



BW-IMU225 Series

**Low-cost CAN Inertial Measurement
Unit**

Technical Manual

V4.0



Introduction

BW-IMU225 is a high-precision strapdown inertial measurement unit that can measure the angular velocity and acceleration of a moving carrier. The data deviation is estimated by the 6-state Kalman filter with appropriate gain, which is suitable for inertial attitude measurement in motion or vibration state.

BW-IMU225 uses highly reliable MEMS accelerometers and gyroscopes, and it uses algorithms to ensure measurement accuracy. At the same time, the sealing design and strict production process ensure that the product can accurately measure movement parameters such as the angular velocity, acceleration and attitude of the carrier in harsh environments. Through various compensations such as nonlinear compensation, quadrature compensation, temperature compensation and drift compensation, the error source of BW-IMU225 can be greatly eliminated and the product accuracy level can be improved. It has a digital interface, which can be easily integrated into the user's system.

Feature

- Dynamic compensation, quadrature compensation
- Sampling frequency up to 500Hz
- CAN Output
- Wide temperature range: $-40\text{ }^{\circ}\text{C} \sim +85\text{ }^{\circ}\text{C}$, Temperature compensation
- Small size: L60×W59×H29mm

Application

- Unmanned ships and underwater robots
- Construction machinery
- Stable platform
- AGV unmanned guided vehicle
- Heavy truck
- Unmanned drive
- Robots
- Unmanned aircrafts

Product Feature



Electrical index

| | |
|-----------------------|-----------------|
| Power voltage | 9-36V DC |
| Working current | 30mA (40mA max) |
| Operating temperature | -40~85°C |
| Storage temperature | -55~100°C |



Performance index

| | | |
|---------------|------------------------------------|--|
| Gyro | Resolution | 0.01°/sec |
| | Range | ±400°/sec |
| | Bias stability at room temperature | < 2°/h (100s,1σ) < 20°/h (10s,1σ) |
| | Angle random walk coefficient | < 0.1 °/√h |
| | Bias repeatability | < 50 °/h (1σ) |
| | Scale factor non-linearity | ≤100ppm (1σ) |
| | Scale factor repeatability | ≤100ppm (1σ) |
| | Bandwidth | 100Hz |
| Accelerometer | Range: X, Y, Z | ±3.6g |
| | Resolution | 0.01mg |
| | Add zero offset | 0.15mg |
| | Bias stability | 0.001mg (25°C, 100s, 1σ) 0.01mg (25°C, 10s, 1σ) |

Resolution: The smallest change value of the measured value that the sensor can detect and distinguish within the measurement range.



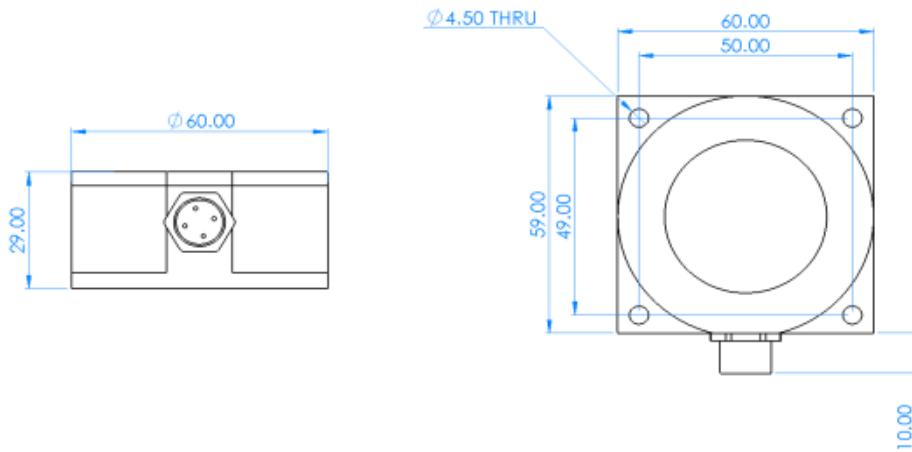
Mechanical Index

| | |
|------------------|------------------------------------|
| Connector | Metal joint (Cable 1.5m) |
| Protection level | IP67 |
| Shell material | Magnesium aluminum alloy anodizing |
| Installation | Four M4 screws |



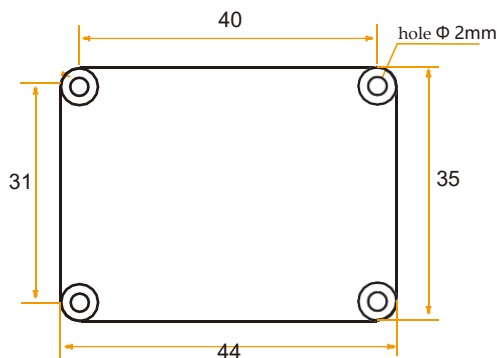
Package product size

Product size: L60*W59*H29 (mm)



