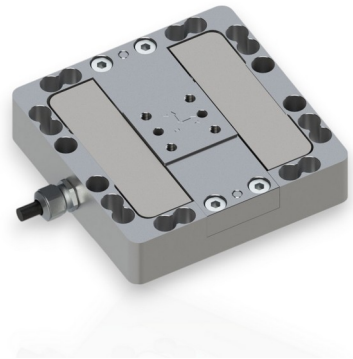
3-Axis Force Sensor K3D120 5kN/VA

Item number: 5020



Highlights

- 3D force sensor
- low profile of 30 mm
- variants 50 N ... 5 kN
- compensation matrix "s" for minimized crosstalk

The 3-axis force sensor K3D120 is suitable for measuring force in three mutually perpendicular axes.It is ready for 50 N to 5 kN in all three axes and can optionally be manufactured in other measurement ranges.The force sensor is made of high-strength aluminium alloy up to the 1 kN measurement range. From 1 kN onwards, the force sensor is made from the material stainless steel 1.4542 (option "VA").It stands out due to its particularly compact structure, with an area of 120mm x 120mm and a low total height of just 30mm.Example application areas include force measurement in production processes, force control in handling machines, force measurement in assembly processes, and three-dimensional load measurement.

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”)**.

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)

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Stand: 30.03.2026

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

Optional special version

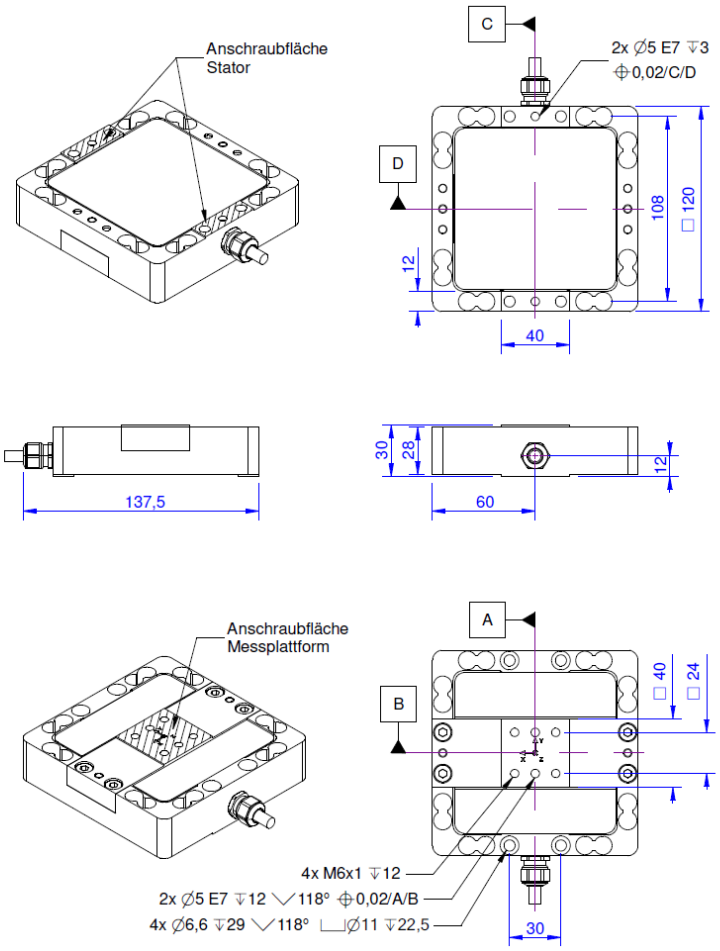
- Protection class IP68: from rated force 200 N
- Temperature range: -40°C to 180°C
- Vacuum version from 10^{-5} mbar
- Pressure range up to 8 bar
- Suitable for cleanrooms

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Technical Drawing



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Technical Data

Basic Data		Unit
Type	3-axis force sensor	
Force direction	Tension/Compression	
Rated force Fx	5	kN
Rated force Fy	5	kN
Rated force Fz	5	kN
Force introduction	Internal thread	
Dimension 1	4xM6	
Sensor Fastening	Through-hole	
Dimension 2	4xØ6,6	
Operating force	150	%FS
Rated displacement	0.06	mm
Material	Stainless steel	
Natural frequency fx	6	kHz
Dimensions	120 x 120 x 30	mm³
Height	30	mm
Length or Diameter	120	mm
Torque limit	300	Nm
Bending moment limit	300	Nm
Variants	50N... 5kN	

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Electrical Data		Unit
Rated output x-axis	1	mV/V
Rated output y-axis	1	mV/V
Rated output z-axis	1	mV/V
Zero signal	0.05	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	740	Ohm
Output resistance x-axis	700	Ohm
Input resistance y-axis	740	Ohm
Output resistance y-axis	700	Ohm
Input resistance z-axis	740	Ohm
Output resistance z-axis	700	Ohm
Insulation resistance	5	GOhm
Tolerance input resistance	10	Ohm
Tolerance output resistance	5	Ohm

Eccentricity and Crosstalk		Unit
Allowed torque according of eccentric load	100	Nm
Influence of eccentric load to FS	1	%FS / 100Nm
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
Temperature effect on zero signal	0.02	%FS/K
Temperature effect on characteristic value	0.01	%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	IP67	

Abbreviation: RD: „Reading“; FS: „Full Scale“1) 0,5mV/V bis 50N; 1mV/V ab 100N.The exact nominal sensitivity is indicated in the test reportCrosstalk 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

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Channel	Symbol	Description	Wire color	PIN
X-Axis	+Us	sensor supply	brown	2
	-Us	sensor supply	white	1
	+Ud	bridge output	green	3
	-Ud	bridge output	yellow	4
Y-Axis	+Us	sensor supply	pink	6
	-Us	sensor supply	grey	5
	+Ud	bridge output	blue	7
	-Ud	bridge output	red	8
Z-Axis	+Us	sensor supply	purple	10
	-Us	sensor supply	black	9
	+Ud	bridge output	grey / pink	11
	-Ud	bridge output	red / blue	12

Pressure load: positive output signal.Shield- transparent.

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