# AHRS IMU Sensor | WT901C

The Robust Acceleration, Angular velocity, Angle & Magnetic filed Detector

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The WT901C is a IMU sensor device, detecting acceleration, angular velocity, angle as well as magnetic filed. The robust housing and the small outline makes it perfectly suitable for industrial applications such as condition monitoring and predictive maintenance. Configuring the device enables the customer to address a broad variety of application by interpreting the sensor data by smart algorithms and Kalman filtering.
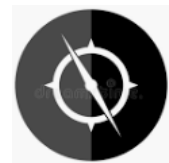
BUILT-IN SENSORS
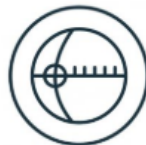
Accelerometer	Gyroscope	Magnetometer

Tutorial Link

[Google Drive](#)

Link to instructions DEMO:
[WITMOTION Youtube Channel](#)
[WT901C 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

- AGV Truck

- Platform Stability

- Auto Safety System

- 3D Virtual Reality

- Industrial Control

- Robot

- Car Navigation

- UAV

- Truck-mounted Satellite Antenna Equipment

WT901C RS485 | Datasheet v23-0627 | www.wit-motion.com |support@wit-motion.com

Contents

1 Overview

WT901C's scientific name is AHRS IMU sensor. A sensor measures 3-axis angle, angular velocity, acceleration and magnetic field. Its strength lies in the algorithm which can calculate three-axis angle accurately.

WT901C is employed where the highest measurement accuracy is required. WT901C 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, PC software, 51 serial, STM32, Arduino, and Matlab sample code, communication protocol

• WITMOTION sensors have been praised by thousands of engineers as a recommended attitude measurement solution

2 Features

- The default baud rate of this device is 9600 and could be changed.

- The interface of this product only leads to a serial port

- The module consists of a high precision gyroscope, accelerometer, geomagnetic field and barometer sensor. The product can solve the current real-time motion posture of the module quickly by using the high-performance microprocessor, advanced dynamic solutions and Kalman filter algorithm.

- The advanced digital filtering technology of this product can effectively reduce the measurement noise and improve the measurement accuracy.

3 Specification

3.1 Accelerometer parameters

Parameter	Condition	Typical
Range		±16g
Resolution		0.0005(g/LSB)
RMS noise	Bandwidth = 100Hz	0.75~1mg-rms
Static zero drift	Placed horizontally	±20~40mg
Temperature drift	-40°C ~ +85°C	±0.15mg/℃
Bandwidth		5~256Hz

3.2 Gyroscope parameters

Parameter	Condition	Typical
Range		±2000°/s
Resolution	±2000°/s	0.061(°/s)/(LSB)
RMS noise	Bandwidth = 100Hz	0.028~0.07(°/s)-rms
Static zero drift	Placed horizontally	±0.5~1°/s
Temperature drift	-40°C ~ +85°C	±0.005~0.015 (°/s)/℃
Bandwidth		5~256Hz

3.3 Magnetometer parameters

Parameter	Condition	Typical value
Range		±2Gauss
Resolution	±2Gauss	0.0667mGauss/LSB

3.4 Pitch and roll angle parameters

Parameter	Condition	Typical
Range		X:±180°
		Y:±90°
Inclination accuracy		0.2°
Resolution	Placed horizontally	0.0055°
Temperature drift	−40°C ~ +85°C	±0.5~1°

3.5 Heading angle parameter

Parameter	Condition	Typical
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 exists)【2】
Resolution	Placed horizontally	0.0055°

Note:

[1] Please perform magnetic field calibration in the test environment before use to ensure that the sensor is familiar with the magnetic field in the environment. When calibrating, please keep away from magnetic interference.

【2】 In some vibration environments, there will be cumulative errors, and the specific errors cannot be estimated. The actual test shall prevail.

3.6 Module parameters

Basic parameters

parameter	Condition	Minimum	Default	Maximum
Communication Interface	UART	4800bps	9600bps	230400bps
	CAN	3K	250K	1M
Output content		On-chip time, acceleration: 3D, angular velocity: 3D, magnetic field: 3D, angle: 3D		
Protocol			MODBUS	
Transmission distance		10m		
Number of cascades				128Pcs
Start Time				1000ms
Operating temperature		−40℃		85℃
Storage temperature		−40℃		100℃
Shock proof				20000g

3.7 Electrical parameters

Parameter	Condition	Minimum	Default	Maximum
Supply voltage		5V	12V	36V
Working current	Work （5V）		11mA	
	Sleep（5V）		8mA	

