BWN427 Series

Modbus Dual Axis Inclinometer

Technical Manual

V3.0

BWN427
Modbus Dual Axis Inclinometer




Introduction

BWN427 is a cost-effective dual-axis inclinometer developed and produced by Bewis Sensing. It adopts MEMS technology and modbus output. The measurement range is ±90°, the highest accuracy is 0.02°, and the working temperature is -40°C-+85°C. The product uses a high-precision MEMS accelerometer and a high-resolution differential digital-to-analog converter, with built-in automatic compensation and filtering algorithms, which largely eliminates errors caused by environmental changes. Convert the change of the static gravity field into the inclination change, and directly output the horizontal inclination value through the voltage method. This product has high long-term stability, low temperature drift, simple use, and strong ability to resist external interference. It is a recommended choice to be used for surveying and mapping, industrial automation and other industries.

Features

- Dual axis inclination measurement
- Resolution：0.01°
- Power supply：9-35V
- Dimension：L90*W40.5*H26（mm）
- Highest accuracy：0.02°
- Range：±90°
- Output mode：RS232/RS485/TTL optional
- IP67 Protection level

Application

- Industrial automatic leveling
- Medical instruments
- Photovoltaic automatic tracking
- Tower tilt monitoring
- Lifting equipment inclination control
- Structural deformation monitoring
- Surveying and Mapping Instruments
- Equipment automation

Product Feature

Electrical index

Parameter	Condition	Minimum	Typical	Maximum
Power voltage(V)		9	12	35
Working Current (mA)	No load	20	30	40
Operating Temperature (℃)		-40	25	85
Storage Temperature (℃)		-55	25	100

Performance index

Measurement Range (°)	Condition	±90
Measurement axis		X-Y
Accuracy (°)	Highest	0.02
Resolution (°)	Completely still	0.01
Zero bias (°/℃)	-40~85℃	±0.005
Cross axis error(°)	-40~85℃	0.01
Output frequency (Hz)	5-100Hz adjustable	Up to 100
Mean time between failures MTBF	≥90000 h	
Electromagnetic compatibility	According to GBT17626	
Insulation resistance	≥100 MΩ	
Impact resistance	2000g，0.5ms，3 times/axis	

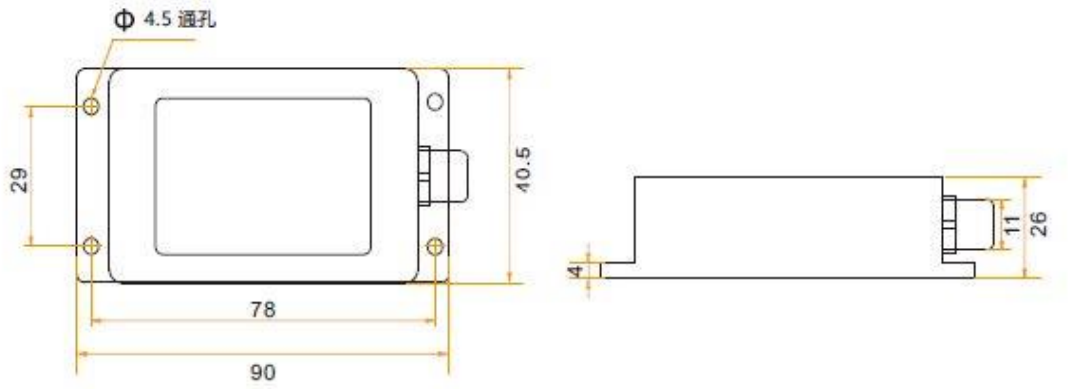
Resolution: The smallest change value of the measured value that the sensor can detect and distinguish within the measurement range.
Accuracy: The root mean square error of the actual angle and the sensor measuring angle for multiple (≥16 times) measurements.

Mechanical Index

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

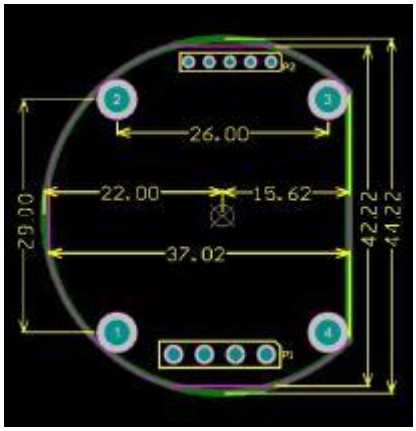
Package product size

Product size：L90*W40.5*H26（mm）



Bara board product size

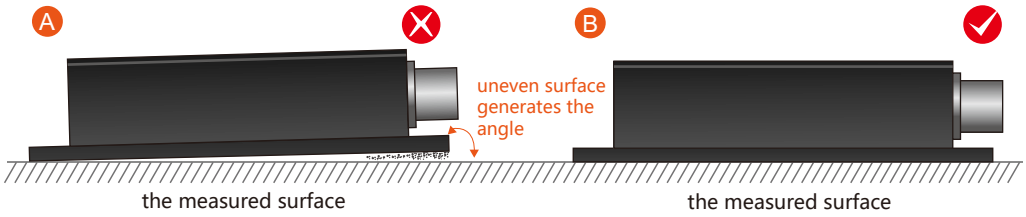
The front device is 3.85mm, the back is 2.5mm, and the board thickness is 2.0mm

