



## 1. Background information

This user manual is a detailed description of Tronic's Evaluation Tool software and provides guidance for the evaluation of GYPRO® or AXO® sensors. Before reading it, you should have already set-up Tronic's Evaluation Kit as per the instructions of the document UMAXOGYPRO-EVK (MCD010A).

The content of this document is also presented in the form of a tutorial video ([here](#)).

### 1. System Requirements

Tronic's Evaluation Tool software is compatible with Windows 7 or later versions. The program automatically adapts to the operating system on which it runs, eliminating the need for manual settings.

#### Recommended system configuration:

- Processor 1.6 GHz or faster
- 2 GB RAM
- 1280\*960 pixels minimal screen resolution  
(The window size of the Tronic's software is 1280\*680).
- 780 MB free hard disk space for the Arduino IDE and Tronic's Evaluation Tool software (an additional space is needed during installation only to accommodate the initial setup files).
- USB Port.
- Operating Systems: Windows 7, Windows Server 2008 R2, Windows Thin PC, Windows 8 / 8.1, Windows RT, Windows Server 2012 and Windows 10.

## 2. What is Tronic's Evaluation Tool?

Tronic's Evaluation Tool enables testing the performance and the specifications of GYPRO® and AXO® products. This software combines high-performance with easy-to-use and time-saving features that let you focus on the sensor abilities.

Using Tronic's Evaluation Tool software, you can:

- Read the sensor output
- Read the Temperature Sensor output
- Measure the sensor startup time
- Visualize a compass oriented in terms of the sensor angle (GYPRO® only)
- Visualize a plane inclined in terms of the sensor inclination (AXO® only)
- Measure the startup-time of the sensor
- Record data acquisitions in a text file
- Read and write the Temperature Compensation coefficients in the System Register and the MTP memory
- Read and write the Temperature Calibration coefficients in the System Register and the MTP
- Modify the sensor output format
- Modify the Temperature Sensor output format
- Check the self-test of the sensor
- Read the drive frequency of the MEMS die (GYPRO® only)
- Contact the Tronic's support team

**Note:** All the software is based on an Arduino firmware developed by Tronic's. Before running the software, make sure you have programmed your Arduino M0 board as explained in the Evaluation Kit Quick Start Guide ref UMAXOGYPRO-EVK.

## 2. Tronics Evaluation Tool software description

### 1. Introduction

The Tronics Evaluation Tool is made of 5 tabs:

- **Reading GYPRO® / AXO® (Main Tab):** To read the sensor data (Angular rate / Linear Acceleration and Temperature) and to display them on two real-time charts.
- **System Register (SR):** To enable reading, writing or changing the output format of the data (Raw, Compensated or Calibrated) by modifying the sensor System Register.
- **Multi-Time-Programmable (MTP):** Useful to read and program new temperature compensation coefficients in the MTP of the sensor.
- **Others:** To check Hardware and Logic Self-Test, to measure startup time, to read Drive Frequency and to generate debug reports for Tronics support team.
- **Compass / Plane:** To display a real-time compass using GYPRO® or plane using AXO®.

Once the Arduino board is detected by the software, you can click on the top left power ON/OFF button. The application will start and read the sensor information (serial number and type of sensor).

