

K6D175 20kN/2kNm/UP13



Description

The K6D175 multi-axis sensor is designed for measuring force and torque in three mutually perpendicular axes.

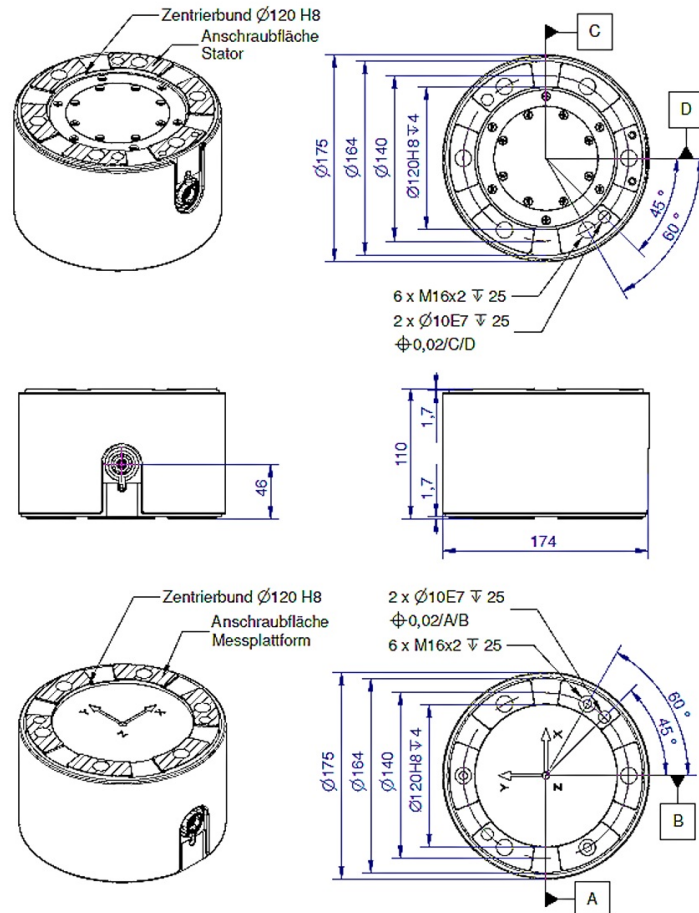
The measurement ranges for the forces and moments can be factory adapted in a wide range. The K6D175 was developed for the following applications:

- Robotics
- Measurements in automation technology.

The force and torque loadings are evaluated e.g. using GSV-8DS SubD44HD or GSV-8AS 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.

Dimensions



Technical Data

Force sensor

| | |
|----------------------|-----------------------|
| Type | 6-Axis force sensor |
| Force direction | Tension / Compression |
| Rated force Fx | 20 kN |
| Rated force Fy | 20 kN |
| Rated force Fz | 50 kN |
| Force introduction | Inner thread |
| Dimension 1 | 6x M16x2 |
| Sensor Fastening | Inner thread |
| Dimension 2 | 6x M16x2 |
| Operating force | 200 %FS |
| Rated displacement | 0.1 mm |
| Twist | 0.01 rad |
| Material | Stainless steel |
| Natural frequency | 1.7 kHz |
| Dimensions | Ø175 x 110 mm |
| Height | 110 mm |
| Length or Diameter | 175 mm |
| Rated torque Mx | 2 kNm |
| Rated torque My | 2 kNm |
| Rated torque Mz | 5 kNm |
| Torque limit | 300 %FS |
| Bending moment limit | 300 %FS |

Electrical Data

| | |
|---|-------------|
| Input resistance | 350 Ohm |
| Tolerance input resistance | 10 Ohm |
| Output resistance | 350 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 ... 10 V |
| Zero signal to | -0.05 mV/V |
| Zero signal from | 0.05 mV/V |
| characteristic value range min | 0.45 mV/V |
| characteristic value range max | 0.7 mV/V |

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

| | |
|------------------------|---------------------------|
| Connection type | Connector |
| Name of the connection | round plug connector UP13 |

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 |

Abbreviation : 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 | 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;

Manual

Stiffness Matrix K6D175 10kN/1kNm

| | | | | | | |
|-------------|-------------|-------------|------------|------------|------------|----------|
| 178.1 kN/mm | 0,0 | 0,0 | 0,0 | 10331 kN | 0,0 | u_x |
| 0,0 | 178.1 kN/mm | 0,0 | -103314 kN | 0,0 | 0,0 | u_y |
| 0,0 | 0,0 | 786.7 kN/mm | 0,0 | 0,0 | 0,0 | u_z |
| 0,0 | -10331 kN | 0,0 | 2149.7 kNm | 0,0 | 0,0 | ϕ_x |
| 10331 kN | 0,0 | 0,0 | 0,0 | 2149.7 kNm | 0,0 | ϕ_y |
| 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1404.3 kNm | ϕ_z |

Stiffness Matrix K6D175 20kN/2kNm

| | | | | | | |
|-------------|-------------|--------------|------------|------------|------------|----------|
| 375.5 kN/mm | 0,0 | 0,0 | 0,0 | 21800 kN | 0,0 | u_x |
| 0,0 | 375.5 kN/mm | 0,0 | -21800 kN | 0,0 | 0,0 | u_y |
| 0,0 | 0,0 | 1658.3 kN/mm | 0,0 | 0,0 | 0,0 | u_z |
| 0,0 | -21800 kN | 0,0 | 4531.7 kNm | 0,0 | 0,0 | ϕ_x |
| 21800 kN | 0,0 | 0,0 | 0,0 | 4531.7 kNm | 0,0 | ϕ_y |
| 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4844.0 kNm | ϕ_z |

Stiffness Matrix K6D175 50kN/5kNm

| | | | | | | |
|-------------|-------------|--------------|------------|------------|------------|----------|
| 614.4 kN/mm | 0,0 | 0,0 | 0,0 | 35600 kN | 0,0 | u_x |
| 0,0 | 614.4 kN/mm | 0,0 | -35600 kN | 0,0 | 0,0 | u_y |
| 0,0 | 0,0 | 2713.6 kN/mm | 0,0 | 0,0 | 0,0 | u_z |
| 0,0 | -35600 kN | 0,0 | 7415.4 kNm | 0,0 | 0,0 | ϕ_x |
| 35600 kN | 0,0 | 0,0 | 0,0 | 7415.4 kNm | 0,0 | ϕ_y |
| 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4844.0 kNm | ϕ_z |

| Element | Description |
|---------|---------------------------------------|
| [kN/mm] | force- displacement |
| [kNm] | torque- twist |
| [kN] | force- twist and torque- displacement |


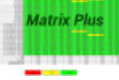



Mounting

The force is applied to an annulus/to 6 segments of a circle, 155 mm – 140 mm in diameter, on the end faces of the sensor. No force is applied to the area inside the 140 mm in diameter ring.

The areas outside the annuli can be used for centring purposes. A centring hole is provided to secure the angular position.

Recommended tightening torque: 250Nm.

accessories

| Description | Description |
|---|---|
|  K6D-CalibrationMatrix HL | Standard calibration matrix "High load" for the sensors with big measuring ranges |
|  K6D-CalibrationMatrix HL/Plus | High accuracy calibration matrix for 6-axis force/torque sensors; |
|  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. |
|  K6D-Adapter Development | Indicative offer for an adapter set, Consisting of e.g. 2 plates, For mounting a device / flange on K6D sensor; |
|  Connection cable UP13/27p/m/90°-D-Sub44HD/m | Connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD |