TLE5x09A16(D) Evaluation Kit

Analog AMR/GMR Angle Sensor Evaluation Kit

About this document

Scope and purpose

This document describes the Evaluation Kit for the TLE5x09A16(D) angle sensor. The purpose of this manual is to describe the software installation process and how to use the TLE5x09A16(D) angle sensor Evaluation Kit.

Intended audience

This document is intended for anyone who wants to use the TLE5x09A16(D) Evaluation Kit

Table of contents

1 General description

This kit is based on XMC™4700 platform. The kit is equipped with the TLE5x09A16(D) dual die angle sensor and a FTDI chip that implements a high baud rate communication.

The EvalKit consists of:

•   Dual Die Angle Sensors Evaluation Board

•   Rotation knob (3D printed) with magnet (MTS SD-6x2.5-NI-N35SH)

The EvalKit does not contain:

•   micro USB cable
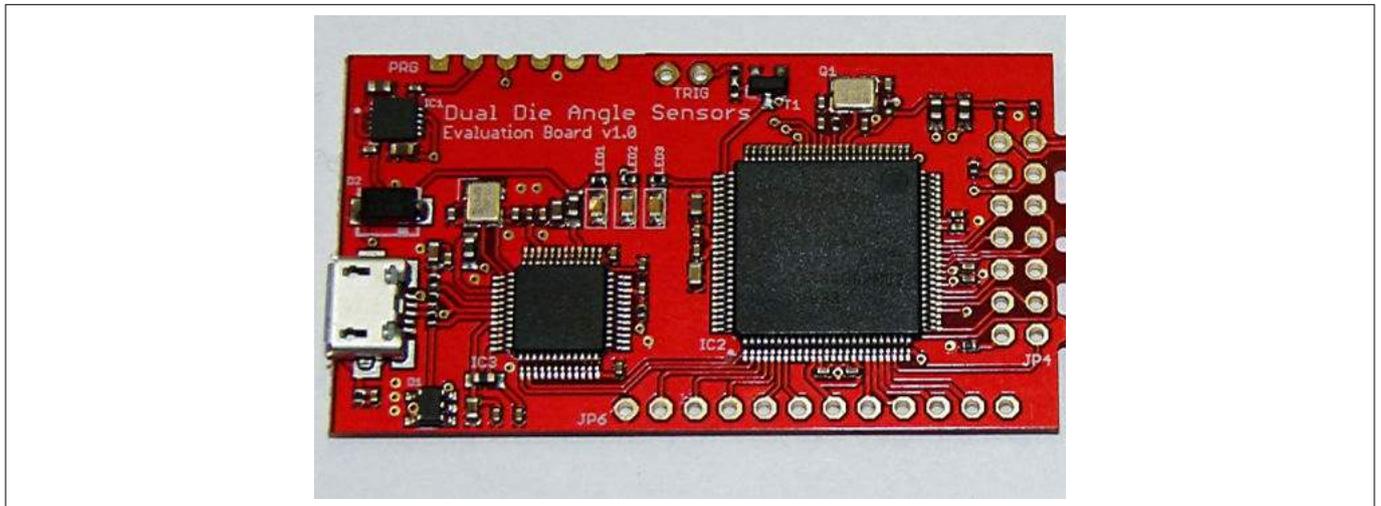
**Figure 1**   **Dual Die Angle Sensors Eval Kit with XMC™ 4700**
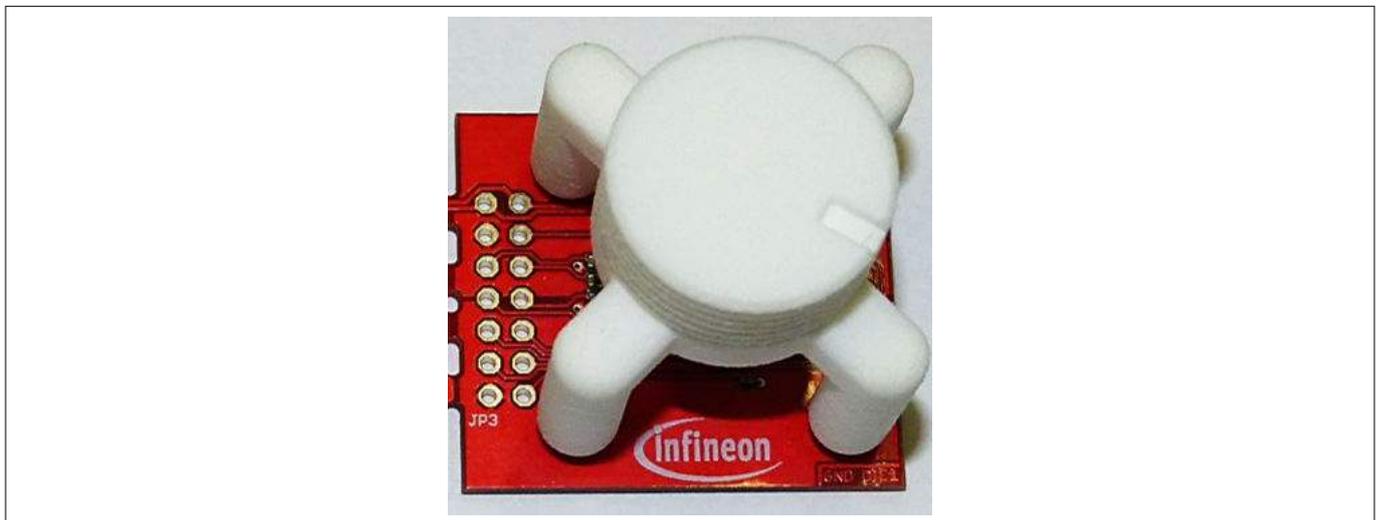
Figure 2   **Rotation knob with TLE5x09A16(D) angle sensor below**

