

USER MANUAL

WT9011DCL-BT5.0

Bluetooth 5.0 Inclinometer Sensor



Tutorial Link

WT9011DCL BT5.0 | manual v23-0213 | www.wit-motion.com



[Google Drive](#)

Link to instructions DEMO:

[WITMOTION Youtube Channel](#)

[WT9011DCL-BT5.0 Playlist](#)

If you have technical problems or cannot find the information that you need in the provided documents, please contact our support team. Our engineering team is committed to providing the required support necessary to ensure that you are successful with the operation of our AHRS sensors.

Contact

[Technical Support Contact Info](#)

Application

- Unmanned/Assisted Driving
- Large-scale farming automated farming
- Safety monitoring for working at heights
- Unmanned aerial vehicle
- Industrial attitude monitoring
- Human motion tracking/capture
- Robot, Automated Guided Transporter
- Pedestrian Navigation
- Truck-mounted Satellite Antenna Equipment

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1 Introduction

The WT9011DCL-BLE5.0 is a multi-sensor device detecting acceleration, angular velocity, angle as well as magnetic field. The robust housing and the small outline makes it perfectly suitable for industrial retrofit applications such as condition monitoring and predictive maintenance. Configuring the device enables the customer to address a broad variety of use cases by interpreting the sensor data by smart algorithms.

WT9011DCL-BLE5.0's scientific name is AHRS IMU sensor. A sensor measures 3-axis angle, angular velocity, acceleration, magnetic field. Its strength lies in the algorithm which can calculate the three-axis angle accurately.

It is employed where the highest measurement accuracy is required. WT9011DCL-BT5.0 offers several advantages over competing sensor:

- Heated for best data availability: new WITMOTION patented zero-bias automatic detection calibration algorithm outperforms traditional accelerometer sensor
- High precision Roll Pitch Yaw (X Y Z axis) Acceleration + Angular Velocity + Angle + Magnetic Field output
- Low cost of ownership: remote diagnostics and lifetime technical support by WITMOTION service team
- Developed tutorial: providing manual, datasheet, demo video, free software for Windows computer, APP for Android smartphones
- WITMOTION sensors have been praised by thousands of engineers as a recommended attitude measurement solution

1.1 Warning Statement

- Putting more than 5 Volt across the sensor wiring of the main power supply can lead to permanent damage to the sensor.
- For proper instrument grounding: use WITMOTION with its original factory-made cable or accessories.
- Do not access the I2C interface.
- Do not change the baud rate because WitMotion Bluetooth sensor's baud rate is fixed.

1.2 LED Status

LED	Status	Remark
Red	Keeping on	Charging (powered by offered Type-C wire)
Green	Flashing once every one second	Standby
	Flashing once every two seconds	Pairing succeeds

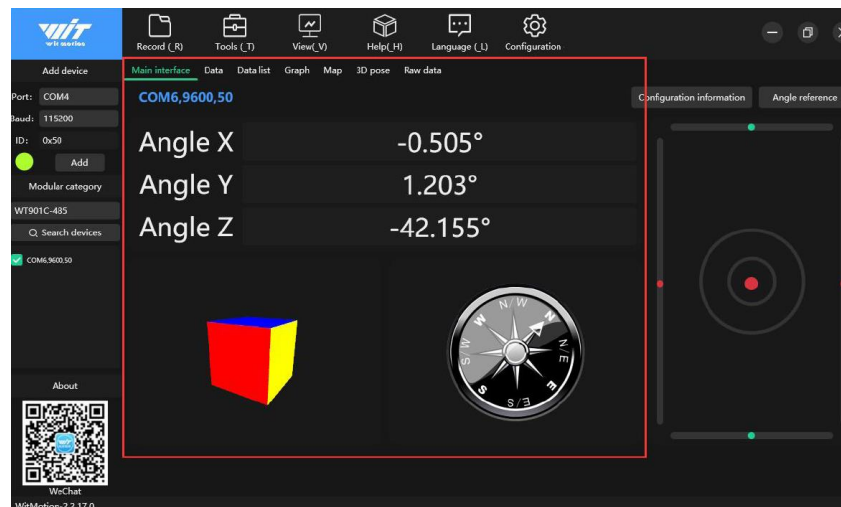
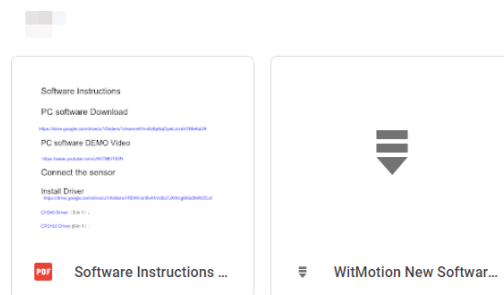
2 Instructions of 2023 New Software

In order to improve the user experience and our customer service, we develop a new version PC software.

Below is the new software and universal instruction download link.

https://drive.google.com/drive/folders/1dnwmnH7mi4zBpNqDywLzrzsV7BfeKaD9?usp=share_link

WITMOTION New Software(Universal)



3 Use Instructions with PC

Please install the complete tutorial including software, drivers, manual, etc.

[Link to download software](#)

3.1 PC Connection

PC software is only compatible with Windows system.

Link to install the files.

[Google Drive](#)

3.1.1 Serial Connection

Step 1. Connect the sensor with offered Type-C wire.

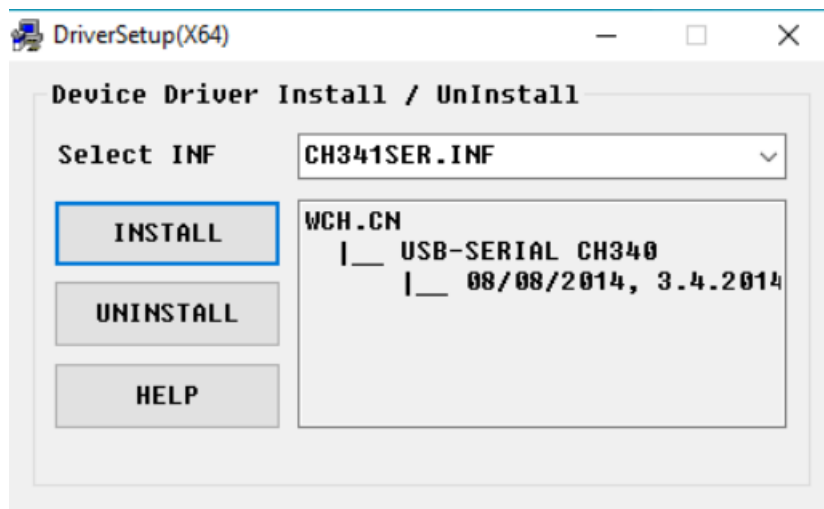
(Warm Reminder:If you wanna use a longer cable, it should be a standard Type-C data cable)

Step 2. Install the driver- CH340


[Download Link](#)

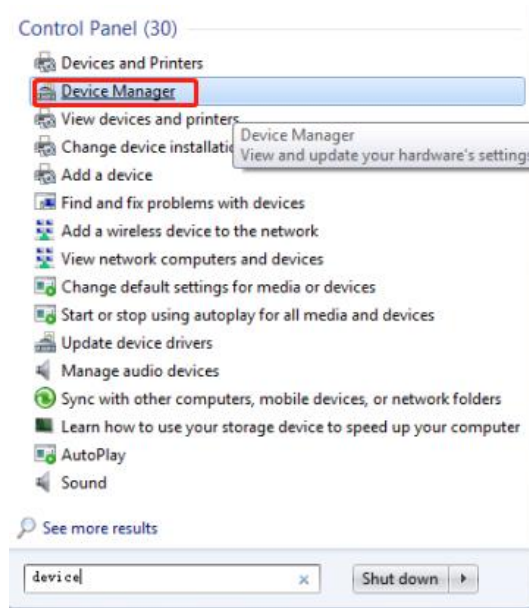
*How to Install and update the CH340 driver

Click the "Uninstall" button first. Then click on the "Install" button.



*How to verify your driver is working

1) To check that the CH340 enumerates to a COM port, you can open the device manager. You can click the **Start** or  (Windows) button and type "*device manager* to quickly search for the application.



2) After opening the device manager, you will need to open the **Ports (COM & LPT)** tree. The CH340 should show up as **USB-SERIAL CH340 (COM##)**. Depending on your computer, the COM port may show up as a different number.




Step 3. Open the software(Minimu.exe)

Name	Date modified	Type	Size
3D	11/4/2021 4:06 PM	File folder	
AD	11/4/2021 4:06 PM	File folder	
AD_EN	11/4/2021 4:06 PM	File folder	
data	11/4/2021 4:06 PM	File folder	
ini	11/4/2021 4:06 PM	File folder	
playPic	11/4/2021 4:06 PM	File folder	
playPic_EN	11/4/2021 4:06 PM	File folder	
recordFile	11/4/2021 4:06 PM	File folder	
temp	11/17/2021 9:03 AM	File folder	
zh	11/4/2021 4:06 PM	File folder	
zh-CN	11/4/2021 4:06 PM	File folder	
zh-Hans	11/4/2021 4:06 PM	File folder	
ConfigHelper.dll	5/27/2019 11:01 AM	Application extens...	8 KB
DataTypeEnum.dll	11/4/2021 3:16 PM	Application extens...	8 KB
DllJavaMethod.dll	11/4/2021 3:09 PM	Application extens...	7 KB
HardWareInfo.dll	11/4/2021 3:09 PM	Application extens...	8 KB
ISerialPort.dll	11/4/2021 3:16 PM	Application extens...	13 KB
metergroup.dll	6/1/2018 4:20 PM	Application extens...	15 KB
MiniIMU.exe	11/17/2021 9:03 AM	Application	2,094 KB

Name	Date modified	Type	Size
3D	11/4/2021 4:06 PM	File folder	
AD	11/4/2021 4:06 PM	File folder	
AD_EN	11/4/2021 4:06 PM	File folder	
data	11/4/2021 4:06 PM	File folder	
ini	11/4/2021 4:06 PM	File folder	
playPic	11/4/2021 4:06 PM	File folder	
playPic_EN	11/4/2021 4:06 PM	File folder	
recordFile	11/4/2021 4:06 PM	File folder	
temp			
zh			
zh-CN			
zh-Hans			
ConfigHelper.dll			
DataTypeEnum.dll			
DllJavaMethod.dll			
HardWareInfo.dll			
ISerialPort.dll			
metergroup.dll			
MiniIMU.exe			
MiniIMU.exe.config			
ReplaceFileGrogram.exe			
SensorAgreement.dll	11/4/2021 3:16 PM	Application extens...	15 KB
SerialPortProtocol.dll	11/4/2021 3:16 PM	Application extens...	24 KB
SmileWei.EmbeddedApp.dll	6/1/2018 4:20 PM	Application extens...	11 KB
tmpReplce.txt	11/17/2021 9:03 AM	Text Document	1 KB
UpdateLog.txt	4/14/2022 11:10 AM	Text Document	12 KB
UsbLibrary.dll	6/1/2018 4:20 PM	Application extens...	18 KB
Wit-Upgrade-Program.exe	4/24/2020 2:36 PM	Application	279 KB

close this until it upgraded successfully





Data will appear after auto-search finishes

Notice: If not successful, please operate manually
Choose the com port and baud rate 115200, data will be shown on the software.

3.1.2 BLE 5.0 Adapter Connection

The pairing process of connection may vary from the different operating systems.

*Windows 7 OS computer

Please check below link for detailed instructions.

