BWL320 Series

Voltage Output Dual Axis Inclinometer

Technical Manual

V4.0

BWL320
Voltage Output Single Axis Inclinometer

Introduction

BWL320 is a low-cost dual-axis inclinometer with Modbus output developed and produced by Bewis Sensing. It uses a mature industrial-grade MEMS accelerometer, with a measuring range of ±180°, the highest accuracy of 0.1°, and an operating temperature of-40℃ to +85 ℃. This product is small in size and light in weight, which can meet the application requirements with limited space. It converts the change of the static gravity field into the change of the inclination angle, and directly outputs the horizontal inclination angle value through the voltage mode. It has the advantages of low cost, small temperature drift, simple use, and strong anti-interference ability. It is photovoltaic power generation, pan-tilt control, tower ideal for inclination measurement in industries such as rod monitoring!

Main Feature

- Dual axis tilt measurement
- Resolution: 0.01°
- Power supply: 12-36V
- Volume： L90*W40.5*H26 （mm）
- Highest accuracy： 0.1°
- Range： ±90°
- Output： 0-5V/ 0-10V for optional
- IP67 protection level

Application

- Industrial automatic leveling
- Medical instruments
- Photovoltaic automatic tracking
- Tower tilt monitoring
- Special valve
- Oil drilling equipment
- Industrial converter
- Lifting equipment inclination control

Product Feature

Electrical index

Parameter	Condition	Minimum	Typical value	Maximum
Power voltage(V)		12		36
Operating current(mA)	No load	20	50	60
Output load(kΩ)	Resistive	10		
Output load(nF)	Capacitive			20
Operating temperature(℃)		-40		85
Storage temperature(℃)		-55		100

Performance Index

Measurement Range (°)	Condition	±90
Measurement axis		X-Y
Accuracy (°)	Room temperature	0.1
Resolution (°)	Completely still	0.01
Cross axis error(°)	-40~85℃	0.2
Start-up time		<3s
Output frequency (Hz)	100	
Zero current output(V)	2.5(0~5 output); 5(0~10 output)	
Full-scale output current range(V)	0~5(0~10)	
Mean time between failures MTBF	≥90000 h/times	
Electromagnetic	According to GBT17626	
Insulation resistance	≥100 MΩ	
Impact resistance	2000g , 0.5ms , 3 times/axis	
Weight (g)	230 (without outer packaging)	

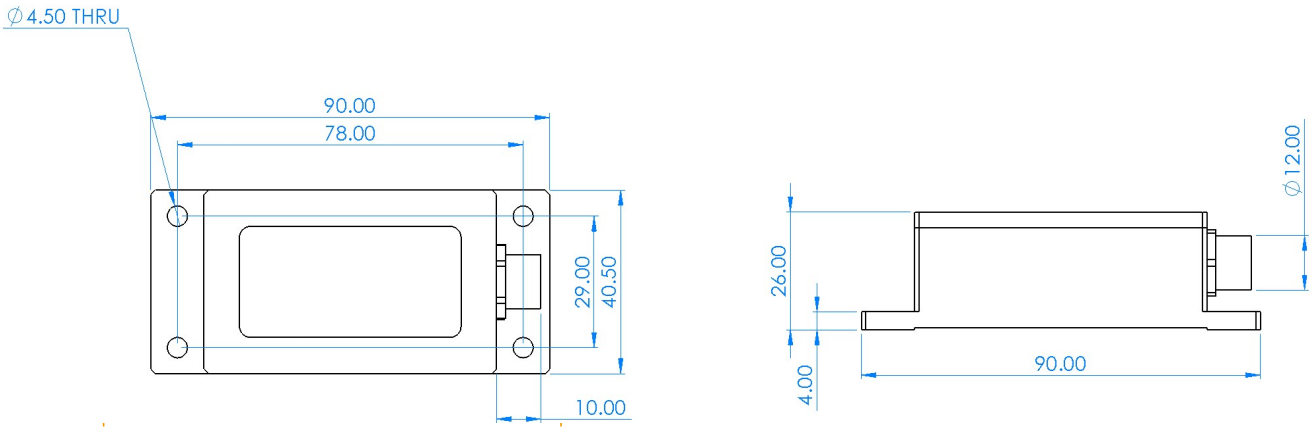
Resolution: The smallest change value of the measured value that the sensor can detect and distinguish within the measurement range.
Accuracy: The root mean square error of the actual angle and the sensor measuring angle for multiple (≥16 times) measurements.