The Evaluation Kit includes a GUI software application that can be downloaded from the Evaluation Kit product page

2 Installation

This is the installer entry point.
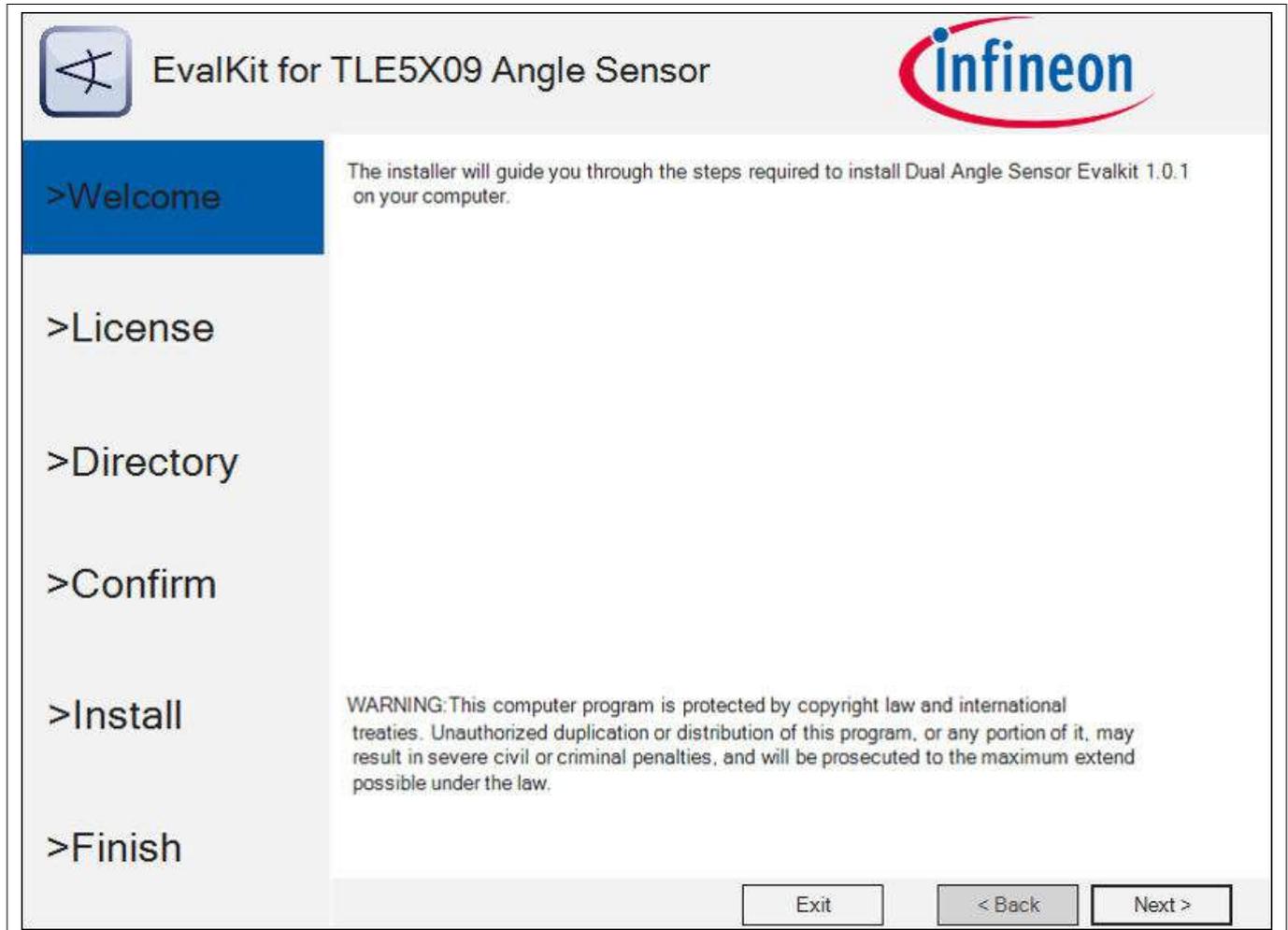
Figure 3   Installer entry point