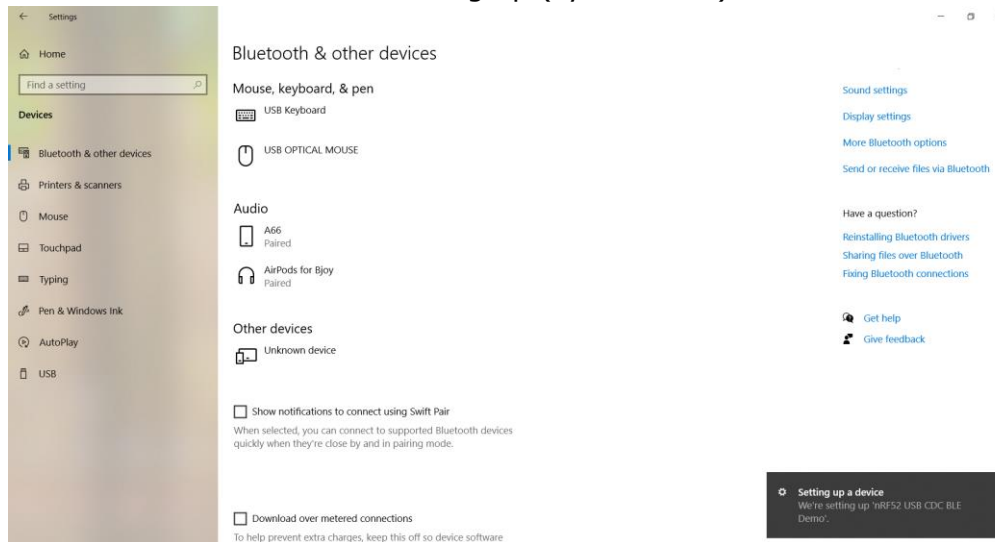
[BLE 5.0 Adapter working with Win 7 OS](#)

*Windows 10 OS computer

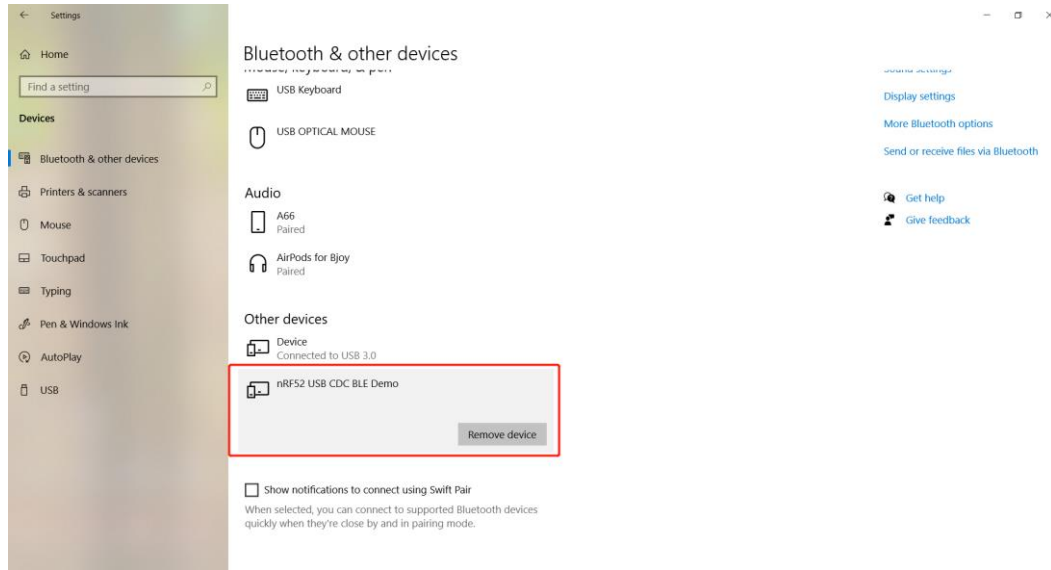
Complete Process:

Step 1. Insert adapter into the USB port in the beginning

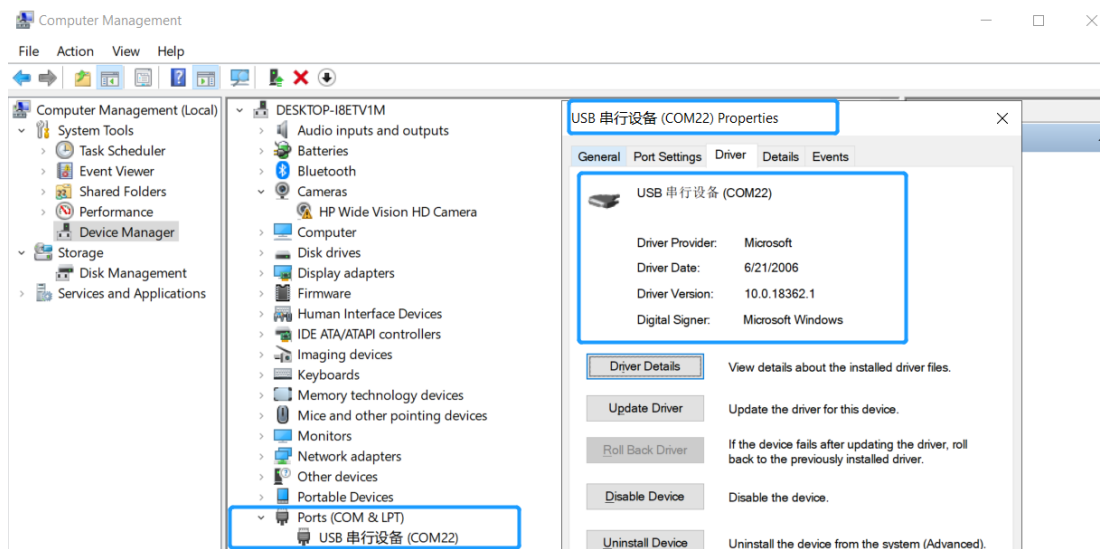
For the first time connection, normally speaking, there will be a pop-up window which indicates the device setting up.(system hint)



Once the system recognizes the device, you can find it on “Bluetooth & other devices” control page

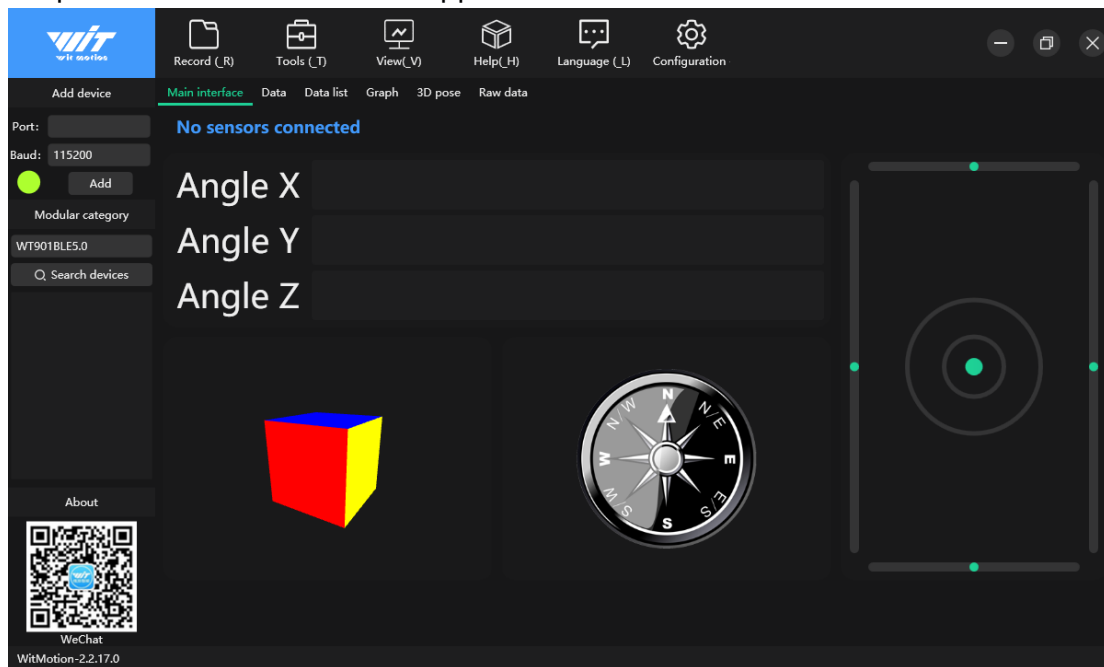


Or confirm if there is a port generated in the device manager.
(Bluetooth visual port.)

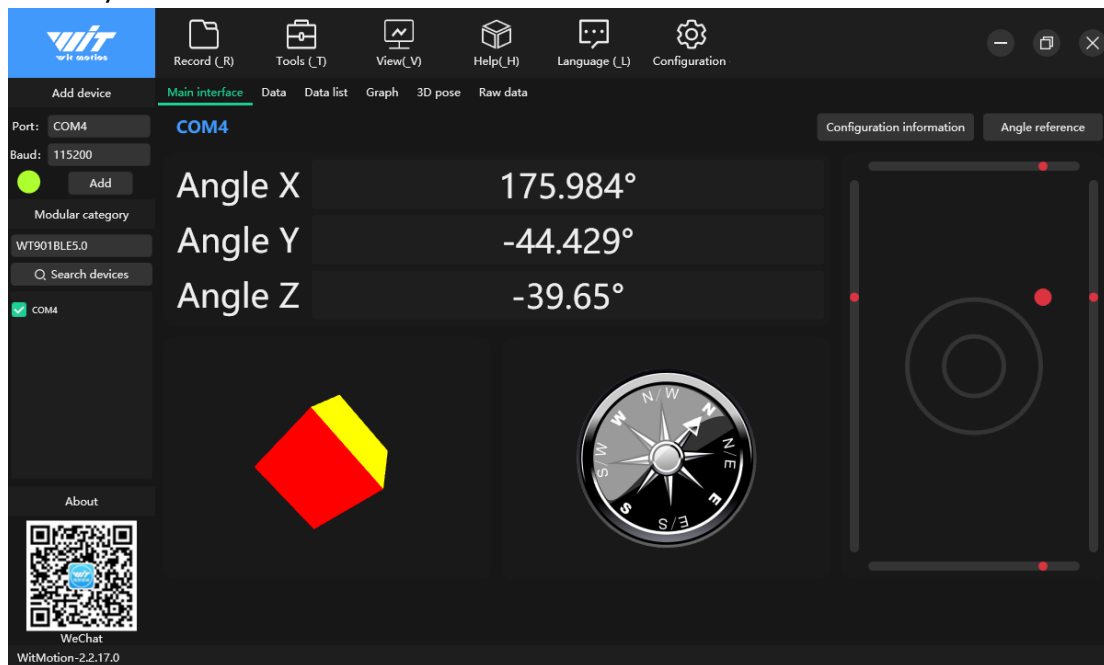


Step 2. Turn on the sensor after blue light of adapter flashes
P.S The sensor’s LED light will flash quickly. (once per second)

Step 3. Run the MiniIMU.exe application



Step 4. Long press the sensor button to start up, turn on the intelligent upper computer, select WT901BLE5.0 for module category, select serial port, the default baud rate is 115200, and then click Add. After the connection is successful, the upper computer can see the data sent back by the sensor.



Step 5. Data will appear once the auto-search finished
LED status: The LED light of sensor will flash slowly. (once every two seconds.)
The adapter's LED light will remain still.

3.2 Calibration

Preparation: Ensuring the sensor is "Online".

Calibration on PC software:

It is required to calibrate for the first time usage.

3.2.1 Accelerometer Calibration

Purpose:

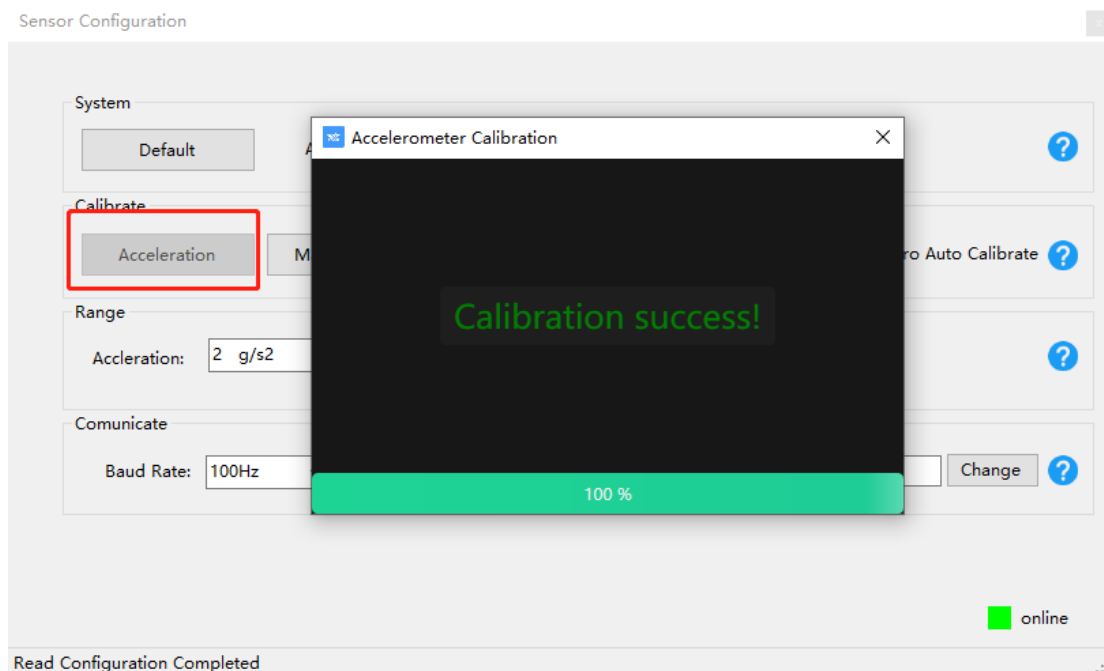
The accelerometer calibration is used to remove the zero bias of the accelerometer. Before calibration, there will be different degrees of bias error. After calibration, the measurement will be accurate.

