HWT905 Attitude Angle Sensor
SPECIFICATION

Model ：HWT905

Description: High precision 10-axis attitude angle sensor with temperature compensation

Production Standard

Enterprise quality system standard: ISO9001:2016

Tilt switch production standard：GB/T191SJ 20873-2016

Criterion of detection：GB/T191SJ 20873-2016

Revision date：2018.06.28

Version	Update content	Author	Date
V1.0	Release	Sharlene	20170628

Catalog

1 Description

This product is built-in, RM3100 module and SCA3300 Accelerometer, the communication protocol and specific parameters please refer to the information:

https://wiki.wit-motion.com/english/doku.php?id=tilt_switch

- Module integrates high-precision gyroscopes, accelerometer, RM3100 geomagnetic sensor, high-performance microprocessors and advanced dynamics solves dynamic Kalman filter algorithm to quickly solve the current real-time movement of the module attitude .
- The use of advanced digital filtering technology, can effectively reduce the measurement noise and improve measurement accuracy.
- Integrates gesture solver, with dynamic Kalman filter algorithm, can get the accurate attitude in dynamic environment, attitude measurement precision is up to 0.05 degrees with high stability, performance is even better than some professional Inclinometer!
- Integrate voltage stabilization circuit, working voltage is 3.3v ~ 5v, pin level compatible 3.3V and 5V embedded system .
- Supports serial port TTL/232 digital interface, Serial port rate is adjustable from 2400kbps ~ 921600 kbps(9600 default)
- Highest 200Hz output data rate. The output data and rate can be adjusted.
- 4layer PCB technology, thinner, smaller, and more reliable.

2 Features

1、Voltage：3.3V~5V

2、Consumption current：<40mA

3、Volume：55mm X 36.8mm X 24mm

4、Measuring dimensions:

Acceleration: X Y Z

Angular velocity: X Y Z

Attitude angle:X Y Z

Magnetic field：X Y Z

Atmospheric pressure:YES

5、Range: Acceleration: ± 3g, Angular velocity: ± 2000 ° / s,Angle:X Z ±180° Y ±90°

6、Stability: Acceleration: 0.01g, Angular speed 0.05° / s.

7、Measurement Accuracy: X Y axis 0.05°, Z axis 1° (Magnetic field calibration is good, and no magnetic field interference).

8、Data output: Time, Acceleration, Angular velocity, Angle,Magnetic field, Pressure , Height

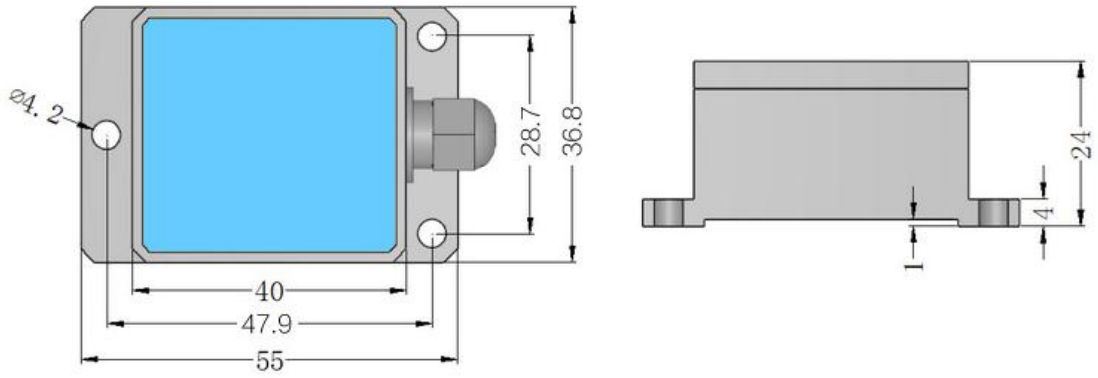
9、The data output frequency 0.1Hz ~200Hz

10、Data Interface: UART(TTL , Baud rate support2400,4800,9600,19200,38400,57600, 115200,230400,460800,921600)

Mag：RM3100

Parameter	Cycle Counts		
	50	100	200
Field Measurement Range	-800 μT to +800 μT		
Noise	30 nT	20 nT	15 nT
Gain @ 3V (LSB/μT)	20 nT	38 nT	75 nT
Linearity over ±200 μT	0.5 % (typical)		
Sensitivity	50 nT	26 nT	13 nT
Max 3- - Axis Sample Rate	534 μA	284 μA	147 μA
Current Usage @ 8 Hz, 3 Axes	70 μA	135 μA	260 μA
Circuit Oscillation Frequency	180 kHz		
Bias Resistor (RB)	121 Ω		

3 Product Size(Unit :mm）



4 Line Color Function

Line color function	RED	YELLOW	GREEN	BLACK
	VCC 5V	TX	RX	GND

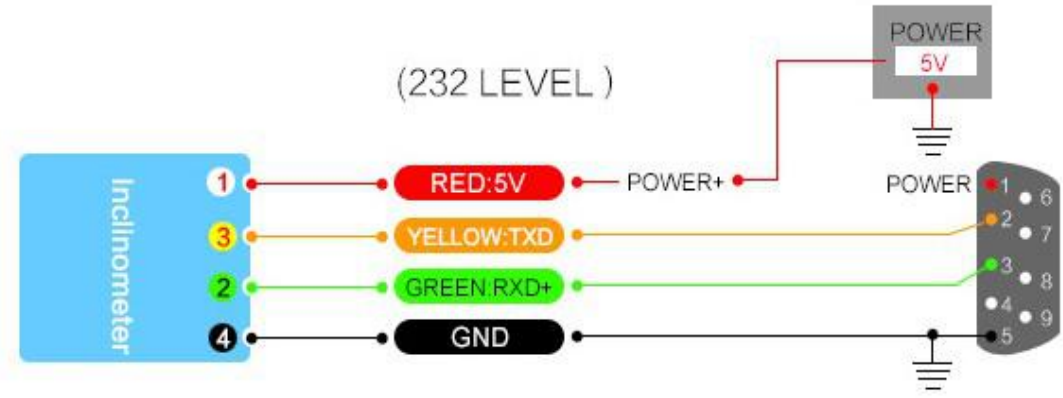
5 Axial Direction

As shown in the figure above, the coordinates of the module are indicated, and the right is the X axis, the upper is Y axis, the Z axis is perpendicular to the surface of the paper to yourself. The direction of rotation is defined by the right hand rule, that is the thumb of the right hand is pointed to the axial direction, and the other four finger is the direction of the bending of the right hand.,The X axis angle is the angle of rotation about the X axis，The Y axis angle is the angle of rotation about the Y axis，The Z axis angle is the angle of rotation about the Z axis

6 Hardware Connection

6.1 232 Level Connection

6.1.1 Connection Diagram



6.1.2 Connection Method

Connecting to a computer requires a USB to 232 serial port module. The following USB-to-serial module is recommended:

https://www.aliexpress.com/store/product/Usb-converter-cp2102-usb-ttl-485-232-3-3v-and-5v-output-three-multifunctional-functions/2029054_32873159970.html?spm=2114.12010612.8148356.3.30b57b82smrtiU

6.2 TTL Level Connection

6.2.1 Connection Diagram

6.2.2 Connection Method

USB-TTL connect method：5V/3V to red line, TXD to green line, RXD to yellow line, GND to GND.

