Hamburg Engineering

RION™

SPECIFICATIONS

Item No.：SCA131A

Description：Switch Output Type Tilt Switch

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

●Ver:.05

●Date:2015.1.23

SCA INCLINOMETER

Output Signal:RS232/RS485/TTL/CANOPEN/4-20mA/0-5V

General Description

SCA131A is a digital type dual-axis tilt switch developed by RION company who integrated import control core unit , and based on level security alarm and platform leveling detection related industries application , using the transistor output circuit . Users can set alarm angle value by themselves, it will output the switch signal (output voltage = supply voltage) when exceeds the safety angle value, the drive solenoid valve will cut off the hydraulic system, also can drive the buzzer and warning lights, automatically warn the worker to operate safely .The products are mainly used to control a variety of construction machinery or equipment platform leveling, real-time automatic monitoring on platform tilt in four directions left, right , front and back status . This product with design precision, again to compensate the temperature and linearity, integrated short-circuit, high-voltage transient, polarity and surge etc. full protection functions, suitable for a variety of harsh industrial environments operating. Using the industrial grade MCU, three-anti PCB, import cable, wide temperature metal enclosure and other measures etc. to improve the industry level on products reliability and stability.

Features:

- Dual-axis tilt switch
- Accuracy：please refer to the technical data
- RS232 series output
- Switch output（high-low level）
- Resolution : 0.01°
- Wide temperature working: -40～+85℃
- IP67 protection class
- Highly anti-vibration performance>2000g
- Direct lead cable interface
- Customer can set alarm angle value by himself
- With Setting 0° function
- Positive/negative direction output is optional
- DC 9～36V wide voltage input

Application:

- Engineering mechanical vehicles
- Rail-mobile monitoring
- Various engineering mechanical measurement of dip angle
- oil-well drilling equipment
- Radar detection of vehicle platform
- Underground drill posture navigation
- Gun Barrel angle measurement in early shooting
- Based on the angle direction measurement
- Satellite communications vehicle posture detection
- Shield pipe jacking application
- Ship's navigation posture measurement
- Geological equipment inclined monitoring
- The intelligent excavator / crane / cranes / pile driver / drill machine / special vehicles / mine car / track car / fire truck / aerial vehicles / bridge machine

Ordering information:
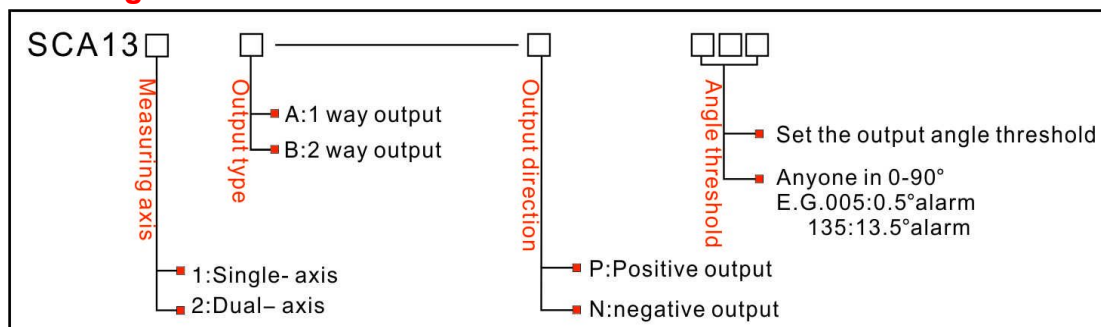
E.g：SCA131A-P005：Single-axis/1 way/ positive direction output /0.5deg alarm

Note: 1) Different models with different color line function definition, please refer to ordering Information description before ordering ;

2) The factory default alarm threshold: ± 2 ° (also can be customized according to customer requests), refer to the ordering information;

3) The positive ,negative direction explanation : (positive direction) usually state normally closed, exceed the alarm threshold becomes normally open;

(negative direction) usually the state normally open, exceeding the alarm threshold becomes normally closed;

Technical Data:

Parameters Conditions	SCA131A-P015	Unit
Measuring rang	±15	°
Measuring axis	X,Y	
Resolution	0.01	°
Absolute accuracy	0.05	°
Long term stability	0.05	
Zero temperature coefficient	-40～85°　　±0.006	°/℃
Sensitivity temperature coefficient	-40～85°　　≤100	ppm/℃
Power on time	0.1	S
Response time	0.2	s
EMC	According to EN61000 and GBT17626	
MTBF	≥50000 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 cables 4*0.4mm2	
Weight	120g(without cable)	

