



## SPECIFICATIONS

Item No.: ACA628T

Description: High Accuracy Current Type Dual-Axis Inclinometer  
with Full Temperature Compensation

### **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
- 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
- Version: Ver.09
- Date: 2014.4.16

# ACA628T-High Accuracy Current Type Dual-Axis Inclinometer with Full Temperature Compensation



## General Description

ACA628T is a high precision & full temperature compensation dual-axis inclinometer with analog current output, Newest MEMS high-technology for production, high-precision 24bit A / D differential converter inside the product, to ensure the the products output current signal linearity, and users no need to do linearity correction by themselves in the future , install then to use, stability and reliability ! In addition, because of ACA618T system integrates high-resolution temperature sensor, with the MCU central processing system secondary temperature compensation, full temperature zero drift can be controlled to 0.0008 °/°C ,normal temperature and small measuring range the most accurate up to 0.003 °, built-in miniature solid pendulum, by measuring the static gravity field changes then convert to angle change, the change in output current (4-20mA). Compared to the voltage type inclinometer, ACA628T output using standard industrial electrical interface 4 ~ 20mA, longer transmission distance up to 2Km.

Non-contact installation features make ACA618T with superior system integration, Simply fix the sensor on the measured surface by screws , then can automatically calculate the object posture inclination, easy to operate, convenient to install .With strong ability resistance to external electromagnetic interference and to withstand shock and vibration, in domestic the counterparts products with absolute competitive advantage.

## Features

- Dual-Axis Inclinometer
- Wide voltage input: 9~36V
- IP67 protection class
- High Resolution: 0.001°
- Measuring Range :±1~±90° optional
- Wide temperature working: -40~+85°C
- Highly anti-vibration performance >2000g
- Out mode: 4~20mA(customized)

Temperature drift: 0.0008°/°C

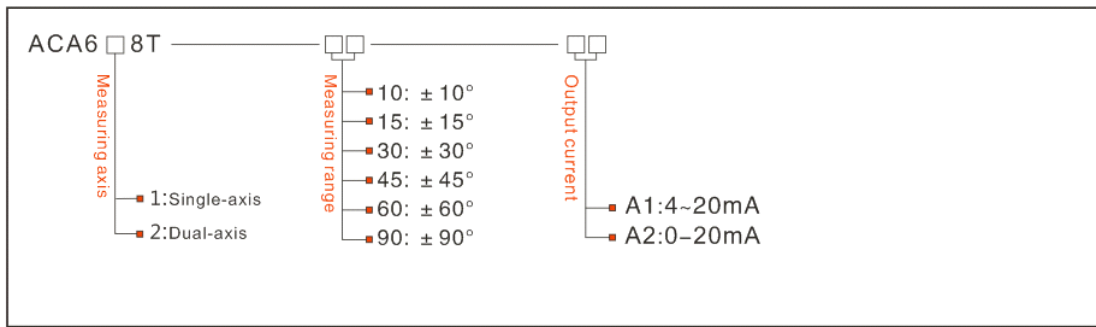
## Application:

- Engineering vehicles automatic leveling
- Laser equipment position
- Underground drill posture navigation
- Precise machine tool level control
- Directional satellite communications antenna pitching angle measurement
- Bridge & dam detection
- Medical facilities angle control
- Railway gauging rule , gauge equipment leveling
- Geological equipment inclined monitoring



# ACA628T-High Accuracy Current Type Dual-Axis Inclinometer with Full Temperature Compensation

## Ordering information:



E.g: ACA628T-10-A1: Dual-axis/Standard/ $\pm 10^\circ$  Measuring range/4-20mA output current

## Technical Data

Parameters	Conditions	ACA628T-10	ACA628T-30	ACA628T-60	ACA628T-90	Unit
Measuring range		$\pm 10$	$\pm 30$	$\pm 60$	$\pm 90$	
Measuring axis		X,Y	X,Y	X,Y	X,Y	
Zero output	0° Output	12	12	12	12	mA
Resolution		0.001	0.001	0.001	0.001	°
Absolute accuracy		0.003	0.01	0.02	0.03	°
Annual Long term stability		0.01	0.02	0.03	0.04	
Zero temperature coefficient	-40~85°	$\pm 0.0008$	$\pm 0.0008$	$\pm 0.0008$	$\pm 0.0008$	°/°C
Sensitivity temperature coefficient	-40~85°	$\leq 50$	$\leq 50$	$\leq 50$	$\leq 100$	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	$\geq 50000$ hours/times					
Insulation Resistance	$\geq 100M$					
Shockproof	100g@11ms、Times/Axis(half sinusoid)					
Anti-vibration	10grms、10~1000Hz					
Protection glass	IP67					
Cables	Standard 1M length、wearproof、wide temperature、Shielded cables 4*0.4mm <sup>2</sup> air-plug connector					
Weight	150g(without cable )					

\* This Technical data only list  $\pm 10^\circ$ ,  $\pm 30^\circ$ ,  $\pm 60^\circ$ ,  $\pm 90^\circ$  series for reference, other measuring range please refer to the adjacent parameters .