7 PC Software Method

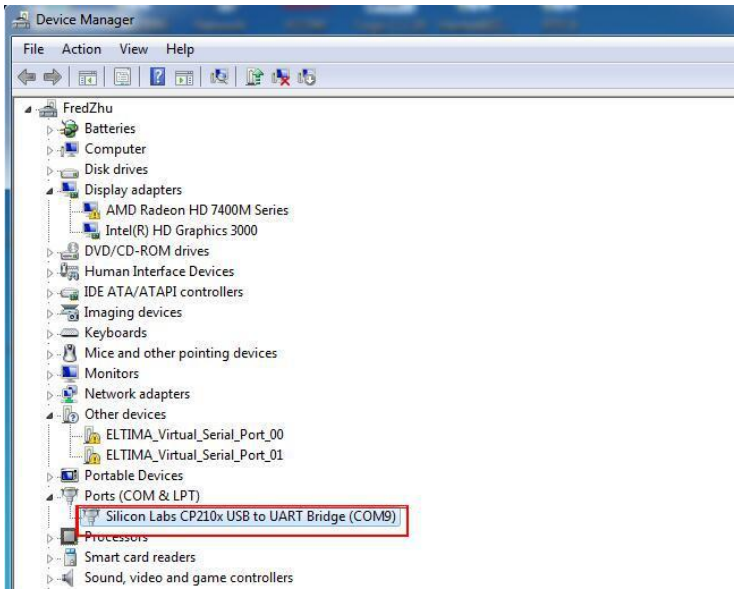
7.1 Method

Note that if the PC software can not run please download and install .net framework4.0：
http://www.microsoft.com/zh-cn/download/details.aspx?id=17718

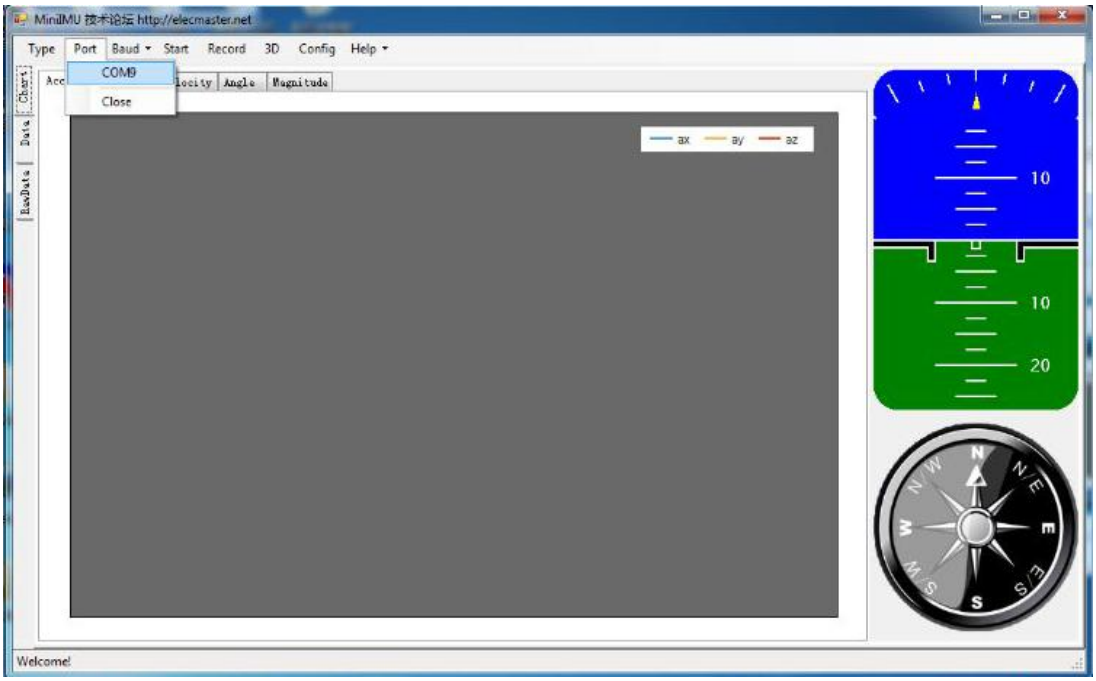
First, the module is connected via USB-TTL module to the computer, install the USB-TTL module driver. The drive：
CH340:https://wiki.wit-motion.com/english/doku.php?id=communication_module

If choose the USB-TTL(CP2102),the driver is :
CP210X:https://wiki.wit-motion.com/english/doku.php?id=communication_module

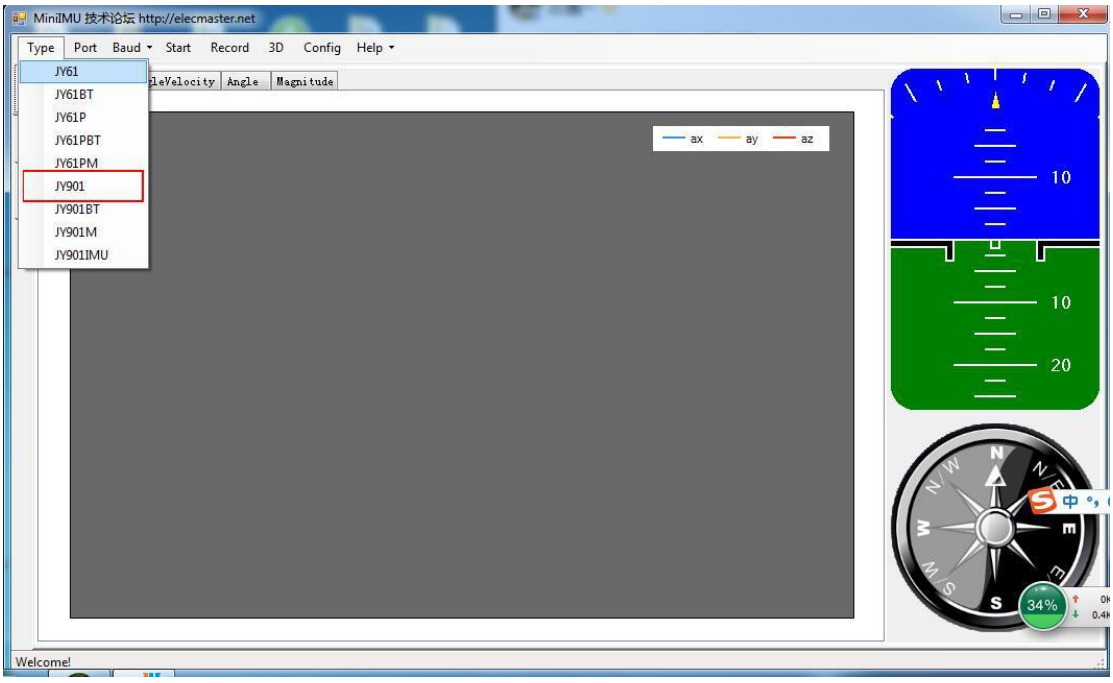
After installing the module driver, and then Device Manager can query corresponding serial number, as below figure shows:



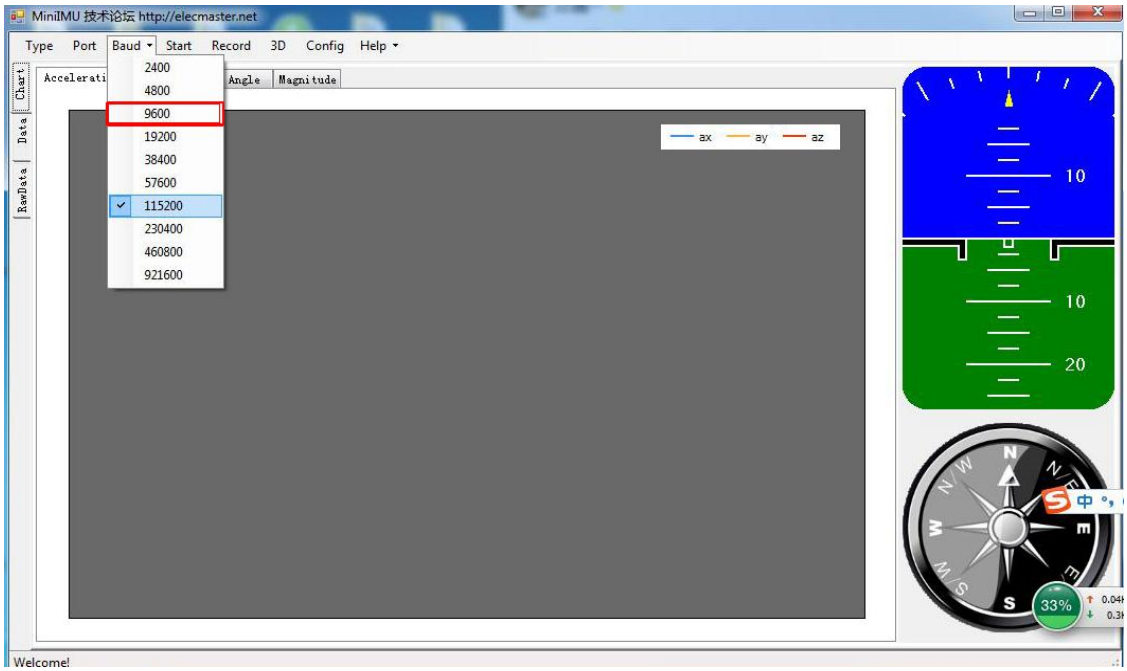
Open the software MiniIMU.exe, In the "Packet / PC",Click “Port” and select the com number you just saw in the device manager.

