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- › [WitMotion Shenzhen Co.,Ltd](#) /
- › WitMotion WT901BLECL MPU9250 9-Axis IMU Sensor User Manual

WitMotion Shenzhen Co.,Ltd WT901BLECL

WitMotion WT901BLECL MPU9250 9-Axis IMU Sensor User Manual

High-Precision Accelerometer, Gyroscope, Angle, and Magnetometer with Bluetooth 5.0

1. INTRODUCTION

The WitMotion WT901BLECL is a high-precision 9-axis Inertial Measurement Unit (IMU) sensor designed for various applications requiring accurate motion and orientation tracking. It integrates an MPU9250 chip, providing data for acceleration, angular velocity (gyroscope), angle (pitch, roll, yaw), and magnetic field. Equipped with Bluetooth 5.0, it offers robust wireless connectivity and low power consumption. This manual provides essential information for setting up, operating, and maintaining your WT901BLECL sensor.



Image: The WT901BLECL sensor shown alongside a smartphone displaying its data interface, including graphs for X, Y, Z angles and numerical readouts.

2. PACKAGE CONTENTS

Upon opening the package, please verify that all items listed below are present:

- 1 x WT901BLECL BLE 5.0 Sensor with Type-C Interface
- 1 x Type-C Data and Charging Cable
- 1 x Welcome Guide

Note: A BLE 5.0 adapter is sold separately and may be required for PC connectivity if your computer does not have built-in Bluetooth 5.0.

3. PRODUCT OVERVIEW

The WT901BLECL sensor is designed for reliable and accurate data acquisition. Its compact form factor and robust design make it suitable for various applications. Key features include:

- **9-Axis Data Output:** Provides 3-axis acceleration, 3-axis angular velocity (gyroscope), 3-axis angle (Pitch, Roll, Yaw), and magnetic field data.
- **Bluetooth 5.0 Connectivity:** Offers a wireless range of up to 50 meters in open areas, ensuring stable data transmission with low power consumption.
- **Kalman Filtering Algorithm:** Integrates advanced dynamic fusion algorithms and Kalman filtering for stable data output, excellent bias stability, low noise levels, and improved measurement accuracy.
- **USB Type-C Interface:** For data communication and charging.
- **Multi-Sensor Support:** Compatible with Windows computers and Android smartphones, supporting simultaneous connection of up to 4 sensors.

Bluetooth 5.0対応姿勢センサー

テスト統合を簡素化し、プロジェクト開発を支援する



9軸データ出力



3軸加速度



3軸ジャイロ
スコープ



3軸角度



3軸磁場



四元数



シリアルポ
ートの状態

Image: An illustration detailing the 9-axis data output of the sensor, showing icons for 3-axis acceleration, gyroscope, angle, magnetic field, quaternions, and serial port status.

