



BW-VG527E Series

High Accuracy Modbus Dynamic Inclination Sensor

Technical Manual

V4.0



Introduction

The VG527E Dynamic Inclination Sensor is an attitude measurement device with surge (shock) immunity to IEC 61000-4-5 Class IV, which measures the inertial attitude parameters of roll and pitch, as well as angular velocity and acceleration of a moving carrier. Attitude deviation is estimated by a 6-state Kalman filter with appropriate gain, which is suitable for inclination measurement under motion or vibration. VG527E adopts high-quality and reliable MEMS accelerometer and gyroscopes with algorithms to ensure the measurement accuracy, and the hermetically-sealed design and rigorous process ensure that the product can still accurately measure the carrier's attitude parameters in harsh environments. The VG527E is equipped with a digital interface, which makes it very easy to integrate into the user's system.

Feature

- Dynamic accuracy: 0.1°
- Static accuracy: 0.01°.
- Non-linear compensation, quadrature compensation
- Special offset tracking algorithm eliminates drift
- RS485-Modbus-RTU protocol
- Wide temperature range: -40°C~+85°C
- High-performance Kalman filter algorithm, EMC function
- Volume and shape: L97*W63*H27.2 (mm)

Application

- Underwater Unmanned Vehicles
- Wind turbine tower sway monitoring
- Platform stabilization
- Large ships
- Optical pods
- Unmanned vehicles
- Specialized vehicles
- Unmanned aerial vehicles

Feature

Electrical indicators

Voltage	9-36V DC
Working current	30mA (40mA Max)
Temperature in use	-40~85°C
Temperature in store	-55~100°C

Performance Index

Attitude Parameter	Dynamic accuracy	0.1°
	Static accuracy	0.01°
	Resolution	0.01°
	Range	Pitch±90°, Roll±180°
Physical properties	Dimension	L97*W63*H27.2 (mm)
	Weight (with wire)	400g
	Weight (With packaging)	480g
Interface characteristics	Start delay	<50ms
	Maximum sampling rate	500Hz
	serial port communication rate	2400 to 115200 baud rate
electrostatic discharge (ESD)	IEC 61000-4-2 Class IV	Contact discharge 8KV, air discharge 15KV
Fast transient pulse group immunity	IEC 61000-4-4 Class IV	Repetition Frequency 5kHz, Power Supply Positive and Negative 4KV, Signal Line 2KV
Surge (shock) immunity	IEC 61000-4-5 Class IV	Power Positive and Negative, Signal Wire; Common Mode 4KV
Average Trouble-Free	≥30000 hours/time	
electromagnetic	In accordance with GBT17626	
impact resistance	2000g, 0.5ms, 3 times/axis	

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

Accuracy: The root mean square error between the actual angle and the angle measured by the sensor for multiple times (≥16 times).



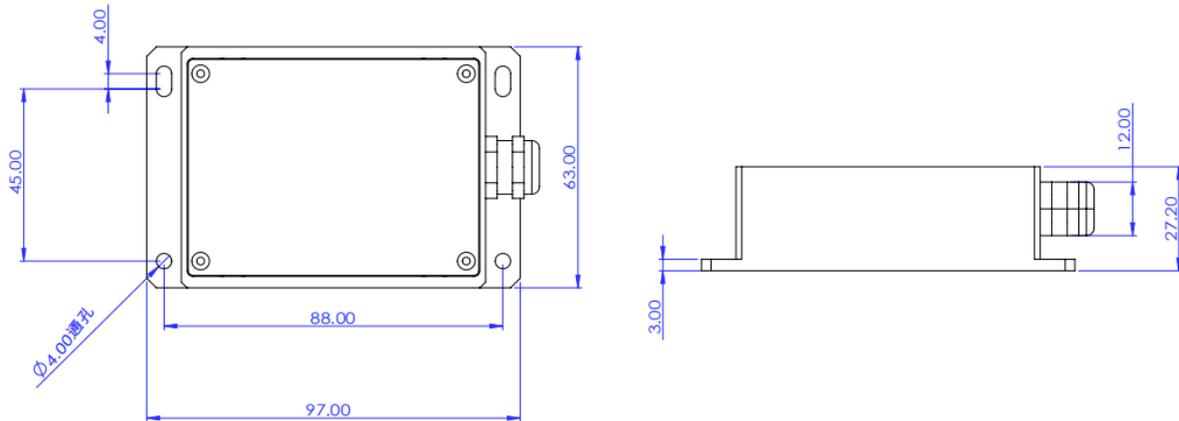
Mechanical properties

Connector	M12 Air Plug
Protection level	IP67
Shell material	Magnesium-aluminum alloy oxidation
Installation	Four M4 screws



