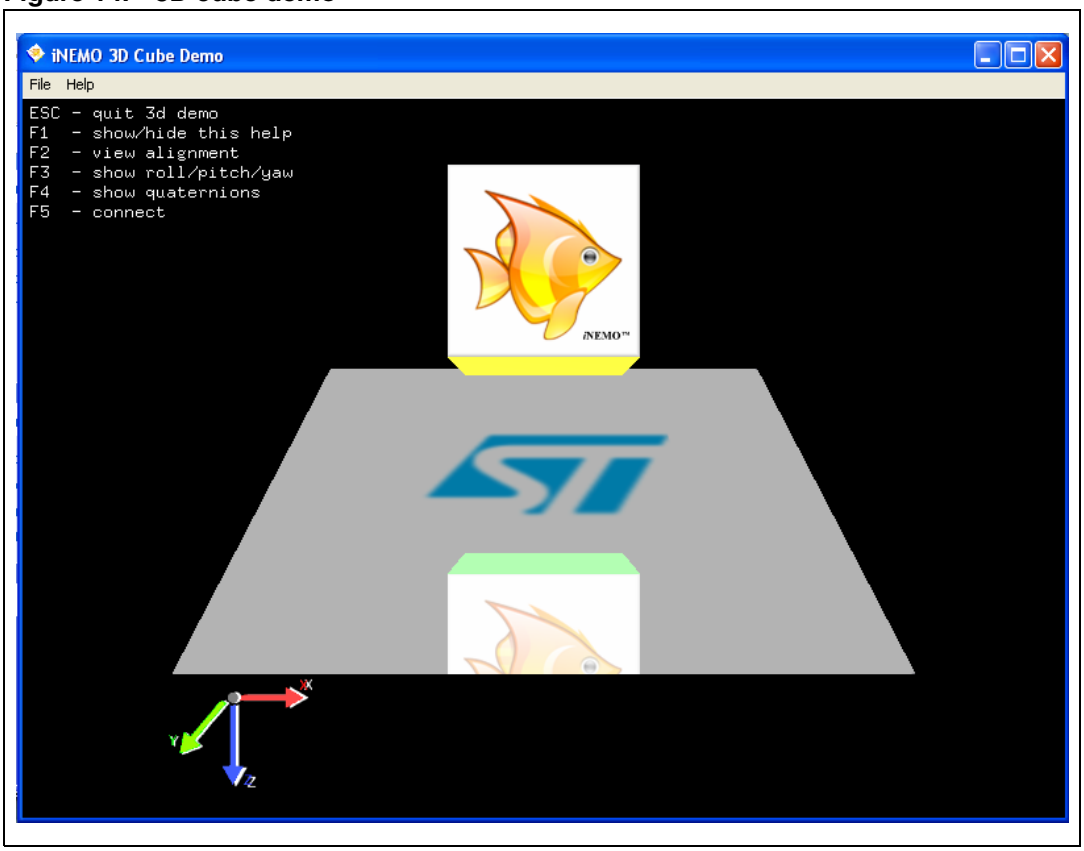
The “iNEMO 3D Cube Demo” is an external client application, connecting this demo to the server. It is also possible to start the application from the system menu Start/Programs/STMicroelectronics/iNEMO Suite/Demos/3D Cube Demo/ or launch from a console with the command “iNEMO 3D Cube Demo.exe IP=xxx.yyy.www.zzz, PORT=31001”, where xxx.yyy.www.zzz is the IP address where the server runs.

The application can also be run from a remote PC which is in the same network as the server. More than one instance of the application can run on the same PC or remotely, it depends on the network speed connection and the PC processor speed and RAM.

From the 3D cube window it is possible to execute some useful commands:

- ESC - to close the window alignment
- F1 - to hide or show window help
- F2 - to align the 3D view towards the monitor (see *Section 2.6.1*)
- F3 - to show roll, pitch, and yaw values
- F4 - to show quaternion values

Figure 14. 3D cube demo

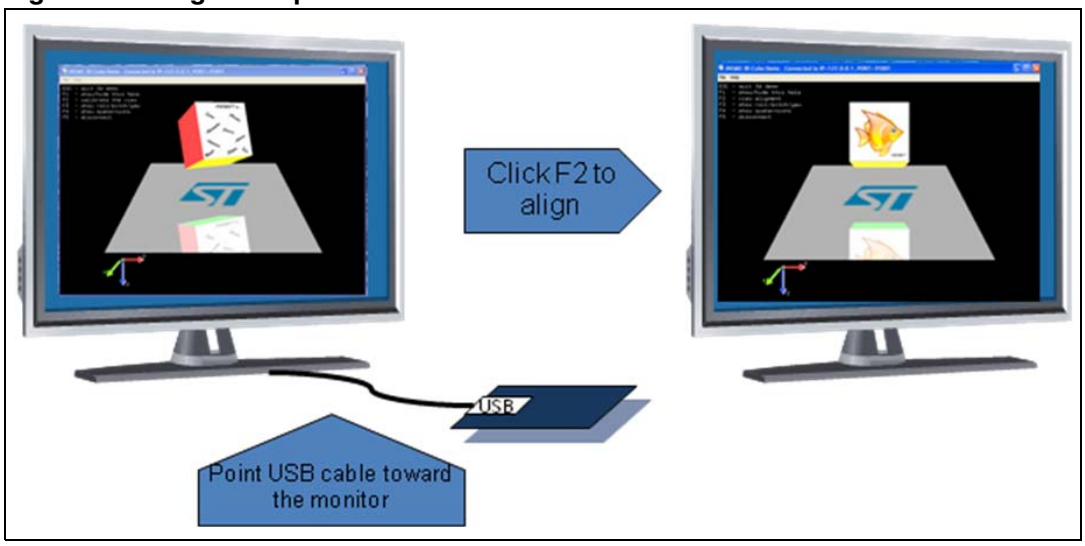


2.6.1 3D view alignment

The AHRS reference frame is aligned to the magnetic north (see *Figure 14* for reference system); it means that the yaw angle value is referred to the magnetic north. In order to better understand the tracked motion, it can be useful to realign the rotation towards the monitor direction, by view alignment operation (it is just a reference system transformation).

To align the iNEMO, it is necessary to point the USB cable towards the monitor and press the F2 key, if the calibration is correct, the cube shows the “goldfish” side (*Figure 15*).

Figure 15. Alignment procedure



3 Revision history

Table 1. Document revision history

Date	Revision	Changes
11-Oct-2010	1	Initial release.