RION TECH

CE FC RoHS

PATENT NO: ZL 201830752872.2
CE certification: AT011611743E
FCC certification: AT011611744E
RoSH certification: 18300RC20410801

V1.7

HIGH ACCURACY VOLTAGE INCLINOMETER WITH FULL TEMP-COMPENSATION

ACA610T/ACA620T-N

Technical Manual

RION QUALIFICATION CERTIFICATION

○ Quality management system certification: IATF16949: 2016 (Certificate No.: T178487)
○GJB9001C-2017 Standard Weaponry Quality Management System Certification (Registration number: 02622J31799R0M)
○ Intellectual property management system certification:GB/T29490-2013 standard (Certificate No.:41922IP00281-06R0M)
○ High-tech Enterprise (Certificate No.: GR201844204379)
○ ShenZhen Professional Dedicated Unique Innovative Enterprice(No.: SZ20210879)
○ CE certification: AT011611743E
○ FCC certification: AT011611744E
○ RoHS certification: 18300RC20410801
○ China National Intellectual Property Appearance Patent (Patent No.: ZL 201830752872.2)
○ Revision time:2023-9-12

Note: Product functions, parameters, appearance, etc. will be adjusted as the technology upgrades. Please contact our pre-sales business to confirm when purchasing.

GENERAL DESCRIPTION

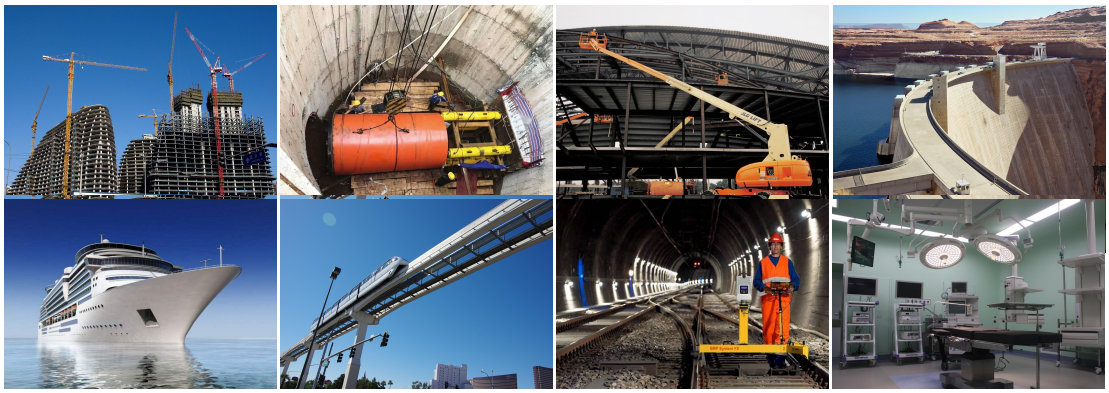
ACA610T/ACA620T-N is a high-precision single/dual-axis inclinometer with full temperature compensation and voltage output. it adopts a high-precision 24bit A/D differential converter to ensure the current output linearity of the product, so the user does not need to make the linearity correction. it is stable, reliable and easy to use. The system integrates a high-resolution temperature sensor, coworking with the MCU, processing secondary temperature compensation, by which the full temperature zero drift can be achieved at 0.0005°/℃, and the accuracy at room temperature can reach 0.003° for small measure range. The feature of non-contact installation makes this product compatible for different systems. Just fix the sensor on the surface of the object to be measured with screws, and then it automatically calculate the inclination angle of the object. It is convenient to install, easy to operate, robust to resist interference and vibration, it has prominent advantage against its counterparts.

