LPMS-CANAL2
Quick Start Guide ver. 1.3

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I. Introduction

Welcome to the LP-RESEARCH Motion Sensor LPMS-CANAL2 Quick Start Guide.

In this documentation we will explain everything you need to know to quickly set up the LPMS-CANAL2 hardware, install its software and get started with sensor data acquisition. We have put a lot of effort into making the LPMS-CANAL2 a great product, but we are always eager to improve and work on new developments. If you have any further questions or comments regarding this documentation please feel free to contact us anytime.

For more information on the LPMS-CANAL2 or other product series, please refer to datasheets and user manuals, available from the LP-RESEARCH website at the following address: http://www.lp-research.com.

II.   Document Revision History

Date	Revision	Changes
2016-06-01	1.0	- Initial release.
2016-10-01	1.1	- Add the tables of relations between baudrate and data update rate.
2016-10-13	1.2	- Modification on input voltage range
2017-10-27	1.3	- Add connector pinout description

III. Device Specification

Table 1. LPMS-CANAL2 Main Specification

Parameters	LPMS-CANAL2
Output range of Euler angle	Roll：±90°; pitch：±180°; Yaw：±180°
Bandwidth	400Hz
Resolution	0.01°
Accuracy	<0.5° (Static), <2° RMS (Dynamic)
Max. instant impact (0.1 ms)	10,000 g
Output data type	Raw data/Euler/Quaternion/Linear acceleration/Air pressure/Altitude/Temperature
Internal sampling rate	400 Hz
Communication interface	CAN BUS
Max. baudrate	1M bps
Communication protocol	LPCAN / CANOpen
Size	48x40x25 mm
Weight	67.5 g
Max. data update rate	400Hz
Power consumption	155mW@3.3V
Power supply	5V~15V DC
Working temperature	-40~+80 ℃
Connector	SACC-DSI-MS-5CON-PG 9/0,5,SCO,M12
Waterproof level	IP67

Table 2. Accelerometer Specification

Parameters	Typical Value	Unit
Measurement range	±2/±4/±8/±16	g
Sensitivity	0.061/0.122/0.244/0.488	mg/LSB
Linear acceleration sensitivity change vs. temperature	±1	%
Linear acceleration typical zero-g level offset accuracy	±40	mg
Linear acceleration zero-rate change vs. temperature	±0.5	mg/°C
Acceleration noise density	90 (FS= ±2 g ODR = 104 Hz)	μg/√Hz

Table 3. Gyroscope Specification

Parameters	Typical Value	Unit
Measurement range	±125/±245/±500/±1000/±2000	dps
Sensitivity	4.375/8.75/17.50/35/70	mdps/LSB
Angular rate sensitivity change vs. temperature	±1.5	%
Angular rate typical zero-rate level	±10	dps
Angular rate typical zero-rate level change vs. temperature	±0.05	dps/°C
Rate noise density	7	mdps/√Hz
Angular random walk	9	degree/hour

Table 4. Magnetometer Specification

Parameters		Typical Value	Unit
Measurement range		±4/±8/±12/±16	gauss
Sensitivity		6842/3421/2281/1711	LSB/gauss
Zero-gauss level		±1	gauss
RMS noise (Ultra-high-performance mode)	X axis	3.2	mgauss
	Y axis	3.2	mgauss
	Z axis	4.1	mgauss

Non-linearity	±0.12	%FS

Table 5. Pressure and Humidity Sensor Specification

Parameters	Typical Value	Unit
Pressure measurement range	300~1100	hPa
Temperature coefficient of offset	±1.5	Pa/K
Absolute accuracy pressure	±1.0	hPa
Pressure sensitivity	0.18	Pa
Pressure noise	1.3	Pa
Humidity measurement range	0~100	%RH
Humidity accuracy	±3	%RH
Humidity latency （10~90~10 %RH，25 ℃）	±1	%RH
Humidity sensitivity	0.008	%RH
Humidity noise	0.02	%RH
Humidity stability （10~90 %RH, 25 ℃）	0.5	%RH/year

Table 6. Relation between CAN Bus Baudrate and Max. Update Rate

Baudrate (kbps)	Max. Update Rate (Hz)
125	200
250	400
500	400
1000	400

Table 7. Relation between LPBUS Baudrate and Max. Update Rate

Baudrate (kbps)	Max. Update Rate (Hz)
125	100
250	200
500	400
1000	400

IV. CAN BUS Connector Pinout

5-Pins Connector Type
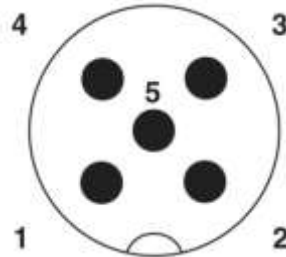
Pin no.	Signal	Remark	Cable Color
1	NC		Brown
2	VDD	+5V~+15VDC	White
3	GND		Blue
4	CAN+		Black
5	CAN-		Grey

8-Pins Connector Type
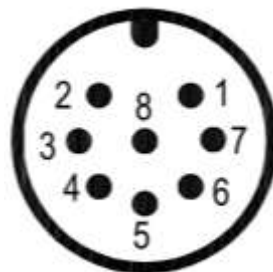
Pin No.	Interface Type	Signal Name	Remark	Cable Color
1		CAN-V	+5V~+15V DC	White
3	CAN	CAN+	-	Green
4		CAN-	-	Yellow
8		USB-V	+5V DC	RED
6	USB	D-	-	Pink
7		D+	-	Blue
2	-	GND	-	Brown
5	-	RES	-	Grey

*IMPORTANT: USB and CAN interfaces cannot be used at the same time.

V.   Operation

OpenMAT Software Installation

We offer windows OS based software called LpmsControl for users to easily manipulate the LPMS-CANAL2 sensor. The LpmsControl software is a sub program of OpenMAT software. Please choose a correct version of OpenMAT software from our homepage based on the operation system specification. The followings show an example of installing the OpenMAT software under Windows 7 32bit system.

1) Go to: http://www.lp-research.com/support/, and download the latest version of OpenMAT for the sensor, like OpenMAT Version 1.3.5 (Windows 32-bit binary) showed as below.
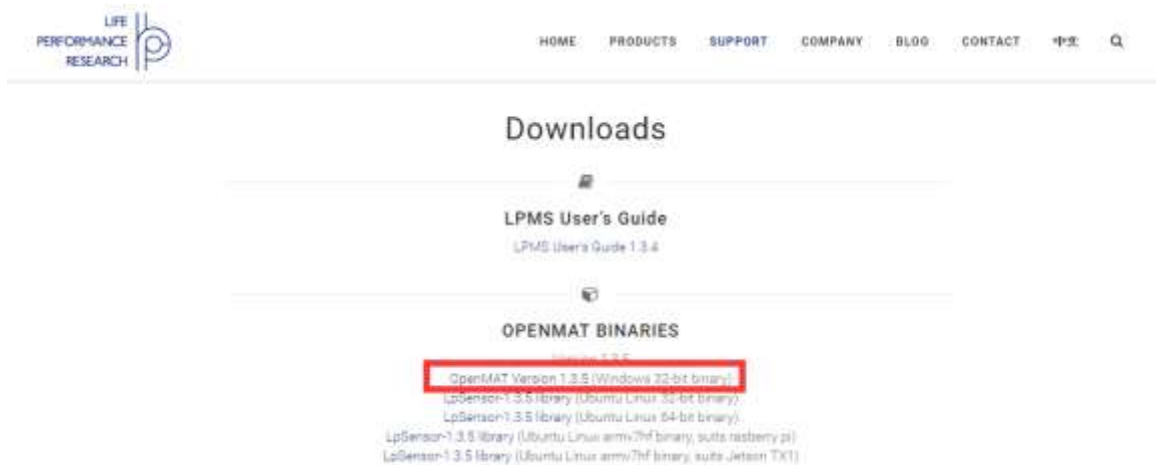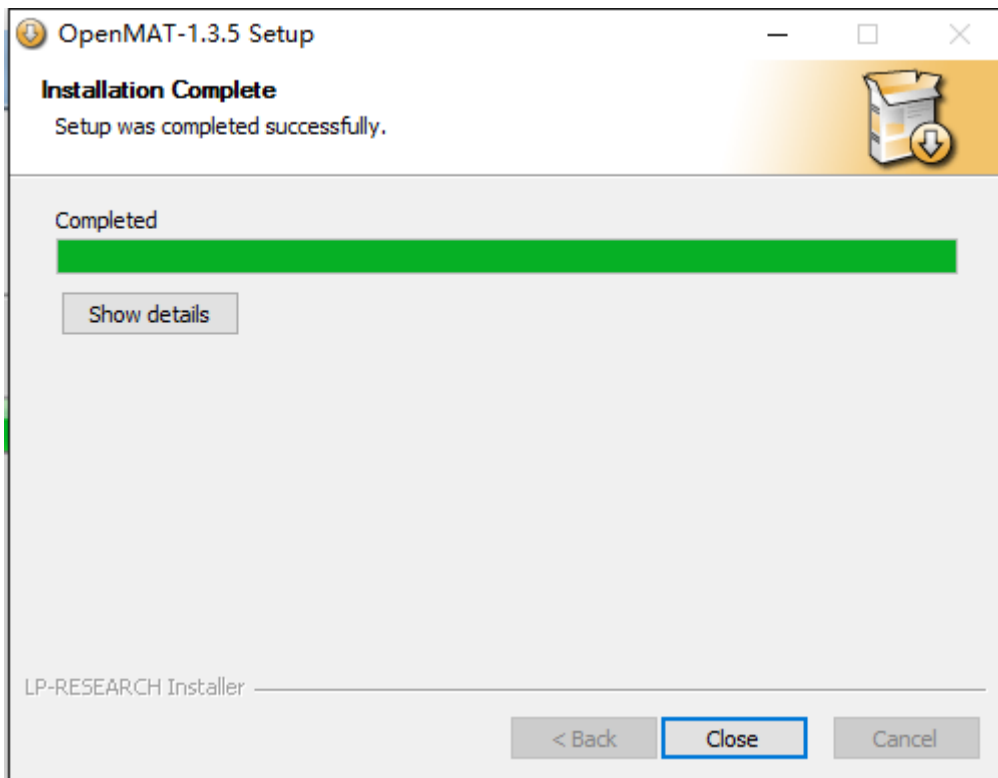

2) Run the installer after the download process is finished, and push the "I Agree" button for the next step.
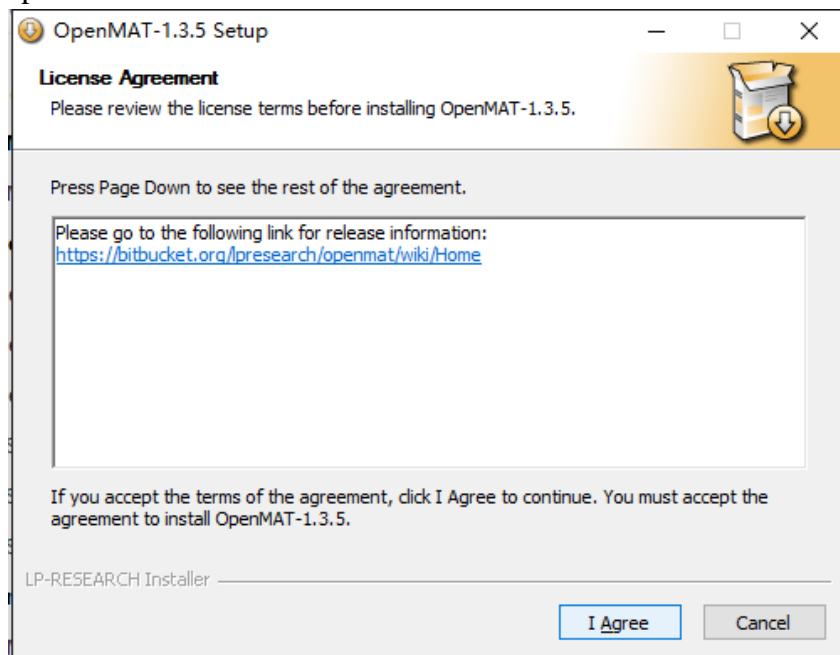
3) Push the "Browse" button to select the installation path of the program, and then push "Install" to start the installation process.
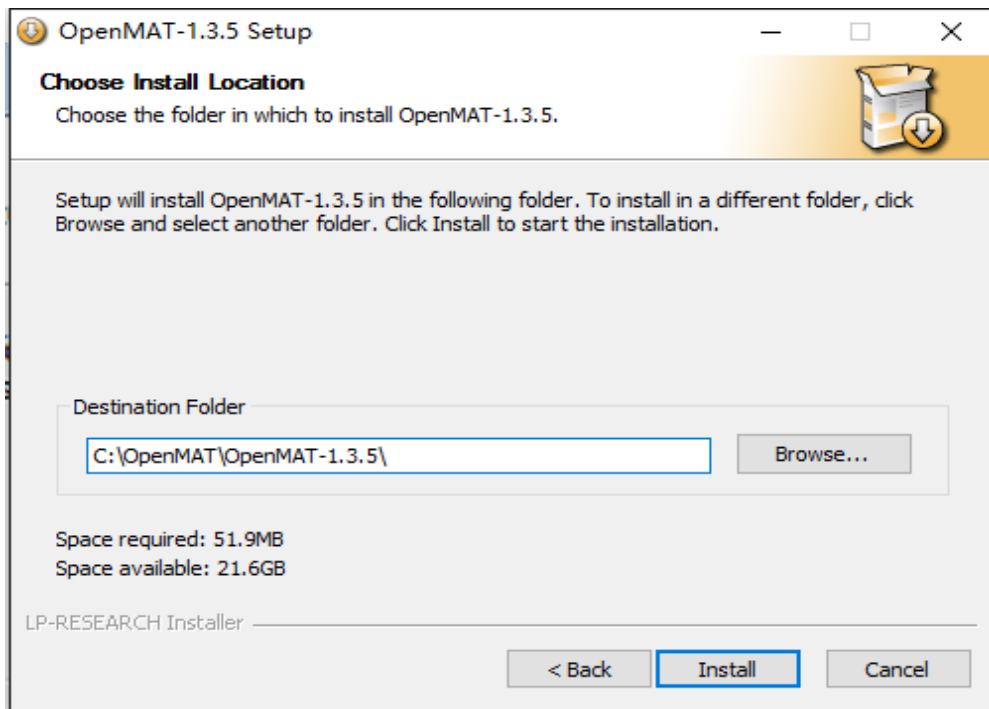
4) Push the "Close" button to complete the installation.

To run the LpmsControl software from the start menu of your windows system, you can see the following interface.
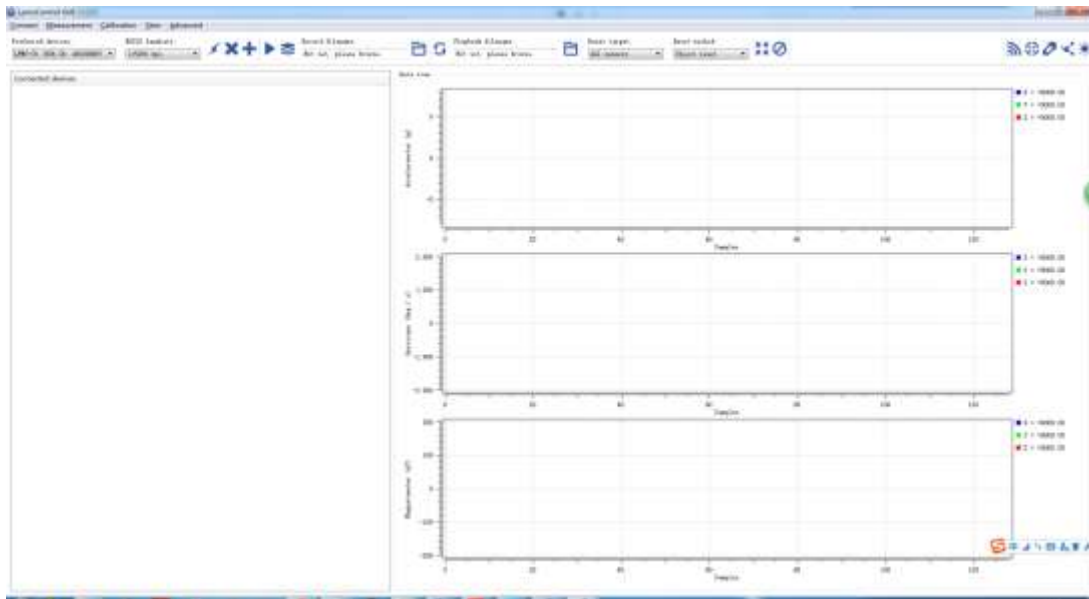
Connection with PC

In order to connect the sensor to a PC via the CAN BUS port, a CAN-to-USB converter is needed. LpmsControl software is supporting the PCAN-USB cable from PEAK-System Technik GmbH. The detailed information of PCAN-USB can be referred to: http://www.peak-system.com.

After connecting the PCAN-USB cable to a PC, the system will pop out a notice of driver installation. Please download and install the corresponding driver of PCAN-USB from the webpage of PEAK-System. The device manager of windows operation system will show the PCAN-USB device if the driver is installed correctly, as showed in the following image.

Before connecting LPMS-CANAL2 with PCAN-USB cable, the hardware setting of the DB9 port on PCAN-USB needs to be modified. In default, the pin no.1 of this DB9 port is not outputting 5V voltage. Please refer to section "Voltage Supply of External Devices" in the manual of PCAN-USB to have the pin no.1 output +5V.


When the hardware setting of PCAN-USB is completed, users can connect it with LPMS-CANAL2 sensor with proper wiring between the M12 and DB9 connectors. Then the PCAN-USB can be plugged into PC to power the sensor and acquire data.

Please follow the instructions below to complete the remaining steps.

1) To start the LpmsControl software. If the PCAN-USB cable has been connected with PC, the CAN baudrate setting item should be showed up on the toolbar, seen as the following image. Please choose the correct baudrate according to your sensor setting. The default value is 125kbps.
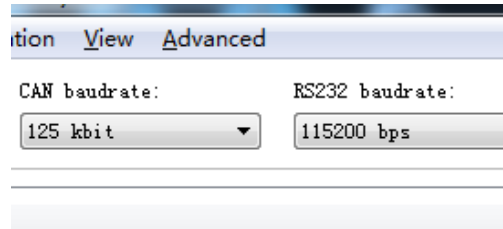
2) To select the "Add/remove sensor" under "Connect" menu or click the "+" button on toolbar.

The "add device" window will pop out, as following.
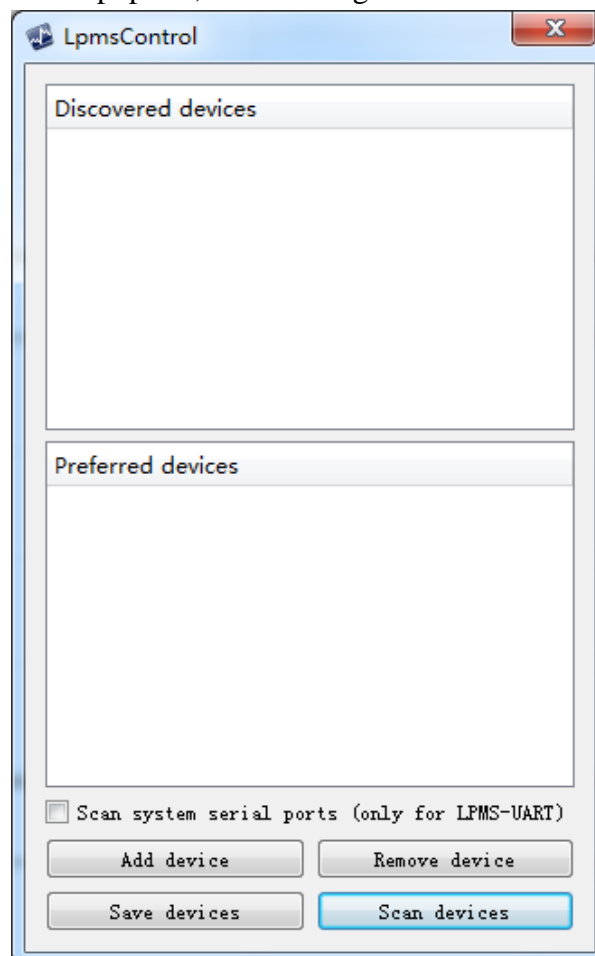
3) To click the "Scan devices" button and start the device discovery process. Please wait until the process is finished.

4) To select the target sensor ID from the "Discovered devices" list, for example, "LPMS-CU2 (CAN ID: 1)" in the following image.

5) To add the selected sensor to "Preferred devices" list by clicking the "Add device" button.

6) To click the "Save devices" button to save the preferred devices list, and return to main interface of LpmsControl.
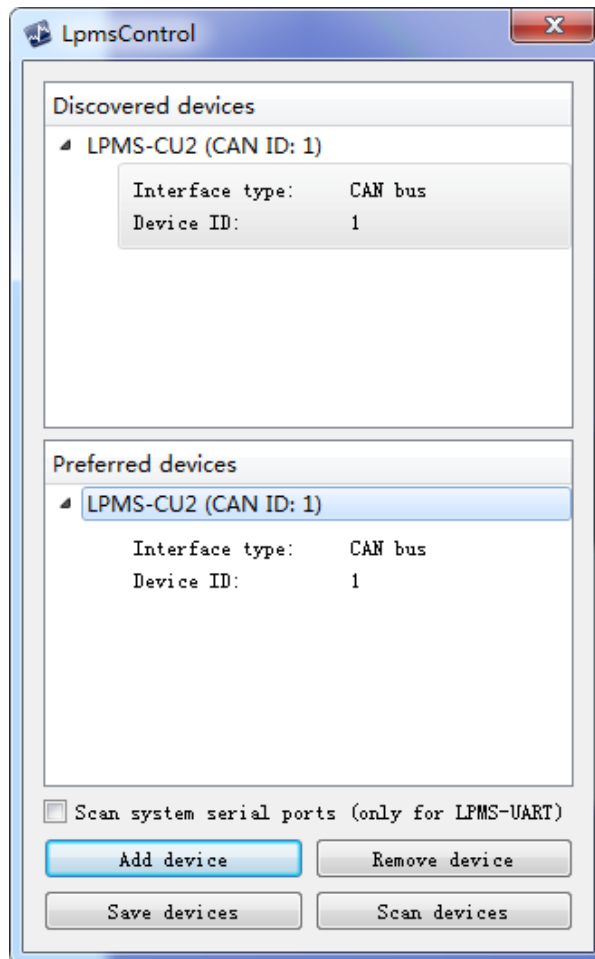

7) To select the target sensor ID from the Preferred devices list, and click Connect function under "Connect" menu or click the lightning button on toolbar to connect the sensor.
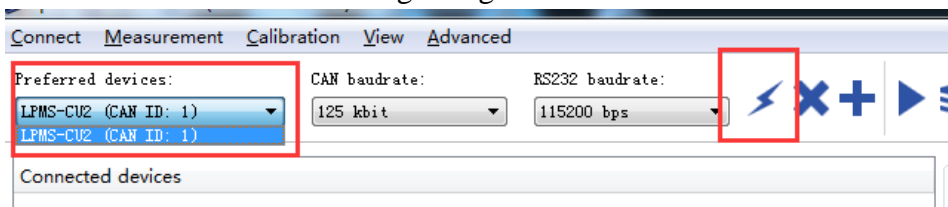

