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K6D27 50N/1Nm 50N/1Nm/CG

Description

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 '3D force' and '3D 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 5000 N/mm. The stiffness of the sensor to torque is roughly 106 Nmm/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-1A8USB K6D amplifier and GSVmulti software, for example, it is possible to measure forces from 50 micronewtons and torques from 1 millinewton metre.

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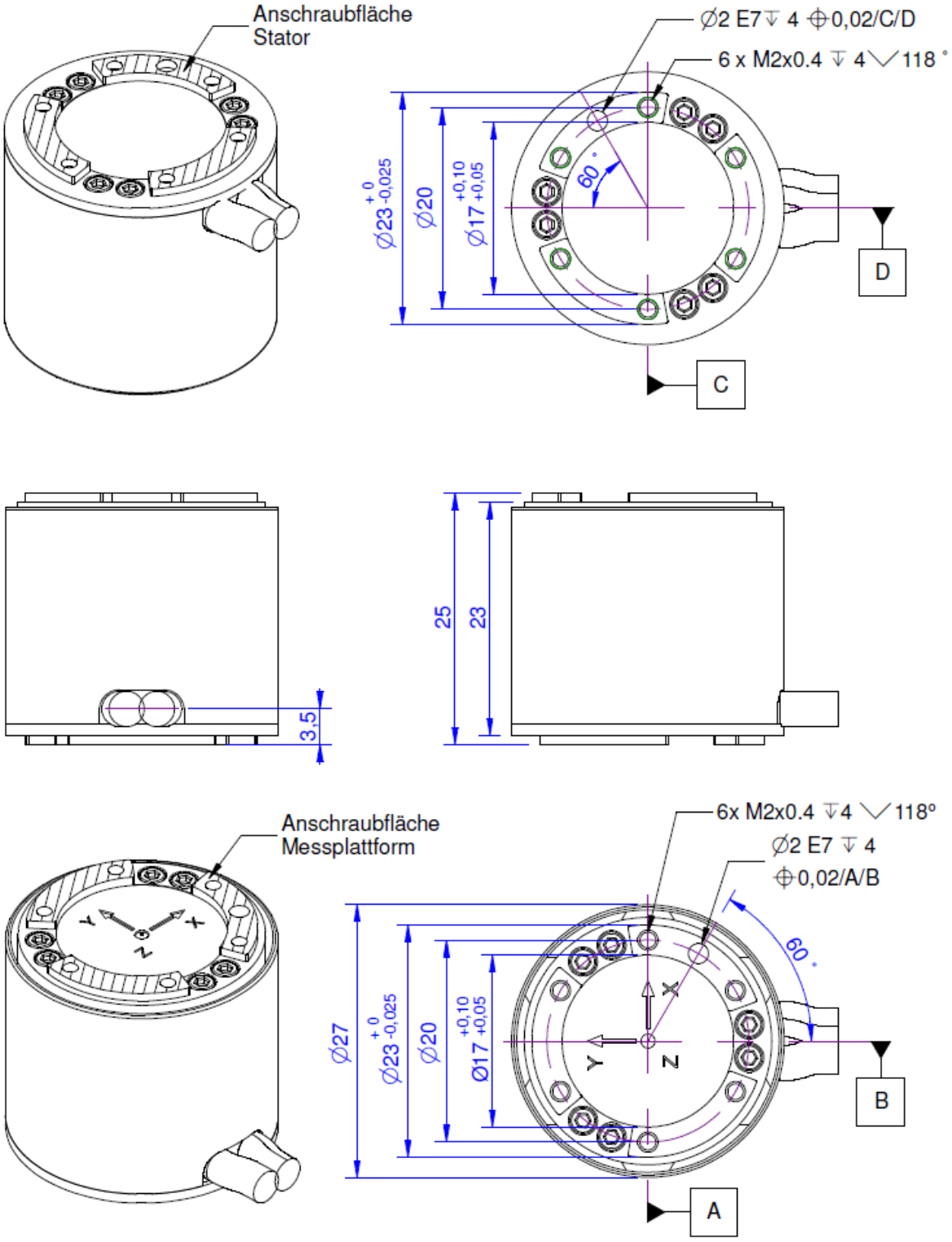
Dimensions



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Technical Data

Force sensor		
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	Inner thread	
Dimension 1	6x M2x0,4	
Sensor Fastening	Inner thread	
Dimension 2	6x M2x0,4	
Operating force	150	%FS
Rated displacement	0.01	mm
Twist	0.001	rad
Material	Aluminium alloy	
Natural frequency	4.2	kHz
Dimensions	Ø27 x 25	mm
Height	25	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

Electrical Data		
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 f	2.5 ... 5	V
Operating range of excitation voltage f	1 ... 5	V
Zero signal to	-1.5	mV/V
Zero signal from	1.5	mV/V
Rated output	0.6	mV/V / FS

Precision		
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

Connection Data

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Connection type	24 conductor open	
Name of the connection	STC-32T-12	
Cable length	3	m

Eccentricity and Crosstalk

Crosstalk	1	%FS

Temperature

Rated temperature range f	-10 ... 70	°C
Operating temperature range f	-10 ... 85	°C
Storage temperature range f	-10 ... 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.

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Pin Configuration

Channel	Symbol	Description	Wire colour	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.

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Manual

Stiffness Matrix K6D27 50N/1Nm

6.6 kN/mm	0,0	0,0	0,0	47 kN	0,0	u_x
0,0	6.7 kN/mm	0,0	-47 kN	0,0	0,0	u_y
0,0	0,0	55.9 kN/mm	0,0	0,0	0,0	u_z
0,0	-47 kN	0,0	2.8 kNm	0,0	0,0	phi_x
47 kN	0,0	0,0	0,0	2.8 kNm	0,0	phi_y
0,0	0,0	0,0	0,0	0,0	1.2 kNm	phi_z

Element	Meaning
[kN/mm]	Force - Distance
[kNm]	Torque - Twisting
[kN]	Force - Twisting and Torque - Distance

Remark: The unit for twisting is radiant.

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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.

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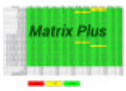
accessories

	Description	Description
	K6D-CalibrationMatrix SL/Plus	High accuracy calibration matrix for 6-axis force/torque sensors;
	K6D-CalibrationMatrix SL	Standard calibration matrix "Small load" for the sensors with small measuring ranges
	GSV-8DS	8-channel amplifier with USB port, analog output, UART interface. Other versions GSV-8AS CAN with Canbus and GSV-8AS EC with EtherCAT fieldbus.
	GSV-8AS	8-channel amplifier with USB port, analog output, UART interface. Other versions GSV-8AS CAN with Canbus and GSV-8AS EC with EtherCAT fieldbus.
	Configuration 24p/m/M16	Round plug, 24 pole, configured with sensor cable
	Configuration D-Sub44/m/HD	Assembling the connector to sensor cable; Connector Type SubD, 44 pins, male (male), with hood
	K6D-Adapter Development	Indicative offer for an adapter set, Consisting of e.g. 2 plates, For mounting a device / flange on K6D sensor;