LPMS-UTTL2
Quick Start Guide ver. 1.4

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http://www.lp-research.com

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I. Introduction

Welcome to the LP-RESEARCH Motion Sensor LPMS-UTTL2 Quick Start Guide.

In this documentation we will explain everything you need to know to quickly set up the LPMS-UTTL2 hardware, install its software and get started with sensor data acquisition. We have put a lot of effort into making the LPMS-UTTL2 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-UTTL2 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	- Correction on input voltage range.
2017-09-28	1.3	- Correction on DB9 connector pinout information
2018-03-27	1.4	- Updated tables of parameters
2018-06-21	1.5	- Adjusted maximum supply voltage to 18V

III. Device Specification

Table 1. LPMS-UTTL2 Main Specification

Parameters	LPMS-UTTL2
Output range of Euler angle	Roll：±180°；pitch：±90°；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	UART / USB*
Max. baudrate	921600bps
Communication protocol	LPBUS
Size	34.5x34x15.7 mm
Weight	17.6 g
Max. data update rate	400Hz
Power consumption	<175mW@3.3V
Power supply	5V~18V DC (UART TTL) / 5V (USB)
Working temperature	-40~+80 °C
Connector	DB9(female) / micro-USB type B

* The USB port is primarily used for the connection with windows-based operation systems. With the use of LpmsControl software, users can easily modify the sensor settings and upgrade the sensor firmware.

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

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 (FS=±4 gauss)		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

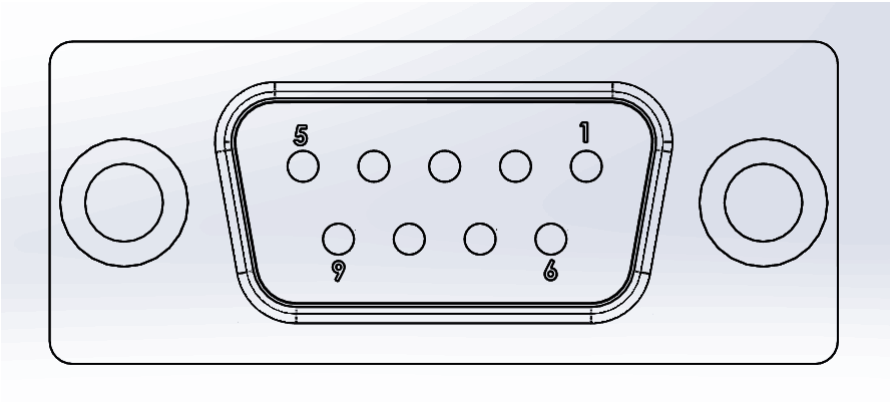
Table 5. Pressure and Humidity Sensor Specification

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 °C）	±1	%RH
Humidity sensitivity	0.008	%RH
Humidity noise	0.02	%RH
Humidity stability （10~90 %RH, 25 °C）	0.5	%RH/year

Table 6. Relation between UART Baudrate and Max. Update Rate

Baudrate (bps)	Max. Update Rate (Hz)
19200	10
57600	50
115200	100
921600	400

IV. Connector Pinout



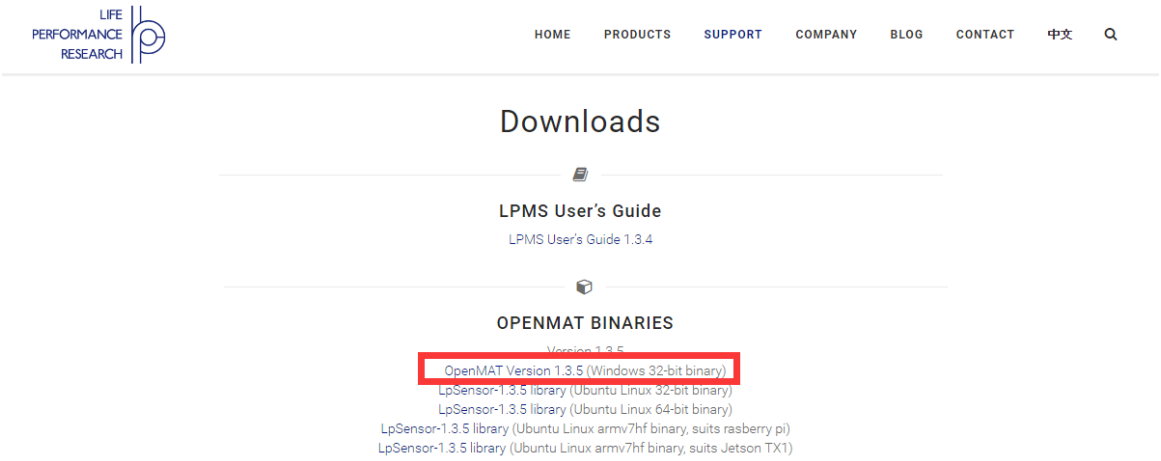
Pin no.	Signal	Remark
1	VDD	+5V~+18VDC
2	RES	
3	RES	
4	RXD	UART_RX
5	GND	
6	GND	
7	RES	
8	TXD	UART_TX
9	RES	

