

DI-1246-R02 Series

Ultra Low Cost Dynamic Tilt Sensor

Technical Manual

V1.0

Ultra Low Cost Dynamic Tilt Sensor

DI-1246-R02

FEATURES

- Non-linear compensation, quadrature compensation
- Dynamic and static measurement
- Gyro drift compensation
- Special offset tracking algorithm to eliminate drift
- RS232/485/TTL/CAN interface output optional
- Wide temperature range：-40℃~+85℃
- High-performance Kalman filter algorithm
- Small Size: 2.165 × 1.46 × 0.94 (inch)
  55 × 37 × 24 (mm)

APPLICATIONS

- Marine vessels
- Construction Machinery
- Platform stability
- Agricultural machinery
- ROV underwater robot navigation
- Unmanned drive
- Robot
- Unmanned craft

DESCRIPTION

The DI-1246-R02 dynamic inclination sensor is a low-cost attitude measurement device that measures the inertial attitude parameters of roll and pitch as well as angular velocity and acceleration of a moving carrier. Attitude deviations are estimated using a 6-state Kalman filter with appropriate gain for inclination measurements in motion or vibration. This product utilizes high quality and reliable MEMS accelerometers and gyroscopes with algorithms to ensure accuracy, and a hermetically sealed design and rigorous workmanship to ensure that the product can accurately measure the carrier's attitude parameters even in harsh environments. This sensor has a digital interface that makes it very easy to integrate into the user's system.

SPECIFICATIONS

Table 1. Electrical

Parameter	Min.	Typ.	Max.	Unit/Note
Power Supply Voltage	5		12	V
Operating Current		30	40	mA
Operating Temperature Range	−40		+85	°C
Storage Temperature Range	−55		+100	°C

Table 2. Performance index

Attitude Parameter	Dynamic accuracy	3°
	Static accuracy	0.3°
	Resolution	0.01°
	Tilt margin	Pitch ± 90°, roll ± 180°.
Physical properties	Dimension	L55 x W37 x H24 (mm)
	Weight (with wire)	130g
	Weight (With packaging)	210g
Interface characteristics	Start delay	<50ms
	Maximum sampling rate frequency	100Hz
	Serial communication rate	2400 to 115200 baud rate
	Digital output format	Binary High Performance Protocol
Trouble-free work on average	≥90000 hours	
EMC	According to GBT17626	
Insulation Resistance	≥100 MΩ	
Surge suppression	2000g, 0.5ms, 3 Time/shaft	

*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.

ELECTRICAL INTERFACE

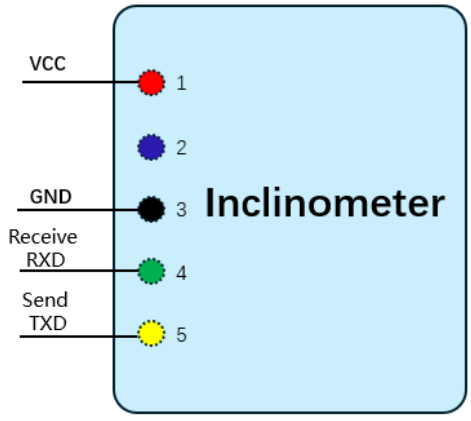


Figure 2. Pin Names

Table 3. Pin Number, Colors and Functions

No.	Color		Functions
1		Red	VCC: DC 5V ~ 12V
2		Bule	NC
3		Black	GND
4		Green	Receive RXD (B、D-)
5		Yellow	Send TXD (A、D+)