FEATURES

★ Single / Dual axis inclination measurement
★ Accuracy: 0.003°
★ Wide temperature working: -40~+85℃
★ Highly anti-vibration performance >2000g
★ Temperature drift 0.0005°/℃
★ Measure Range :±1~±90° optional
★ Wide voltage input: 11.5~36V
★ IP67 protection grade
★ High Resolution: 0.0007°

APPLICATION

★ Engineering vehicles automatic leveling
★ Precision instrument level control
★ Underground drill posture navigation
★ Geological equipment inclined monitoring
★ Railway gauging rule , gauge equipment leveling
★ Bridge & dam detection
★ Medical facilities angle control
★ Direction measurement based on inclination



SPECIFICATIONS

ACA610T/620T-N		CONDITIONS	PARAMETERS				UNIT
Measure range			±10	±30	±60	±90	°
Measure axis			X Y	X Y	X Y	X Y	axis
Zero output		0° output	2.5	2.5	2.5	2.5	V
Resolution			0.0007	0.0007	0.0007	0.0007	°
Measure accuracy	MAXE	Room temp.	0.003	0.01	0.02	0.03	°
	RMSE	Room temp.	0.003	0.003	0.005	0.008	°
Zero Temp. coefficient		-40 ~ 85℃	0.0005	0.0005	0.0005	0.0005	°/℃
Sensitivity temp-coefficient		-40 ~ 85℃	≤50	≤50	≤50	≤50	ppm/℃
Power on time			0.5	0.5	0.5	0.5	S
Response frequency		20Hz					
EMC		According to EN61000 and GBT17626					
MTBF		≥98000 hours/times					
Insulation Resistance		≥100MΩ					
Shockproof		100g@11ms、3 axial direction (half sinusoid)					
Anti-vibration		10grms、10 ~ 1000Hz					
Protection grade		IP67					
Cables		Standard 7 P * 6.8 mm aviation connector, 2m long, wear-resistant, wide temperature, shielded cable, cable weight ≤ 200 G					
Weight		≤260g(without cable)					

*This performance parameters only cover the measurement ranges of ±10°, ±30°,±60° and ±90°.
For other measurement ranges, please refer to the nearest parameters.

KEY WORDS:

Resolution: Refers to the sensor in measuring range to detect and identify the smallest changed value.

MAXE: refers to the biggest error of the product within the range and at multiple angle points.

RMSE: refers to the root mean square difference between the measured value and the actual angle of the product within the range and for multiple times (more than 16 times).

Zero Temperature Drift Coefficient: the change rate of the indication value relative to normal temperature within the rated operating temperature range of the sensor at the zero degree.

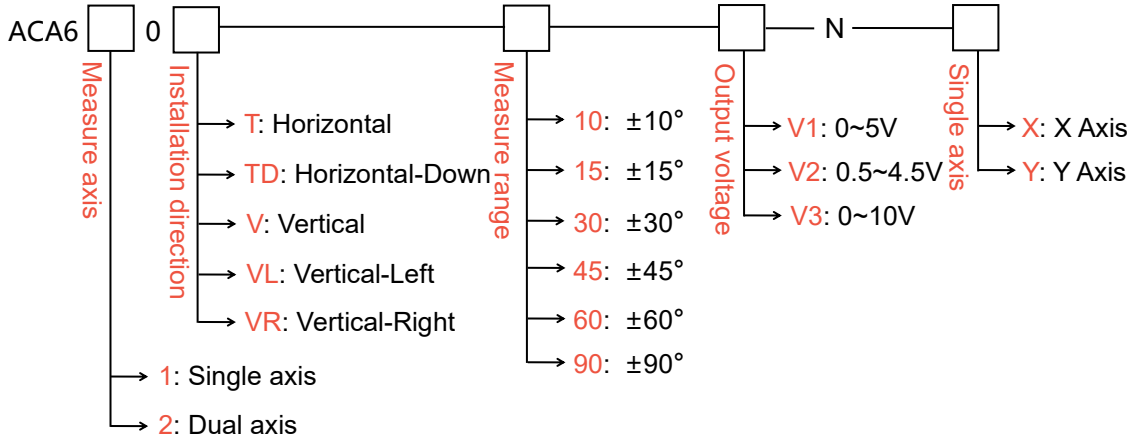
Sensitivity Temperature Drift Coefficient: The percentage change rate with temperature of the full-scale indication relative to the full-scale indication at room temperature of the sensor

