SPECIFICATIONS

Item No.：LCA331A

Description：relay 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:.06

●Date:2014.10.31

LCA341A series a low cost tilt switch developed by RION for application like level safety alarming and platform level monitor and alarm. There is relay output circuit inside. Alarm threshold value is pre-stable. when the inclination exceed set alarm value, it will output relay output signal(drive current 1A) to drive the solenoid valve hydraulic system or drive buzzer or alarming light for the safety of platform. Its main function is to monitor and alarm the(dual axis or single axis) inclination of platform automatically. It is well-designed, the temperature and linearity are compensated. It has short-circuit, high voltage, surge protection etc. And all its components meet the requirement of industry application.

Feature

- Single/dual axis
- Switch/replay output
- IP67
- Adjustable alarm value
- DC 9～36v input

- accuracy: refer to parameter
- wide working temp.:-40～+85℃
- high anti-vibration>2000g
- zero set function

- RS232 set alarm angle
- resolution: 0.01°
- direct lead cable
- positive/negative output

Application

- Engineering vehicles automatic leveling
- Bridge & dam detection
- Aerial platform vehicle,lifter safety & protection
- Medical facilities angle control
- Underground drill posture navigation
- Shield pipe jacking application
- The intelligent excavator / crane / cranes / pile driver / drill machine / special vehicles / mine car / track car / fire truck / aerial vehicles / bridge machine

Order information
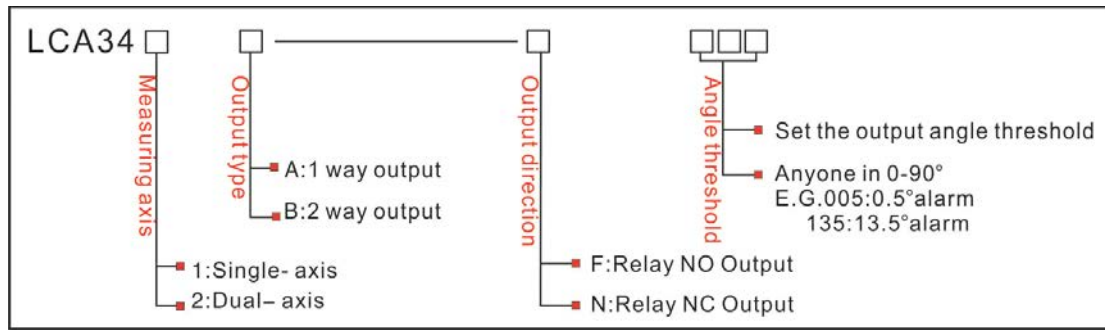
eg: LCA341A-F005, single axis/single output way/replay output normal on/0.5deg alarm

note:

1) please place order according to the order description;

2) the factory default alarm threshold value is +-2deg, if other value required, please order refer to the order information;

3) explanation: N(normal close)- it is normal close when inclination within threshold value and change to normal open when exceeds threshold value; F(normal open)- it is normal open when inclination within threshold value and change to normal close when exceeds threshold value.

Technical data

parameter	LCA341A-N015	unit
Measuring range	±15	°
Measuring axis	X,Y	
Resolution	0.05	°
Absolute accuracy	0.1	°
Long-term stability	0.05	
Zero temp. coeffiecient	-40～85°　±0.006	°/℃
Temp. Sensitivity coefficient	-40～85°　≤100	ppm/℃
Power on time	0.1	S
Response time	0.2	s
Electromagnetic compatibility	Per EN61000 and GBT17626	
MTBF	≥50000hours/time	
IR	≥100mge	
Impact resistance	100g@11ms、3 times/axis(half sinusoid)	
Anti-shock	10grms、10～1000Hz	
waterproof	IP67	
cable	1m, durable, grease proof, wide temperature, shield cable, 4 x 0.4 mm2	
weight	120g(exclude cable)	

Electronic Characteristics

Parameters	Conditions	Min	Standard	Max	Unit
Power supply	Standard	9	12、24	36	V
Alarm output current				1000	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.

