



Description

The multi-component sensor F6D100 is used for force and torque measurement in three mutually perpendicular axes.

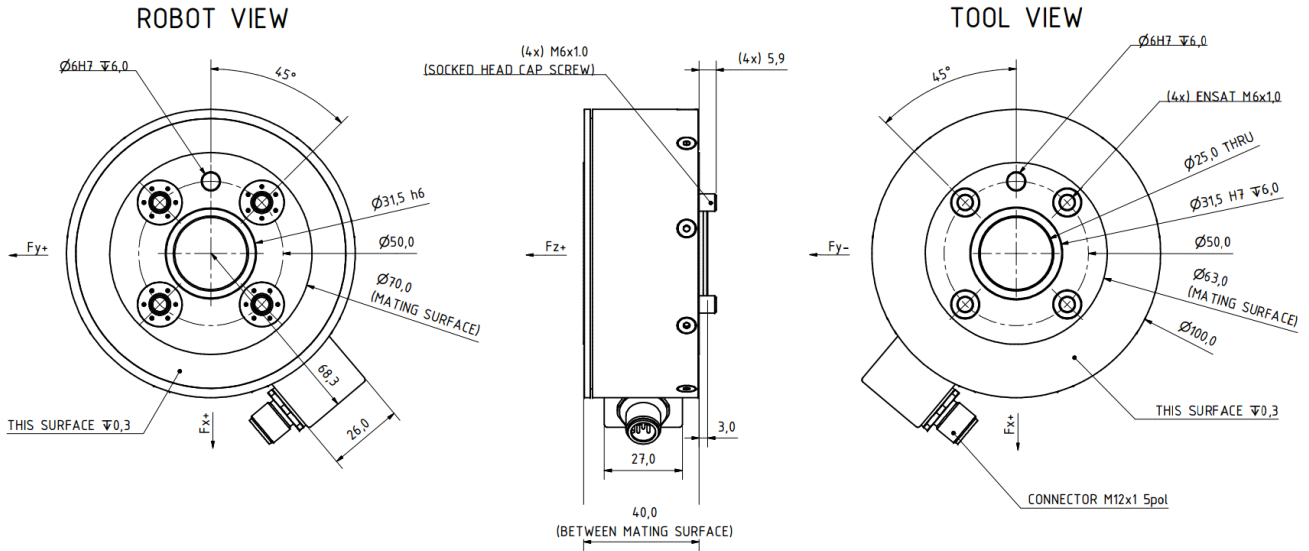
The multi-component sensor F6D100 is equipped with mounting flanges according to DIN EN ISO 9409-1 for industrial robots. The measuring flange of the sensor contains tapped holes M6 on the same pitch circle. The F6D force / torque sensor can be mounted to the robot flange without additional adapters, making it particularly flat and light compared to the K6D series sensors.

The evaluation of the force and moment load is carried out with an integrated electronics type GSV-6.

The sensors are made of an aluminum alloy.

Our robotics partner IPR offers solutions for applications of force / torque sensors.

Dimensions



Technical Data

Force sensor	
Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	200 N
Rated force Fy	200 N
Rated force Fz	400 N
Force introduction	Inner thread
Dimension 1	4xM6
Sensor Fastening	Through bore
Dimension 2	M6
Operating force	300 %FS
Rated displacement	0.05 mm
Twist	0.04 rad
Material	Aluminium alloy
Height	40 mm
Length or Diameter	100 mm
Rated torque Mx	20 Nm
Rated torque My	20 Nm
Rated torque Mz	20 Nm
Breaking force	600 %FS

Electrical Data	
Input resistance	1000 Ohm
Tolerance input resistance	50 Ohm
Output resistance	1000 Ohm
Tolerance output resistance	50 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	1 mV/V
Rated output	0.4 mV/V / FS

Measuring frequency	
Data frequency f	10 ... 800 Hz
Sampling frequency	12 kHz

Precision	
Accuracy class	1%
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

Supply

Supply voltage f	18 ... 28 V
Current consumption f	100 ... 250 mA

Interface

Type of the interface	can
Quantity of the interface	1
Isolation of the interface	2 kV

Connection Data

Connection type	5-Leiter offen
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Temperature

Rated temperature range f	-10 ... 70 °C
Operating temperature range f	-10 ... 85 °C
Storage temperature range f	-10 ... 85 °C
Environmental protection	IP64

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 .

