BW-VG 427C Series

High-precision Modbus Dynamic Inclinometer

Technical Manual

V3.0

BW-VG427C
High-precision Modbus Dynamic Inclinometer

Introduction

The VG427C Dynamic Inclination Sensor product is a highly accurate attitude measurement device that measures the inertial attitude parameters of roll and pitch as well as angular velocity and acceleration of a moving carrier. Attitude deviations are estimated by a 6-state Kalman filter with appropriate gain for inclination measurements in motion or vibration.The VG427C utilizes high quality and reliable MEMS accelerometers and gyroscopes with algorithms to ensure measurement accuracy, and a hermetically sealed design and rigorous workmanship to ensure that the product can accurately measure the carrier's attitude parameters in harsh environments. The VG427C is equipped with a digital interface, which makes it very easy to be integrated into the user's system.

Feature

- Dynamic accuracy: 0.2°
- Static accuracy: 0.01°
- Non-linear compensation, quadrature compensation
- Special offset tracking algorithm to eliminate drift
- RS232/485/TTL With Modbus output optional
- Wide temperature range：-40℃~+85℃, Temperature compensation
- High-performance Kalman filter algorithm
- Dimension：L60x W59 x H29（mm）

Application

- Underwater unmanned boat
- Turbine sloshing monitoring
- Platform stability
- large ship
- Photoelectric pod
- Unmanned Drive
- Special Vehicles
- Unmanned Craft

Feature

Electrical indicators

Voltage	9-36VDC
Working current	30mA （40mA Max）
Temperature in use	-40~85℃
Temperature in store	-55~100℃

Performance Index

Attitude Parameter	Dynamic accuracy	0.2°
	Static accuracy	0.01°
	Resolution	0.01°
	Tilt range	Pitch ±90°，Roll ±180°
Physical properties	Dimension	L60×W59×H29（mm）
	Weight (with wire)	280g
	Weight (With packaging)	360g
Interface characteristics	Start delay	<50ms
	Maximum sampling rate frequency	500Hz
	Serial communication rate	2400 to 115200 baud rate
	Digital output format	Binary high-performance
MTBF	≥ 90000h	
EMC	According to GBT17626	
Insulation Resistance	≥ 100MΩ	
Surge suppression	2000g，0.5ms，3 Times/axis	

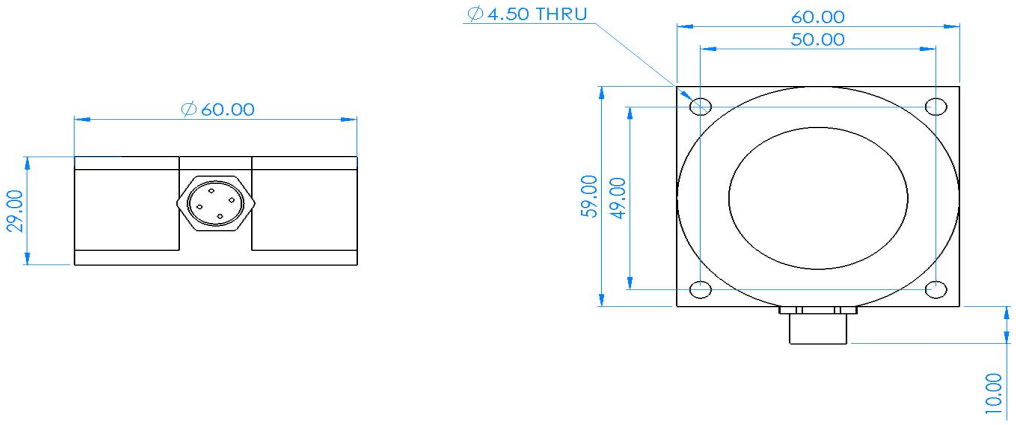
Resolution：The measured minimum change value that the sensor can detect and resolve within the measurement range.
Accuracy: The error between the actual angle and the Root mean square(RMS) of the measured angle of the sensor(≥16 times).

Mechanical

Connector	Metal connector（Cable 1.5m)
Protection level	IP67
Shell material	Magnesium aluminum alloy oxidation
Installation	Three M4 screws