1.   Click Next to go forward with the process
2.   Please read the license agreement
     a.   Check the *"I accept the terms in the License Agreement"* checkbox
     b.   The "Next" button activates only after agreeing with the terms
3.   Directory for the software installation
     a.   You may select the installation folder – recommended is to leave the default installation path
     b.   You may select if a desktop icon is generated or not
     c.   The hardware device may only operate on a computer that has the FTDI driver installed
     d.   The Software GUI is built in .NET environment 4.5. A check is being done for compatibility and you may choose to install (if not already installed) the .NET framework 4.7 (web installer – requires connection to internet)
4.   Confirm the installation process
5.   Beginning of the installation process
     a.   Windows UAC (user access control) will prompt for access confirmation
     b.   Depending on the security settings, you may need administration rights on the installation machine
     c.   Wait for the installation process to finish
6.   Beginning ot the FTDI driver installation process

2 Installation

7. Device driver installation Wizard

    a. This wizard helps you install the software drivers that some computers devices need in order to work

    b. Click next to continue

8. Please read the license agreement and check the *"I accept this agreement"* checkbox. The "Next" button activates only after agreeing with the terms

9. Finalize the installation by clicking Finish

    a. Check the message provided by the installer. In case of errors, the Software will not be available for running

3 Evaluation Kit for Angle Sensors

3.1 Connection to PC and starting the application

Connect the hardware to PC using a USB to Micro-USB cable

Start the application (via shortcut on desktop or Start → All Programs → Infineon Technologies → Dual Angle Sensor Evalkit)

1: This GUI component will show any connected devices. You may select the device and open a connection / flash the device.

Note: *Press the ´Connect´Button to go on. There are three buttons available: Connect, disconnect, refresh*

2: You may select the sensor type via the combo-box and start/stop acquisition.

3: Sensor panel – will be displayed after valid sensor is being selected by the user.

3.2 Connecting to the device

While connecting to the device, the animated picture with rotating gears will appear.

The software will check the firmware version and flash if it needs to be updated.