V. Operation

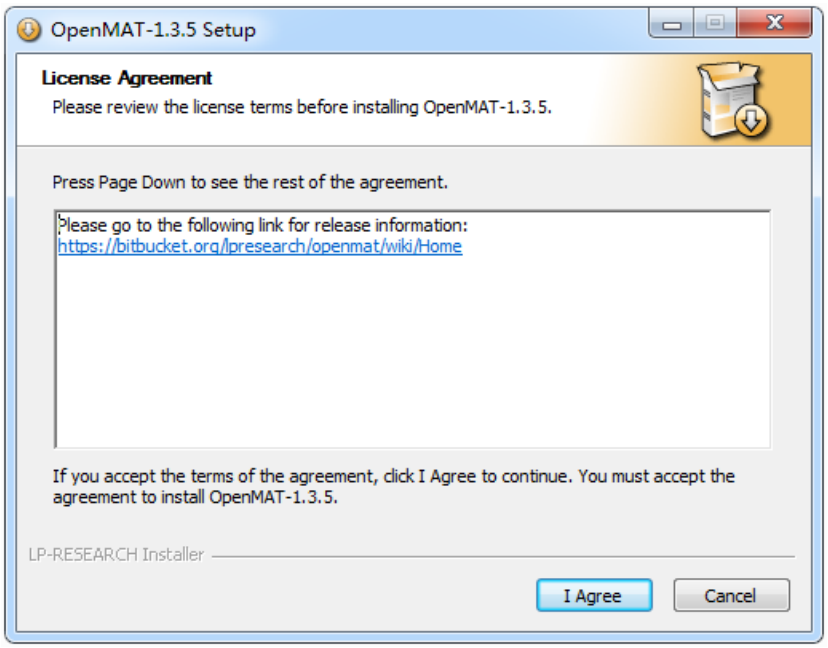
OpenMAT Software Installation

We offer windows OS based software called LpmsControl for users to easily manipulate the LPMS-UTTL2 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.

