USER MANUAL

SINRT(RS232)

IP67 Relay-type Tilt Swtich

Tutorial Link

Google Drive

Link to instructions DEMO:
WITMOTION Youtube Channel
SINRT Playlist

If you have technical problems or cannot find the information that you need in the provided documents, please contact our support team. Our engineering team is committed to providing the required support necessary to ensure that you are successful with the operation of our AHRS sensors.

Contact

Technical Support Contact Info

Application

- AGV Truck
- Platform Stability
- Auto Safety System
- 3D Virtual Reality
- Industrial Control
- Robot
- Car Navigation
- UAV
- Truck-mounted Satellite Antenna Equipment

Contents

1 Introduction

The SINRT is a multi-sensor device detecting acceleration, angular velocity, and angle. The robust housing and the small outline makes it perfectly suitable for industrial retrofit applications such as condition monitoring and predictive maintenance. Configuring the device enables the customer to address a broad variety of use cases by interpreting the sensor data by smart algorithms.

SINRT's scientific name is AHRS IMU sensor. A sensor measures 2-axis angle. Its strength lies in the algorithm which can calculate dual-axis angle accurately.

It is employed where the highest measurement accuracy is required. SINRT offers several advantages over competing sensor:

• Heated for best data availability: new WITMOTION patented zero-bias automatic detection calibration algorithm outperforms traditional accelerometer sensor

• High precision Roll Pitch Yaw (X Y) Acceleration + Angular Velocity + Angle

• Low cost of ownership: remote diagnostics and lifetime technical support by WITMOTION service team

• Developed tutorial: providing manual, datasheet, Demo video, free software for Windows computer

• WITMOTION sensors have been praised by thousands of engineers as a recommended attitude measurement solution

1.1 Warning Statement

- Putting more than 36 Volt across the sensor wiring of the main power supply can lead to permanent damage to the sensor.
- VCC cannot connect with GND directly, otherwise it will lead to the burning of the circuit board.
- For proper instrument grounding: use WITMOTION with its original factory-made cable or accessories.
- Do not access the I2C interface.
- For secondary developing project or integration: use WITMOTION with its compiled sample code.

2 Use Instructions with PC

2.1 Connection Method

PC software is only compatible with Windows system.

Link to SINRT's demo video

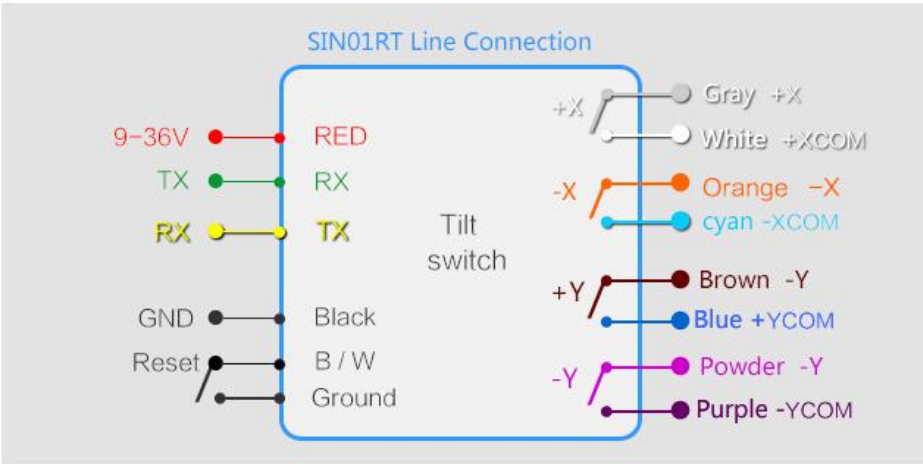
2.1.1 PIN Definition

For detailed pin function, it is recommended to check Chapter 4 on datasheet of SINRT.

Electrical connection

Line color	Red	Black	Green	Yellow	White	Gray	Cyan	Orange	Blue	Brown	Purple	Pink	B/W
	1	2	3	4	5	6	7	8	9	10	11	12	13
Function	VCC 9-36V	GND	TTL(RX) /RS232 (R)	TTL(TX) /RS232 (T)	+X COM	+X	-X COM	-X	+Y COM	+Y	-Y COM	-Y	Reset

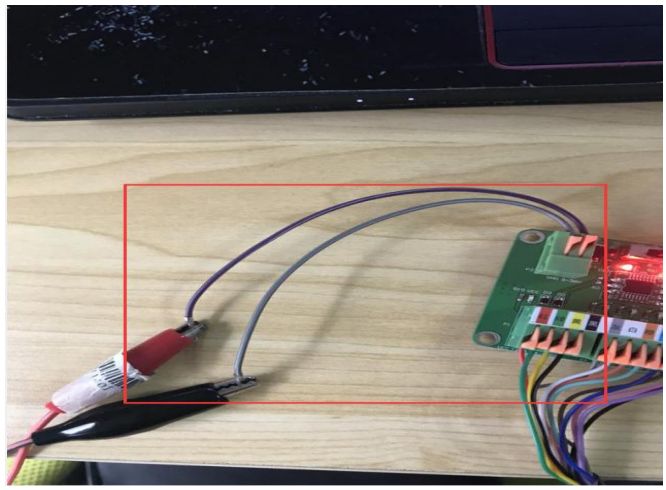
1. Red line Connect 9-36v power supply, Black wire connect to ground.
2. If you select the TTL version, the green and yellow lines indicate the serial port ttl interface RX (green), TX (yellow), if choose Rs232 ,that the serial port 232 interface RX (green), TX (yellow),The alarm threshold (-x, + x.-y, + y), can be set different threshold.



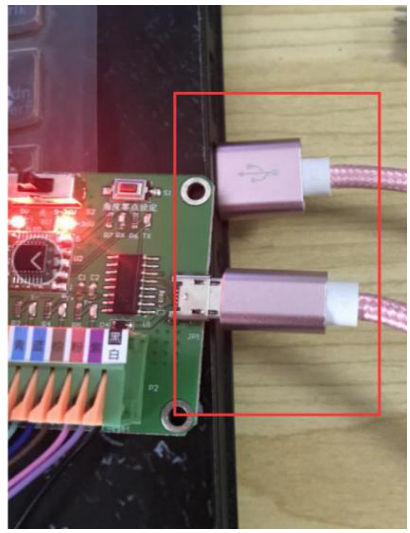
Notice: Connect Reset to GND more than 2s,it will set the current position to 0°

2.1.2 Serial Connection

Step 1.
Turn the switch to 9-36V and Connect the evaluation board with power supply
Evaluation board's VCC - power supply's VCC (9-36V)
Evaluation board's GND - power supply's GND



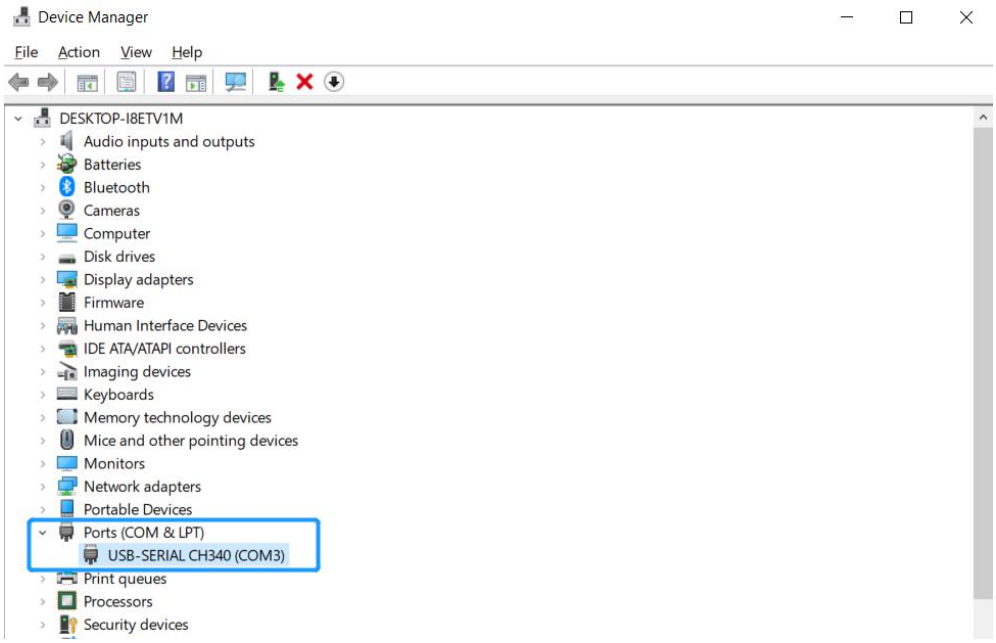
Step 2. Connect the evaluation board with a Micro-USB data cable



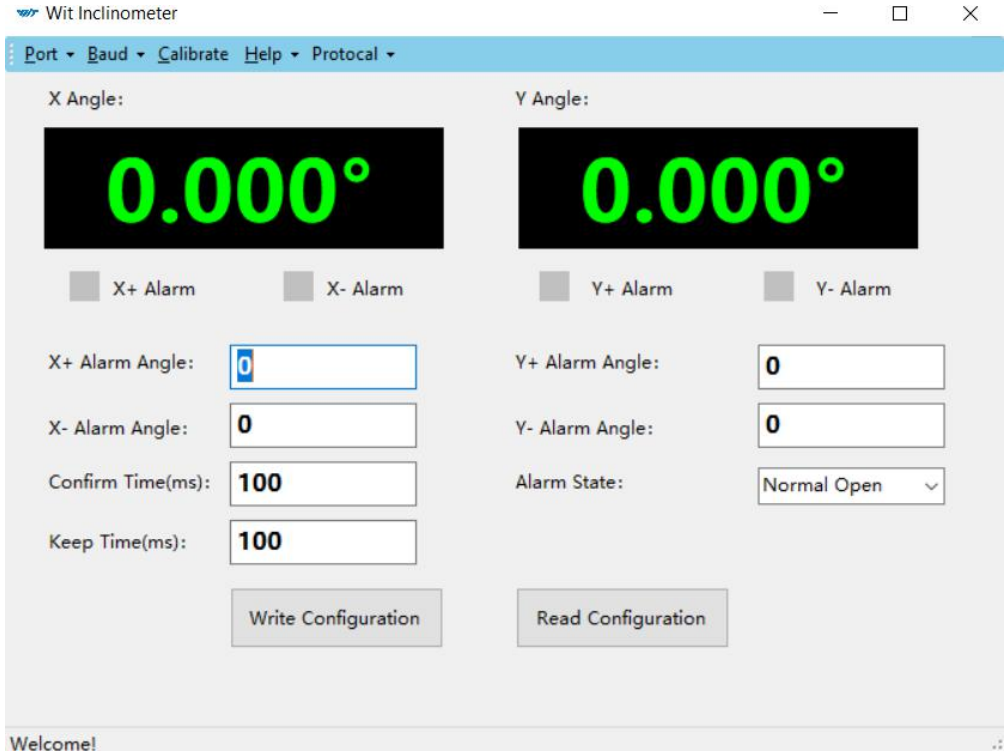
Step 3. Download whole tutorial from below link
Link to download software

Step 4. Unzip the software and install the driver CH340

Step 5. Insert the Micro-USB cable to computer and confirm the "Com port" in device manager.

