RION TECH

Appearance patent no.: ZL 201830752874.1

V1.9

CURRENT SINGLE/DUAL AXES INCLINOMETER

RION LCA318T/LCA328T

TECHNICAL MANUAL

RION-TEHC QUALIFICATION CERTIFICATION

○ Quality management system certification: GB/T19001-2016 idt ISO19001:2015 standard (certificate no.: 128101)

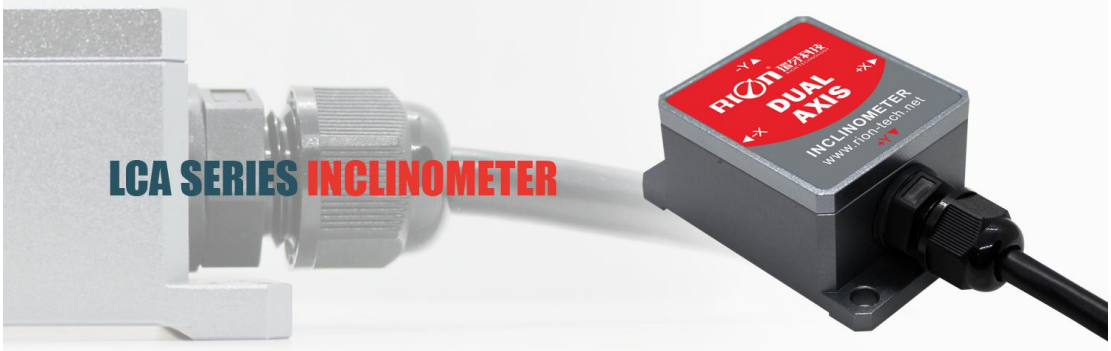
○ High-tech enterprise (certificate No.: GR201844204379)

○ CE certification: AT18250EC100244

○ China National Intellectual Property Appearance Patent (Patent No .: ZL 201830752874.1)

○ Revision date: 2022-1-4

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



▶ PRODUCT DESCRIPTION

LCA318T & LCA328T series tilt angle is a small-volume MEMS uniaxial tilt sensor developed by RION. The output current is internally quadratic linearity corrected. It is a linearity current output tilt angle sensor. It is mainly aimed at applications where volume and cost are highly restrictive. Due to the built-in inclination unit of the latest micro-electromechanical production process, the product is small, long-distance transmission can reach more than 2000 meters, and it has strong resistance to external electromagnetic interference and can be adapted to long-term work in harsh industrial environments.

This product adopts the non-contact measurement, which can output the current attitude and inclination in real time. It is simple to use and does not need to retrieve the relative changes. It is an ideal choice for industrial automation control and platform measurement attitude!

▶ KEY FEATURES

★ Single and biaxial inclination measurement
★ Accuracy: 0.1 °
★ Output mode: 4~20mA
★ IP67 protection level
★ Resolution 0.02 °
★ Any range within 360 ° is optional
★ Wide voltage input: 9~36V
★ Wide temperature operation: -40 ~ + 85 ℃
★ High anti-vibration performance> 3500g
★ Small size 55 × 37 × 24mm (customizable)

▶ PRODUCT APPLICATION

★ Electric blind chair leveling
★ Gimbal operation monitoring
★ Satellite antenna positioning
★ Medical bed level
★ Car chassis measurement
★ Four-wheel positioning system
★ Various engineering machinery angle control

▶ PERFORMANCE INDEX

LCA318T/328T	CONDITION	PARAMETER				UNIT
Measure range		±30	±60	±90	0~360	°
Measure axis		X Y	X Y	X Y	X Y	Axis
Zero output	0° output	12	12	12	12	mA
Resolution		0.02	0.03	0.05	0.08	°
Measure accuracy	@25℃	0.1	0.1	0.15	0.2	°
Long term. stability		<0.5	<0.5	<0.5	<0.5	
Zero Temp.coefficient	-40～85℃	±0.02	±0.02	±0.02	±0.02	°/℃
Sensitivity temp-coeffi	-40～85℃	≤150	≤150	≤150	≤150	ppm/℃
Power-on start time		0.5	0.5	0.5	0.5	S
Response time		0.02	0.02	0.02	0.02	s
Response frequency		1～20	1～20	1～20	1～20	Hz
EMC	According to EN61000 and GBT17626					
MTBF	≥45000 hours/times					
Insulation Resistance	≥100 MΩ					
Impact resistance	100g@11ms, 3 Axial Direction (Half Sinusoid)					
Anti-vibration	10grms、10～1000Hz					
Protection grade	IP67					
Cables	standard configuration: 1 meter wearproof、grease proofing、wide temperature、Shielded cables 4*0.3mm2					
Weight	≤135g (including 1 meter cable)					

* This performance parameter only lists ± 30 °, ± 60 °, ± 90 °, ± 360 ° series as a reference, for other measurement ranges, please refer to the adjacent parameters.

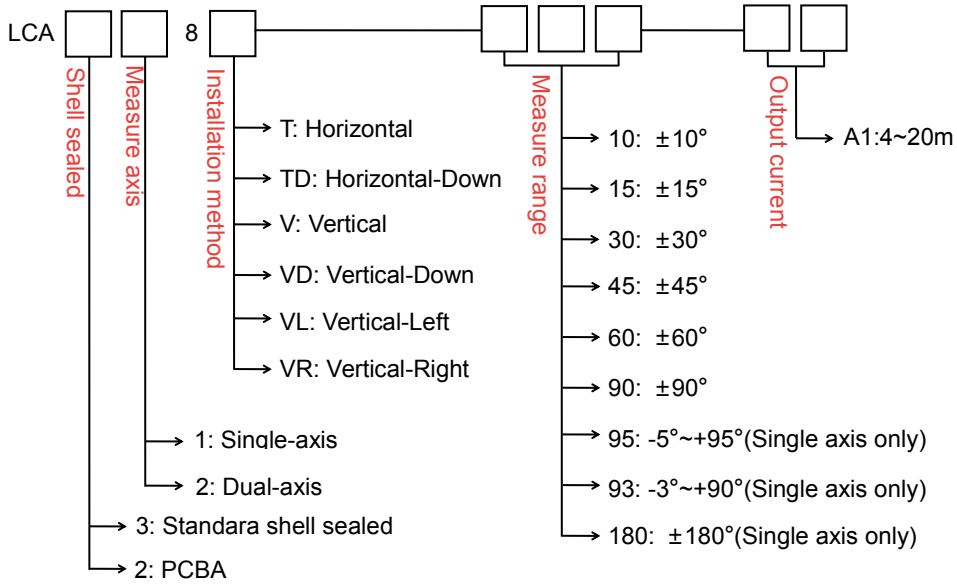
▶ ELECTRONIC CHARACTERISTICS

PARAMETERS	CONDITION	MIN	TYPICAL	MAX	UNIT
Power supply voltage	Standard	9	12、24	36	V
Working current			12		mA
Output internal resistance	resistiveness	400		1000	kΩ
Current sampling resistor	Advice		250		R
Operating temp.		-40		+85	℃
Store temp.		-40		+85	℃

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.

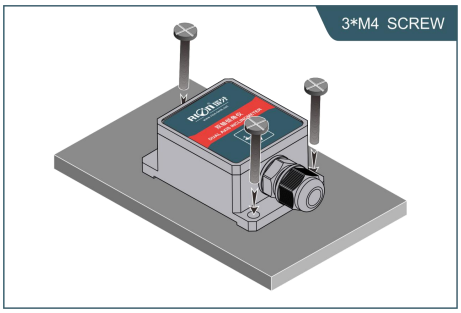
▶ ORDER INFORMATION



E.g: LCA318T-10-A1：Standara shell sealed / single axis / horizontal installation / ± 10 ° measure range / 4-20mA output current.