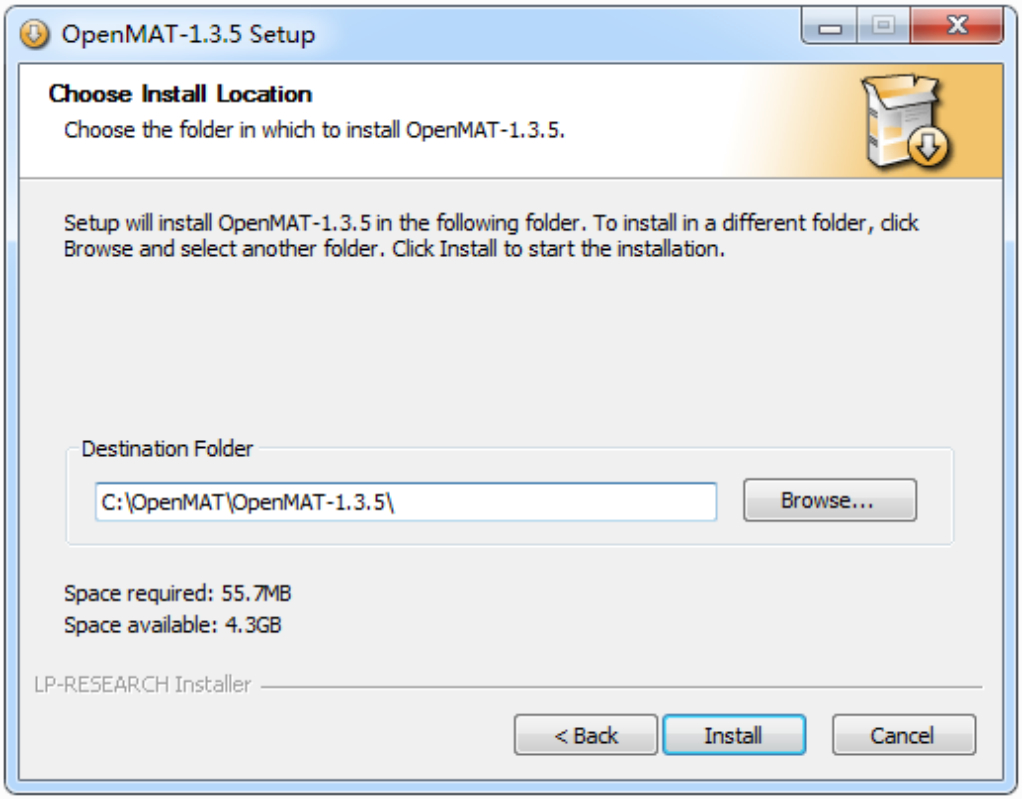
1) Go to: http://www.lp-research.com/support/, and download the latest version of OpenMAT for the sensor, like OpenMAT Version 1.3.5 (Windows 32-bit binary) showed as below.



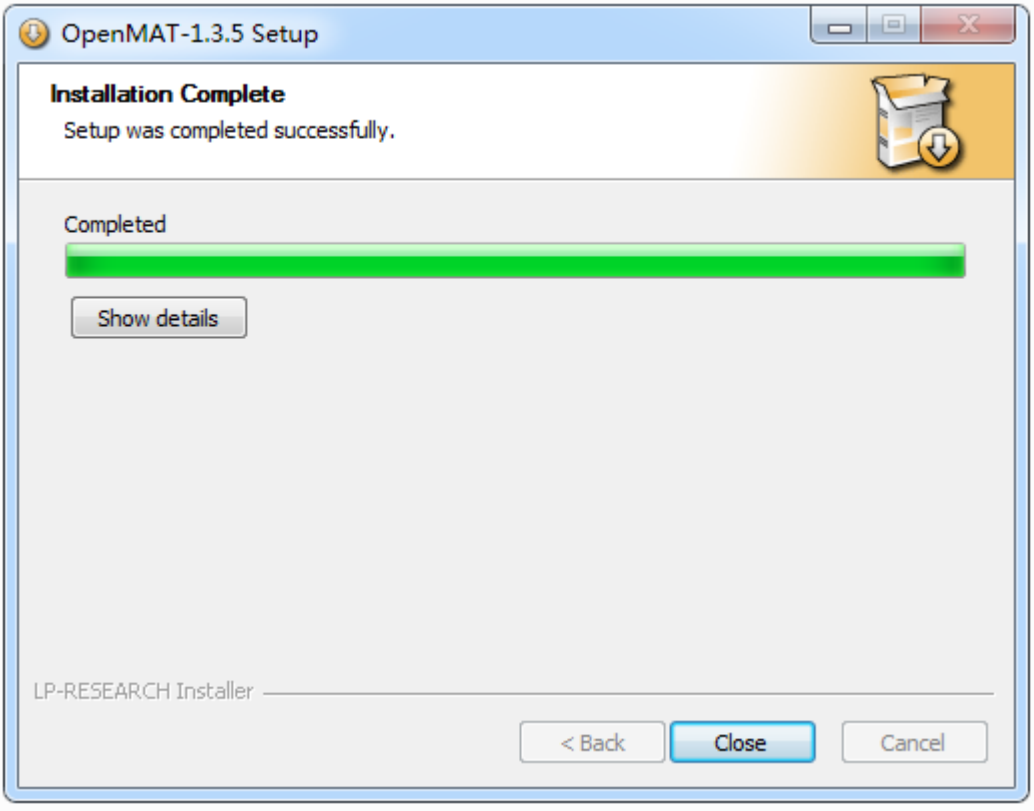
2) Run the installer after the download process is finished, and push the "I Agree" button for the next step.



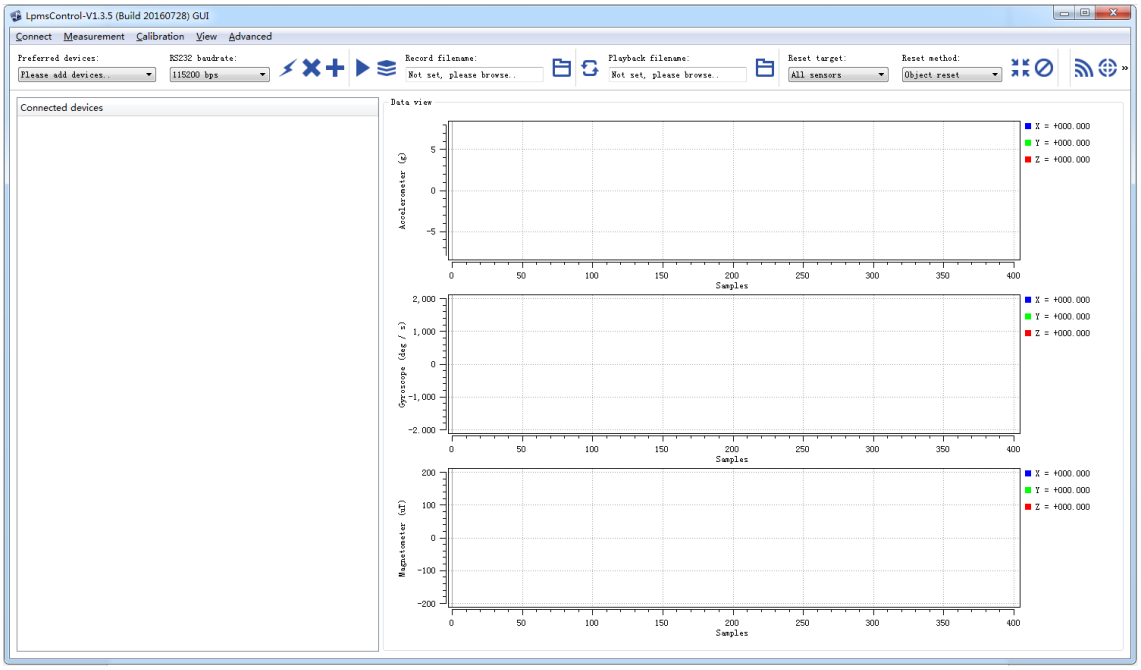
3) Push the "Browse" button to select the installation path of the program, and then push "Install" to start the installation process.



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

LPMS-UTTL2 can communicate with a host system via either UART TTL or USB interface. **Notice: Both interfaces cannot be used at the same time.**

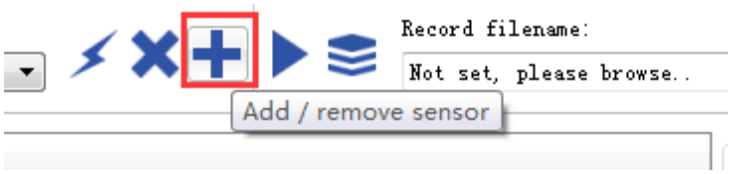
The USB port is aimed at connecting with a windows OS based host system for the sensor. User can change the sensor settings and acquire sensor data by using our LpmsControl software. The UART port is aimed at connecting with various types of industrial host systems via serial communication. Users can change the sensor settings and acquire sensor data based on our LPBUS communication protocols. The sensor operation via either UART or USB interface at a windows operation system is introduced in the following sections.