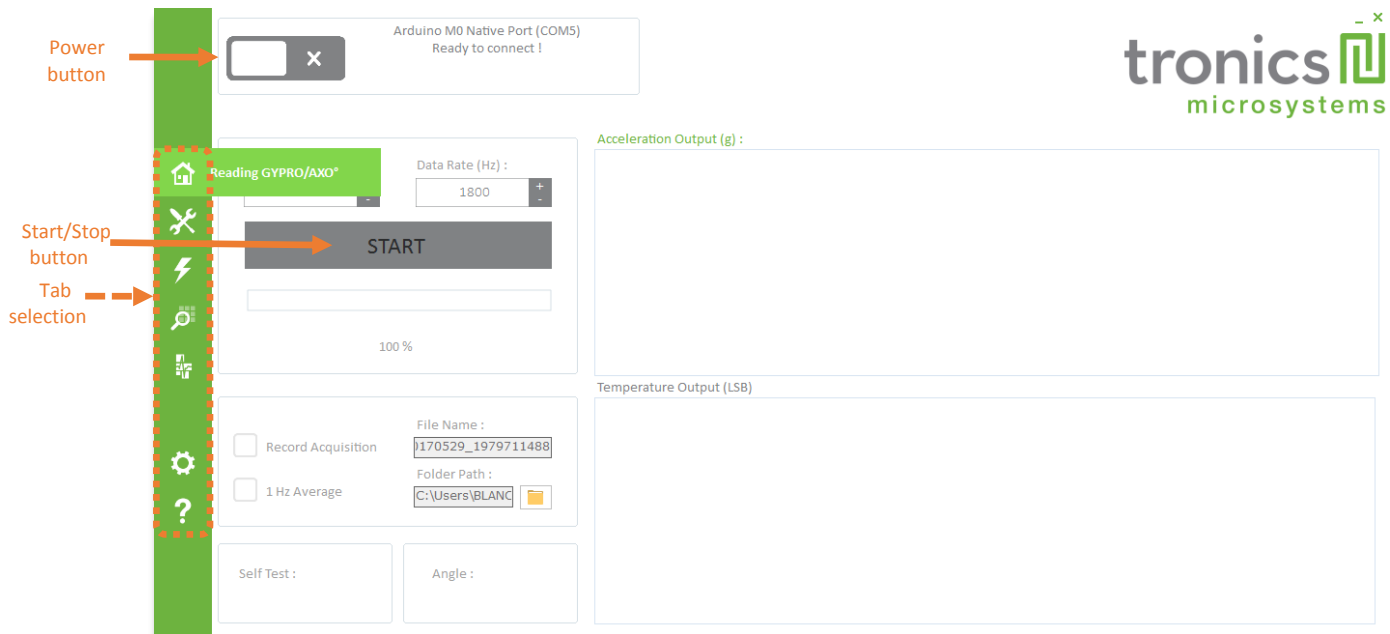


Figure 1: Tronics Evaluation Tool opening screen ("Reading GYPRO® / AXO®" tab)

Please note that the correct position is to have the Arduino board on top (above the Evaluation board). If you want to place the Arduino M0 at the bottom of the stack (upside-down configuration), just click on the compass during data acquisition in order to get a correct visualization of the data.

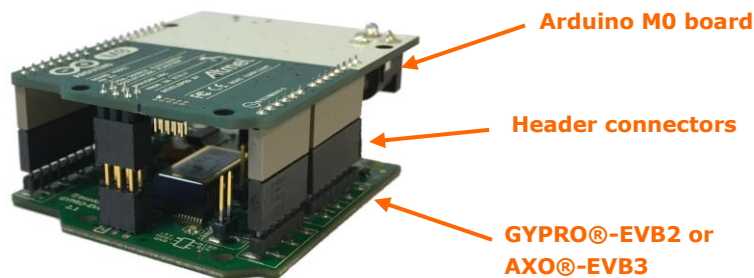


Figure 2: Correct position of the evaluation board

## 2. TAB#1 Reading GYPRO® / AXO® (main tab)

The tab called Reading GYPRO® / AXO® is the default screen when Tronics Evaluation Tool software is started. It is also the software's main tab and includes all core features and functions in the application.

Actions that can be performed from the Reading GYPRO® / AXO® screen include:

- Reading the sensor's outputs : Angular Rate output (for GYPRO® products), Linear acceleration (for AXO®), Temperature output and Self-Test
- Real-time display of the outputs
- Recording an acquisition

The main tab consists of 8 blocks:

1. **Acquisition Time:** Time during which the sensor will be read (in seconds)
2. **Data Rate:** Number of measurements transmitted per second from the sensor. The value entered here should be within 1 and 2000 Hz.  
For example, defining an acquisition time of 30 seconds with a data rate of 1600 Hz means reading 48 000 measurement points.
3. **Rate (for GYPRO®) or Acceleration (for AXO®) and Temperature output charts:** Displays the Angular Rate output (in LSB or °/s) or Linear acceleration (in LSB or g) and the Temperature output (in LSB or °C) of the sensor during the defined acquisition time. Please be aware that the real-time display refresh rate is limited to 30 points per second.
4. **Start/Stop Button:** Starts or stops the reading.
5. **Progress Bar:** Shows the progress of the ongoing acquisition. When clicking on the percentage, the time remaining until the end of the reading will appear.
6. **Record and 1 Hz Average features:** It is possible to record all the measurement points into a text file.

