



CG

### Description

The K6D68 multi-component sensor is suitable for measuring force and torque in three mutually perpendicular axes.

The K6D68 force / torque sensor is characterized by compact dimensions at high forces and moments. It is eminently suitable for applications in robotics, e.g.

- collision detection
- "Teach-In"
- Presence or error detection
- Force- or torque-controlled operation
- Stress measurement in medical technology / prosthetics / orthopedic technology / gait analysis
- Measurements in sports medicine
- Comfort measurements / Ergonomic measurements
- Monitoring of joining and assembly processes

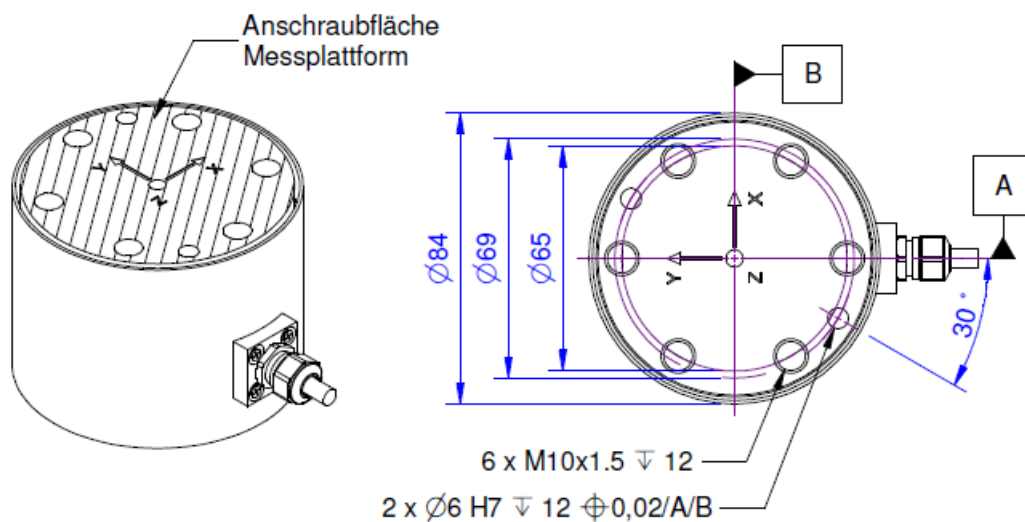
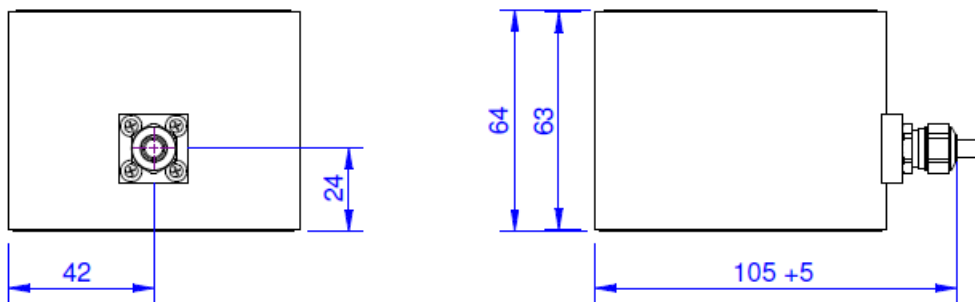
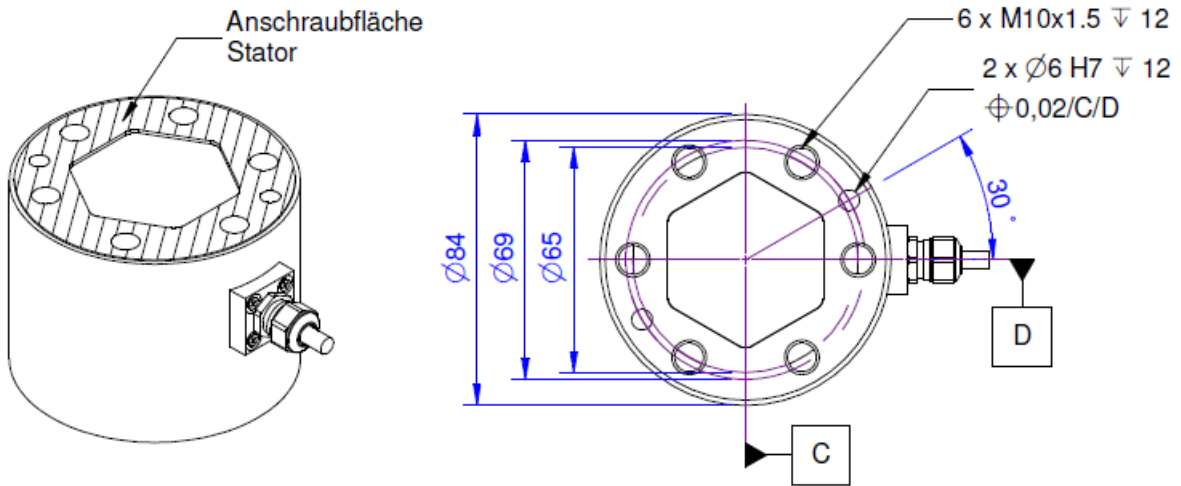
The evaluation of the load of force and torque takes place e.g. with a measuring amplifier GSV-8. With the freely available software GSVmulti the display, recording and export of the measurement results are possible. The calculation of the 6 load sizes is e.g. via a Windows DLL or via Labview using a provided digital calibration document. The calibration document contains the individual calibration factors and error corrections of the sensor. Due to the detailed documentation of the calculation instructions, the use of 6 measuring amplifiers with analogue output, e.g. GSV-1H, with subsequent billing of the measurement results possible.

The sensors K6D68 1kN / 20Nm and 2kN / 50Nm are made of an aluminum alloy with a stainless steel housing. The sensors from 5kN / 50Nm are made entirely of stainless steel.

### Technical characteristics

Modèles	K6D68 (1kN/20Nm/CG)	K6D68 (2kN/50Nm/CG)	K6D68 (5kN/50Nm/CG)	K6D68 (10kN/100Nm/CG)	K6D68 (10kN/500Nm/CG)
F <sub>x</sub> [N]	1000	2000	5000	10 000	10 000
F <sub>y</sub> [N]	1000	2000	5000	10 000	10 000
F <sub>z</sub> [N]	2000	4000	10 000	20 000	20 000
M <sub>x</sub> [Nm]	20	50	50	100	500
M <sub>y</sub> [Nm]	20	50	50	100	500
M <sub>z</sub> [Nm]	20	50	50	100	500
Connectique	Cable	Cable	Cable	Cable	Cable
Page	3-4	5-6	7-8	9-10	11-12

Dimensions (CG)



Specification : Model K6D68 (1kN/20Nm/CG)

Force sensor	
Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	1 kN
Rated force Fy	1 kN
Rated force Fz	2 kN
Force introduction	Inner thread
Dimension 1	6x M10x1,5
Sensor Fastening	Inner thread
Dimension 2	6x M10x1,5
Operating force	300 %FS
Material	Aluminium alloy
Natural frequency	2.3 kHz
Dimensions	Ø83 x 64 mm
Height	64 mm
Length or Diameter	83 mm
Rated torque Mx	20 Nm
Rated torque My	20 Nm
Rated torque Mz	20 Nm
Torque limit	140 Nm
Bending moment limit	140 Nm

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
Rated output	0.4 mV/V / FS

Precision	
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

Connection Data	
Connection type	24 conductor open

K6D68\_2KN\_20NM\_CG.pdf | K6D68\_4KN\_50NM\_CG.pdf | K6D68\_10KN\_100NM\_CG.pdf | K6D68\_20KN\_200NM\_CG.pdf | K6D68\_50KN\_500NM\_CG.pdf

Specification : Model K6D68 (1kN/20Nm/CG)

Name of the connection	33-24 PUR/24x0,03 mm <sup>2</sup>
Cable length	5 m
<b>Eccentricity and Crosstalk</b>	
Crosstalk	1 %FS
<b>Temperature</b>	
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  $M_x$ ,  $M_y$ ,  $M_z$ .

Specification : Model K6D68 (2kN/50Nm/CG)

Force sensor	
Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	2 kN
Rated force Fy	2 kN
Rated force Fz	4 kN
Force introduction	Inner thread
Dimension 1	6x M10x1,5
Sensor Fastening	Inner thread
Dimension 2	6x M10x1,5
Operating force	400 %FS
Material	Aluminium alloy
Natural frequency	3.2 kHz
Dimensions	Ø83 x 64 mm
Height	64 mm
Length or Diameter	83 mm
Rated torque Mx	50 Nm
Rated torque My	50 Nm
Rated torque Mz	50 Nm
Torque limit	300 Nm
Bending moment limit	250 Nm

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
Rated output	0.4 mV/V / FS

Precision	
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

Connection Data	
Connection type	24 conductor open

Specification : Model K6D68 (2kN/50Nm/CG)

Name of the connection	33-24 PUR/24x0,03 mm <sup>2</sup>
Cable length	5 m
<b>Eccentricity and Crosstalk</b>	
Crosstalk	1 %FS
<b>Temperature</b>	
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  $M_x$ ,  $M_y$ ,  $M_z$ .

Specification : Model K6D68 (5kN/50Nm/CG)

**Force sensor**

Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	5 kN
Rated force Fy	5 kN
Rated force Fz	10 kN
Force introduction	Inner thread
Dimension 1	6x M10x1,5
Sensor Fastening	Inner thread
Dimension 2	6x M10x1,5
Operating force	200 %
Material	Stainless steel
Natural frequency	2.4 kHz
Dimensions	Ø83 x 64 mm
Height	64 mm
Length or Diameter	83 mm
Rated torque Mx	50 Nm
Rated torque My	50 Nm
Rated torque Mz	50 Nm
Torque limit	450 Nm
Bending moment limit	400 Nm

**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
Rated output	0.4 mV/V / FS

**Precision**

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

**Connection Data**

Connection type	24 conductor open
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Specification : Model K6D68 (5kN/50Nm/CG)

Name of the connection	33-24 PUR/24x0,03 mm <sup>2</sup>
Cable length	5 m
<b>Eccentricity and Crosstalk</b>	
Crosstalk	1 %FS
<b>Temperature</b>	
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  $M_x$ ,  $M_y$ ,  $M_z$ .



Specification : Model K6D68 (10kN/100Nm/CG)

Force sensor	
Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	10 kN
Rated force Fy	10 kN
Rated force Fz	20 kN
Force introduction	Inner thread
Dimension 1	6x M10x1,5
Sensor Fastening	Inner thread
Dimension 2	6x M10x1,5
Operating force	200 %
Material	Stainless steel
Natural frequency	3.3 kHz
Dimensions	Ø83 x 64 mm
Height	64 mm
Length or Diameter	83 mm
Rated torque Mx	100 Nm
Rated torque My	100 Nm
Rated torque Mz	100 Nm
Torque limit	800 Nm
Bending moment limit	700 Nm

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
Rated output	0.4 mV/V / FS

Precision	
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

Connection Data	
Connection type	24 conductor open

Specification : Model K6D68 (10kN/100Nm/CG)

Name of the connection	33-24 PUR/24x0,03 mm <sup>2</sup>
Cable length	5 m
<b>Eccentricity and Crosstalk</b>	
Crosstalk	1 %FS
<b>Temperature</b>	
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  $M_x$ ,  $M_y$ ,  $M_z$ .

Specification : Model K6D68 (10kN/500Nm/CG)

**Force sensor**

Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	10 kN
Rated force Fy	10 kN
Rated force Fz	20 kN
Force introduction	Inner thread
Dimension 1	6x M10x1,5
Sensor Fastening	Inner thread
Dimension 2	6x M10x1,5
Operating force	400 %
Material	Stainless steel
Natural frequency	4.4 kHz
Dimensions	Ø83 x 64 mm
Height	64 mm
Length or Diameter	83 mm
Rated torque Mx	500 Nm
Rated torque My	500 Nm
Rated torque Mz	500 Nm
Torque limit	1500 Nm
Bending moment limit	1500 Nm

**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
Rated output	0.4 mV/V / FS

**Precision**

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

**Connection Data**

Connection type	24 conductor open
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Specification : Model K6D68 (10kN/500Nm/CG)

Name of the connection	33-24 PUR/24x0,03 mm <sup>2</sup>
Cable length	5 m
<b>Eccentricity and Crosstalk</b>	
Crosstalk	1 %FS
<b>Temperature</b>	
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
1	+Us	positive bridge supply	red
	-Us	negative bridge supply	black
	+Ud	positive bridge output	green
	-Ud	negative bridge output	white
2	+Us	positive bridge supply	blue
	-Us	negative bridge supply	yellow
	+Ud	positive bridge output	purple
	-Ud	negative bridge output	grey
3	+Us	positive bridge supply	orange
	-Us	negative bridge supply	brown
	+Ud	positive bridge output	pink
	-Ud	negative bridge output	transparent
4	+Us	positive bridge supply	green-black
	-Us	negative bridge supply	black-white
	+Ud	positive bridge output	red-black
	-Ud	negative bridge output	white-black
5	+Us	positive bridge supply	purple-black
	-Us	negative bridge supply	yellow-black
	+Ud	positive bridge output	bue-black
	-Ud	negative bridge output	gray-black
6	+Us	positive bridge supply	pink-black
	-Us	negative bridge supply	brown-black
	+Ud	positive bridge output	orange-black
	-Ud	negative bridge output	transparent-black

Shield: connected with sensor housing;

### Mounting

The forces is applied to an annulus (80 - 50 mm in diameter) on the end faces of the sensor. No force is applied to the area inside the ring.

A centring hole is provided to secure the angular position.