The picture will disappear when the process is complete and the device is ready.
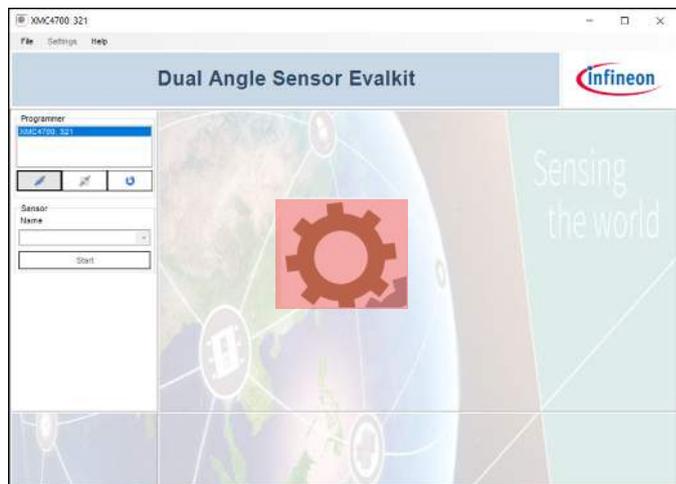
3.3 TLE5x09A16(D) sensor panel

After selecting the sensor from the drop down list, the sensor panel will appear.

You can now start the data acquisition. All controls (Settings, Calibration Panel, Save, Clear) become available only if data acquisition is stopped.
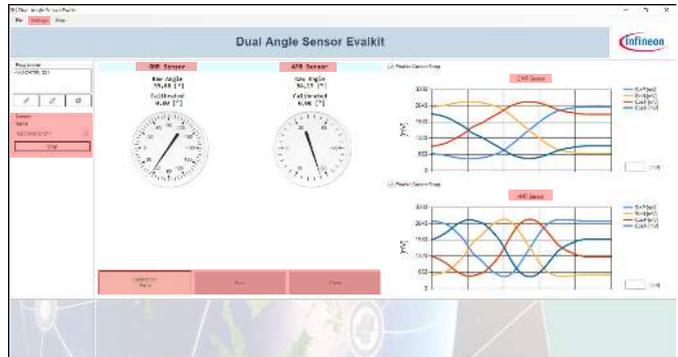
3.4 Calibration panel

The raw signals of the analog angle sensor TLE5x09A16(D) have to be calibrated to achieve high angle accuracy.

A calibration of amplitude, offset and non-orthogonality has to be done when the sensor is used the first time (end-of-line calibration).

When the panel opens the final parameters used for angle calibration are read from the microcontroller.

In this panel the user can start the sensor calibration procedure. Every start will reset the existing calibration parameters stored on the microcontroller.

Below the circle quadrants, instruction messages are displayed.

