



# **BW-IMU325 Series**

**Cost-effective**

**Inertial Measurement Unit**

# **Technical Manual**



## Introduction

BW-IMU325 is a high-precision 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-IMU325 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-IMU325 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
- RS232 /485/TTL Output optional
- Wide temperature range:  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ , Temperature compensation
- Small size:  $L60 \times W59 \times H29\text{mm}$

## Application

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

## Product Feature

### Electrical index

|                       |                 |
|-----------------------|-----------------|
| Power supply          | 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 | < 1.5°/h ( 100s, 1σ)<br>< 15°/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)<br>0.01mg ( 25°C, 10s, 1σ) |

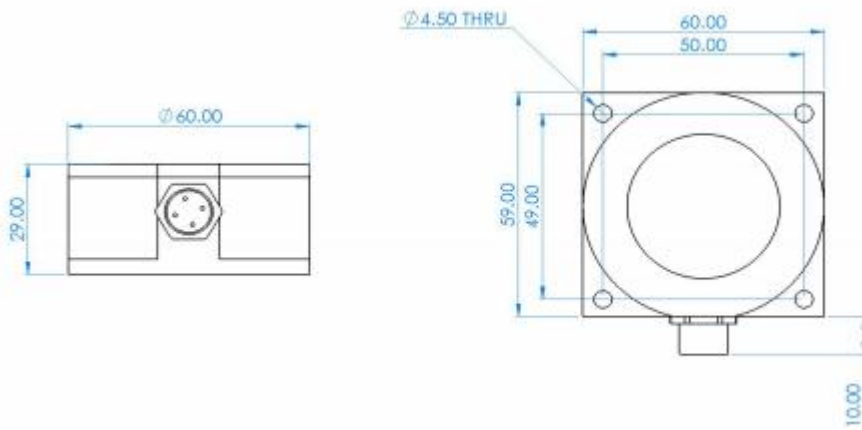
**Resolution:** The smallest change value of the measured value that the sensor can detect and distinguish within the measurement range.

### Mechanical Index

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

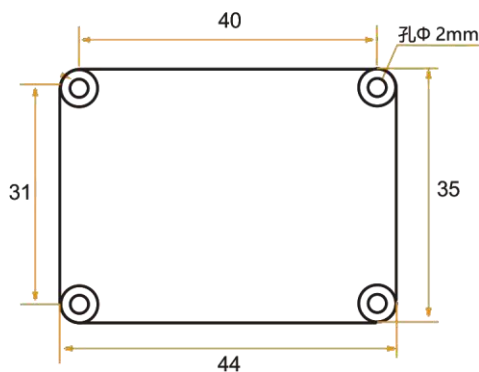
### Package product size

Product size: L60\*W59\*H29 (mm)



### PCB size

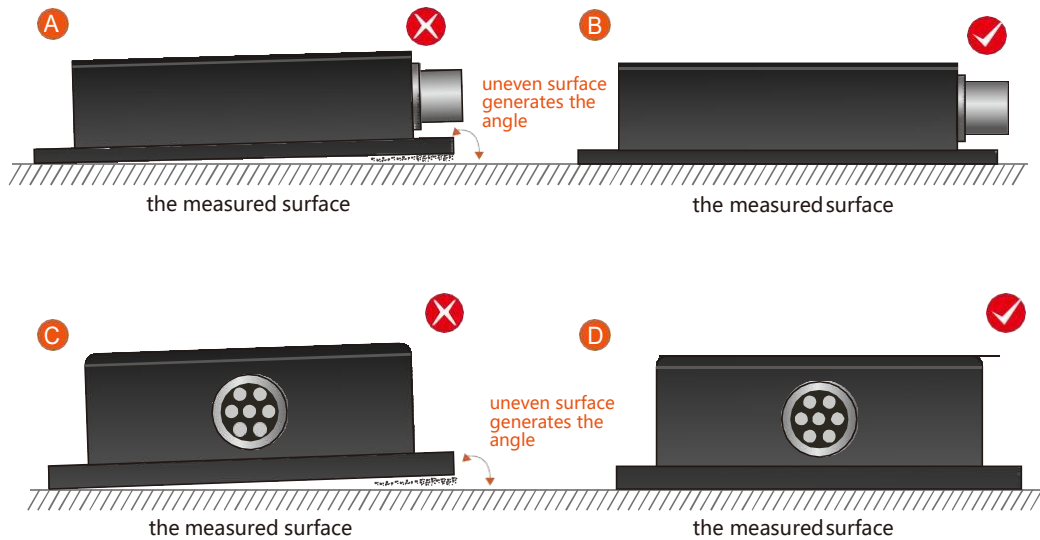
Product size: L44\*W35\*H11 (mm) The length and width may have an error of  $\pm 1$ mm, please refer to the actual product



