AIT



TS-6623-R12 Series

Voltage Output Dual Axis Inclinometer

Technical Manual

V1.0

Product Features

- Dual axis inclination measurement
- Resolution：0.001°
- Power supply：12-36V
- Dimension：L90*W40.5*H26（mm）
  L3.54*W1.59*H1.02(inch)
- Highest accuracy：0.01°
- Range：±90°
- Output：0-5V /0-10V optional
- IP67 Protection level

Applications

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

Product Description

TS-6623-R12 is a cost-effective dual-axis inclinometer developed and produced by AIT Sensing, which adopts MEMS technology and voltage output. It has a measurement range of ±90°, the highest accuracy of 0.01°, and an operating temperature of -40°C to +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 eliminates errors caused by environmental changes to the greatest extent. Convert the change of the static gravity field into the change of the inclination angle, and directly output the horizontal inclination value through the digital method. This product has high long-term stability, low temperature drift, simple use, andstrong ability to resist external interference. It is a recommended choice to be used for surveying and mapping, industrial automation and other industries.

Technical Specifications

Table 1. Performance Index

Measurement Range (°)	Condition	±90
Measurement axis		X-Y
Accuracy (°)	Room temperature	0.01
Resolution (°)	Completely still	0.001
Zero bias (°/℃)	-40~85℃	±0.005
Output frequency (Hz）	100	
Full-scale output voltage range (V)	0~5V、0~10V optional	
Mean time between failures MTBF	≥90000 h	
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.

Table 2. Electrical Index

Parameter	Condition	Minimum	Typical	Maximum
Power voltage(V)		12		36
Working Current (mA)	No load	20	30	40
Output load（kΩ）	Resistive	10		
Output load (mF)	Capacitive			20
Operating Temperature (℃)		-40	25	85
Storage Temperature (℃)		-55	25	100

Electrical Interface

Electrical interfaces

Cable color& Function	RED	BLACK	GREEN	YELLOW	BROWN	ORANGE
	1	3	4	5	8	9
	VCC 12-36VDC	GND	RXD	TXD	U XOUT	U YOUT