Press Start to beginn.
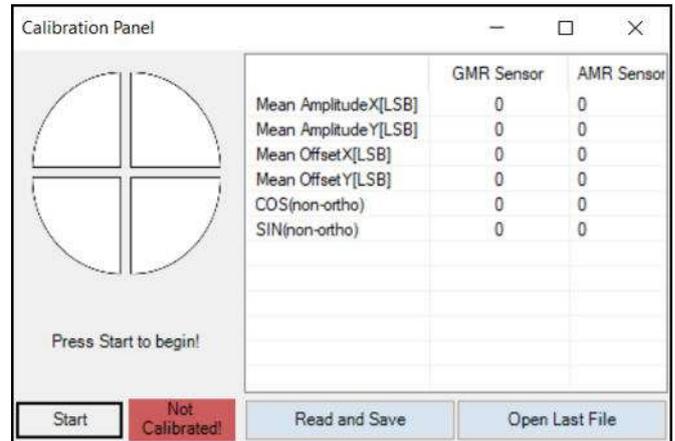
Rotate the knob slowly counter clockwise.
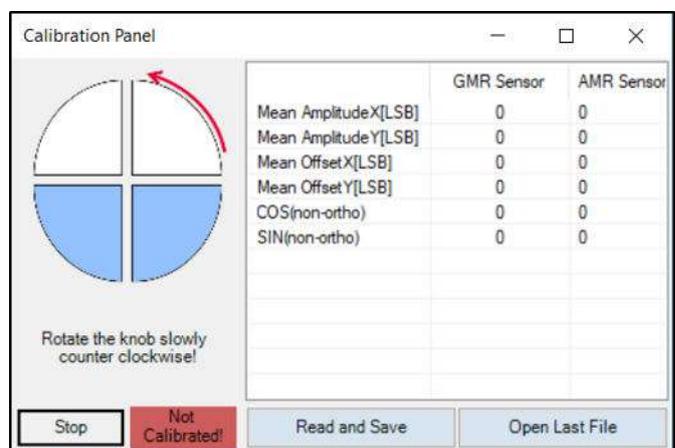
Rotate the knob slowly clockwise.
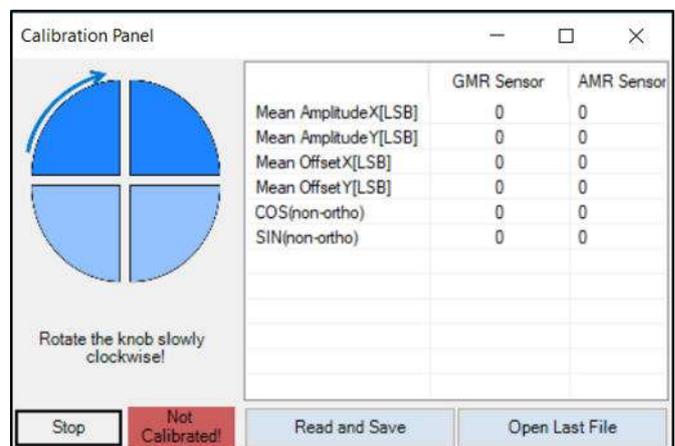
Calibration finished.
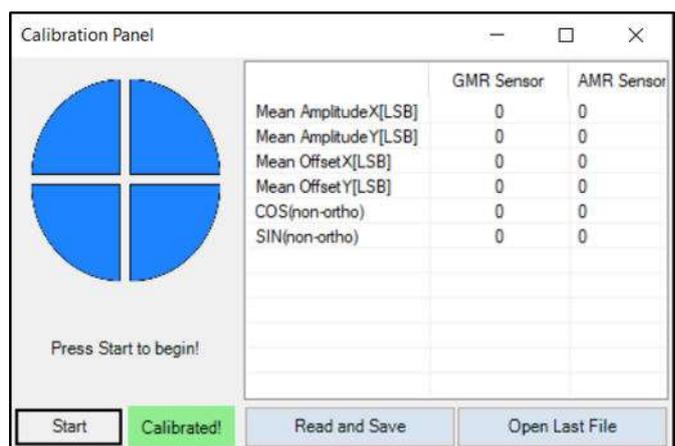
After the calibration process is complete, the user can read and save the calibration parameters stored on the microcontroller.

In the panel are displayed only the final parameters used for angle calibration. By clicking "Open Last File", the user can access the full parameters list stored on a csv file at every "Read and Save".

The example in **Figure 4** shows the calibration parameters amplitude, offset and non-orthogonality of TLE5309(D) sensor. The X value corresponds to the cosine output while the Y value corresponds to the sine.

The GMR sensor is placed on the top and the AMR sensor on the bottom of the package. The bottom sensor is in flipped configuration compared to the top sensor in TLE5x09A16(D) dual die variants.