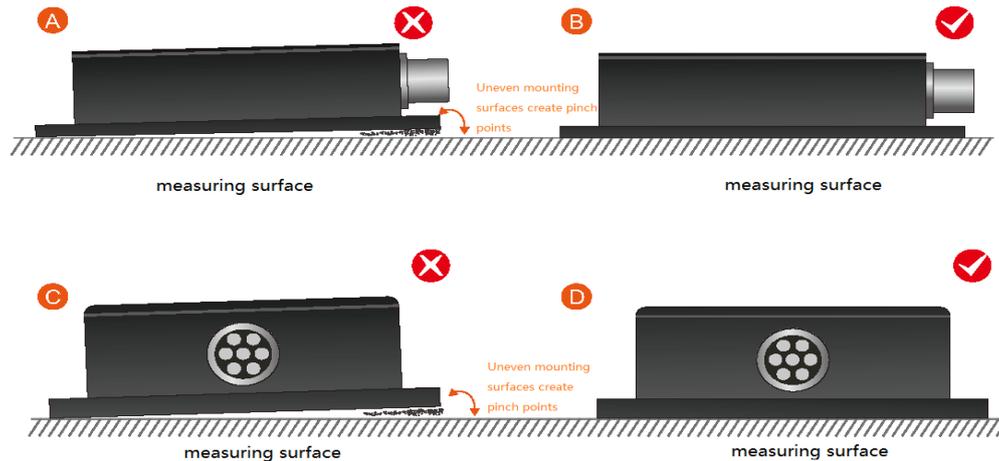
Package product size

Product Size: L97*W63*H27.2 (mm)

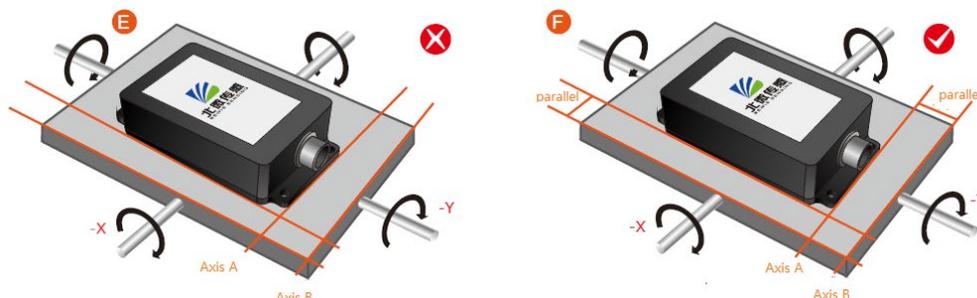


Installation

Correct installation can be avoided to produce measurement errors, the sensor should be installed to do the following points: First of all, to ensure that the sensor mounting surface and the measured surface completely close to the measured surface, the measured surface should be as horizontal as possible, there can not be as shown in Figure A and Figure C in the generation of the angle, the correct installation as shown in Figure B and Figure D.



Secondly, the bottom line of the sensor and the axis of the object to be measured should not have the pinch angle shown in Figure E. When installing the sensor, the bottom line of the sensor should be kept parallel or orthogonal to the axis of rotation of the object to be measured. The product can be installed horizontally or vertically (vertical installation needs to be customized), the correct installation method shown in Figure F.

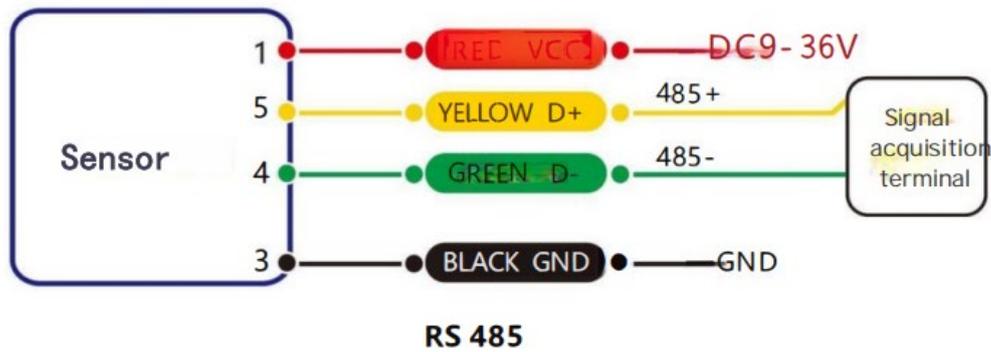


Finally, the mounting surface of the sensor and the measured surface must be fixed tightly, contact flat, stable rotation, to avoid measurement errors due to acceleration, vibration.