Manual

Stiffness Matrix K6D68 (1kN/20Nm/CG)

23.6 kN/mm	0.0	0.0	0.0	471.1 kN	0.0	$u_x$
0.0	23.6 kN/mm	0.0	-471.1 kN	0.0	0.0	$u_y$
0.0	0.0	120.6 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-471.1 kN	0.0	37.7 kNm	0.0	0.0	$\phi_{i_x}$
471.1 kN	0.0	0.0	0.0	37.7 kNm	0.0	$\phi_{i_y}$
0.0	0.0	0.0	0.0	0.0	22.1 kNm	$\phi_{i_z}$

Stiffness Matrix K6D68 (2kN/50Nm/CG)

47.0 kN/mm	0.0	0.0	0.0	939.0 kN	0.0	$u_x$
0.0	47.0 kN/mm	0.0	-939.0 kN	0.0	0.0	$u_y$
0.0	0.0	240.4 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-939.0 kN	0.0	75.1 kNm	0.0	0.0	$\phi_{i_x}$
939.0 kN	0.0	0.0	0.0	75.1 kNm	0.0	$\phi_{i_y}$
0.0	0.0	0.0	0.0	0.0	44.0 kNm	$\phi_{i_z}$

Stiffness Matrix K6D68 (5kN/50Nm/CG)

64.5 kN/mm	0.0	0.0	0.0	1290.8 kN	0.0	$u_x$
0.0	64.5 kN/mm	0.0	-1290.8 kN	0.0	0.0	$u_y$
0.0	0.0	330.4 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-1290.8 kN	0.0	103.3 kNm	0.0	0.0	$\phi_{i_x}$
1290.8 kN	0.0	0.0	0.0	103.3 kNm	0.0	$\phi_{i_y}$
0.0	0.0	0.0	0.0	0.0	60.5 kNm	$\phi_{i_z}$

Stiffness Matrix K6D68 (10kN/100Nm/CG)

128.6 kN/mm	0.0	0.0	0.0	2572.6 kN	0.0	$u_x$
0.0	128.6 kN/mm	0.0	-2572.6 kN	0.0	0.0	$u_y$
0.0	0.0	658.6 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-2572.6 kN	0.0	205.8 kNm	0.0	0.0	$\phi_{i_x}$
2572.6 kN	0.0	0.0	0.0	205.8 kNm	0.0	$\phi_{i_y}$
0.0	0.0	0.0	0.0	0.0	120.6 kNm	$\phi_{i_z}$

K6D68\_2kN\_20Nm\_CG.pdf | K6D68\_4kN\_50Nm\_CG.pdf | K6D68\_10kN\_50Nm\_CG.pdf | K6D68\_20kN\_100Nm\_CG.pdf | K6D68\_20kN\_500Nm\_CG.pdf

Manual









Stiffness Matrix K6D68 (10kN/500Nm/CG)

228.7 kN/mm	0.0	0.0	0.0	4573.5 kN	0.0	$u_x$
0.0	228.7 kN/mm	0.0	-4573.5 kN	0.0	0.0	$u_y$
0.0	0.0	1170.8 kN/mm	0.0	0.0	0.0	$u_z$
0.0	-4573.5 kN	0.0	365.9 kNm	0.0	0.0	$\phi_{ix}$
4573.5 kN	0.0	0.0	0.0	365.9 kNm	0.0	$\phi_{iy}$
0.0	0.0	0.0	0.0	0.0	214.4 kNm	$\phi_{iz}$

Caption

Element	Description
[kN/mm]	Force - Shift
[kNm]	Torque - Twist
[kN]	Force - Twist and Torque - Shift

Accessories

Description	Description
	K6D-CalibrationMatrix SL Standard calibration matrix "Small load" for the sensors with small measuring ranges
	K6D-CalibrationMatrix SL/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.
	Configuration D-Sub44/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
	K6D68-Adapter VA
	K6D-Adapter Development Indicative offer for an adapter set, Consisting of e.g. 2 plates, For mounting a device / flange on K6D sensor;

Order options

Type	Description
K6D68 1kN/20Nm	1kN; 1kN; 2kN; 20Nm; 20Nm; 20Nm; Aluminium
K6D68 2kN/50Nm	2kN; 2kN; 5kN; 50Nm; 50Nm; 50Nm; Aluminium
K6D68 5kN/50Nm	5kN; 5kN; 10kN; 50Nm; 50Nm; 50Nm; Steel
K6D68 10kN/100Nm	10kN; 10kN; 20kN; 100Nm; 100Nm; 100Nm; Steel
K6D68 10kN/500Nm	10kN; 10kN; 20kN; 500Nm; 500Nm; 500Nm; Steel

*F<sub>x</sub>; F<sub>y</sub>; F<sub>z</sub>; M<sub>x</sub>; M<sub>y</sub>; M<sub>z</sub>; Material*