



DTS6-A1 Current Output Dynamic Tilt Sensor

Product manual

V1.1-20230921

Technical Highlights

- ❖ Measuring range selectable from $\pm 1^\circ$ to $\pm 90^\circ$;
- ❖ Dynamic accuracy $\pm 0.3^\circ$;
- ❖ Static accuracy $\pm 0.05^\circ$;
- ❖ Output mode 4~20mA.



Product Introduction

The DTS6-A1 is an industrial-grade dynamic tilt measurement device that uses current output, offering excellent vibration resistance and suitable for stable and reliable dynamic angle monitoring of objects. Its output signal is a standard 4-20mA current loop, simultaneously reflecting dual-axis dynamic attitude angles and supporting long-distance transmission with a maximum cabling distance of 2000 meters.

Internally, it integrates a three-axis accelerometer and a three-axis gyroscope. By measuring the gravitational field component and gyro angular rate information, and using a built-in six-axis Kalman filter algorithm, it calculates the dynamic attitude angle in real time and converts the angle data into a current signal output. This output method has strong anti-interference capabilities and is suitable for complex industrial applications such as engineering machinery.

The core sensing element is manufactured using MEMS technology, and temperature drift and nonlinearity errors are systematically compensated and corrected before shipment. Under small measurement range conditions, the static accuracy can reach 0.03° , meeting the accuracy requirements of general industrial measurements. The product features a compact structure, reliable packaging technology, and good shock and vibration resistance. Its internal circuit design prioritizes RF interference suppression and electromagnetic compatibility, making it suitable for trenchless underground construction machinery and other industrial sites with similar operating conditions.

Regarding reliability and environmental adaptability, this product utilizes an industrial-grade MCU, a conformal-coated PCB, weather-resistant imported cables, and a wide-temperature-range shielded metal housing. From component selection and manufacturing processes to structural design, the goal is to enhance long-term operational stability in industrial environments, resulting in overall performance advantages comparable to similar products.

Application Scope

Typical applications for this product series include: cranes and construction machinery, agricultural machinery, mobile elevators and fire trucks, automated guided vehicles (AGV), automated assembly machinery, boring and drilling applications.





Performance Parameters

DTS6-A1	Condition	Parameters					Unit
Range		±10	±30	±60	±90	±180	°
Measurement Axis		X Y	X Y	X Y	X Y	X	Axis
Zero Output	0° Output	12	12	12	12	12	mA
Resolution		0.01	0.01	0.02	0.03	0.05	°
Dynamic Accuracy	@25℃	0.3	0.3	0.3	0.5	0.5	°
Static Accuracy	@25℃	0.05	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℃	±0.006	±0.006	±0.006	±0.006	±0.006	°/℃
Sensitivity Temp. Coefficient	-40~85℃	≤100	≤100	≤100	≤100	≤100	ppm/℃
Power-On Startup Time		1.0	1.0	1.0	1.0	1.0	S
Response Time		0.01	0.01	0.01	0.01	0.01	s
Response Frequency		20~100	20~100	20~100	20~100	20~100	Hz
Electromagnetic Compatibility	Compliant with EN61000 and GBT17626						
Insulation Resistance	≥100 megohms						
Shock Resistance	100g@11ms, triaxial (half-sine wave)						
Vibration Resistance	10grms /10~1000Hz						
Waterproof Rating	IP67						
Cable	Standard 2-meter shielded cable						
Weight	≤180g(excluding cable)						
Resolution: The smallest change in the measured quantity that the sensor can detect and distinguish within its measurement range.							
Measurement Accuracy: The combined error of the sensor under normal temperature conditions, including linearity, repeatability, hysteresis, zero-point deviation, and horizontal axis error.							
Long-term Stability: The deviation between the maximum and minimum values of the sensor after one year of long-term operation under normal temperature conditions.							
Response Time: The time required for the sensor output to reach the standard value after a single angular change.							