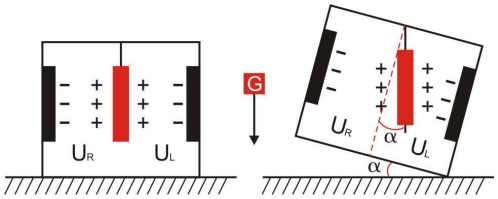
▶ MECHANICAL PARAMETERS

○ Connector: 1m straight lead (customizable)
○ Protection level: IP67
○ Shell material: aluminum alloy frosted and oxidized
○ Installation: Three M4 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_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:

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

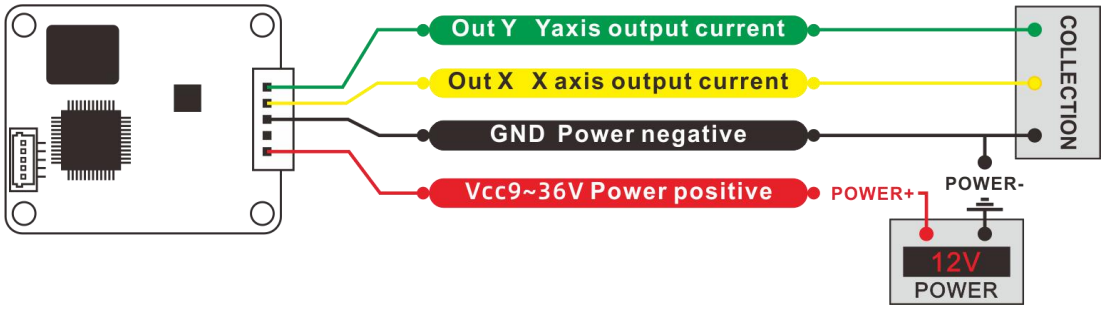
▶ ANGLE CALCULATION FORMULA

Angle = (output current-zero position current) ÷ angle sensitivity
Angle sensitivity = output current range ÷ angle measurement range
Example: LCA318T-30-A1 (± 30 ° measuring range 16mA output current range)
Angle sensitivity = 16 ÷ 60 = 0.266666 mA / °

▶ ELECTRICAL CONNECTION

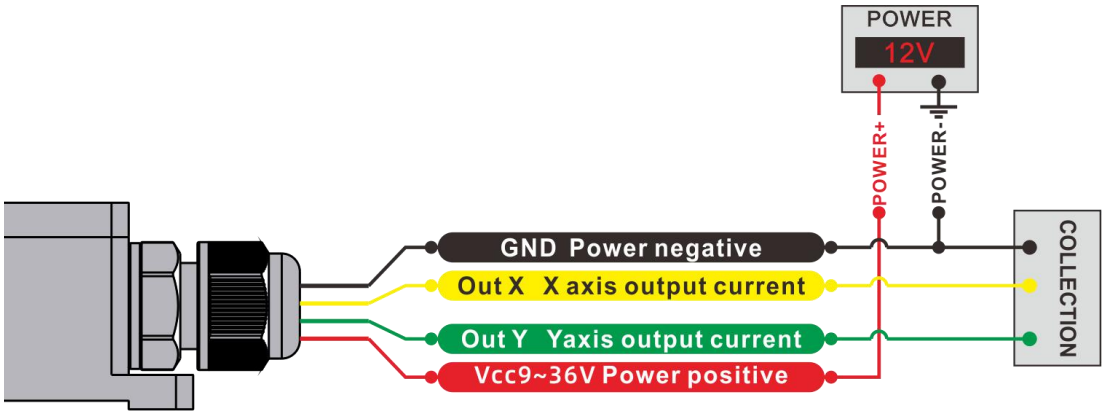
PCBA electrical connection

Color	GREEN	YELLOW	BLACK	RED
Function	Out Y- Y axis output current	Out X- X axis output current	GND Power negative	Vcc9~36V Power positive



