



# **BW-IMU327 Series**

**High-performance**

**Inertial Measurement Unit**

# **Technical Manual**

V4.0



## Introduction

The BW-IMU327 is a cost-effective short-coupled inertial measurement unit that can measure angular velocity and acceleration parameters of moving carriers. The raw data is estimated by a 6-state Kalman filter with appropriate gain, making it suitable for inertial measurements in motion or vibration.

BW-IMU327 adopts highly reliable MEMS accelerometers and gyroscopes, and guarantees the measurement accuracy through algorithms. Meanwhile, the hermetically sealed design and strict production process ensure that the product can still accurately measure the angular velocity and acceleration of the carrier and other motion parameters under harsh environments. The BW-IMU327 is equipped with 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×W59×H29mm

## 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	9-35V 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	< 0.5°/h ( 100s, 1σ) < 5°/h ( 10s, 1σ)
	Bias stability at full temperature	< 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
	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.



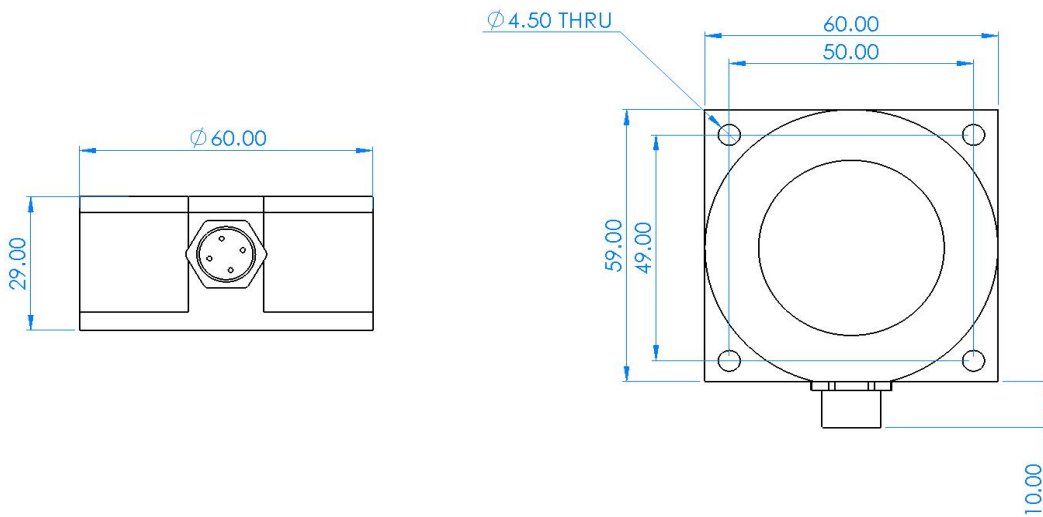
### Mechanical Index

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



### Package product size

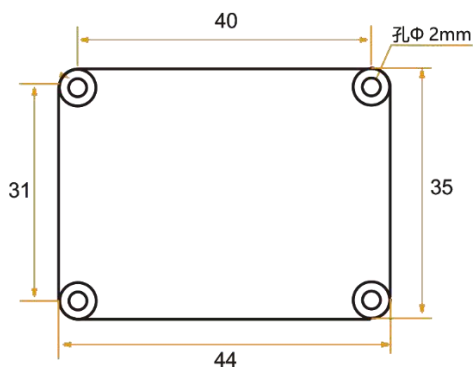
Product size: L60\*W59\*H29 (mm)



### PCB size



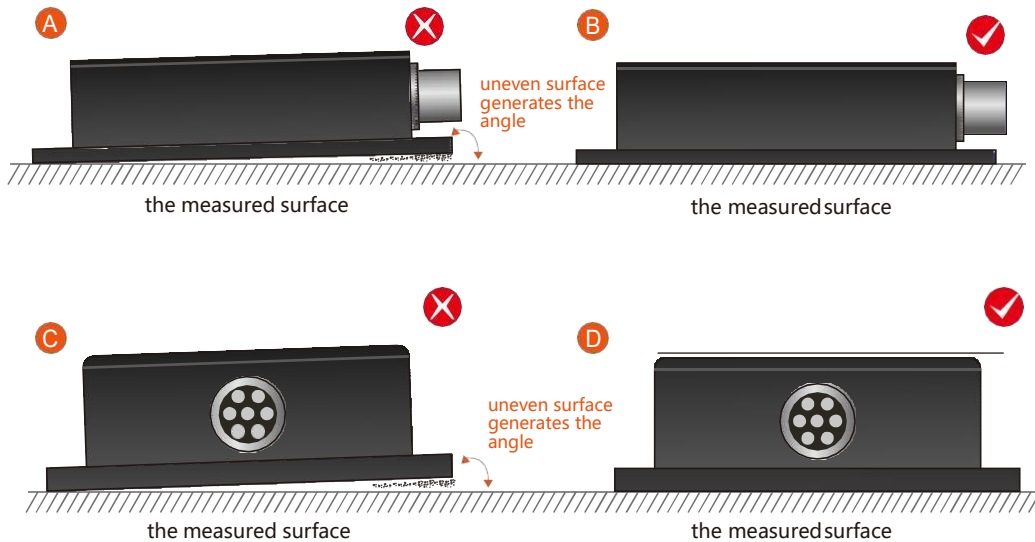
Product size: L44\*W35\*H11 (mm) The length and width may have an error of  $\pm 1$ mm, please refer to the actual product