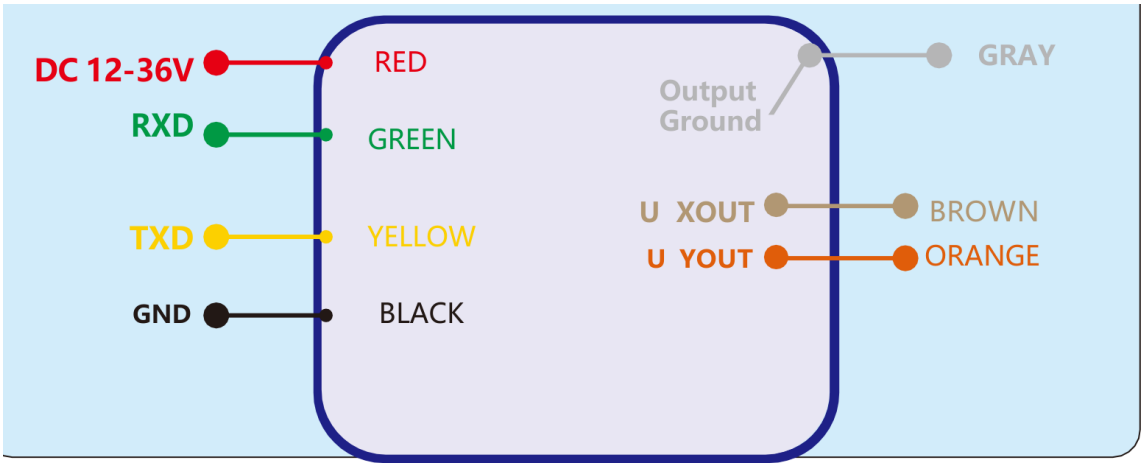


Figure 1. Electrical interfaces

RS232 Electrical interfaces

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

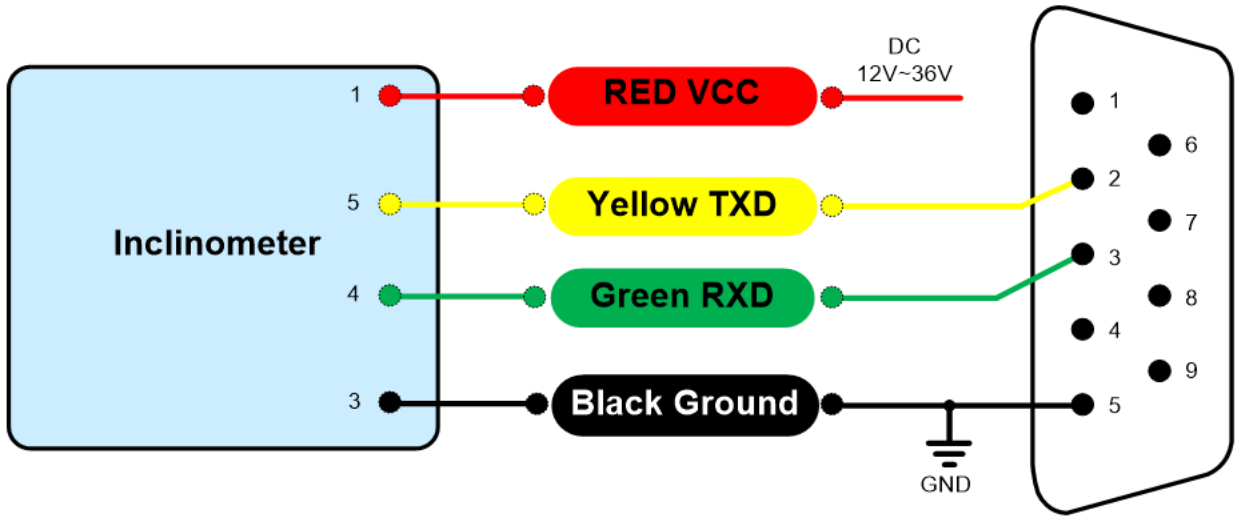


Figure 2. RS232 Electrical interfaces

Debugging and Testing

You can download the serial debugging assistant directly on the official website, or you can use the more convenient and intuitive host computer software.

TS-6623-R12 supporting serial port debugging software can connect the tilt 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 and Y direction tilt angle, and you can also modify and set other parameters.

Operating Steps:

① Correctly connect the serial port hardware of the inclinometer and connect the power supply.

② Select the computer serial port and baud rate and click to connect to the serial port.

③ Click start, the current tilt angle of the inclinometer in the X and Y direction will be displayed on the screen.

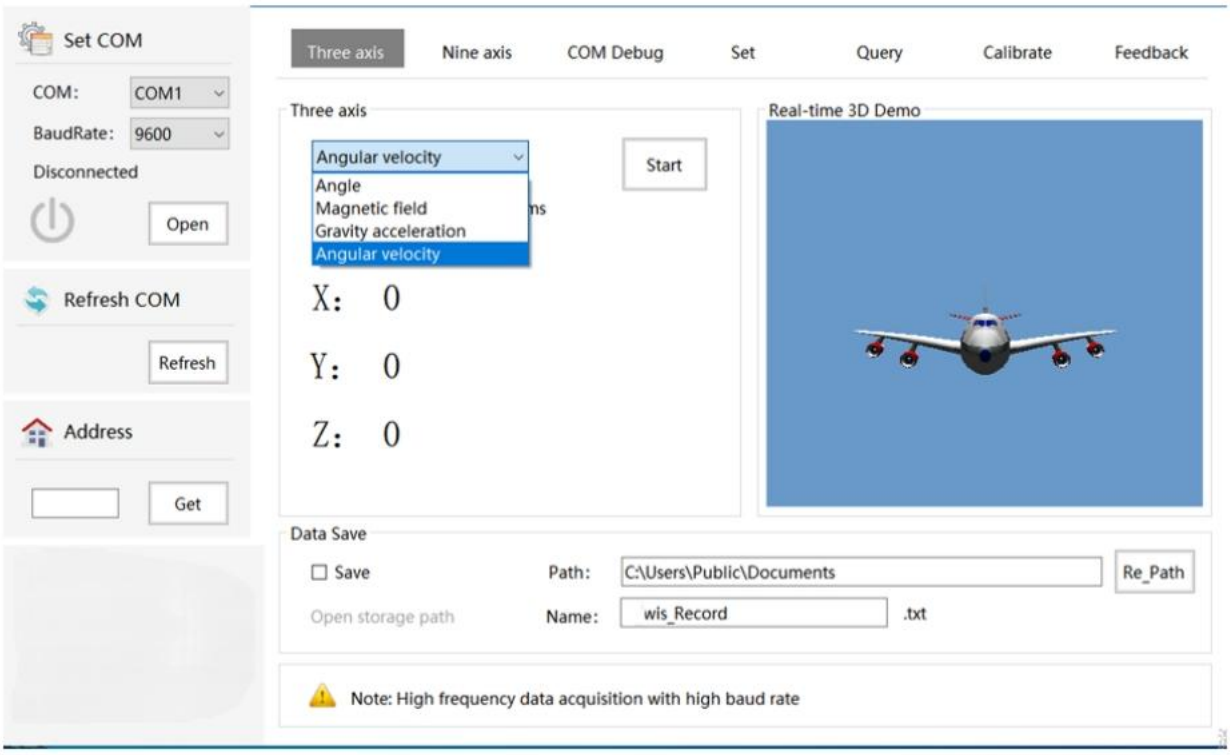


Figure 3. Software Debugging Interface

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.