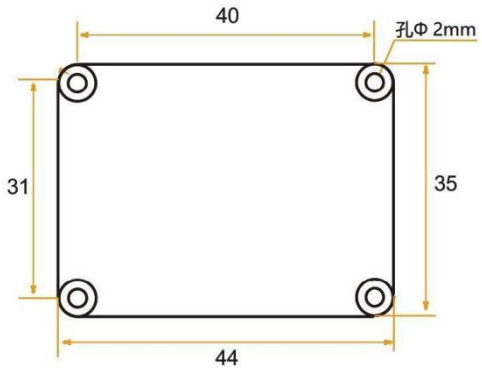
Package product size

Product Size：L60*W59*H29（mm）



Bare board product size

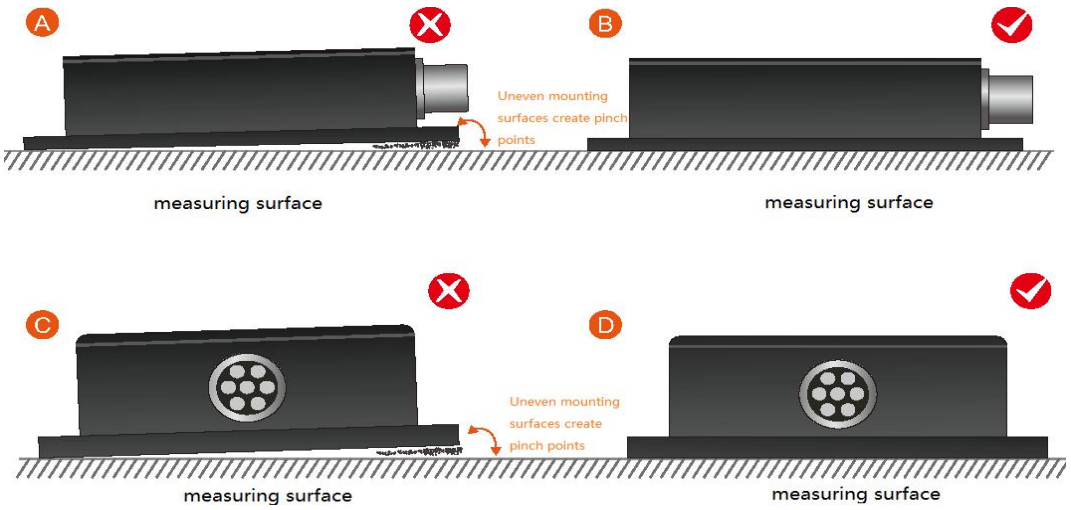
PCB Size: L44*W35*H11mm, ±1mm error for length and width dimensions, please refer to actual size



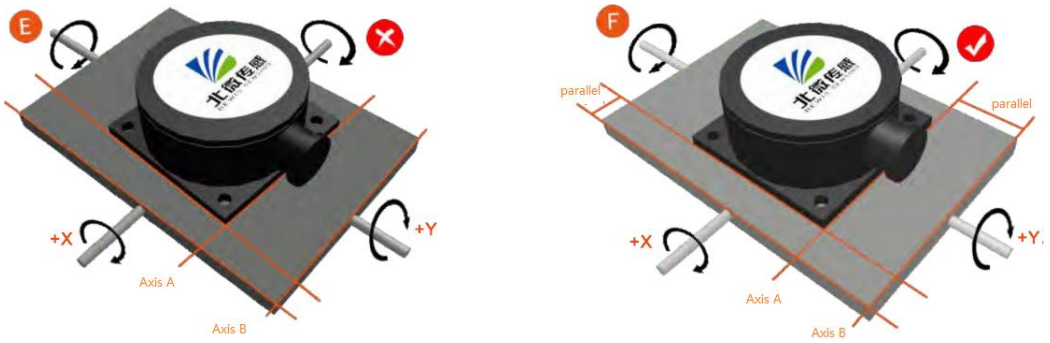
Installation

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. 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, and the bottom line of the sensor should be kept parallel or orthogonal to the axis of rotation of the measured object during installation. This product can be installed horizontally or vertically (vertical installation needs to be customized), and the correct installation method is shown in Figure F.