Manual

Stiffness Matrix F6D100-50 200N/20Nm

27,3 kN/mm	0,0	0,0	0,0	2185 kN	0,0	u_x
0,0	27,3 kN/mm	0,0	-2185 kN	0,0	0,0	u_y
0,0	0,0	270,6 kN/mm	0,0	0,0	0,0	u_z
0,0	-2185 kN	0,0	248,3 kNm	0,0	0,0	ϕ_x
2185 kN	0,0	0,0	0,0	248,3 kNm	0,0	ϕ_y
0,0	0,0	0,0	0,0	0,0	78,2 kNm	ϕ_z

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

Mounting

Pin configuration

Signal	Description	Wire color	PIN
CAN_GND	Mass CAN	brown	1
+24V	Operating voltage 24V	white	2
GND_24V	Mass operating voltage	blue	3
CAN_H	Can High	black	4
CAN_L	CAN Low	grey	5

Calibration matrix

The calibration matrix contains 36 calibration factors for calculating the forces and torques from the 6 output signals of the force sensor. A Labview vi is available for processing the calibration matrix

Measuring amplifier

The measuring amplifier GSV-8DS or GSV-8AS has 24-pole plug connector to connect the 6-axis force/torque sensor. The mechanical forces and torques are calculated from 6 output voltages of each measuring channel with the calibration matrix.

Software

The GSVmulti software is included in delivery with measuring amplifiers GSV-8. The software allows the application of the calibration matrix and the displacement of the coordinate system to represent the torques around a freely selectable reference point.

To create your own software, a Labview VI is available.

Mounting instruction

The force is applied to a circular ring ($\varnothing 80$ - $\varnothing 40$) on the live end of the sensor. The area inside the circular ring remains unloaded.

A center hole $\varnothing 6$ serves to secure the angular position.

4x M6 external thread for mounting on robot flange (mounted with Allen key from the tool side, the screws are integrated in the F6D sensor, can not be lost);

4x M6 internal thread for mounting the tool (this flange corresponds again to the robot flange);


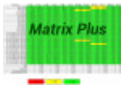


Summary: The sensor has M6 internal thread and M6 external thread.

Robotics solutions from IPR

Our robotics partner IPR offers solutions for applications of force / torque sensors in the areas of

- Mounting and handling technology
- Machine loading
- Foundry and blacksmith
- Cavity preservation
- Sealing and damping
- Lack and paint
- Services

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;
 PCAN-USB Adapter	PCAN-USB adapter for connection to CAN Bus and to PC
 F6D-CAN-Adapter	CAN-adapter to connect an F6D sensor and a PCAN-USB cable;



Description

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The evaluation of the force and moment load is carried out with an external measuring amplifier GSV-8DS SubD44HD or GSV-8AS.

The sensors are made of an aluminum alloy.

Our robotics partner IPR offers solutions for applications of force / torque sensors.

Technical Data

Force sensor

Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	200 N
Rated force Fy	200 N
Rated force Fz	400 N
Force introduction	Inner thread
Dimension 1	4xM6
Sensor Fastening	Through bore
Dimension 2	M6
Operating force	600 % FS
Rated displacement	0.05 mm
Twist	0.04 rad
Material	Aluminium alloy
Height	40 mm
Length or Diameter	100 mm
Rated torque Mx	20 Nm
Rated torque My	20 Nm
Rated torque Mz	20 Nm
Torque limit	200 % FS
Bending moment limit	300 % FS

Electrical Data

Input resistance	1000 Ohm
Tolerance input resistance	50 Ohm
Output resistance	1000 Ohm
Tolerance output resistance	50 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	1 mV/V
Rated output	0.4 mV/V / FS

Precision

Accuracy class	1%
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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Name of the connection

round plug connector MP11, 24-
pole, male

Temperature

Rated temperature range f	-10 ... 70 °C
Operating temperature range f	-10 ... 85 °C
Storage temperature range f	-10 ... 85 °C
Environmental protection	IP64

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.