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3.8 Size

Parameter	Specification	Tolerance	Comment
Length	51.3	±0.1	Unit: millimeter.
Width	36	±0.1	
Height	15	±0.1	
Weight	13	±1	Unit: gram

3.9 Axial Direction

The coordinate system used for attitude angle settlement is the northeast sky coordinate system. Place the module in the positive direction, as shown in the figure below, direction left is the Y-axis, the direction forward is the X-axis, and direction upward is the Z-axis. Euler angle represents the rotation order of the coordinate system when the attitude is defined as Z-Y-X, that is, first turn around the Z-axis, then turn around the Y-axis, and then turn around the X-axis.
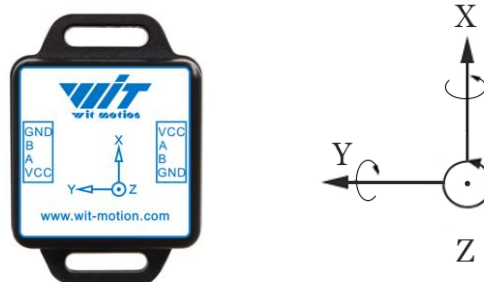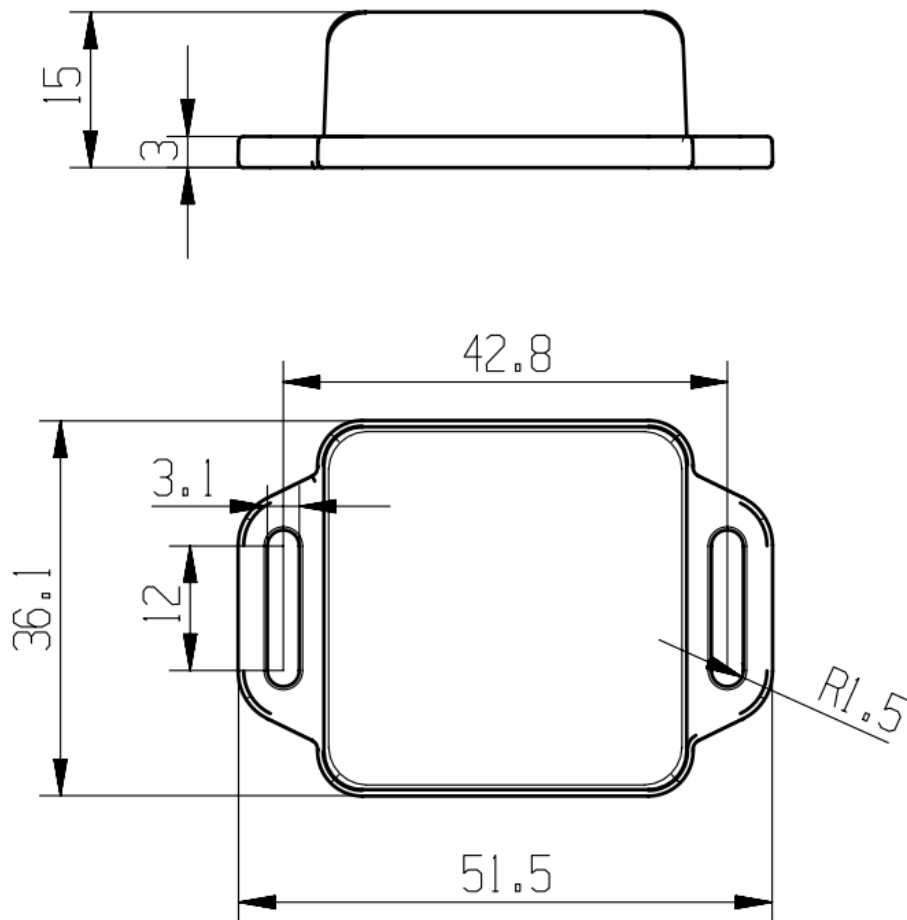
4 Pin Definition

Interface Standard

XH2.54-4P

PIN	Function
➢ VCC	5-36V input supply
➢ A	RS485 interface A - A
➢ B	RS485 interface B - B
➢ GND	Ground

5 Casing Specification

6 MODBUS Communication Protocol

Level: RS485 level

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

HWT901B RS485 module can be accessed entirely through RS485, the default address is 0x50, can be hanged by serial port instruction or MODBUS write address.

Link   to
https://drive.google.com/file/d/1ca_V03j7cYkCGV40qEeuLS-9BQlxZoVa/view?usp=share_link Modbus Protocol