Electrical Interface

Wiring definition

	红色 RED	蓝色 BLUE	黑色 BLACK	绿色 GREEN	黄色 YELLOW
Line Color Function	1	2	3	4	5
	VCC DC 9-36V	PE	GND ground	CAN L	CAN H



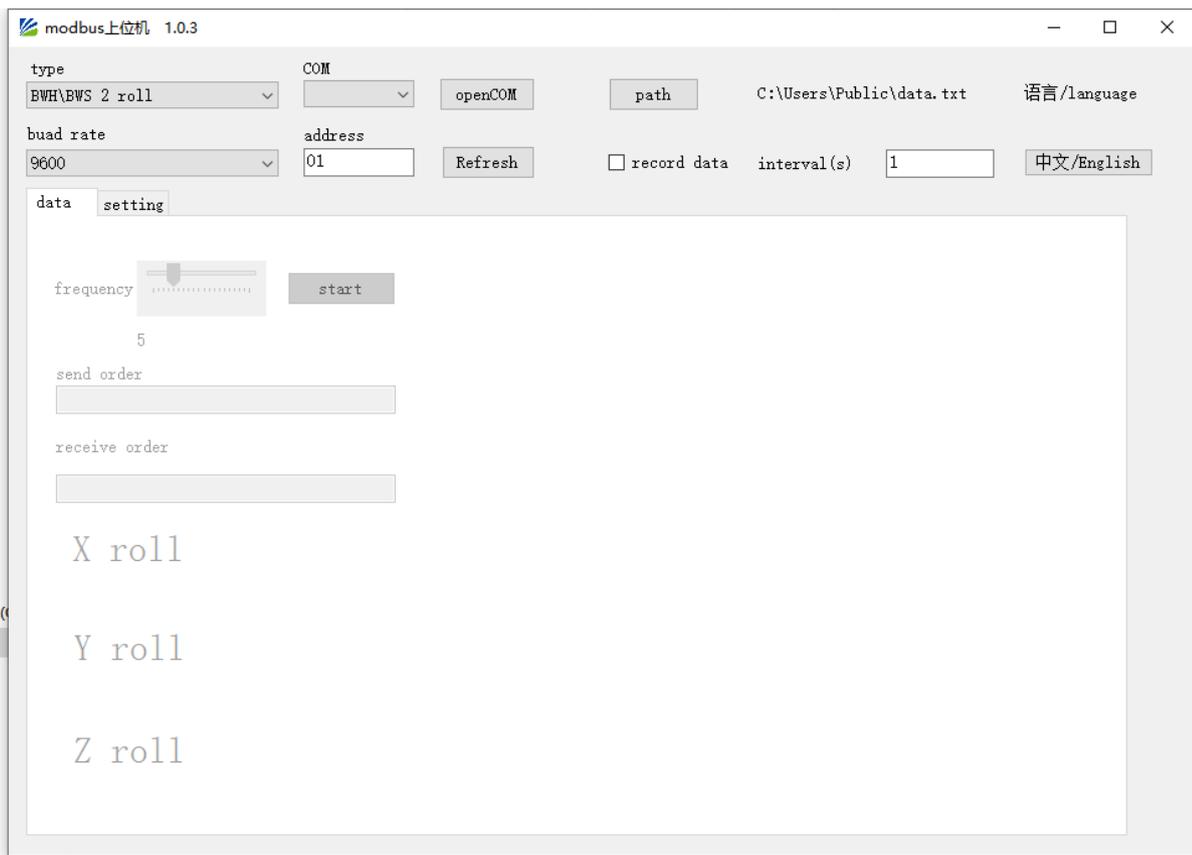
Testing software

You can directly download the serial port debugging assistant from the official website (Technical Service->Download Area), or you can use the more convenient and intuitive host computer software.

BW-VG527E serial debugging software can connect the inclination sensor on the computer and display the angle. The software debugging interface is shown in the figure below, using the tilt debugging host computer, you can easily display the current X-direction, Y-direction tilt angle, you can also modify and set other parameters.

Software use steps:

- ① Connect the serial hardware of inclinometer correctly and connect the power supply.
- ② Select the correct device model (choose azimuth series).
- ③ Select the computer serial port and baud rate and click Connect Serial Port.
- ④ Click Start, the screen will show the current tilt angle of the inclinometer in X and Y direction



Order Information

Model	Communication mode	Package situation
BW-VG527E	RS485-ModbusRTU	IP67 Package/M12 Aerial Plug

Executive standard

- Enterprise Quality System Standard: ISO9001:2015 Standard (Certificate No.23919Q10455R0S)
- 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

BW-VG527E Series

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