1. Via UART interface

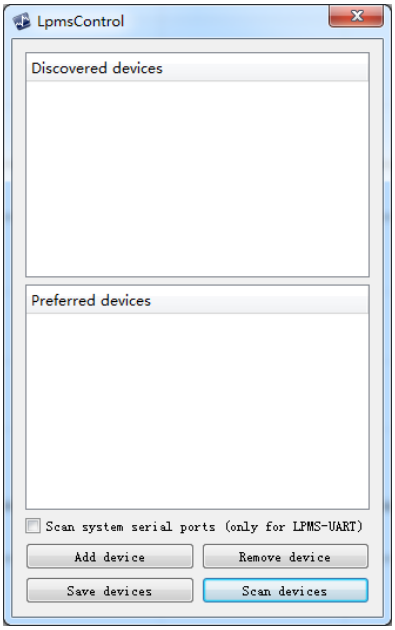
In order to connect the sensor to a PC via the UART port, a TTL-to-USB conversion cable is needed. Please connect the conversion cable with LPMS-UTTL2 sensor based on the pinout description in section "Connector Pinout". After plugging the conversion cable to a windows OS PC, a COM port is supposed to be assigned to the cable, which can be confirmed through the device manager of windows system. Please remember that COM port number and use it for the sensor connection. The LED on the sensor should behave like a pulsating light at blue color, which indicates the sensor is functionally working.

Please follow the instructions below to complete the remaining steps.

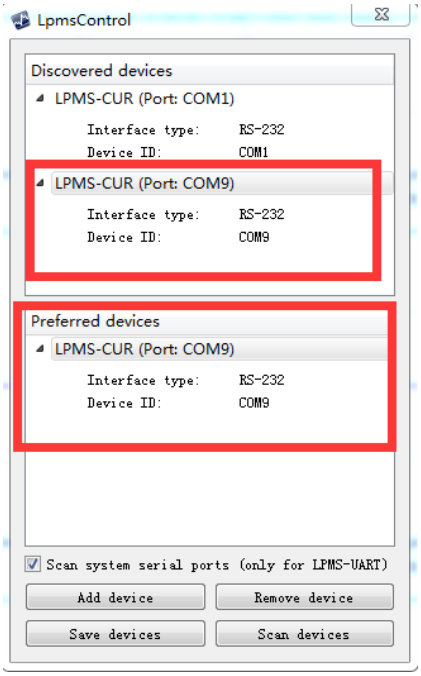
1) To select the "Add/remove sensor" under "Connect" menu or click the "+" button on toolbar.



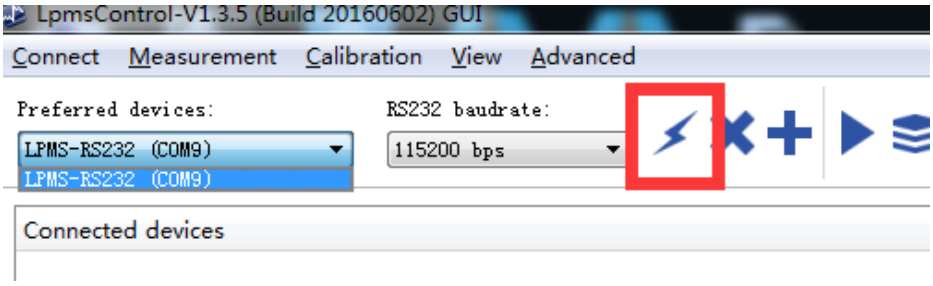
The "add device" window will pop out, as following.



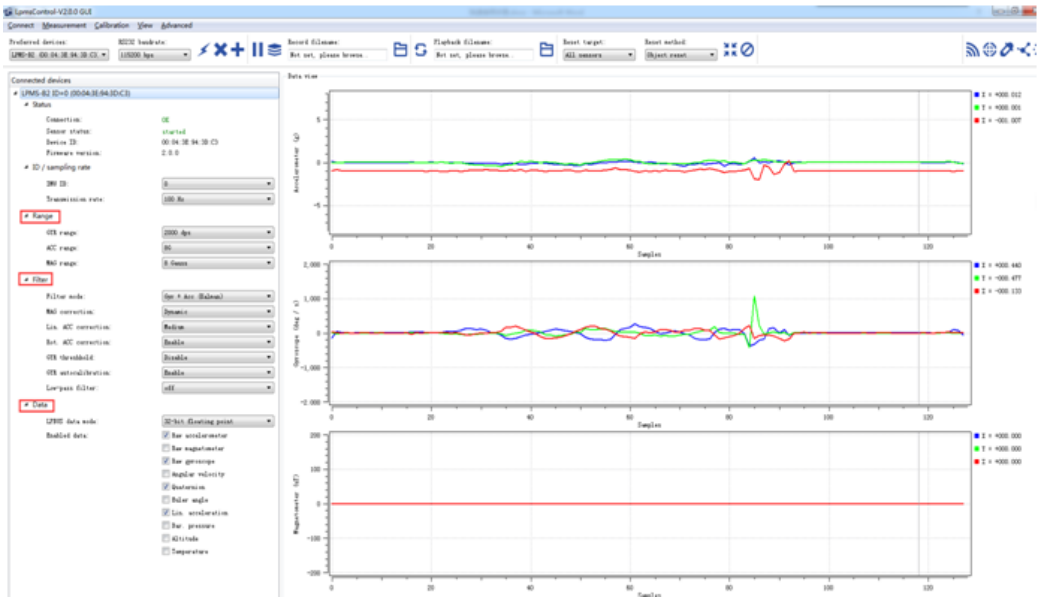
2) To check the option of "Scan system serial ports (only for LPMS-UART)" and click the "Scan devices" button to start the device discovery process. Please wait until the process is finished.
3) To select the target sensor ID from the "Discovered devices" list, for example, "LPMS-CUR(Port:COM9)" in the following image. This COM port should be same as the one of the conversion cable.
4) To add the selected sensor to "Preferred devices" list by clicking the "Add device" button.
5) To click the "Save devices" button to save the preferred devices list, and return to main interface of LpmsControl.