Methods:

Step 1. Keep the module horizontally stationary

Step 2. Click the acceleration in the "Configuration" and wait for 5 seconds

Step 3. Calibration done if OK shows



Step 4. Check the result--confirm if there is 1g on Z-axis acceleration

The screenshot displays the WIT Motion software interface with the following data:

Time		Acceleration		Angular velocity		Angle	
System time:	13:54:50	X:	0 g	X:	0.183 °/s	X:	0.005 °
Chip date:	0-0-0	Y:	-0.001 g	Y:	0 °/s	Y:	0.033 °
Chip time:	0:0:0.0	Z:	1 g	Z:	-0.366 °/s	Z:	-89.72 °
Version:	10055.1.2	a :	1.000 g	w :	0.409 °/s		

Magnetic field		Pressure		Port		Quaternion	
X:	-87.442 uT	Temperature:	28.4 °C	D0:	0	q0:	0.7088
Y:	16.367 uT	Pressure:	0 Pa	D1:	0	q1:	0.00018
Z:	-79.025 uT	Height:	0.00 m	D2:	0	q2:	0.00021
h :	118.991 uT	Voltage:		D3:	0	q3:	-0.70532

Location		PDOP	
Longitude:	0°0.0000'	Number sate:	0
Latitude:	0°0.0000'	Location acc.:	0.00
GPS height:	0.0 m	Horizontal ac.:	0.00
GPS heading:	0.0 °	Vertical accur.:	0.00
GPS ground s.:	0.000 km		

Additional interface elements include: Port: COM4, Baud: 115200, Device ID: WT901BLE67(E8CBED5C8838), and version: WitMotion-2.2.17.0.

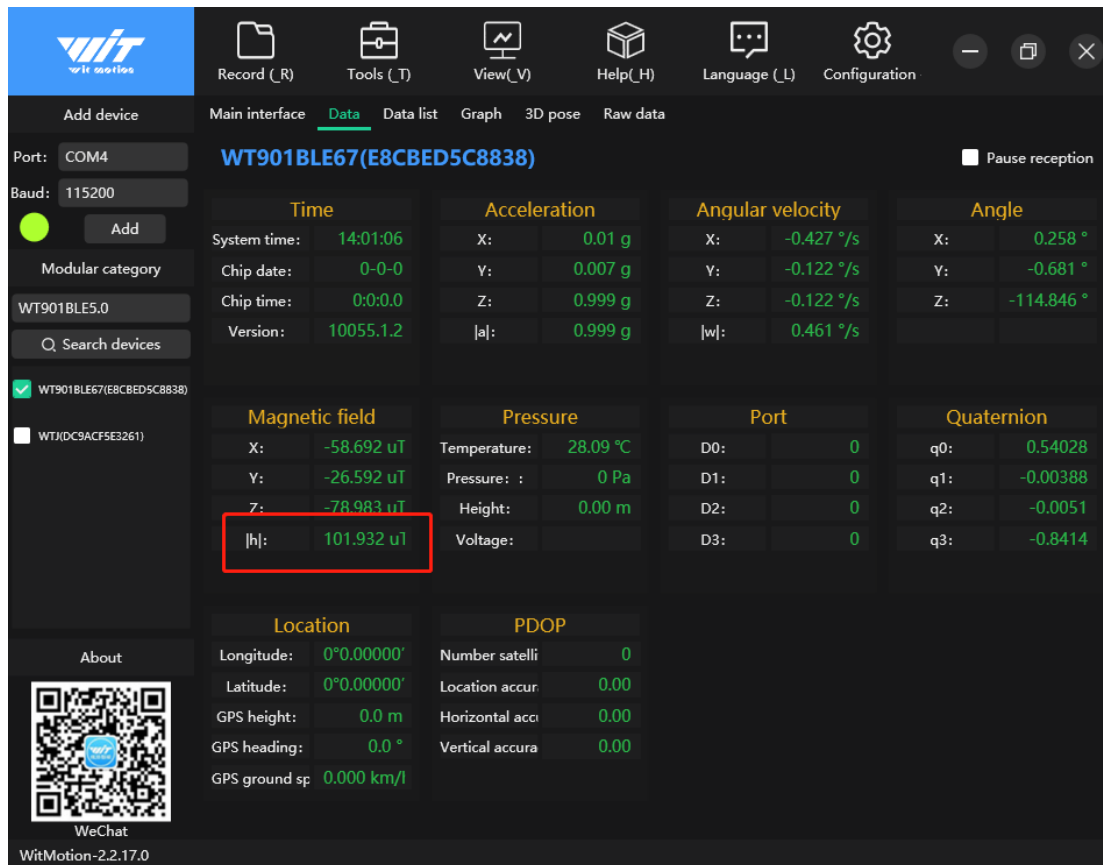
3.2.2 Magnetic Field Calibration

Purpose:

Magnetic calibration is used to remove the zero bias of the magnetic field sensor. Usually, the magnetic field sensor will have a large zero error when it is manufactured. If it is not calibrated, it will bring a large measurement error, which will affect the accuracy of the measurement of the z-axis angle of the heading angle.

Preparation:

1. Sensors should be 20cm away from magnetic and iron and other materials
2. The value of H in magnetic field must be lower than 350.



The screenshot shows the WitMotion software interface with the following data displayed:

Time	Acceleration	Angular velocity	Angle
System time: 14:01:06	X: 0.01 g	X: -0.427 °/s	X: 0.258 °
Chip date: 0-0-0	Y: 0.007 g	Y: -0.122 °/s	Y: -0.681 °
Chip time: 0:0:0.0	Z: 0.999 g	Z: -0.122 °/s	Z: -114.846 °
Version: 10055.1.2	a : 0.999 g	w : 0.461 °/s	

Magnetic field	Pressure	Port	Quaternion
X: -58.692 uT	Temperature: 28.09 °C	D0: 0	q0: 0.54028
Y: -26.592 uT	Pressure: 0 Pa	D1: 0	q1: -0.00388
Z: -78.983 uT	Height: 0.00 m	D2: 0	q2: -0.0051
h : 101.932 uT	Voltage:	D3: 0	q3: -0.8414

Location	PDOP
Longitude: 0°0.00000'	Number satelli: 0
Latitude: 0°0.00000'	Location accur: 0.00
GPS height: 0.0 m	Horizontal acc: 0.00
GPS heading: 0.0 °	Vertical accura: 0.00
GPS ground sp: 0.000 km/h	

Methods:

Step 1. Open the Configuration menu.

Step 2. Click the "magnetic field" and slowly rotate the sensor 360° around X, Y, Z, 3-axis accordingly.

Read Config Calibration Time

System

Reset Sleep Algorithm: 9-axis Install Direction: Horizontal Instruction Startup

Calibrate

Acceleration Magnetic Filed Gyro Auto Calibrate

Reset Height Reset Z-axis Angle

Range

Acceleration: 16 g Th: 20Hz

Communication

Output Rate: 10Hz

Online

Magnetic field calibration

Please rotate X, Y, and Z axis by 360 degrees for calibration, and then click OK after the operation is completed.

OK(O)

MagCal

chartXZ

chartYZ

chartXY

Calibrate Method: Ellipse fitting

Current Value	Offset	Range
X: -274	X: -174	X: 267
Y: 109	Y: -30	Y: 267
Z: 41	Z: -162	Z: 267
H : 298		

[View operating instructions](#)

End calibration Read Parameters Write Parameters

Please rotate 360 degrees around x, y and Z axis respectively



Step 3. Click OK once the calibration done.

Step 4. Place the sensor horizontally stationary and make the Y axis point to the north.

Step 5. Check the data of Z axis angle, it's ok if the value is about 0°.

3.2.3 Gyroscope Automatic Calibration

The gyroscope calibration is to calibrate the angular velocity, and the sensor will calibrate automatically.

It is recommended that the automatic calibration of gyroscopes can be inactivated only if the module rotates at a constant speed.

3.2.4 Reset Z-axis Angle

Note: If you want to avoid magnetic interference, you can change the algorithm to 6-axis, function of resetting Z-axis angle can be used.

The z-axis angle is an absolute angle, and it takes the northeast sky as the coordinate system can not be relative to 0 degree.

Z axis to 0 is to make the initial angle of the z axis angle is relative 0 degree. When the module is used before and z - axis drift is large, the z - axis can be calibrated. When the module is powered on, the Z axis will automatically return to 0.

Calibration methods as follow: firstly keep the module static, click the "Reset Z-axis Angle" in the "Configuration", you will see the angle of the Z axis backs to 0 degree in the "Data".

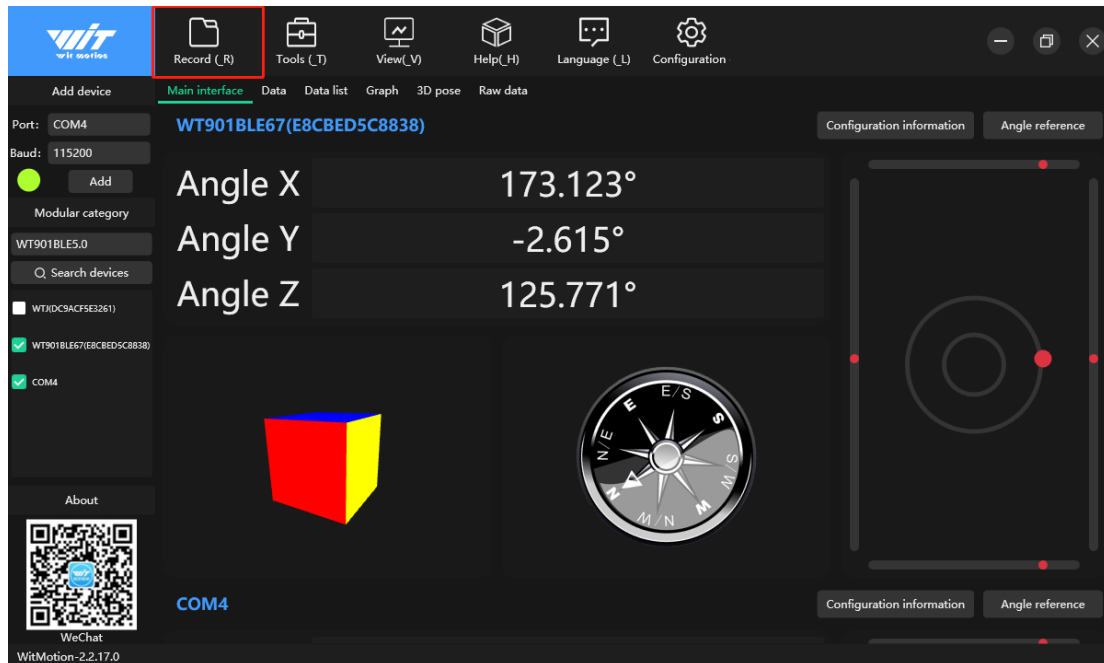
3.2.5 Reset Height to 0

Only available for the module built-in barometer like WT901B, HWT901B, WTGAHRS1, WTGAHRS2.

