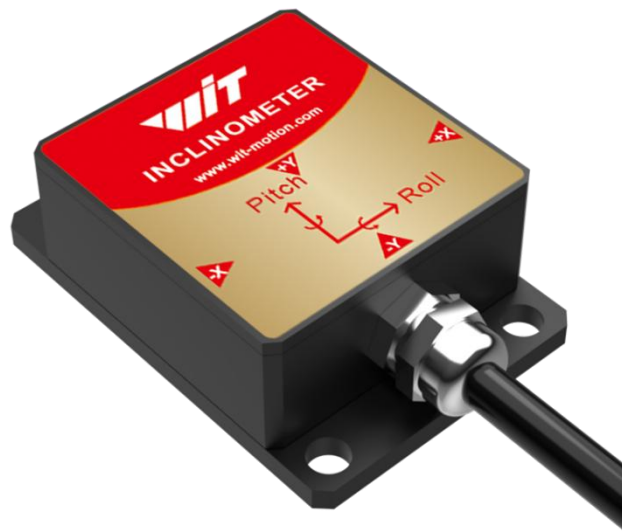


HWT905 Data Sheet & User Manual



Contents

1. Product Introduction	2
1.1. Product Overview	1
1.2. Features	1
2. Parameter indicators	2
2.1. Accelerometer parameters	2
2.2. Gyroscope parameters	2
2.3. Magnetometer parameters	3
2.4. Pitch and roll angle parameters	3
2.5. Heading angle parameters	3
2.6. Module parameters	4
2.6.1. Basic parameters	4
2.6.2. Electrical parameters	4
3. Product size	5
4. Line sequence definition and connection	5
4.1. Line sequence description	5
4.2. HWT905-485 connects to PC software	6
4.2.1. PC software download	6
4.2.2. PC software connection method	6
5. Product Packaging	7

1. Product Introduction

1.1. Product Overview

- This product is a high-performance 3D motion attitude measurement system based on **MEMS technology**. It includes motion sensors such as a **three-axis gyroscope** , a **three-axis accelerometer** , and a three-axis **electronic compass** . By integrating various high-performance sensors and utilizing a proprietary core attitude dynamics algorithm engine, combined with a high-dynamic Kalman filter fusion algorithm, it provides customers with high-precision, high-dynamic, and real-time compensation of three-axis attitude angles. Flexible configuration of various data types allows for diverse application scenarios.
- The leading sensor fusion algorithm based on Kalman filtering principle and with independent intellectual property rights meets various high-precision application requirements and achieves accurate motion capture and posture estimation.
- We have the domestically leading high-precision turntable equipment and instruments, and our products integrate independently developed high-precision calibration and calibration algorithms to improve the measurement accuracy of the products.
- At the same time, we provide users with various PC softwares, operating instructions, development manuals, and development codes required to minimize the R&D time for various needs.

1.2. Features

- The module integrates high-precision gyroscopes, accelerometers, and geomagnetic field sensors, and adopts high-performance microprocessors and advanced dynamics solvers and Kalman dynamic filtering algorithms. It can quickly solve the current real-time motion posture of the module and has the advantages of a wide measurement range, excellent anti-noise capability, no hysteresis, and stable temperature characteristics.
- The use of advanced digital filtering technology can effectively reduce measurement noise and improve measurement accuracy.
- The module integrates an attitude solver, which, combined with the dynamic Kalman filter algorithm, can accurately output the current attitude of the module in a dynamic environment. The attitude measurement accuracy is 0.05 degrees, and the stability is extremely high. The performance is even better than some professional inclinometers!

- The module has its own voltage stabilization circuit, and the operating voltage is 5V~36V.
- Supports digital interfaces such as TTL, 232, 485, and CAN, allowing users to choose the best connection method. The serial port baud rate is adjustable from 4800bps to 230400bps.
- Military-grade magnetic field chip, automatically recovers from magnetic field interference.
- P67 level protection, aluminum shell, strong resistance to external electromagnetic interference, stable performance, can adapt to long-term work in harsh industrial environments.