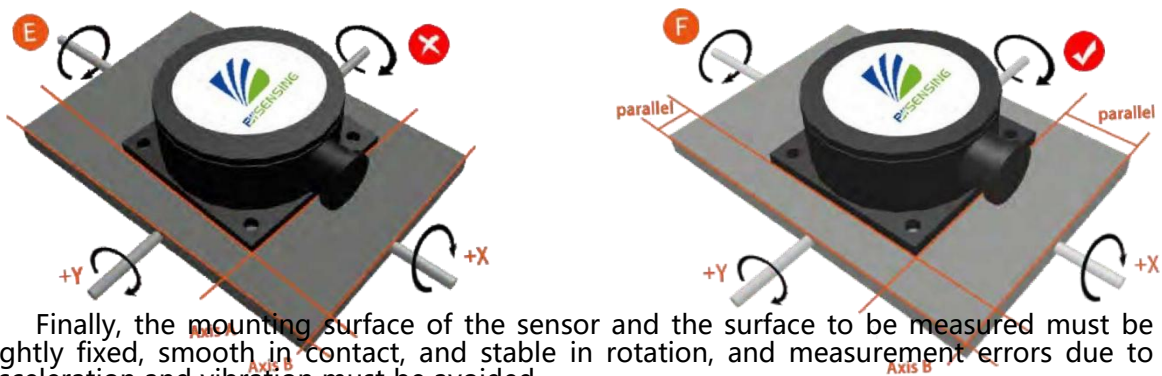
## Installation

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.

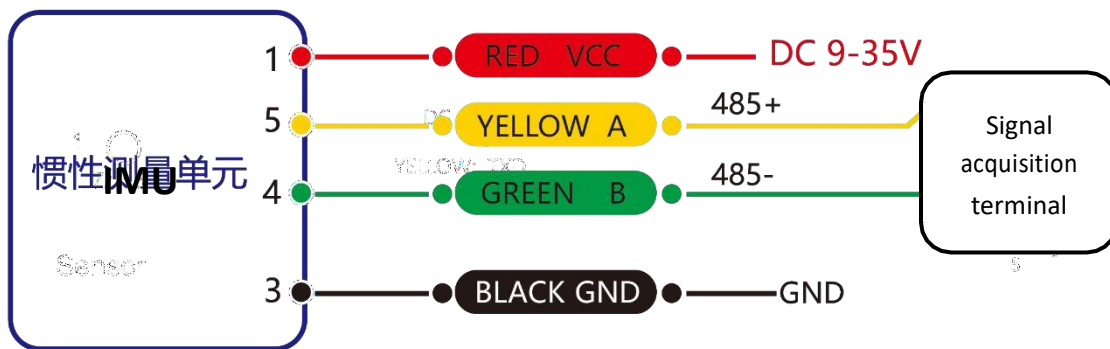


Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

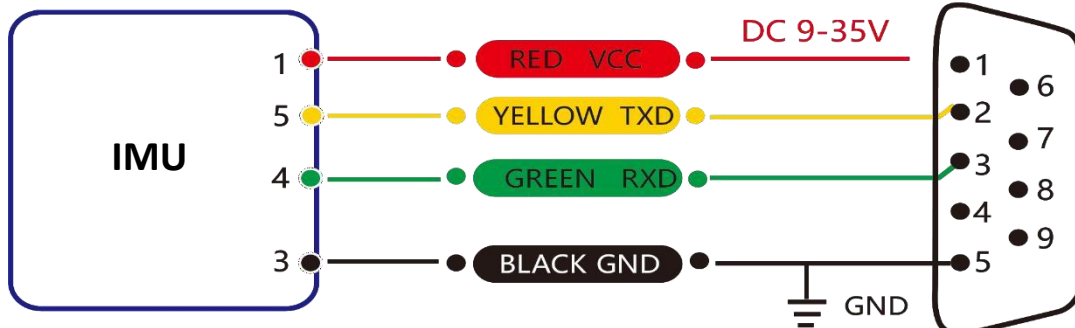
### Electrical Connection

#### Wiring Definition

	RED	BLUE	BLACK	GREEN	YELLOW
Wiring color	1	2	3	4	5
function	Power Positive DC 9-35V	NC	GND	Receive RXD B、D-	Send TXD A、D+



RS485 Wiring diagram



RS 232接线图

## Debugging software

You can download the serial debugging assistant directly on the official website (Technical service -> download area), or you can use the more convenient and intuitive host computer software.

BW-IMU327 supporting serial port debugging software can connect the inclination sensor on the computer to display the angle. The software debugging interface is shown in the figure below. Using the tilt angle to debug the host computer, you can easily display the current X and Y directions, and you can also modify and set other parameters.

### Steps for use:

- ① Connect the serial port hardware of the inclinometer correctly, and connect the power supply.
- ② Select correct device model. (Select azimuth series.)
- ③ Select computer serial port and baud rate and click connect serial port.
- ④ Click start button and the current inclination angle of the incliner in X and Y directions will be displayed on the screen.



**Order information**

<b>Product model</b>	<b>Communication mode</b>	<b>Package situation</b>
BW-IMU327-485	RS485	IP67 Package /Metal joint
BW-IMU327 -232	RS232	IP67 Package /Metal joint
BW-IMU327 -TTL	TTL	IP67 Package /Metal joint

**Executive standard**

- National Standard for Static Calibration of Biaxial Inclination Sensors (Draft)
- GB/T 191 SJ 20873-2003 General Specification for Tiltmeters and Leveling Devices



# **BW-IMU500C Series**

## **High-precision Inertial Measurement Unit**

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