Check "Record Acquisition", enter a file name and a destination directory before starting the reading.

⚠ 1 Measurement point ~ 22 bytes. For a 1-hour record (3600 seconds) with a 2000 Hz data rate, you should check that you have  $2000 \times 3600 \times 22 = 158400000 = 158.4$  free Mb on your hard drive.

The data file is organized in 4 column. The first is the measurement point number, the second is the angular rate, the third is the temperature and the fourth is the self-test status.

Fichier	Edition	Format	Affichage	?
1	0,31	8731	1	
0	0,3105	8731	1	
1	0,3124	8731	1	
2	0,3124	8731	1	
3	0,3137	8731	1	
4	0,3123	8731	1	
5	0,3112	8731	1	
6	0,3125	8731	1	
7	0,3123	8731	1	

Figure 3: Tronics Evaluation Tool - Example of a data file

For long acquisition times, it is recommended to use the "1 Hz average" feature. The software will read all the points at the specified data rate but it will output only an average every 1s.

7. **Self-Test:** Displays the Self-Test status during the reading.
8. **Compass (GYPRO®) / Plane (AXO®):** The compass displays an angle corresponding to the integration of the angular rate output. When the sensor is at rest (reference point), the compass shows 0° (ie points to the 'north' of the screen). Clicking on the angle label will change the unit (from Degrees to Radians). Clicking on the compass itself will change the rotation direction, which can be helpful if you placed the boards "upside down". If needed, you can see a bigger compass in the last tab called "Compass".

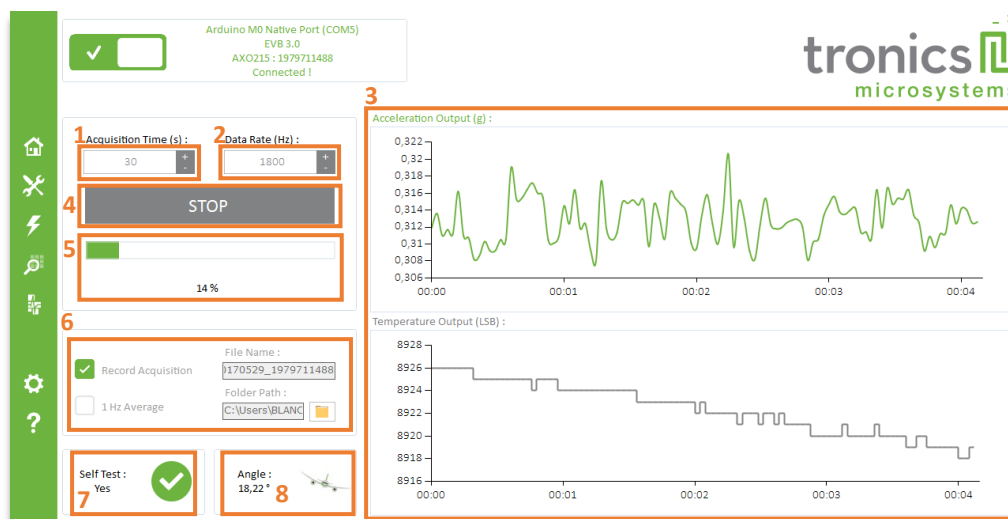


Figure 4: Tronics Evaluation Tool - "Reading Gypro" tab

### 3. TAB#2: System Register (SR)

In this tab, you can read and write the coefficients stored in sensor's System Register (the temperature compensation coefficients for the angular rate output and the calibration coefficients for the temperature output).

You also can switch the output between Raw / Compensated data (inertial measurement) and Raw / Calibrated data (temperature sensor output) by clicking on the corresponding buttons. This will automatically change the units of the display charts in the main tab : °/s to LSB using GYPRO® or g to LSB using AXO® and °C to LSB. For more information about these coefficients and the System Register of the sensor, please refer to the sensor datasheet.