2. Parameter indicators

2.1. Accelerometer parameters

Parameter	Condition	Typical values
Range		±6g
Resolution	±6g	0.0005(g/LSB)
RMS noise	Bandwidth = 100 Hz	1.2 mg-rms
Static zero drift	Horizontal placement	±20mg
Temperature Drift	-40°C ~ +125 °C	±0.09mg/°C
bandwidth		5~256Hz

2.2. Gyroscope parameters

Parameter	Condition	Typical values
Range		±2000°/s
Resolution	±2000°/s	0.061(°/s)/(LSB)
RMS noise	Bandwidth = 100 Hz	0.028~0.07(°/s)-rms
Static zero drift	Horizontal placement	±0.5~1°/s

Temperature Drift	-40°C ~ +85°C	±0.005~0.015 (°/s)/°C
bandwidth		5~256Hz

2.3. Magnetometer parameters

Parameter	Condition	Typical values
Measuring range	Loop count value (200)	-400uT to +400uT
Linearity ±200uT	Loop count value (200)	0.6%
Resolution	Loop count value (200)	13nT/LSB

2.4. Pitch and roll angle parameters

Parameter	Condition	Typical values
Range		X:±180°
		Y:±90°
Inclination accuracy		0.05°
Resolution	Horizontal placement	0.0055°
Temperature Drift	-40°C ~ +85°C	±0.5~1°

2.5. Heading angle parameters

Parameter	Condition	Typical values
Range		Z:±180°
Heading accuracy	9-axis algorithm, magnetic field calibration, dynamic/static	1° (without magnetic field interference) 【1】
	6-axis algorithm, static	0.5° (dynamic integral cumulative error) 【2】

Resolution	Horizontal placement	0.0055°
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Note:

【1】 Please calibrate the magnetic field in the test environment before use to ensure that the sensor is familiar with the magnetic field in the environment. Please stay away from magnetic interference during calibration.

【2】 In some vibration environments, there will be cumulative errors. The specific error cannot be estimated. Please refer to the actual test.

2.6. Module parameters

2.6.1. Basic parameters

Parameter	Condition	Minimum	Default	Maximum
Communication interface	485	4800bps	9600bps	230400bps
Output content		On-chip time, acceleration: 3D, angular velocity: 3D, magnetic field: 3D, angle: 3D		
Startup time				1000ms
Operating temperature		-40℃		85℃
Storage temperature		-40 ℃		100 ℃
impact resistant				20000g
Protection level				IP67

Note:

【1】 485 products use the Modbus protocol and are in master-slave mode, which is determined by the user's read content quantity and reading rate.

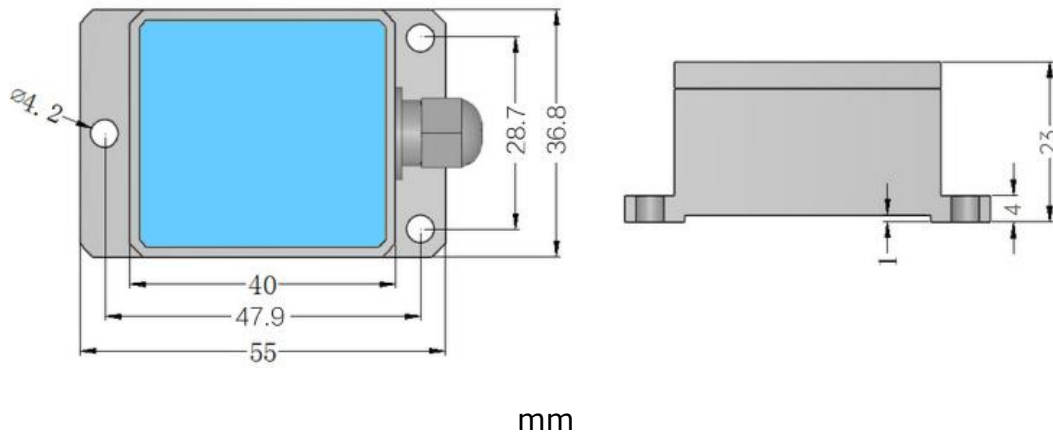
2.6.2. Electrical parameters

Note:

If you need 5-36V, please make a note to the salesperson when placing an order. Customization is supported.