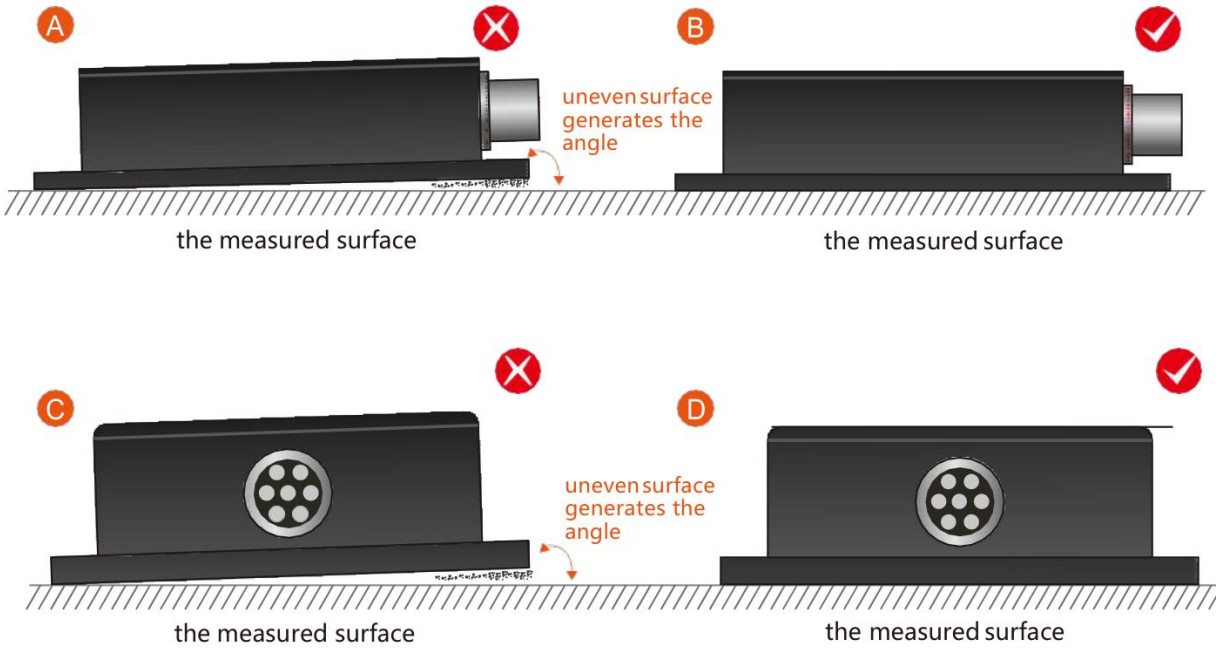


Figure 4. Correct and Incorrect Installation Methods (A/B/C/D)

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.

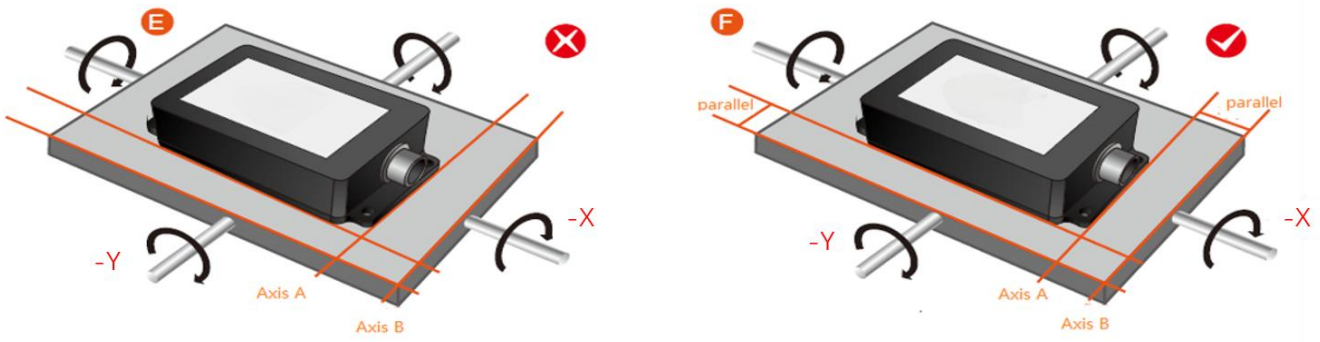


Figure 5. Installation Methods (E/F)

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.