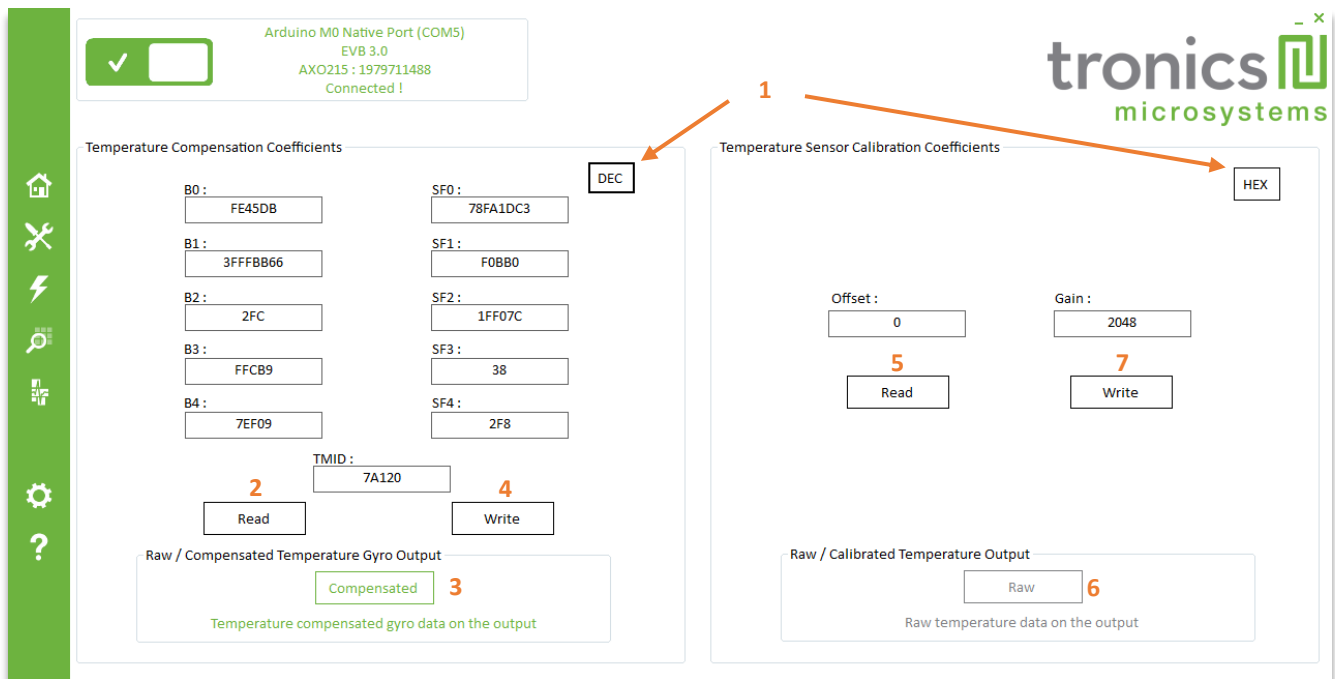


Figure 5: Tronic's Evaluation Tool - "System Register (SR)" tab

Button	Description
1	Changes from decimal value to hexadecimal
2	Reads the temperature compensation coefficients (gyro output) from the System Register
3	Changes the format of the angular rate (gyro) output: <ul style="list-style-type: none"> <li>- Compensated (Gyro Output in °/s or Accelerometer Output in g)</li> <li>- Raw (Gyro Output or Accelerometer Output in LSB)</li> </ul>
4	Writes the temperature compensation coefficients (sensor output) into the System Register
5	Reads the temperature output calibration coefficients from the System Register
6	Changes the format of the temperature sensor output: <ul style="list-style-type: none"> <li>- Calibrated (Temperature Sensor Output in °C)</li> <li>- Raw (Temperature Sensor Output in LSB)</li> </ul>
7	Writes the temperature output calibration coefficients from the System Register

#### 4. TAB#3: Multi-Time-Programmable (MTP)

In this tab you can program the coefficients in the sensor's Multi Time Programmable memory (MTP).