Mechanical Index

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

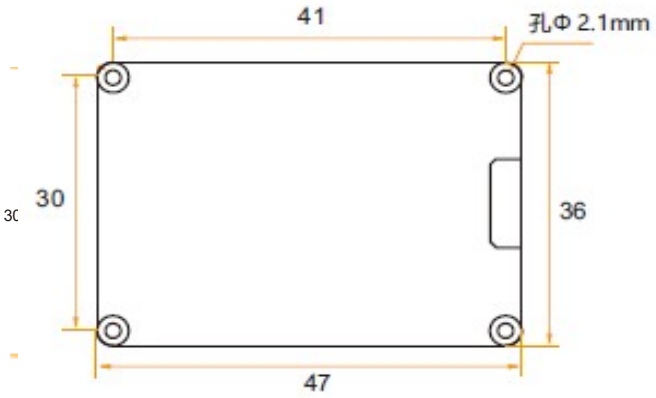
Package product size

Product size：L90*W40.5*H26（mm）



Bare board product size

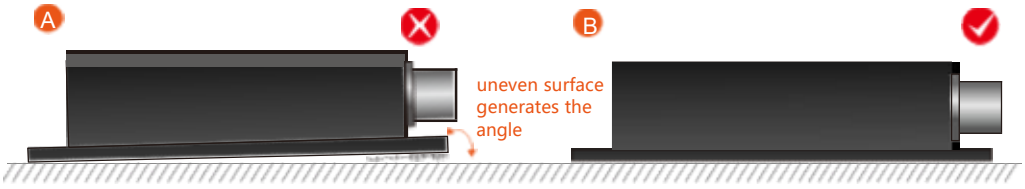
Product size：L47*W36*H15（mm） The length and width may have an error of ±1mm, please refer to the actual product

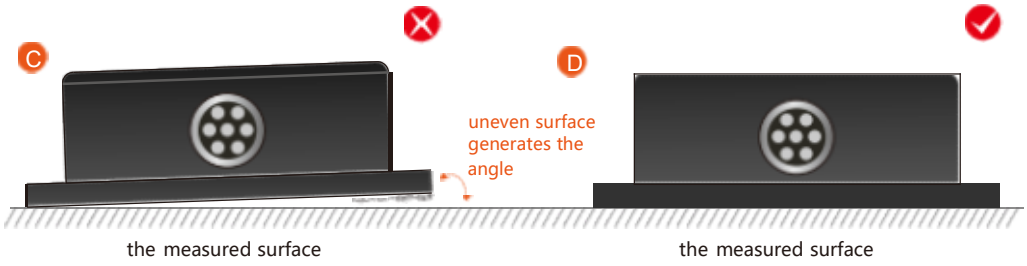


Installation

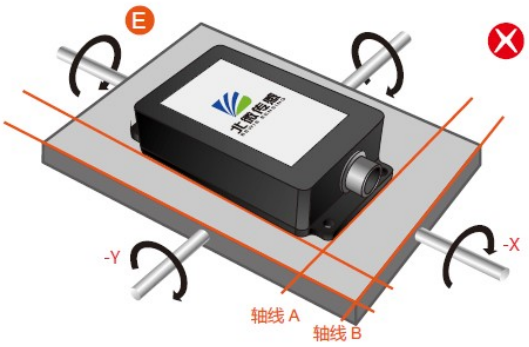
The correct installation method can avoid measurement errors. When installing the sensor, please do the following:

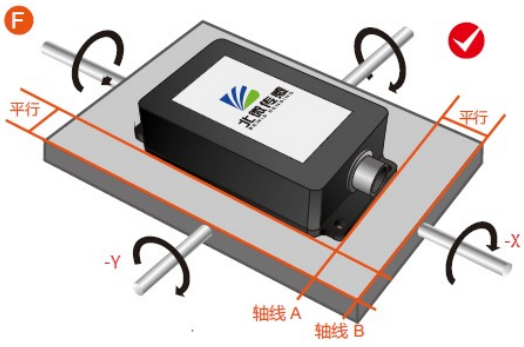
First of all, make sure that the sensor mounting surface is completely close to the measured surface, and the measured surface should be as level as possible. There should be no included angles as shown in Figure A and Figure C. The correct installation method is shown in Figure B and Figure D.





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.