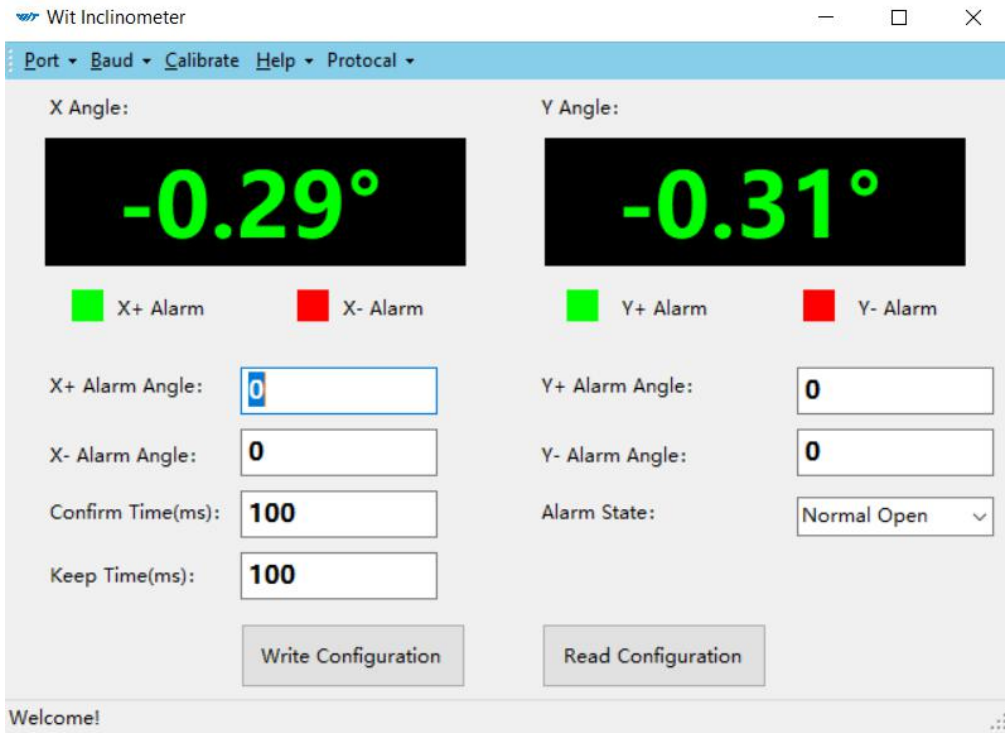


Step 6. Open the software, Inclinometer.exe



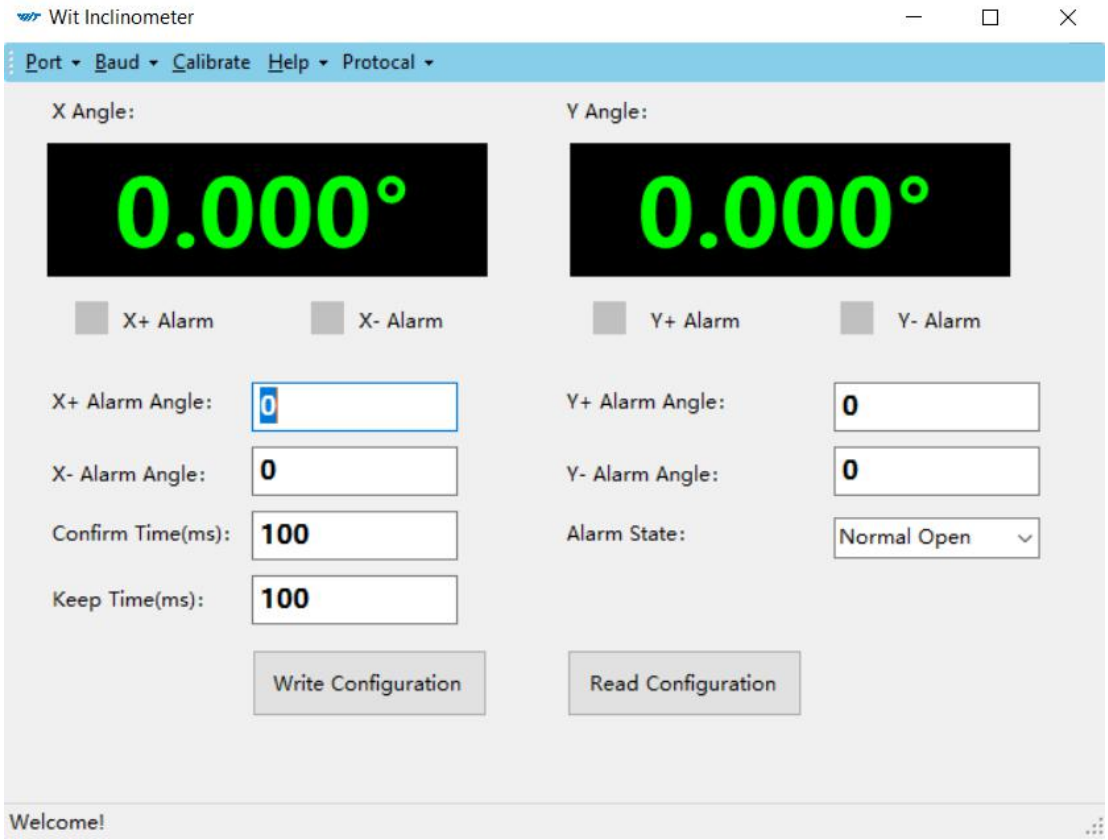
Step 7.

Select the com port and baud rate 9600, data will be shown on the software. Data will appear after auto-search finishes.