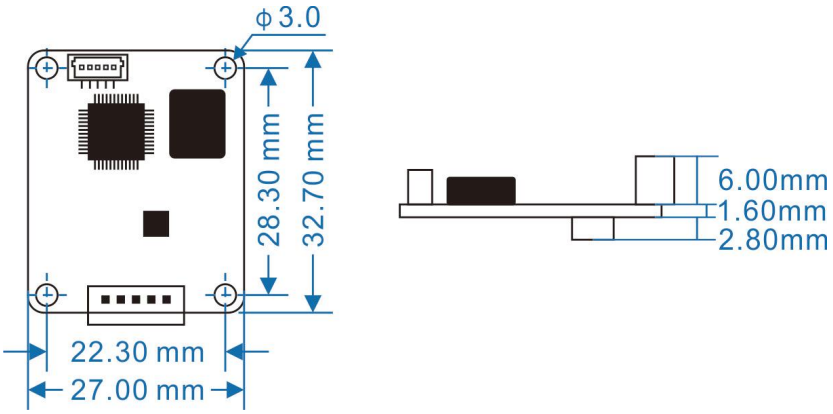
SHELL electrical connection

Color	BLACK	YELLOW	GREEN	RED
Function	GND Power negative	Out X- X axis output current	Out Y- Y axis output current	Vcc9~36V Power positive