ELECTRONIC CHARACTERISTICS

PARAMETERS	CONDITIONS	MIN	STANDARD		MAX	UNIT
Power supply	Standard	11.5	12	24	36	V
Working current			40			mA
Output overload	Resistive	10				kΩ
	Capacitive				20	nF

Working temperature		-40		+85	℃
Store temperature		-40		+85	℃

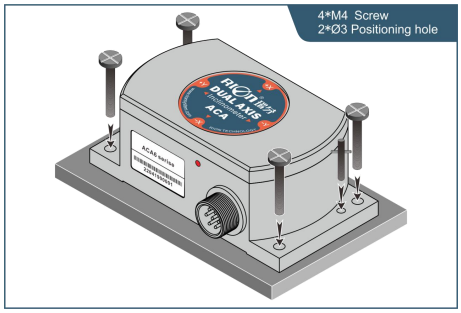
▸ ORDERING INFORMATION



E.g: ACA610T-10-V1-N-X: Single axis / Horizontal installation / ± 10°Measure range / 0~5V Output voltage / X Axis.

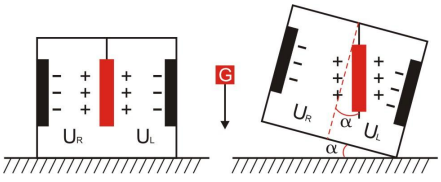
▸ MECHANICAL PARAMETERS

○ Connectors : Aviation connector
(1 meter direct lead wire; length optional)
○ Protection grade : IP67
○ Enclosure material : Aluminum Oxide
○ Installation : 4*M4 screws
2*3mm plug position(optional)



▸ 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 is obtained after conversion.



U_R, U_LRespectively is the pendulum left plate and the right plate corresponding to their respective voltage between theelectrodes, 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:

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

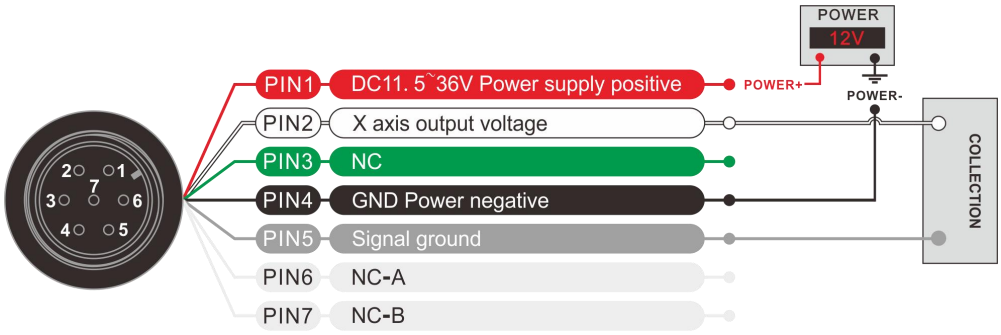
▸ ANGLE OUTPUT CALCULATION FORMULA

Angle=(output voltage－Zero position voltage)÷Angle sensitivity
Angle sensitivity=output voltage range÷ Angle measuring range
E.g：**ACA616T-30-V1-N** (±30° Measure range 0～5V output voltage range)
Angle sensitivity= 5÷60=0.83333 V/°

