

## K6D154 50N/5Nm, 100N/10Nm, 200N/20Nm, 500N/50Nm



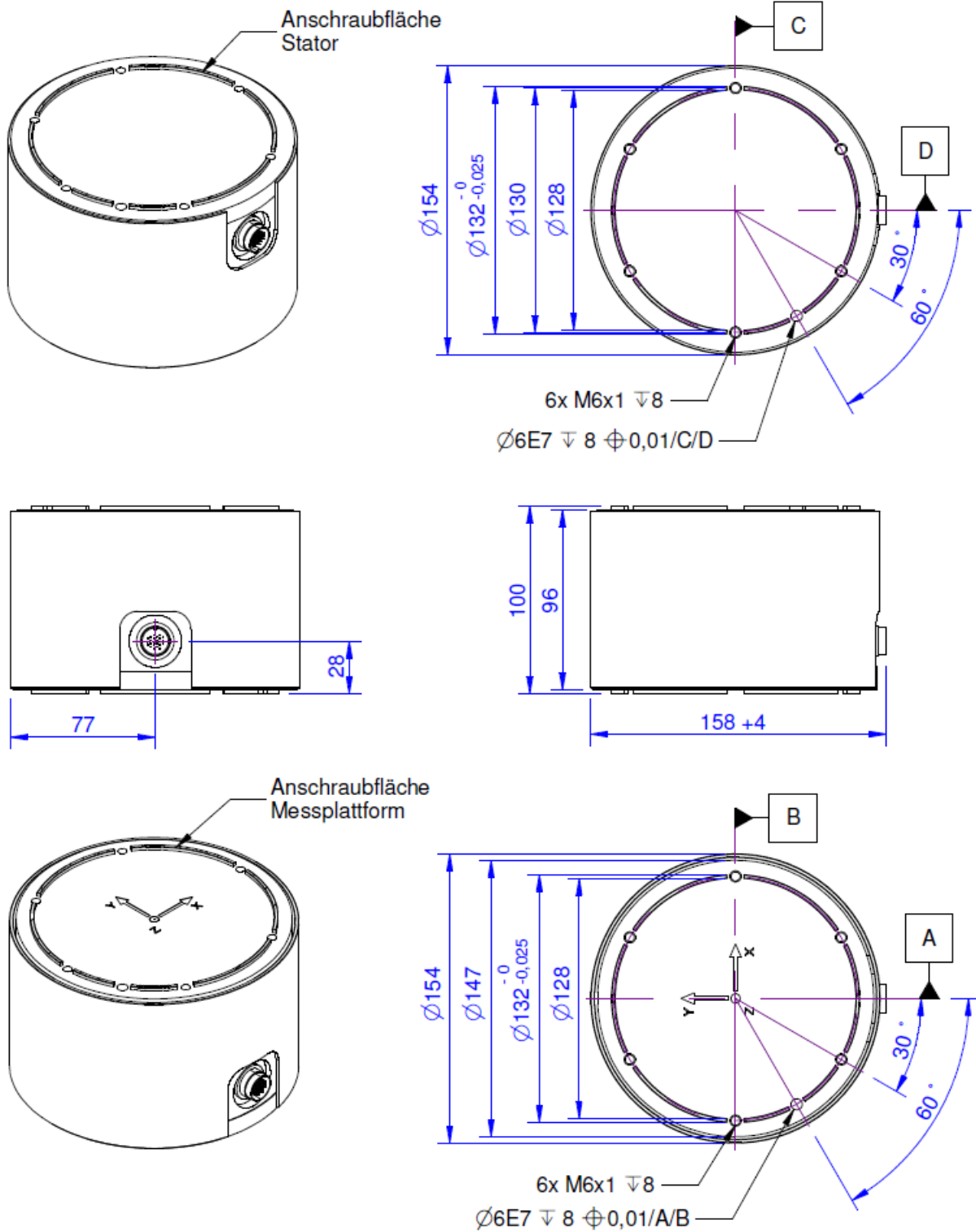
### Description

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-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.

Dimensions



## Technical Data

### Force sensor

Type	6-Axis force sensor
Force direction	Tension / Compression
Force introduction	Inner thread
Dimension 1	6x M6x1
Sensor Fastening	Inner thread
Dimension 2	6x M6x1
Operating force	400 %FS
Material	Aluminium alloy
Dimensions	Ø154 x 100 mm
Height	100 mm
Length or Diameter	150 mm
Torque limit	200 %FS
Bending moment limit	200 %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	-0.05 mV/V
Zero signal from	0.05 mV/V
Rated output	0.4 mV/V / FS

### 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	Connector
Name of the connection	M16 round plug connector

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

*Shield: connected with sensor housing;*

## Manual

### Stiffness Matrix K6D154 50N/5Nm

1.3 kN/mm	0.0	0.0	0.0	62 kN	0.0	$u_x$
0.0	1.3 kN/mm	0.0	-62 kN	0.0	0.0	$u_y$
0.0	0.0	5.7 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-62 kN	0.0	12.5 kNm	0.0	0.0	$\phi_{ix}$
62 kN	0.0	0.0	0.0	12.5 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	8.7 kNm	$\phi_{iz}$

### Stiffness Matrix K6D154 100N/10Nm

2.6 kN/mm	0.0	0.0	0.0	125 kN	0.0	$u_x$
0.0	2.6 kN/mm	0.0	-125 kN	0.0	0.0	$u_y$
0.0	0.0	11.4 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-125 kN	0.0	25.1 kNm	0.0	0.0	$\phi_{ix}$
125 kN	0.0	0.0	0.0	25.1 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	17.4 kNm	$\phi_{iz}$

### Stiffness Matrix K6D154 200N/20Nm

5.4 kN/mm	0.0	0.0	0.0	262 kN	0.0	$u_x$
0.0	5.4 kN/mm	0.0	-262 kN	0.0	0.0	$u_y$
0.0	0.0	23.9 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-262 kN	0.0	52.7 kNm	0.0	0.0	$\phi_{ix}$
262 kN	0.0	0.0	0.0	52.7 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	36.6 kNm	$\phi_{iz}$

### Stiffness Matrix K6D154 500N/50Nm

11.1 kN/mm	0.0	0.0	0.0	534 kN	0.0	$u_x$
0.0	11.1 kN/mm	0.0	-534 kN	0.0	0.0	$u_y$
0.0	0.0	48.8 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-534 kN	0.0	107.5 kNm	0.0	0.0	$\phi_{ix}$
534 kN	0.0	0.0	0.0	107.5 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	74.7 kNm	$\phi_{iz}$

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

## Mounting









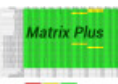
The sensor features a force-sensitive ring on both top and bottom with a centring collar. The mount for the sensor should be designed such that the mount and the sensor touch only over the surface of the force-sensitive ring. If you are making an adaptor plate, please be sure to note that the groove 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.

accessories

Description	Description
	K6D-CalibrationMatrix SL
	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
	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.
	Configuration SubD44/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;
	Connection cable M16/24p/f-SubD44HD/m Connection cable for K6D sensor to 8-channel measuring amplifier GSV-8DS D-Sub44HD;
	Connection cable M16/24p/f-m16/24p/m Connection cable for K6D sensor to 8-channel measuring amplifier GSV-8AS;
	K6D-CalibrationMatrix SL/Plus High accuracy calibration matrix for 6-axis force/torque sensors;