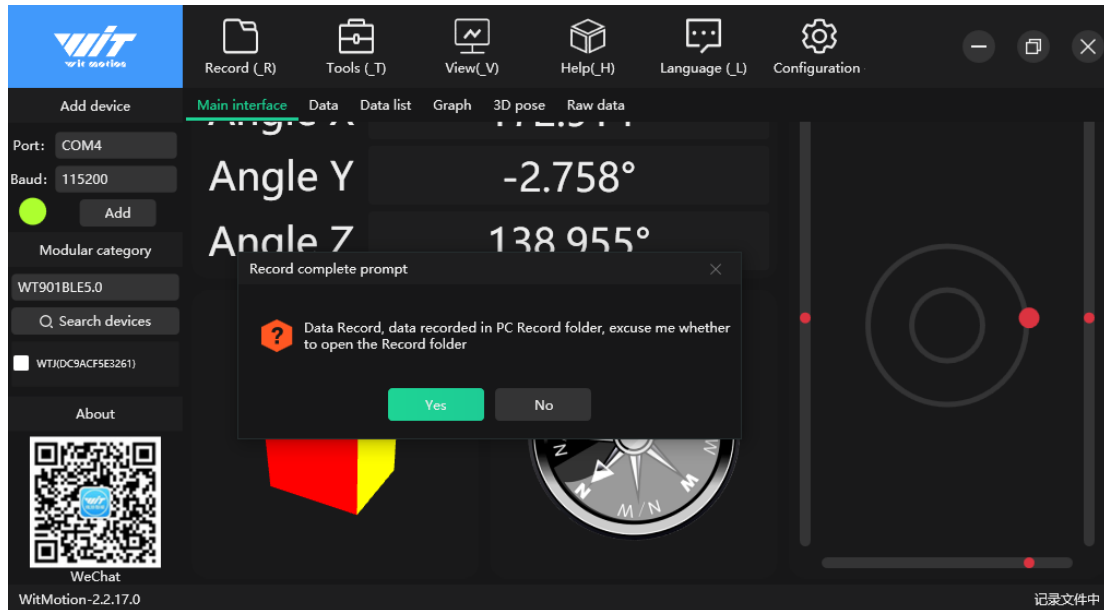
3.3 Configuration

3.3.1 Data Recording

There is no memory chip in the sensor module, and the data can be recorded and saved on the computer.



Method is as follows: Click “Record” and “Start Record” then “End Record” will save the data as a TXT file. The saved file is in the directory of the upper computer program Data.tsv: the beginning of the file has the value corresponding to the data.



名称	修改日期	类型	大小
WT901BLE5.0_1671118602648	2022/12/15 15:37	BIN 文件	84 KB
WT901BLE5.0_1671118602648.play	2022/12/15 15:37	PLAY 文件	2,817 KB
WT901BLE5.0_1671118602648_1	2022/12/15 15:37	XLS 工作表	615 KB
WT901BLE5.0_1671118602648_1	2022/12/15 15:37	文本文档	542 KB
WT901BLE5.0_1671118760725	2022/12/15 15:39	BIN 文件	18 KB
WT901BLE5.0_1671118760725.play	2022/12/15 15:39	PLAY 文件	599 KB
WT901BLE5.0_1671118760725_1	2022/12/15 15:39	XLS 工作表	134 KB
WT901BLE5.0_1671118760725_1	2022/12/15 15:39	文本文档	119 KB
WT901BLE5.0_1671118772882	2022/12/15 15:40	BIN 文件	119 KB
WT901BLE5.0_1671118772882	2022/12/15 15:40	PLAY 文件	3,987 KB
WT901BLE5.0_1671118772882	2022/12/15 15:40	XLS 工作表	873 KB
WT901BLE5.0_1671118772882	2022/12/15 15:40	文本文档	770 KB

It is highly recommended that data can be pasted to a Excel file. In this way, all data will be shown in order.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Time	Sensor	Accelerat	Accelerat	Accelerat	Angular	Angular	Angular	vAngle X	vAngle Y	vAngle Z	Magnetic	Magnetic	Magnetic	Temperat	Quaterni	Quaterni	Quaterni	Quaternions	30
2	15:30:42COM4	0.045	0.125	-1.019	0	0	0	173.123	-2.609	126.606	36.417	22.275	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
3	15:30:42WT901BLEF	0.046	0.121	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
4	15:30:42WT901BLEF	0.047	0.122	-1.023	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
5	15:30:42WT901BLEF	0.049	0.12	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
6	15:30:42WT901BLEF	0.044	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
7	15:30:42COM4	0.047	0.121	-1.012	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
8	15:30:42COM4	0.049	0.121	-1.025	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
9	15:30:42COM4	0.047	0.122	-1.011	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
10	15:30:42WT901BLEF	0.048	0.124	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
11	15:30:42WT901BLEF	0.042	0.122	-1.014	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
12	15:30:42WT901BLEF	0.049	0.123	-1.019	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
13	15:30:42WT901BLEF	0.046	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
14	15:30:42COM4	0.046	0.125	-1.018	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
15	15:30:42COM4	0.047	0.123	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
16	15:30:42COM4	0.045	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
17	15:30:42COM4	0.048	0.122	-1.021	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
18	15:30:42COM4	0.049	0.125	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
19	15:30:42COM4	0.051	0.121	-1.009	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
20	15:30:42WT901BLEF	0.045	0.121	-1.017	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
21	15:30:42WT901BLEF	0.047	0.121	-1.012	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
22	15:30:42WT901BLEF	0.049	0.121	-1.025	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
23	15:30:42WT901BLEF	0.047	0.122	-1.011	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
24	15:30:42COM4	0.049	0.124	-1.02	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
25	15:30:42COM4	0.044	0.125	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
26	15:30:42COM4	0.045	0.122	-1.023	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
27	15:30:42COM4	0.046	0.123	-1.017	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06378	
28	15:30:42COM4	0.046	0.123	-1.014	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
29	15:30:42WT901BLEF	0.046	0.125	-1.018	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
30	15:30:42WT901BLEF	0.047	0.123	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
31	15:30:42WT901BLEF	0.045	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
32	15:30:42WT901BLEF	0.048	0.122	-1.021	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
33	15:30:42COM4	0.042	0.121	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
34	15:30:42COM4	0.049	0.124	-1.016	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
35	15:30:42COM4	0.046	0.121	-1.019	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
36	15:30:42COM4	0.048	0.122	-1.019	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
37	15:30:42COM4	0.046	0.123	-1.012	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
38	15:30:42WT901BLEF	0.049	0.125	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
39	15:30:42WT901BLEF	0.051	0.121	-1.009	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
40	15:30:42WT901BLEF	0.049	0.124	-1.02	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
41	15:30:42WT901BLEF	0.044	0.125	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
42	15:30:42COM4	0.047	0.124	-1.022	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
43	15:30:42COM4	0.046	0.119	-1.014	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	
44	15:30:42COM4	0.048	0.126	-1.02	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06378	

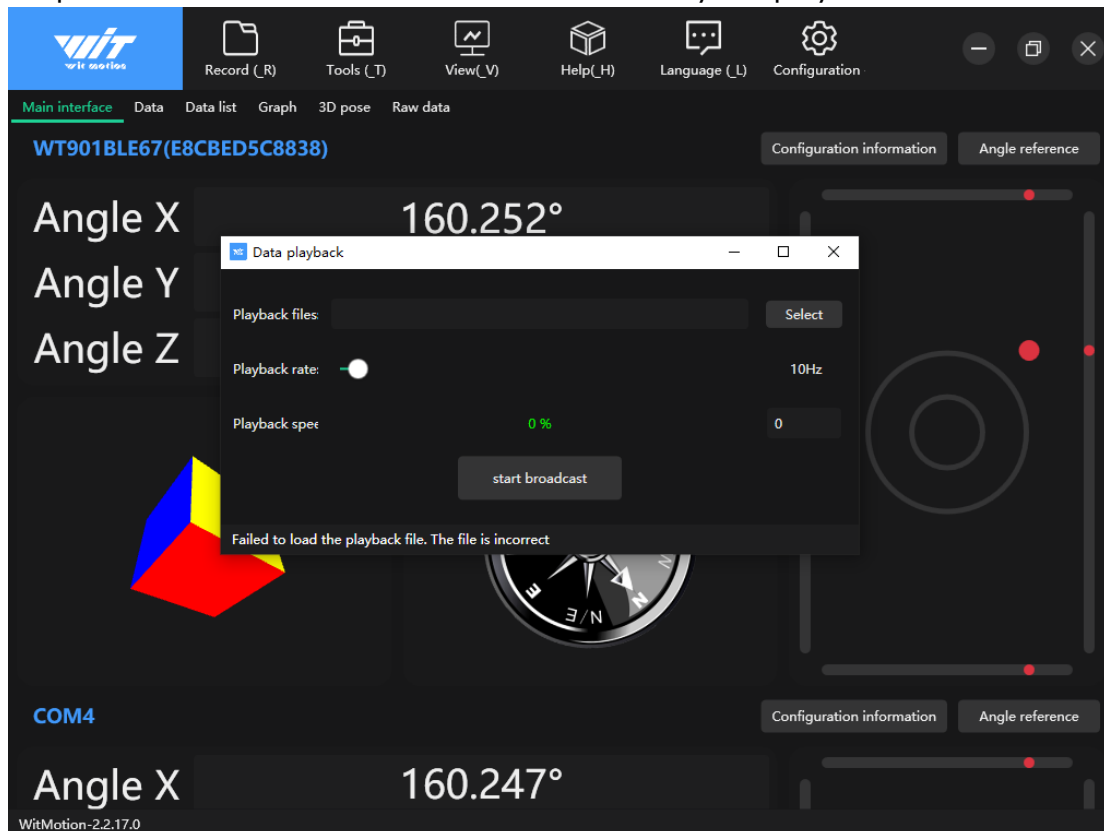
3.3.2 Data Playback

New function: When creating recorded file each time, there will a BIN file created in the folder of record file in path of installed software meanwhile.

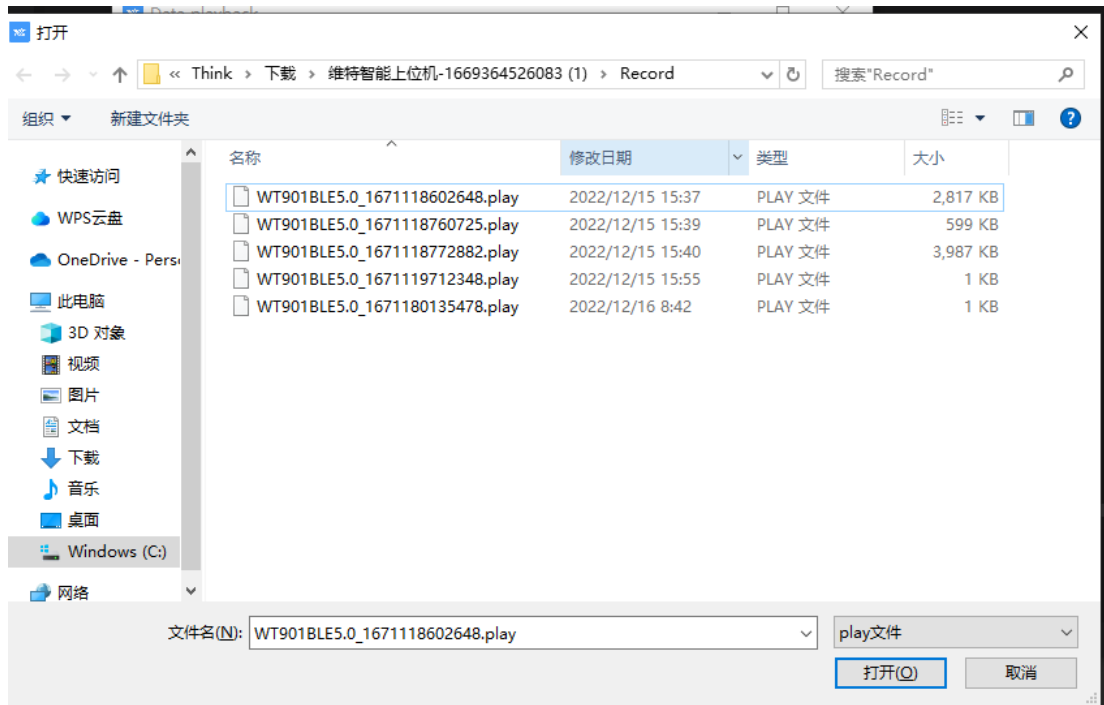
Recorded data playback method:

Step 1: Disconnect the sensor

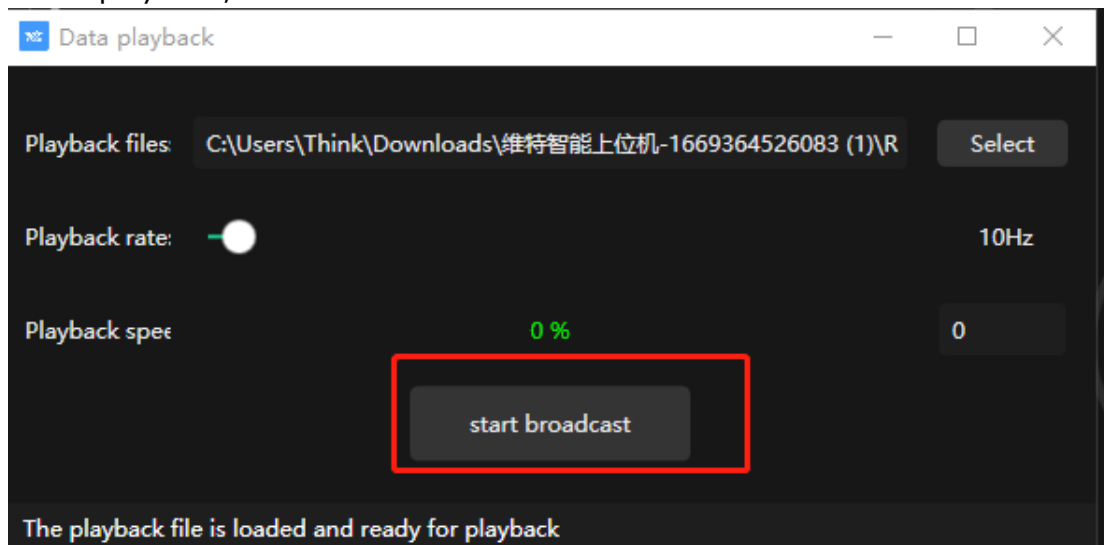
Step 2: Click "Record" Button and then click "Play file playback"



Step 3: Choose the original path of software installation and load the Bin file



Step 4: Click "Run" and the Binary file will be playback
When playback, the rate can be editable.



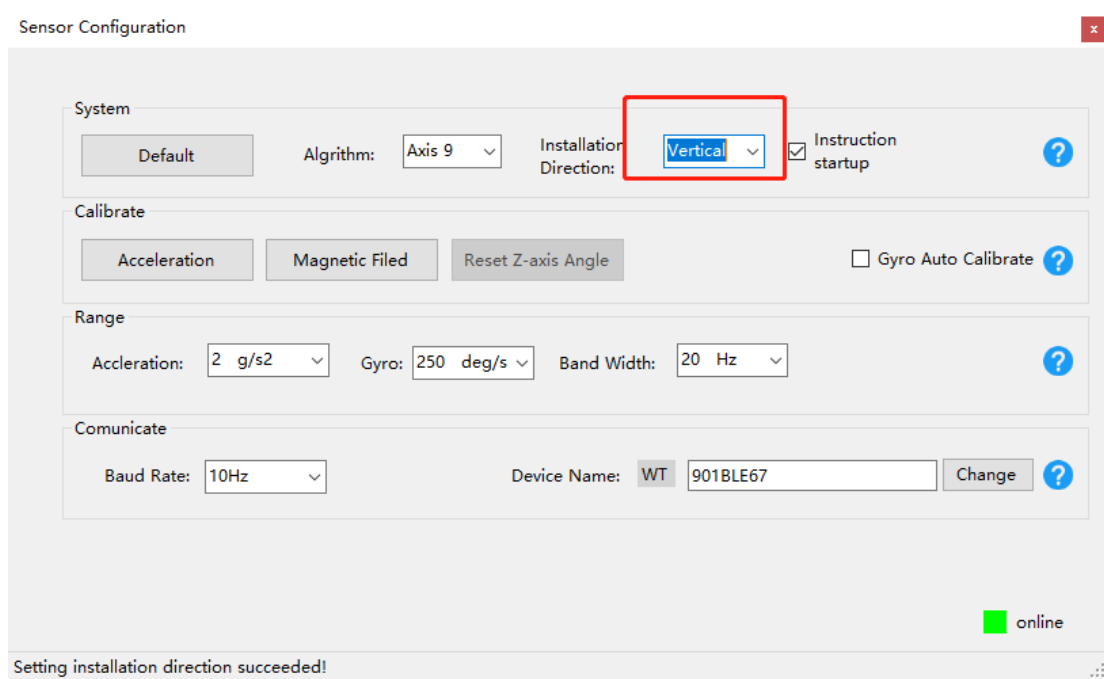
3.3.3 Placement Direction

The default installation direction of the module is horizontal. When the module needs to be installed vertically, the vertical installation can be set.

Step 1: Rotate the module 90 degrees around the X-axis

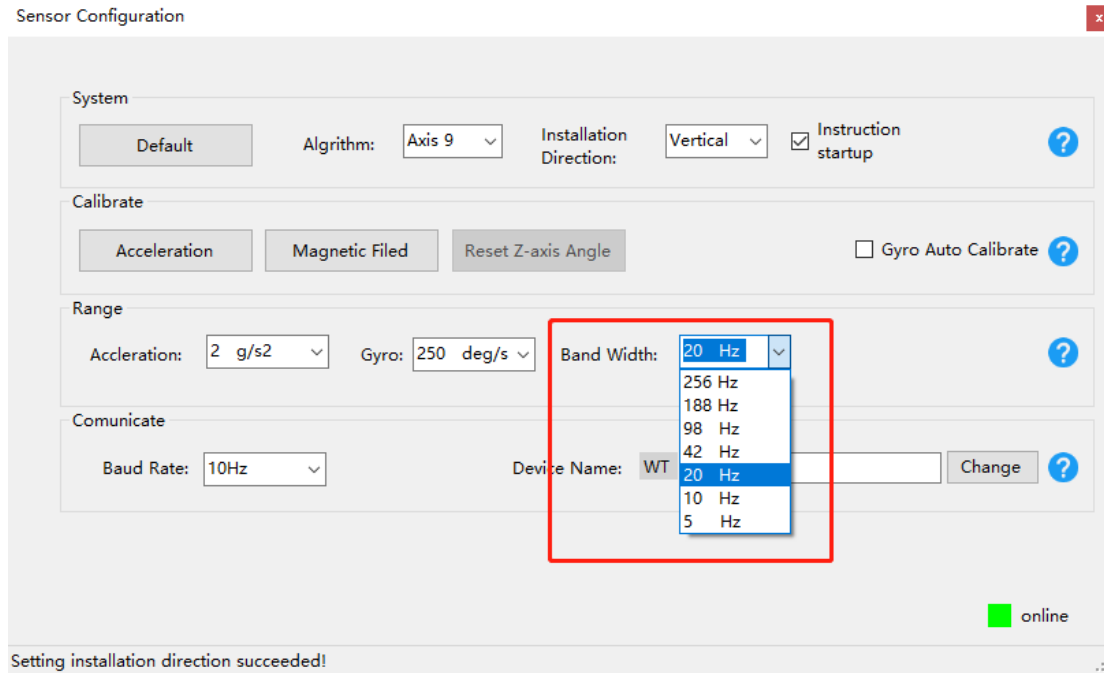
Step 2: Place the sensor 90 degrees vertically

Step 3: Click “Vertical” as install directions on the “Configuration” menu



3.3.4 Bandwidth

Default bandwidth is 20Hz.



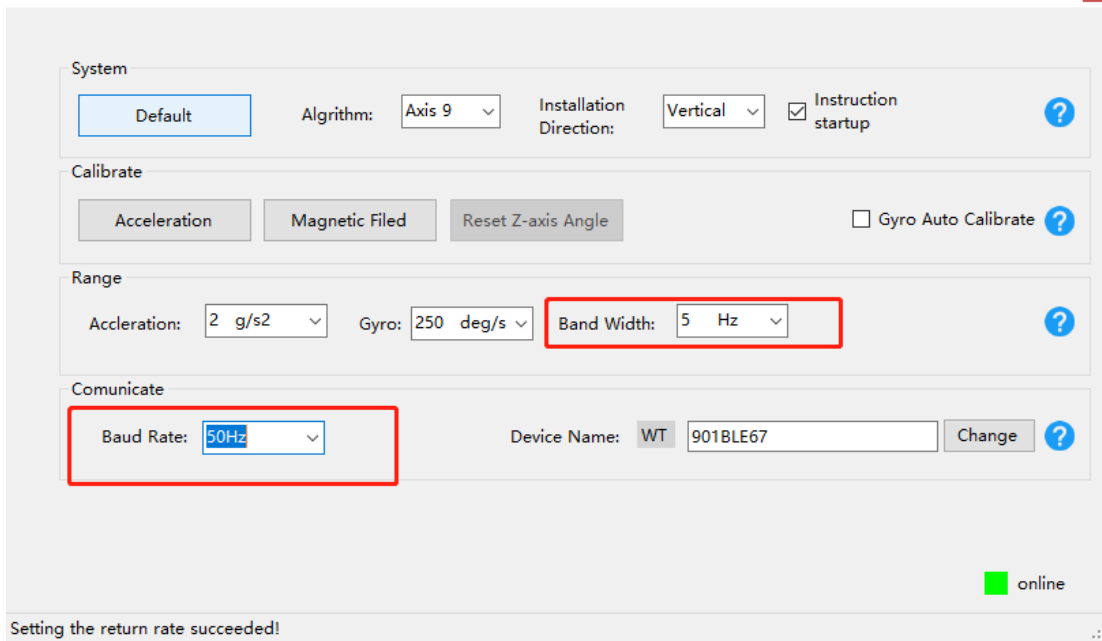
Explanation:

1. The higher rate of bandwidth setting will lead to higher fluctuation in data waveform. Conversely, the lower rate of bandwidth, data will become more fluent.

For example:

Band Width as 5Hz, Baud Rate as 5Hz. The waveform is very steady.

Sensor Configuration



The screenshot shows the 'Sensor Configuration' window with the following settings:

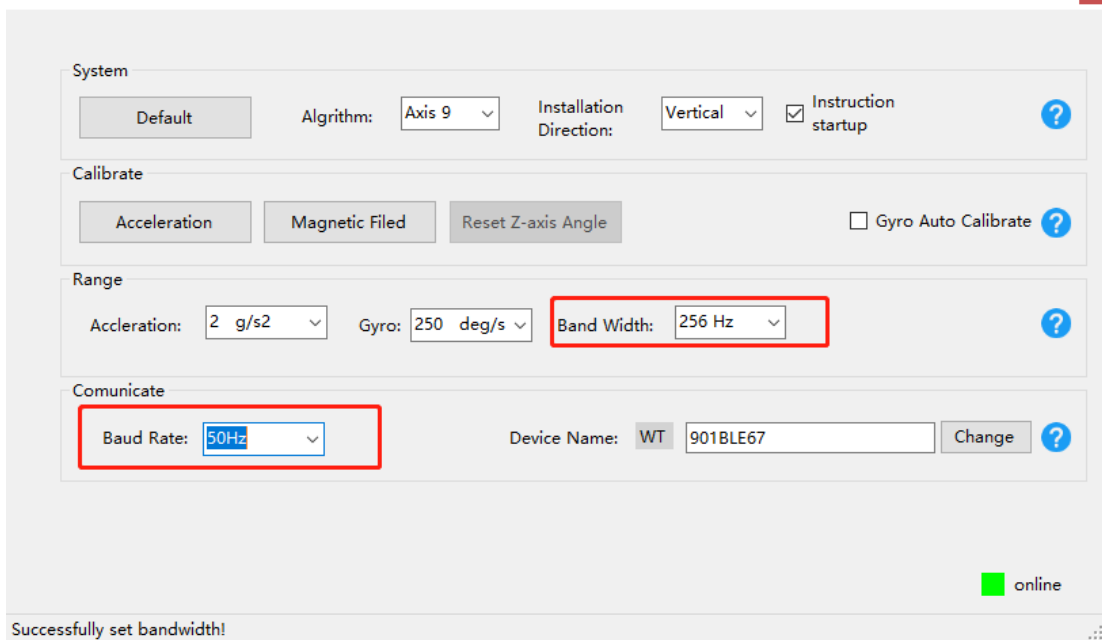
- System:** Default (selected), Algorithm: Axis 9, Installation Direction: Vertical, Instruction startup:
- Calibrate:** Acceleration, Magnetic Filed, Reset Z-axis Angle, Gyro Auto Calibrate:
- Range:** Acceleration: 2 g/s², Gyro: 250 deg/s, Band Width: 5 Hz (highlighted in red)
- Communicate:** Baud Rate: 50Hz (highlighted in red), Device Name: WT 901BLE67, Change

online

Setting the return rate succeeded!

