

## K6D40 200N/5Nm/CG, 500N/20Nm/CG, 200N/5Nm/MP11, 500N/20Nm/MP11



### Description

The K6D40 multi-component sensor is designed to measure the forces and torques on three mutually perpendicular axes.

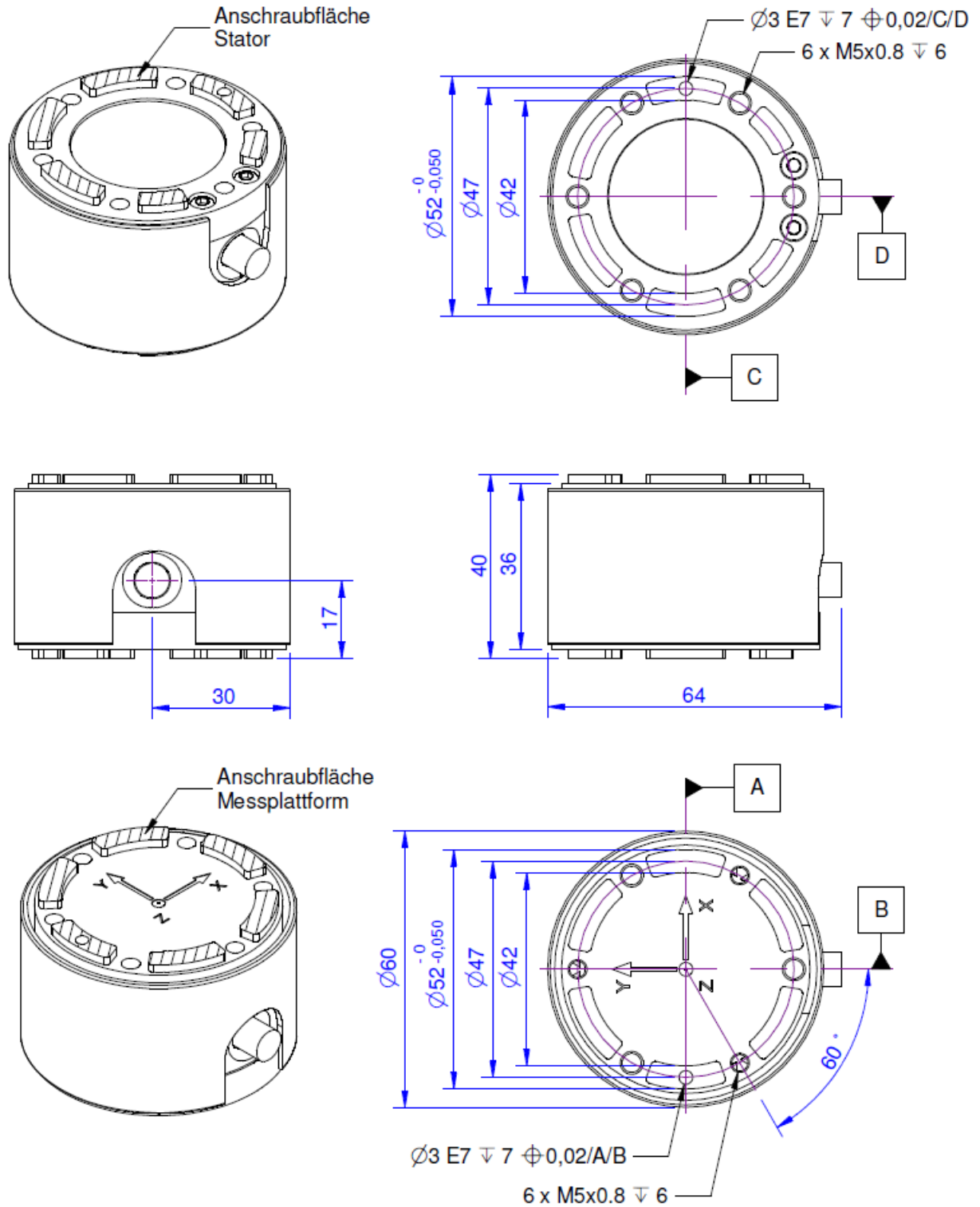
Owing to this sensor's very light weight of only 160 g (K6D40 200 N / 5 Nm) or 450 g (K6D40 500 N / 20 Nm), it is very well suited for use in robotics, e.g.

