



BW-VG600 Series

**High-precision Digital
Dynamic Inclinometer**

Technical Manual

V3.0



Introduction

The VG600 dynamic inclinometer is a high-precision attitude measurement device that can measure the roll, pitch and angle of moving carriers. Inertial attitude parameters for velocity and acceleration. The attitude deviation is estimated by the 6-state Kalman filter with appropriate gain, which is suitable for operation. Inclination measurement under dynamic or vibrating conditions. VG600 uses high-quality and reliable MEMS accelerometer and gyroscope, and passes algorithms. The measurement accuracy is ensured, while the sealing design and strict process ensure that the product can accurately measure the attitude parameters of the carrier in the harsh environment. Pass through various compensations such as nonlinear compensation, quadrature compensation, temperature compensation and drift compensation, it can greatly eliminate the error caused by interference and improve the level of accuracy of the product. VG600 has a digital interface, which can be easily integrated into the user's system.

Feature

- Dynamic accuracy: 0.05°
- Static accuracy: 0.01°
- Non-linear compensation, quadrature compensation
- Special offset tracking algorithm to eliminate drift
- RS232/485/TTL interface output optional
- Wide temperature range: -40°C~+85°C
- 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

Product 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	0.05°
	Static accuracy	0.01°
	Resolution	0.01°
	Tilt margin	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
Trouble-free work on average	≥ 90000 hours	
EMC	According to GBT17626	
Insulation Resistance	≥ 100MΩ	
Surge suppression	2000g, 0.5ms, 3 Times/shaft	

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).



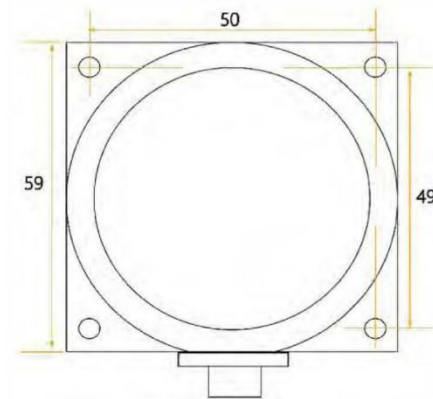
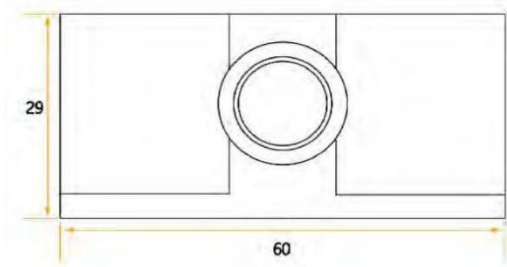
Mechanical

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



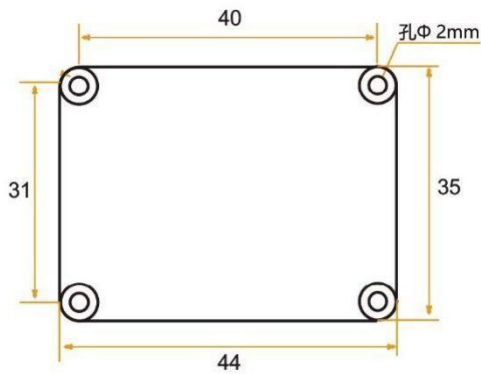
Package product size

Product Size: L60*W59*H29 (mm)