Band Width as 256Hz, Baud Rate as 50Hz. The waveform will show more fluctuation.

Sensor Configuration



The screenshot shows the 'Sensor Configuration' window with the following settings:

- System:** Default (selected), Algorithm: Axis 9, Installation Direction: Vertical, Instruction startup:
- Calibrate:** Acceleration, Magnetic Filed, Reset Z-axis Angle, Gyro Auto Calibrate:
- Range:** Acceleration: 2 g/s², Gyro: 250 deg/s, Band Width: 256 Hz (highlighted in red)
- Communicate:** Baud Rate: 50Hz (highlighted in red), Device Name: WT 901BLE67, Change

online

Successfully set bandwidth!

2. The higher rate of bandwidth will solve the data-repeating problem. For example, if the bandwidth setting is 20Hz, retrieval rate as 50Hz, there will be 5 repeating data. If you prefer there is no repeating data, it is required to increase the bandwidth more than 50Hz.

3.3.5 6-axis/ 9-axis Algorithm

6-axis algorithm: Z-axis angle is mainly calculated based on angular velocity integral. There will be calculated error on Z-axis angle.

9-axis algorithm: Z-axis angle is mainly calculated and analyzed based on the magnetic field. Z-axis angle will have few drift.

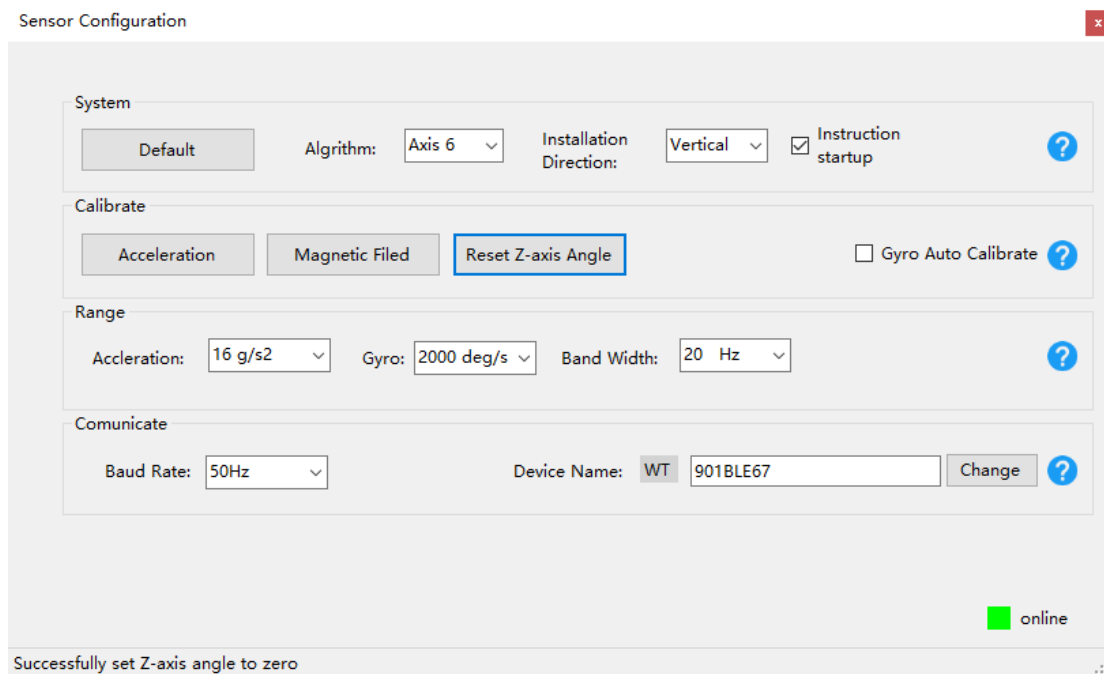
The default algorithm of WT9011DCL-BT5.0 is 9-axis. If there is magnetic field interference around installed environment, it is recommended to switch to 6-axis algorithm to detect the angle.

Method:

Step 1: Switch to the "Axis 6" algorithm on the "Configuration" menu.

Step 2: Proceed with the "Accelerometer calibration" and "Reset Z-axis angle" calibration.

After the calibration is completed, it can be used normally.

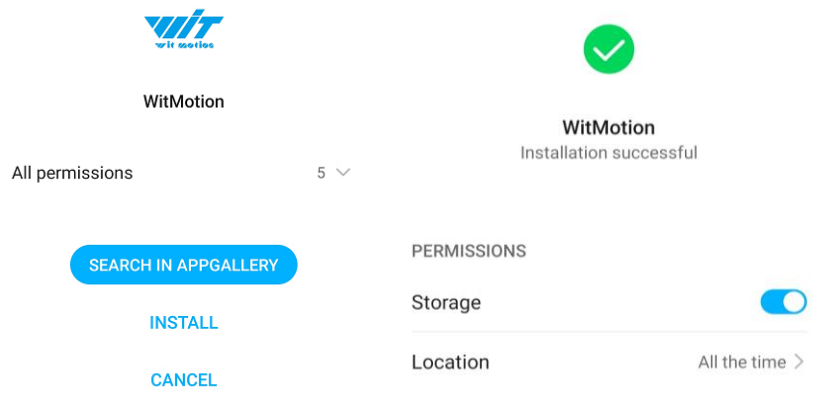


4 Use Instructions with Android Phone

For APP Configuration introduction, please referring to the Chapter 2.2

4.1 APP Installation

Install the APK file, give permission of Location and Storage



[2022v APP download link](#)

[WITMOTION 2023v New Android APP](#)

My Drive > WITMOTION Document Center > WT901BLECL

Name ↓	Owner	Last modified	File size
Videos (demo)	me	Dec 17, 2021 me	–
Matlab Sample Code	me	Nov 6, 2021 me	–
Manual & Datasheet (Document)	me	Aug 12, 2021 me	–
Apps	me	Dec 17, 2021 me	–

About Android APP:

1. It is required to allow for application positioning (Always allowed), and turn on the positioning function and Bluetooth

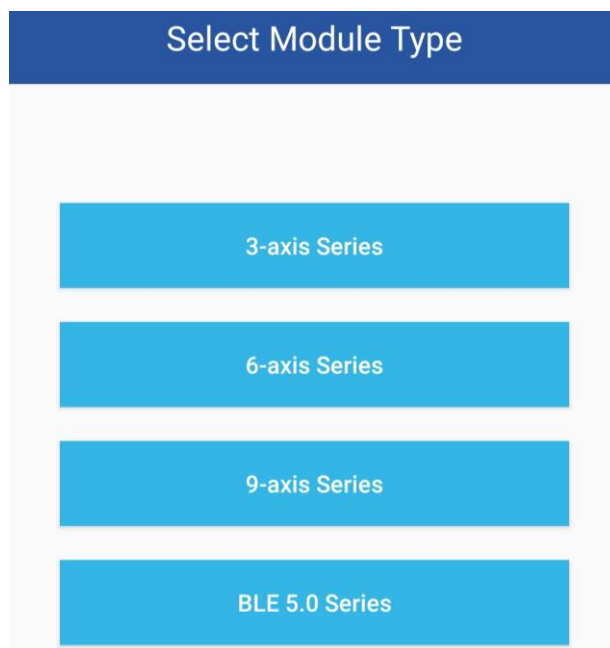
Note: Paired devices can be searched without turning on positioning, but according to Google's requirements, if APP installed on a higher version of Android (6.0) mobile phone is paired with a Bluetooth device, positioning must be allowed when using Bluetooth at the same time.

2. After turning on Bluetooth, it takes about one minute to search for authorization to find Bluetooth.

4.2 Connection

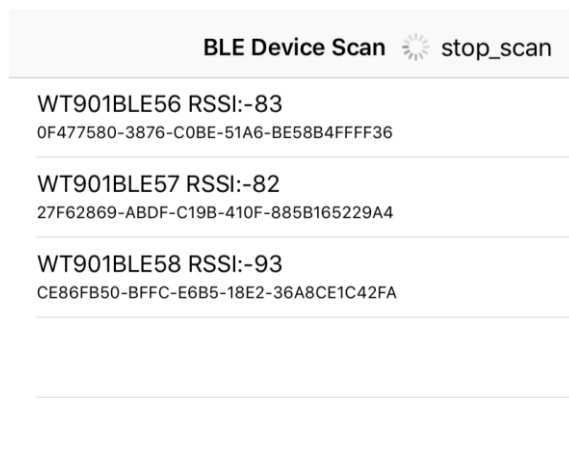
Step 1. Install the APK file, give permission of Location and Storage

Step 2. Open APP and choose "BLE 5.0 Series"



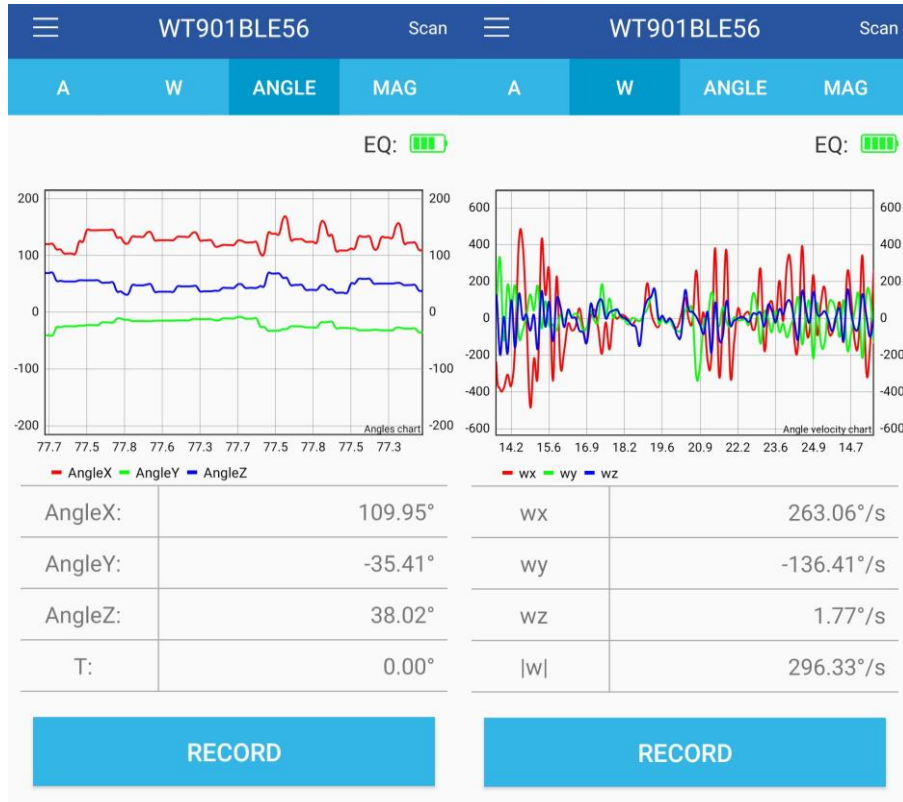
Step 3: Turn on the sensor and scan the device

Note: The device will show as "WT901BLE"+"MAC address"



Step 4. When pairing is done, the blue LED light of the sensor will flash and keep about one second