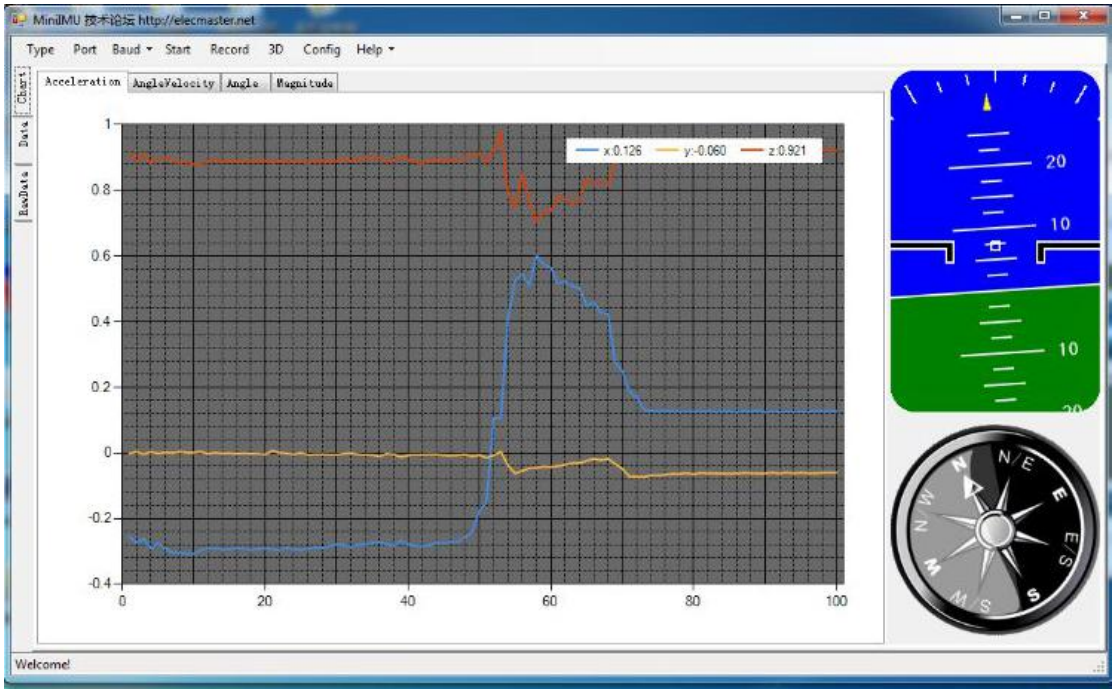


Click the “Type” and select model “JY901”.



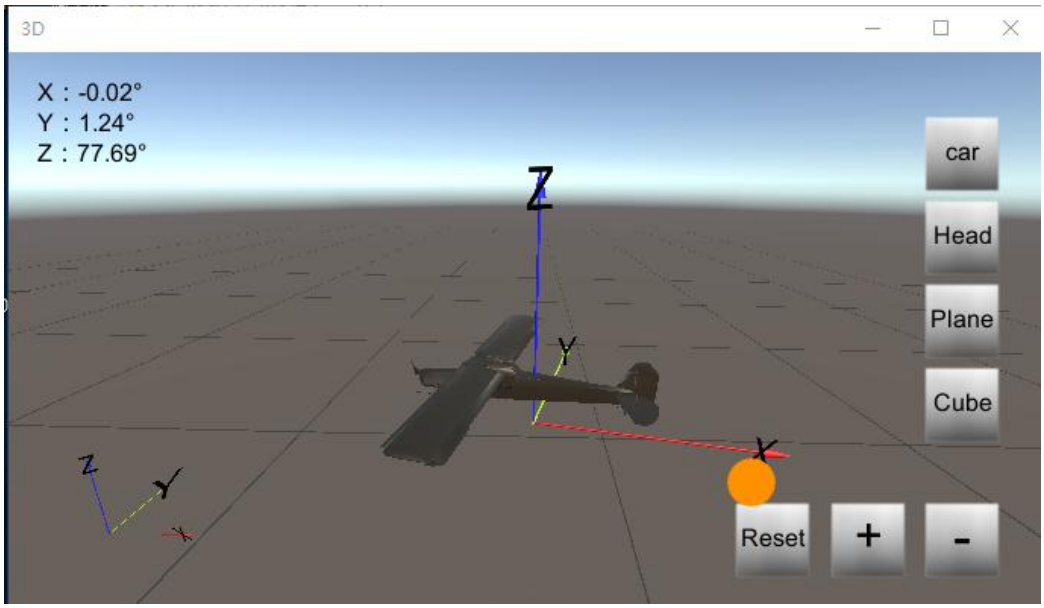
Click the “Baud” and select “9600”, after all those selections are completed, the software can display data.





When the time interval between the current acquisition data and the previous acquisition data is long, the chart update will be slow. At this time, you can right-click the image and pop up the clear diagram bar. Click the clear diagram option to speed up the data refresh rate.

Click the “3D” and you can bring up the three-dimensional display interface, which displays the three-dimensional posture of the module.



7.2 Restore Factory Setting

Instruction method : HWT905 module connected to a PC via USB module , click the Settings tab and make sure it online. Click “Recovery”. After restore the factory settings ,need to restart the module again. (This method requires advance knowledge to know baud rate of the module, if the baud rate does not match the command will not take effect, try using a short-circuit recovery method).

7.3 Module Calibration

Reminder: The module calibration and configuration should be carried out under the online state which displayed in the low right corner of the software configuration bar.

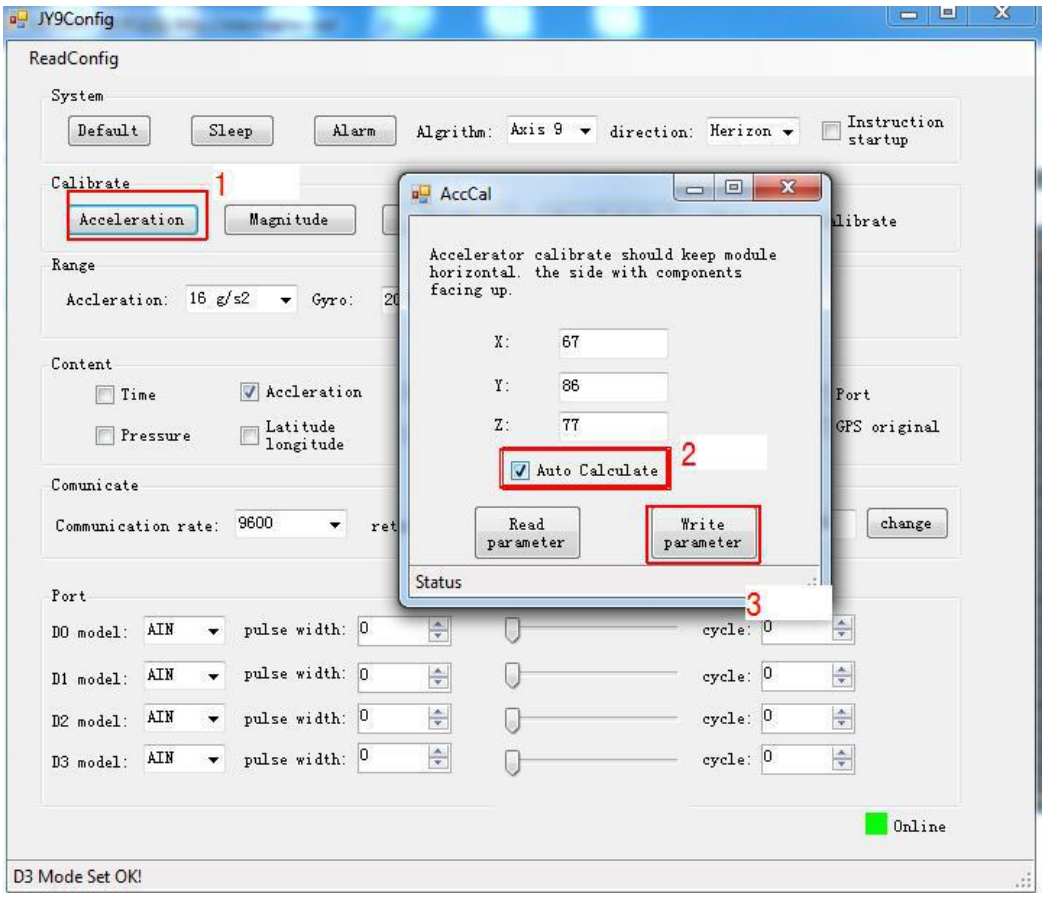
The module need to be calibrated before the module is used. The calibration of HWT905 includes accelerometer calibration and magnetic calibration.