WITMOTIONのコア優位性

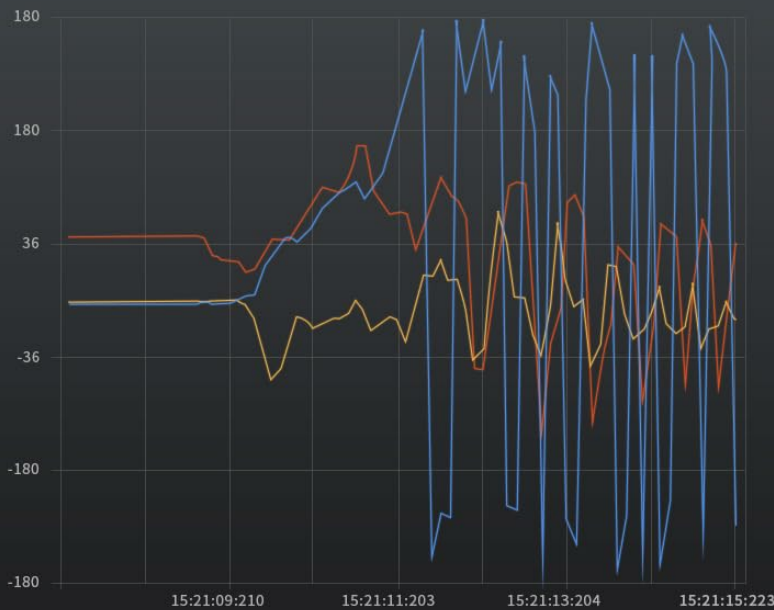
最先端MEMS技術チップ

低消費電力

高性能

高い耐干渉性

Mems



カルマンフィルタリングアルゴリズム
× R&D動的融合アルゴリズム

↑ 高い安定性

↓ ノイズ低減

↑ 精度向上

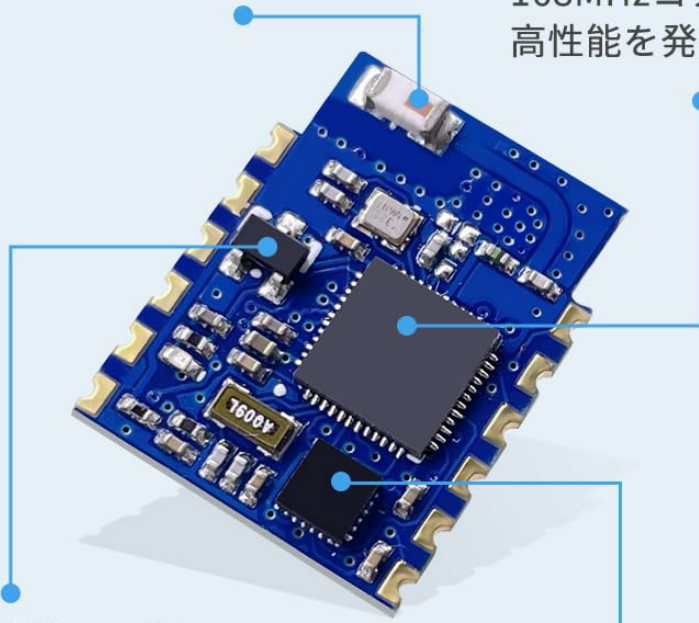
Image: A visual representation of WitMotion's core advantages, highlighting the advanced MEMS technology chip and the Kalman filtering algorithm for high stability, noise reduction, and improved accuracy.

ハードウェア解析

高品質なコンポーネントにより、
IMUデータ出力の安定性と精度を確保

内蔵Bluetoothアンテナにより、
安定したデータ伝送を実現

168MHzコアのMCUを搭載し、
高性能を発揮



電源チップがモジュールの
電圧安定性を保護

MEMSセンサーチップを内蔵し、
信頼性の高いデータ測定が可能

Image: A detailed hardware analysis showing the internal components of the sensor, including the integrated Bluetooth antenna, 168MHz MCU, power chip for voltage stability, and MEMS sensor chip for reliable data measurement.

4. SPECIFICATIONS

Parameter	Value
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Parameter	Value
Manufacturer	WitMotion Shenzhen Co.,Ltd
Model Number	WT901BLECL
Measurement Range (Acceleration)	±16g
Measurement Range (Angular Velocity)	±2000°/s
Measurement Range (Magnetic Field)	±2 Gauss
Measurement Range (Angle)	X/Z ±180°, Y ±90°
Resolution (Acceleration)	0.5mg/LSB (2048LSB/g)
Resolution (Angular Velocity)	0.061(°/s)/LSB
Resolution (Magnetic Field)	0.0667mG/LSB
Resolution (Angle)	0.0055°/LSB
Accuracy (Angle)	X, Y axis: 0.2°; Z axis: 1° (without magnetic interference, after calibration)
Output Content	Acceleration, Angular Velocity, Angle, Magnetic Field (configurable)
Communication Method	BLE 5.0 technology, max 50m (in open area)
Usage Time	Approx. 8 hours
Weight	18g
Battery Capacity	130mAh
Dimensions	32.5 x 23.5 x 11.6 mm

製品パラメータ

測定範囲 加速度: +16g、角速度: $\pm 2000^\circ/\text{s}$ 、
磁場: ± 2 ガウス、角度: X/Z $\pm 180^\circ$ 、Y $\pm 90^\circ$

分解能 加速度: 0.5mg/LSB (2048LSB/g)
角速度: 0.061($^\circ/\text{s}$)/LSB
磁場: 0.0667mG/LSB 角度: 0.0055 $^\circ$ /LSB

精度 X、Y軸: 0.2 $^\circ$ Z軸: 1 $^\circ$
(磁場干渉なし、キャリブレーション後)

出力内容 加速度、角速度、角度、磁場
(デフォルト出力ではない)

通信方式 BLE 5.0技術を使用、最大50m (開けた場所で)

使用時間 8時間

重量 18g

バッテリー 130mAh

寸法 32.5*23.5*11.6mm

Image: A table summarizing the product specifications, including measurement ranges, resolution, accuracy, communication method, battery life, weight, and dimensions.

