



Appearance Patent No.:ZL 201830752892.X

V1.4

VOLTAGE TYPE SINGLE/DUAL AXIS INCLINOMETER

RION SCA110T/SCA120T

Technical Manual

SCA110T/SCA120T VOLTAGE TYPE SINGLE/DUAL AXIS INCLINOMETER



RION QUALIFICATION CERTIFICATION

- Quality management system certification: GB/T19001-2016 idt ISO19001:2015 standard (Certificate No.: 128101)
- High-tech Enterprise (Certificate No.: GR201844204379)
- CE certification: AT011611741E FCC certification: AT011611742E
- Chinese National Intellectual Property Appearance Patent (Patent No.: ZL 201830752892.X)
- Revision date: 2021-7-8

Note: Product functions, parameters, appearance, etc. will be adjusted along with technological upgrades.
Please contact our pre-sales business for confirmation when purchasing.

SCA110T/SCA120T VOLTAGE TYPE SINGLE/DUAL AXIS INCLINOMETER



SCA INCLINOMETER

► INTRODUCTION

SCA110T/SCA120T is one tilt sensor with analog voltage output. Users only need to collect the voltage value of the sensor to calculate the current inclination of the object. The built-in (MEMS) micro-solid pendulum is used to measure the change of the static gravity field and convert it into the change of the inclination angle. The change is output through the voltage (0-5V); it is mainly used to measure the inclination of the object and the horizontal plane.

This product adopts the principle of non-contact measurement, can output the current attitude inclination in real time, and is easy to install. MEMS sensor production technology, high precision, small size, strong resistance to external electromagnetic interference, strong ability to withstand shock and vibration, is an ideal choice for industrial equipment and platform measurement attitude!

► MAIN FEATURE

- ★ Single/dual Axis Inclinator
- ★ Wide voltage input: 9~36V
- ★ Wide temperature working: -40~+85°C
- ★ IP67 protection class
- ★ Small Volume : 90×40×26mm (customized)
- ★ Measuring Range : ±1~±180° optional
- ★ Output interface : 0~5V
- ★ Resolution: 0.01°
- ★ Highly anti-vibration performance >2000g

► APPLICATION

- ★ Leveling of construction vehicles
- ★ Safety protection of high-altitude platforms
- ★ Underground drilling rig attitude navigation
- ★ Direction measurement based on inclination
- ★ Mining machinery and oil drilling equipment
- ★ Alignment control, bending control
- ★ Monitoring of bridges and Dadian
- ★ Medical equipment angle control
- ★ Shield pipe jacking application
- ★ Inclination monitoring of geological equipment
- ★ Equipment level control



○Inclinometer ○Digital Compass ○Digital Inclinometer ○Accelerometer ○Gyro ○North Finder ○INS&IMU

RION TECHNOLOGY SINCE2008 · Attitude & Position Solution Provider

SCA110T/SCA120T VOLTAGE TYPE SINGLE/DUAL AXIS INCLINOMETER

▶ PARAMETERS

SCA110&SCA120T	CONDITION	PARAMETER					UNIT
Measure range		±10	±30	±60	±90	±180	°
Measure axis		X/XY	X/XY	X/XY	X/XY	X/XY	Axis
Zero output	0° output	2.5	2.5	2.5	2.5	2.5	V
Resolution		0.01	0.01	0.02	0.03	0.05	°
Measure accuracy	@25°C	0.03	0.05	0.06	0.08	0.1	°
Long term stability		0.05	0.05	0.05	0.05	0.05	°
Zero Temp.coefficient	-40 ~ 85°C	±0.006	±0.006	±0.006	±0.006	±0.006	°/°C
Sensitivity temp-coeffi	-40 ~ 85°C	≤100	≤100	≤100	≤100	≤100	ppm/°C
Power-on start time		0.5	0.5	0.5	0.5	0.5	S
Response time		0.02	0.02	0.02	0.02	0.02	s
Response frequency		1 ~ 20	1 ~ 20	1 ~ 20	1 ~ 20	1 ~ 20	Hz
EMC	According to EN61000 和 GBT17626c						
MTBF	≥50000 hours/times						
Insulation Resistance	≥100MΩ						
Impact resistance	100g@11ms、3 Axis Direction (Half Sinusoid)						
Anti-vibration	10grms、10 ~ 1000Hz						
Protection grade	IP67						
Cables	Standard as 1-meter length, wear-resistant, oil-proof, wide temperature, shielded cable 4 * 0.4mm2						
Weight	165g(exclude cable)						

*This performance parameter only lists ± 10 °, ± 30 °, ± 60 °, ± 90 ° series as a reference, other measurement ranges please refer to the adjacent parameters.

