# 6-Axis Force Sensor K6D154 200N/20Nm

Item number: 11292



The K6D154 multi-axis sensor is designed for measuring force and torque in three mutually perpendicular axes.
The K6D154 was developed specifically for measurements in flow channels. Its particular features are

- high stiffness,
- low crosstalk,
- high precision.

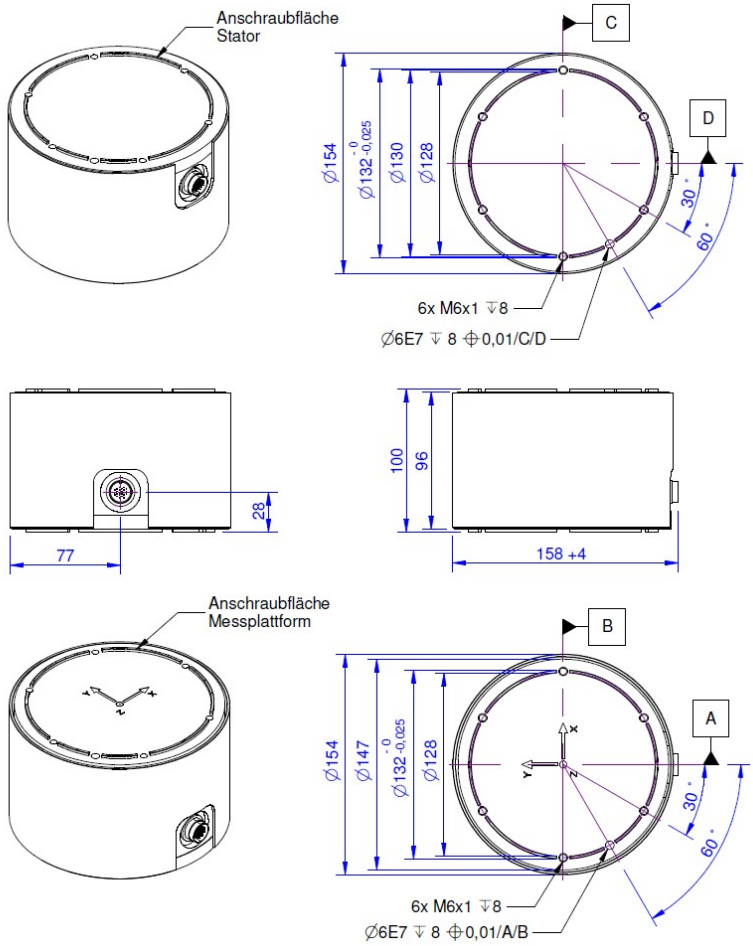
Because of its large diameter, this multi-axis sensor can compensate for torque from an eccentric application of force particularly well.
The force and torque loadings are evaluated e.g. using a GSV-8DS measurement amplifier. The 6 load values can be calculated using a Windows DLL or using LabVIEW with the aid of a digital calibration document provided.
The calibration document contains the individual calibration factors and error corrections for the sensor.

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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 | 200 | N |
| Rated force Fy | 200 | N |
| Rated force Fz | 500 | N |
| Force introduction | Innengewinde | |
| Dimension 1 | 6x M6x1 | |
| Sensor Fastening | Internal thread | |
| Dimension 2 | 6x M6x1 | |
| Operating force | 400 | %FS |
| Material | alluminum-alloy | |
| Height | 100 | mm |
| Length or Diameter | 150 | mm |
| Rated torque Mx | 20 | Nm |
| Rated torque My | 20 | Nm |
| Rated torque Mz | 20 | Nm |
| Torque limit | 200 | %FS |
| Bending moment limit | 200 | %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 | -0.05 | mV/V |
| Zero signal to | 0.05 | mV/V |
| Characteristic value range from | 0.3 | mV/V |
| Characteristic value range to | 0.56 | mV/V |

| Eccentricity and Crosstalk | | Unit |
|---|---|---|
| Crosstalk | 1 | %FS |

| Accuracy Data | | Unit |
|---|---|---|
| Accuracy class | 0,2 | |
| 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 | |

Abbreviation : 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 | green | 4 |
| | -Us | negative bridge supply | yellow | 3 |
| | +Ud | positive bridge output | white | 9 |
| | -Ud | negative bridge output | brown | 8 |
| 2 | +Us | positive bridge supply | blue | 10 |
| | -Us | negative bridge supply | red | 11 |
| | +Ud | positive bridge output | gray | 2 |
| | -Ud | negative bridge output | pink | 1 |
| 3 | +Us | positive bridge supply | gray-pink | 6 |
| | -Us | negative bridge supply | red-blue | 5 |
| | +Ud | positive bridge output | black | 12 |
| | -Ud | negative bridge output | purple | 7 |
| 4 | +Us | positive bridge supply | white-yellow | 23 |
| | -Us | negative bridge supply | yellow-brown | 18 |
| | +Ud | positive bridge output | white-green | 21 |
| | -Ud | negative bridge output | brown-green | 22 |
| 5 | +Us | positive bridge supply | white-pink | 15 |
| | -Us | negative bridge supply | brown-pink | 14 |
| | +Ud | positive bridge output | white-gray | 17 |
| | -Ud | negative bridge output | gray-brown | 16 |
| 6 | +Us | positive bridge supply | white-red | 20 |
| | -Us | negative bridge supply | brown-red | 24 |
| | +Ud | positive bridge output | white-blue | 13 |
| | -Ud | negative bridge output | brown-blue | 19 |
| - | shield | | transparent | |

Shield: connected with sensor housing;

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## Mounting

The sensor features a force-sensitive ring on both top and bottom with a centring collar. The mount for the sensor should be designed such that the mount and the sensor touch only over the surface of the force-sensitive ring. If you are making an adaptor plate, please be sure to note that the groove is not deeper than 1.5 mm. This ensures that contact is solely via the force-sensitive ring.

### Mounting plate

The sensor features a fitting ring on top and bottom. Mounting plates to suit can be supplied on request. The mounting plate is pre-drilled with holes 3 mm in diameter. These holes can be drilled out to wider diameters or tapped with appropriate threads. (See next page for a drawing of the mounting plate)

Mounting plates are not included as standard and must be ordered separately.

## Stiffness Matrix

| | | | | | |
|---|---|---|---|---|---|
| 5.4 kN/mm | 0.0 | 0.0 | 0.0 | 262 kN | 0.0 |
| 0.0 | 5.4 kN/mm | 0.0 | -262 kN | 0.0 | 0.0 |
| 0.0 | 0.0 | 23.9 kN/mm | 0.0 | 0.0 | 0.0 |
| 0.0 | -262 kN | 0.0 | 52.7 kNm | 0.0 | 0.0 |
| 262 kN | 0.0 | 0.0 | 0.0 | 52.7 kNm | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 36.6 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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