ELECTRICAL CONNECTION

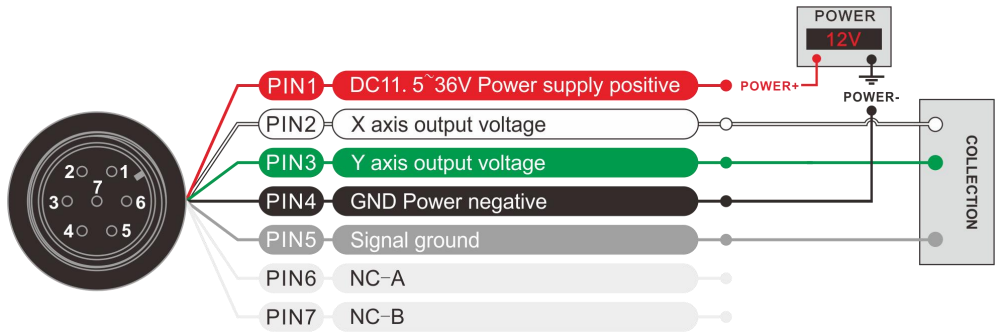
SINGLE AXIS ELECTRICAL CONNECTION

Wire Color function	RED	WHITE	GREEN	BLACK	GRAY
	DC11.5~36V Power supply positive	Out X X axis output voltage	NC	GND Power supply negative	Signal GND



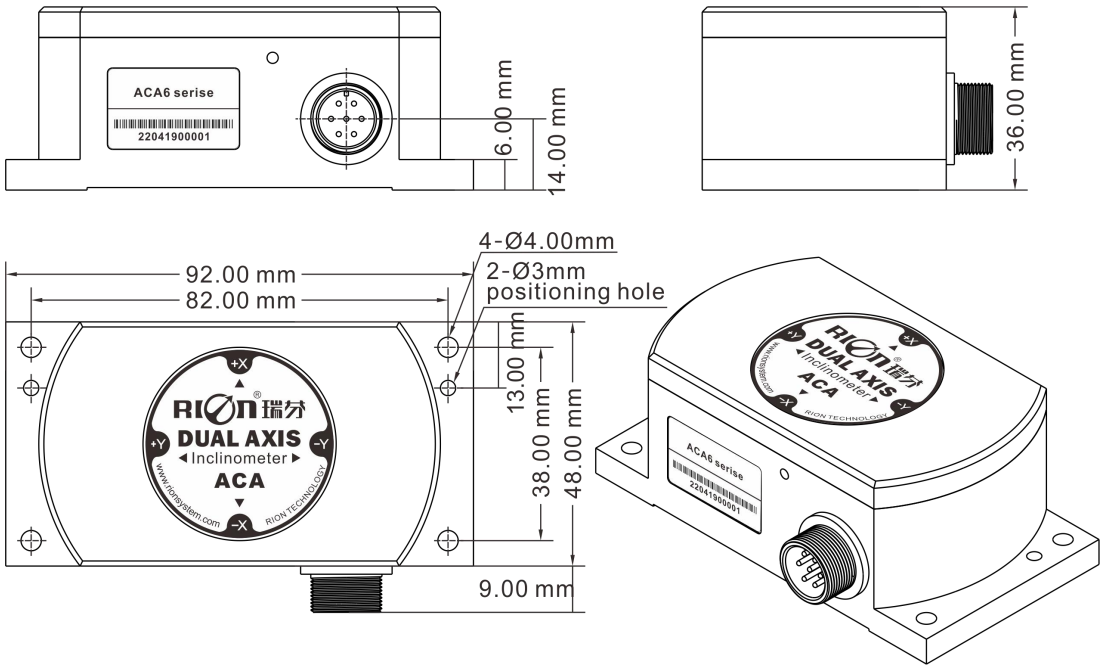
DUAL AXIS ELECTRICAL CONNECTION

Wire Color function	RED	WHITE	GREEN	BLACK	GRAY
	DC11.5~36V Power supply positive	Out X X axis output voltage	Out Y Y axis output voltage	GND Power supply negative	Signal GND



* Signal ground: output voltage signal. Connect the GND of acquisition device.

