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WiT HWT901B Ahrs IMU Sensor Installation Guide

**WitMotion Shenzhen Co., Ltd|
AHRS IMU Sensor | HWT901B**

Contents

HWT901B Ahrs IMU Sensor

The Robust Acceleration, Angular velocity, Angle , Magnetic filed & Air Pressure Detector
The HWT901B is a IMU sensor device, detecting acceleration, angular velocity, angle , magnetic filed as well as air pressure. 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	Barometer

Tutorial Link

Google Drive
Link to instructions DEMO:
WITMOTION Youtube Channel
HWT901B 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

Overview

HWT901B's scientific name is AHRS IMU sensor. A sensor measures 3-axis angle, angular velocity, acceleration, magnetic field and air pressure. Its strength lies in the algorithm which can calculate three-axis angle accurately. HWT901B is employed where the highest measurement accuracy is required. HWT901B 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 + Air Pressure output
- Low cost of ownership: remote diagnostics and lifetime technical support by WITMOTION service team
- Developed tutorial: providing manual, datasheet, Demo video, PC software, mobile phone APP and 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

Features

- Built-in WT901B module, for detailed parameters, please refer to the instructions.
- 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 highperformance 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.
- Maximum 200Hz data output rate. Output content can be arbitrarily selected, the output speed 0.2HZ~ 200HZ adjustable.

Specification

3.1 Parameter

Parameter	Specification
➢ Working Voltage	TTL:5V-36V
➢ Current	<40mA
➢ Size	55mm x 36.8mm X 24mm
➢ Data	Angle: X Y Z, 3-axis Acceleration: X Y Z, 3-axis Angular Velocity: X Y Z, 3-axis Magnetic Field : X Y Z, 3-axis Air Pressure : 1-Axis Time, Quaternion
➢ Output frequency	0.2Hz–200Hz
➢ Interface	Serial TTL level,
➢ Baud rate	9600(default, optional)

Measurement Range & Accuracy		
Sensor	**Measurement Range**	**Accuracy/Remark**
➢Accelerometer	X, Y, Z, 3-axis ±16g	Accuracy: 0.01g Resolution: 16bit Stability: 0.005g
➢Gyroscope	X, Y, Z, 3-axis -±2000°/s	Resolution: 16bit Stability: 0.05°/s
➢Magnetometer	X, Y, Z, 3-axis ±4900µT	0.15µT/LSB typ. (16-bit) PNI RM3100 Magnetometer Chip
➢Angle/ Inclinometer	X, Y, Z, 3-axis X, Z-axis: ±180° Y ±90° (Y-axis 90° is singular point)	Accuracy:X, Y-axis: 0.05° Z-axis: 1°(after magnetic calibration)
➢Barometer	1-axis	Accuracy : 1m

Accelerometer Parameters

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

Gyroscope parameters

Parameter	Condition	Typical Value
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)/°C
Bandwidth		5~256Hz

Magnetometer parameters

Parameter	Condition	Typical Value
Range	Cycle count value (200)	-800uT to +800 uT
Linearity ±200uT	Cycle count value (200)	0.60%
Measuring range	Cycle count value (200)	13nT/LSB

Pitch and roll angle parameters

Parameter	Condition	Typical Value
Range		X:±180°
		Y:±90°
Inclination accuracy		0.1°
Resolution	Placed horizontally	0.0055°
Temperature drift	-40°C ~ +85°C	±0.5~1°

Heading angle parameter

| Parameter	Condition	Typical Value
Range		Z:±180°
Heading accuracy	9-axis algorithm, magnetic field calibration, dynamic/static	1° (without interference from magnetic field)
	6-axis algorithm, static	0.5° (Dynamic integral cumulative error exists)
Resolution	Placed horizontally	0.0055°

Module parameters
Basic parameters

Parameter	Condition	Min	Default	Max
Interface	UART	4800bps	9600bps	230400bps
	CAN	3K	250K	1M
Output content			On-chip time, acceleration: 3D, angular velocity: 3D, magnetic field: 3D, angle: 3D	
Output rate		0.2Hz	10Hz	200Hz
Start time				1000ms
Operating temperature		-40℃		85℃
Storage temperature		-40℃		100℃
Shockproof				20000g

Electrical parameters

Parameter	Condition	Min	Default	Max
Supply voltage		5V	12V	36V
Working current	Work 5V~36V		4.6mA TTL 8.9mA 232 8.5mA 485 21.3mA(CAN	

