



STRAINSENSE

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SPECIFICATIONS

Item No: LCA310T

Description: Voltage Output Single-axis Inclinometer

Production standard references

- 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
- Ver:.06
- Date:2014.8.1

LCA310T- Voltage Output Single-axis Inclinometer



General Description

The LCA310T series inclinometer is developed for markets with a requirement for volume and cost effective for small sized low-cost single-axis tilt sensors. Within the tilt sensor, the output voltage goes through an internal secondary linearity correction. Incorporating the latest MEMS technology, it achieves a small size, low power consumption, high consistency and stability, working temperature of -40 to $+85$ and is a cost-effective inclination module.

This product adopts a non-contact measuring principle, outputting real-time current inclination and simple to use, no need to find the two sides of an angle. With advantages of small size, strong ability of resisting external electromagnet interferences and a strong ability to withstand shock and vibration, it is the ideal choice for industrial equipment and platform measuring.

Features

- Single-Axis Inclinometer
- Accuracy: refer to the technical data
- Output interface: 0~5V
- IP67 protection class
- Resolution: 0.1°
- Measuring ranges $\pm 10^\circ$ to $\pm 180^\circ$
- Wide voltage input: 9~36V
- Wide operating temperature: -40 to $+85^\circ\text{C}$
- High shock resistance $>3500\text{g}$
- Compact size: $55 \times 37 \times 24\text{mm}$

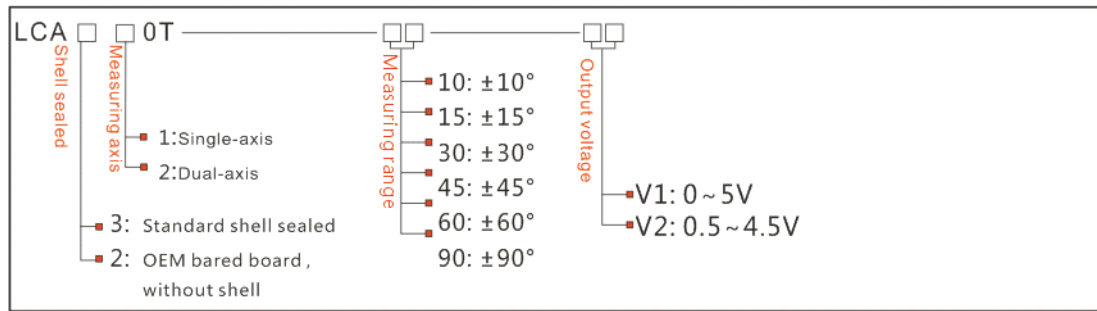
Applications

- Mobility chair leveling
- Satellite antenna positioning
- Car Chassis Measurement
- Mechanical measurement of dip angle
- Cloud deck operating monitor
- Medical equipment leveling
- Four wheeled positioning system



LCA310T- Voltage Output Single-axis Inclinometer

Ordering information:



Example LCA310T-10-1 Single-axis/Standard /±10°Measuring range/0-5V output voltage

Technical Data

Parameters	Conditions	LCA310T-30	LCA310T-60	LCA310T-90	LCA310T-360	Unit
Measuring range		±30	±60	±90	±180	°
Measuring axis		X axis	X axis	X axis	X axis	
ZERO output	0° output	2.5	2.5	2.5	2.5	V
Resolution		0.1	0.1	0.1	0.1	°
Absolute accuracy		0.2	0.4	0.5	0.75	°
Long term stability		<0.5	<0.5	<0.5	<0.5	
Zero temperature coefficient	-40~85°	±0.02	±0.02	±0.02	±0.02	°/C
Sensitivity temperature coefficient	-40~85°	<150	<150	<150	<150	ppm
Power on time		0.5	0.5	0.5	0.5	Sec
Response time		0.05	0.05	0.05	0.05	Sec
Response frequency		1 to 20	1 to 20	1 to 20	1 to 20	Hz
Electromagnetic compatibility	According to EN61000 and GBT17626					
MTBF	45000 hours					
Insulation Resistance	100M ohms					
Shock	100g@11ms 3Times/axis (half sinusoidal)					
Vibration	10g rms 10~1000Hz					
Protection class	IP67					
Cable	Standard 1M length, Durable, Grease proof, Wide temperature range Shielded cable 4 cores x 0.4mm ²					
Weight	90g (without cable)					

*This Technical data only list ± 30 °, ± 60 °, ± 90 °, ± 360 ° series for reference, other measuring ranges available.