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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 F6D100-50 200N/20Nm

36.6 kN/mm	0.0	0.0	0.0	329 kN	0.0	u_x
0.0	36.6 kN/mm	0.0	-329 kN	0.0	0.0	u_y
0.0	0.0	357.9 kN/mm	0.0	0.0	0.0	u_z
0.0	-329 kN	0.0	316.1 kNm	0.0	0.0	ϕ_x
329 kN	0.0	0.0	0.0	316.1 kNm	0.0	ϕ_y
0.0	0.0	0.0	0.0	0.0	102.6 kNm	ϕ_z

Element	Description of the context
[kN/mm]	Force - Displacement
[kNm]	Torque - Twist
[kN]	Force- Twist and Torque - Displacement

Mounting

Calibration matrix

The calibration matrix contains 36 calibration factors for calculating the forces and torques from the 6 output signals of the force sensor. A Labview vi is available for processing the calibration matrix

Measuring amplifier

The measuring amplifier GSV-8DS or GSV-8AS has 24-pole plug connector to connect the 6-axis force/torque sensor. The mechanical forces and torques are calculated from 6 output voltages of each measuring channel with the calibration matrix.

Software

The GSVmulti software is included in delivery with measuring amplifiers GSV-8. The software allows the application of the calibration matrix and the displacement of the coordinate system to represent the torques around a freely selectable reference point.

To create your own software, a Labview VI is available.

Mounting instruction

The force is applied to a circular ring (Ø80-Ø40) on the live end of the sensor. The area inside the circular ring remains unloaded.

A center hole Ø6 serves to secure the angular position.

4x M6 external thread for mounting on robot flange (mounted with Allen key from the tool side, the screws are integrated in the F6D sensor, can not be lost);

4x M6 internal thread for mounting the tool (this flange corresponds again to the robot flange);







Summary: The sensor has M6 internal thread and M6 external thread.

Robotics solutions from IPR

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- Mounting and handling technology
- Machine loading
- Foundry and blacksmith
- Cavity preservation
- Sealing and damping
- Lack and paint
- Services

accessories

Description	Description
 <p>K6D-CalibrationMatrix SL</p>	Standard calibration matrix "Small load" for the sensors with small measuring ranges
 <p>K6D-CalibrationMatrix SL/Plus</p>	High accuracy calibration matrix for 6-axis force/torque sensors;
 <p>GSV-8DS</p>	8-channel amplifier with USB port, analog output, UART interface. Other versions GSV-8AS CAN with Canbus and GSV-8AS EC with EtherCAT fieldbus.
 <p>GSV-8AS</p>	8-channel amplifier with USB port, analog output, 16x DIO, UART interface.
 <p>Connection cable MP11/f-D-Sub44HD/m</p>	Connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
 <p>Connection cable MP11/f-D-Sub44HD/m/straight</p>	Straight connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
 <p>Connection cable MP11/f-D-Sub44HD/m/angled</p>	Angled connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
 <p>Connection cable MP11/f-open end</p>	Connection cable for K6D sensor
 <p>Connection cable MP11/f-M16/24p/m</p>	Connection cable for the K6D sensor to 8-channel measuring amplifier GSV-8AS
 <p>Connection cable MP11/f-M16/24p/m/angled</p>	Angled connection cable for the K6D sensor to 8-channel measuring amplifier GSV-8AS