   After completing all the steps above, the LPMS-CANAL2 should have been connecting with windows system. Users can check all the data visualization and parameter settings of the sensor from LpmsControl.
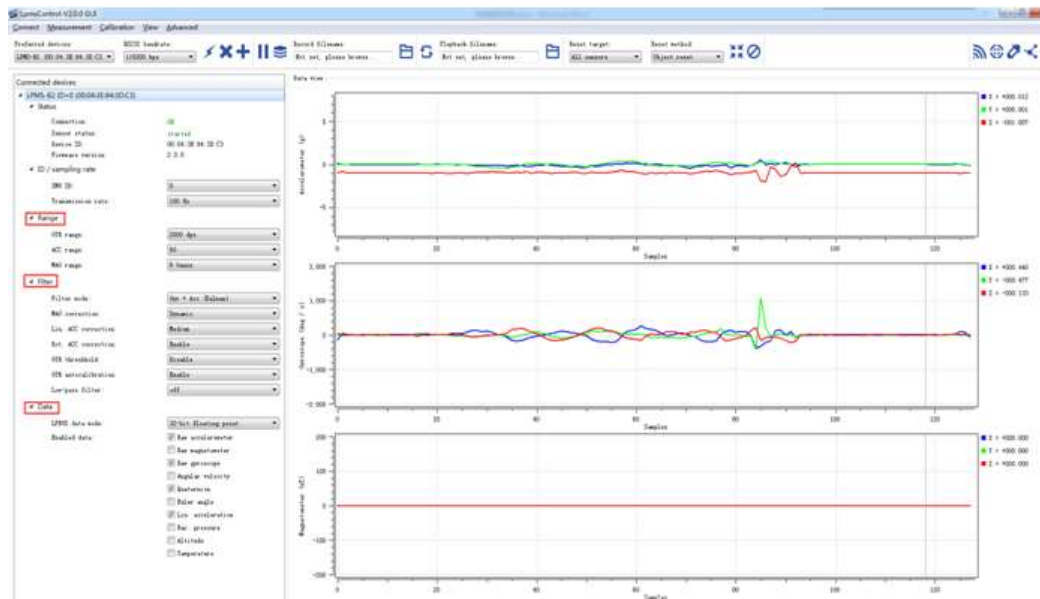
On the left side of the main interface of LpmsControl, users can change the sensor settings, like measurement range, filter modes, data updating rate, etc. Moreover, the types of output data can be modified by checking or unchecking the check box of each parameter. For example, in the following image the "raw magnetometer" is checked so that the acquisition of magnetic data is enabled.
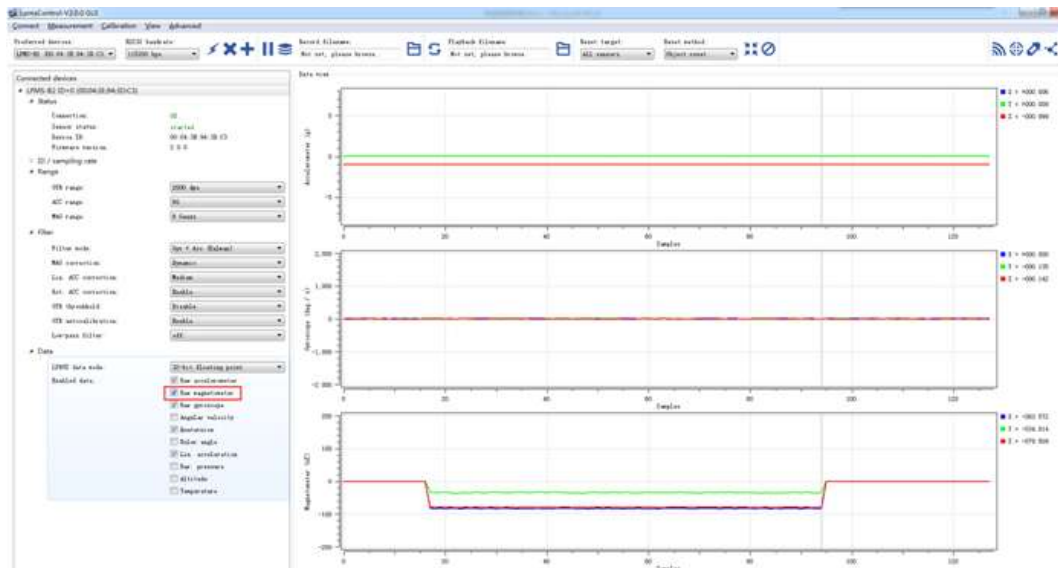
For more information, please refer to our product datasheets and product manuals.