Dimensions

Overall Dimensions

Product size：L90*W40.5*H26（mm）

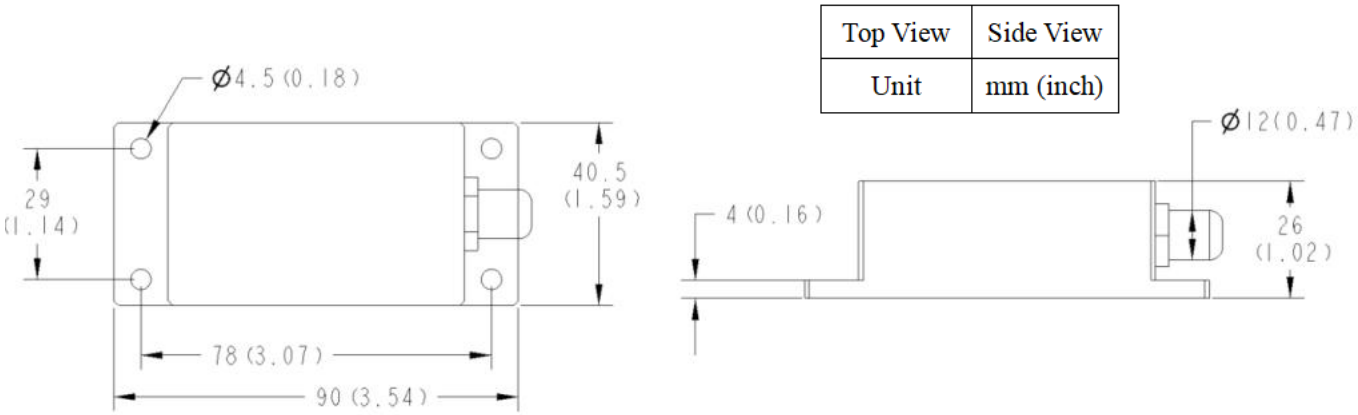


Figure 6. Overall Dimensions

PCB Dimensions

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

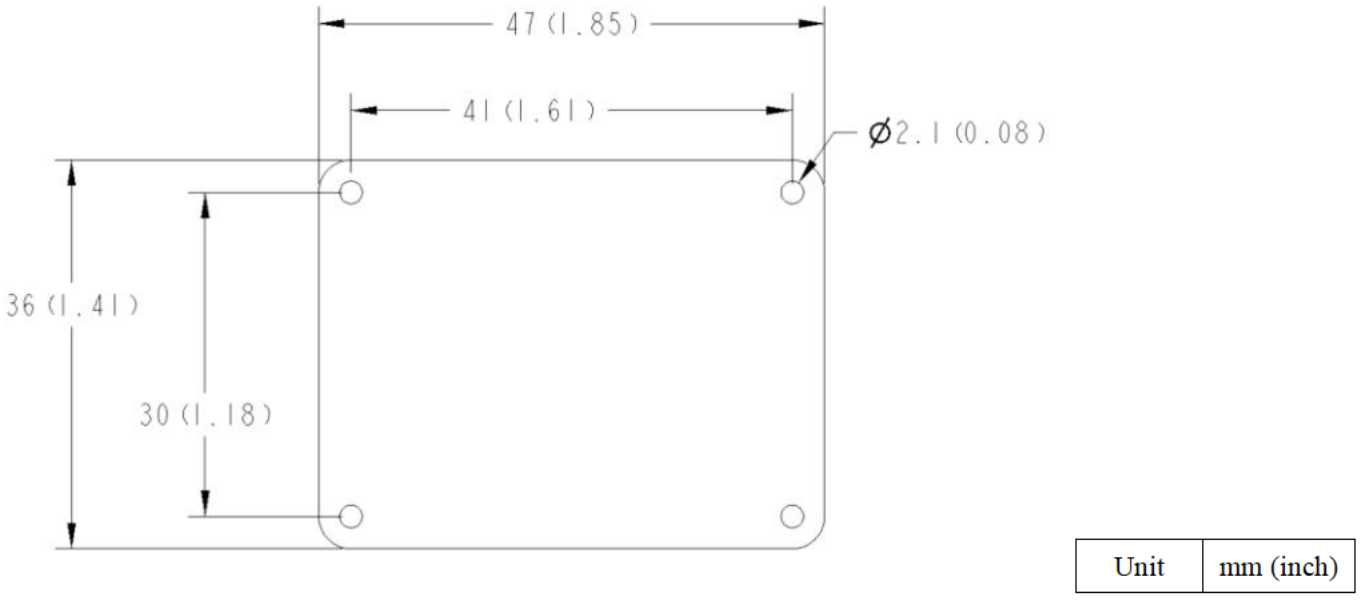


Figure 7. PCB Dimensions

Table 3. Mechanical Specifications

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