Calibration Panel	GMR Sensor	AMR Sensor
Mean Amplitude X[LSB]	2867	2871,5
Mean Amplitude Y[LSB]	2878	2849,25
Mean Offset X[LSB]	-8,5	21,5
Mean Offset Y[LSB]	0,5	10,25
COS(non-ortho)	0,999987241759...	0,999999131995573'
SIN(non-ortho)	-0,00505136786...	0,0013175764770400
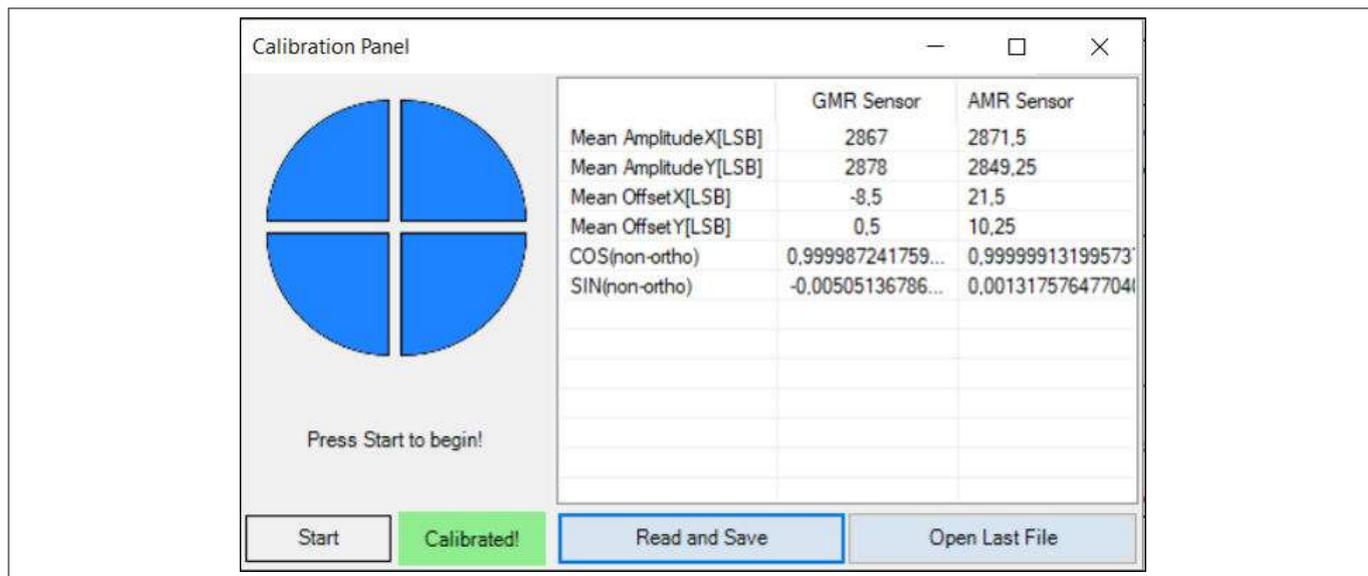
Figure 4   Calibration panel

Files are saved in the computer: "C:\Users\<user>\AppData\Local\InfineonDualAnalogAngleTemp"

The calibration procedure is done on the microcontroller with the "Library for One Time Calibration & Compensation".

Figure 5   **Parameter list of calibration process**

3.5   TLE5x09A16(D) sensor panel

The TLE5x09A16(D) eval kit displays real-time angle values.

After the sensor is fully calibrated, the calibrated angle value will be displayed.

The user can click and pin a cursor in the signal chart. If the checkbox "Enable Cursor Snap" is checked, the cursor will point to the nearest signal value. The cursor value is displayed in the right corner box.