Description

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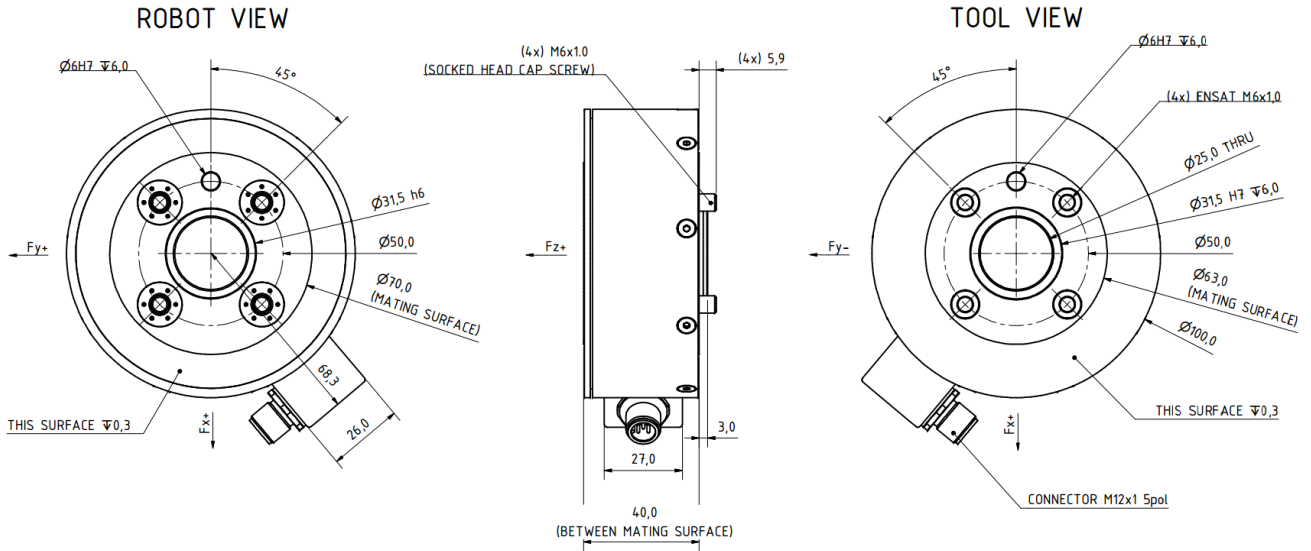
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Dimensions



Technical Data

Force sensor	
Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	600 N
Rated force Fy	600 N
Rated force Fz	1200 N
Force introduction	Inner thread
Dimension 1	4xM6
Sensor Fastening	Through bore
Dimension 2	M6
Operating force	300 %FS
Rated displacement	0.05 mm
Twist	0.04 rad
Material	Aluminium alloy
Height	40 mm
Length or Diameter	100 mm
Rated torque Mx	60 Nm
Rated torque My	60 Nm
Rated torque Mz	60 Nm
Breaking force	600 %FS

Electrical Data	
Input resistance	1000 Ohm
Tolerance input resistance	50 Ohm
Output resistance	1000 Ohm
Tolerance output resistance	50 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	1 mV/V
Rated output	0.4 mV/V / FS

Measuring frequency	
Data frequency f	10 ... 800 Hz
Sampling frequency	12 kHz

Precision	
Accuracy class	1%
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

Supply

Supply voltage f	18 ... 28	V
Current consumption f	100 ... 250	mA

Interface

Type of the interface	can	
Quantity of the interface	1	
Isolation of the interface	2	kV

Connection Data

Connection type	5-Leiter offen	
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Temperature

Rated temperature range f	-10 ... 70	°C
Operating temperature range f	-10 ... 85	°C
Storage temperature range f	-10 ... 85	°C
Environmental protection	IP64	

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 .

Manual

Stiffness Matrix F6D100-50 600N/60Nm

76,7 kN/mm	0,0	0,0	0,0	6137 kN	0,0	u_x
0,0	76,7 kN/mm	0,0	-6137 kN	0,0	0,0	u_y
0,0	0,0	760,1 kN/mm	0,0	0,0	0,0	u_z
0,0	-6137 kN	0,0	697,3 kNm	0,0	0,0	ϕ_x
6137 kN	0,0	0,0	0,0	697,3 kNm	0,0	ϕ_y
0,0	0,0	0,0	0,0	0,0	219,7 kNm	ϕ_z

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

Mounting

Pin configuration

Signal	Description	Wire color	PIN
CAN_GND	Mass CAN	brown	1
+24V	Operating voltage 24V	white	2
GND_24V	Mass operating voltage	blue	3
CAN_H	Can High	black	4
CAN_L	CAN Low	grey	5

Calibration matrix

The calibration matrix contains 36 calibration factors for calculating the forces and torques from the 6 output signals of the force sensor. A Labview vi is available for processing the calibration matrix

Measuring amplifier

The measuring amplifier GSV-8DS or GSV-8AS has 24-pole plug connector to connect the 6-axis force/torque sensor. The mechanical forces and torques are calculated from 6 output voltages of each measuring channel with the calibration matrix.

Software

The GSVmulti software is included in delivery with measuring amplifiers GSV-8. The software allows the application of the calibration matrix and the displacement of the coordinate system to represent the torques around a freely selectable reference point.

To create your own software, a Labview VI is available.

