



## SPECIFICATIONS

Item No.: LCA310T

Description: Voltage Type Single-axis Inclinator

Version: Ver.03

### **Production implementation standard reference**

- Enterprise quality system standards: ISO9001: 2008 standard (certification number: 128101)
- Tilt sensor production standards: GB / T 191 SJ 20873-2003 inclinometer general specification of Level
- The Academy of metrology and quality inspection Calibrated in accordance to: JJF1119-2004 Electronic Level calibration Specification
- Gyro accelerometer test standard: QJ 2318-92 Gyro accelerometer test methods
- Software development reference standard: GJB 2786A-2009 military software development General requirements
- Product environmental testing standards: GJB150
- Electromagnetic anti-interference test standards: GB / T 17626

## General Description

The LCA310T series inclinometer was developed as a small volume, low-cost single-axis tilt sensor, the output voltage through an internal secondary linearity correction, is a linearity voltage output tilt sensor, mainly for the application market where with high-volume and cost restrictive. Built-in the latest MEMS production technology inclination unit, small size, low power consumption, and high consistency and stability of MEMS technology, working temperature up to the industry level  $-40$  to  $+85^{\circ}\text{C}$ , is a ultra-high cost-effective inclination modules.

This product adopts non-contact measuring principle, can real-time output the current posture inclination, simple to use, no need to find the relative variation of the two surface for mounting. Small size, strong ability of resisting external electromagnet interference, strong ability to withstand shock and vibration. It is the ideal choice for industrial equipment and platform measuring attitude !

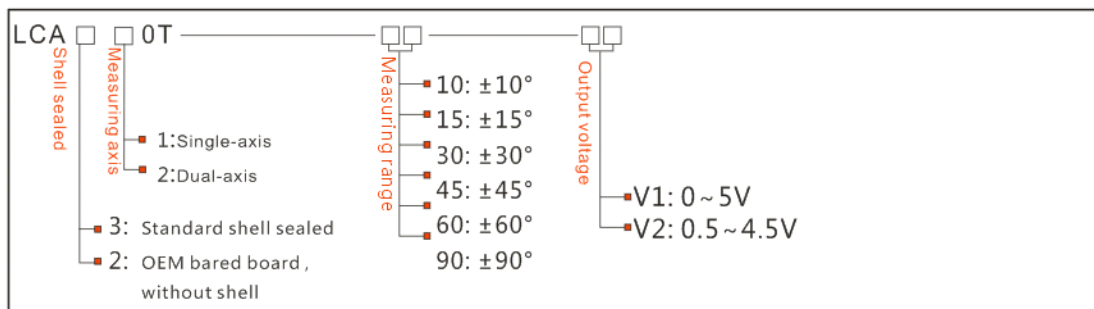
## Features

- Single-Axis Inclinometer
- Accuracy: refer to the technical data
- Output interface :0~5V
- IP67 protection class
- Resolution: 0.05°
- Full measuring range anyone within 360° optional
- Wide voltage input: 9~36V
- Wide temperature working:  $-40\sim+85^{\circ}\text{C}$
- Highly anti-vibration performance  $>3500\text{g}$
- Small Volume : 55×37×24mm (customized)

## Application:

- Electric blind man chair leveling
- Satellite antenna positioning
- Car Chassis Measurement
- engineering mechanical measurement of dip angle
- Cloud deck operating monitor
- Medical equipment leveling
- Four - wheeled positioning system

## Ordering information:



E.g: LCA310T-10-v1 : Single-axis/Standard / $\pm 10^{\circ}$  Measuring range/0-5V output voltage

## Technical Data

Parameters	Conditions	LCA310T-30	LCA310T-60	LCA310T-90	LCA310T-360	Unit
Measuring rang		±30	±60	±90	±180	°
Measuring axis		X	X	X	X	
ZERO output	0° output	2.5	2.5	2.5	2.5	V
Resolution		0.05	0.05	0.05	0.05	°
Absolute accuracy		0.1	0.1	0.2	0.2	°
Long term stability		0.2	0.2	0.25	0.26	
Zero temperature coefficient	-40~85°	±0.008	±0.008	±0.008	±0.008	°/°C
Sensitivity temperature coefficient	-40~85°	≤150	≤150	≤150	≤150	ppm/°C
Power on time		0.5	0.5	0.5	0.5	S
Response time		0.05	0.05	0.05	0.05	s
Response frequency		1~20	1~20	1~20	1~20	Hz
Electromagnetic compatibility	According to EN61000 and GBT17626					
MTBF	≥45000 hours/times					
Insulation Resistance	≥100M					
Shockproof	100g@11ms、3Times/Axis(half sinusoid))					
Anti-vibration	10grms、10~1000Hz					
Protection glass	IP67					
Cables	Standard 1M length、wearproof、grease proofing、wide temperature、Shielded cables4*0.4mm2					
Weight	90g(without cable)					

\*This Technical data only list ± 30 °, ± 60 °, ± 90 °, ± 360 ° series for reference, other measuring range please refer to the adjacent parameters.