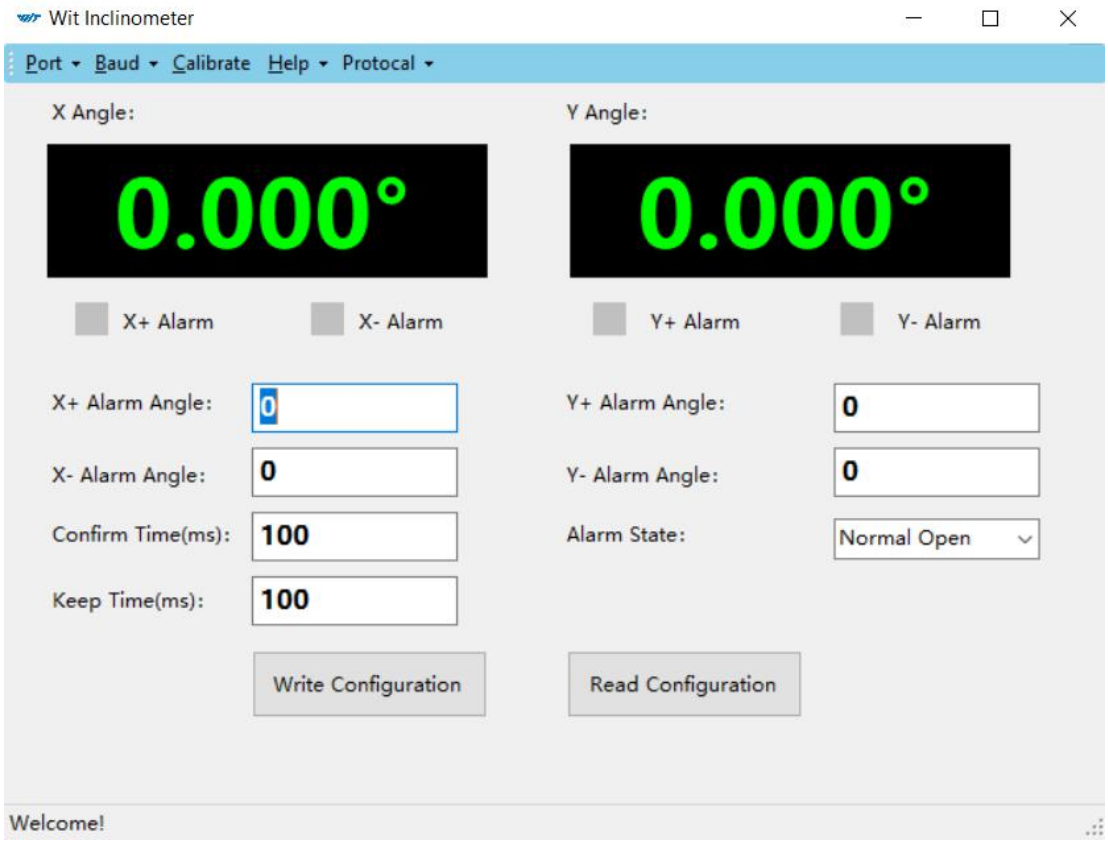
2.2 Software Introduction

2.2.1 Main Menu



Main Menu of software		
Content		Function
Port		Com port selection
Baud		Baud rate selection
Calibrate		Acceleration calibration
Help	Language	selection (English/ Chinese)
	Help	Link to support team
	About	Info about Inclinometer.exe
Protocol		Normal or Modbus, TTL& RS232 is normal

2.2.2 User Interface



Menu of software	
Content	Function
X+ Alarm Angle	X+ Angle Trigger setting
X- Alarm Angle	X- Angle Trigger setting
Y+ Alarm Angle	Y+ Angle Trigger setting
Y- Alarm Angle	Y- Angle Trigger setting
Confirm Time	How long does the angle trigger the setting, the alarm will occur. To avoid the false alarm
Keep Time	How long the alarm will keep
Alarm State	Normal Open/ Close, only for SINRT relay-type tilt switch

2.3 Calibration

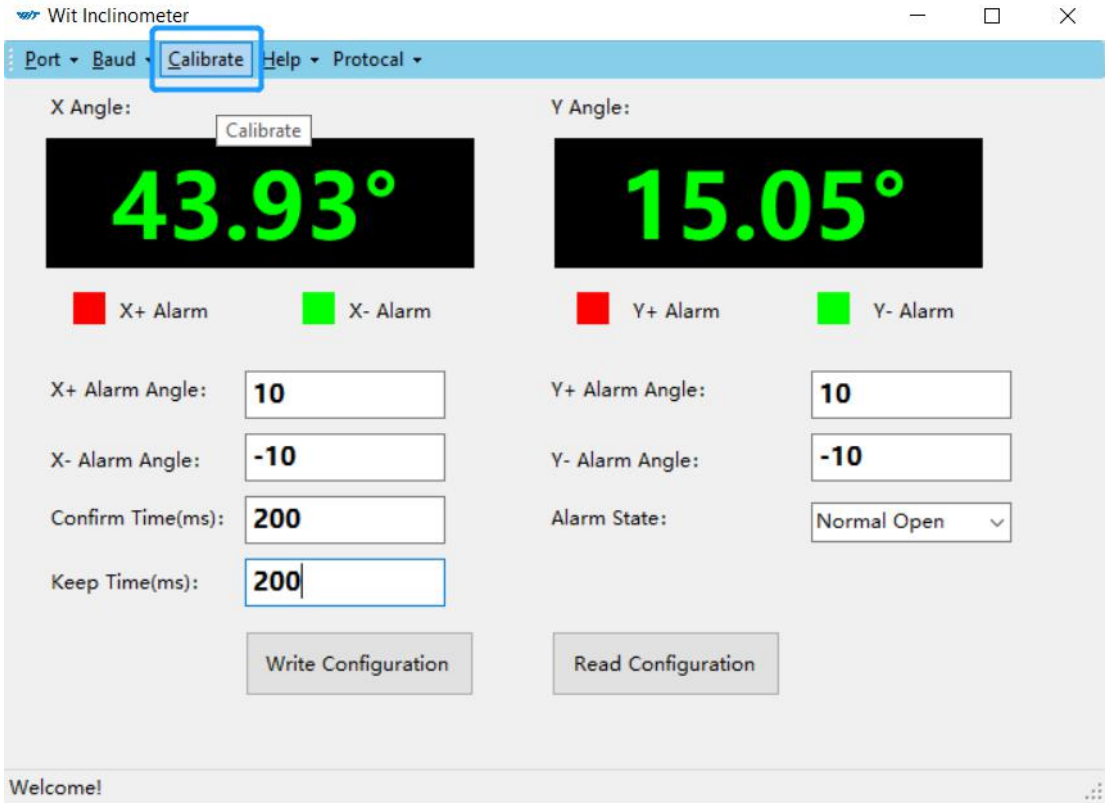
Preparation:
Make sure the sensor is "Online".

Calibration on PC software:

It is required to calibrate for the first time usage.
The accelerometer calibration is used to remove the zero bias of the accelerometer. Before calibration, there will be different degrees of bias error. After calibration, the measurement will be accurate.