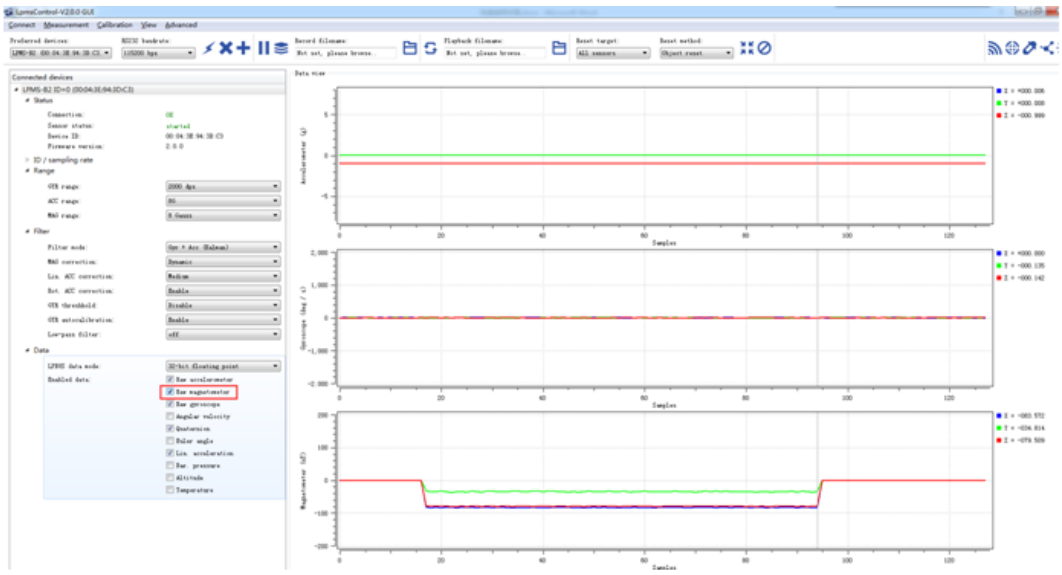
6) To select the target sensor ID from the Preferred devices list, and click Connect function under "Connect" menu or click the lightning button on toolbar to connect the sensor. Note: The default baudrate of UART communication is 115200bps.



After completing all the steps above, the LPMS-UTTL2 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.



2. Via USB interface

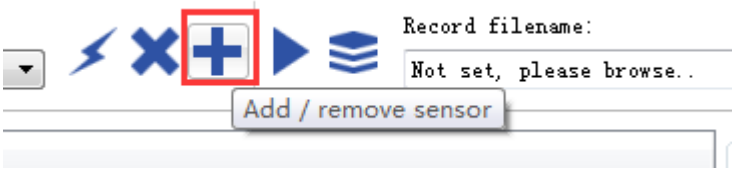
Users can connect LPMS-UTTL2 to a PC via USB port. After plugging in, windows operation system will activate the installation of USB drivers automatically. USBXpress device will be showed up in the device manager if the driver has been installed successfully,

seen as following.