PCB size

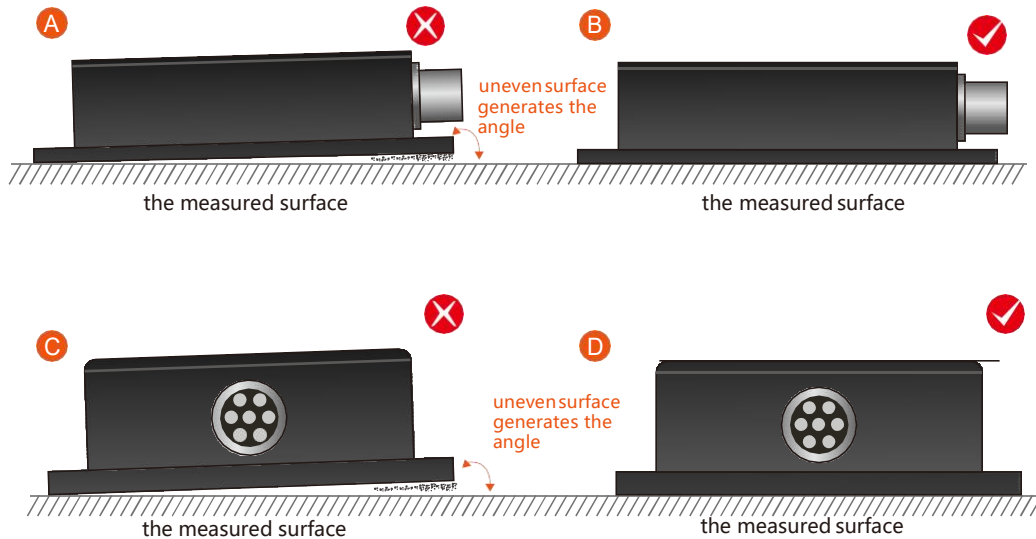
Product size: L44*W35*H11 (mm) The length and width may have an error of ± 1 mm, please refer to the actual product



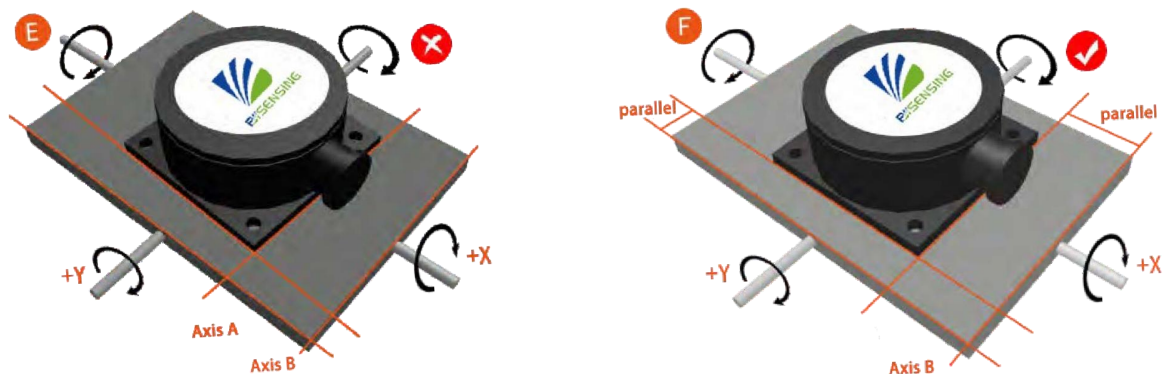
Installation

The correct installation method can avoid measurement errors. When installing the sensor, please do the following:

First of all, make sure that the sensor mounting surface is completely close to the measured surface, and the measured surface should be as level as possible, and there should be no included angles as shown in Figure A and Figure C. The correct installation method is shown in Figure B and Figure D.



Secondly, the bottom line of the sensor and the axis of the measured object cannot have an angle as shown in Figure E. When installing, keep the bottom line of the sensor parallel or orthogonal to the axis of rotation of the measured object. This product can be installed horizontally or vertically (vertical installation needs to be customized), and the correct installation method is shown in Figure F.



Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

Debugging software

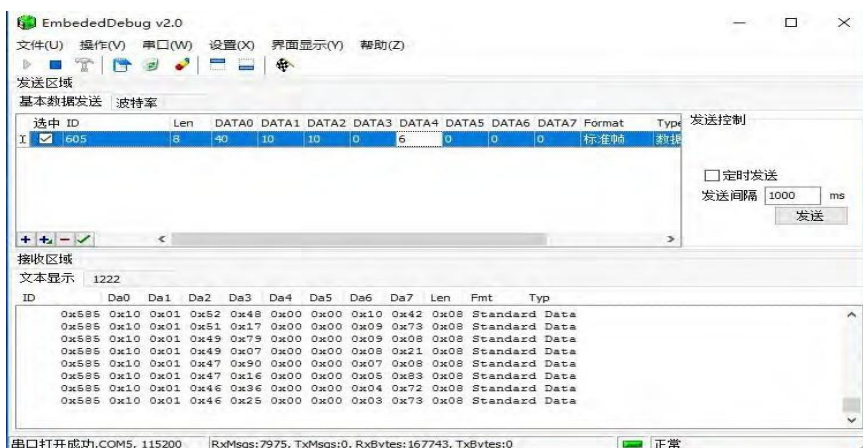
When communicating with CAN interface products, there is generally a dedicated CAN receiving device, so the software is the one that comes with the CAN acquisition device, and the usage methods are different, so there is no corresponding supporting software. Take the CAN receiver module and product communication used by our company as an example:



Configure CAN baud rate and parameters as follows:



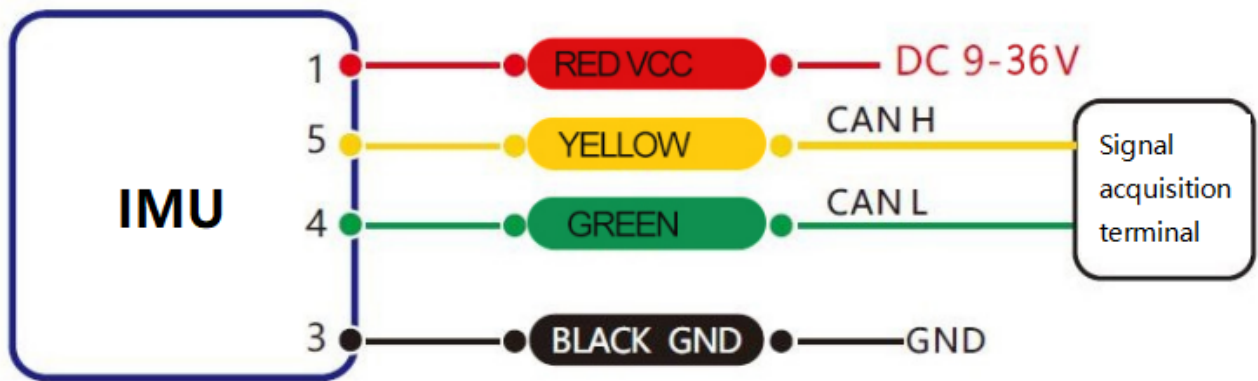
The receiving and sending area is set as follows:



Electrical Interface

CAN Wiring Definition

| | RED | BLUE | BLACK | GREEN | YELLOW |
|------------|-----------------|------|-----------|-------|--------|
| Wire color | 1 | 2 | 3 | 4 | 5 |
| function | VCC DC 9-36V | NC | GNDground | CAN L | CAN H |



CAN总线接线图

Order information

| Product model | Communication mode | Package situation |
|---------------|--------------------|---------------------------|
| BW-IMU225-CAN | CAN | IP67 Package /Metal joint |

Executive standard

- Enterprise Quality System Standard: ISO9001:2015 Standard (Certificate No.064-21-Q-3290-RO-S)
- CE certification (certificate number: M.2019.103. U Y1151)
- ROHS (certificate Number: G 190930099)
- GB/T 191 SJ 20873-2003 General specification for inclinometer and level
- GBT 18459-2001 The calculation method of the main static performance index of the sensor
- JJF 1059.1-2012 Evaluation and expression of measurement uncertainty
- GBT 14412-2005 Mechanical vibration and shock Mechanical installation of accelerometer
- GJB 450A-2004 General requirements for equipment reliability
- GJB 909A Quality control of key parts and important parts
- GJB899 Reliability appraisal and acceptance test
- GJB150-3A High temperature test
- GJB150-4A Low temperature test
- GJB150-8A Rain test
- GJB150-12A Sand and dust experiment
- GJB150-16A Vibration test
- GJB150-18A Impact test
- GJB150-23A Tilt and rock test
- GB/T 17626-3A Radio frequency electromagnetic field radiation immunity test
- GB/T 17626-5A Surge (impact) immunity test
- GB/T 17626-8A Power frequency magnetic field immunity test
- GB/T 17626-11A Immunity to voltage dips, short-term interruptions and voltage changes

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Measurement Unit**

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