▶ ELECTRICAL PARAMETERS

PARAMETER	CONDITION	MIN	TYPICAL	MAX	UNIT
Power supply	Standard	9	12、24	36	V
	Optional		5		V
Working current			30		mA
Output overload	Resistive	10			kΩ
	Capacitive			20	nF
Working temp		-40		+85	°C
Store temp.		-40		+85	°C

KEY WORDS :

Resolution: It refers to the smallest change value that the sensor can detect and distinguish in the measurement range.

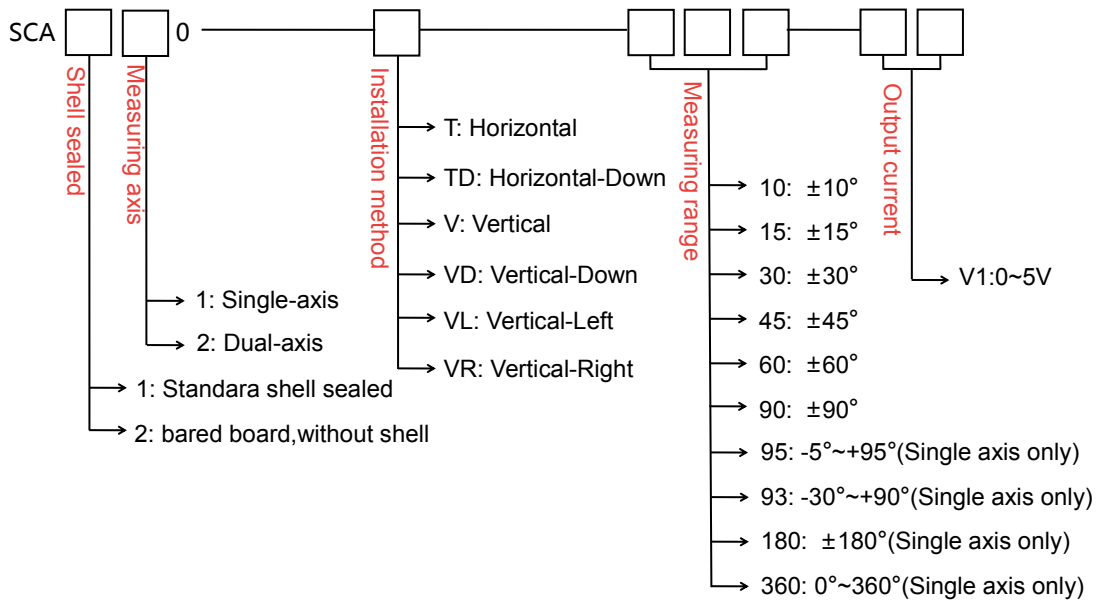
Measure accuracy: Refers to the combined error of linearity, repeatability, hysteresis, zero deviation, and horizontal axis error of the sensor under normal temperature conditions.

Long-term stability: refers to the deviation between the maximum value and the minimum value of the sensor under normal temperature conditions after a year of long-term work.

Response time: It refers to the time required for the sensor output to reach the standard value when the sensor changes angle once.

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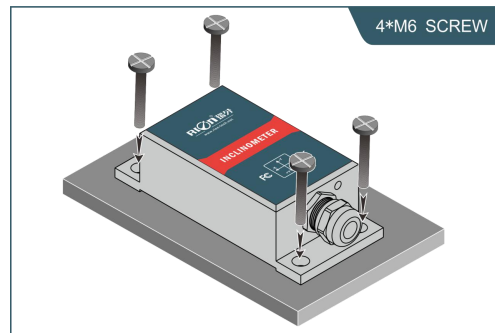
ORDER INFORMATION



E.g : SCA110T-10-V1 : Standard shell sealed / Single axis / Horizontal / ± 10 ° measure range / 0-5V.