**Programming is irreversible.** The temperature compensation coefficients for the angular rate output can be programmed up to 5 or 7 additional times. The temperature sensor calibration coefficients however can be programmed only one time. For more information on the sensor's MTP, please refer to the sensor product datasheet.

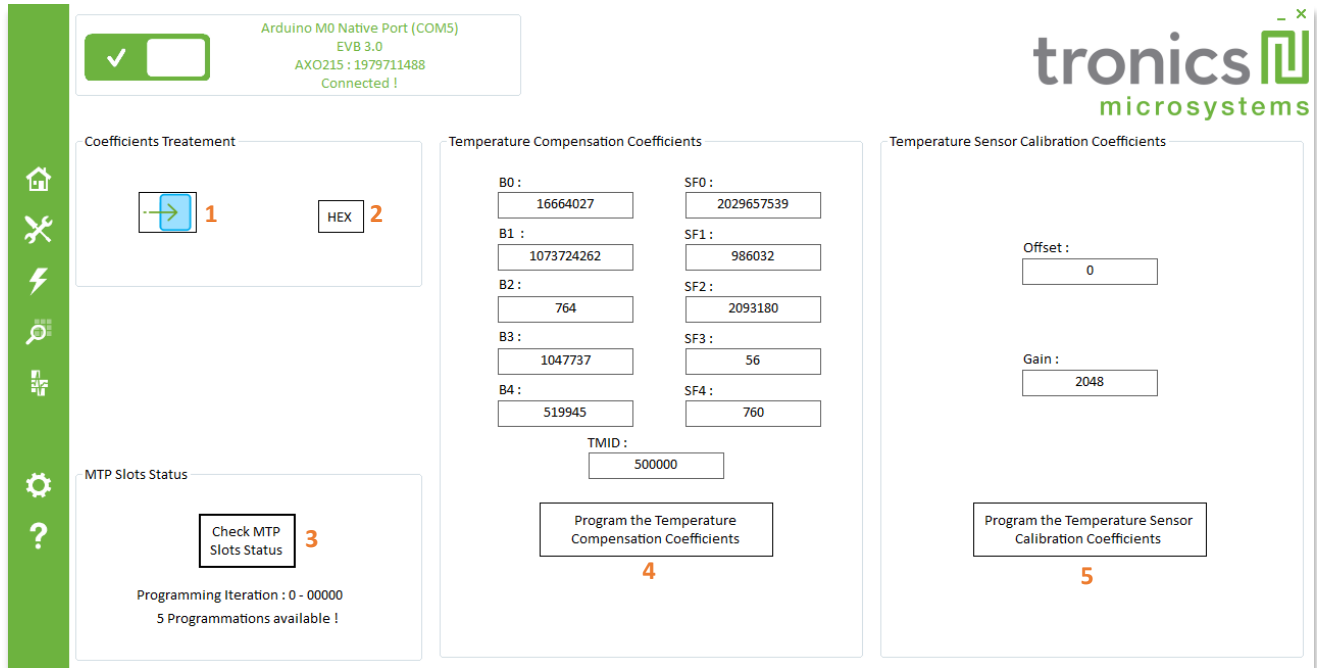


Figure 6 : Tronic's Evaluation Tool – “Multi-Time-Programmable (MTP)” tab

Button	Description
1	Imports the set of coefficients from the Tab#2 (System Register)
2	Changes from decimal value to hexadecimal
3	Checks how many slots are available for re-programming the temperature compensation coefficients of the sensor output
4	Programs the temperature compensation coefficients of the sensor output into the MTP
5	Programs the Temperature Sensor Calibration coefficients into the MTP

- (1) Procedure for re-programming the temperature compensation coefficients of the angular rate output:
  - a- Check the MTP Slot Status (to make sure the sensor has free slots which can receive new temperature compensation coefficients)
  - b- Enter the desired coefficients into the boxes or import the set of coefficients from the TAB#2 (System Register)
  - c- Click on the “Program the temperature compensation coefficients” button. **This step is irreversible but re-programming is still possible as long as there are available slots in the MTP.**
- (2) Procedure for programming the temperature sensor calibration coefficients:
  - a- Enter the desired coefficients into the boxes or import the set of coefficients from the TAB#2 (System Register)
  - b- Click on the “Program the temperature sensor calibration coefficients” button. **This step is irreversible and the temperature sensor can be calibrated only 1 time.**

### 5. TAB#4: Others

This tab includes several features such as checking self-test status, measuring the startup time, reading the drive frequency of the sensor and generating automatic debug reports to be sent to Tronics support team.