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			kfi
	Capacitive			20	nF
Working temperature		-40		+85	C
Store temperature		-55		+125	C

Key words

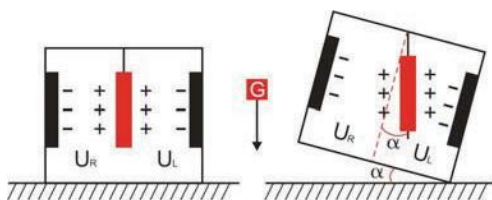
Resolution:	Refers to the smallest available rate of change output.
Absolute accuracy:	Measured at normal temperature: absolute linearity, repeatability, hysteresis, zero deviation, and transverse error/comprehensive error.
Long term stability:	Deviation at normal temperature between the max and min after 12 months.
Response time:	For a given angle change, the time for the output to give the new value.

Mechanical Parameters

- Connectors: 1m lead cable (optional lengths available)
- Protection class: IP67
- Enclosure material: Anodized Aluminium
- Installation: 3 x M4 screws (not supplied)

Working Principle

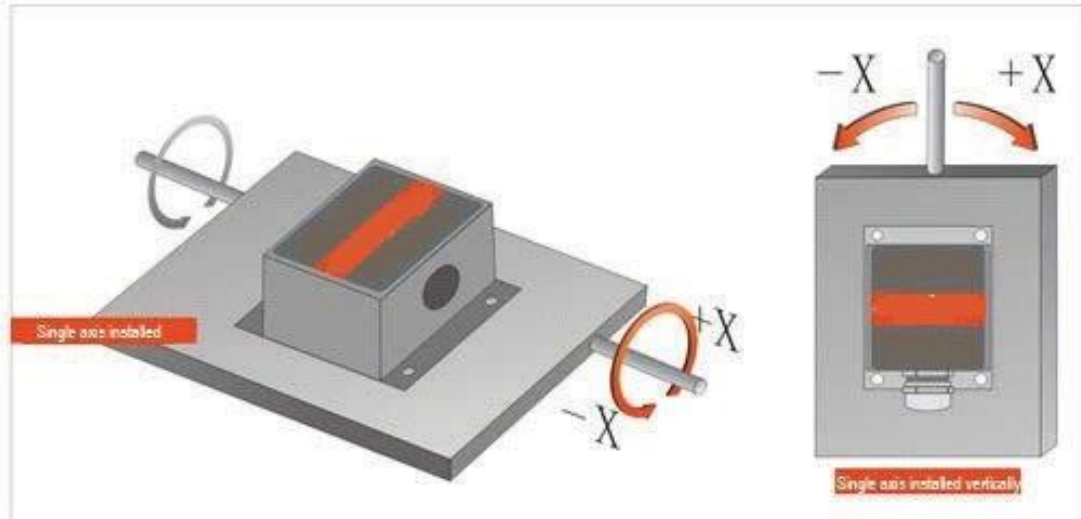
Using the capacitive micro pendulum principle with the earth gravity principle. when the inclination unit is tilted, the Earth's gravity acts on the corresponding pendulum and will produce a measurement of corresponding gravity, causing the capacitance to change, by enlarging the capacitance value, filtering the result for smooth response.