Electrical Parameters

Parameters	Condition	MIN	TYP		MAX	Unit
Supply voltage	Standard	9	12	24	36	V
Operating current			50			mA
Output load	Resistive		400		1000	Ω
Operating temp.		-40			+85	°C
Storage temp.		-40			+85	°C

Ordering and Selection

Model	Package	Axis	Range	Current output	Installation Orientation
DTS	3: PCBA board	X: X Axis	10: $\pm 10^\circ$	A1: 4~20 mA	H: Horizontal installation
	6: Shell	Y: Y Axis	15: $\pm 15^\circ$		HD: Horizontal downward
	9: Corrosion-resistant casing	D: Dual Axis	30: $\pm 30^\circ$	-	V: Vertical installation
			45: $\pm 45^\circ$		VD: Vertical downward
			60: $\pm 60^\circ$		VL: Vertical left
			90: $\pm 90^\circ$		VR: Vertical right
			180: $\pm 180^\circ$ (X-axis only)		

E.g: DTS6X10-A1-H : Standard housing / Single-axis X-axis / Measurement range $\pm 10^\circ$ / 4~20mA output / Horizontal mounting.

Angle output calculation formula

Angle = (Output Current - Zero-Point Position Current) $\div$ Angle Sensitivity

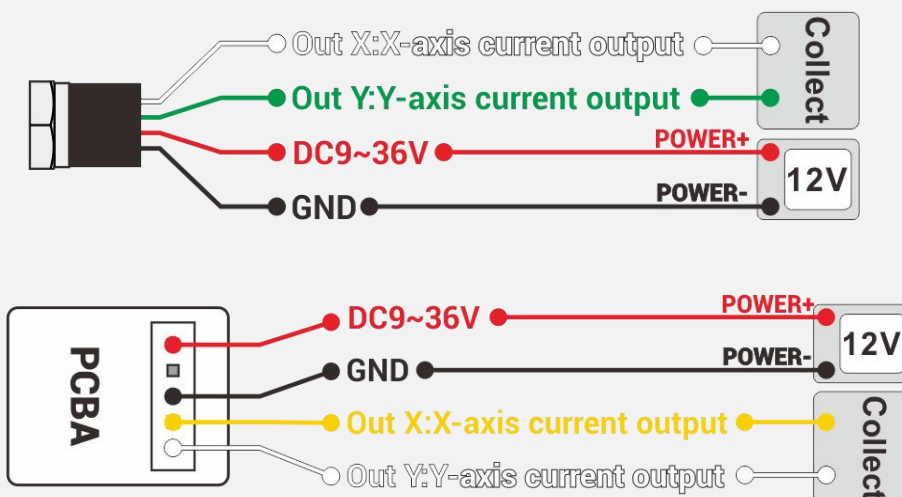
Angle sensitivity = Output current range $\div$ Angle measurement range

Example: DTS6X10-A1-H ($\pm 10^\circ$ Measurement Range 4~20mA Output current range)

Angular sensitivity = $(20-4) \div (+10^\circ - (-10^\circ)) = 16 \div 20 = 0.8 \text{ mA/}^\circ$

