

ASC MEMS Capacitive Tilt Sensors



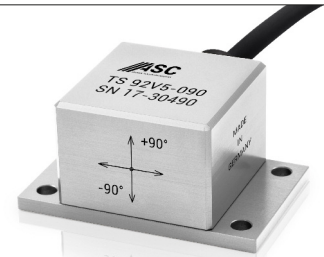
ASC TS91V1, TS91V5 (Uniaxial)

ASC TS92V1, TS92V5 (Biaxial)

- ▶ Uniaxial / Biaxial
- ▶ 4 / 8 Wire System
- ▶ Anodised Aluminium Housing
- ▶ Stainless Steel Housing
- ▶ Protection Class IP67 / IP68
- ▶ Made in Germany



ASC TS91V1-090 (Uniaxial)



ASC TS92V5-090 (Biaxial)

Features

- ▶ Range: $\pm 90^\circ\text{C}$
- ▶ DC Response
- ▶ High Resolution
- ▶ Low Temperature Coefficient of Bias
- ▶ Excellent Long-Term Bias Stability
- ▶ Wide Temperature Range
- ▶ High Shock Limit

Options

- ▶ Customised Cable Length
- ▶ Customised Connector
- ▶ 4-20mA Current Output

Applications

- ▶ Crane Safety Systems
- ▶ Building Construction Machines
- ▶ Solar Array Tracking Systems
- ▶ Ship's Navigation Posture Measurement
- ▶ Flap Bridge Monitoring
- ▶ Track Alignment & Maintenance
- ▶ Wheel Alignment
- ▶ Truck Chassis Levelling
- ▶ Machine Tool Angle Positioning

Tilt Sensors

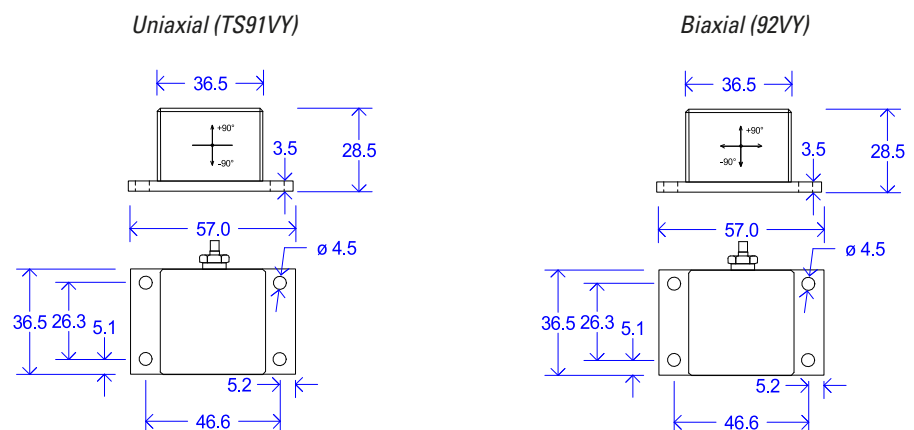
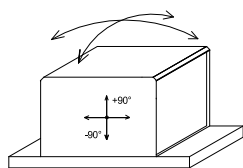
MEMS capacitive accelerometers measure both static and dynamic accelerations. Tilt is a static measurement where earth's gravity is the acceleration being measured. The change in degrees of tilt corresponds to a change in acceleration due to a changing component of gravity that acts on the accelerometer. Low-g accelerometers with high sensitivity result in the highest degree of resolution of a tilt measurement. For a tilt from -90° to $+90^\circ$, the ASC MEMS capacitive accelerometer experiences acceleration from $-1g$ to $+1g$. The analog output from the tilt sensor (V_{out}) can be converted to the degree of tilt (θ) using the following equation:

$$\theta = \arcsin ((V_{out} - \text{Offset}) / \text{Sensitivity})$$

ASC's tilt sensors yield a nominal full scale output of $\pm 2V$ for an acceleration of $\pm 1g$, which corresponds to a tilt of $\pm 90^\circ$. The nominal bias or offset (output at $0g$ or 0°) is $< \pm 10\text{mV}$ ($< \pm 0.29^\circ$) and the output swing is from $-2V$ to $+2V$ with a linear response in the range $< \pm 15^\circ$.

Description

ASC's tilt sensors TS9XVY, feature an analog voltage output and are available in two versions, uniaxial and biaxial. Biaxial tilt sensors contain two independent MEMS sensors oriented at 90° to each other to allow perpendicular tilt measurement. ASC's tilt sensors feature either a light-weight anodized aluminium housing, which provides case isolation against ground loops or a robust stainless steel housing, which has an IP68 rating. The sensor sensitivity and bias is extremely stable over a wide temperature range from -40°C to $+120^\circ\text{C}$. The sensors can be powered using a 6-36 VDC supply, where the output is independent of the supply. ASC's tilt sensors can withstand shocks as $5000g$ and feature an aluminium housing (78g) or stainless steel housing (192g) with an integral cable. The sensors can be configured with a 4-20 mA current output as an option.



All dimensions are in mm

Typical Specifications

ASC TILT SENSOR:

UNIAXIAL
TS91V1 (ALUMINIUM)
TS91V5 (STAINLESS STEEL)

BIAXIAL
TS92V1 (ALUMINIUM)
TS92V5 (STAINLESS STEEL)

DYNAMIC

Angular range	°	±90
Acceleration range	g	±1
Resolution	°	0.005
Non-linearity	%	1
Shock limit	gpk	Operational: 5000 (0.1 ms; half-sine)
Recovery time	ms	1

ELECTRICAL

Excitation voltage	V DC	+6 to +36
Current consumption (per axis)	mA	2
Offset (Bias at 0°)	°	<±0.3
Isolation		Case Isolated
Spectral noise	°/√Hz	0.001

ENVIRONMENTAL

Temperature coefficient of sensitivity	%/°C	0.03
Temperature coefficient of bias	%/°C	0.02
Long-term bias stability (one year)	°	0.1
Operating temperature	°C	-40 to +120
Storage temperature	°C	-40 to +125
Protection Class		TS91V1 & TS92V1: IP67 TS91V5 & TS92V5: IP68

PHYSICAL

Sensing element		MEMS Capacitive
Case material		Anodised Aluminium / Stainless Steel
Connector		Cable gland
Mounting		4x M5 Screw
Weight (excl. cable)	gram	TS91V1 & TS92V1 (Aluminium Housing): 78 TS91V5 & TS92V5 (Stainless Steel housing): 192
Integral cable		12-wire high-temperature PUR cable (AWG 30) Outer diameter: 4.4 mm; 30 gram/meter

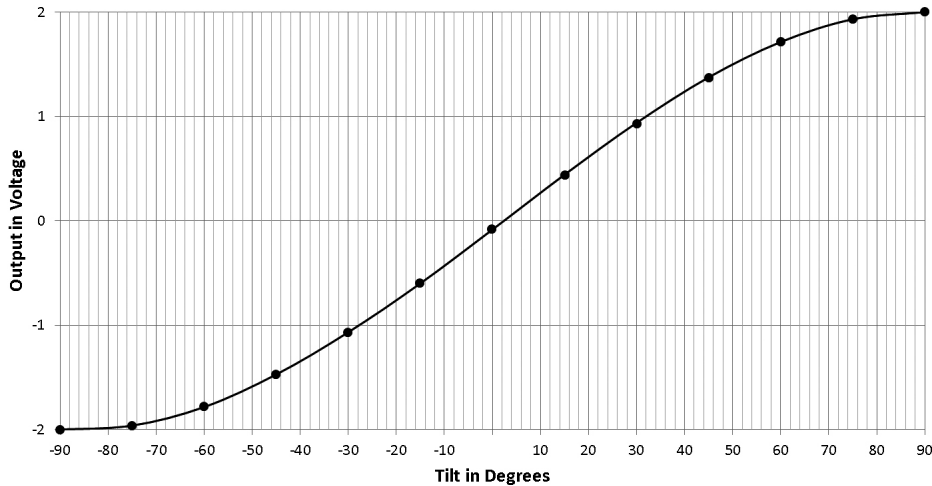
Note: All values are typical at +25°C, unless otherwise specified

CALIBRATION

A factory calibration certificate is included with each sensor.

A calibration certificate from a DAkkS certified (Deutsche Akkreditierungsstelle, DAkkS, to DIN EN ISO/IEC 17025) can also be provided upon request.

ASC TS 91V1-090 Typical Response



Cable Code / Pin Configuration

Uniaxial, 4-wire: ASC TS91VY-090

Y-axis:

Red Supply +

Black Supply-

Green Signal+

White Signal-

Biaxial, 8-wire: ASC TS92VY-090

Y-axis:

Red Supply +

Black Supply-

Green Signal+

White Signal-

X-axis:

Red/Violet Supply+

Black/Violet Supply-

Green/Violet Signal+

White/Violet Signal-

ORDERING INFORMATION

ASC TS	9XV	Y	090	6A
ASC Tilt	X: 1 (uniaxial)	Y: 1 (aluminium); IP67	Range:90	6m cable
Sensor	X: 2 (biaxial) V: Voltage Output	Y: 5 (stainless steel); IP68		open-ended (standard)

Ex. ASC TS 91V5-090-6A

ASC GmbH · Advanced Sensors Calibration

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