After connecting the LPMS-UTTL2 to PC, the LED on the sensor should behave like a pulsating light at blue color, which indicates the sensor is functionally working.

Please follow the instructions below to complete the remaining steps.

1) To select the "Add/remove sensor" under "Connect" menu or click the "+" button on toolbar of LpmsControl.



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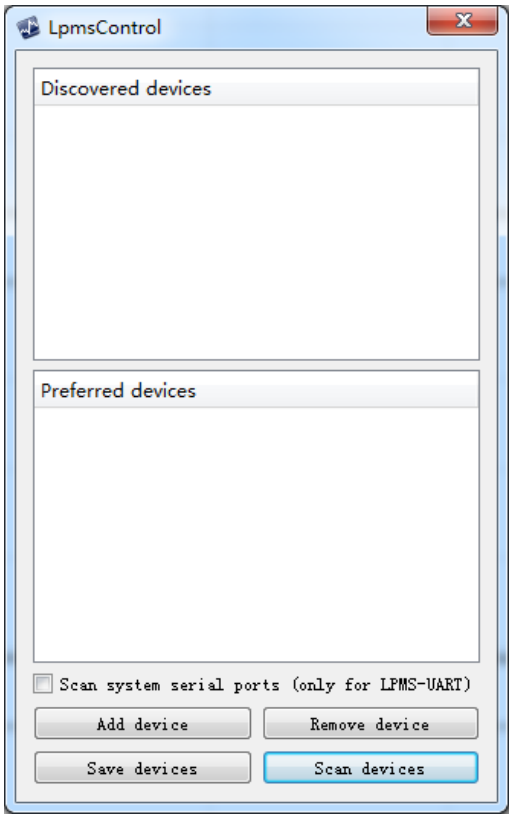
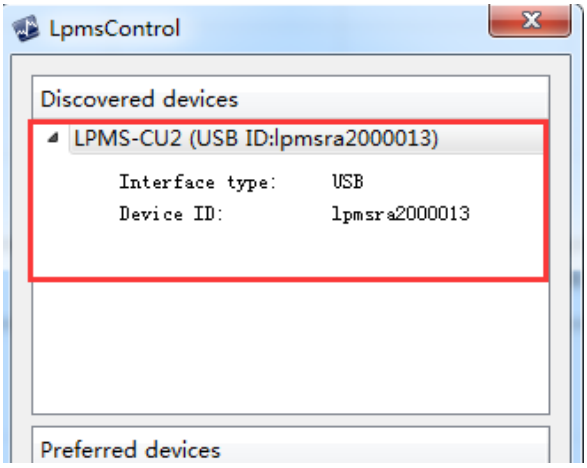


2) To click the "Scan devices" button and start the device discovery process. Please wait until the process is done.
3) To select the target sensor ID from the "Discovered devices" list, for example, "LPMS-CU2 (USB ID: lpmsra2000013)" in the following image.



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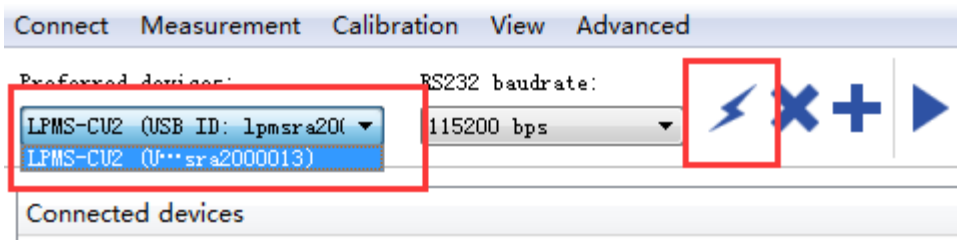

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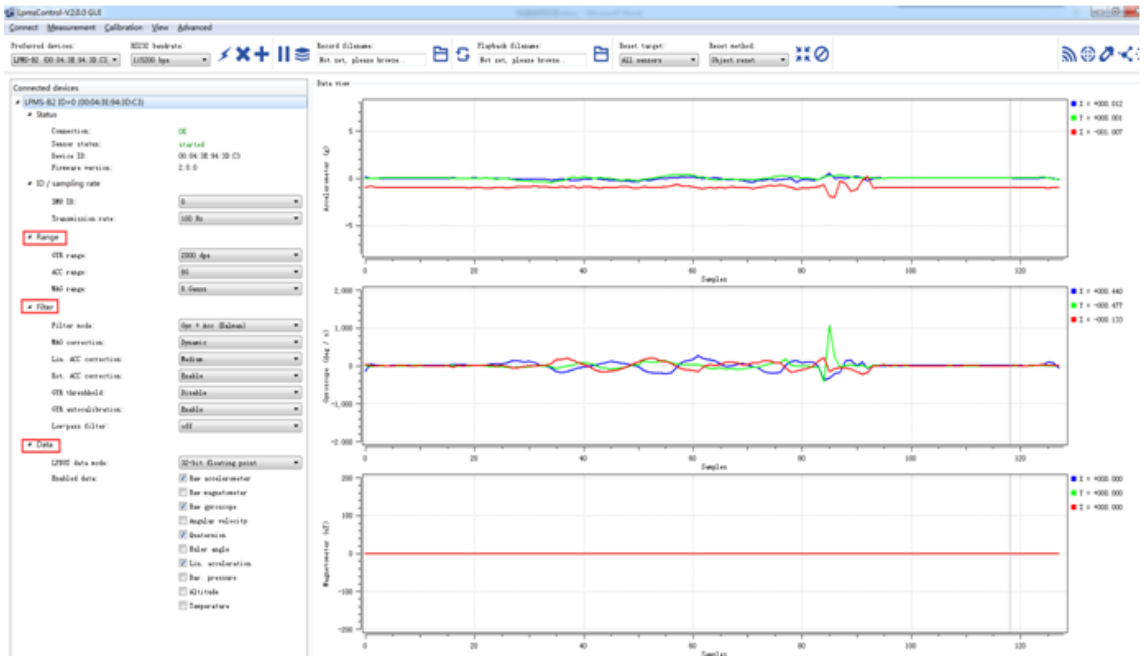

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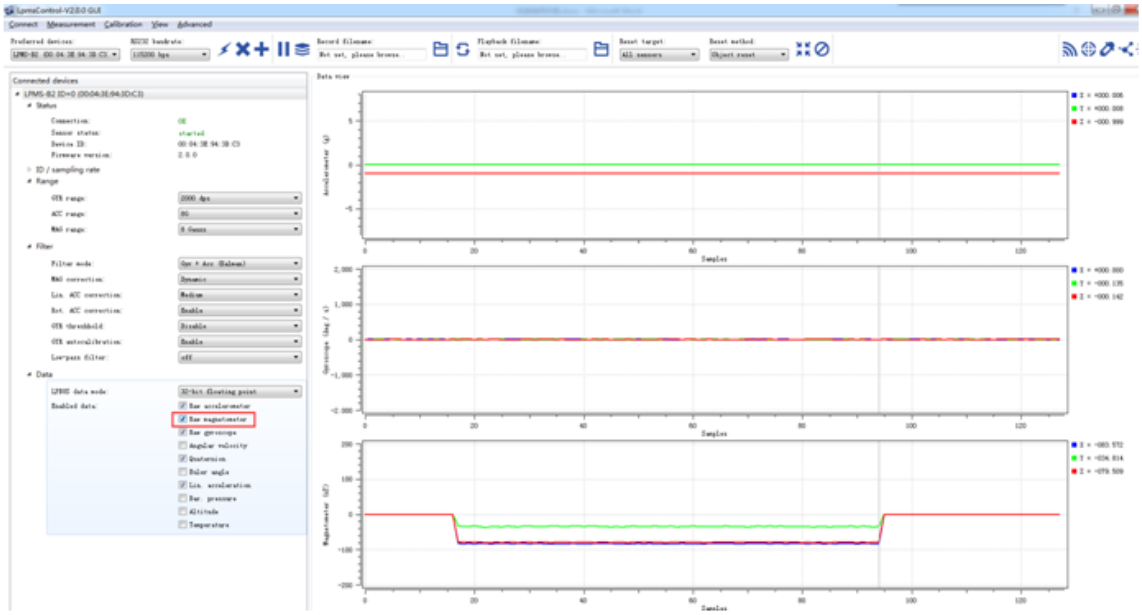

For more information, please refer to our product datasheets and product manuals.