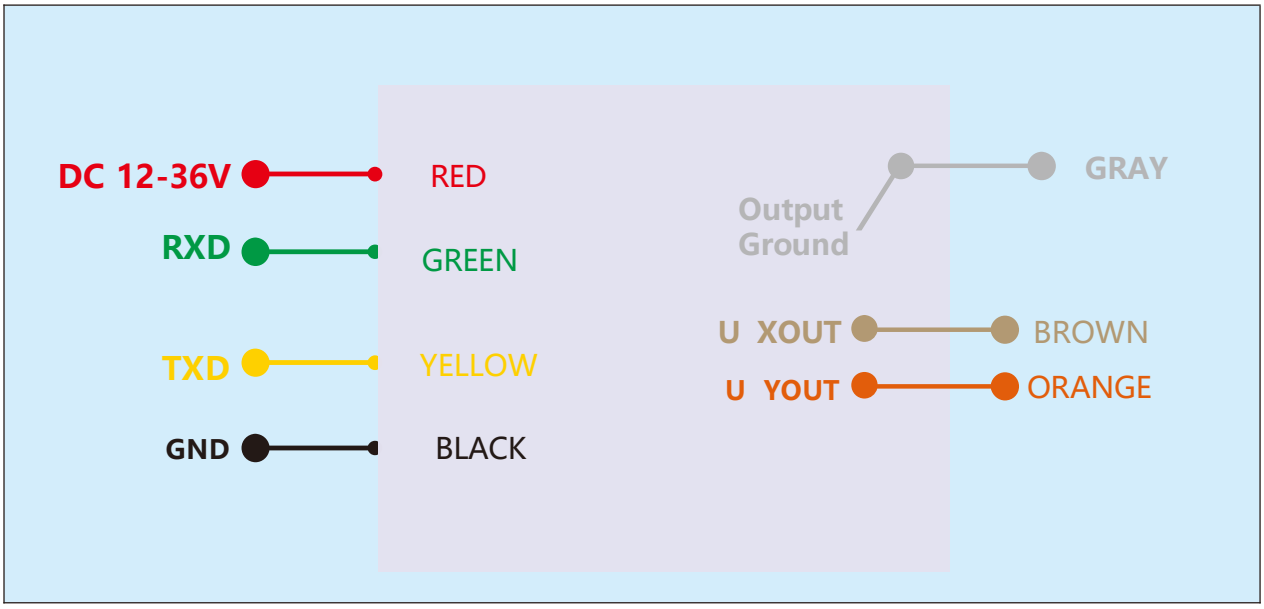


Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

Electrical Interface

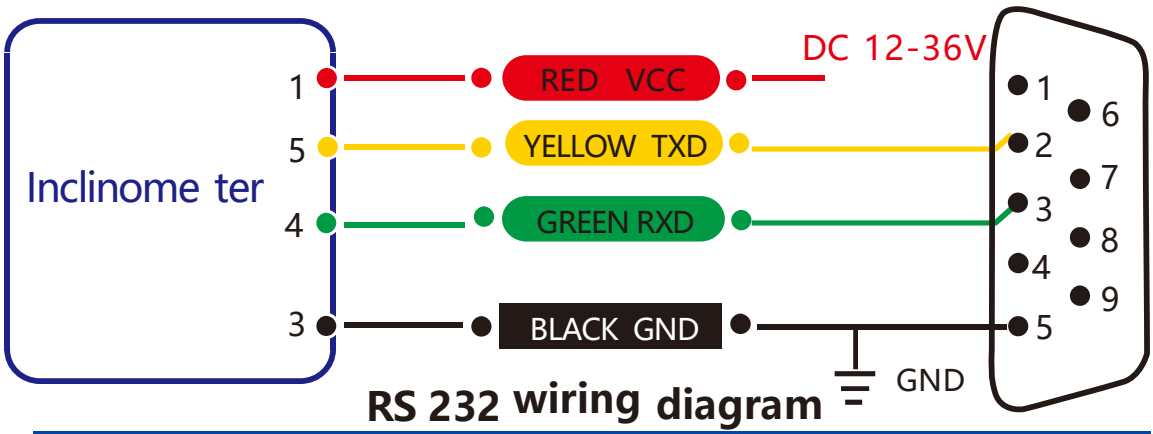
Electrical interfaces

Cable color & Function	RED	BLACK	GREEN	YELLOW	BROWN	ORANGE	GRAY
	1	3	4	5	8	9	10
	VCC DC12-36V	GND	RXD	TXD	U XOUT	U YOUT	Output Ground



Electrical interfaces

Cable color & Function	RED	BLUE	BLACK	GREEN	YELLOW
	1	2	3	4	5
	VCC DC 12-36V	NC	GND	RXD	TXD



RS 232 wiring diagram

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.