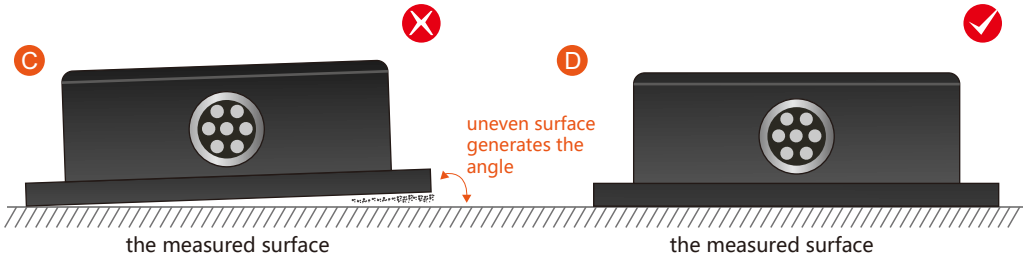


Installation

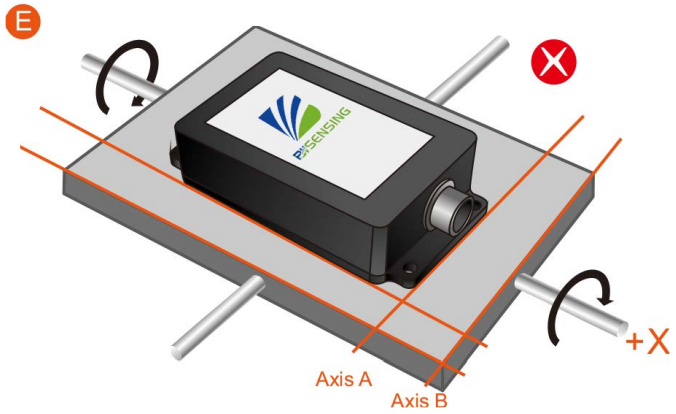
The correct installation method can avoid measurement errors. When installing the sensor, please do the following:

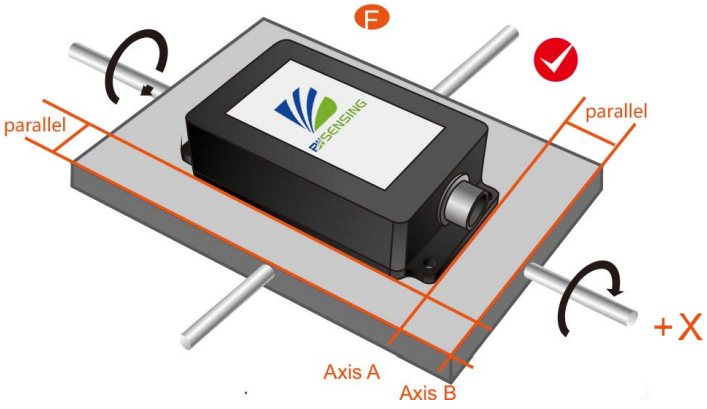
First of all, make sure that the sensor mounting surface is completely close to the measured surface, and the measured surface should be as level as possible, and there should be no included angles as shown in Figure A and Figure C. The correct installation method is shown in Figure B and Figure D.





Secondly, the bottom line of the sensor and the axis of the measured object cannot have an angle as shown in Figure E, 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.