After a few seconds, the data will show automatically



4.3 Calibration

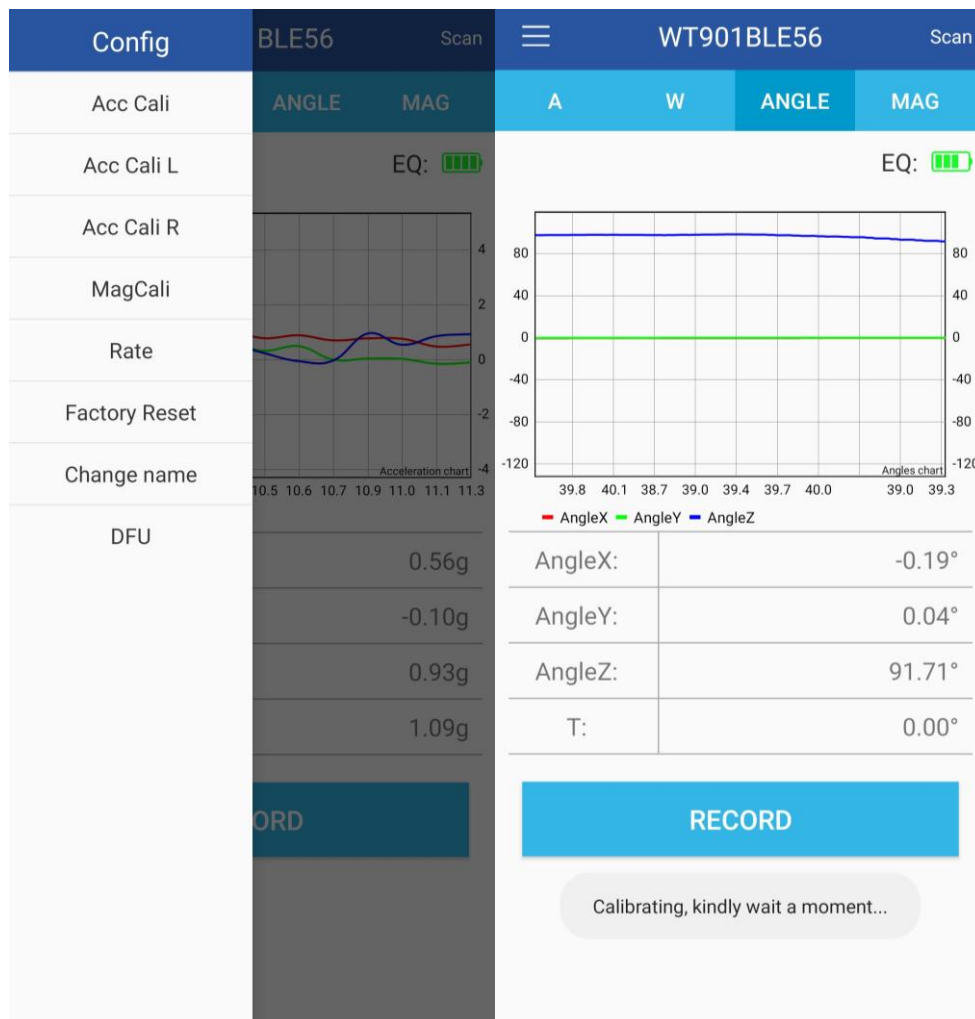
4.3.1 Acceleration Calibration

Step 1. Keep the module horizontally stationary

Step 2. Click the "Calibration" menu

Step 3. Click the "Acceleration Calibration" and wait for 3 seconds

Step 5. Check the result--confirm if there is 1g on Z-axis acceleration



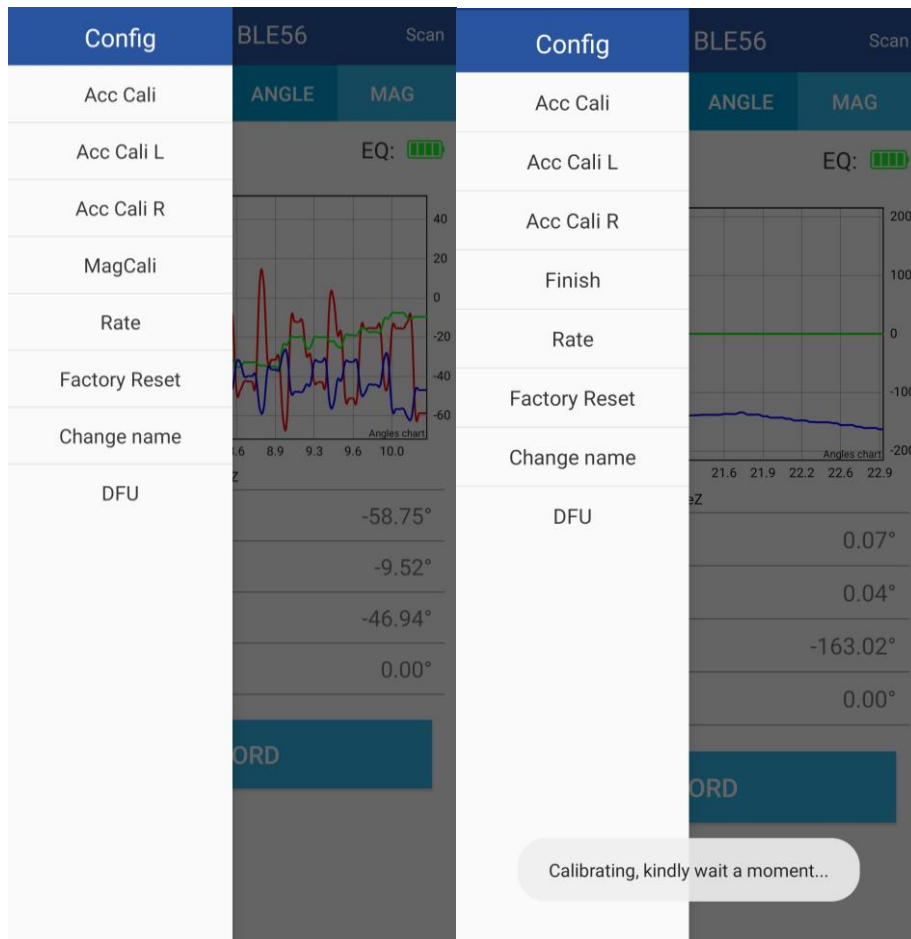
4.3.2 Magnetic Field Calibration

Step 1. Click the "Calibration" menu

Step 2. Click the "Magnetic calibration" button

Step 3. Slowly rotate the module 360° around X, Y, Z, 3-axis accordingly

Step 4. After rotation, click "Finish"



Check the result: The Z-axis angle will have less drift than before.

Notice: If there is drift of Z-axis, please stay away from the objective that can create magnetic field interference.

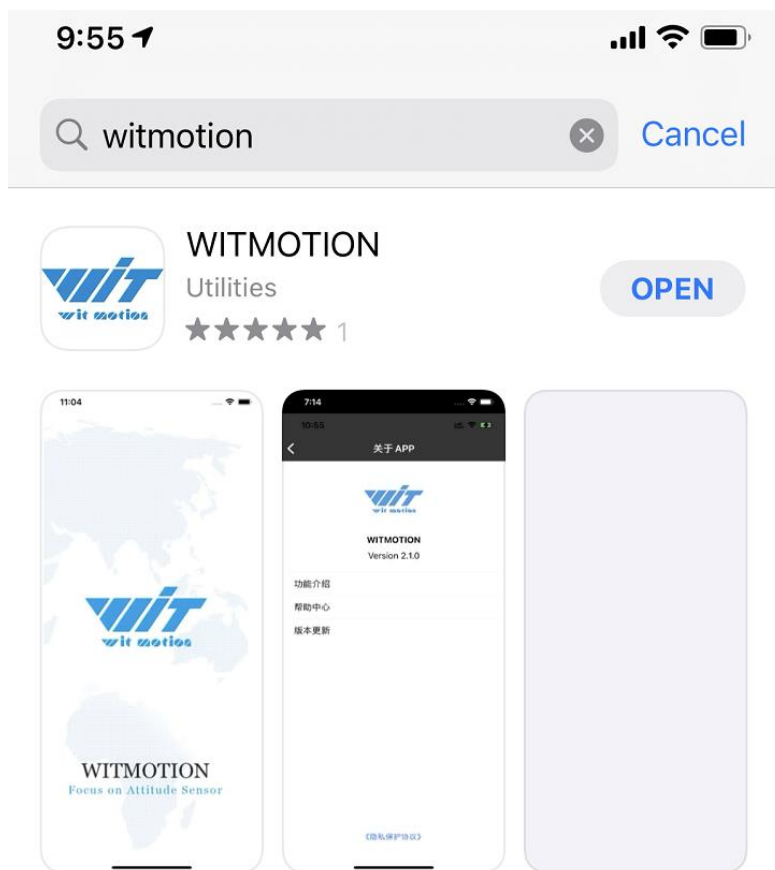
5 Use Instructions with iPhone

The new version of iOS APP has been launched. There will be many function coming out soon in future. The existing function of history recording is in instructions at present.

Your understanding would be highly appreciated.

5.1 How to Install

Step 1. Search "WITMOTION" on iOS App Store
Install the APP

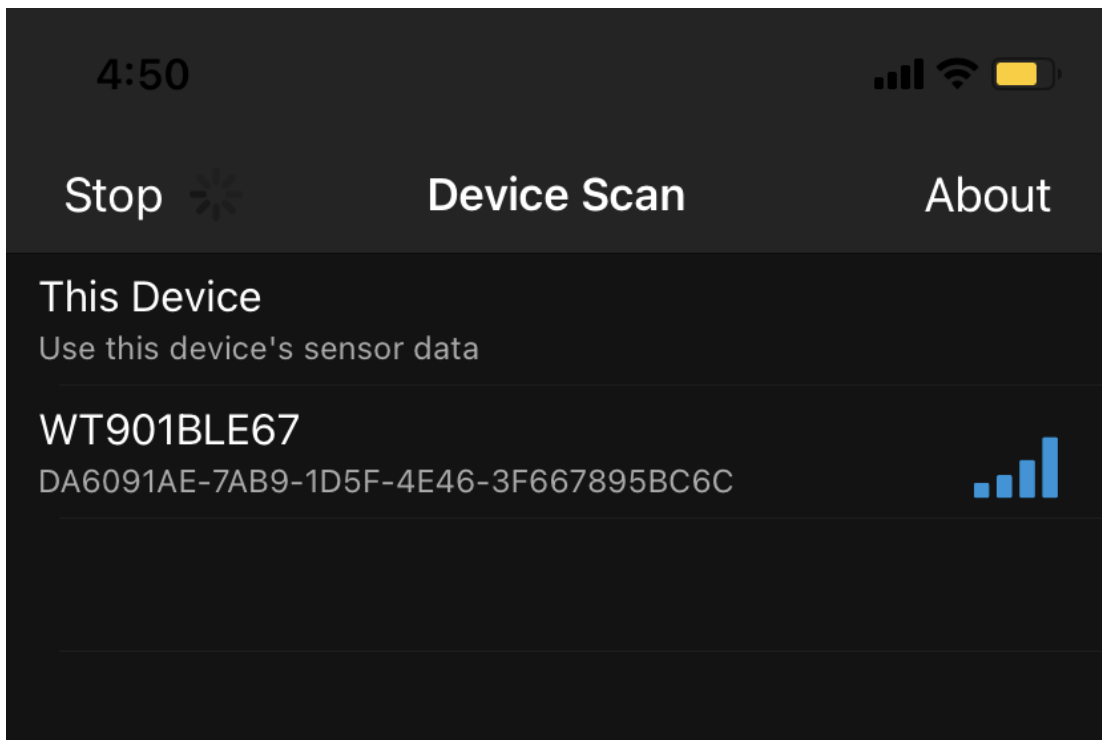
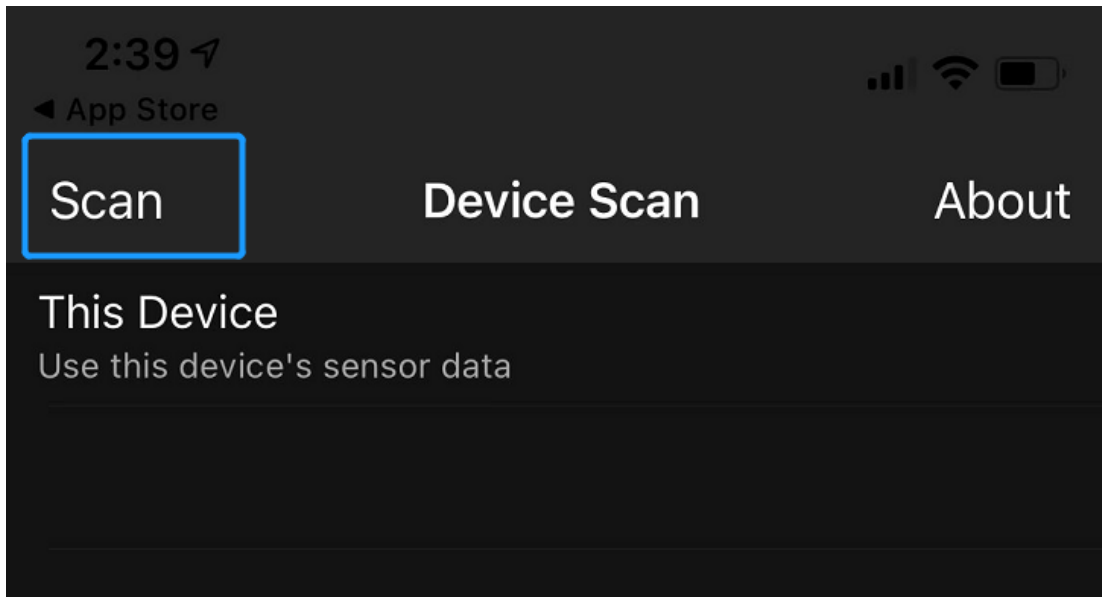