- (1) **Drive frequency (GYPRO® only):** Clicking on the 'Read' button will display the MEMS resonating frequency ('Drive Frequency') of the sensor mounted on your evaluation board.
- (2) **Self-test :** There are two ways to check the self-test status of the sensor:
  - a- A dedicated pin ('Hardware Self-Test')
  - b- A dedicated bit in the SPI register ('Logic Self-Test')
 Here you can request the status of the Self-Test and get results from the 2 methods.
- (3) **Startup-Time:** You can measure the startup time of the sensor by clicking on the "Start" button.
- (4) **Support:** In case you encounter any issue during the evaluation of the sensor, you can generate here debug reports which will be useful for Tronics support team to understand the problem.

First, you need to enter your name and company information, as well as a short description of the problem.

Then click on the "Support" button to generate the debug reports and **make sure you don't touch the Evaluation Kit or disconnect the USB cable while the procedure is ongoing.**

The procedure will generate 3 text files into a folder called 'Support' at the same location as the software .exe.

- *XX\_SupportSensorInfo.txt* contains information about the sensor (Serial Number, Drive Frequency...), and the computer (OS and Environment).
- *XXX\_SupportRead.txt* is a 30-seconds data acquisition of the sensor output. **The sensor should be at rest during this acquisition.**
- *XXX\_SupportSystemRegister.txt* is a copy of the complete System Register of the sensor.

Once the procedure is finished, **you need to send these 3 files by e-mail at [support@tronicsgroup.com](mailto:support@tronicsgroup.com)**

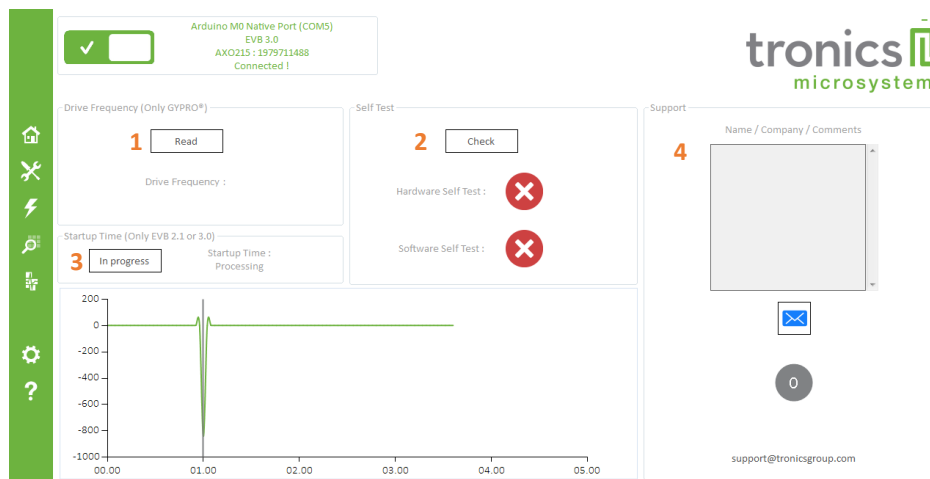


Figure 7: Tronics Evaluation Tool - "Others" tab

Button	Description
1	Measures and displays the Drive Frequency of the sensor (Only for GYPRO® Products)
2	Checks the two self-test status: <ul style="list-style-type: none"> <li>• Hardware : Voltage Level on TMUX3 pin</li> <li>• Logic : Bit0, address 0x3 of the SPI Register</li> </ul>
3	Generates 3 debug files
4	Measure the sensor startup-time

## 6. TAB#5: Compass / Plane

In the last tab, with a GYPRO® product you can see a real time compass similar to the compass on the main tab, but with a simultaneous display of the angular rate. If you have a AXO® sensor, you can see a plane inclined or positioned according to the accelerometer output.