Parameter	Condition	Minimum	Default	Maximum
Supply voltage		9V	12V	36V
Working current	Working (12V)		23mA (TTL) 23mA (232) 9mA (485) 23mA (CAN)	

3. Product size



4. Line sequence definition and connection

4.1. Line sequence description

TTL PIN Definition

Wiring	RED	YELLOW	GREEN	BLACK
	VCC 5-36V	TX	RX	GND



232 PIN Definition

Wiring	RED	YELLOW	GREEN	BLACK
	VCC 5-36V	232TX	232RX	GND



4.2. HWT905 connects to PC software

4.2.1. PC software download

1. CH340 driver download link:

https://drive.google.com/file/d/1JidopB42R9EsCzMAYC3Ya9eJ8JbHapRF/view?usp=drive_link

2. Witmotion software download link:

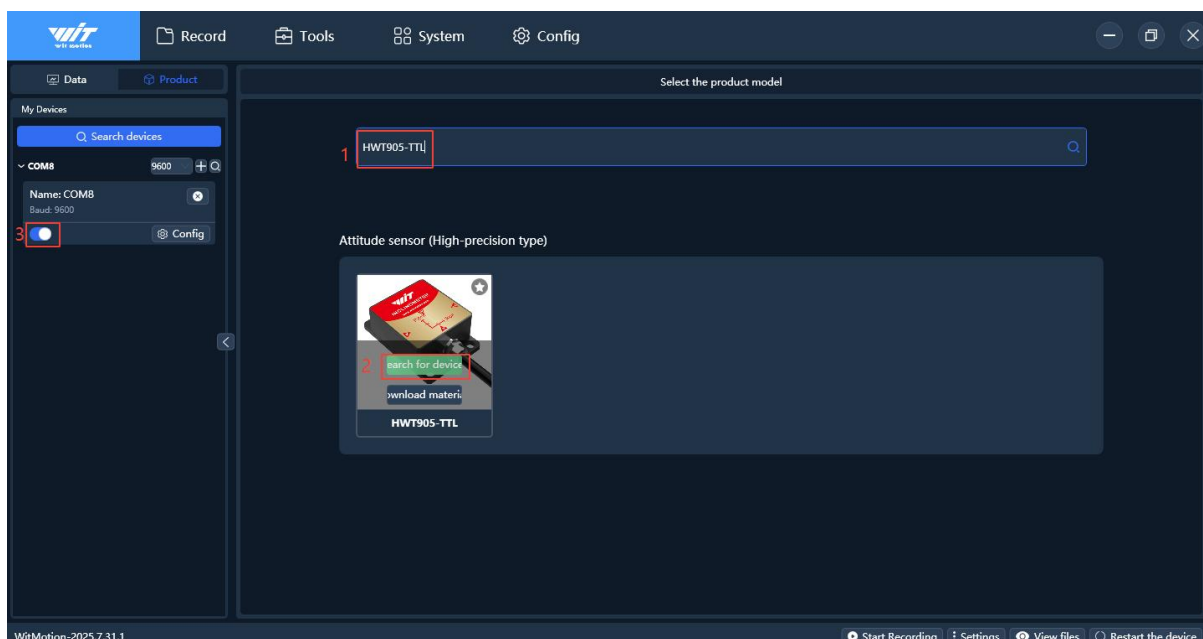
https://drive.google.com/file/d/10xysnkuyUwi3AK_t3965SLr5Yt6YKE-u/view?usp=drive_link

4.2.2. PC software connection method

1. Open Witmotion software:

① Select model HWT905-TTL or HWT905-232;

② Click Search for device;





③ Switch data interface;



5. Product Packaging