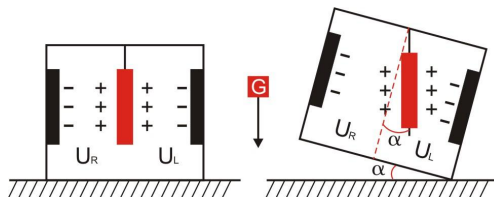
MECHANICAL PARAMETERS

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



WORKING PRINCIPLE

Adopt imported core control unit and apply the principle of capacitive micro-pendulum. Using the principle of earth's gravity, when the tilting unit tilts, the earth's gravity will produce a gravitational component on the corresponding pendulum, and the corresponding electric capacity will change. By amplifying and filtering the electric capacity, the inclination angle is obtained after conversion.



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:

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

ANGLE CALCULATION FORMULA

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

Angle sensitivity = output voltage range ÷ angle measurement range

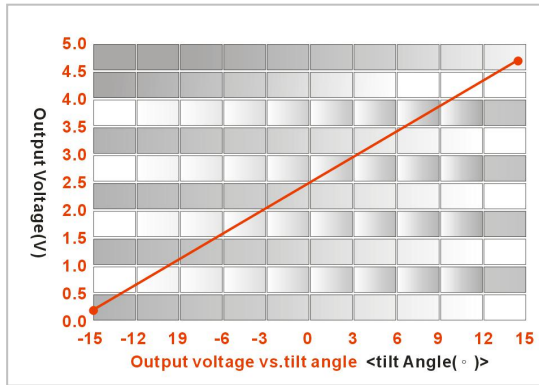
Example: SCA110T/SCA120T-30-A1 (± 30 ° measurement range 0-5V output voltage range)

Angle sensitivity = 5 ÷ 60 = 0.83333 V/°

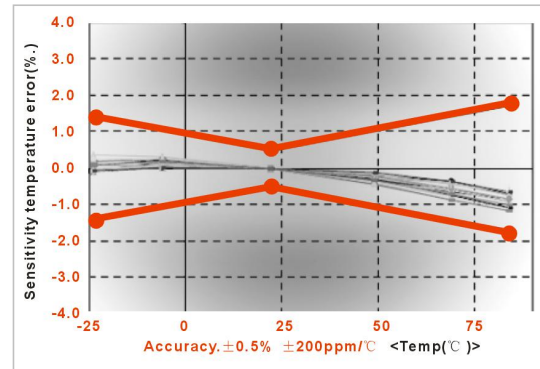
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▶ TYPICAL PERFORMANCE CHART

1 : Input and output characteristics :



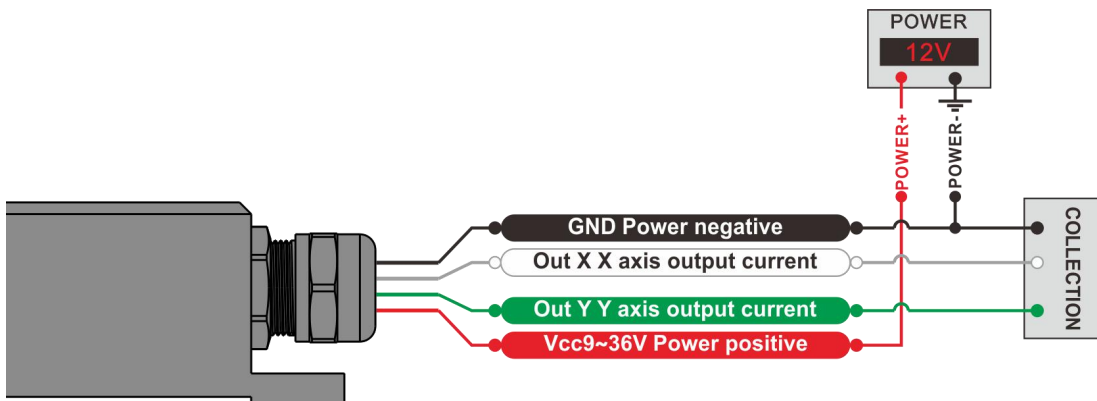
2 : Temperature characteristic graph :



