6-Axis Force Sensor K6D27 50N/1Nm

Item number: 4520



Highlights

- Miniature Force-/Torque Sensor, Ø27 x 24,9 mm²
- Resolution of forces from 50 mN,
- Resolution of moments from 1 mNm
- Integration in wind tunnel model

The K6D27 multi-element sensor is suitable for measuring the forces in three spatial axes and for measuring the torque acting on the three spatial axes.

This Force-/Torque sensor is integrated into a cylinder which is just 27 mm in diameter. The sensor features 24 high-impedance ultra-miniature strain gauges of the newest generation. Despite its small dimensions, however, this multi-element sensor is highly robust: it offers IP 65 protection and its Teflon connector cable is temperature-resistant, extremely flexible and suitable for use in medical applications. The 24 connector leads are divided between two AWG 32 Teflon cables, each of which are less than 2 mm in diameter. This allows the best possible flexibility to be obtained.
The connector cables are fixed to one of the two mounting flanges. This prevents any measurement error being caused by the elasticity of the cables.
The two mounting flanges are symmetrically designed. They each have two centring collars, 23 mm and 17 mm in diameter, plus one locating hole 2 mm in diameter.

The stiffness of the sensor to forces is roughly 6600 N/mm. The stiffness of the sensor to torque is roughly 1.2 kNm/rad.

Possible uses for the sensor include:

- Integration into wind-tunnel models,
- Integration into handgrips and tools in medicine
- Measurement in sports medicine and biomechanics,
- For regulating fitting and handling processes in micromechanics.

By combining the sensor with the GSV-8DS amplifier and GSVmulti software, for example, it is possible to measure forces from 50 micronewtons and torques from 1 millinewton metre.

Optional special version

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Stand: 10.10.2026

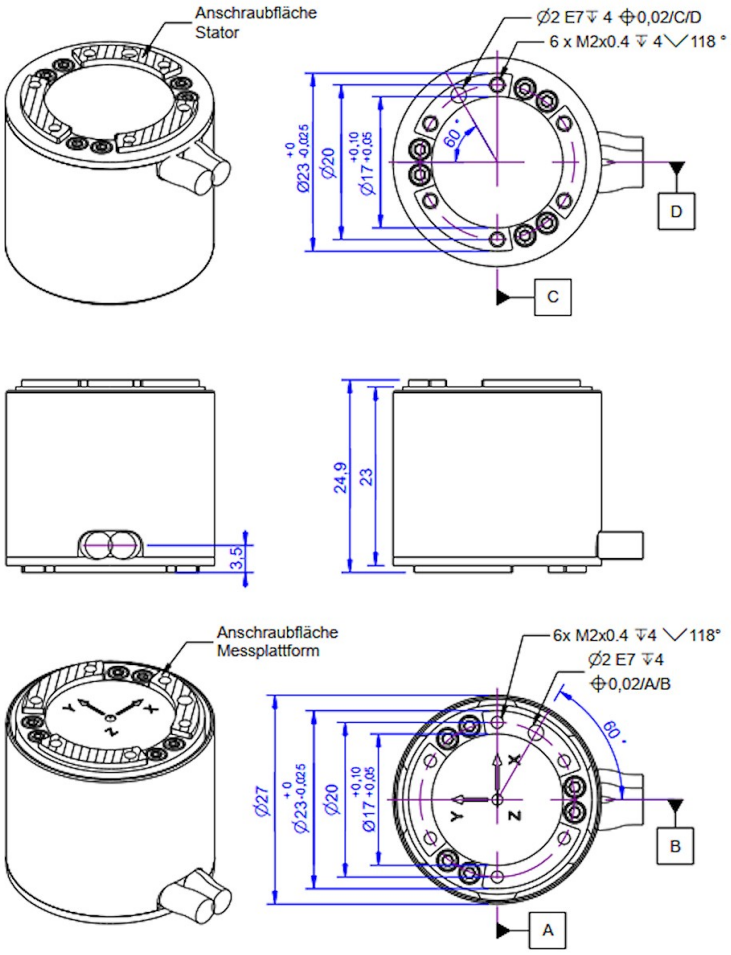
- Temperature range -40°C to 180°C
- Vacuum version from 10^{-5} mbar
- Pressure range up to 8 bar

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Technical Drawing



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Technical Data

Basic Data		Unit
Type	6-axis force sensor	
Force direction	Tension/Compression	
Rated force Fx	50	N
Rated force Fy	50	N
Rated force Fz	200	N
Force introduction	Innengewinde	
Dimension 1	6x M2x0,4	
Sensor Fastening	Internal thread	
Dimension 2	6x M2x0,4	
Operating force	150	%FS
Rated displacement	0.01	mm
Twist	0.001	rad
Material	alluminum-alloy	
Natural frequency fx	4.2	kHz
Height	24.9	mm
Length or Diameter	27	mm
Rated torque Mx	1	Nm
Rated torque My	1	Nm
Rated torque Mz	1	Nm
Breaking force	300	%FS

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Electrical Data		Unit
Input resistance	1000	Ohm
Tolerance input resistance	10	Ohm
Output resistance	1000	Ohm
Tolerance output resistance	10	Ohm
Insulation resistance	2	GOhm
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	5	V
Zero signal from	-1.5	mV/V
Zero signal to	1.5	mV/V
Rated output	0.6	mV/V / FS

Eccentricity and Crosstalk		Unit
Crosstalk	1	%FS

Accuracy Data		Unit
Accuracy class	0,5	
Relative linearity error	0.1	%FS
Relative zero signal hysteresis	0.1	%FS
Temperature effect on zero signal	0.1	%FS/K
Temperature effect on characteristic value	0.05	%RD/K
Relative creep	0.1	%FS
Relative repeatability error	0.5	%FS

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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	

Abbreviations: RD: Reading; FS: Full scale;The application of a calibration matrix is required for the determination of the forces Fx, Fy, Fz and moments Mx, My, and Mz from the 6 measurement channels, and to compensate for the crosstalk.
The calibration data are individually determined and documented for the sensor.
The measurement error is expressed individually by the specification of the extended measurement uncertainty (k = 2) for the forces Fx, Fy, Fz, and moments Mx, My, Mz.

PIN Assignment

Channel	Symbol	Designation	Color	PIN
1	+Us	positive bridge supply	brown	1
	-Us	negative bridge supply	white	2
	+Ud	positive bridge output	green	3
	-Ud	negative bridge output	yellow	4
2	+Us	positive bridge supply	pink	5
	-Us	negative bridge supply	grey	6
	+Ud	positive bridge output	blue	7
	-Ud	negative bridge output	red	8
3	+Us	positive bridge supply	purple	9
	-Us	negative bridge supply	black	10
	+Ud	positive bridge output	orange	11
	-Ud	negative bridge output	transparent	12
4	+Us	positive bridge supply	brown	13
	-Us	negative bridge supply	white	14
	+Ud	positive bridge output	green	15
	-Ud	negative bridge output	yellow	16
5	+Us	positive bridge supply	pink	17
	-Us	negative bridge supply	grey	18
	+Ud	positive bridge output	blue	19
	-Ud	negative bridge output	red	20
6	+Us	positive bridge supply	purple	21
	-Us	negative bridge supply	black	22
	+Ud	positive bridge output	orange	23
	-Ud	negative bridge output	transparent	24

Shield: connected with sensor housing;Us: bridge input (supply voltage) to one strain gauge, full bridge;The sensor features a 24-pin M16 flange socket, type 09-0497-00-24 (male).The GSV-1A8USB K6D measurement amplifier has a 24-pin M16 flange socket type 09-0498-00-24 (female). Sensor and amplifier are connected by a 3 m connector cable, type 2x STC32T-12 with cable plug and cable socket, Binder, M16, series 423, gold-plated.

Mounting

The sensor features 6 segments arranged in a circle on both top and bottom to which the forces are applied. The forces should be applied to the segments. If you are making an adaptor plate, please ensure that the heights of the centring collars 17 mm and 23 mm in diameter are not more than 0.9 mm.The connector cable is arranged on the ‘fixed’ side.

Stiffness Matrix

6.6 kN/mm	0.0	0.0	0.0	47 kN	0.0
0.0	6.7 kN/mm	0.0	-47 kN	0.0	0.0
0.0	0.0	55.9 kN/mm	0.0	0.0	0.0
0.0	-47 kN	0.0	2.8 kNm	0.0	0.0
47 kN	0.0	0.0	0.0	2.8 kNm	0.0
0.0	0.0	0.0	0.0	0.0	1.2 kNm

- The elements with the unit kN/mm describe the relationship between force and path.
- The elements with the unit kNm describe the relationship between torque and twist.
- The elements with the unit kN describe the relationship between torque and path (columns 1 to 3) or the relationship between force and twist (columns 4 to 6)

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