The user can also zoom into the chart by using mouse scroll.
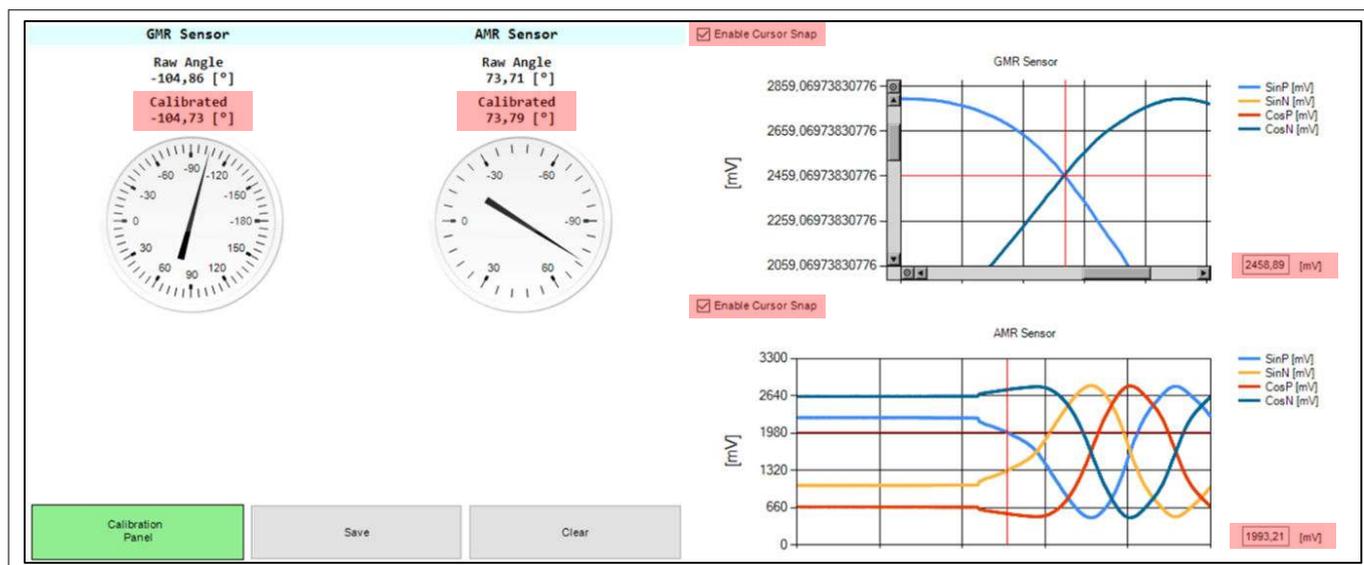
Figure 6   **Sensor panel**

3.6   Sensor config panel

This panel can be accessed while data acquisition is stopped at Settings → Sensor Config.

The user can select a predefined acquisition rate for the sensor data read. Lowering the rate will reduce the required processing power (on the microcontroller and computer).
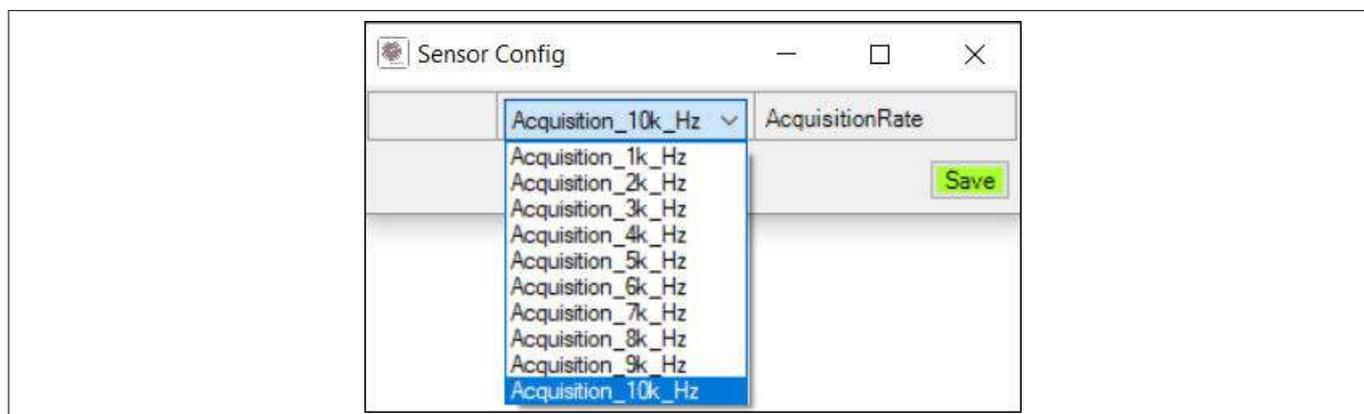
Figure 7   **Sensor confi panel**

3.7   TLE5x09A16(D) saved sensor acquired data

All sensor acquired data can be saved in a csv file, by pressing "Save" button from the sensor panel.

3 Evaluation Kit for Angle Sensors

Figure 8   **Sensor acquired data**

Revision history

Revision	Date	Changes
Rev. 1.0	2020-06-17	• Initial creation

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.