BW-IMU125C Series

High-Performance Inertial Measurement Unit

Technical Manual

V3.0

Introduction

BW-IMU125C 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-IMU125C 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-IMU125C can be greatly eliminated and the product accuracy level can be improved. BW-IMU125C 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 interface output
- Wide temperature range: -40 ℃~+85℃, Temperature compensation
- Small size: L60×W59×H29mm

Application

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

Product Feature

Electrical index

Power voltage	9-36V DC
Working current	30mA （40mA Max)
Operating temperature	-40~85℃
Storage temperature	-55~100℃

Performance index

Gyro	Resolution	0.01°/sec
	Range	±400°/sec
	Bias stability at room temperature	< 0.5 °/h （100s,1σ) < 30 °/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	±3.6 g
	Resolution	0.01 mg
	Bias stability	0.001mg （25℃，100s，1σ) 0.01mg （25℃，10s，1σ)

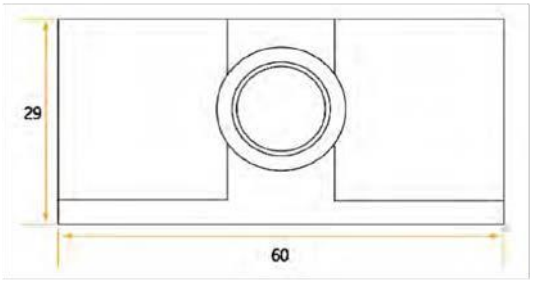
Resolution: The smallest change value of the measured value that the sensor can detect and distinguish within the measurement range.
Accuracy: The root mean square error of the actual angle and the sensor measuring angle for multiple (≥16 times) measurements.

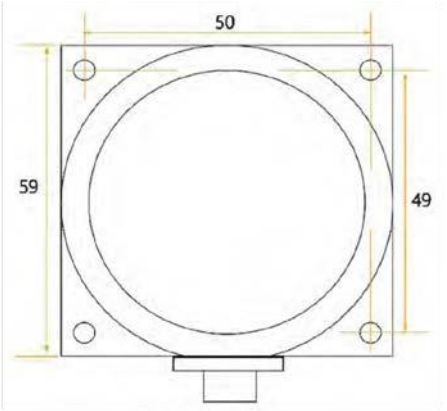
Mechanical index

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

Package product size

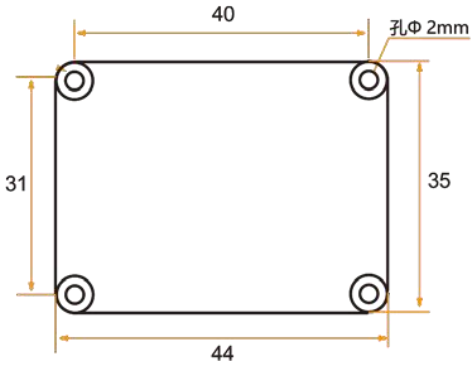
Product size：L60*W59*H29（mm）





PCB Size

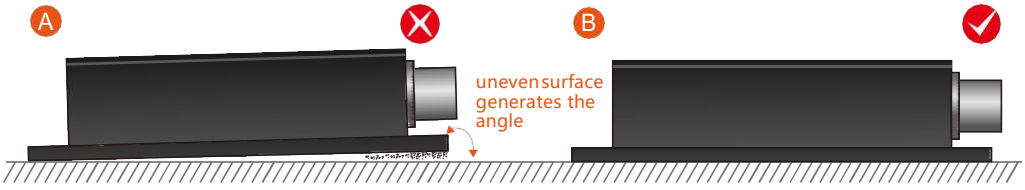
Product size：L44*W35*H11（mm） The length and width may have an error of ±1mm, please refer to the actual product

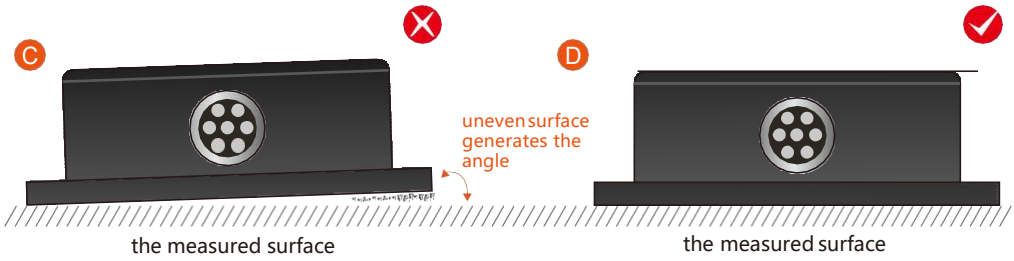


Installation

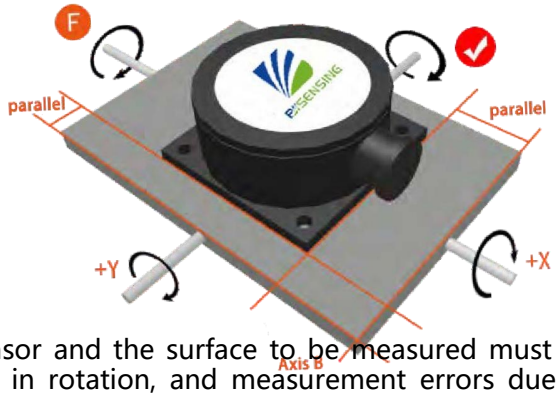
The correct installation method can avoid measurement errors. When installing the sensor, please do the following:

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.



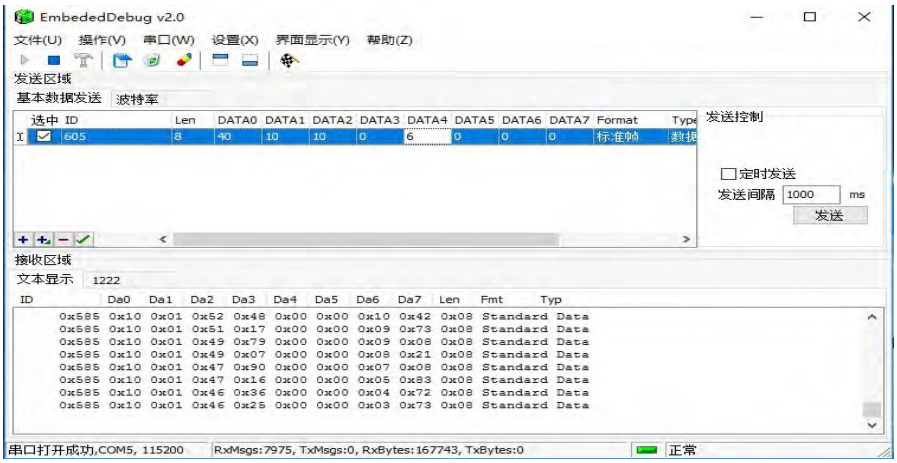
Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

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:



Order information

Product model	Communication mode	Package situation
BW-IMU125C	CAN	IP67 Package /Metal joint

Executive standard

- Specification for static calibration of dual-axis tilt sensors National Standard (draft)
- GB/T 191 SJ 20873-2003 General specification for inclinometer and level

BW-IMU125C series

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