3-Axis Force Sensor K3D60a 20N

Item number: 8021



Highlights

- Compensation matrix "s" for minimized crosstalk

The K3D60a 3-axis sensor is suitable for force measurement in three mutually perpendicular axes. This 3D force sensor is available in the measuring ranges 10 N to 500 N.

Up to a nominal load of 100 N, these sensors are made of aluminum; from a nominal load of 200 N, they are made of stainless steel.

The K3D60a 3-axis force sensor is equipped with full-bridge strain gauges. The signals from the full-bridge strain gauges 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 bending 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 cantilevers in this 3D force sensor are connected in series.

Calibration of 3-Axis Force Sensors – From Standard (cv) to High Precision (s)

A key characteristic of 3D force sensors is crosstalk: applying a force also triggers a measurement in the two unloaded axes. Thanks to several compensation mechanisms (mechanical and electrical), crosstalk is typically less than 3% of the nominal load. Crosstalk is reproducible and proportional to the amplitude of the applied force. By applying an additional compensation matrix, crosstalk in all axes can be reduced to a maximum of less than 1%.

By default, you receive two factory calibrations, each with two measurement points:

one **without a compensation matrix (“cv”)** and one **with extended matrix compensation (“s”)**.

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Stand: 17.04.2026

For detailed proof of the sensor's linearity, you can optionally **extend the calibration to 4 or 6 measurement points:**

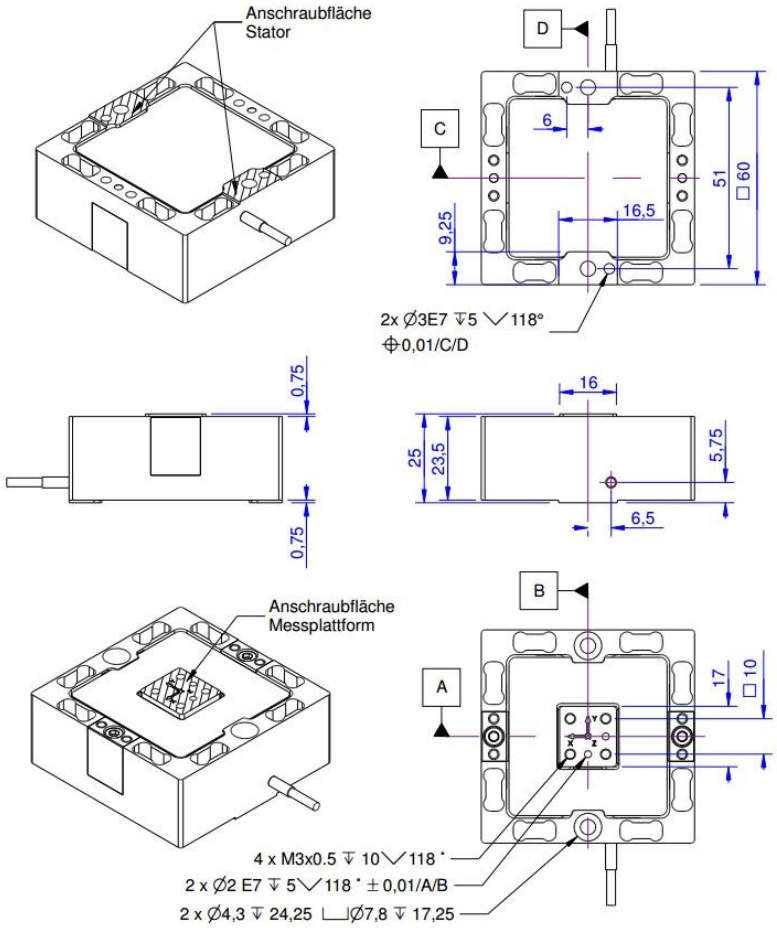
- Factory calibration certificate SL/4 (4 measurement points)
- Factory calibration certificate SL/6 (6 measurement points)

This ensures your sensor is optimally calibrated to your application from the very first measurement.

Optional special version

- Protection class IP68: from rated force 200 N
- Temperature range: -40°C to 180°C
- Vacuum version from 10^{-5} mbar
- Pressure range up to 8 bar
- Suitable for cleanrooms

Technical Drawing



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Technical Data

Basic Data		Unit
Type	3-axis force sensor	
Force direction	Tension/Compression	
Rated force Fx	20	N
Rated force Fy	20	N
Rated force Fz	20	N
Force introduction	Internal thread	
Dimension 1	4x M3x0,5	
Sensor Fastening	Through-hole	
Dimension 2	2x Ø4,3	
Operating force	200	%FS
Rated displacement	0.1	mm
Material	alluminum-alloy	
Natural frequency fx	1.5	kHz
Dimensions	60 x 60 x 25	mm³
Height	25	mm
Length or Diameter	60	mm
Torque limit	20	Nm
Bending moment limit	20	Nm
Variants	10N... 500N	

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Electrical Data		Unit
Rated output x-axis	0.5	mV/V / FS
Rated output y-axis	0.5	mV/V / FS
Rated output z-axis	0.5	mV/V / FS
Zero signal	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	395	Ohm
Output resistance x-axis	350	Ohm
Input resistance y-axis	395	Ohm
Output resistance y-axis	350	Ohm
Input resistance z-axis	395	Ohm
Output resistance z-axis	350	Ohm
Insulation resistance	5	GOhm
Tolerance input resistance	10	Ohm
Tolerance output resistance	10	Ohm

Eccentricity and Crosstalk		Unit
Influence of eccentric load to FS	1	%FS / 10Nm
Crosstalk from x to y at rated load	1	%FS
Crosstalk from y to x at rated load	1	%FS
Crosstalk from z to x/y at rated load	1	%FS
Crosstalk from x/y to z at rated load	1	%FS

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Accuracy Data		Unit
Accuracy class	0,5	
Relative linearity error	0.2	% FS
Relative zero signal hysteresis	0.02	% FS
Temperature effect on zero signal	0.02	%FS / K
Temperature effect on characteristic value	0.02	%RD/ K
Relative creep	0.1	% FS

Environmental Data		Unit
Rated temperature range from	-10	°C
Rated temperature range to	70	°C
Operating temperature range from	-10	°C
Operating temperature range to	85	°C
Storage temperature range from	-10	°C
Storage temperature range to	85	°C
Environmental protection	IP65	

Abbreviation : RD: „Reading"; FS: „Full Scale";1) The exact rated output is reported in the test report .2) K3D60a with 370 and 390 Ohm input impedance and 350 ohm output resistanceCrosstalk is less than 1% when using the compensation matrix (type s).
Without using the compensation matrix, crosstalk is less than 3% (matrix type cv).

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	

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