Accuracy: Refers to the RMS error between the actual angle and the sensor measuring angle more times (≥16 times)

Mechanical Parameters

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

○ Protection glass：IP67

○ Enclosure material ：Aluminum Oxide

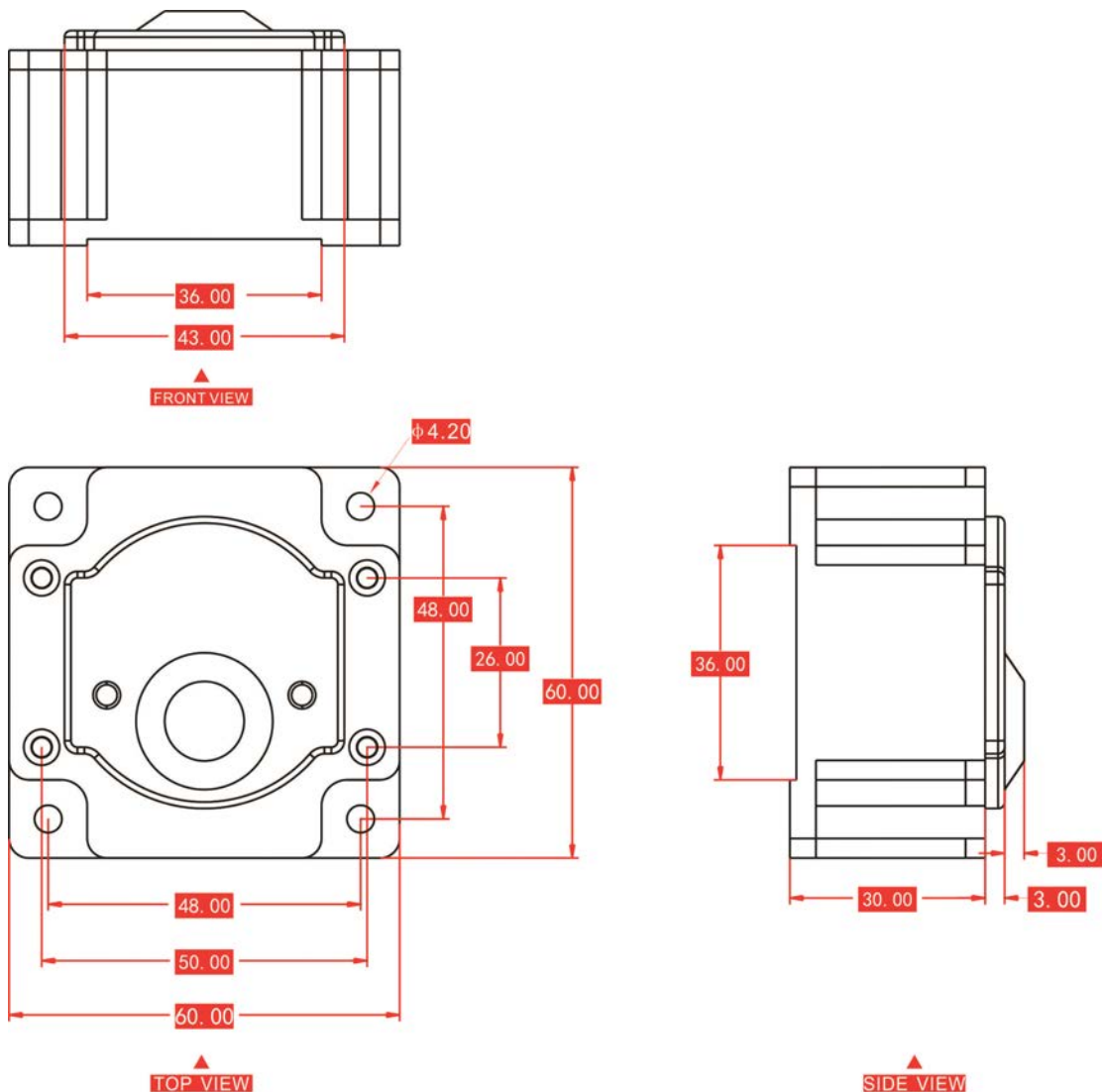○ Installation ：4*M6 screws

Working principle
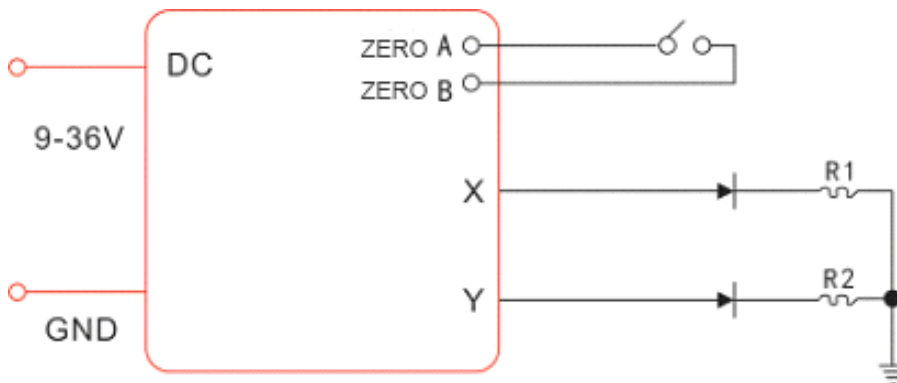
Above figure is the working principle diagram of the dual-axis , the output is high-low level signal, in this figure, when the tilt reaches the preset value of the positive X direction,

X side output high-low level, R1 is lit, when reach the preset value of the Y direction, R2 lit...