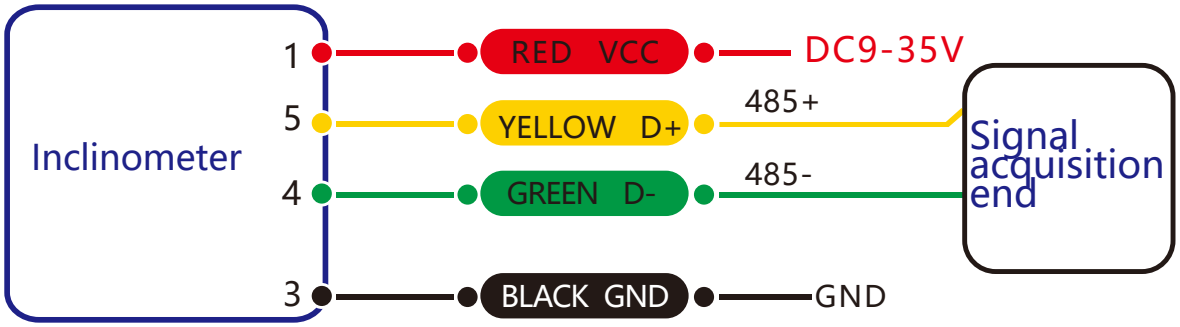




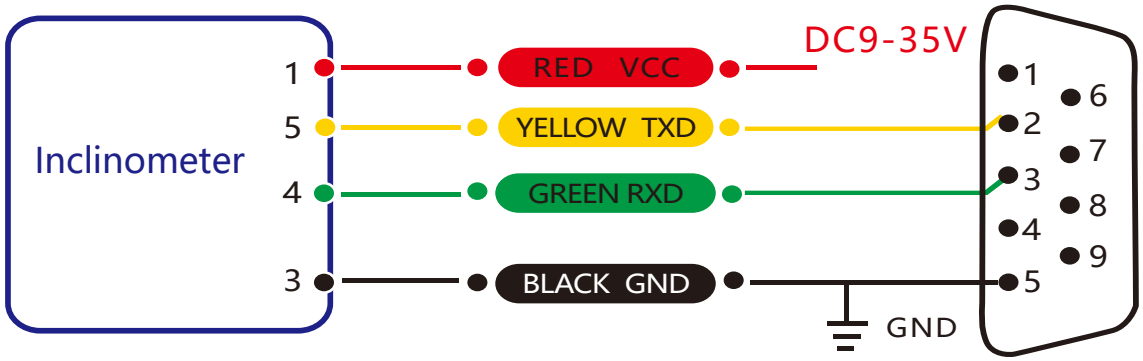
Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

Electrical Interface

Wiring definition					
Wire color	RED	BLUE	BLACK	GREEN	YELLOW
	1	2	3	4	5
function	VCC DC 9-35V	NC	GND	RXD(B、D-)	TXD(A、D+)



RS 485 wiring diagram



RS 232 wiring diagram

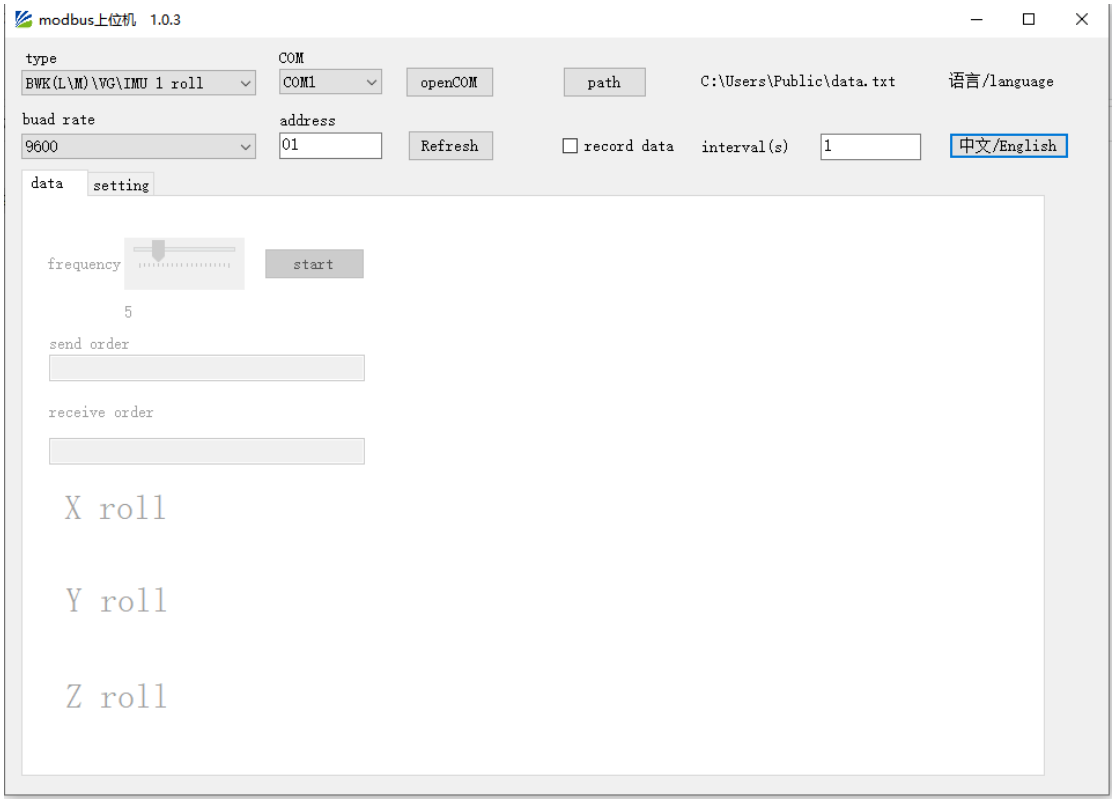
Debugging software

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.

BWN427 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 and Y 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 and Y directions will be displayed on the screen.



Order information

Model	Range	Communication mode	Package situation
BWN427	90	RS485	IP67 Package/Metal joint
BWN427	90	RS232	IP67 Package/Metal joint
BWN427	90	TTL	IP67 Package/Metal joint

Executive standard

- National Standard for Static Calibration Specifications for Dual-Axis Inclination Sensors (Draft)
- GB/T 191 SJ 20873-2003 General Specification for Inclinometers and Levels

BWN427 Series

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