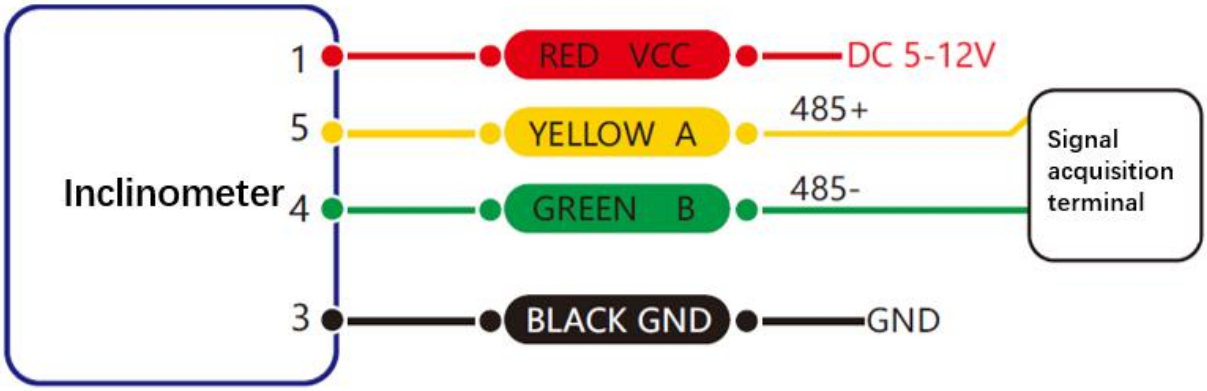


Figure 3. RS 485 Wiring Diagram

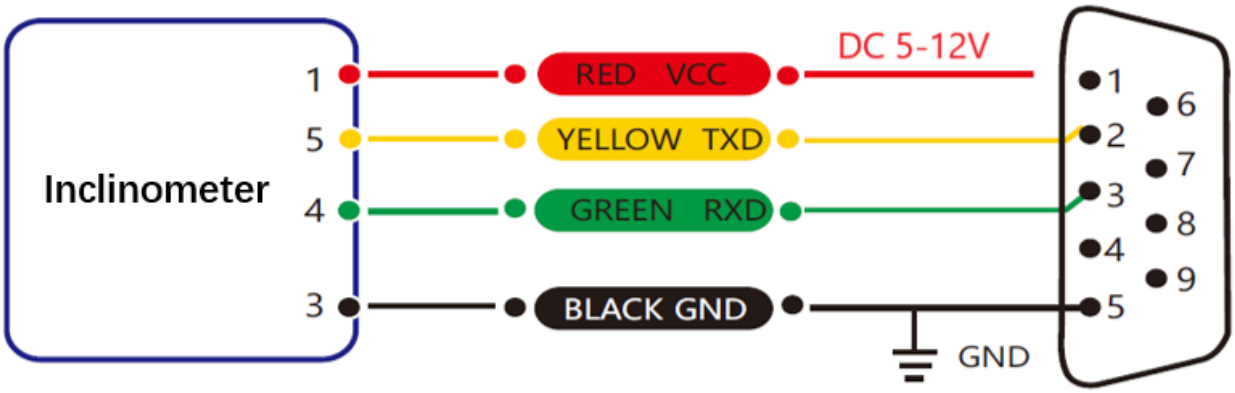


Figure 3. RS 232 Wiring Diagram

TEST SOFTWARE

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

DI-1246-R02 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.

Steps：

(1) Connect the serial port hardware of the inclinometer correctly, and connect the power supply.

(2) Select correct device Type (Select Azimuth series).

(3) Select computer serial port and baud rate and click connect serial port.

(4) Click start button and the current inclination Angle of the incliner in X and Y directions will be displayed on the

screen.

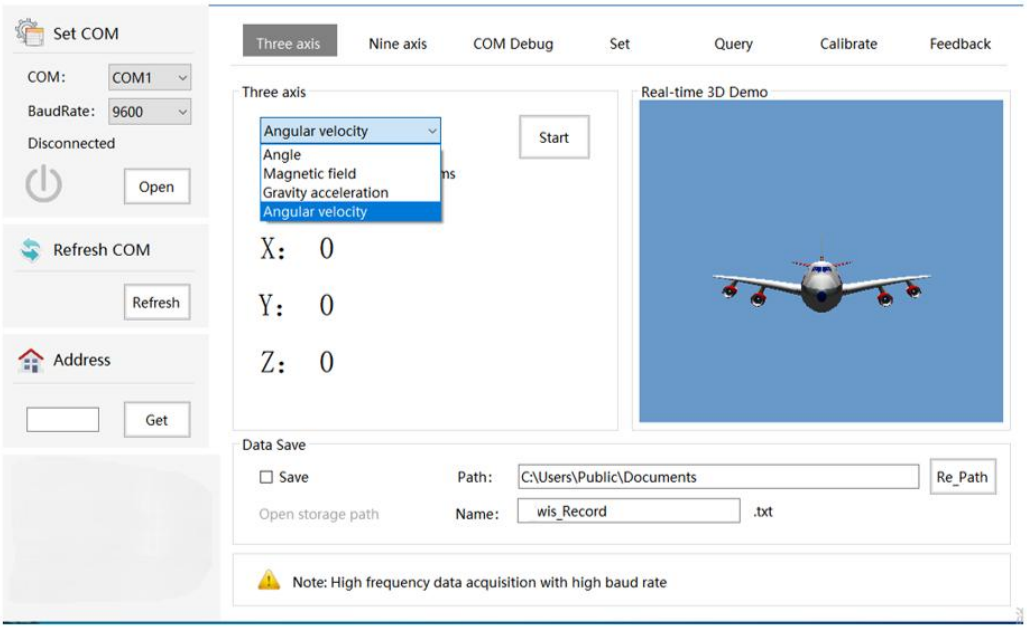
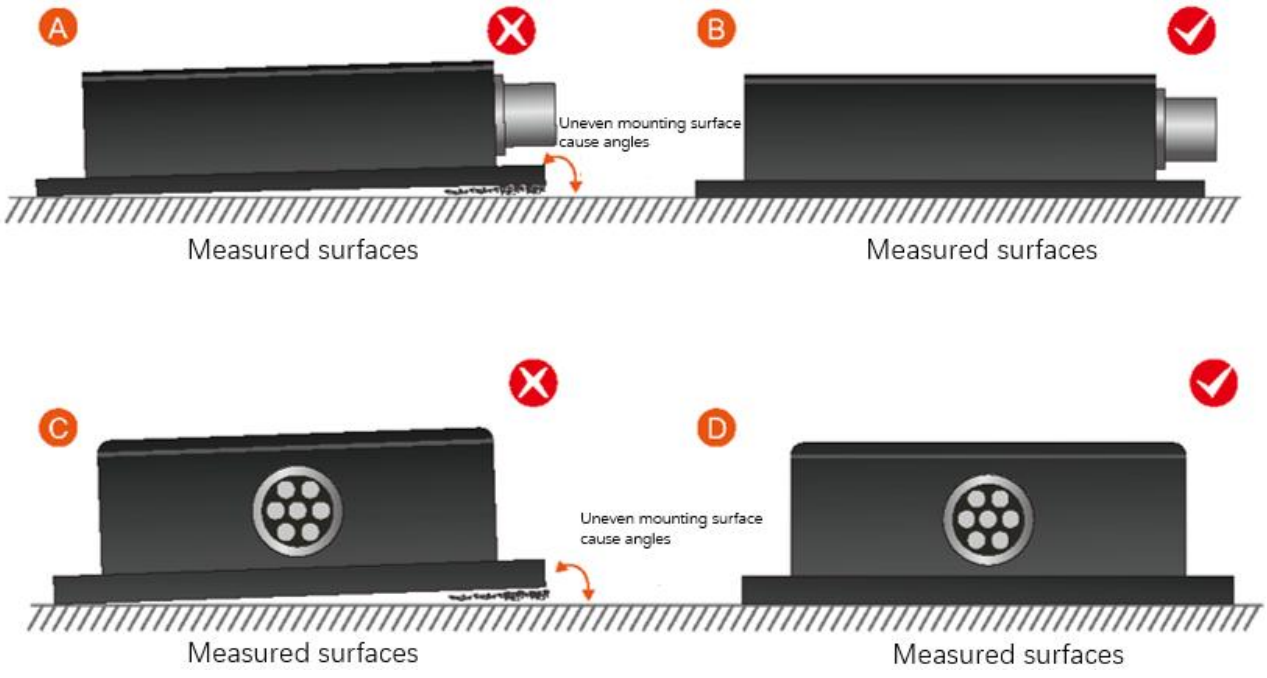


Figure 4. Software Debugging Interface

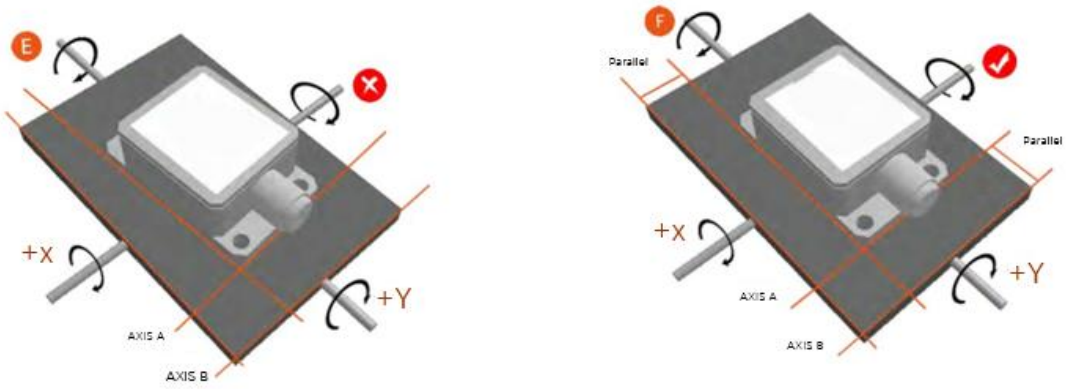
INSTALLATION

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. 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 edge line of the sensor and the axis of the measured object cannot have an angle as shown in figure E, and the installation should keep the bottom edge line of the sensor parallel or perpendicular to the rotating axis of the measured object. This product can be installed horizontally or vertically (vertical installation requires 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 contact, and stable in rotation, and measurement errors due to acceleration and vibration.

DIMENSIONS

Outline Dimensions

Top View	Side View
Side View	Unit: mm (inch)

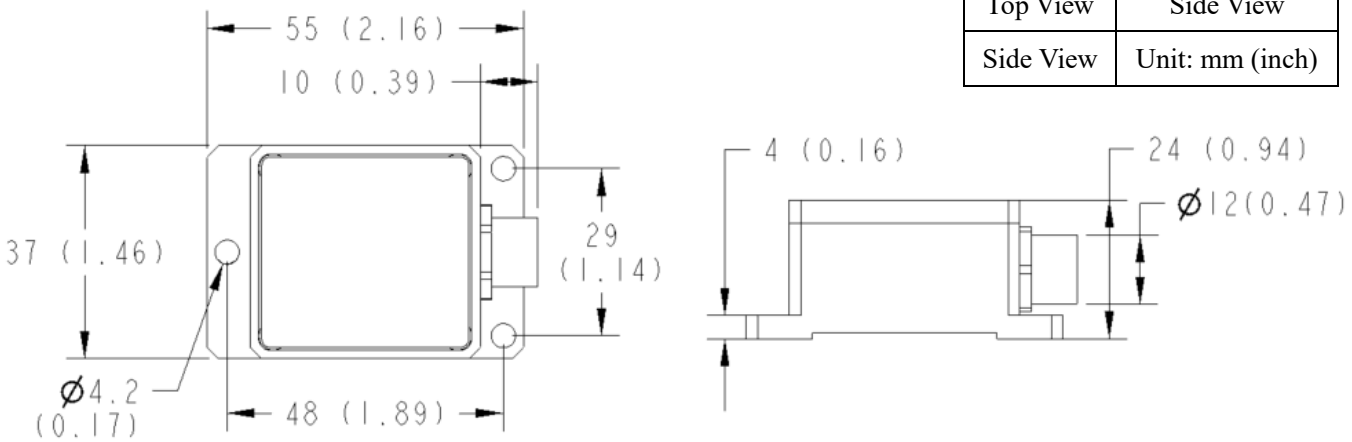


Figure 2. Outline Dimensions

Product Size：L33*W27*H6（mm）

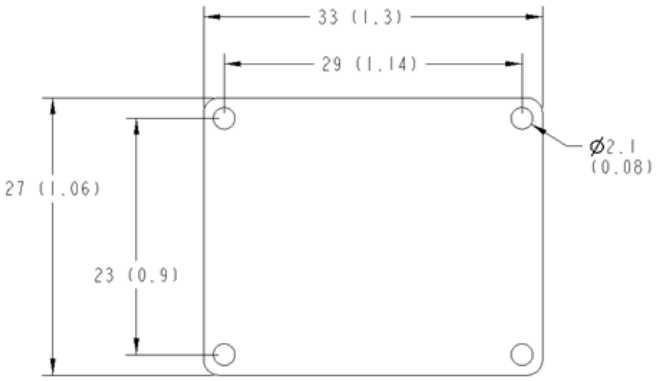


Figure 3. PCB Outline

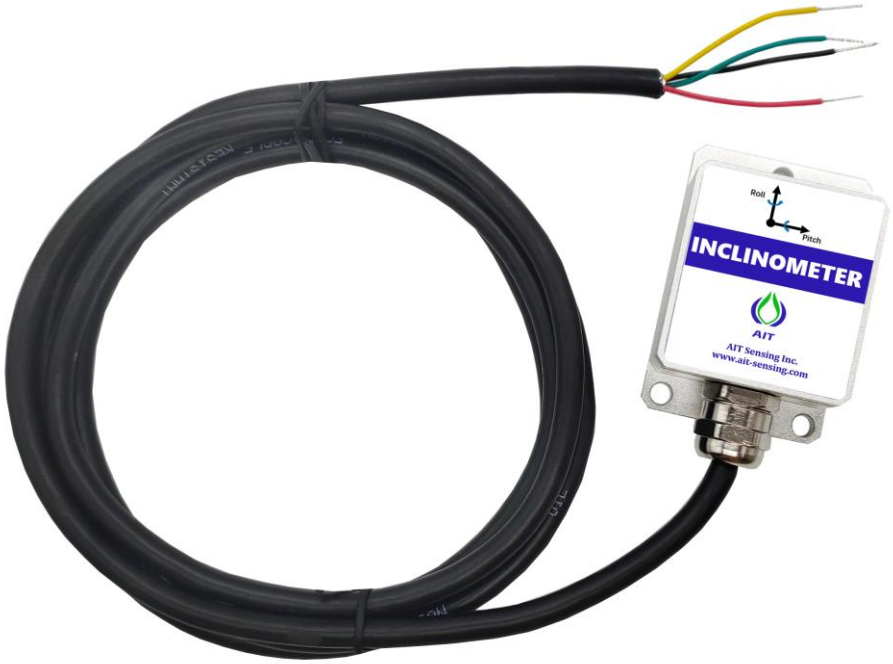


Figure 4. Top View of DI-1246-R02

Table 4. Mechanical Index

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