### Key words:

Resolution: Refers to the sensor in measuring range to detect and identify the smallest changed value.

Absolute accuracy: Refers to in the normal temperature circumstances,the sensor absolute linearity, repeatability, hysteresis, zero deviation, and transverse error comprehensive error.

Long term stability : Refers to the sensors in normal temperature conditions, the deviation between the maximum and minimum values after a year's long time work.

Response time: Refers to the sensor in an angle change, the sensor output value reached the standard time required.

## Electronic Characteristics

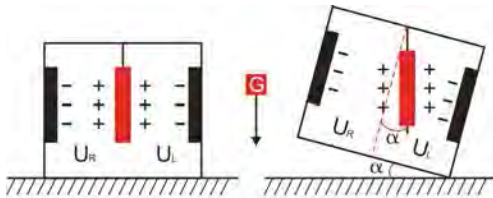
Parameters	Conditions	Min	Standard	Max	Unit
Power supply	Standard	9	12、24	36	V
	Optional		5		V
Working current			50		MA
Output overload	Resistive	10			kΩ
	Capacitive			20	N F
Working temperature		-40		+85	°C
Store temperature		-55		+125	°C

## Mechanical Parameters

- Connectors: 1m lead cable (customized)
- Protection glass: IP67
- Enclosure material : Aluminum Oxide
- Installation : 4\*M3 screws

## Working Principle

Adopt the European import of core control unit, using the capacitive micro pendulum principle and the earth gravity principle, when the the inclination unit is tilted, the Earth's gravity on the corresponding pendulum will produce a component of gravity, corresponding to the electric capacity will change, , by enlarge the amount of electric capacity , filtering and after conversion then get the inclination.



$U_R, U_L$  Respectively is the pendulum left plate and the right plate corresponding to their respective voltage between the electrodes, when the tilt sensor is tilted,  $U_R, U_L$  Will change according to certain rules, so  $f(U_R, U_L, \alpha)$  On the inclination of  $\alpha$  function:  
 $\alpha = f(U_R, U_L)$

## Angle output calculation formula

**Angle=(output voltage—Zero position voltage)÷Angle sensitivity**

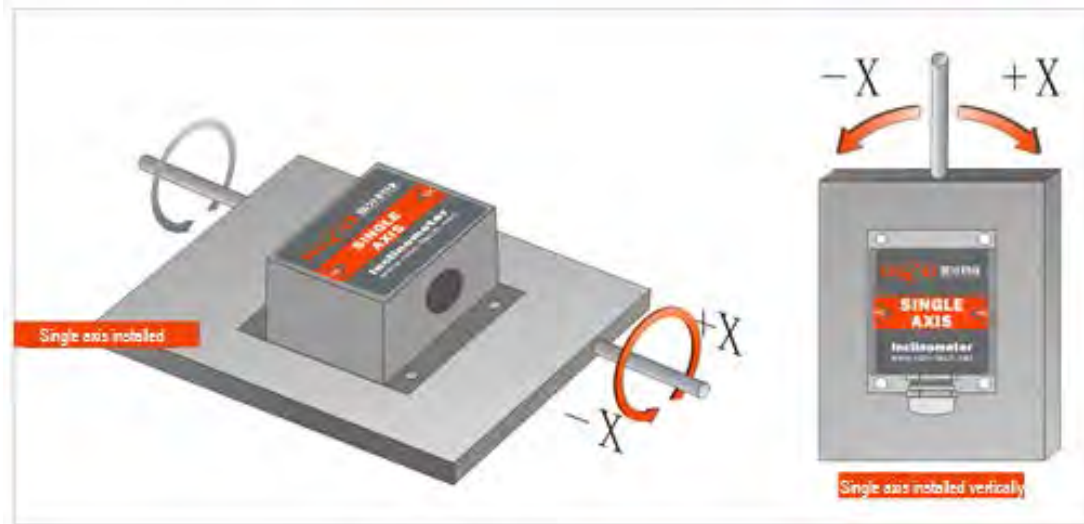
**Angle sensitivity=output voltage range÷ Angle measuring range**