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 α function:
 $\alpha = f(U_R, U_L)$

Measuring Orientation & Fitting

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



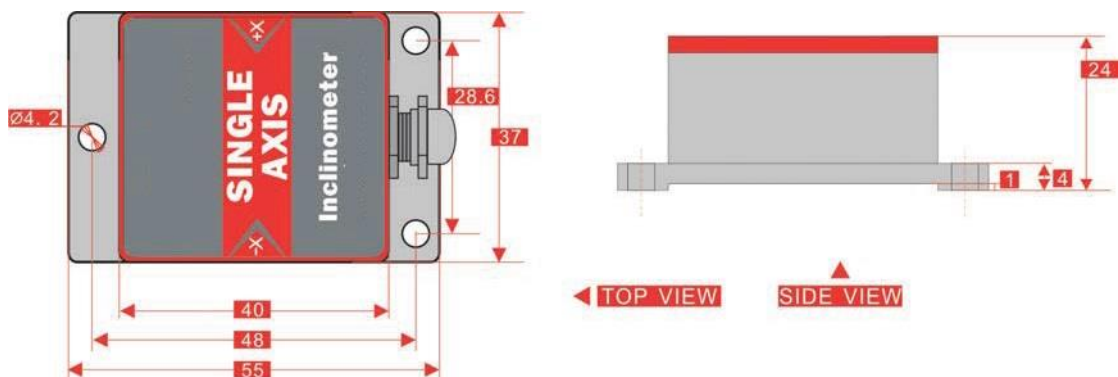
Angle output calculation formula

Angle = (output voltage - zero position voltage) ÷ angle sensitivity

Angle sensitivity = output voltage range ÷ angle measuring range

EG LCA310T-30-V1 (±30° Measuring range 0~5V output voltage range)
Angle sensitivity = 5 ÷ 60 = 0.83333 V/°

Dimensions

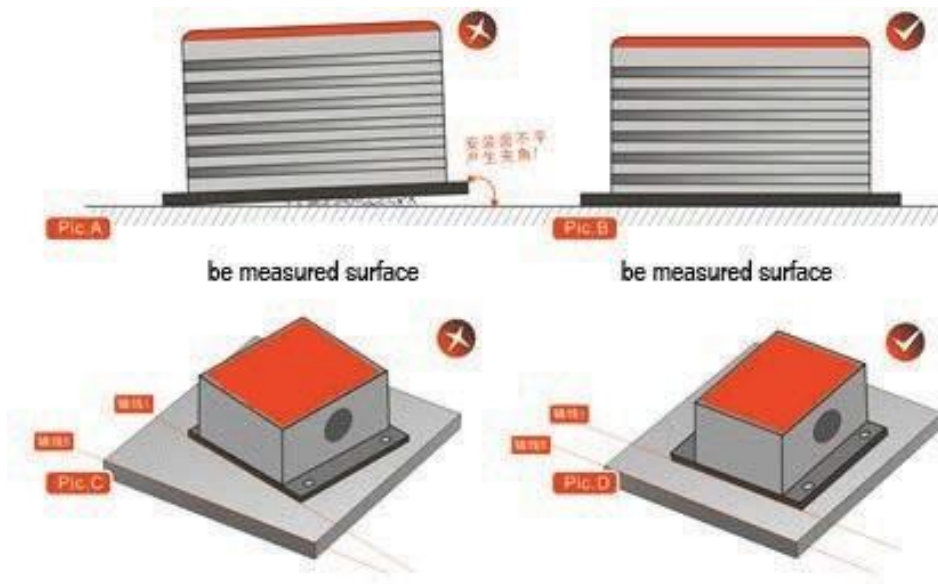


Size: L55mm × W37mm × H24mm

Product installation notes

Please follow the guidance to install the tilt sensor. Incorrect installation can cause measurement errors particularly in relation to the "surface" flatness.

- 1) The Sensor mounting surface and the measured surface must be closely affixed. If the mounting surface is uneven, it is likely to cause the sensor to measure an angle error. See Figure Pic A & B.
- 2) The sensor axis and the measured axis must be parallel. See Figure Pic C & D



Electrical Connection

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