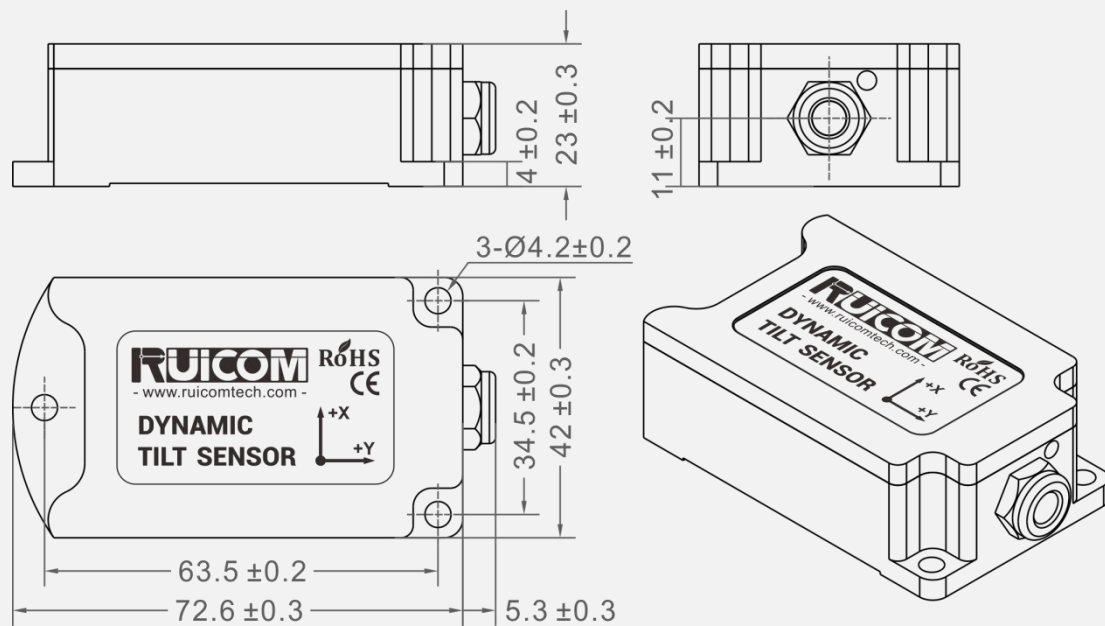
Interface Definition

Shell line color	PCBA line color	Definition	Description
Red	Red	DC9~36V	Power supply positive terminal
White	Yellow	X_OUT	X-axis current output
Green	White	Y_OUT	Y-axis current output
Black	Black	GND	Power supply negative terminal