**E.g: LCA310T-30-V1 (±30° Measuring range 0~5V output voltage range )**

**Angle sensitivity= 5 ÷ 60=0.83333 V/°**

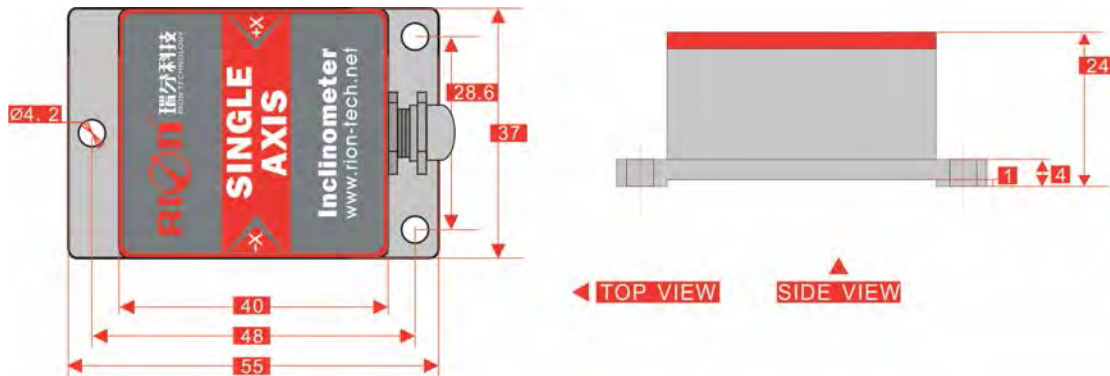
## Measuring Directions&Fix

The installation must guarantee the product bottom is parallel to measured face, and reduce the influence of dynamic and acceleration to the sensor. This product can be installed horizontally or mounted vertically (mounted vertically selection is only applicable to the single axis), for installation please refer to the following scheme.



## Dimension

Size: L55mm×W37mm×H24mm



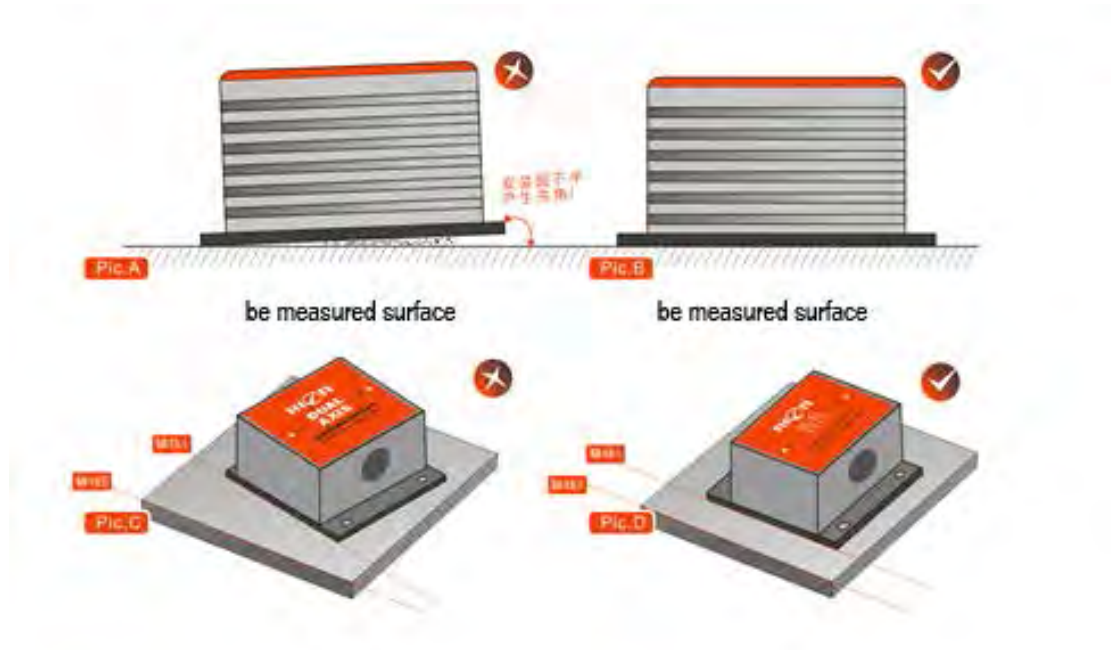
## Electrical Connection

Line color	BLACK	YELLOW	RED	GREEN
function	GND Power Negative	Out X- Output voltage	DC 9-36V	NC

## Production installation notes:

Please follow the correct way to install tilt sensor, incorrect installation can cause measurement errors, with particular attention to the "surface", "line"::

- 1) The Sensor mounting surface and the measured surface must be fixed closely, smoothly, stability, if mounting surface uneven likely to cause the sensor to measure the angle error. See Figure Pic.AB
- 2) The sensor axis and the measured axis must be parallel, the two axes do not produce the angle as much as possible. See Figure Pic.CD



Whilst every effort has been made to ensure the accuracy of this specification, we cannot accept responsibility for damage, injury, loss or expense from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.

For pricing or any further information, please contact Omni Instruments Ltd.