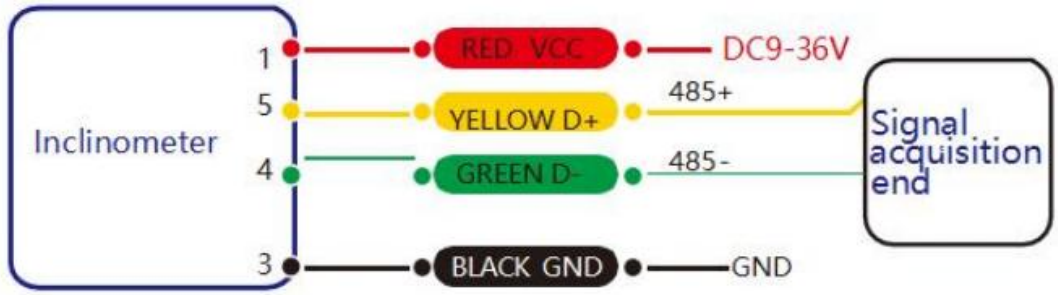


Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

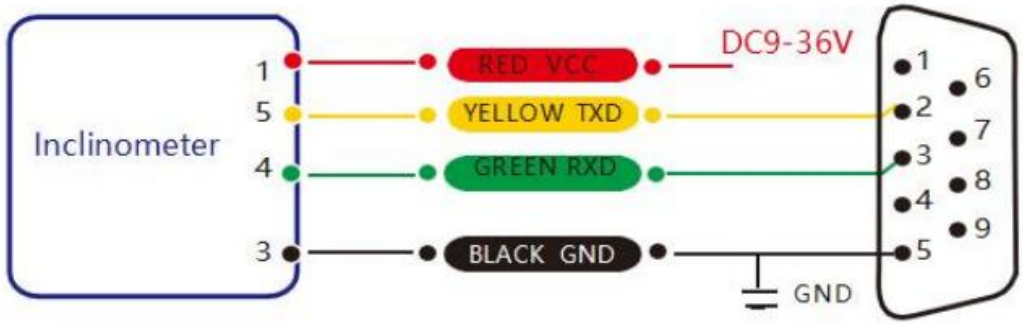
Electrical Interface

Wiring definition

	红色 RED	蓝色 BLUE	黑色 BLACK	绿色 GREEN	黄色 YELLOW
Wires Color	1	2	3	4	5
Function	VCC DC 9-36V	NC	GND	RXD (B、D-)	TXD (A、D+)



RS 485 wiring diagram



RS 232 wiring diagram

Axis definition

Three-axis attitude, gyroscope, acceleration data axis

All comply with the right-hand rule.

Testing 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. The BW-VG427C 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.

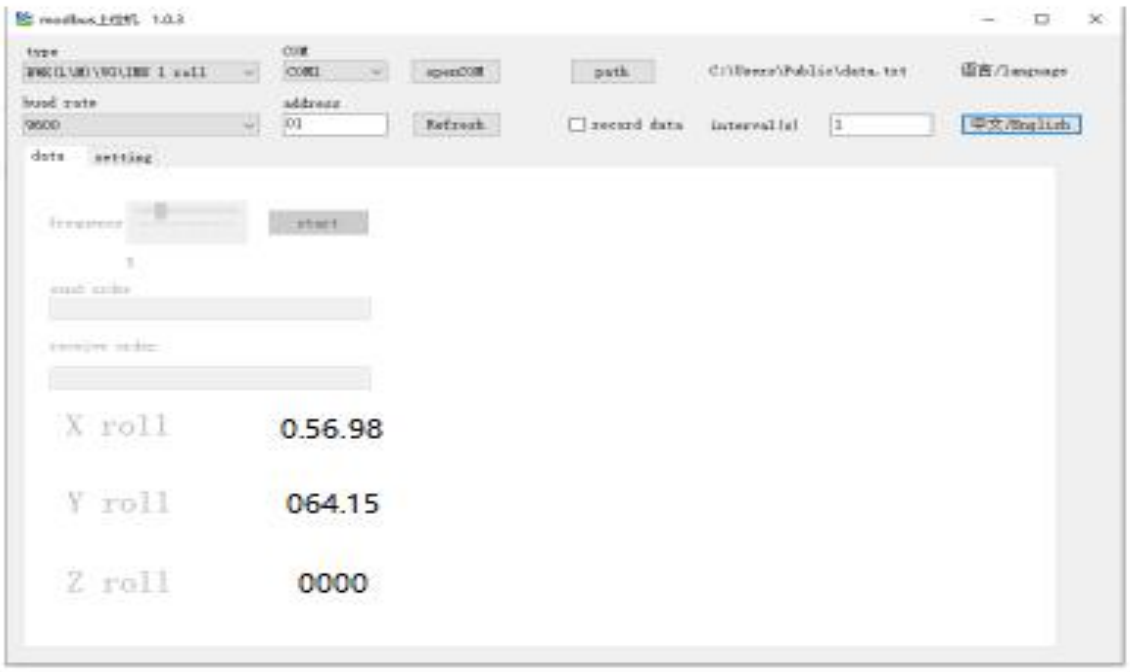
Step:

① Connect the serial port hardware of the inclinometer correctly, and connect the power supply.

② Select correct device Type (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

Model	Communication Mode	Package Situation
BW-VG427C-485	RS485	IP67/ Metal interface
BW-VG427C-232	RS232	IP67/ Metal interface
BW-VG427C-TTL	TTL	IP67/ Metal interface

Executive standard

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

BW-VG425C Series

High precision Modbus Dynamic Inclinometer

Wuxi Bewis Sensing Technology LLC

Add：Building 30, NO. 58, Xiuxi Road, Binhu District, Wuxi City, Jiangsu Province, China

Tel：+86 18921292620

Mail：sales@bwsensing.com

Web：www.bwsensing.com