



SPECIFICATIONS

Item No.: SCA128T

Description: Current Type Dual-Axis Inclinometer

Version: Ver.08

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

SCA128T- Current Type Dual-Axis Inclinometer



General Description

SCA128T is a standard industrial output dual-axis inclinometer, standard current 4 ~ 20mA output, meanwhile output dual axis inclination, can be long-distance transmission of up to 2000 meters. The output signal with strong anti-interference, professional be used to work on engineering machinery and equipment in harsh environment. The product uses the latest MEMS sensor production technology for production, made precise compensation and correction to temperature error and nonlinearity error, small measuring range the highest accurate up to 0.03 ° (more precision index, please refer to product Electronic Characteristics), high accuracy , small size, high packaging technology, good capacity to withstand shock and vibration, built-in anti-RF, anti-electromagnetic interference circuit , is particularly suitable for application underground trenchless type of machinery and other harsh industrial environments. In addition to this product is better than the ordinary market product on technical parameters, on the reliability and stability the product is also using the high-end application-level MCU, three-proofing PCB board, imported cable, wide temperature shielded metal enclosure and other measures to improve product industrial level.

Features

- Dual-Axis Inclinometer
- Accuracy : refer to the technical data
- Output interface : 4-20mA
- IP67 protection class
- Resolution: 0.0025°
- Measuring Range : $\pm 1 \sim \pm 90^\circ$ optional
- Wide voltage input: 9~36V
- Wide temperature working: $-40 \sim +85^\circ\text{C}$
- Highly anti-vibration performance >2000g
- Small Volume : 90×40×26mm (customized)

Application:

- Engineering vehicles automatic leveling
- Aerial platform vehicle, lifter safety & protection
- Underground drill posture navigation
- Based on the angle direction measurement
- Directional satellite communications antenna pitching angle measurement
- Equipment level control
- Mining machinery, oil-well drilling equipment
- Bridge & dam detection
- Medical facilities angle control
- Shield pipe jacking application
- Geological equipment inclined monitoring
- Alignment control , curve control



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SCA128T- Current Type Dual-Axis Inclinometer

Electronic Characteristics

Parameters	Conditions	Min	Standard	Max	Unit
Power supply	Standard	9	12、24	36	V
Working current			50		mA
Output overload	Resistive		400	1000	Ω
Working temperature		-40		+85	°C
Store temperature		-55		+125	°C

Technical Data

Parameters	Conditions	SCA128T-10	SCA128T-30	SCA128T-60	SCA128T-90	unit
Measuring range		±10	±30	±60	±90	°
Measuring axis		X,Y	X,Y	X,Y	X,Y	
Zero output	0° output	12	12	12	12	MA
Resolution		0.0025	0.0025	0.0025	0.0025	°
Absolute accuracy		0.02	0.05	0.08	0.1	°
Long term stability		0.05	0.05	0.05	0.05	
Zero temperature coefficient	-40~85°	±0.006	±0.006	±0.006	±0.006	°/°C
Sensitivity temperature coefficient	-40~85°	≤100	≤100	≤100	≤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	≥50000hours/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	120g(without cable)					

* This Technical data only list ± 10 °, ± 30 °, ± 60 °, + 90 ° 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.

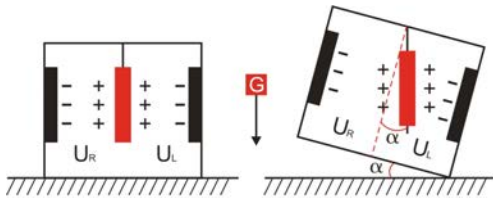
Mechanical Parameters

- Connectors: 1m lead cable (customized)
- Protection glass: IP67
- Enclosure material : Aluminum Oxide
- Installation : 4*M6 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.

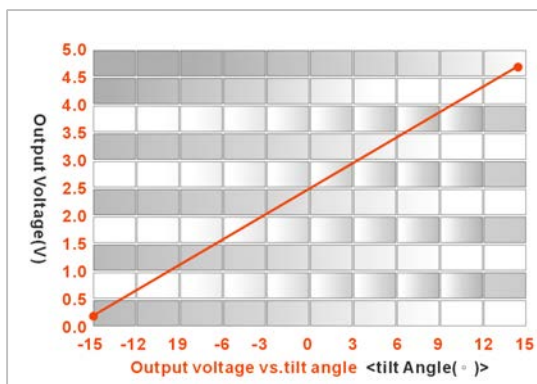


U_R, U_L respectively is the pendulum left plate and the right plate corresponding to their respective voltage between the electrodes, when the tilt sensor is tilted, U_R, U_L will change according to certain rules, so $f(U_R, U_L)$ on the inclination of α function:

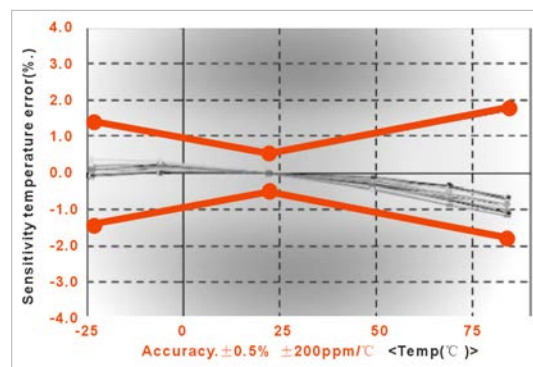
$$\alpha = f(U_R, U_L)$$

Typical performance diagram

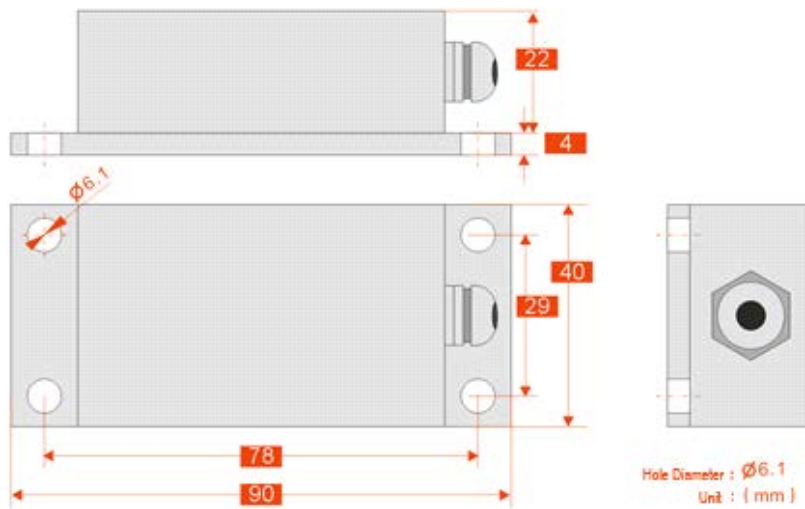
1: Input and Output characteristics:



2: Temperature characteristic chart:



Dimension



Size: L90×W40×H26mm

Angle output computational formula

Angle = (Output current – ZERO position current) ÷ Angle sensitivity

Angle sensitivity = Output current range ÷ Angle measuring range

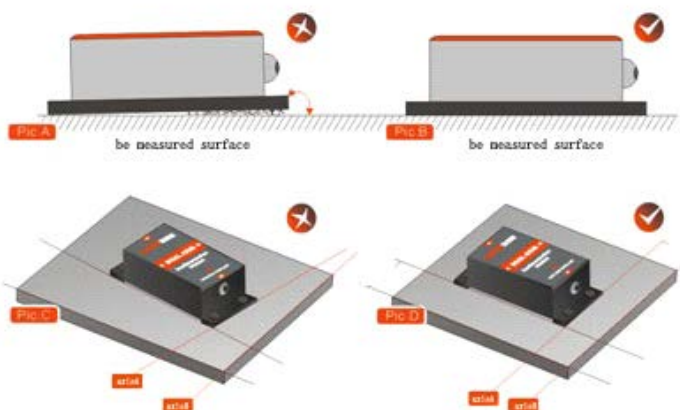
E.g: SCA128T-30-A1 (±30° Measuring range 16mA Output current range)

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

Production installation notes :

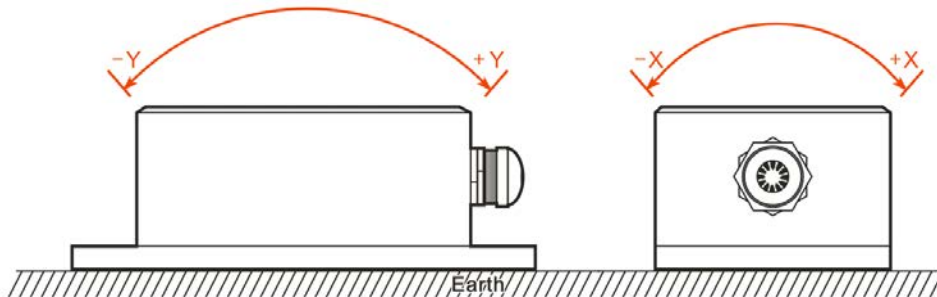
Please follow the correct way to install tilt sensor, incorrect installation can cause measurement errors, with particular attention to the "surface", "line":

- 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



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.



Electrical Connection

Line color function	BLACK	WHITE	GREEN	RED
	GND Power negative	Out X X Axis output current	Out Y Y Axis output current	Vcc Power supply Power positive

Ordering information:

SCA	8 T	Measuring range	Output current
1: Single-axis	1: Standard shell sealed	10: $\pm 10^\circ$	A1: 4 ~ 20mA
2: Dual-axis	2: OEM bared board , without shell	15: $\pm 15^\circ$	A2: 0 ~ 20mA
		30: $\pm 30^\circ$	
		45: $\pm 45^\circ$	
		60: $\pm 60^\circ$	
		90: $\pm 90^\circ$	
		95: $-5^\circ \sim +95^\circ$	
		93: $-30^\circ \sim 90^\circ$	
		18: $\pm 180^\circ$	

E.g: SCA128T-10-A1: Dual-axis /Standard / $\pm 10^\circ$ Measuring range /4-20mA Output current