5.2 How to setup

Step 1. Turn on the sensor and then click "Scan"

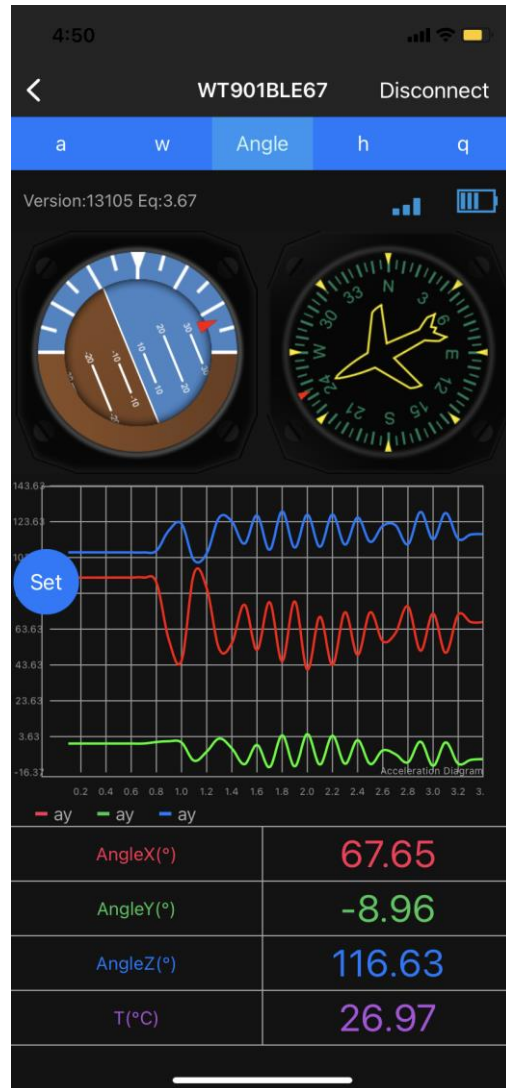
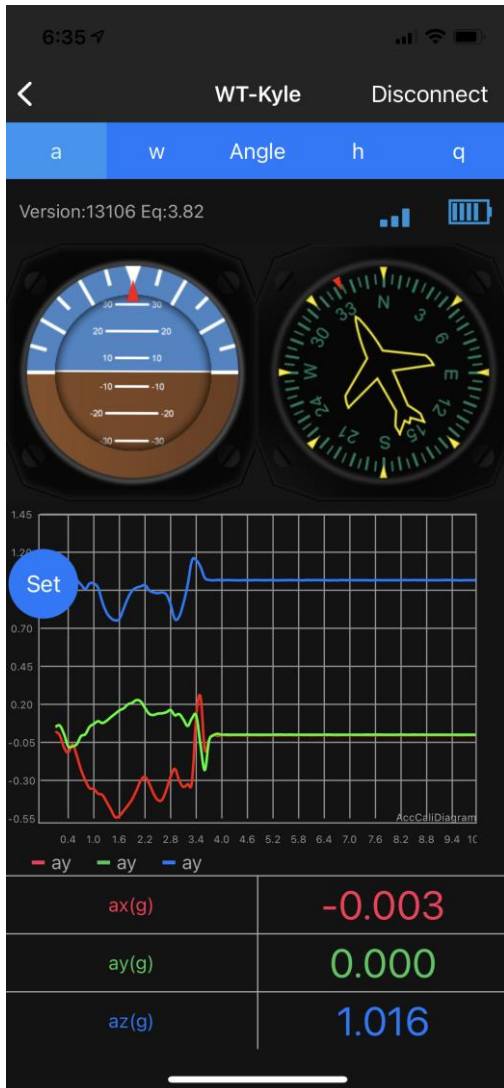


Sensor device ID will be recognized as WT901BLE+number
The second column is its SSID number.



Step 2. Select the device and the data will be online

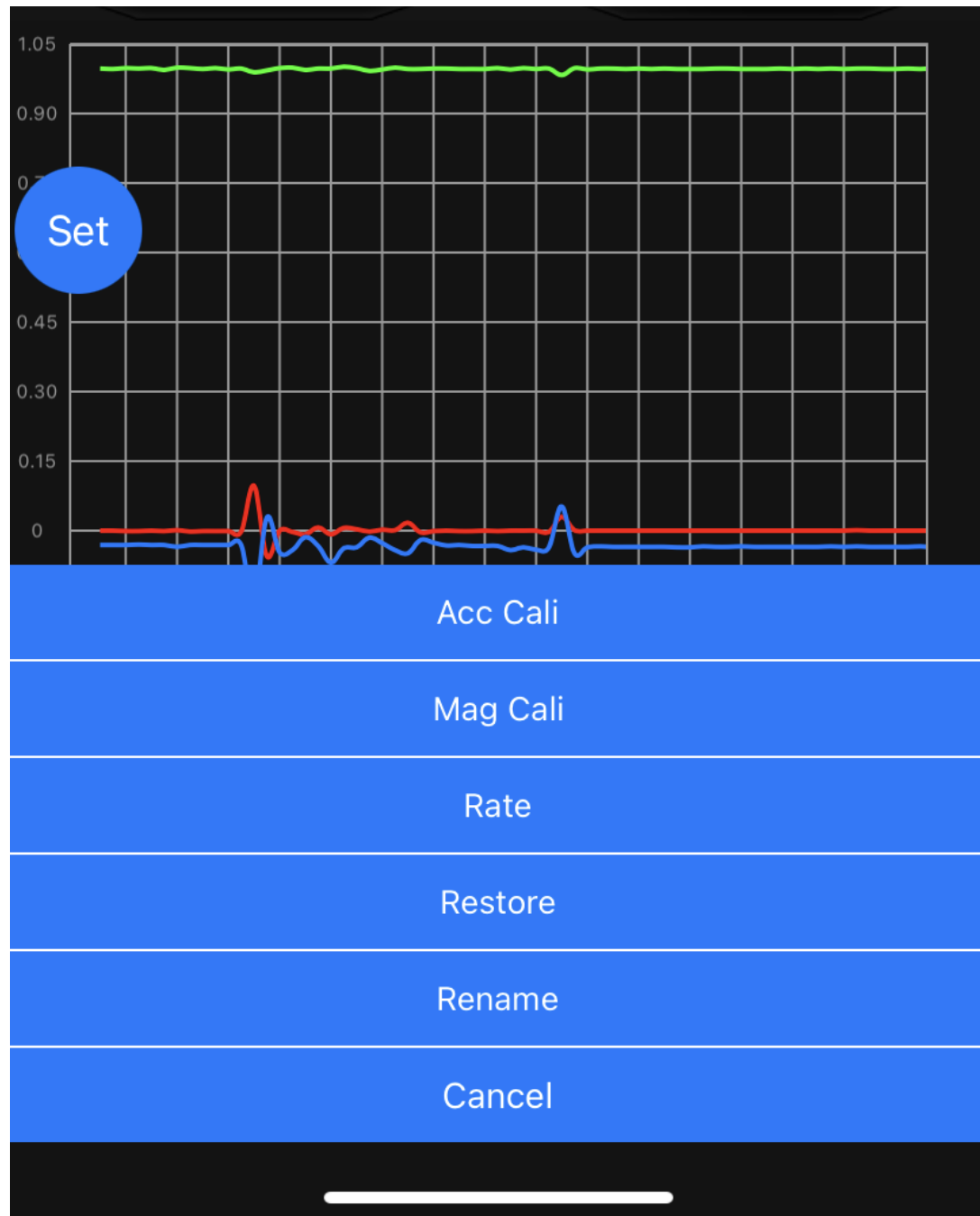
Demo: angle data curve



5.3 How to Configuration

For menu setting and its introduction including button and functions setting, please referring to the Chapter 2.2.

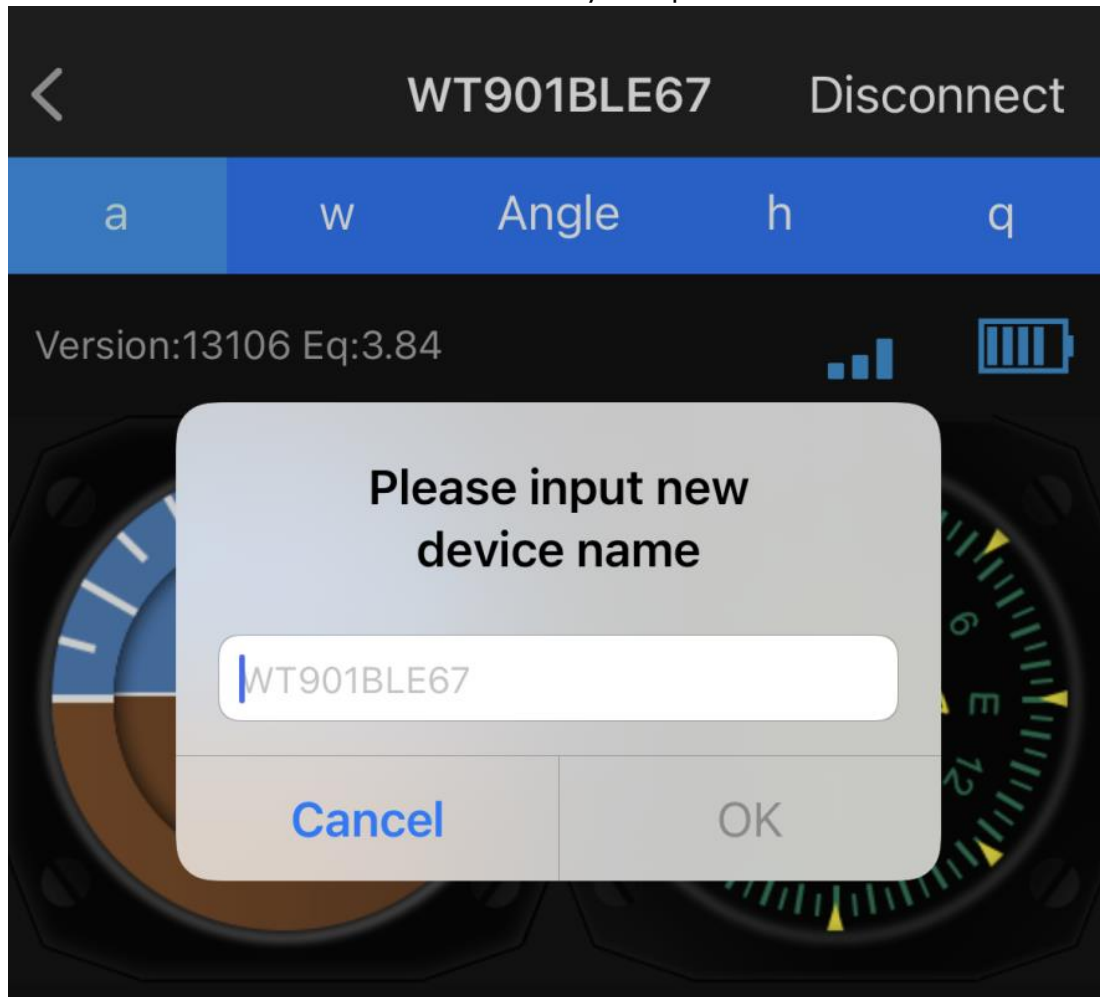
Click the button of "SET" the menu will jump out automatically.



5.3.1 Rename

Click rename and you can edit its name.

The name will be fixed with WT + Name you input.



5.4 Data Recording

The data can be easily recorded by simply press the button of record. The recorded file can be txt format at present. You can send the record file to the computer and then paste the data to an excel file for intuitive reviewing. P.S If you meet any problem, please reach our team at support@wit-motion.com



If you phone comes with txt reader, the recorded file can be easily opened. A txt recorder like Micro Software.
<https://drive.google.com/file/d/1p60oc0WuK4ENURePBLdHU6D9CQ1LoLKD/view?usp=sharing>