▶ ELECTRICAL CONNECTION

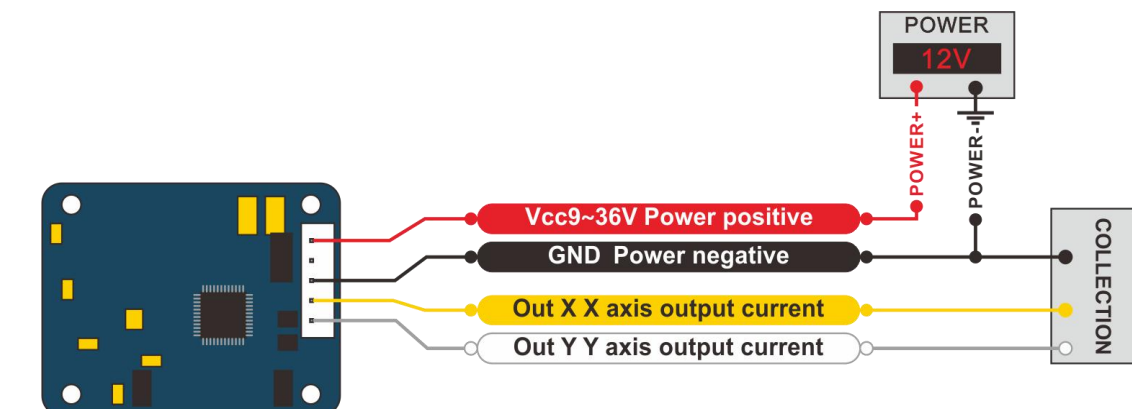
Shell package wiring definition

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



Board wiring definition

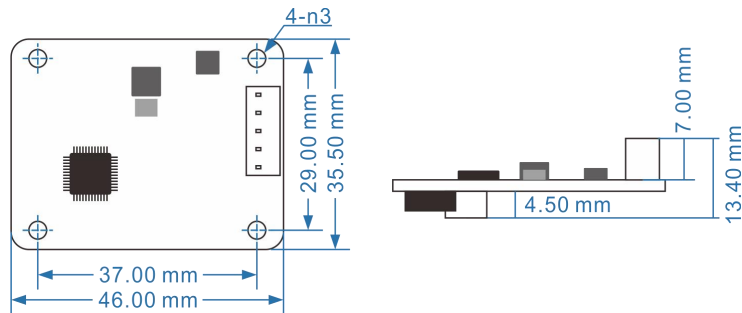
Line color	RED	BLACK	YELLOW	WHITE
function	Vcc9~36V Power supply Power positive	GND Power negative	Out X X Axis output	Out Y Y Axis output



