

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.

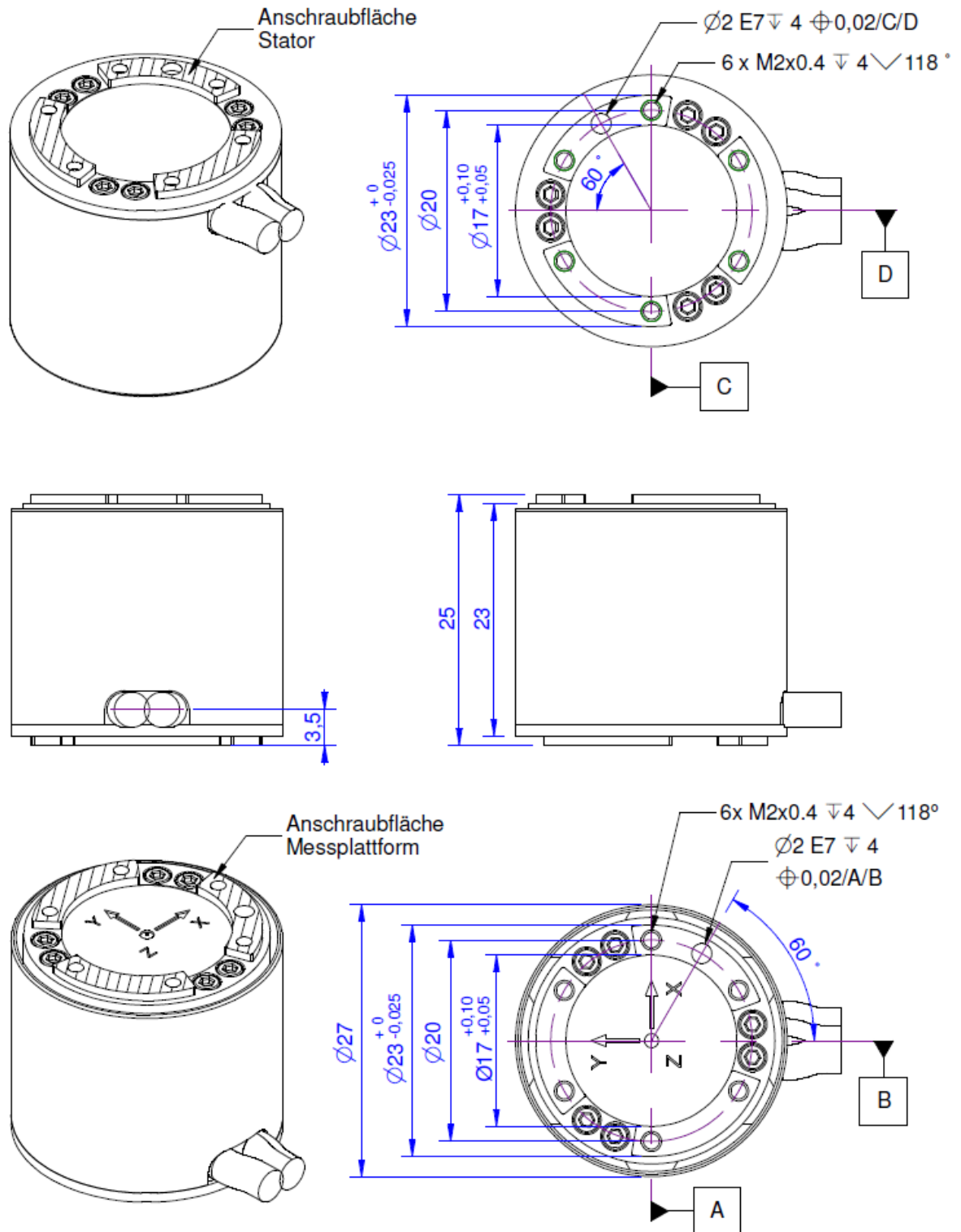
The stiffness of the sensor to forces is roughly 5000 N/mm. The stiffness of the sensor to torque is roughly 106 Nmm/rad.

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.

Dimensions



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 | |
| 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 data

| | |
|--|------------|
| 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

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

Eccentricity and Crosstalk

| | |
|-----------|-------|
| Crosstalk | 1 %FS |
|-----------|-------|

Environmental data

| | |
|-------------------------------|---------------|
| 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 F_x , F_y , F_z and moments M_x , M_y , and M_z 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 F_x , F_y , F_z , and moments M_x , M_y , M_z .

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.

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 | ϕ_x |
| 47 kN | 0,0 | 0,0 | 0,0 | 2.8 kNm | 0,0 | ϕ_y |
| 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1.2 kNm | ϕ_z |

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








Remark: The unit for twisting is radiant.

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.

accessories

| Description | Description |
|---|--|
|  | <p>K6D-CalibrationMatrix SL/4 High accuracy calibration matrix for 6-axis force/torque sensors;</p> |
|  | <p>K6D-CalibrationMatrix SL Standard calibration matrix "Small load" for the sensors with small measuring ranges</p> |
|  | <p>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.</p> |
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|  | <p>Configuration 24p/m/M16 Round plug, 24 pole, configured with sensor cable</p> |
|  | <p>Configuration D-Sub44/m/HD Assembling the connector to sensor cable; Connector Type SubD, 44 pins, male (male), with hood</p> |
|  | <p>K6D-Adapter Development Indicative offer for an adapter set, Consisting of e.g. 2 plates, For mounting a device / flange on K6D sensor;</p> |