5. SETUP

Follow these steps to set up your WitMotion WT901BLECL sensor:

5.1 Charging the Sensor

1. Connect the provided Type-C cable to the sensor's Type-C port.

2. Connect the other end of the cable to a USB power source (e.g., computer USB port, USB wall adapter).
3. The sensor will begin charging. A full charge typically takes approximately 2 hours.

5.2 Software Installation

WitMotion provides PC software and smartphone applications to facilitate data acquisition and analysis. These tools are essential for interacting with the sensor.

- **PC Software:** Download the latest version of the WitMotion PC software from the official website www.witmotion.com. Follow the installation instructions provided with the software.
- **Smartphone App:** Search for the WitMotion app on your Android device's app store. Install the application.

開発とテストを簡素化

WITMOTIONはPC用ソフトウェアおよびスマートフォンアプリを提供二次開発を支援する豊富な開発資料とSDKを完備



Image: An illustration demonstrating how WitMotion simplifies development and testing by providing PC software, smartphone apps, and comprehensive development resources like SDKs and manuals.

5.3 Connecting the Sensor

The WT901BLECL connects wirelessly via Bluetooth 5.0.

1. Ensure the sensor is charged and powered on.
2. **For PC Connection:**
 - Ensure your PC has Bluetooth 5.0 capability. If not, a separate BLE 5.0 adapter is required.

- Open the WitMotion PC software.
- Navigate to the connection settings within the software and search for available Bluetooth devices.
- Select the WT901BLECL from the list and establish a connection.

3. For Smartphone Connection (Android):

- Enable Bluetooth on your Android smartphone.
- Open the WitMotion smartphone app.
- The app should automatically scan for nearby WitMotion sensors. Select your WT901BLECL to connect.

6. OPERATING INSTRUCTIONS

Once connected, you can begin acquiring and analyzing data from the sensor.

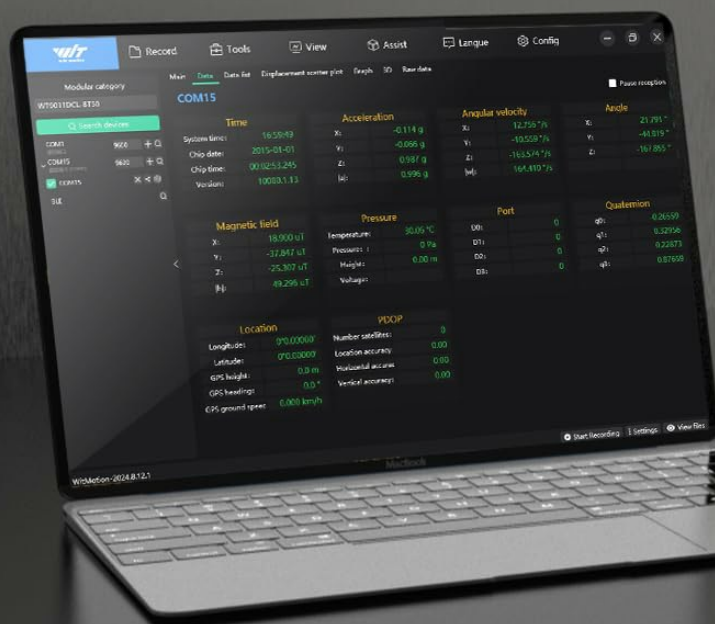
6.1 Real-time Data Monitoring

Both the PC software and smartphone app provide real-time display of sensor data.

- The interface typically includes a dashboard showing current values for acceleration, angular velocity, angle, and magnetic field.
- Graphs visualize data trends over time, allowing for dynamic analysis of motion and orientation.
- The software supports multi-connection, allowing you to monitor up to 4 sensors simultaneously.

リアルタイムデータ更新

解析姿勢センサーシステム



最大4台
までのマルチ接続対応

WITMOTIONソフトウェアの利点



コンパス



3D



ダッシュボード



設定



曲線表示



データ記録

Image: A setup showing a laptop connected to multiple WitMotion sensors, demonstrating real-time data updates and analysis capabilities of the attitude sensor system, supporting up to 4 simultaneous connections.

6.2 Data Recording and Export

The WitMotion software allows you to record sensor data for later analysis.

- Data can typically be recorded in various formats, such as .bin, .play, .csv, and .txt.
- Refer to the software's user guide for detailed instructions on starting, stopping, and managing data recordings.

6.3 Sensor Calibration

For optimal accuracy, especially with magnetic field measurements, calibration may be required.

- The software includes calibration options for the accelerometer, gyroscope, and magnetometer.
- Follow the on-screen instructions within the software to perform calibration procedures.
- It is recommended to perform magnetic field calibration in an environment free from strong magnetic interference.

7. MAINTENANCE

To ensure the longevity and optimal performance of your WT901BLECL sensor, follow these maintenance guidelines:

- **Cleaning:** Use a soft, dry cloth to clean the sensor. Avoid using harsh chemicals or abrasive materials.
- **Storage:** Store the sensor in a cool, dry place away from direct sunlight and extreme temperatures.
- **Battery Care:** For prolonged storage, ensure the battery is partially charged (around 50%). Avoid fully discharging the battery for extended periods.
- **Environmental Considerations:** Avoid exposing the sensor to water, dust, or strong electromagnetic fields, which can affect its performance and lifespan.

8. TROUBLESHOOTING

If you encounter issues with your WT901BLECL sensor, refer to the following common problems and solutions:

8.1 Sensor Not Connecting

- **Check Power:** Ensure the sensor is charged and powered on.
- **Bluetooth Status:** Verify that Bluetooth is enabled on your PC or smartphone.
- **BLE Adapter:** If connecting to a PC, confirm that your PC has Bluetooth 5.0 or that a compatible BLE 5.0 adapter is correctly installed.
- **Range:** Ensure the sensor is within the 50-meter Bluetooth range and there are no significant obstacles.
- **Software/App:** Restart the WitMotion software or app and try connecting again.

8.2 Inaccurate Data Readings

- **Calibration:** Perform a sensor calibration, especially for the magnetometer, in an environment free from magnetic interference.
- **Interference:** Keep the sensor away from strong magnetic fields, large metal objects, or other electronic devices that might cause interference.
- **Firmware:** Check the WitMotion website for any available firmware updates for your sensor model.

8.3 Short Battery Life

- **Charging:** Ensure the sensor is fully charged before use.
- **Usage Conditions:** Extreme temperatures can affect battery performance.
- **Battery Age:** Over time, rechargeable batteries naturally degrade.

9. WARRANTY AND SUPPORT

WitMotion provides comprehensive support for its products.

- **Warranty:** The WT901BLECL sensor comes with a 12-month quality warranty.
- **Tutorials and Resources:**
 - A tutorial link is printed on the guide card included in your package.
 - Complete tutorial downloads and additional resources are available on the official WitMotion website: www.wit-motion.com.
- **Contact Support:** If you have any questions, require technical assistance, or need to claim warranty service, please do not hesitate to contact WitMotion support. They are committed to providing satisfactory service and solutions.
Email: support@wit-motion.com

10. APPLICATIONS

The WitMotion WT901BLECL sensor is versatile and can be applied in various fields:

- **Virtual Reality (VR):** For head tracking and motion capture in VR environments.
- **Robotics:** For robot navigation, balance control, and orientation sensing.
- **Motion Monitoring:** In sports science, fitness tracking, and human-computer interaction.
- **Medical Rehabilitation:** For tracking patient movement and progress during therapy.
- **Industrial Automation:** For monitoring the orientation and movement of machinery.

適用分野

VR



ロボット



動作モニタリング



医療リハビリ
リテーション

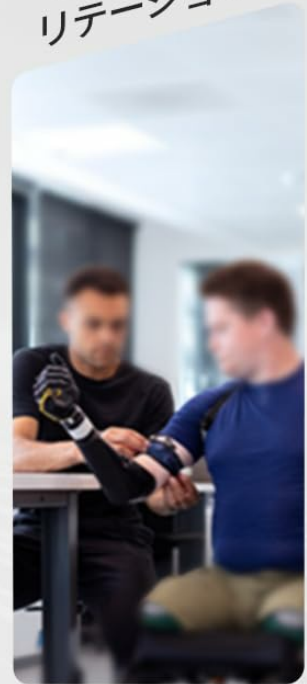


Image: Examples of application fields for the sensor, including VR headsets, robots, motion tracking for athletes, and medical rehabilitation scenarios.