SCA110T/SCA120T VOLTAGE TYPE SINGLE/DUAL AXIS INCLINOMETER

► SIZE

PCBA BOARD SIZE

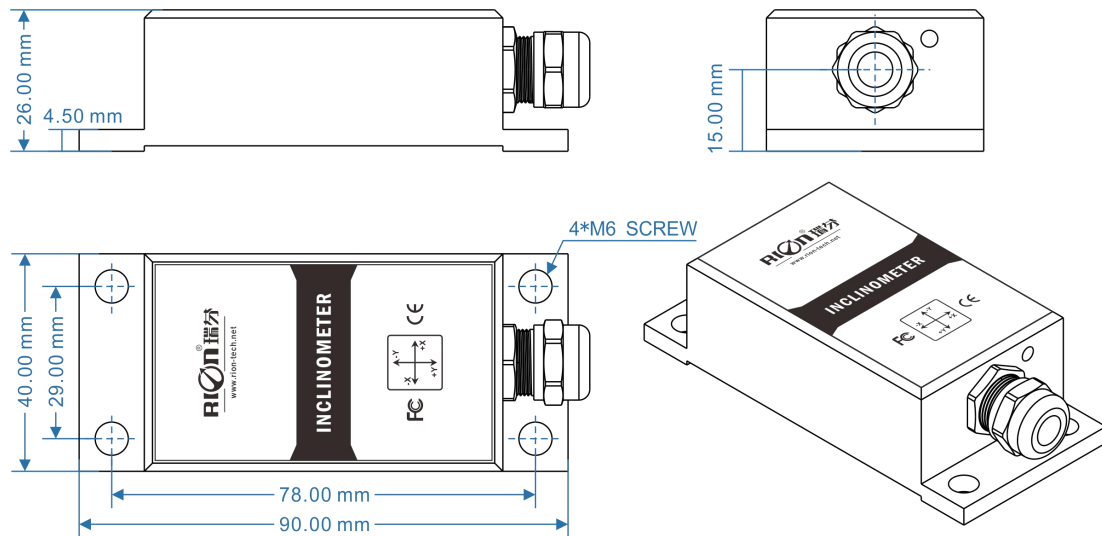


PCBA board size: L46×W35.5×H13.4mm

Installation size: L37×W29×H13.4mm

Mounting screws: 4 M3 screws

SHELL SIZE

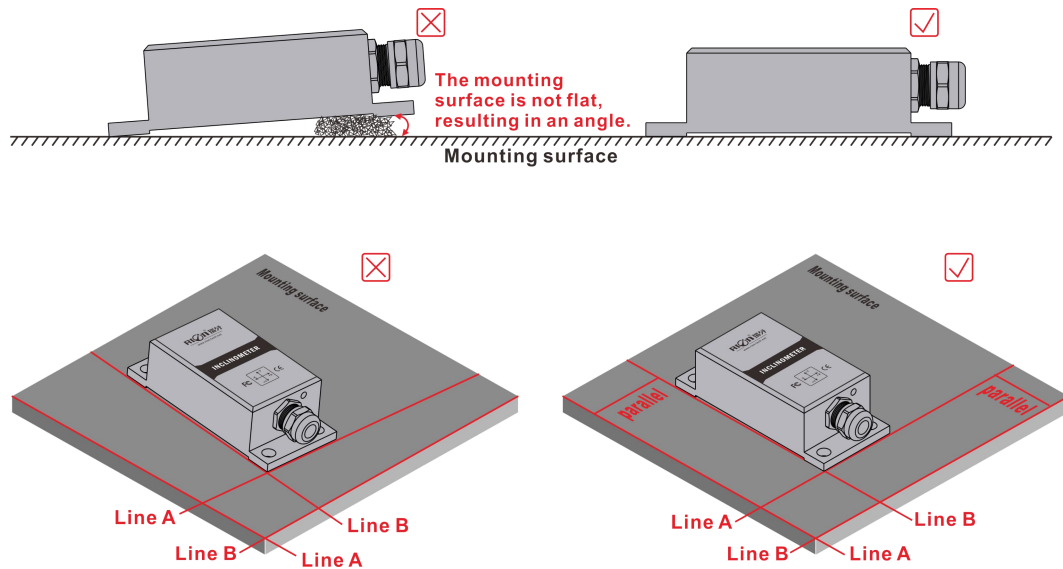


Shell size: L90×W40×H26mm
Installation size: L78×W29×H26mm
Mounting screws: 4 M6 screws

► INSTALLATION PRECAUTIONS

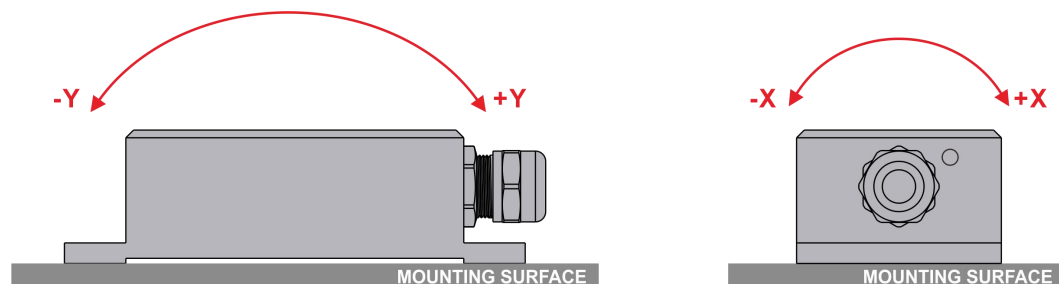
Please install the tilt sensor according to the correct method. Improper installation will cause measurement error. Pay attention to the first "surface" and the second "line":

- 1) The mounting surface of the sensor and the measured surface must be tight, flat and stable. The unevenness of the mounting surface is easy to cause the angle error of the sensor measurement.
- 2) The axis of the sensor and the axis to be measured must be parallel, and the angle between the two axes should be avoided as much as possible.