# ACA628T-High Accuracy Current Type Dual-Axis Inclinometer with Full Temperature Compensation

## Electronic Characteristics

Parameters	Conditions	Min	Standard	Max	Unit
Power supply	Standard	9	12、14	36	V
Working current	No-load		40		mA
Output overload	Resistive		400	1000	kΩ
Working temperature		-40		+85	°C
Store temperature		-55		+100	°C

## 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.

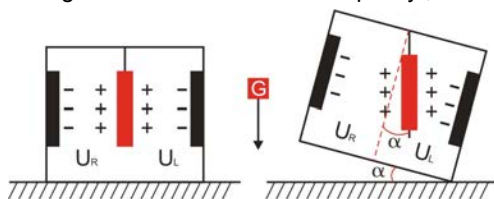
## Mechanical Parameters

- Connectors: 1m cable with air-plug connector (customized)
- Protection glass: IP67(air plug connector)
- Enclosure material : Aluminum Oxide
- Installation : 4\*M4 screws  
2\*3mm plug position(optional)



## 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.

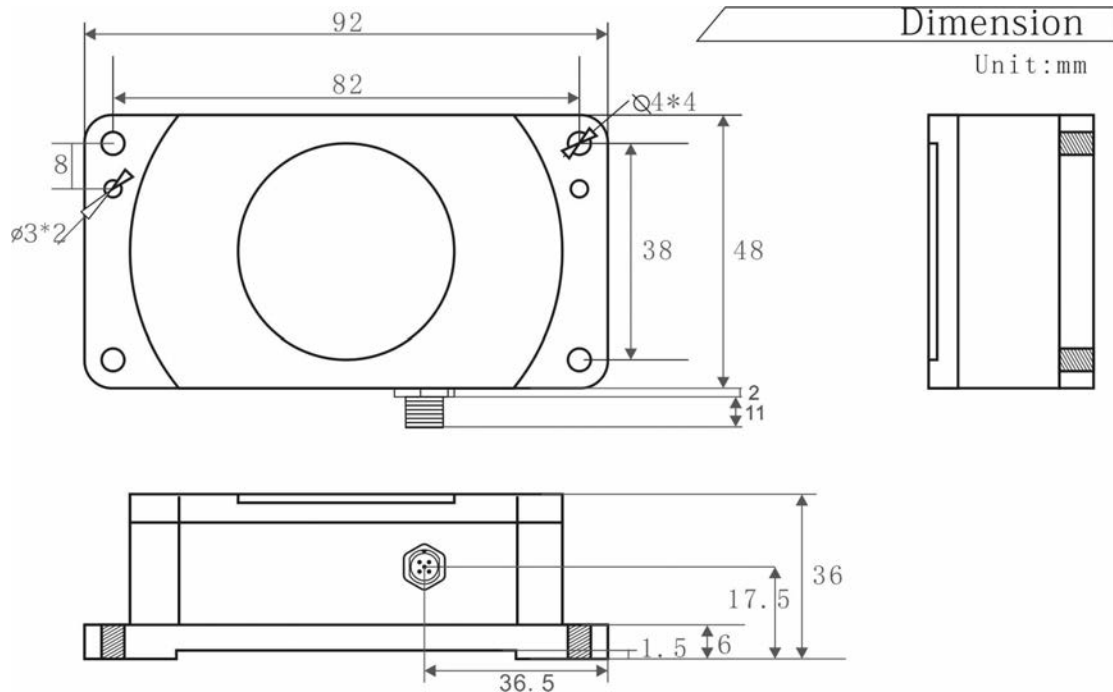


$U_R, U_L$  Respectively is the pendulum left plate and the right plate corresponding to their respective voltage between the electrodes, when the tilt sensor is tilted,  $U_R, U_L$  Will change according to certain rules, so  $f(U_R, U_L, )$  On the inclination of  $\alpha$  function:

$$\alpha = f(U_R, U_L, )$$

# ACA628T-High Accuracy Current Type Dual-Axis Inclinometer with Full Temperature Compensation

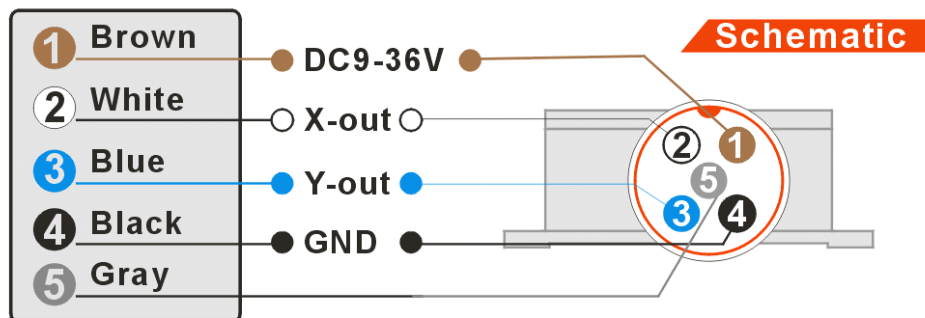
## Dimension



Size: L92×W48×H36mm

## Electrical Connection

Line color function	BLACK	WHITE	BROWN	BLUES	GRAY
	GND Power Negative	Out X X Axis output current	DC 9~36V Power supply positive	Out Y Y Axis output current	FACTORY Use only