7.3.1 Accelerometer Calibration

The accelerometer calibration is used to remove the zero bias of the accelerometer. When the sensor is out of the factory, there will be different degrees of bias error. After manual calibration, the measurement will be accurate.

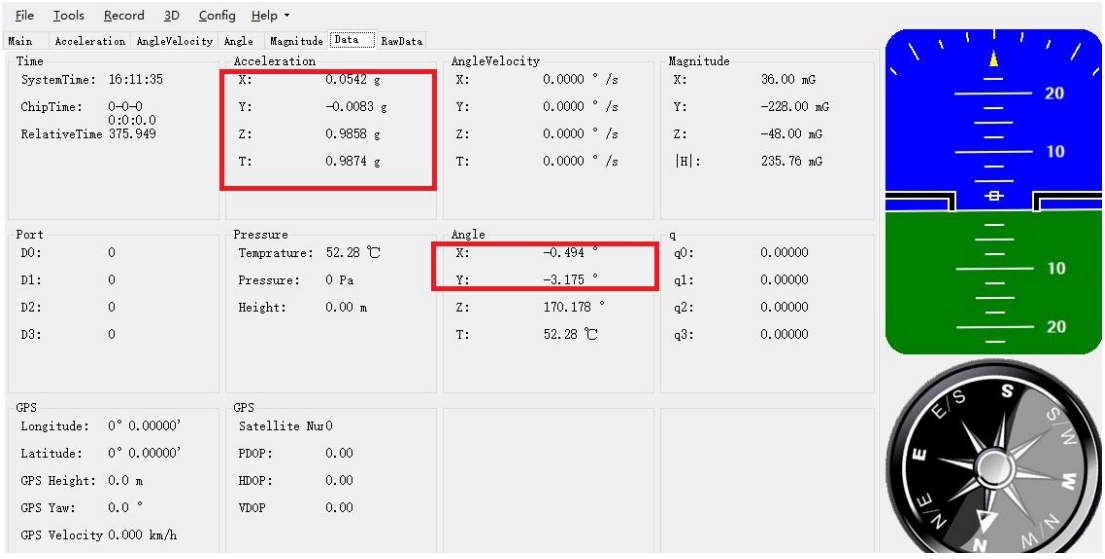
Methods as follow:

1. Firstly keep the module horizontally stationary, in the “Config” of the software click “Acceleration” and a calibration interface will pop up.
2. Check the “Auto Calculate” option, the software will automatically calculates the zero bias value and then click “Write parameter”



3. After 1 to 2 seconds, the three axes of the module acceleration will be around 0 0 1 and the X and Y axes will be around 0°. The X-axis angle after calibration is exactly the same.

Note: When the Z-axis is horizontally stationary, there is 1 G of gravitational acceleration.



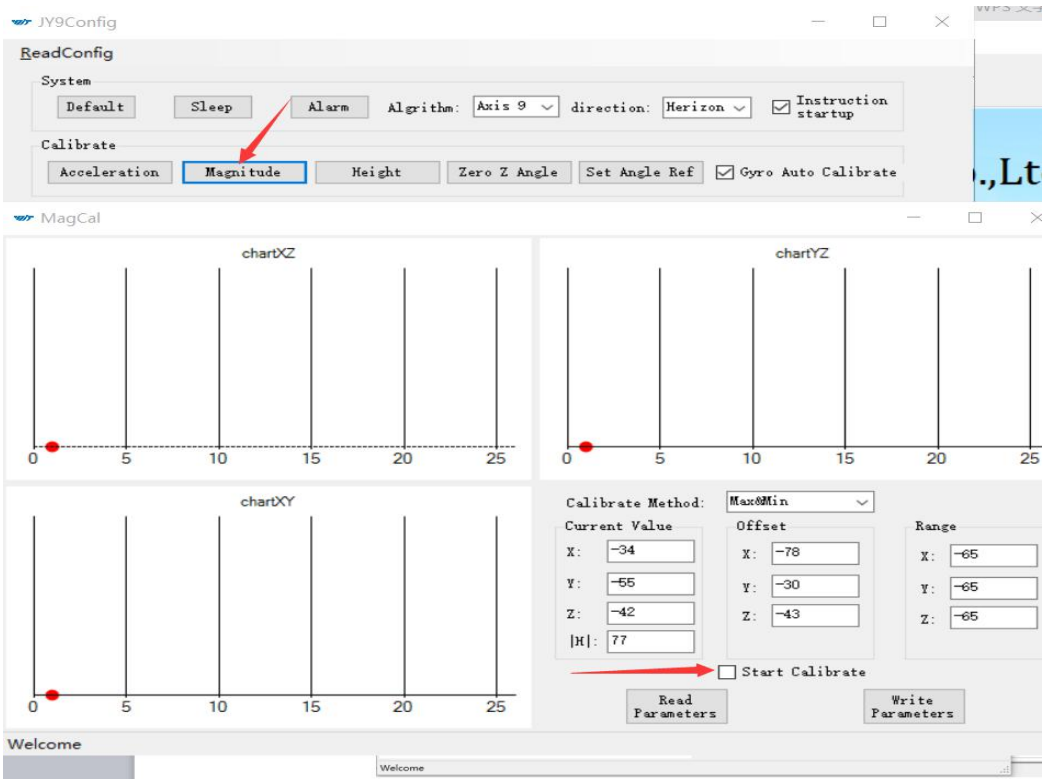
7.3.2Magnetic Calibration

Magnetic field calibration is used to remove the magnetic field sensor's zero offset. Usually, the magnetic field sensor will have a large zero error when it is manufactured. If it is not calibrated, it will bring about a large measurement error and affect the accuracy of the Z-axis angle measurement of the heading angle.

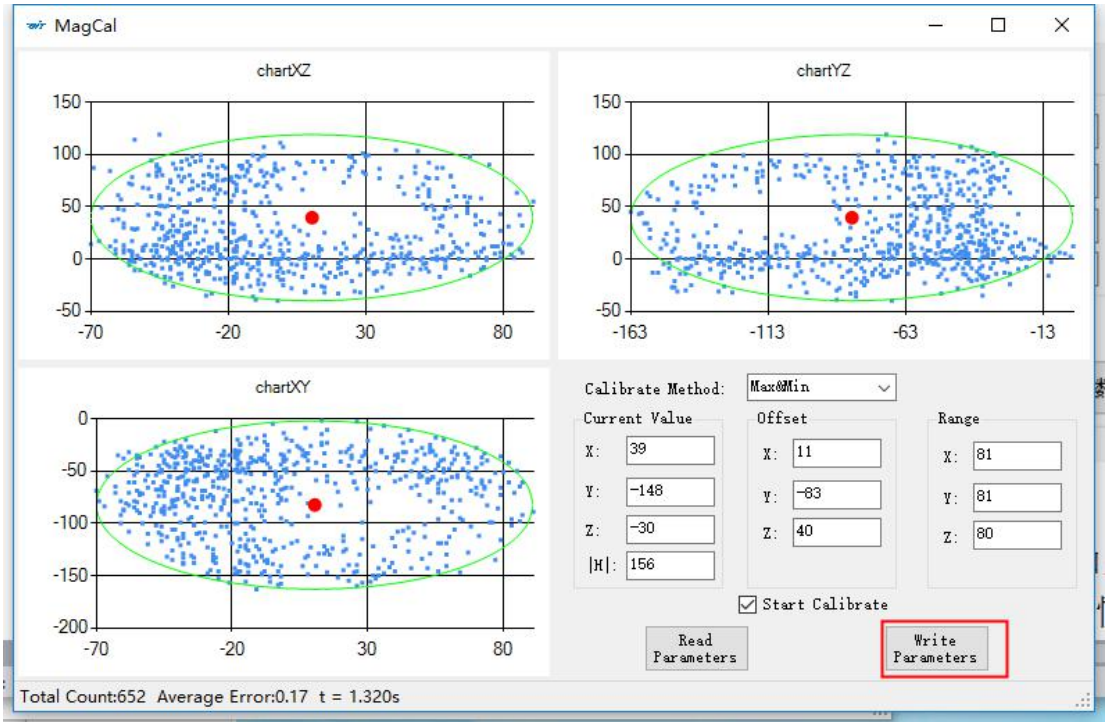
Calibration methods as follow:

1. When calibrating, first connect the module and the computer, and place the module in a place far away from the disturbing magnetic field (ie, more than 20 CM away from magnets and iron, etc.), and then open the upper computer software.