SIZE



Shell size：L92×W48×H36mm

Installation size：L82×W38×H6mm

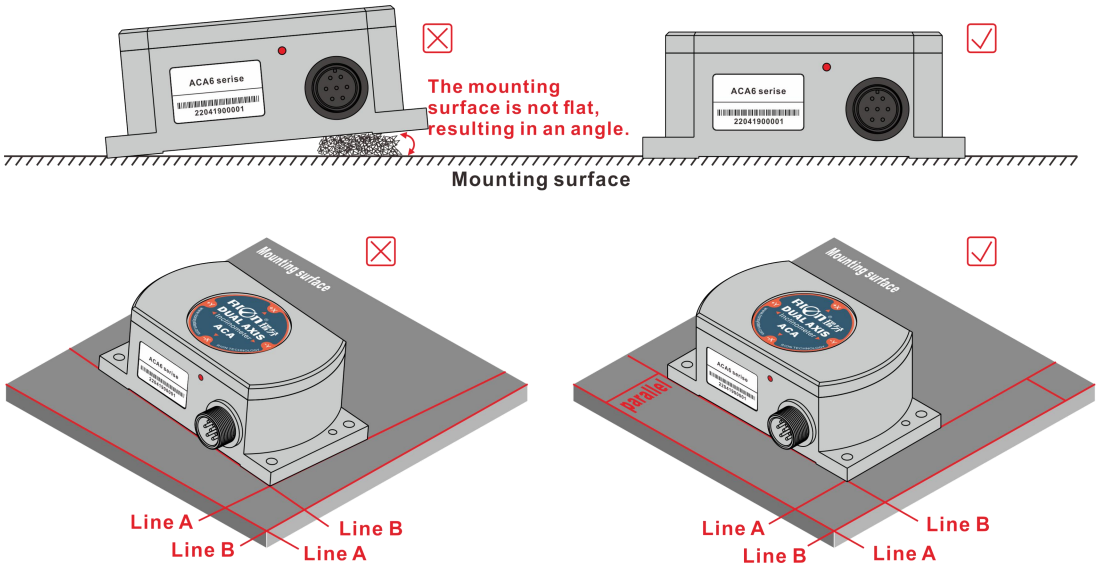
Installation crews：4 M4 screws/2 M3 dowel pins

PRODUCTION INSTALLATION NOTES

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

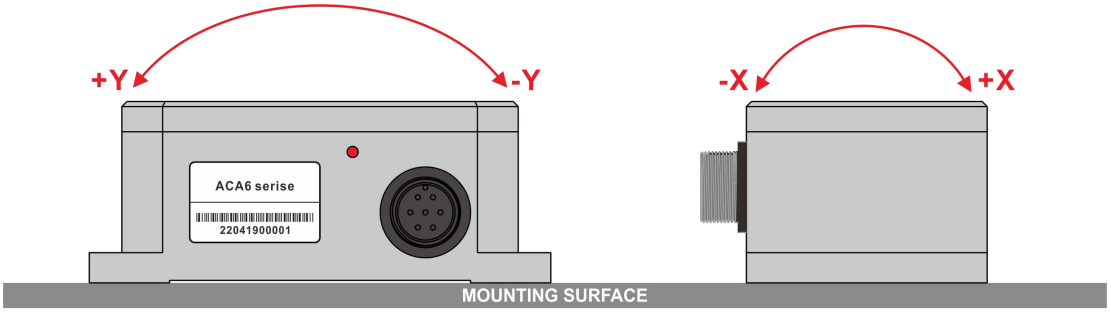
1）The Sensor mounting surface and the measured surface must be fixed closely, smoothly, stability,if mounting surface uneven likely to cause the sensor to measure the angle error.

2) The sensor axis and the measured axis must be parallel ,the two axes do not produce the angle as much as possible.