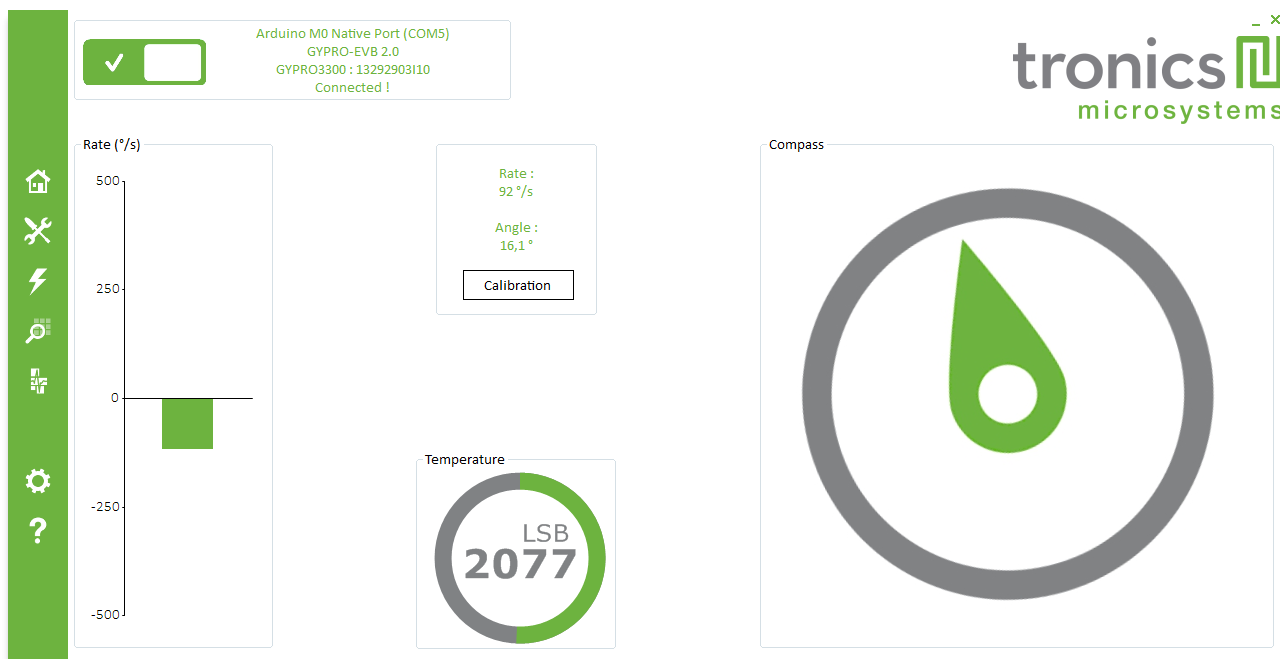


Figure 8 : Tronics Evaluation Tool – “Compass / Plane” tab with a GYPRO® sensor

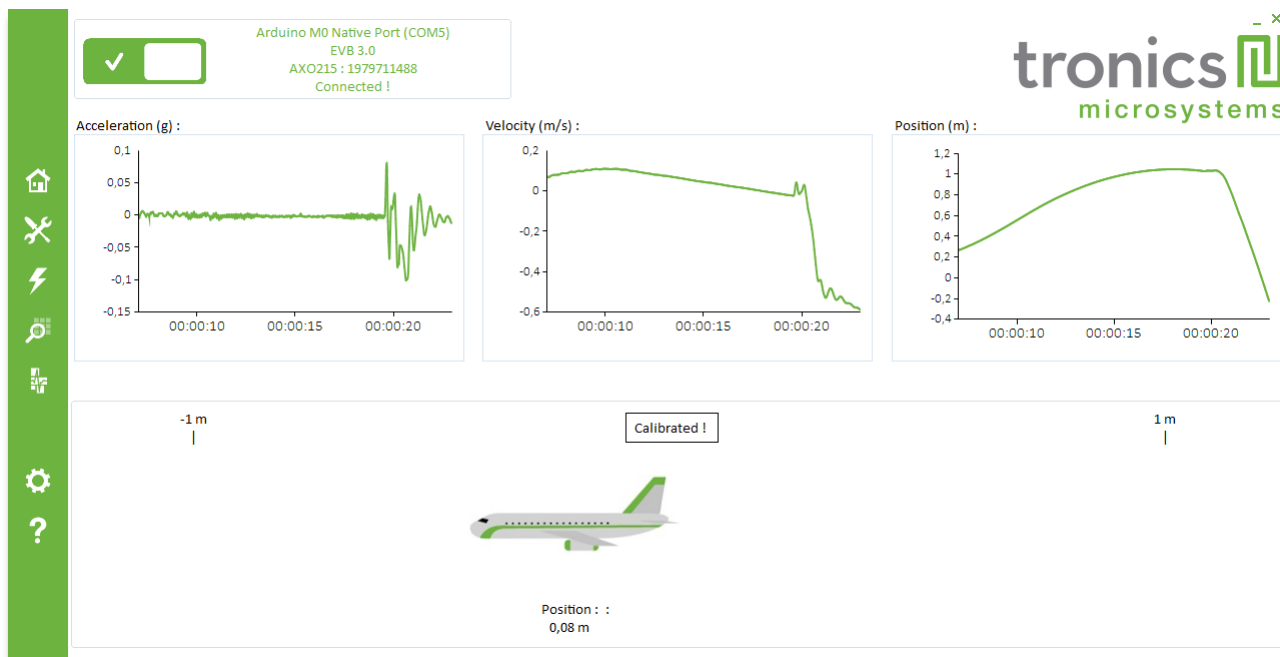


Figure 9 : Tronics Evaluation Tool – “Compass / Plane” tab with a AXO® sensor

Clicking on the ‘Calibration’ button while the sensor is in static position (zero input) corresponds to an auto-calibration of the bias.

### 7. Quick start menu

When the software is running, it is possible to start basic operations quickly, by using the Tronics Icon in the notification area (on the right side of Windows taskbar). Right-clicking on Tronics logo will open a context menu providing direct access to the main functions.

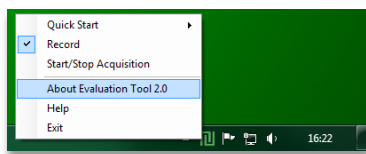


Figure 10: Tronics Evaluation Tool – Quick Start Menu

If you click on “About Tronics Evaluation Tool”, a pop-up will appear with information on the software version:



Figure 11: Tronics Evaluation Tool – About Tronics Evaluation Tool window















### 3. Available Tools and Resources

You are now ready to use Evaluation Kit and Tronics Evaluation Tool software.