Mounting instruction

The force is applied to a circular ring (Ø80-Ø40) on the live end of the sensor. The area inside the circular ring remains unloaded.

A center hole Ø6 serves to secure the angular position.

4x M6 external thread for mounting on robot flange (mounted with Allen key from the tool side, the screws are integrated in the F6D sensor, can not be lost);

4x M6 internal thread for mounting the tool (this flange corresponds again to the robot flange);


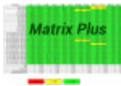


Summary: The sensor has M6 internal thread and M6 external thread.

Robotics solutions from IPR

Our robotics partner IPR offers solutions for applications of force / torque sensors in the areas of

- Mounting and handling technology
- Machine loading
- Foundry and blacksmith
- Cavity preservation
- Sealing and damping
- Lack and paint
- Services

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;
 PCAN-USB Adapter	PCAN-USB adapter for connection to CAN Bus and to PC
 F6D-CAN-Adapter	CAN-adapter to connect an F6D sensor and a PCAN-USB cable;



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Force sensor	
Type	6-Axis force sensor
Force direction	Tension / Compression
Rated force Fx	600 N
Rated force Fy	600 N
Rated force Fz	1200 N
Force introduction	Inner thread
Dimension 1	4xM6
Sensor Fastening	Through bore
Dimension 2	M6
Operating force	600 % FS
Rated displacement	0.05 mm
Twist	0.04 rad
Material	Aluminium alloy
Height	40 mm
Length or Diameter	100 mm
Rated torque Mx	60 Nm
Rated torque My	60 Nm
Rated torque Mz	60 Nm
Torque limit	200 % FS
Bending moment limit	300 % FS

Electrical Data

Input resistance	1000 Ohm
Tolerance input resistance	50 Ohm
Output resistance	1000 Ohm
Tolerance output resistance	50 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	1 mV/V
Rated output	0.4 mV/V / FS

Precision

Accuracy class	1%
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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Name of the connection

round plug connector MP11, 24-
pole, male

Temperature

Rated temperature range f	-10 ... 70 °C
Operating temperature range f	-10 ... 85 °C
Storage temperature range f	-10 ... 85 °C
Environmental protection	IP64

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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 F6D100-50 600N/60Nm

103.0 kN/mm	0.0	0.0	0.0	927 kN	0.0	u_x
0.0	103.0 kN/mm	0.0	-927 kN	0.0	0.0	u_y
0.0	0.0	1004.8 kN/mm	0.0	0.0	0.0	u_z
0.0	-927 kN	0.0	887.4 kNm	0.0	0.0	ϕ_x
927 kN	0.0	0.0	0.0	887.4 kNm	0.0	ϕ_y
0.0	0.0	0.0	0.0	0.0	289.2 kNm	ϕ_z

Element	Description of the context
[kN/mm]	Force - Displacement
[kNm]	Torque - Twist
[kN]	Force- Twist and Torque - Displacement

Mounting

Calibration matrix

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Software

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Mounting instruction

The force is applied to a circular ring (Ø80-Ø40) on the live end of the sensor. The area inside the circular ring remains unloaded.

A center hole Ø6 serves to secure the angular position.

4x M6 external thread for mounting on robot flange (mounted with Allen key from the tool side, the screws are integrated in the F6D sensor, can not be lost);

4x M6 internal thread for mounting the tool (this flange corresponds again to the robot flange);




Summary: The sensor has M6 internal thread and M6 external thread.

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 <p>GSV-8AS</p>	8-channel amplifier with USB port, analog output, 16x DIO, UART interface.
 <p>Connection cable MP11/f-D-Sub44HD/m</p>	Connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
 <p>Connection cable MP11/f-D-Sub44HD/m/straight</p>	Straight connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
 <p>Connection cable MP11/f-D-Sub44HD/m/angled</p>	Angled connection cable for connecting the K6D sensor to an 8-channel measuring amplifier GSV-8DS SubD44HD
 <p>Connection cable MP11/f-open end</p>	Connection cable for K6D sensor
 <p>Connection cable MP11/f-M16/24p/m</p>	Connection cable for the K6D sensor to 8-channel measuring amplifier GSV-8AS
 <p>Connection cable MP11/f-M16/24p/m/angled</p>	Angled connection cable for the K6D sensor to 8-channel measuring amplifier GSV-8AS