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

FRONT VIEW

36.00
43.00

φ4.20

48.00
26.00
60.00

48.00
50.00
60.00

TOP VIEW

36.00

30.00
3.00
3.00

SIDE VIEW

unit：L60XW60XH36mm

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.

-Y +Y   -X +X

标准测量方式

Earth
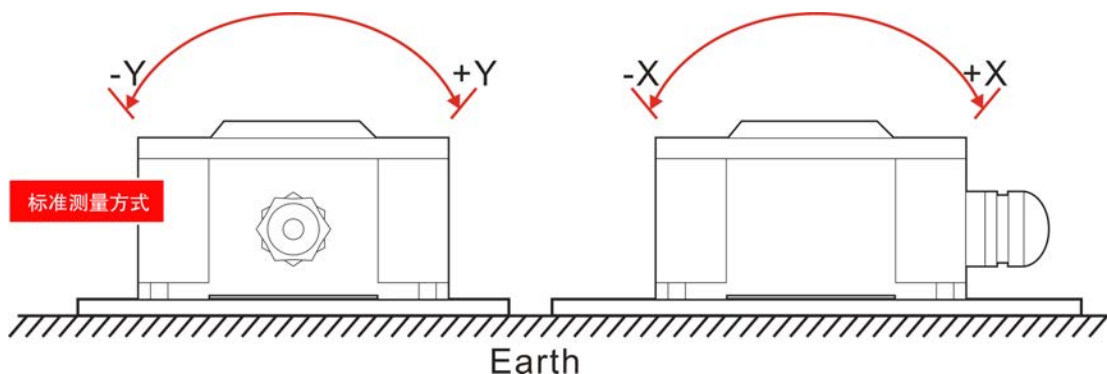
Production installation notes:

Please follow the correct way to install tilt sensor, incorrect installation can cause measurement errors, with particular attention to 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. The sensor axis and the measured axis must be parallel ,the two axes do not produce the angle as much as possible.
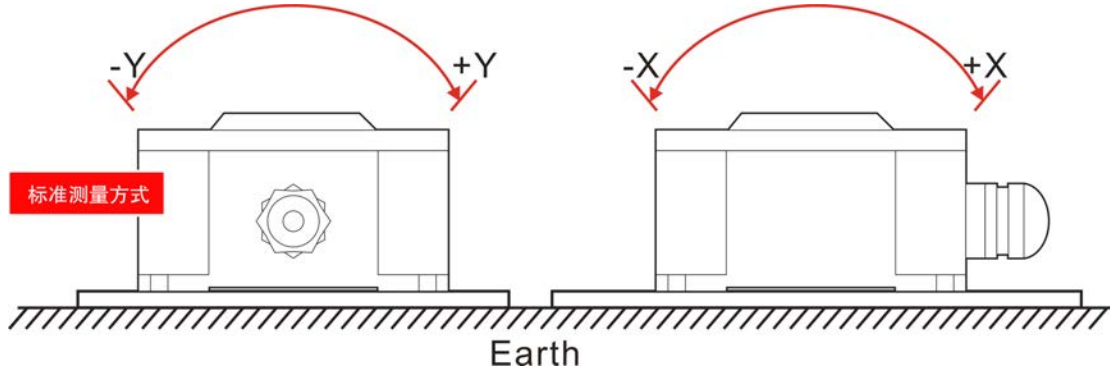