Product Dimensions

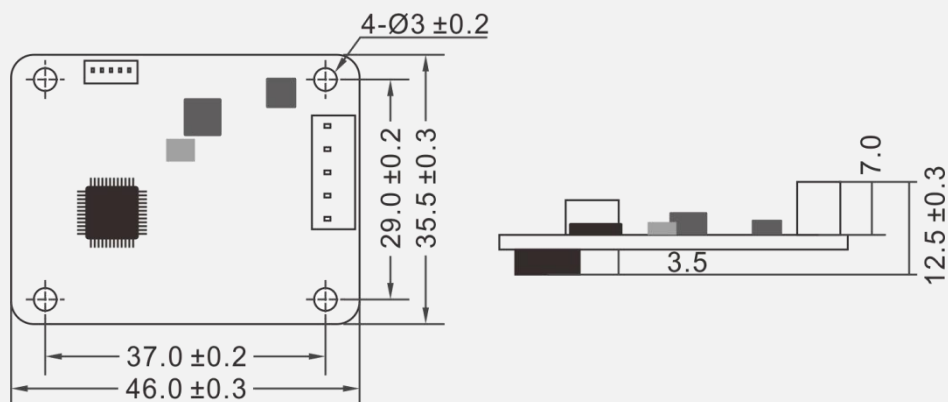
Shell size



Case dimensions: L77.9×W42×H23mm

Recommended screws: 3 M4 screws

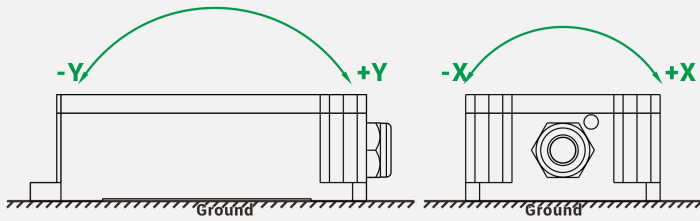
PCBA size



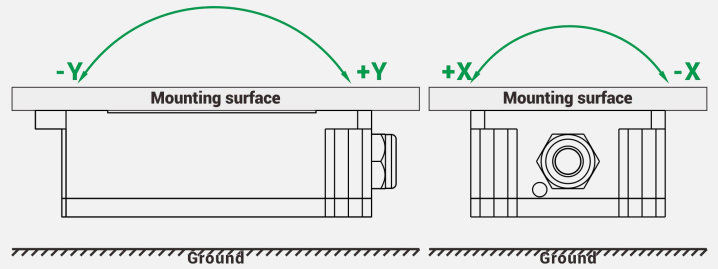
Case dimensions: L46×W35.5×H12.5mm

Recommended screws: 4 M3 screws

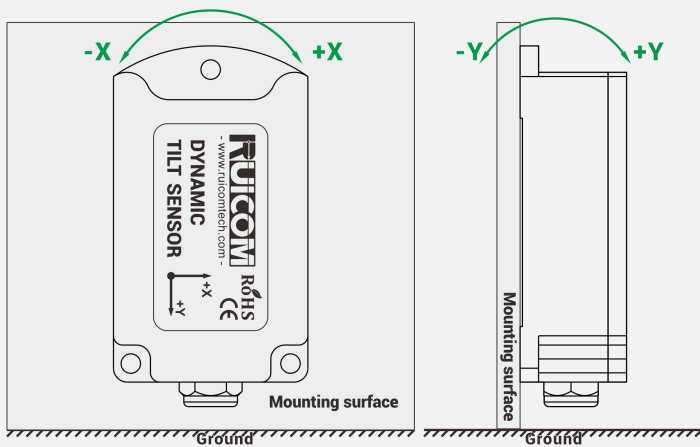
✓ Measurement Orientation



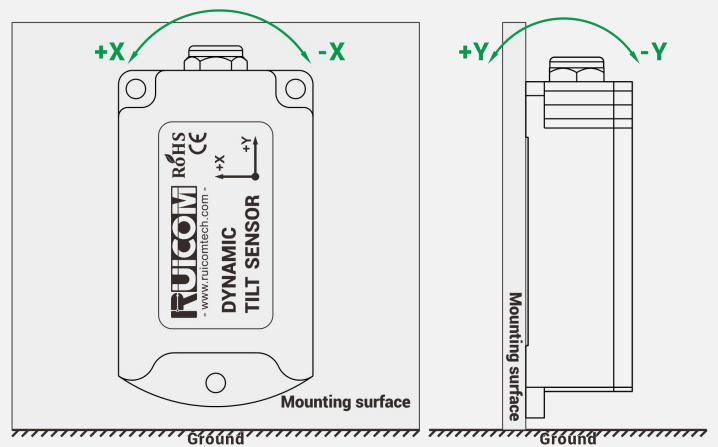
Horizontal installation



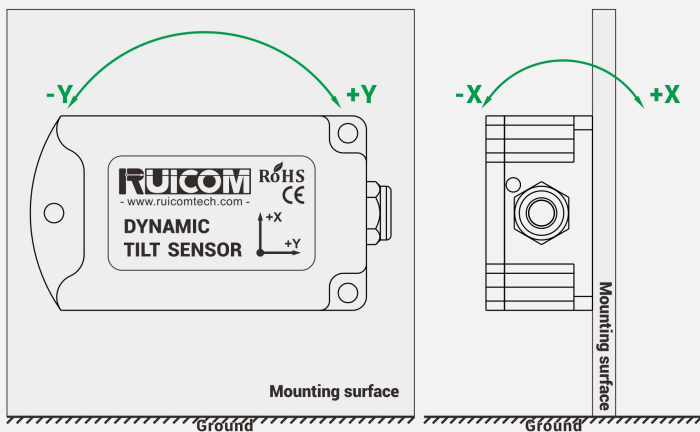
Horizontal downwards



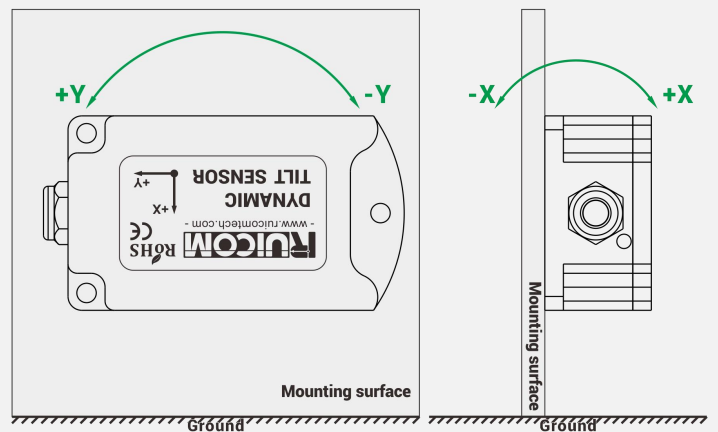
Vertical installation



Vertically downward



Vertical leftwards



Vertical rightwards