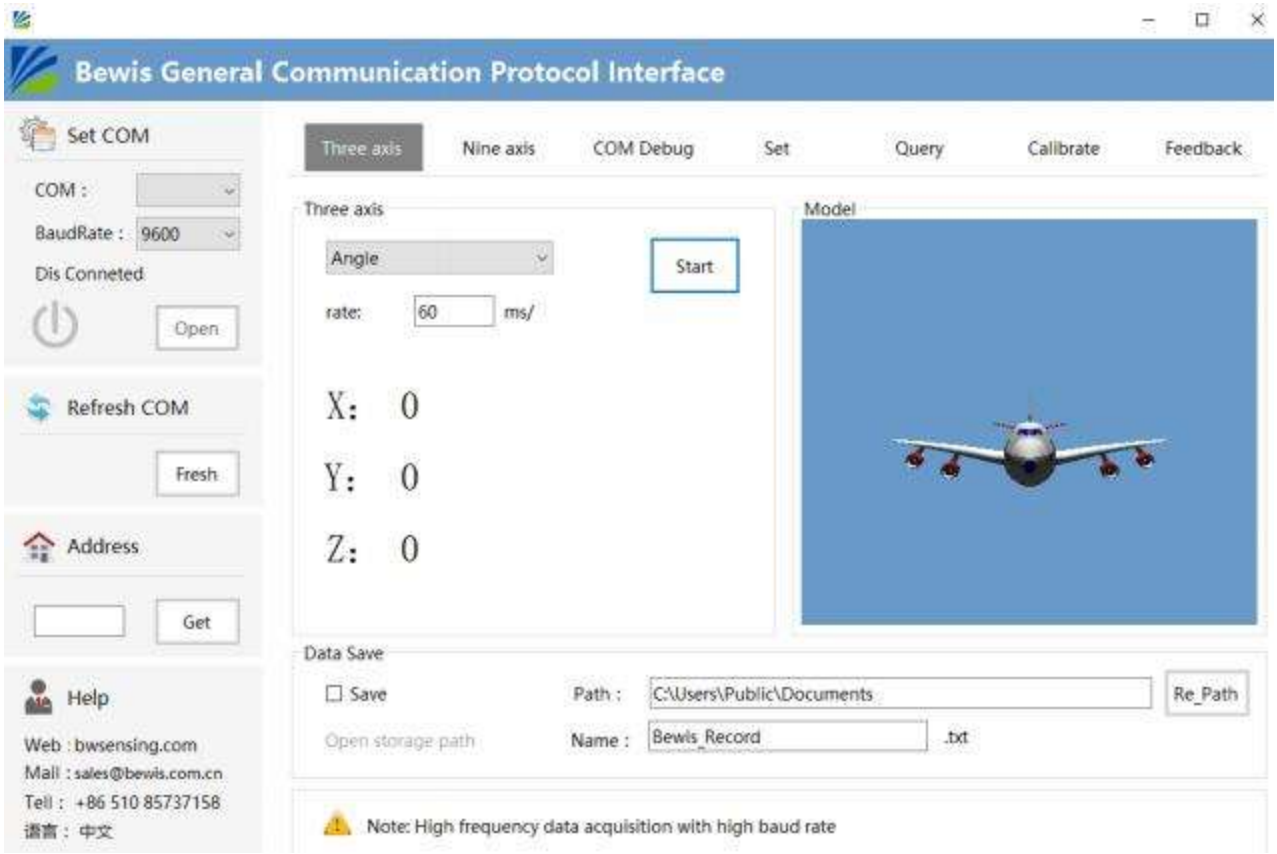
BWL320 supporting serial port debugging software can connect the inclination sensor on the computer to display the angle. The software debugging interface is shown in the figure below. Using the tilt angle to debug the host computer, you can conveniently display the current X direction tilt angle, and 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 computer serial port and baud rate and click connect serial port.

③ Click start button and the current inclination Angle of the incliner in X directions will be displayed on the screen.



Order information

Model	Communication mode	Package situation
BWL320-90-05	0-5V Voltage/RS232	IP67 Package/Metal joint
BWL320-90-010	0-10V Voltage/RS232	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

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