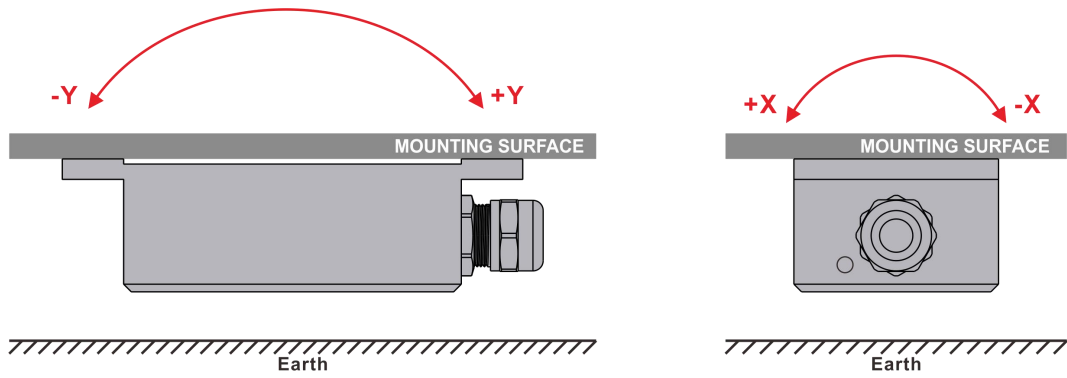
► INSTALLATION DIRECTION

During installation, keep the sensor mounting surface parallel to the target surface to be measured, and reduce the impact of dynamics and acceleration on the sensor. This product can be installed horizontally or vertically, please refer to the following diagram for the installation method:

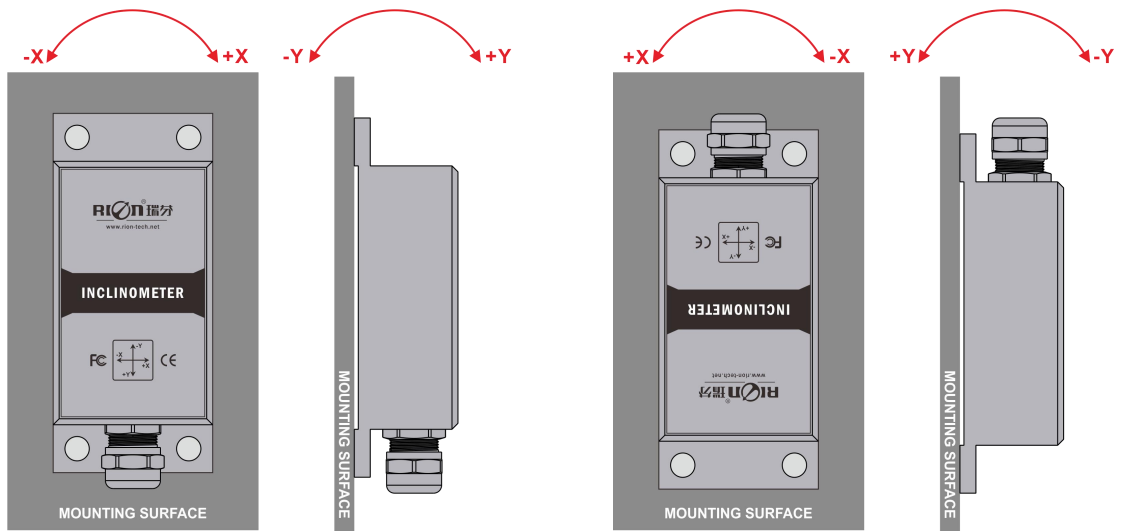


Horizontal installation

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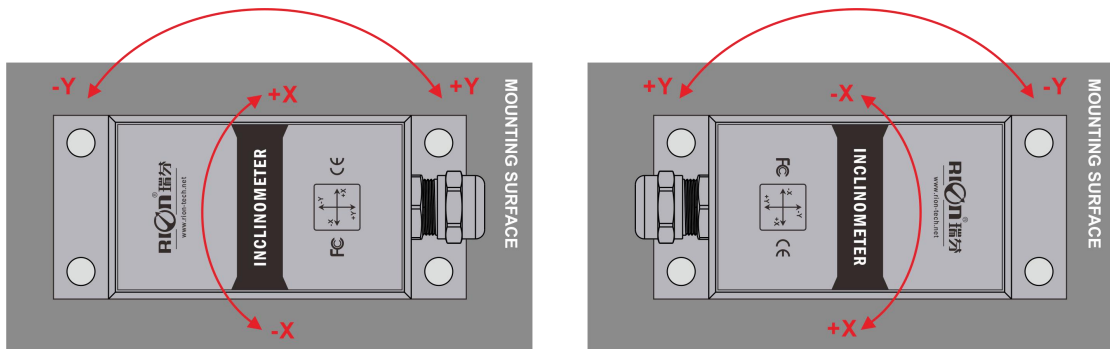


Horizontal-down installation



Vertical installation

Vertical-down installation



Vertical-left installation

Vertical-right installation



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