The following tools and resources are available on [GYPRO®](#) and [AXO®](#) webpages of Tronics website.

Should you encounter any issue while using GYPRO® or AXO® Evaluation Kit, please contact Tronics technical support by sending an email to [support@tronicsgroup.com](mailto:support@tronicsgroup.com).

Item	Description
<b>Documentation &amp; technical notes</b>	
	<b>AXO215 - Datasheet</b>
	<b>GYPRO2300 / GYPRO2300LD - Datasheet</b>
	<b>GYPRO3300 - Datasheet</b>
<b>Mechanical tool</b>	
	<b>AXO215 - 3D model</b>
<b>Evaluation kit</b>	
	<b>AXO®-EVB3 – Evaluation board</b> <i>Evaluation board for AXO215, compatible with Arduino M0</i>
	<b>GYPRO®-EVB2 – Evaluation board</b> <i>Evaluation board for GYPRO2300, 2300LD and 3300, compatible with Arduino M0</i>
	<b>Tronics Evaluation Tool – Software</b>
	<b>AXO®-EVB3 – User manual</b>
	<b>GYPRO®-EVB2 – User manual</b>
	<b>Tronics Evaluation Kit – Quick Start Guide</b>
	<b>Tronics Evaluation Tool – Software User Manual</b>
	<b>Tronics Evaluation Tool – Arduino Firmware</b>