## Angle output calculation formula

$$\text{Angle} = (\text{output current} - \text{Zero position current}) \div \text{Angle sensitivity}$$

$$\text{Angle sensitivity} = \text{output current range} \div \text{Angle measuring range}$$

E.g: ACA628T-30-A1 ( $\pm 30^\circ$  Measuring range 16mA output current range )

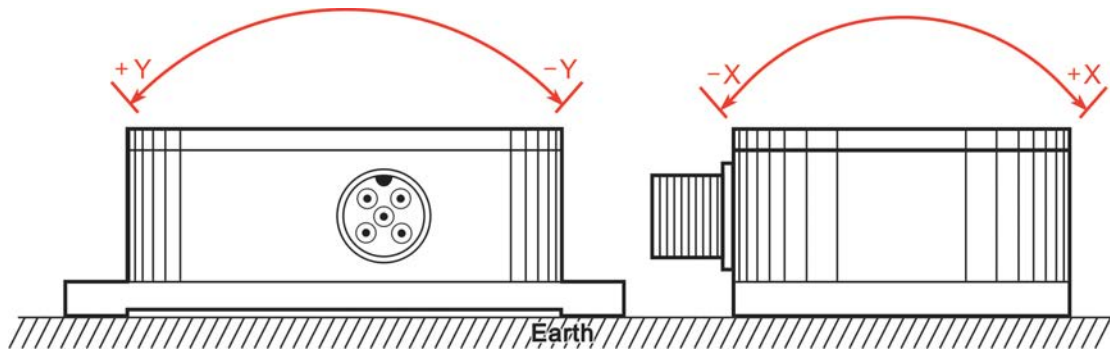
$$\text{Angle sensitivity} = 16 \div 60 = 0.266666 \text{ mA}/^\circ$$



# ACA628T-High Accuracy Current Type Dual-Axis Inclinometer with Full Temperature Compensation

## Measuring Directions&Fix

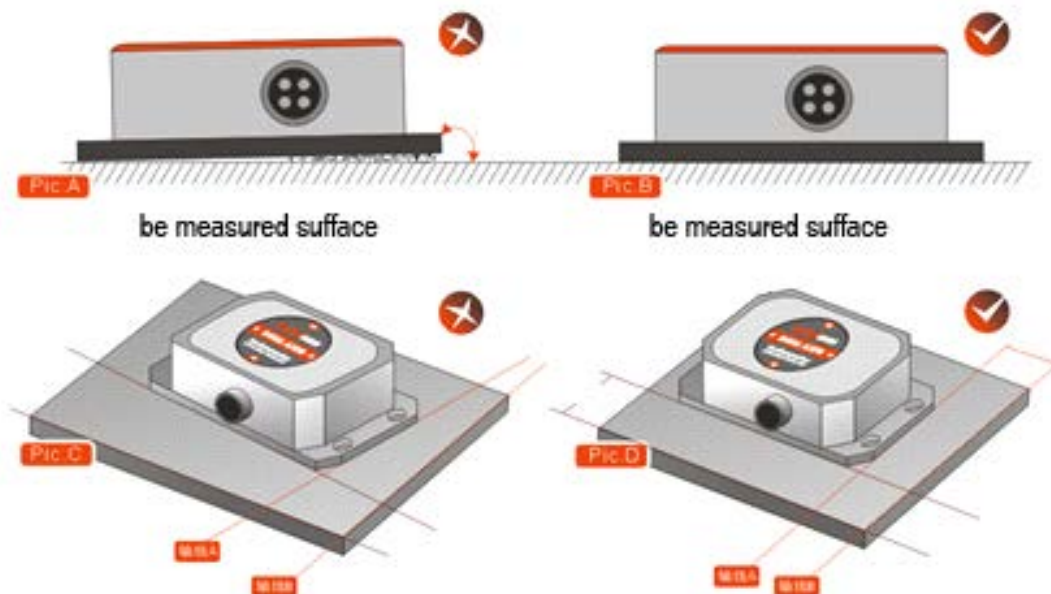
The installation must guarantee the product bottom is parallel to measured face, and reduce the influence of dynamic and acceleration to the sensor. This product can be installed horizontally or mounted vertically (mounted vertically selection is only applicable to the single axis), for installation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



## 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



※More information please visit Rion's company website: [www.rion-tech.net](http://www.rion-tech.net)



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