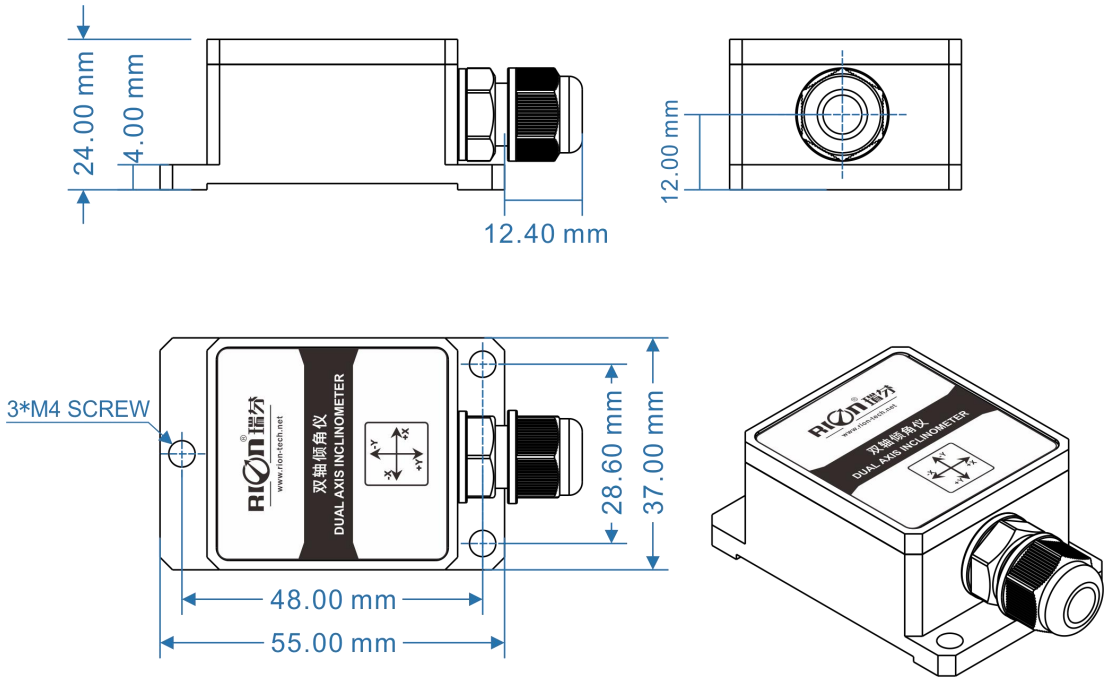
▶ SIZE

PCBA SIZE



SIZE：L27×W33×H10.5mm

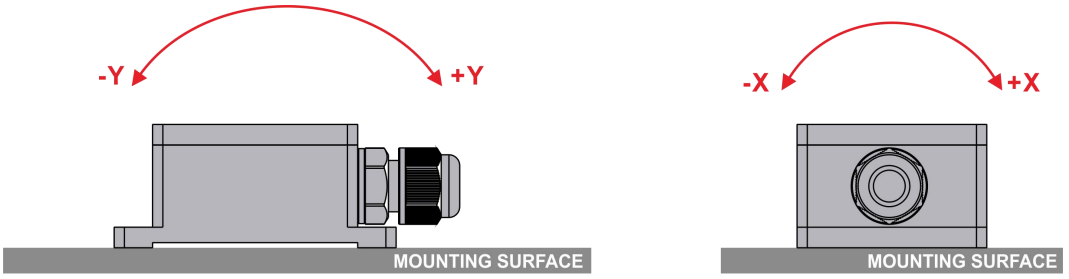
SHELL SIZE



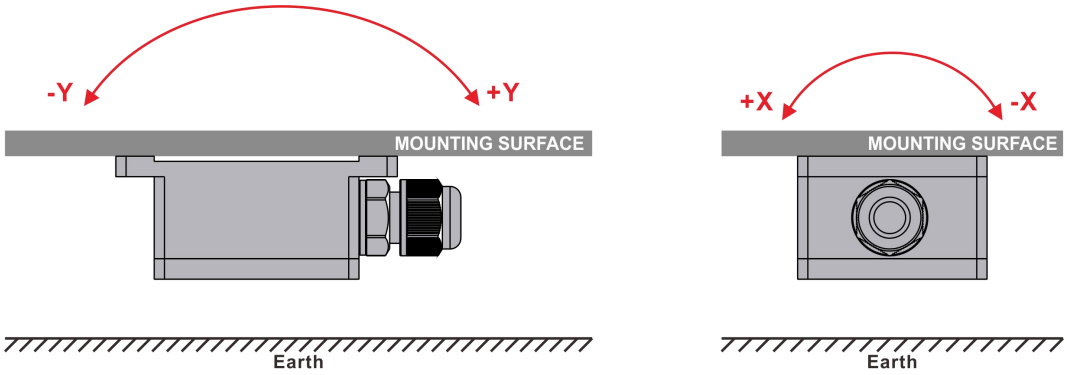
SIZE：L55mm×W37mm×H24mm

▶ INSTALLATION DIRECTION

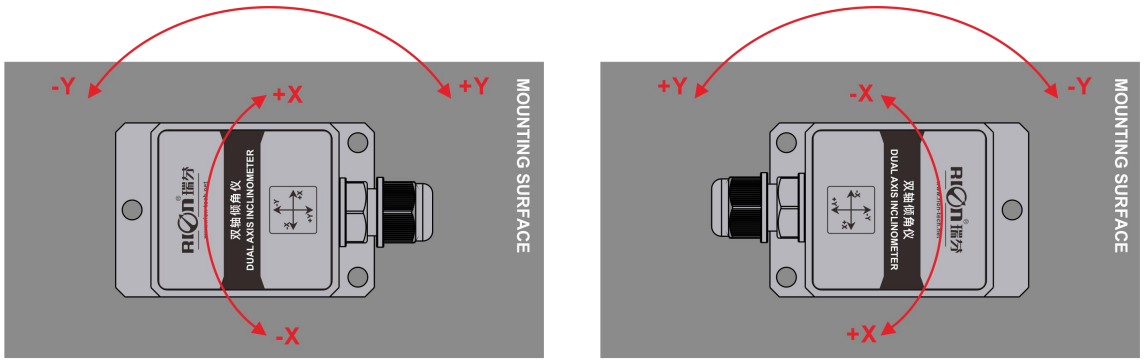
During installation, keep the sensor mounting surface parallel to the target surface to be measured, and reduce the impact of dynamics and acceleration on the sensor. This product can be installed horizontally or vertically, please refer to the following diagram for the installation method:



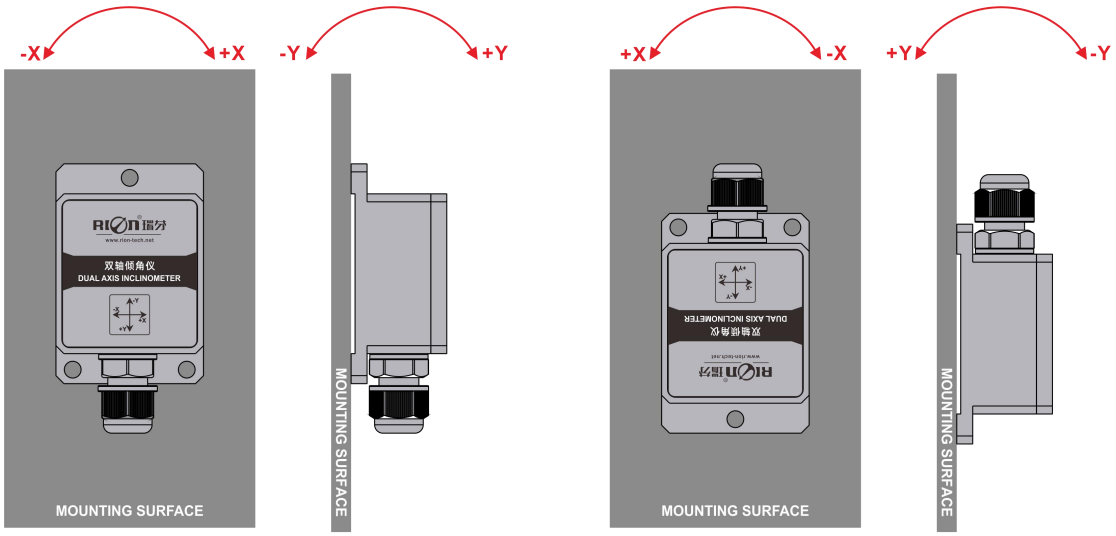
Horizontal installation



Horizontal-down installation



Vertical-left installation **Vertical-right installation**



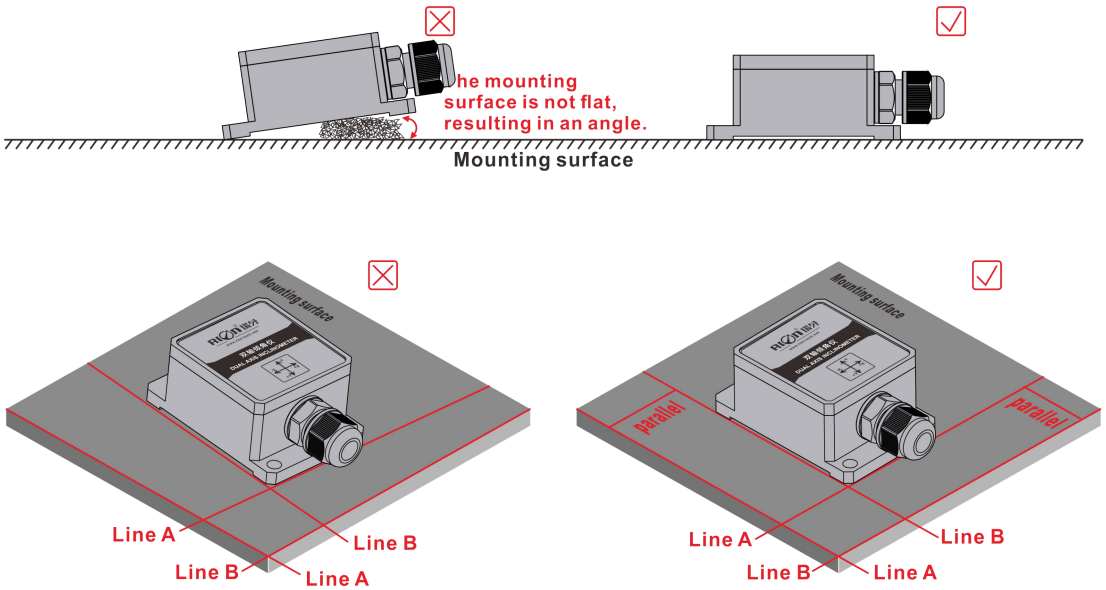
Vertical installation

Vertical-down installation

▶ 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.



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