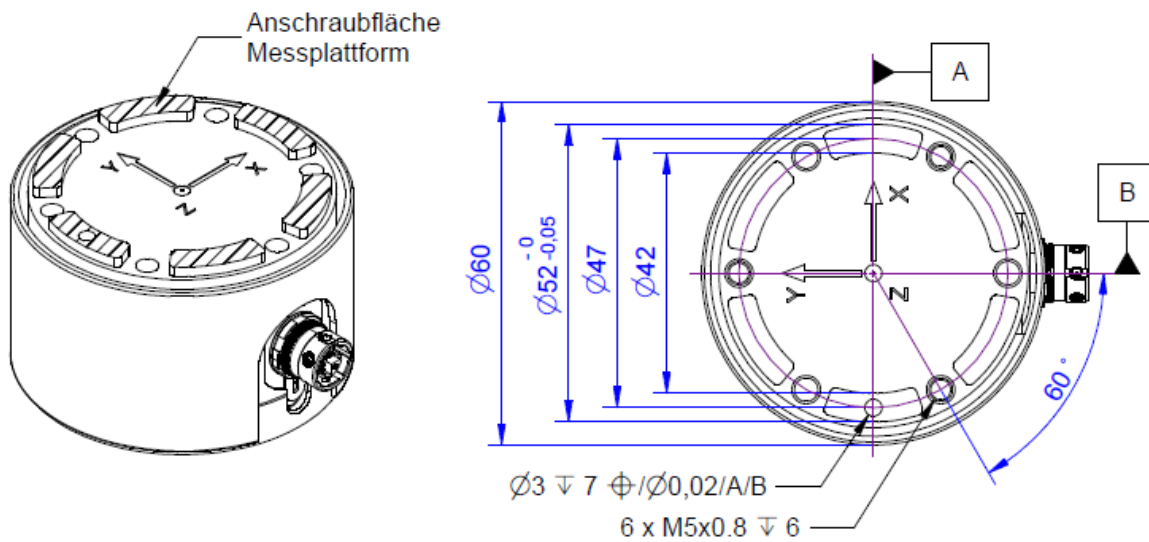
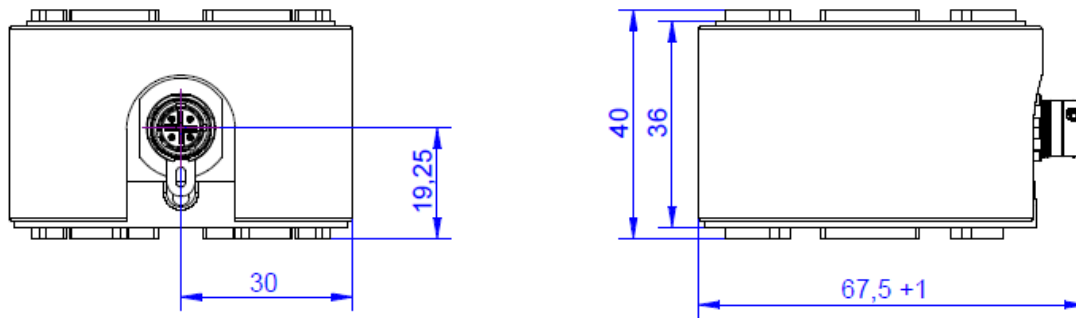
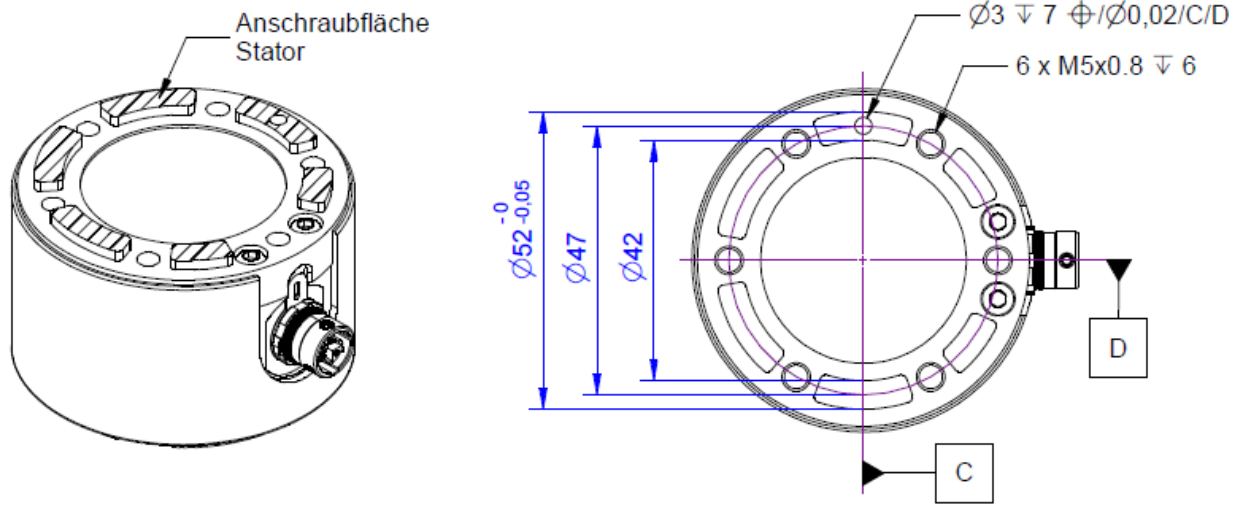
- For collision detection
- "Teach-In"
- Presence detection and error detection
- Force or torque-controlled operation
- Load measurement in medicine, prosthetics, orthopaedic engineering or gait analysis
- Measurement in sports medicine
- Comfort / ergonomics measurements