Electronic Characteristics

Parameters	Conditions	Min	Standard	Max	Unit
Power supply	Standard	9	12、24	36	V
Alarm output current				500	mA
Working current	No-load		40		mA
Working temperature		-40		+85	℃
Store temperature		-55		+125	℃

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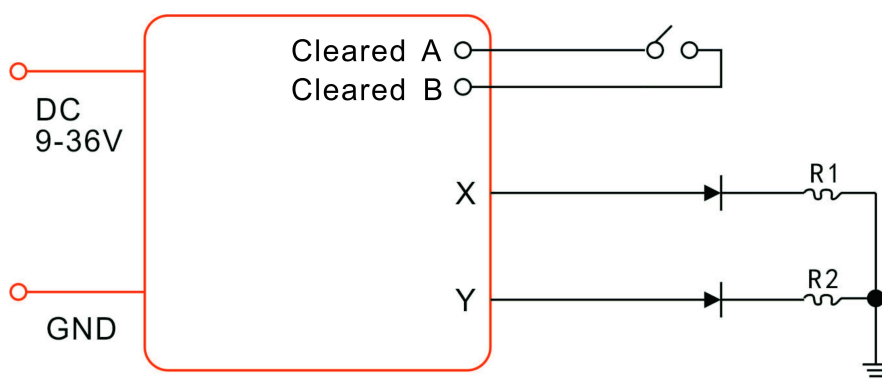
Response time：Refers to the sensor in an angle change, the sensor output value reached the standard time required.

Mechanical Parameters

○ Connectors：1m lead cable（Length can be customized）

○ Protection glass：IP67

○ Enclosure material ：Aluminum Oxide

○ Installation ：4*M6 screws
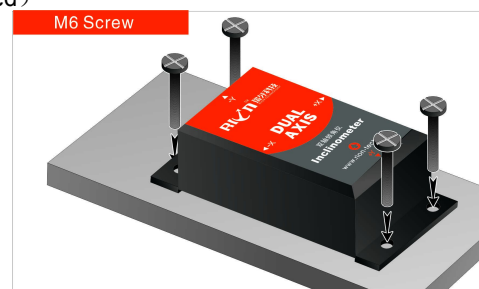
Working Principle

Above figure is the working principle diagram of the dual-axis with 4 ways output switch , the output is high-low level signal, in this figure, when the tilt reaches the preset value of the positive X direction, -X-side output high-low level, R1 is lit, when the tilt reaches the preset value of +x in the reverse direction , R2 is lit, R3, R4 with same rule.

Note: Logic level output type sensor, which port drive capacity is limited so it can not drive a big load, if the device less than 500mA power then the switch can directly drive, if over 500mA then can connect to

motors, solenoids, relays, etc.for drive ,if need set the relative angle ,

For setting the relative angle, short circuit the clearing A line with clearing B line in two seconds.

Dimension:

UNIT:MM
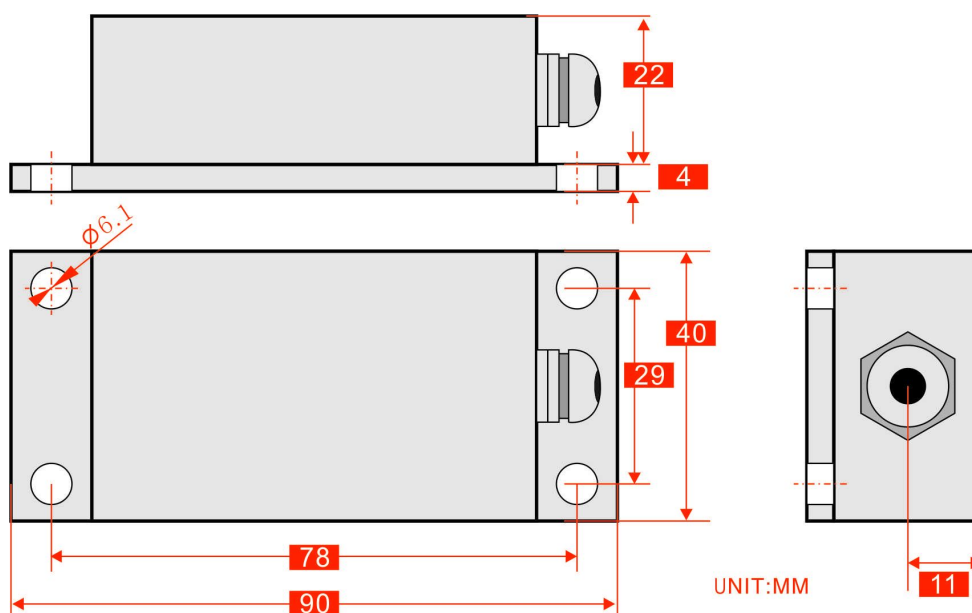
Measuring Directions&Fix

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, and only can do relative measurement , if absolute measurement the level reference will occur error), for installation please refer to the following scheme.
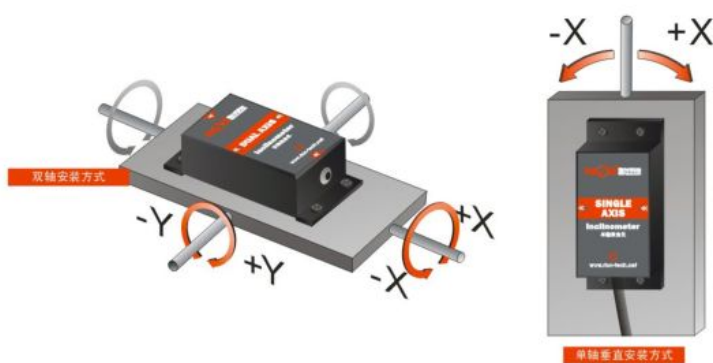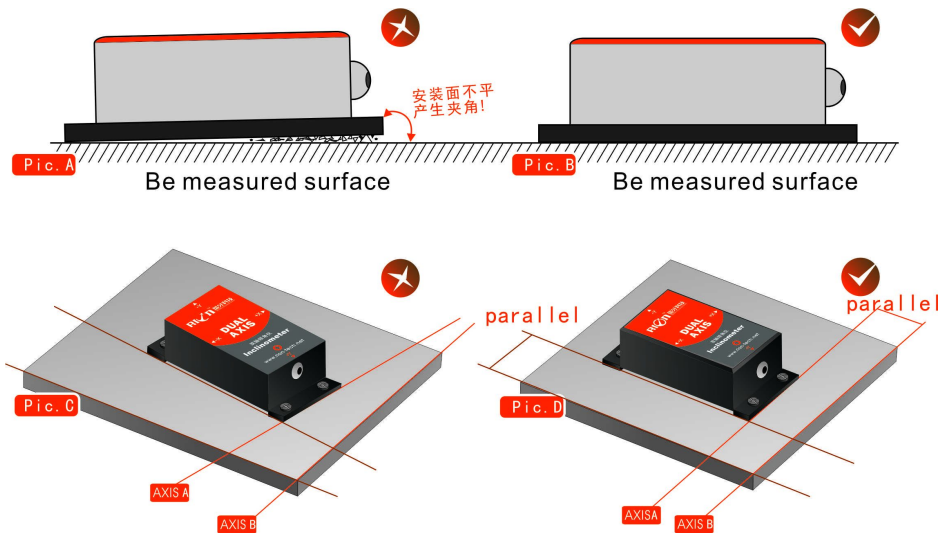

Production installation notes:

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

Pic. A — Be measured surface
安装面不平产生夹角!
Pic. B — Be measured surface

Pic. C — AXIS A / AXIS B — parallel
Pic. D — AXIS A / AXIS B — parallel

Electrical Connection

| Color definition	Single axis with 1 way output	Single axis with 2 ways output	Dual axis with 1 way output	Dual axis with 2 ways output
Red	Power positive	Power positive	Power positive	Power positive
Black	GND	GND	GND	GND
Green	Zero clearing	Zero clearing	Zero clearing	Zero clearing
Brown	/	/	/	/
Orange	RXD	RXD	RXD	RXD
White	TXD	TXD	TXD	TXD
Yellow	X positive output	+ X signal output	positive output	X signal output
Blue	X negative output	- X signal output	negative output	Y signal output

Remark:

1. RXD and TXD cable , customer can connect with computer, can setup   the alarm value through the software, (-X,+X,-Y,+Y) can setup with different value.

2. Single axis with 2 ways has no function to setup with alarm value

3. For RXD and TXD , need to connect with computer to setup the alarm value , pls refer to below connection method

4. If you use the note book to do the adjustment, need one module change from RS232 to USB, if is PC, can connect with computer COM entry directly to do the communication .

TILT SWITCH
① DC 9-36V — POWER+ — POWER 12.00V — POWER-
③ TXD
② RXD
④ GND
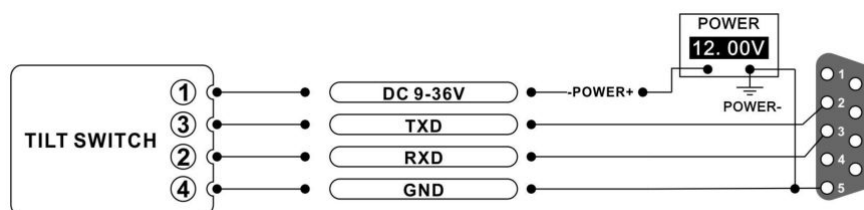
RION Product debugging software

If you want to change the alarm thresholds, can communicate with computer and use the serial debugging assistant software to change .
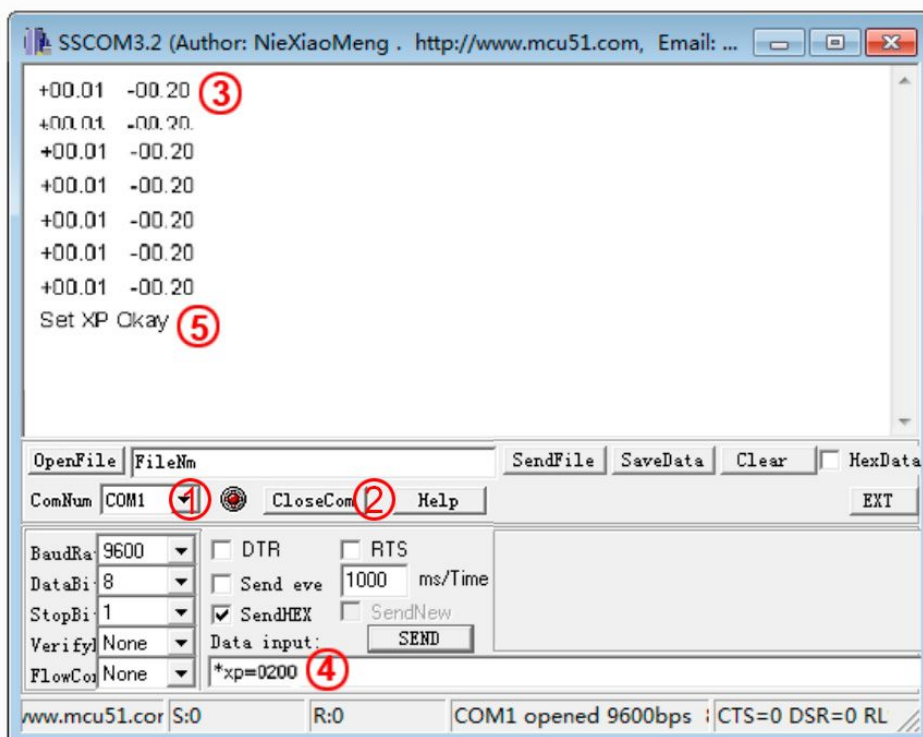
Debug process:

1) Open software;

2) Select the corresponding COM port, refer to 2".

3) Other settings are default setting , no need to set. "

4) Click to open the serial port button, refer to 2 "

5) This data will display in the return data area, refer to 3"

6) If you want to set the alarm threshold, please input setting alarm threshold command in input area, refer to 4" . (For command please refer to the specification of communication protocol .)

7) When the return data area display " command +Okay" proved successful setting. Refer to 5"

Common problem analysis of connection failure:

A) Check power: check positive & negative, whether it is DC?

B) Exchange RXD and TXD two data lines re-debugging;

C) COM occupancy, close other COM port testing device;

D) The black line no connection with the fifth pin of COM port.

E) If use RS232 converter, please check if the converter can work properly, whether the driver is installed;

F) Please use multimeter to measure the sensor current, if lower than 20mA or bigger than 60mA can judge the sensor was damaged.

Hamburg Engineering