2. In the settings page, click on the magnetic field button under the calibration bar to enter the magnetic field calibration mode. At this time, the MagCal window pops up. Click on the calibration button in this window.



3. Then slowly rotate the module around the three axes, let the data points draw points in the three planes, you can rotate a few more times, and after you draw a more regular ellipse, you can stop the calibration. After the calibration is completed, click Write Parameters.



Note: The data points should be within the ellipse but not outside the ellipse. If you cannot draw the ellipse, please keep away from the magnetic field interference. Then refer to the calibration video and place the module on the north-south axis of the Earth's magnetic field.
Calibration video:
https://drive.google.com/drive/folders/1jQcYuTRDi_dPnlvVK5dITyqPTCkfYNaC

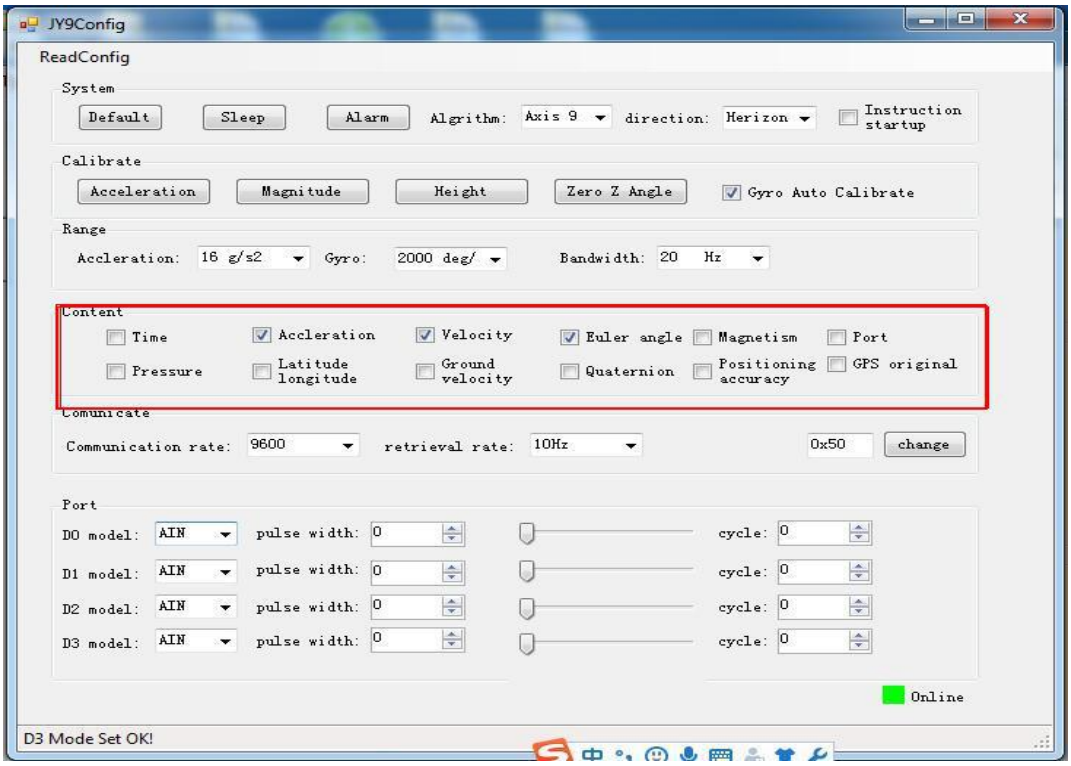
7.3.3 Height Setting 0

The height setting 0 is an operation to make the height of the module returns to 0, the height output of the module is calculated on the basic of the air pressure.。

The altitude return to zero operation is to calculate the current barometric pressure as zero height position. To do this, click on the "Height" option in the configuration bar.

7.4 Set Return Content

Setting method: The content of returned data can be customized according to the user´s needs, click “Config” to open configuration bar, and hook the data content option that you want. The default output of the module is acceleration, angular velocity angle and magnetic field.
HWT905 Output: acceleration, angular velocity, angle, magnetic field, air pressure and altitude, quaternion.

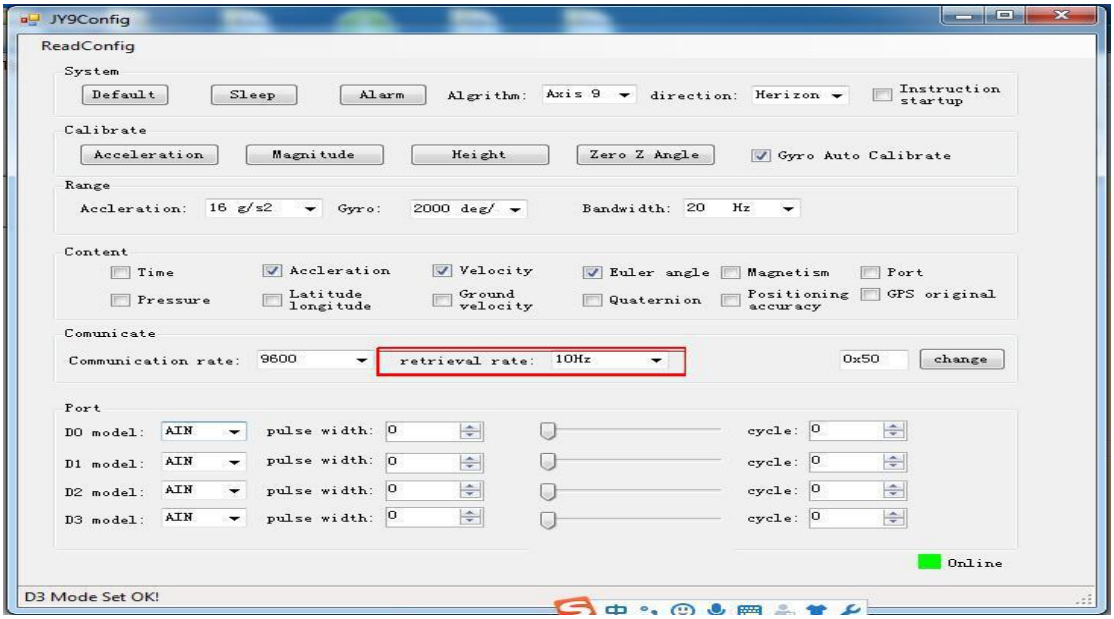


7.5 Set Return Rate

Setting methods: click “Config” to open configuration bar and than set the “retrieval rate” is 0.1HZ-200HZ optional.

The default return rate of the module is 10HZ, the highest return rate supports 200HZ.

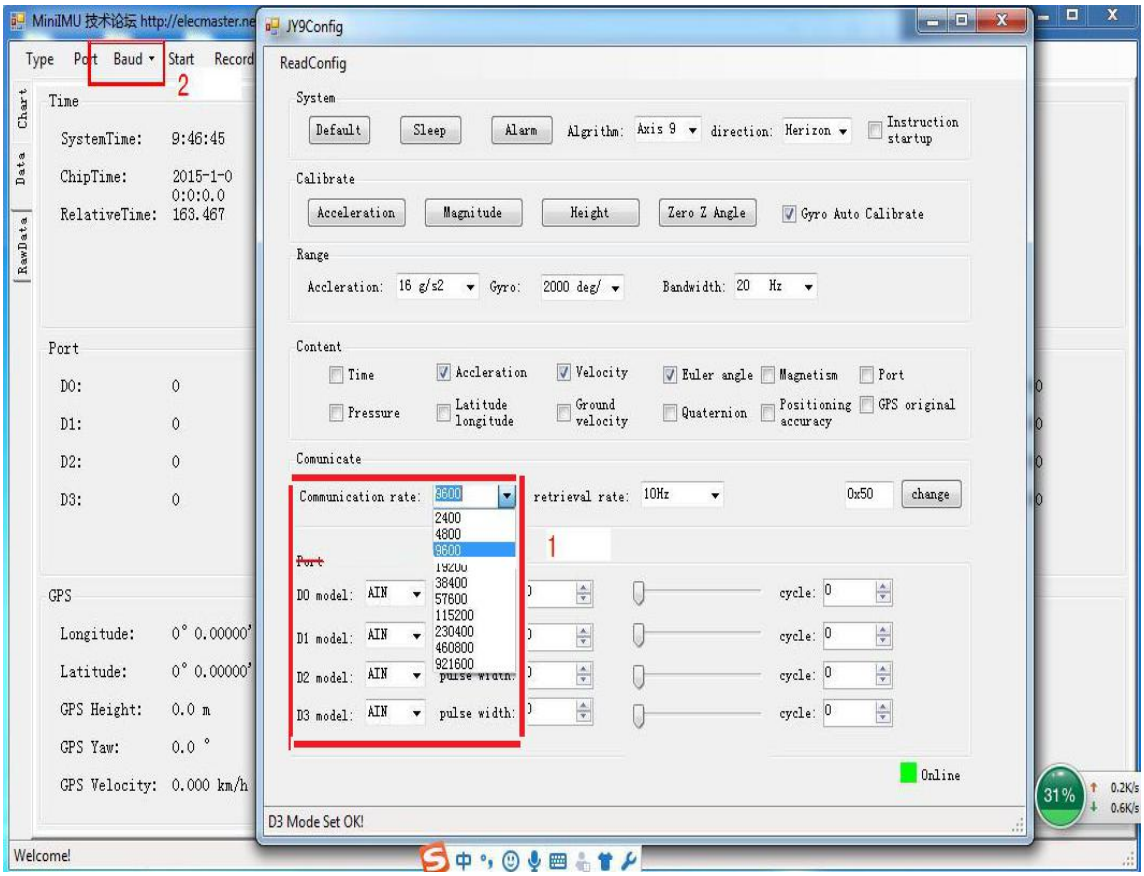
Reminder: If there being a lot of return content and low baud rate of communication, the module will automatically reduce the frequency and output at a maximum allowable output rate. The default baud rate is 115200.