Methods:
Step 1. Keep the sensor horizontally stationary

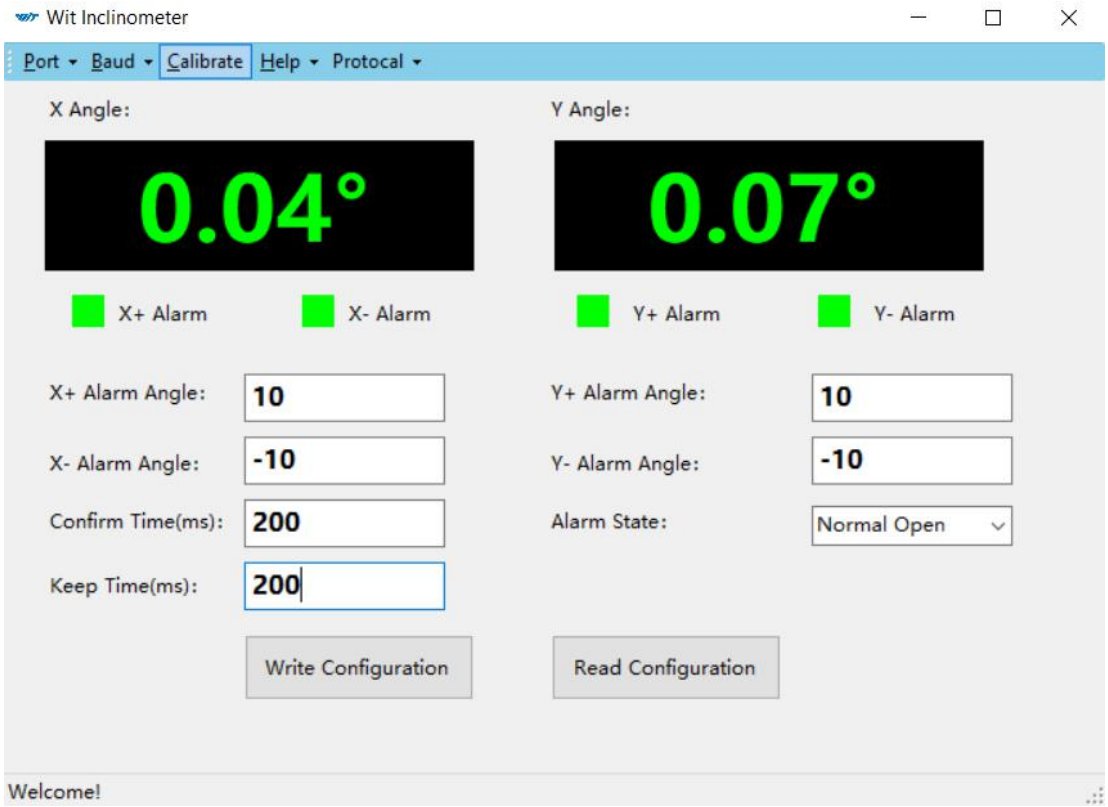
Step 2. Click the calibration button on the PC software, if a pop-up window is displayed, click "Yes". Calibration cannot be performed without unlocking.



Step 3. Check the result.

Then you can see that the X and Y axes are close to 0 degrees.

If the calibration is unsuccessful, you can try to send an instruction to perform the calibration. The calibration instruction is in the communication protocol of datasheet.

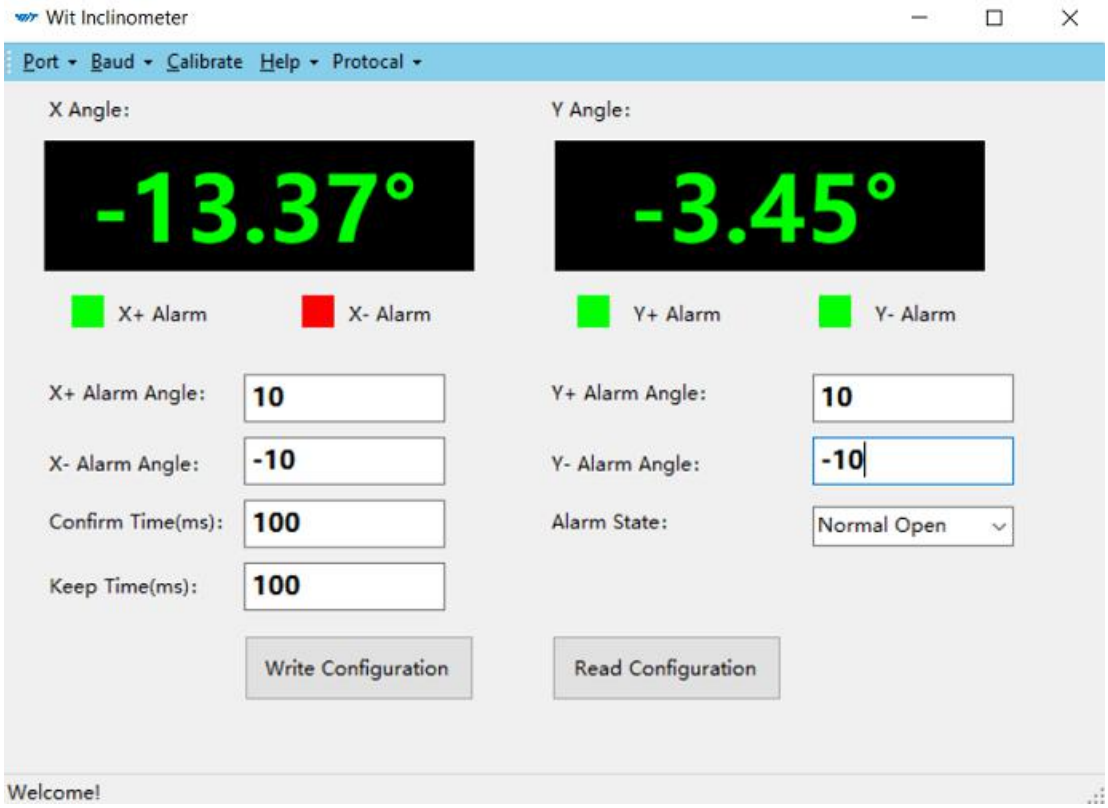


2.4 Configuration

2.4.1 Trigger Setting

As shown in the below picture:
The X+ alarm value is set to 10 degrees, X- alarm value is set to -10 degrees, Y+ alarm value is set to 10 degrees,

The Y-alarm value is set to -10 degrees. At this time, the X-axis angle is -13.37, which is less than -10 degrees, so the X-alarm is red. When it is greater than 10 degrees, X+ will alarm and display in red.