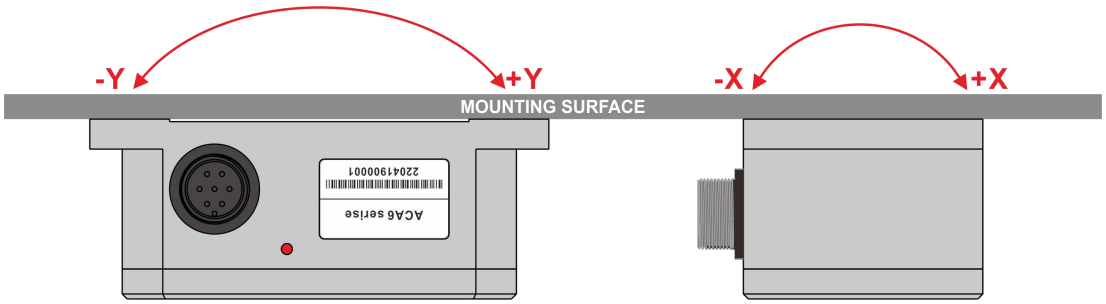


PRODUCT INSTALLATION DIRECTION

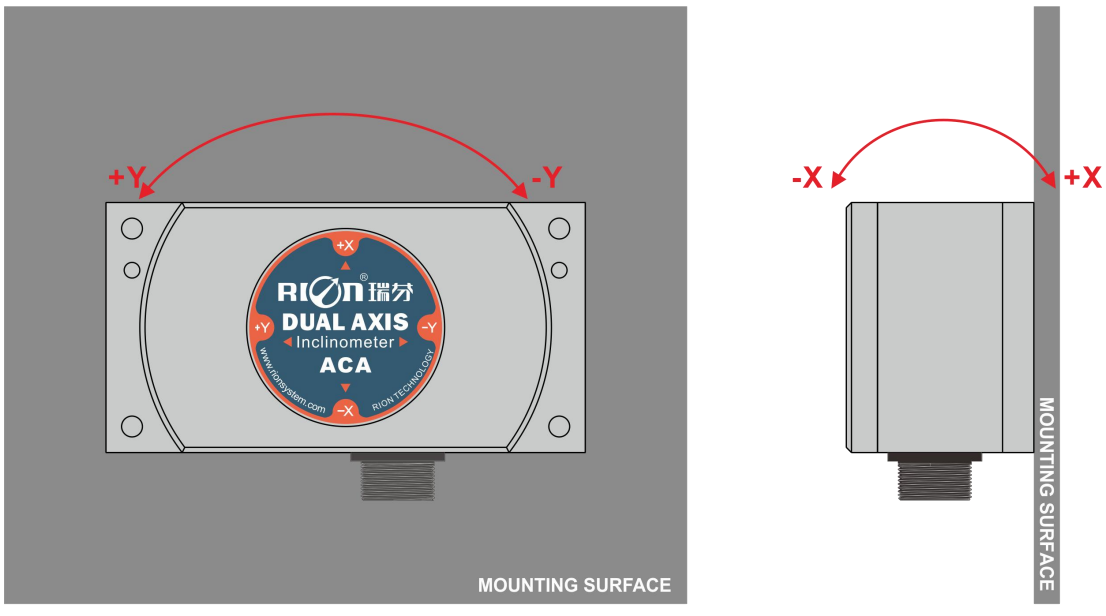
During installation, keep the sensor mounting surface parallel to the target surface to be measured, and reduce the impact of dynamics and acceleration on the sensor. This product can be installed horizontally or vertically, please refer to the following diagram for the installation method:



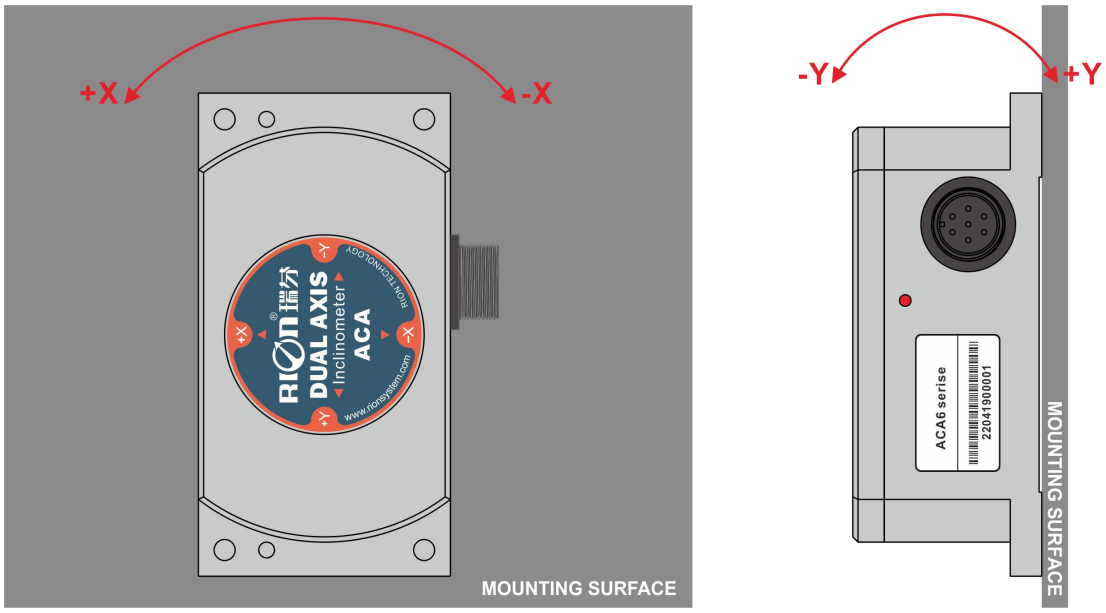
Horizontal installation



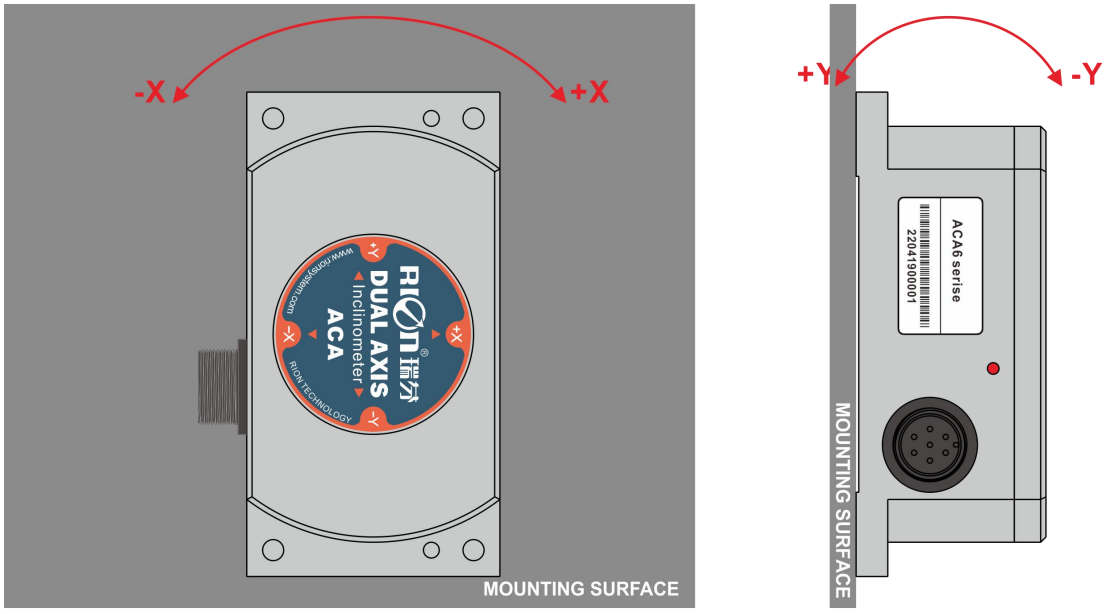
Horizontal-down installation



Vertical installation



Vertical-Left installation



Vertical-Right installation

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