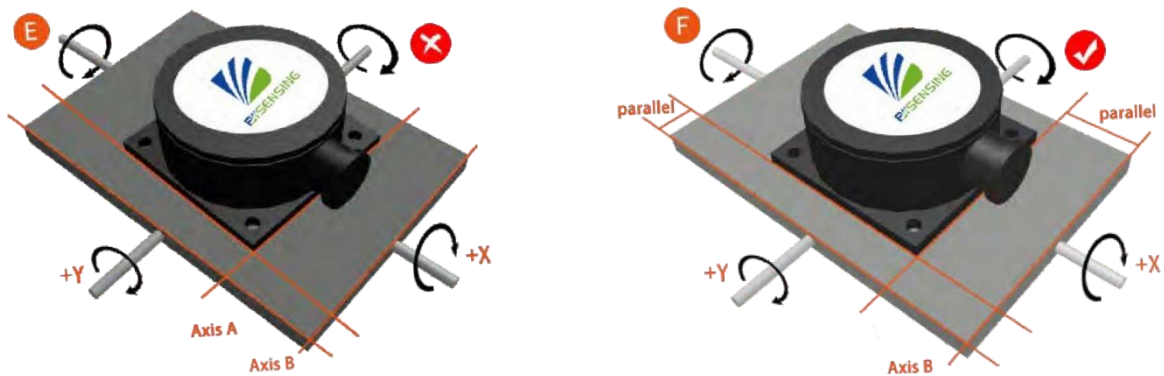
### Installation

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.

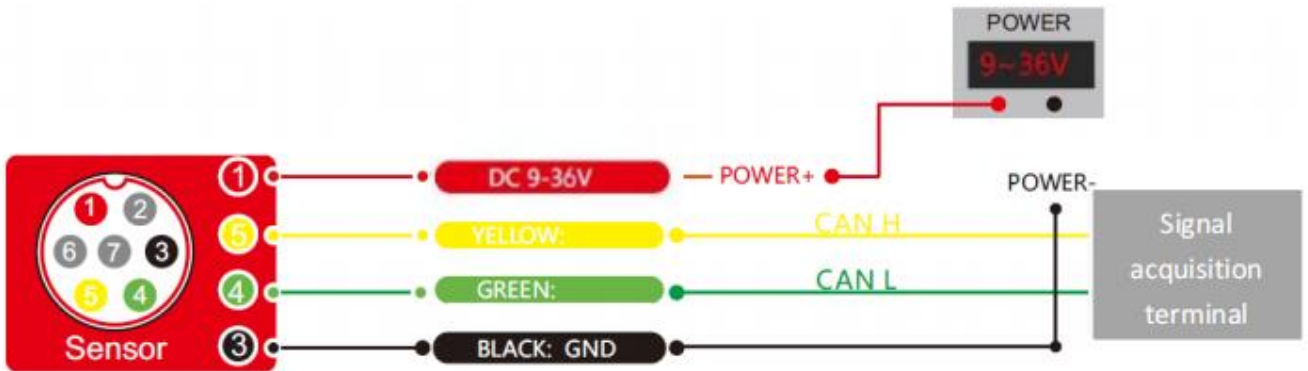


Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

### Electrical Connection

Wiring Definition

| Wiring color function | RED             | BLUE | BLACK | GREEN | YELLOW |
|-----------------------|-----------------|------|-------|-------|--------|
|                       | 1               | 2    | 3     | 4     | 5      |
|                       | VCC<br>DC 9-36V | NC   | GND   | CAN L | CAN H  |

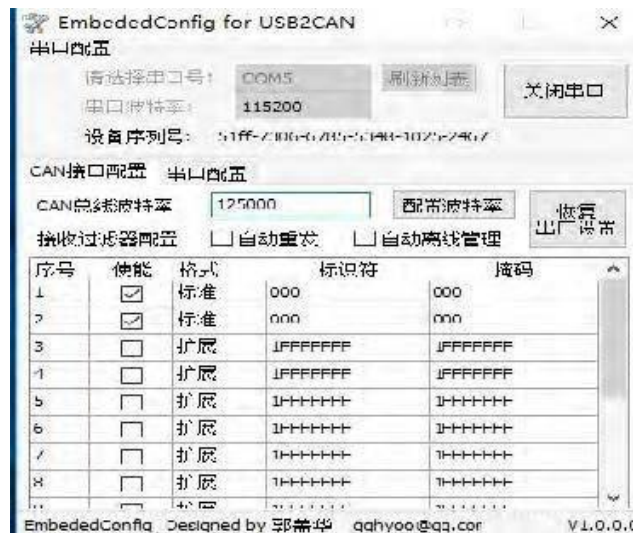


### Debugging software

Since there is generally a dedicated CAN receiving device for data communication with products with CAN interface, the software is the software that comes with the CAN acquisition device, and the usage methods are different, so there is no corresponding supporting software. The following is an example of the communication between the CAN receiving module and the product adopted by our company:



Configure the CAN baud rate and parameters as follows:



The receiving and sending areas are set as follows:



## Order information

| Product model | Communication mode | Package situation         |
|---------------|--------------------|---------------------------|
| BW-IMU325-CAN | CAN                | IP67 Package /Metal joint |

## Executive standard

- Specification for Static Calibration of Biaxial Inclination Sensors National Standard (Draft)
- GB/T 191 SJ 20873-2003 General specification for inclinometer and level



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**Cost-effective Inertial  
Measurement Unit**

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