2.4.2 Confirm Time Setting

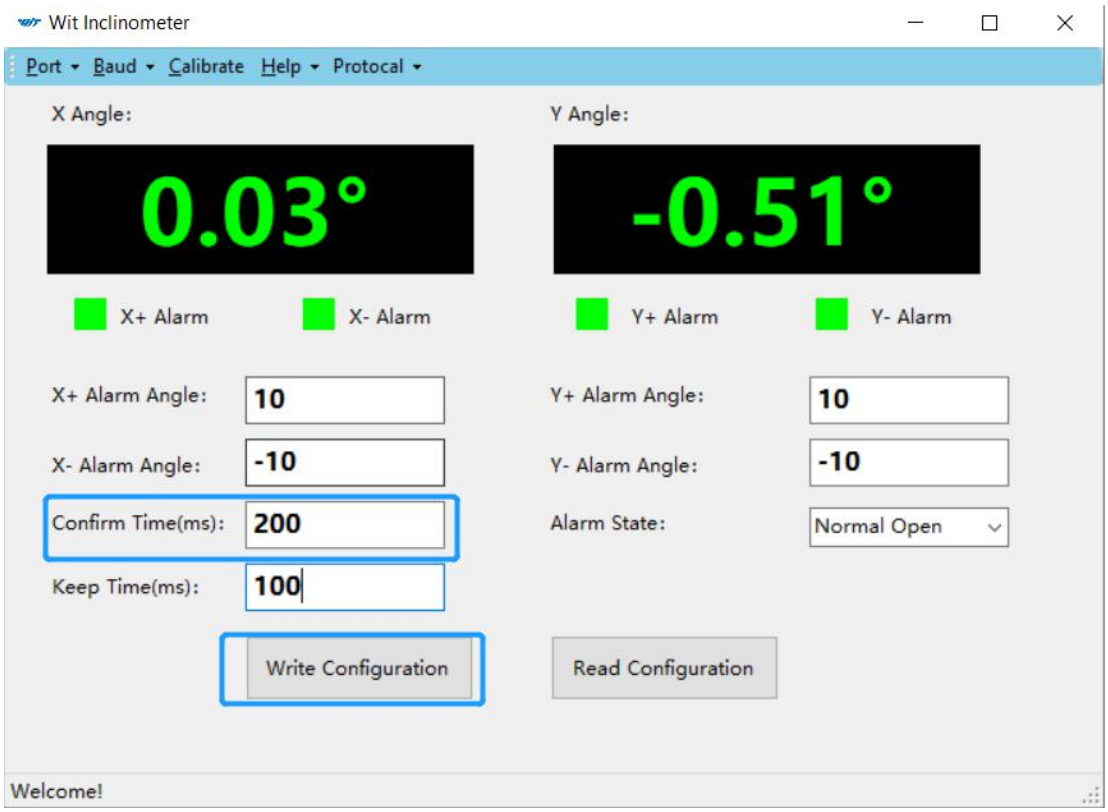
The “Confirm Time" is set for judge how long does the angle trigger the angle alarm setting. To avoid the false alarm.

For example, if X-angle reaching above -10 degree setting for 200ms, the alarm will occur. If less than 200ms, the alarm will not occur.

Step1. Edit the Confirm Time to the preferred setting

Step 2. Click “Write Calibration"

Step 3. Click “Read Calibration" to confirm if setting is done.



2.4.3 Keep Time Setting

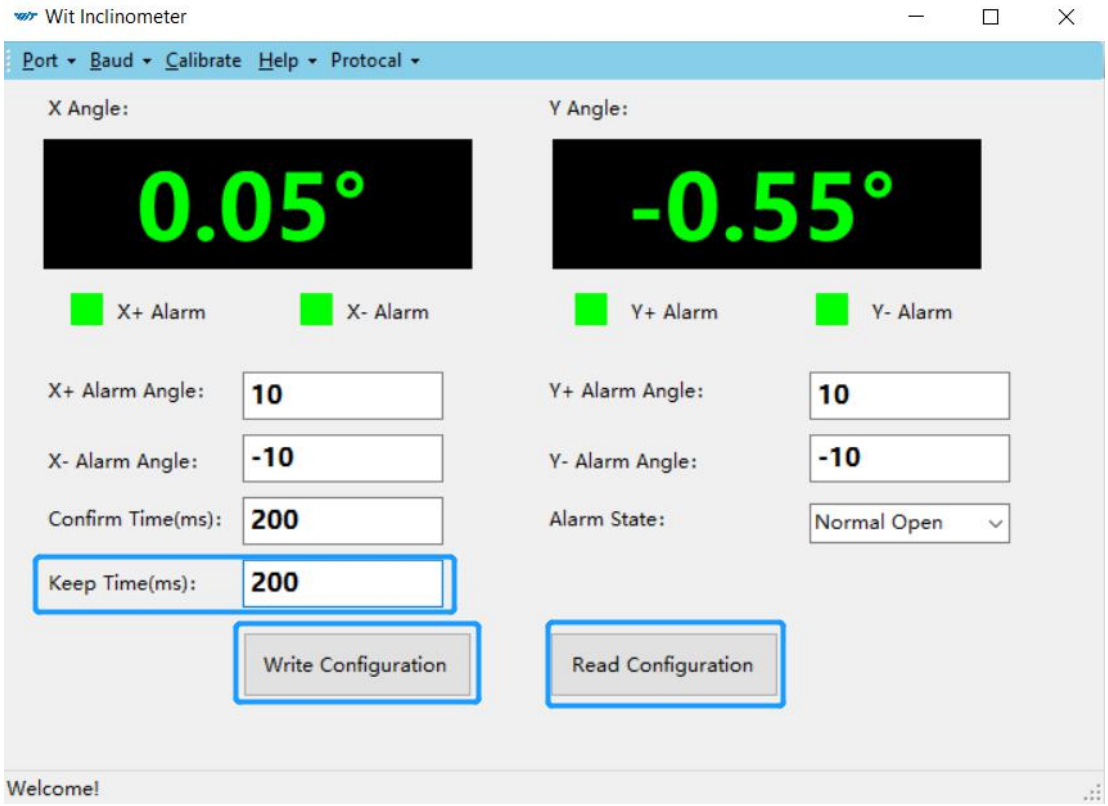
The “Keep Time" function means how long will the alarm keep.

For example, if angle triggers the setting, the alarm will remain for 200ms.

Step1. Edit the “Keep Time" to the preferred setting

Step 2. Click “Write Calibration"

Step 3. Click “Read Calibration" to confirm if the setting is done.