7.6 Set Baud Rate

Module supports multiple baud, 9600 default. Change baud rate only when the module connect to PC program successfully, choose the baud rate and Click “Change” button.

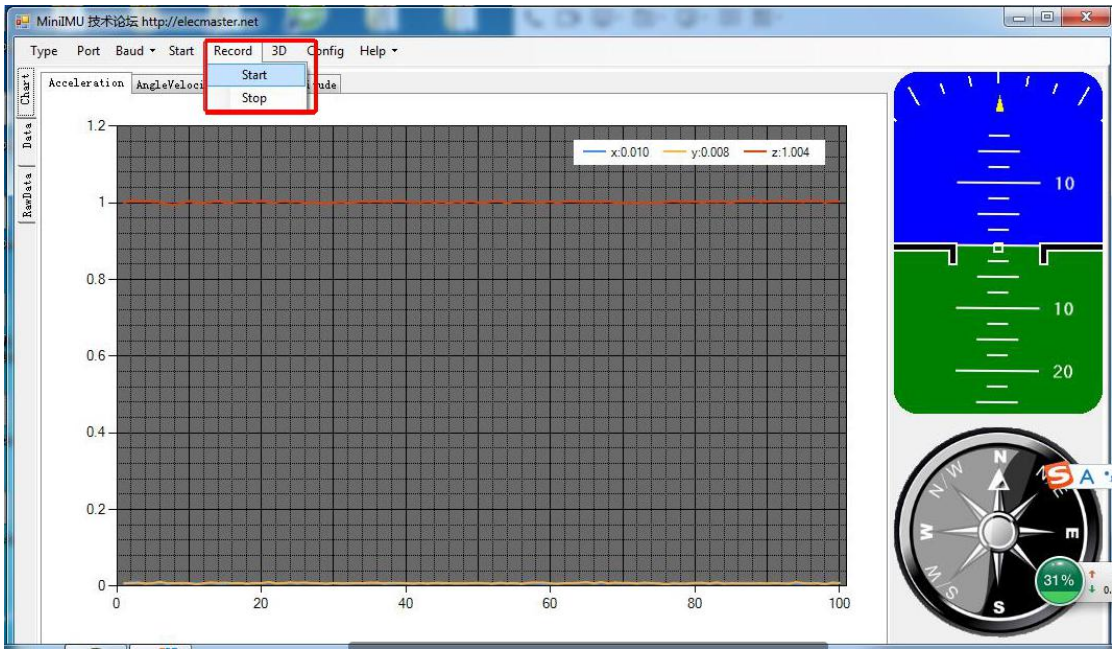
Reminder: After changing the baud rate, the module does not immediately take effect, need to re-power and then it will take effect.



7.7 Data Recording

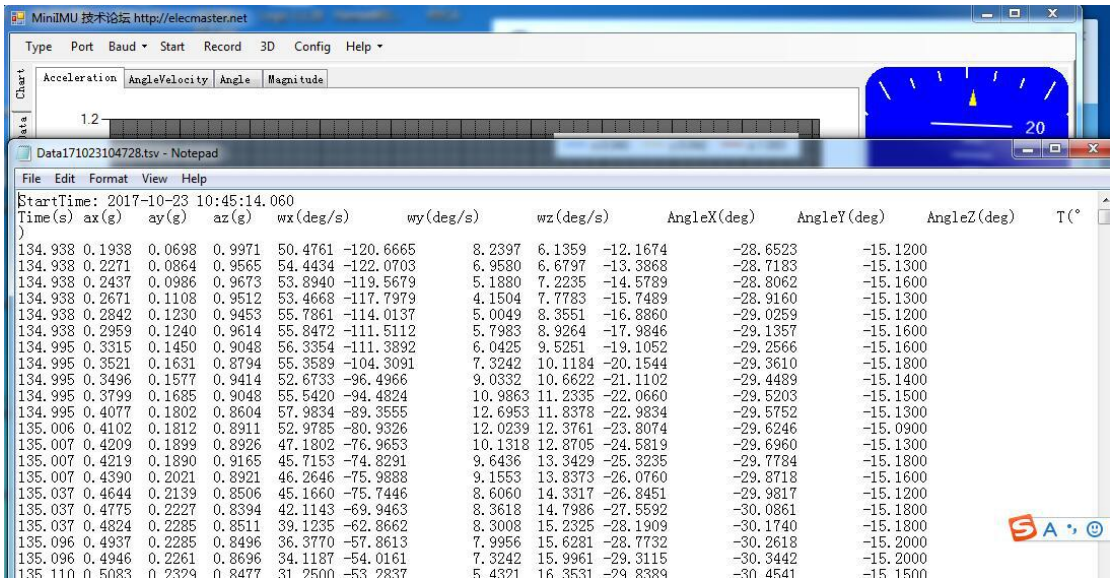
There is no memory chip in the sensor module, and the data can be recorded and saved in the software.

Method are as follows: Click “Record” and “Start” will save the data as a file.



The saved file is in the directory of the software Data. tsv:

The file begins with a value indicating the data. “Time” stands for time, “ax, ay, az” respectively represents the acceleration of X, Y , Z axis. “wx, wy, wz” respectively represents the angular velocity of X, Y, Z axis. “Angle X, Angle Y, Angle Z” respectively represents the angle of the X, Y, Z axis. T represents the temperature.“hx, hy, hz” respectively represents the magnetic field of X, Y, Z axis.

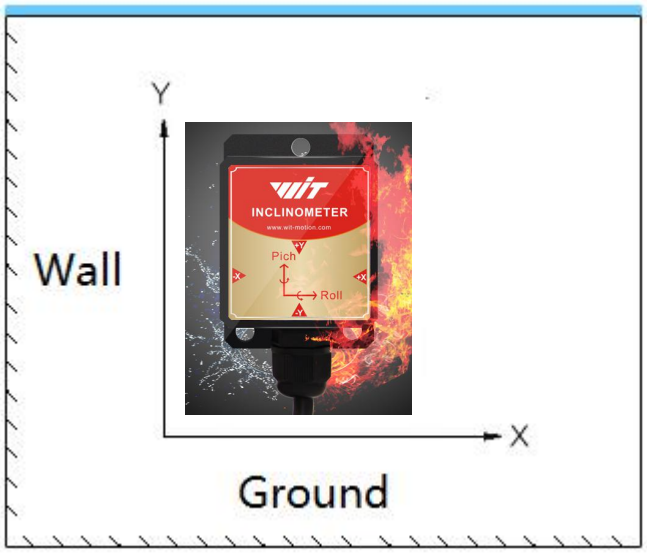


7.8 Installation Direction

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

Vertical installation method: Put the module around X-axis rotation 90 degrees vertical placement.

In the “Config” of the software, click “Vertical” option. The calibration can be used after the setup is completed.



Vertical installation

7.9 Sleep/ Wake up

Sleep: The module paused working and entered the standby mode. Power consumption is reduced after sleeping.