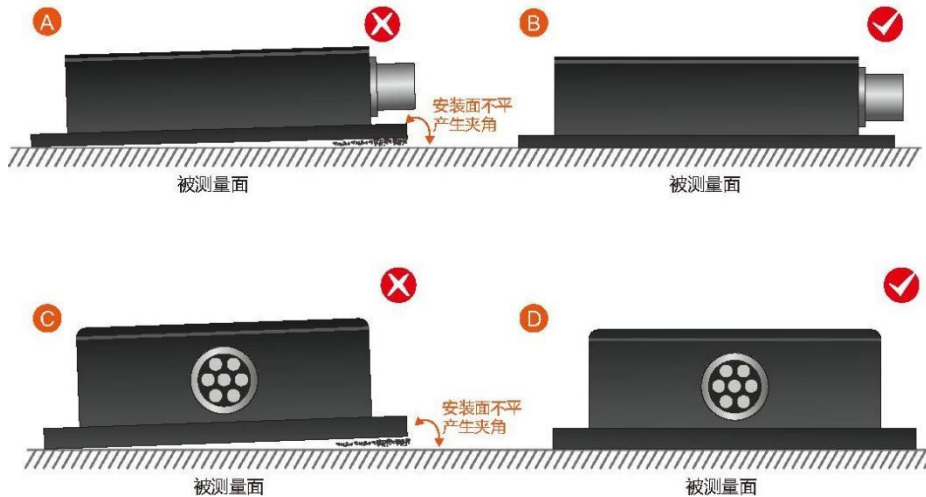
PCB size

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

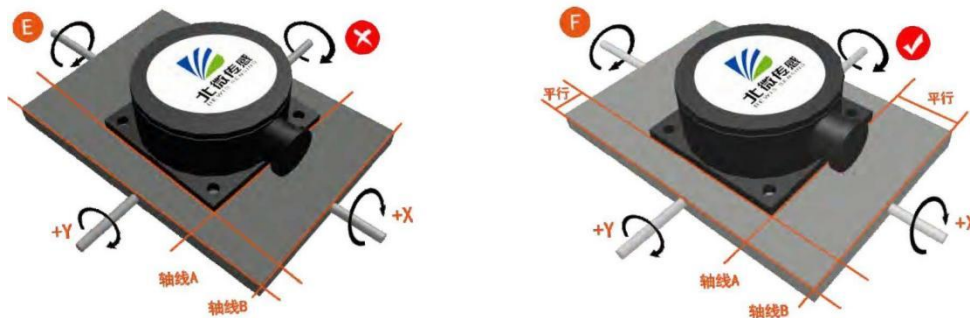


The correct installation method can avoid measurement errors. When installing the sensor, please do the following:

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.

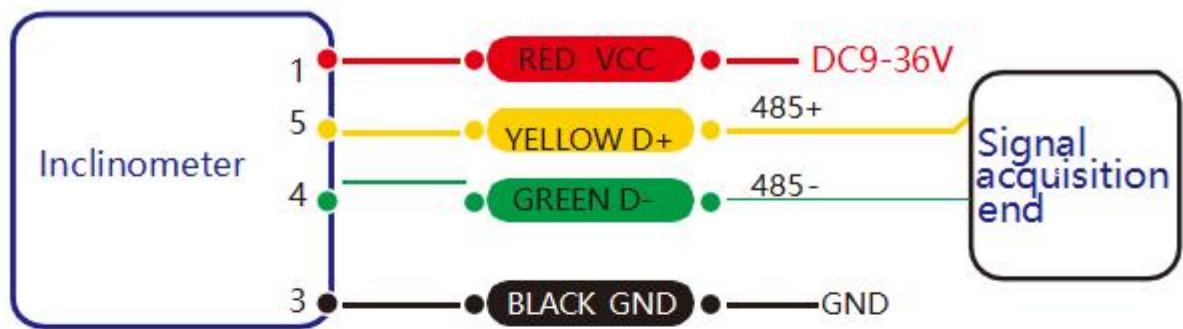


Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

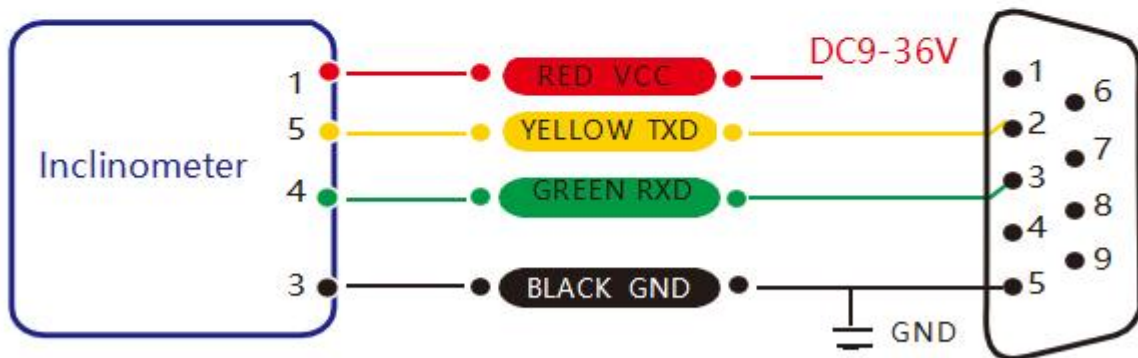
Electrical Interface

Wiring definition

	RED	BLUE	BLACK	GREEN	YELLOW
Line Color	1	2	3	4	5
Function	VCC DC 9-36V	NC	GND	Receive RXD (B, D-)	Send TXD (A, D+)