3.2 Size
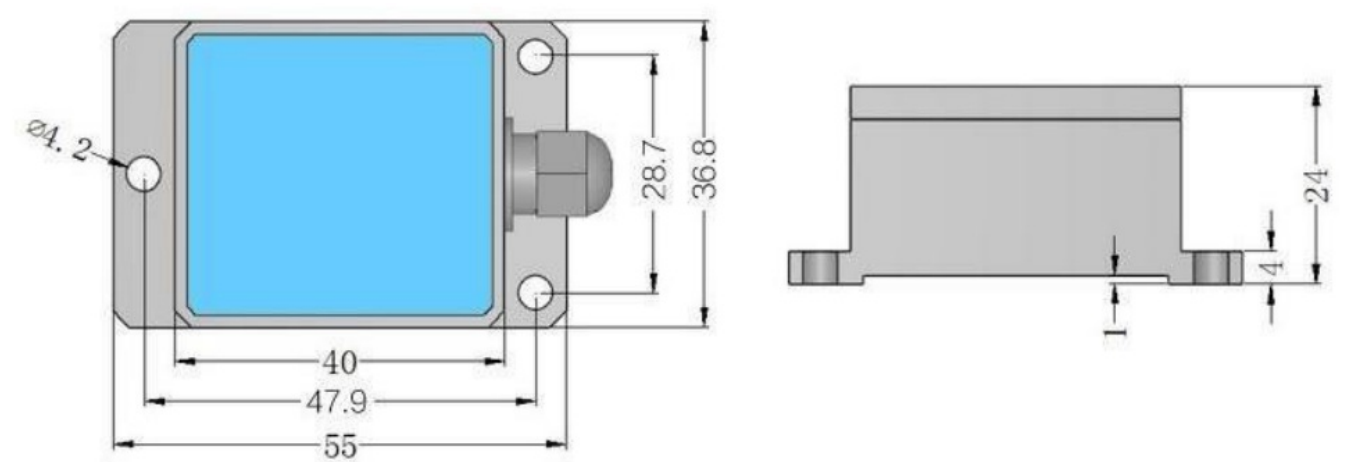
Parameter	Specification	Tolerance	Comment
Length	55	±0.1	Unit: millimeter.
Width	36.8	±0.1	
Height	24	±0.1	
Weight	100	±1	Unit: gram

3.3 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 right is the X-axis, the direction forward is the Y-axis, and direction upward is the Z-axis. Euler angle represents the rotation order of the coordinate system when the attitude is defined as ZY-X, that is, first turn around the Z-axis, then turn aroundthe Y-axis, and then turn around the X-axis.
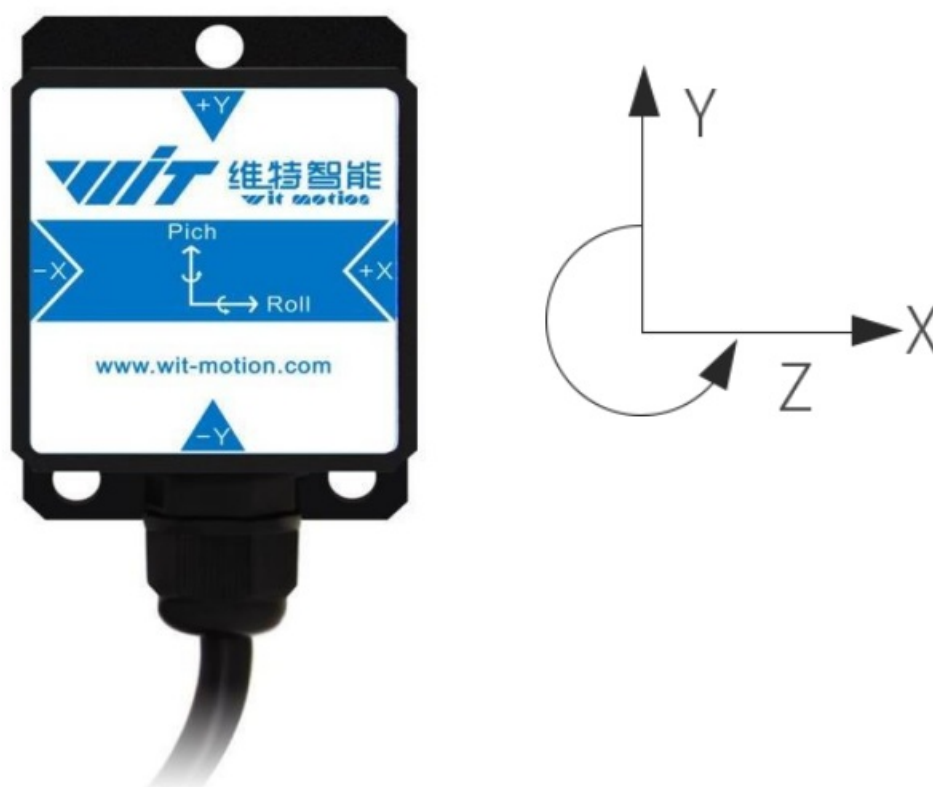
PIN Definition

PIN	Color	Function
VCC	RED	Input Supply TTL : powered by 3.3-5V
RX	GREEN	Serial data input RX :connected with TX
TX	YELLOW	Serial data output TX :connected with RX
GND	BLACK	Ground GND

Communication Protocol

Level: TTL level
Baud rate:4800, 9600 (default), 19200 38400, 57600, 115200, 230400, stop
bit and parity
Link to WITMOTION protocol.

HWT901B TTL
manual v230620
www.wit-motion.com
support@wit-motion.com

Documents / Resources

WiT HWT901B Ahrs IMU Sensor [pdf] Installation Guide
HWT901B Ahrs IMU Sensor, HWT901B, Ahrs IMU Sensor, IMU Sensor, Sensor

References

- ⌠ **Hukseflux | #1 in solar radiation & heat flux measurement**
- **Welcome to nginx!**
- **Welcome to nginx!**
- **User Manual**