

K6D300 400kN/40kNm



Description

The multi-component sensor K6D300 is suitable for the simultaneous force and torque measurement in three mutually perpendicular axes. The measuring ranges for the forces and torques can be adapted in a wide range. The K6D300 was designed for the following applications:

- Robotics
- Measurements in automation technology
- Aerospace

The force/torque sensor has 12 output channels. Each 6 channels are arranged with a robust connector of series UP13. The 12 measuring channels can be used for the

- optimal use of measurement accuracy in the range of 0.2% and better,
- for redundant measurement with two measuring amplifiers of series GSV-8DS.

Alternatively, the force/torque transducer can be operated with 6 channels. In this case, only a measurement amplifier of series GSV 8DS is required. The measurement accuracy is up to 20% of the measuring range in each component (FX and FY).

In conjunction with the measurement amplifier GSV-8DS the 12 measuring channels are optimally synchronized in a few nanoseconds time offset. Mathematically, a 6 x 12 matrix provides optimal error compensation and best possible accuracy.

The 6 x 12 matrix can be processed with the software GSVmulti to represent the forces and torques.

When using only 6 channels or redundant measuring the complete calculation of forces, torques and error compensation are proceed in the measuring amplifier GSV-8DS and given out as an analog signal. In this case, no PC and no external software is required.

Technical Data

Force sensor

Type	6-Axis force sensor	
Force direction	Tension / Compression	
Rated force Fx	400	kN
Rated force Fy	400	kN
Rated force Fz	800	kN
Force introduction	Inner thread	
Dimension 1	12 x M30	
Sensor Fastening	Inner thread	
Dimension 2	12 x M30	
Operating force	200	%FS
Rated displacement	0.1	mm
Twist	0.01	rad
Material	Stainless steel	
Dimensions	Ø300 x 175	mm
Height	175	mm
Length or Diameter	300	mm
Rated torque Mx	40	kNm
Rated torque My	40	kNm
Rated torque Mz	40	kNm
Torque limit	300	%FS

Electrical Data

Input resistance	350	Ohm
Tolerance input resistance	50	Ohm
Output resistance	350	Ohm
Tolerance output resistance	20	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	0.1	mV/V
characteristic value range min	0.4	mV/V
characteristic value range max	0.8	mV/V

Precision data

Accuracy class	0,5%	
Relative linearity error	0.2	%FS
Relative zero signal hysteresis	0.02	%FS
Temperature effect on zero signal	0.02	%FS/K
Temperature effect on characteristic value	0.02	%RD/K
Relative creep	0.1	%FS

Connection Data

Connection type	Connector
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Name of the connection

2x integrated round plug
connector (UP13), 27-pole, male

Eccentricity and Crosstalk

Crosstalk from x to y at rated load	0.5	%FS
Crosstalk from y to x at rated load	0.5	%FS
Crosstalk from z to x/y at rated load	0.5	%FS
Crosstalk from x/y to z at rated load	0.5	

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	

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 12 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 and 7	+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 and 8	+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 and 9	+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 and 10	+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 and 11	+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 and 12	+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;

Plug connector 1: channel 1 - 6

Plug connector 2: channel 7 - 12

Manual

Stiffness Matrix K6D300 400kN/40kNm

4369 kN/mm	0.0	0.0	0.0	327660 kN/rad	0.0	u_x
0.0	4369 kN/mm	0.0	-327660 kN/rad	0.0	0.0	u_y
0.0	0.0	17362 kN/mm	0.0	0.0	0.0	u_z
0.0	-327660 kN/mm	0.0	83363 kNm/rad	0.0	0.0	ϕ_x
327660 kN/mm	0.0	0.0	0.0	83383 kNm/rad	0.0	ϕ_y
0.0	0.0	0.0	0.0	0.0	59172 kNm/rad	ϕ_z

Element	Description of the context
[kN/mm]	Force - Displacement
[kNm/rad]	Torque - twisting
[kN/mm], [kN/rad]	Force - twist and torque - displacement






Mounting

The force is applied on a circular ring $\varnothing 275$ - $\varnothing 170$ mm on the front sides of the sensor. The surface within the $\varnothing 170$ mm circular ring remains unloaded.

The centering collar $\varnothing 170$ mm can be used for centering. A centering hole 16E7 serves to secure the angular position.

Recommended tightening torque: 2000 Nm;

accessories

Description		Description
	K6D-CalibrationMatrix HL	Standard calibration matrix "High load" for the sensors with big measuring ranges
	Set 2x GSV-8DS	Set of 2x GSV-8DS, for connecting to two 6-axis force/torque sensors or a 6-axis force/torque sensor such as K6D225 or K6D300
	Connection cable Set 2xUP13/27p/m/90°-D-Sub44HD/m	Set of 2x connection cable UP13/27p/m/90°-D-Sub44HD/m
	K6D300 Transportation-Box	high-quality transport box for 6-axis force sensor K6D300;
	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.