Electrical Connection

Color definition	Single axis with 1 way	Single axis with 2 way		dual axis with 1 way	dual axis with 2 way
red	Power positive	Power positive		Power positive	Power positive
black	GND	GND		GND	GND
green	Zero clear A	Zero clear A		Zero clear A	Zero clear A
brown	Zero clear B	Zero clear B		Zero clear B	Zero clear B
purple	TXD	TXD		TXD	TXD
yellow	X alarm	+X alarm		XY alarm	X alarm
blue	NC	-X alarm		NC	Y alarm
Orange	RXD	RXD		RXD	RXD

Note:

1) RXD and TXD two lines can be used to connect to the computer, through the software to set the alarm threshold.   (-X, + X,-Y, + Y) can be set different threshold;

2) there is no preset angle value function for dual axes double wires

3) connection of RXD and TXD function, see below drawing.

4) If you are using a laptop debugging you also need a RS232 to USB module, if the PC can be directly connected communication with the computer COM port.(If use converter must install conversion module driver can be use)
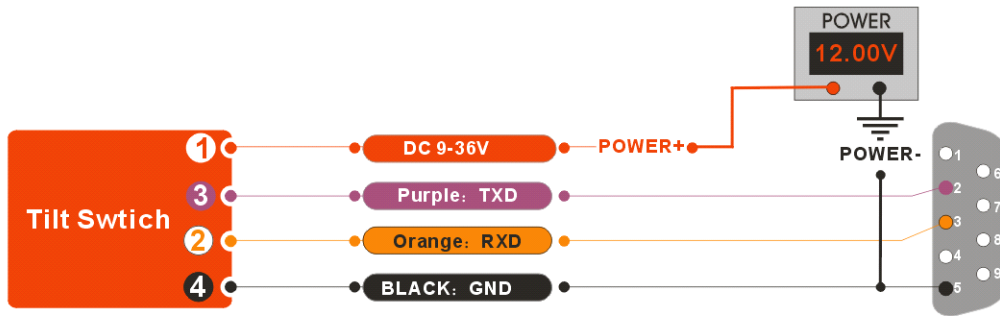
RION Product debugging software

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

Your can download the common public serial port debugging assistant software on line, Rion's products supporting debugging software can connect the inclinometer by itself on computer and display the angle , also can download the public serial port debugging software on line !
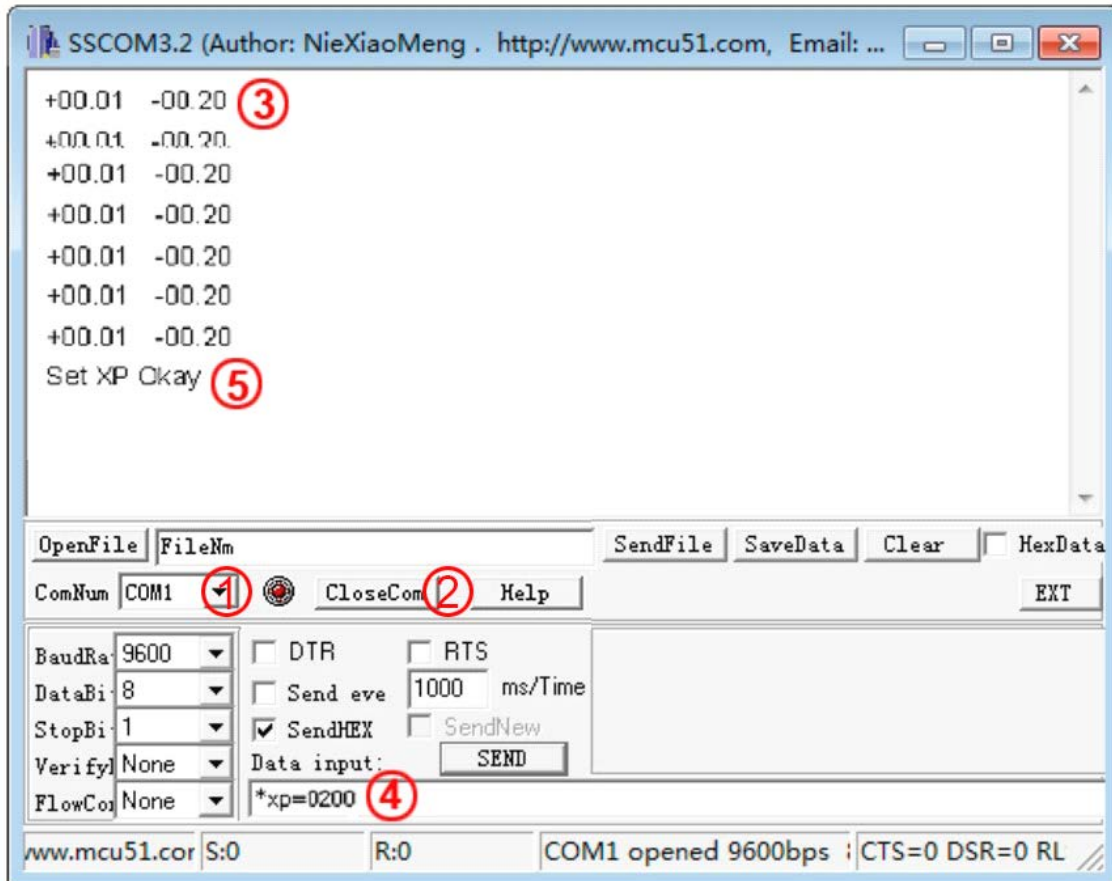
Debug process:

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.

RION product communication protocol

一、DATA FRAME FORMAT：《8 bits date，1 bit stop，No check，Default baud rate 9600）**Angle output format（ASCII code）**

A set of output data from a total of 18 bytes:

Byte1：X	Byte10：Y
Byte2：＋/-	Byte11：＋/-
Byte3：X	The tens column of axis angle value
Byte4：X	The single digit of axis angle value
Byte5：decimal point"."	Byte14：decimal point"."
Byte6：X	The decile of axis angle value
Byte7：X	The percentiles of axis angle value
Byte8：blank space（0x20）	Byte17：Enter（0x0D）
Byte9：blank space（0x20）	Byte18：Line feed（0x0A）

Format as following：

ITEAM	SIGNED	DATA	SPACE	SPACE	ITEAM	SIGNED	DATA	ENTER	NEWLINE
X	+/-	**.**	Blank space	Blank space	Y	+/-	**.**	Enter	Line feed

E.g：the current X axis angle is +01.50deg，Y axis - 01.00 deg, then display X＋01.50； Y－01.00

Note: If the user set the relative zero when power on last time, then power on this time, the system will output："relative angle measure!"

二：The relative setting command (the following command case-sensitive)

Command	Description
&Z	The current position is relative ZERO, related data will be stored in EEPROM, and carry out relative angle output , after accepting command then output :"set relative zero" .
&R	The absolute angle output , after accepting command then output: "absolute zero".
*xp=????	Setting positive half axis of X axis to be alarm point,"????" is angle value， optional value from "0001—1000". The default is 0150。After accepting command then output: "SetxP
*xn=????	*xn=????—— Setting negative half axis of X axis to be alarm point,"????" is angle value，optional value from "0001—1000"。The default is 0150。After accepting command then output："SetxN OK!"

*yp=????	*yp=????——Setting positive half axis of Y axis to be alarm point,"????" is angle value，optional value from "0001—1000"。The default is 0150。After accepting command then output："SetyP OK!"
*yn=????	*yn=????——Setting negative half axis of Y axis to be alarm point，"????" is angle value, optional value from "0001—1000"。The default is 0150。After accepting command then output："SetyN OK!"

Short-circuit the green line and brown line for 2 seconds then open , to set the current angle to be relative ZERO, this function same as "&Z" command , the difference is after using this method to set the ZERO point successfully, there will be approximately 1 second alarm signal output, while "& Z" command without this indication.(Don't use the function please keep the green line disposed of properly , to avoid short-circuit with other lines .)

※ More information please visit Rion's company website: www.rion-tech.net