The force and torque loadings are evaluated e.g. using a GSV-1A8USB 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.

The K6D40 200 N / 5 Nm sensor is made from aluminium alloy with a stainless steel housing. The K6D40 500N/20Nm sensor is made entirely of stainless steel.

Dimensions





## Technical Data

### Force sensor

Type	6-Axis force sensor
Force direction	Tension / Compression
Force introduction	Inner thread
Dimension 1	6x M5x0,8
Sensor Fastening	Inner thread
Dimension 2	6x M5x0,8
Operating force	400 % FS
Material	Stainless steel
Dimensions	Ø60 x 40 mm
Height	40 mm
Length or Diameter	60 mm
Torque limit	300 % FS
Bending moment limit	500 % 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 ... 5 V
Zero signal to	-1.5 mV/V
Zero signal from	1.5 mV/V

### Precision

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	33-24 PUR/24x0,03 mm <sup>2</sup>
Cable length	5 m

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

Shield: connected with sensor housing;

## Manual

### Stiffness Matrix K6D40 200N/5Nm

5.8 kN/mm	0.0	0.0	0.0	116 kN	0.0	$u_x$
0.0	5.8 kN/mm	0.0	-116 kN	0.0	0.0	$u_y$
0.0	0.0	32.3 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-116 kN	0.0	9.3 kNm	0.0	0.0	$\phi_{ix}$
116 kN	0.0	0.0	0.0	9.3 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	5.0 kNm	$\phi_{iz}$

### Stiffness Matrix K6D40 500N/20Nm

15.9 kN/mm	0.0	0.0	0.0	319 kN	0.0	$u_x$
0.0	15.9 kN/mm	0.0	-319 kN	0.0	0.0	$u_y$
0.0	0.0	88.5 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-319 kN	0.0	25.5 kNm	0.0	0.0	$\phi_{ix}$
319 kN	0.0	0.0	0.0	25.5 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	13.8 kNm	$\phi_{iz}$

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








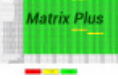
## Mounting

The force is applied to an annulus / to 6 segments of a circle, 52 mm – 42mm in diameter, on the end faces of the sensor. No force is applied to the area inside the ring with a diameter of 42 mm.

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



accessories

Description	Description
	K6D-CalibrationMatrix SL
	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.
	Connection cable MP11/f-D-Sub44HD/m Adapter cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
	Configuration SubD44/m/HD Assembling the connector to sensor cable; Connector Type SubD, 44 pins, male (male), with hood
	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
	K6D-Adapter Development Indicative offer for an adapter set, Consisting of e.g. 2 plates, For mounting a device / flange on K6D sensor;
	K6D-CalibrationMatrix SL/Plus High accuracy calibration matrix for 6-axis force/torque sensors;