Wake up: The module enters the working state from standby state.

The module defaults to a working state, in the “Config” of the software, click “Sleep” option to enter the sleep state, click “Sleep” again to release sleep.

7.10 Set Bandwidth

Bandwidth: The module outputs only the data within the measurement bandwidth, and the data which is larger than the bandwidth will be filtered automatically.

In the “Config” of the software, click “Bandwidth” option to set it, the default setting is 20HZ.

8 Serial Communication Protocol

Level: TTL level (non RS232 level, if the module is wrong to the RS232 level may cause damage to the module)

Baud rate: 2400, 4800, 9600 (default), 19200 38400, 57600, 115200, 230400, 460800, 921600, stop bit and parity bit 0

1.1 7.1 Module to PC Software

1.1.1 7.1.1 Time Output

0x55	0x50	YY	MM	DD	hh	mm	ss	msL	msH	SUM

YY：Year，20YY Year

MM：Month

DD：Day

hh：hour

mm：minute

ss：Second

ms：Millisecond

Millisecond calculate formula：

ms=((msH<<8)|msL)

Sum=0x55+0x51+YY+MM+DD+hh+mm+ss+ms+TL

1.1.2 7.1.2 Acceleration Output：

0x55	0x51	AxL	AxH	AyL	AyH	AzL	AzH	TL	TH	SUM

Calculate formula：

a_x=((AxH<<8)|AxL)/32768*16g(g is Gravity acceleration，9.8m/s^2)

a_y=((AyH<<8)|AyL)/32768*16g(g is Gravity acceleration，9.8m/s^2)

a_z=((AzH<<8)|AzL)/32768*16g(g is Gravity acceleration，9.8m/s^2)

Temperature calculated formular：

T=((TH<<8)|TL) /100 ℃

Checksum：

Sum=0x55+0x51+AxH+AxL+AyH+AyL+AzH+AzL+TH+TL

Note：

1、 the data is transmitted in accordance with the 16 hexadecimal, not ASCII code

2、 Each data is transmitted in a low byte and a high byte, and the two is combined into a short type of symbol. Such as X axis acceleration data Ax, where AxL is the low byte, AxH is high byte.

The conversion method is as follows:

Assuming Data is the actual data, DataH for its high byte, DataL for its low byte part, then: Data= ((short) DataH<<8) |DataL. Here we must pay attention to that force the

DataH to be converted into a symbol of the short type of data and then after shift 8 bit, and the type of Data is also a symbol of the short type, so it can show a negative.

Detailed solution example:

http://elecmaster.net/forum.php?mod=viewthread&tid=812&page=1&extra=#pid1582

1.1.3 7.1.3 Angular Velocity Output

0x55	0x52	wxL	wxH	wyL	wyH	wzL	wzH	TL	TH	SUM

Calculated formular：

w_x=((wxH<<8)|wxL)/32768*2000(°/s)

w_y=((wyH<<8)|wyL)/32768*2000(°/s)

w_z=((wzH<<8)|wzL)/32768*2000(°/s)

Temperature calculated formular：

T=((TH<<8)|TL) /100 ℃

Checksum：

Sum=0x55+0x52+wxH+wxL+wyH+wyL+wzH+wzL+TH+TL

1.1.4 7.1.4 Angle Output：

0x55	0x53	RollL	RollH	PitchL	PitchH	YawL	YawH	TL	TH	SUM

Calculated formular：

Roll（x axis）Roll=((RollH<<8)|RollL)/32768*180(°)

Pitch（y axis）Pitch=((PitchH<<8)|PitchL)/32768*180(°)

Yaw（z axis）Yaw=((YawH<<8)|YawL)/32768*180(°)

Temperature calculated formular：

T=((TH<<8)|TL) /100 ℃

Checksum：

Sum=0x55+0x53+RollH+RollL+PitchH+PitchL+YawH+YawL+TH+TL

Note：

1. Attitude angle use the coordinate system for the Northeast sky coordinate system, the X axis is upper ,the Y axis is left, Z axis is Vertical module toward , Euler coordinate system rotation sequence defined attitude is z-y-x, first rotates around the Z axis. Then, around the Y axis, and then around the X axis.
2. Although the range of rolling angle is ±180 degrees, in fact, because the coordinate rotation order is Z-Y-X, the range of pitch angle (Y axis) is only ±90 degree when the attitude is expressed, and the angle of X axis is larger than 180 degree after 90 degrees. Detailed principle of Baidu Euler angle and posture of the relevant information . Please search on Google about more information of Euler angle and attitude information.
3. Since the three axis are coupled, the angle will be independent only when the angle is small. It will be dependent of the three angle when the angle is large when the attitude angle change, such as when the X axis close to 90 degrees, even if the attitude angle around the X axis, Y axis angle will have a big change, which is the inherent characteristics of the Euler angle

1.1.5 7.1.5 Magnetic output：

0x55	0x54	HxL	HxH	HyL	HyH	HzL	HzH	TL	TH	SUM

Calculated formular：

Magnetic（x axis）Hx=((HxH<<8)| HxL)

Magnetic（y axis）Hy=((HyH <<8)| HyL)

Magnetic（z axis）Hz =((HzH<<8)| HzL)

Temperature calculated formular：

T=((TH<<8)|TL) /100 ℃

Checksum：

Sum=0x55+0x53+HxH+HxL+HyH+HyL+HzH+HzL+TH+TL

1.2 7.2 PC Software to Module

Remider:

1. Factory settings default to use serial port, band rate is 9600, frame rate is 10HZ. Configuration can be configured through PC software. All configuration are power down storage, so you just need to configure it just once on the line.
2. Data format

0xFF	0xAA	Address	DataL	DataH

1.2.1 7.2.1 Register Address table

Address	Symbol	Meaning
0x00	SAVE	Save
0x01	CALSW	Calibration
0x02	RSW	Return data content
0x03	RATE	Return data Speed
0x04	BAUD	Baud rate
0x05	AXOFFSET	X axis Acceleration bias
0x06	AYOFFSET	Y axis Acceleration bias
0x07	AZOFFSET	Z axis Acceleration bias
0x08	GXOFFSET	X axis angular velocity bias
0x09	GYOFFSET	Y axis angular velocity bias
0x0a	GZOFFSET	Z axis angular velocity bias
0x0b	HXOFFSET	X axis Magnetic bias
0x0c	HYOFFSET	Y axis Magnetic bias
0x0d	HZOFFSET	Z axis Magnetic bias
0x0e	D0MODE	D0 mode
0x0f	D1MODE	D1 mode
0x10	D2MODE	D2 mode

0x11	D3MODE	D3 mode
0x12	D0PWMH	D0PWM High-level width
0x13	D1PWMH	D1PWM High-level width
0x14	D2PWMH	D2PWM High-level width
0x15	D3PWMH	D3PWM High-level width
0x16	D0PWMT	D0PWM Period
0x17	D1PWMT	D1PWM Period
0x18	D2PWMT	D2PWM Period
0x19	D3PWMT	D3PWM Period
0x1a	IICADDR	IIC address
0x1b	LEDOFF	Turn off LED
0x1c	GPSBAUD	GPS baud rate
0x30	YYMM	Year、Month
0x31	DDHH	Day、Hour
0x32	MMSS	Minute、Second
0x33	MS	Millisecond
0x34	AX	X axis Acceleration
0x35	AY	Y axis Acceleration
0x36	AZ	Z axis Acceleration
0x37	GX	X axis angular velocity
0x38	GY	Y axis angular velocity
0x39	GZ	Z axis angular velocity
0x3a	HX	X axis Magnetic
0x3b	HY	Y axis Magnetic
0x3c	HZ	Z axis Magnetic
0x3d	Roll	X axis Angle
0x3e	Pitch	Y axis Angle
0x3f	Yaw	Z axis Angle
0x40	TEMP	Temperature
0x41	D0Status	D0Status
0x42	D1Status	D1Status
0x43	D2Status	D2Status
0x44	D3Status	D3Status
0x45	PressureL	Pressure Low Byte
0x46	PressureH	Pressure High Byte
0x47	HeightL	Height Low Byte
0x48	HeightH	Height High Byte
0x49	LonL	Longitude Low Byte
0x4a	LonH	Longitude High Byte
0x4b	LatL	Latitude Low Byte
0x4c	LatH	Latitude High Byte
0x4d	GPSHeight	GPS Height

0x4e	GPSYaw	GPS Yaw
0x4f	GPSVL	GPS speed Low byte
0x50	GPSVH	GPS speed High byte
0x51	Q0	Quaternion Q0
0x52	Q1	Quaternion Q1
0x53	Q2	Quaternion Q2
0x54	Q3	Quaternion Q3

1.2.2 7.2.2 Save Configuration

0xFF	0xAA	0x00	SAVE	0x00

SAVE：Save

0：Save current configuration

1：set to default setting

1.2.3 7.2.3 Calibrate

0xFF	0xAA	0x01	CALSW	0x00

CALSW：Set calibration mode

0：Exit calibration mode

1：Enter Accelerometer calibration mode

2：Enter magnetic calibration mode

3：Set height to 0

1.2.4 7.2.4 Set Installation direction

0xFF	0xAA	0x23	DIRECTION	0x00

DIRECTION：set installation direction

0：set to horizontal installation

1：set to vertical installation

1.2.5 7.2.5 Sleep/ Wake up

0xFF	0xAA	0x22	0x01	0x00

Sent this instruction to enter sleep state, sent it once again, module enter the working state from the standby state.

1.2.6 7.2.6 Algorithm transition

0xFF	0xAA	0x24	ALG	0x00

ALG：6-axis/ 9-axis algorithm transition

0：set to 9-axis algorithm

1：set to 6-axis algorithm

1.2.7 7.2.7 Gyroscope automatic calibration

0xFF	0xAA	0x63	GYRO	0x00

GYRO：gyroscope automatic calibration

0：set to gyroscope automatic calibration

1：removed to gyroscope automatic calibration

1.2.8 .2.8 Set return content

0xFF	0xAA	0x02	RSWL	RSWH

RSWL byte definition

byte	7	6	5	4	3	2	1	0
Name	0x57 pack	0x56 pack	0x55 pack	0x54 pack	0x53 pack	0x52 pack	0x51 pack	0x50 pack
default	0	0	0	1	1	1	1	0

RSWH byte definition

byte	7	6	5	4	3	2	1	0
Name	X	X	X	X	X	0x5A pack	0x59 pack	0x58 pack
default	0	0	0	0	0	0	0	0

0x50 pack：time pack

0：Not output 0X50 pack

1：Output 0X50 pack

0x51 pack：Acceleration pack

0：Not output 0x51 pack

1：Output 0x51 pack

0x52 pack：Angular velocity pack

0：Not output 0x52 packet

1：Output 0x52 pack

0x53 pack：Angle Pack

0：Not output 0x53 pack

1：Output 0x53 pack

0x54 pack：Magnetic Pack

0：Not output 0x54 pack

1：Output 0x54 pack

0x55 pack：Port status pack

0：Not output 0x55 pack

1：Output 0x55 pack

0x56 pack：Atmospheric pressure &Height Pack

0：Not output 0x56 pack

1：Output 0x56 pack

0x57 pack：Longitude and Latitude Output Pack

0：Not output 0x57 pack

1：Output 0x57 pack

0x58 pack：GPS speed Pack

0：Not output 0x58 pack

1：Output 0x58 pack

0x59 pack：Quaternion Pack

0：Not output 0x59 pack

1：Output 0x59 pack

0x5A pack：Satellite position accuracy

0：Not output 0x5A pack

1：Output 0x5A pack

1.2.9 7.2.9 Set return rate

0xFF	0xAA	0x03	RATE	0x00

RATE：return rate

0x01：0.1Hz

0x02：0.5Hz

0x03：1Hz

0x04：2Hz

0x05：5Hz

0x06：10Hz（default）

0x07：20Hz

0x08：50Hz

0x09：100Hz

0x0a：125Hz

0x0b：200Hz

0x0c：Single

0x0d: Not output

After the setup is complete , need to click save,and re-power the module to take effect.

1.2.10 7.2.10 Set baud rate

0xFF	0xAA	0x04	BAUD	0x00

BAUD：

0x00：2400

0x01：4800

0x02：9600（default）

0x03：19200

0x04：38400

0x05：57600

0x06：115200

0x07：230400

0x08：460800

0x09：921600

1.2.11 7.2.11 Set X axis Acceleration bias

0xFF	0xAA	0x05	AXOFFSETL	AXOFFSETH

AXOFFSETL：X axis Acceleration bias low byte

AXOFFSETH：X axis Acceleration bias high byte

AXOFFSET= (AXOFFSETH <<8) | AXOFFSETL

Note：When set the acceleration bias, the output equal the value of the acceleration sensor output value minus the bias value

1.2.12 7.2.12 Set Y axis Acceleration bias

0xFF	0xAA	0x06	AYOFFSETL	AYOFFSETH

AYOFFSETL：Y axis Acceleration bias low byte

AYOFFSETH：Y axis Acceleration bias high byte

AYOFFSET= (AYOFFSETH <<8) | AYOFFSETL

Note：When set the acceleration bias, the output equal the value of the acceleration sensor output value minus the bias value.

1.2.13 7.2.13 Set Z axis Acceleration bias

0xFF	0xAA	0x07	AZOFFSETL	AZOFFSETH

AZOFFSETL：Z axis Acceleration bias low byte

AZOFFSETH：Z axis Acceleration bias high byte

AZOFFSET= (AZOFFSETH <<8) | AZOFFSETL

Note：When set the acceleration bias, the output equal the value of the acceleration sensor output value minus the bias value.

1.2.14 7.2.14 Set X axis Angular velocity bias

0xFF	0xAA	0x08	GXOFFSETL	GXOFFSETH

GXOFFSETL：Set X axis Angular velocity bias low byte

GXOFFSETH：Set Y axis Angular velocity bias high byte

GXOFFSET= (GXOFFSETH <<8) | GXOFFSETL

Note：When set the Angular velocity bias, the output equal the value of the sensor output value minus the bias value.

1.2.15 7.2.15 Set Y axis Angular velocity bias

0xFF	0xAA	0x09	GYOFFSETL	GYOFFSETH

GYOFFSETL：Set X axis Angular velocity bias low byte

GYOFFSETH：Set X axis Angular velocity bias high byte

GYOFFSET= (GYOFFSETH <<8) | GYOFFSETL

Note： When set the Angular velocity bias, the output equal the value of the sensor output value minus the bias value.

1.2.16 7.2.16 Set Z axis Angular velocity bias

0xFF	0xAA	0x0a	GXOFFSETL	GXOFFSETH

GZOFFSETL：Set Z axis Angular velocity bias low byte

GZOFFSETH：Set Z axis Angular velocity bias low byte

GZOFFSET= (GZOFFSETH <<8) | GZOFFSETL

Note： When set the Angular velocity bias, the output equal the value of the sensor output value minus the bias value.

1.2.17 7.2.17 Set X axis magnetic bias

0xFF	0xAA	0x0b	HXOFFSETL	HXOFFSETH

HXOFFSETL：Set X axis magnetic bias low byte

HXOFFSETH：Set X axis magnetic bias high byte

HXOFFSET= (HXOFFSETH <<8) | HXOFFSETL

Note：When set the magnetic bias, the output equal the value of the sensor output value minus the bias value.

1.2.18 7.2.18 Set Y axis magnetic bias

0xFF	0xAA	0x0c	HXOFFSETL	HXOFFSETH

HXOFFSETL：Set Y axis magnetic bias low byte

HXOFFSETH：Set Y axis magnetic bias high byte

HXOFFSET= (HXOFFSETH <<8) | HXOFFSETL

Note：When set the magnetic bias, the output equal the value of the sensor output value minus the bias value.

1.2.19 7.2.19 Set Z axis magnetic bias

0xFF	0xAA	0x0d	HXOFFSETL	HXOFFSETH

HXOFFSETL：Set Y axis magnetic bias low byte

HXOFFSETH：Set Z axis magnetic bias high byte

HXOFFSET= (HXOFFSETH <<8) | HXOFFSETL

Note：When set the magnetic bias, the output equal the value of the sensor output value minus the bias value.

8 Application Area

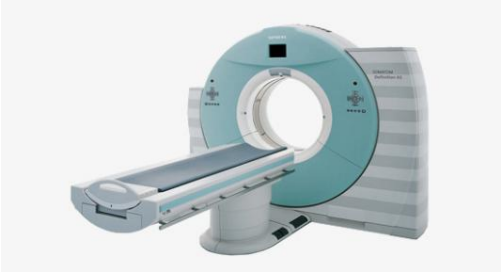
Agricultural machinery

Internet of things

Solar energy

Power monitoring

Medical instruments



Construction machinery

Geological monitoring

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