RS 485 wiring diagram



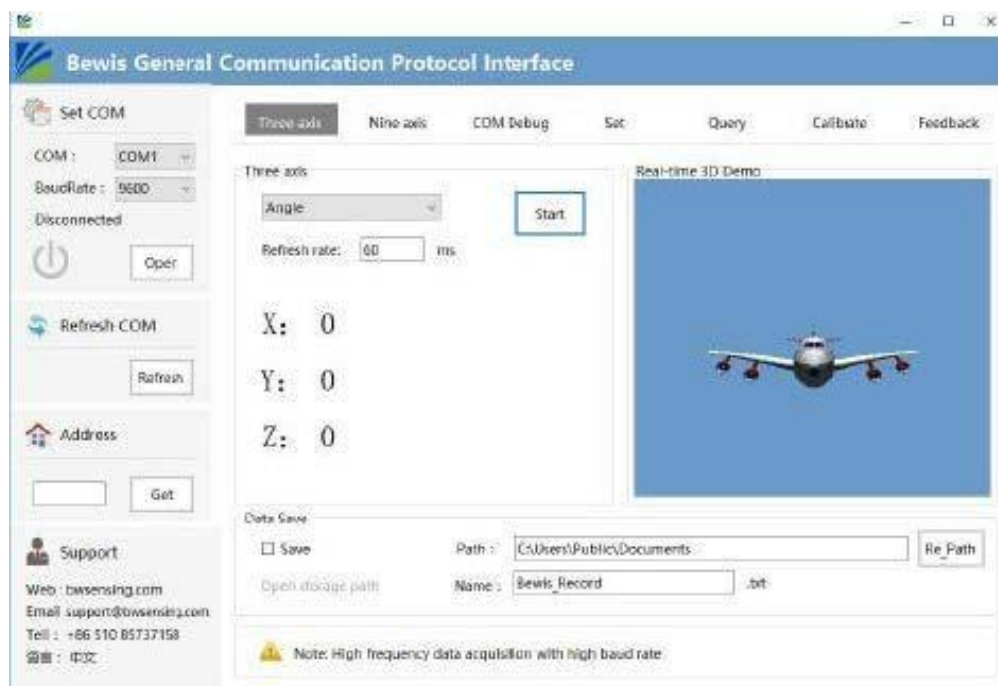
RS 232 wiring diagram

You can download the serial debugging assistant directly on the official website (technical service -> download area), or you can use a more convenient and intuitive host computer software. The BW-VG600 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, the current X and Y directions can be conveniently displayed, and other parameters can also be set and modified.

Using steps:

- ① Correctly connect the serial port hardware of the inclinometer, and connect the power supply.
- ② Select the correct equipment model (select the azimuth angle series).
- ③ Select the computer serial port and baud rate and click to connect to the serial port.
- ④ Click Start, the current tilt angle of the inclinometer in the X and Y directions will be displayed on the screen.



Order Information

Model	Communication Mode	Package Situation
BW-VG600-485	RS485	IP67/ Metal interface
BW-VG600-232	RS232	IP67/ Metal interface
BW-VG600-TTL	TTL	IP67/ Metal interface

Executive standard

- Enterprise Quality System Standard: ISO9001:2015 Standard (Certificate No. 064-21-Q-3290-RO-S)
- 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
- JJF 1059.1-2012 Evaluation and expression of measurement uncertainty
- GBT 14412-2005 Mechanical vibration and shock Mechanical installation of accelerometer
- GJB 450A-2004 General requirements for equipment reliability
- GJB 909A Quality control of key parts and important parts
- GJB899 Reliability appraisal and acceptance test
- GJB150-3A High temperature test
- GJB150-4A Low temperature test
- GJB150-8A Rain test
- GJB150-12A Sand and dust experiment
- GJB150-16A Vibration test
- GJB150-18A Impact test
- GJB150-23A Tilt and rock test
- GB/T 17626-3A Radio frequency electromagnetic field radiation immunity test
- GB/T 17626-5A Surge (impact) immunity test
- GB/T 17626-8A Power frequency magnetic field immunity test
- GB/T 17626-11A Immunity to voltage dips, short-term interruptions and voltage changes

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