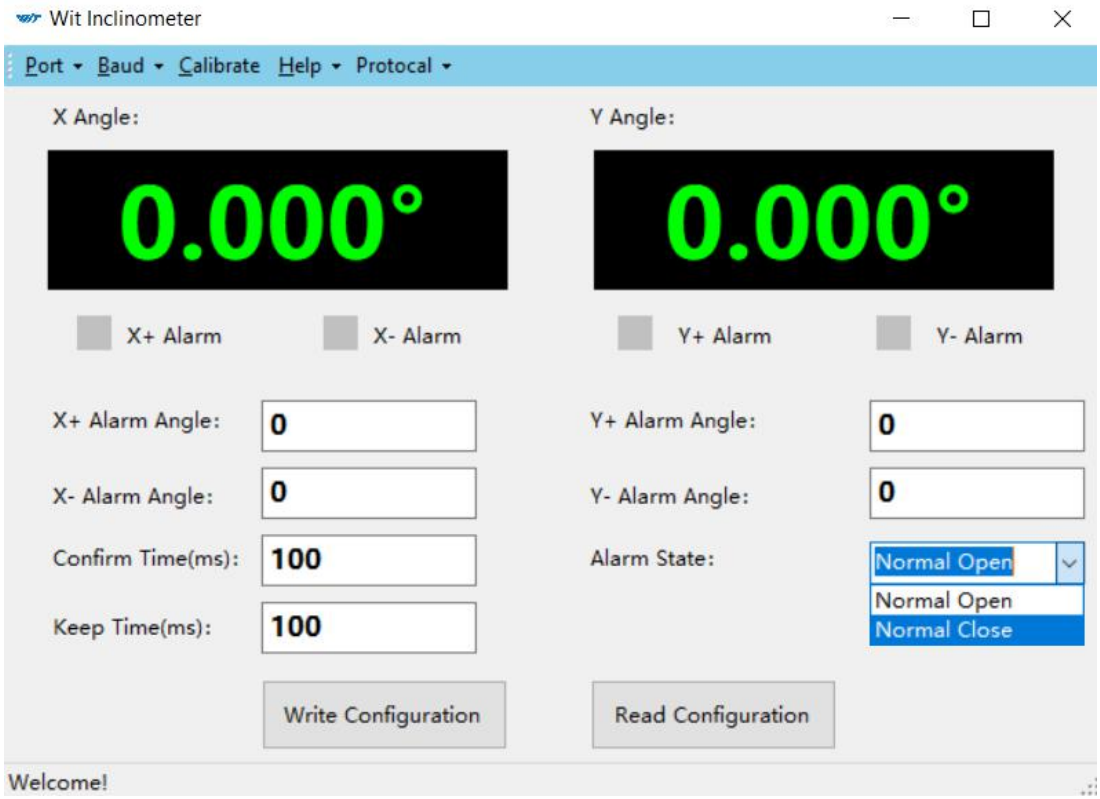


2.4.4 Alarm State

Alarm state setting is for relay-output type.

Normal open: Normal situation relay switch is ON, the sensor switch will turn OFF when the angle triggers the setting.

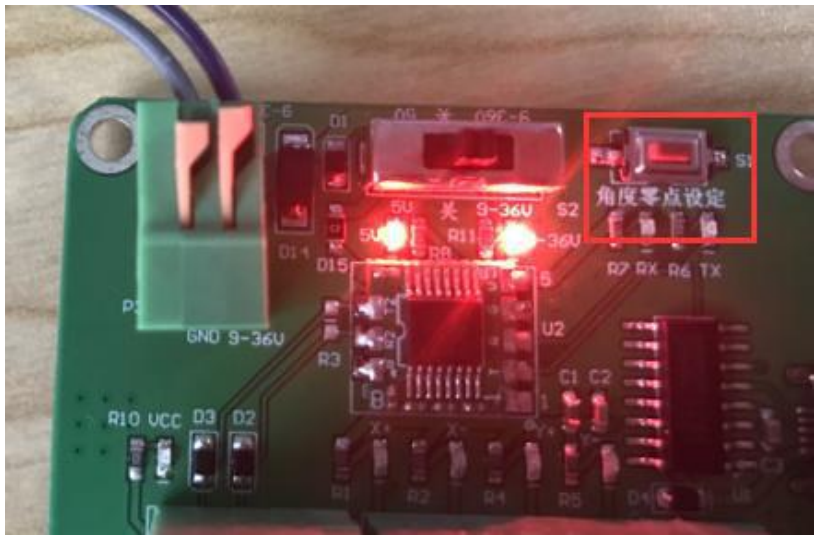
Normal close: Normal situation relay switch is OFF, the sensor switch will turn ON when the angle triggers the setting.



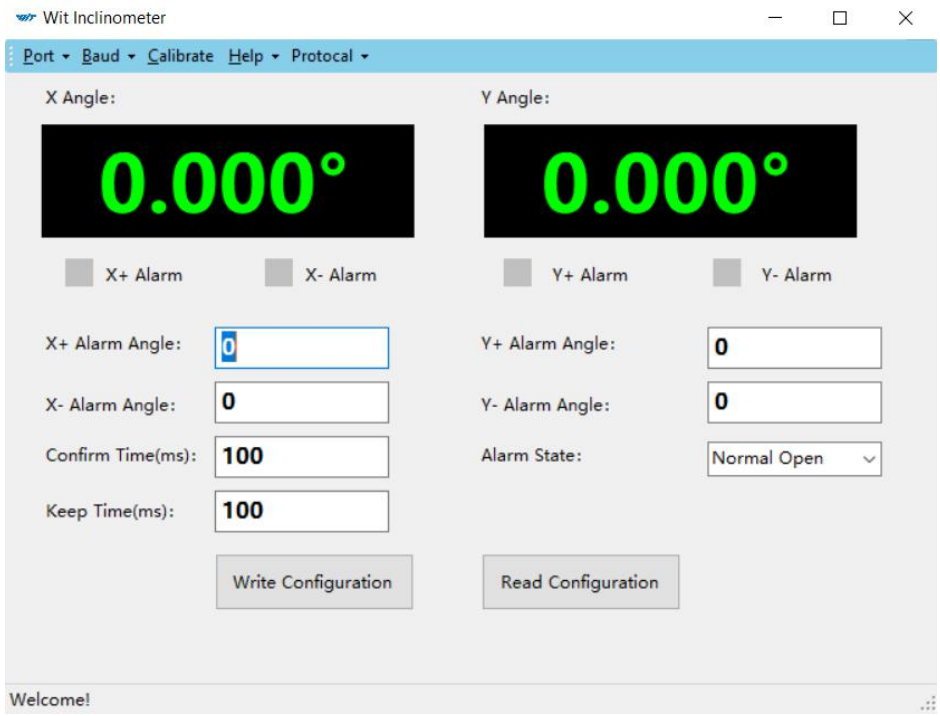
3 Set relative Attitude Angle

Method 1. After the black or write line (signal PIN) connected to the ground two seconds later, current attitude can be set relative 0° angle.

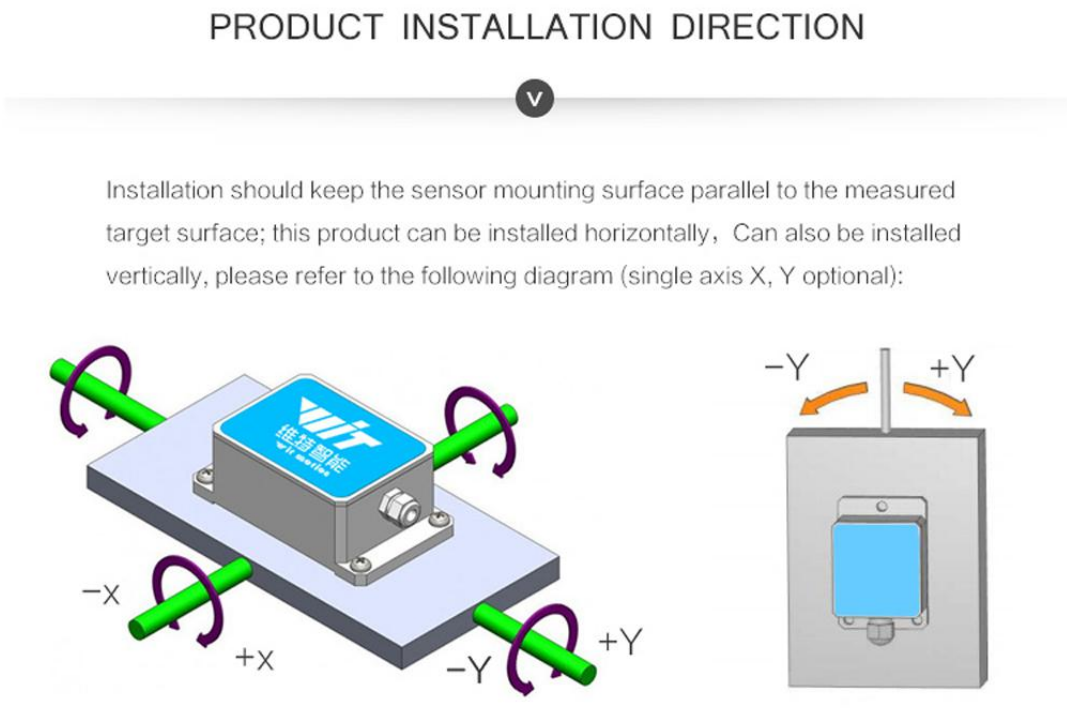
Method 2. Press the button for 2 seconds



Check the result



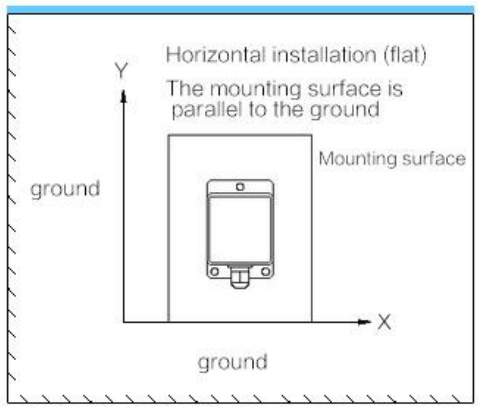
4 Angle Measurement Axial Display

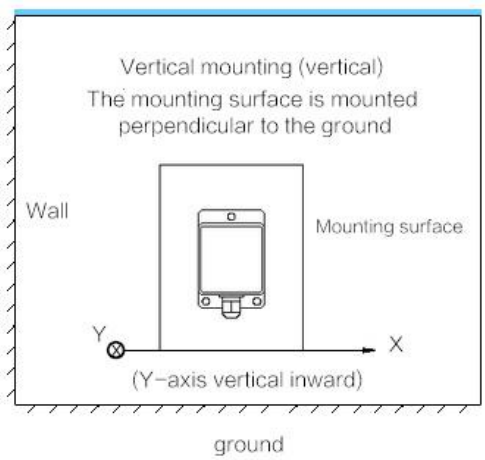


5 Placement Direction

PRODUCT INSTALLATION

Coordinates according to the right hand rule





6 Installation Precautions

Product installation precautions

Please follow the correct method to install the tilt sensor, improper installation will lead to measurement error, with particular attention to the side, the second line

1) The mounting surface of the sensor must be close to the surface to be measured, smooth and stable. If the installation surface is uneven, it is easy to cause the error of the sensor measurement.

2) the sensor axis and the measured axis must be parallel, the two axes as far as possible not to produce the angle, see Figure 3, 4

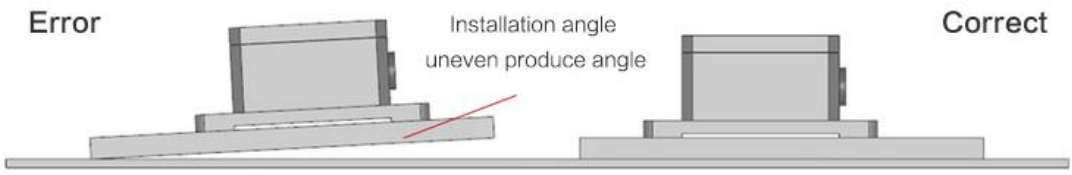


figure 1 Measured mounting surface figure 1

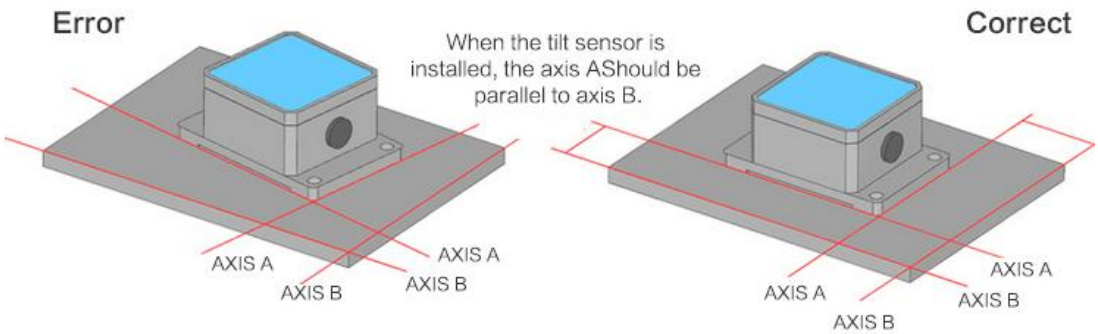


Figure 3 Figure 4