

## 3-Axis Force Sensor K3D35 500mN

Item number: 11683



### Highlights

- miniature 3-axis force sensor
- versions from 500mN
- compact design
- Resolution from 10  $\mu$ N

The K3D35 3-axis force sensor is suitable for force measurement in three mutually perpendicular axes.

It features a particularly compact design with a diameter of 35 mm and a total height of only 28 mm.

The K3D35 3-axis force sensor is available for forces of 500 mN, 2 N, and 10 N. It is particularly suitable for measuring the smallest forces. With the K3D35 500 mN variant, forces from 10  $\mu$ N to 100  $\mu$ N can be resolved - depending on the measuring amplifier.

The K3D35 3-axis force sensor is equipped with full-bridge strain gauges. The signals from the strain gauge full bridges each correspond to a force component in the x-, y-, and z-directions.

The vector decomposition is therefore achieved mechanically, by three orthogonally arranged spring-joint guides (double cantilever beams), and additionally by the arrangement of the strain gauges in the Wheatstone bridge, so that residual transverse forces and moments are also compensated electrically/circuit-wise. The three double cantilever beams are connected in series in this 3D force sensor.

A key quality feature of 3D force sensors is their low crosstalk: The application of a force also results in a reading in the two unloaded axes. Due to the multiple compensation (mechanical + electrical), the crosstalk is typically less than 0.2% of the nominal load. The crosstalk is reproducible and proportional to the applied force amplitude. By applying an additional compensation matrix, crosstalk can be reduced to typically less than 0.1% in all axes.

ME-Meßsysteme therefore supplies two calibration certificates: without a compensation matrix (type "cv") and with a compensation matrix (type "s").

## Technical Data

Basic Data	Unit
Type	3-axis force sensor
Force direction	Tension/Compression
Rated force Fx	500 mN
Rated force Fy	500 mN
Rated force Fz	500 mN
Force introduction	Internal thread
Dimension 1	4x Internal thread M3, 2x fitting hole Ø2mm E9
Sensor Fastening	Internal thread
Dimension 2	4x Internal thread M2,5, 1x fitting hole Ø2mm E9
Operating force	150 %FS
Lateral force limit	150 %FS
Material	alluminum-alloy
Natural frequency fx	223.27 Hz
Dimensions	Ø35 x 28 mm <sup>2</sup>
Torque limit	0.2 Nm
Bending moment limit	0.2 Nm
Variants	500mN...10N

Electrical Data	Unit
Characteristic value range from	0.5 mV/V
Characteristic value range to	1 mV/V
Zero signal tolerance	0.1 mV/V
Rated range of excitation voltage from	2.5 V
Rated range of excitation voltage to	5 V
Operating range of excitation voltage from	1 V
Operating range of excitation voltage to	10 V
Input resistance x-axis	350 Ohm
Output resistance x-axis	350 Ohm
Input resistance y-axis	350 Ohm
Output resistance y-axis	350 Ohm
Input resistance z-axis	350 Ohm
Output resistance z-axis	350 Ohm
Tolerance input resistance	5 Ohm
Tolerance output resistance	5 Ohm

Eccentricity and Crosstalk	Unit
Influence of eccentric load to FS	0.2 %FS/10mm
Crosstalk from x to y at rated load	0.2 %FS
Crosstalk from y to x at rated load	0.2 %FS
Crosstalk from z to x/y at rated load	0.2 %FS
Crosstalk from x/y to z at rated load	0.2 %FS

### Accuracy Data

Unit

Accuracy class	0,2	
Relative linearity error	0.2	%FS
Relative zero signal hysteresis	0.05	%FS
Temperature effect on zero signal	0.2	%FS / K
Temperature effect on characteristic value	0.1	%RD / K
Relative creep	0.2	%FS

### Environmental Data

Unit

- Abbreviations: RD: Actual value ("Reading"); FS: Full Scale;
- For the electrical data alternatively:  $1000 \pm 200$  Ohm possible
- The exact characteristic value is shown in the test report
- Note: The natural frequency only takes into account the load-conducting sensor parts with their specific geometries, masses and stiffnesses, but not other sensor components. The natural frequency is an indication of the dynamic design of the built environment for sensor integration and changes in frequency and direction as soon as additional masses are mounted on the sensor.

### Pin Assignment

Channel	Symbol	Description	Wire color	PIN
1	+Us	positive bridge supply	brown	
	-Us	negative bridge supply	white	
	+Ud	positive bridge output	green	
	-Ud	negative bridge output	yellow	
2	+Us	positive bridge supply	pink	
	-Us	negative bridge supply	grey	
	+Ud	positive bridge output	blue	
	-Ud	negative bridge output	red	
3	+Us	positive bridge supply	purple	
	-Us	negative bridge supply	black	
	+Ud	positive bridge output	orange	
	-Ud	negative bridge output	transparent	

Pressure load: positive output signal. Shield- transparent.