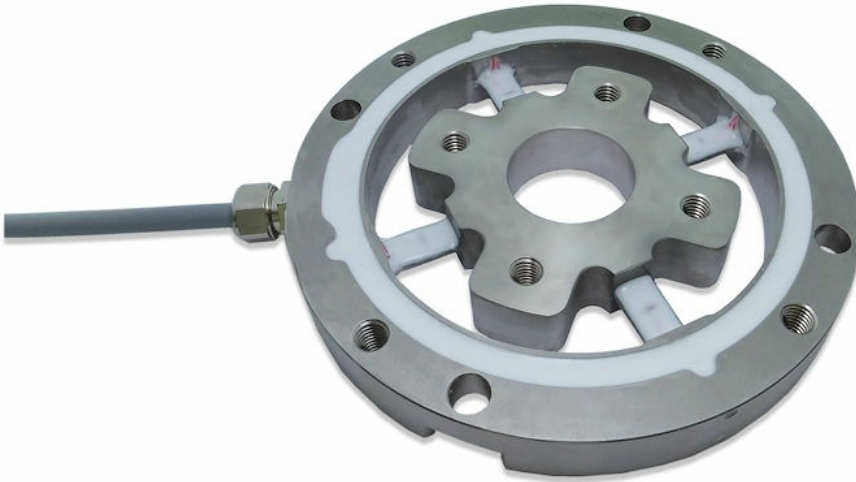


## K3R110 $\pm 50\text{N}$ ; $\pm 100\text{N}$ , $\pm 200\text{N}$ ; $\pm 500\text{N}$ , $\pm 1000\text{N}$ , $\pm 2000\text{N}$ ; $\pm 5000\text{N}$



### Description

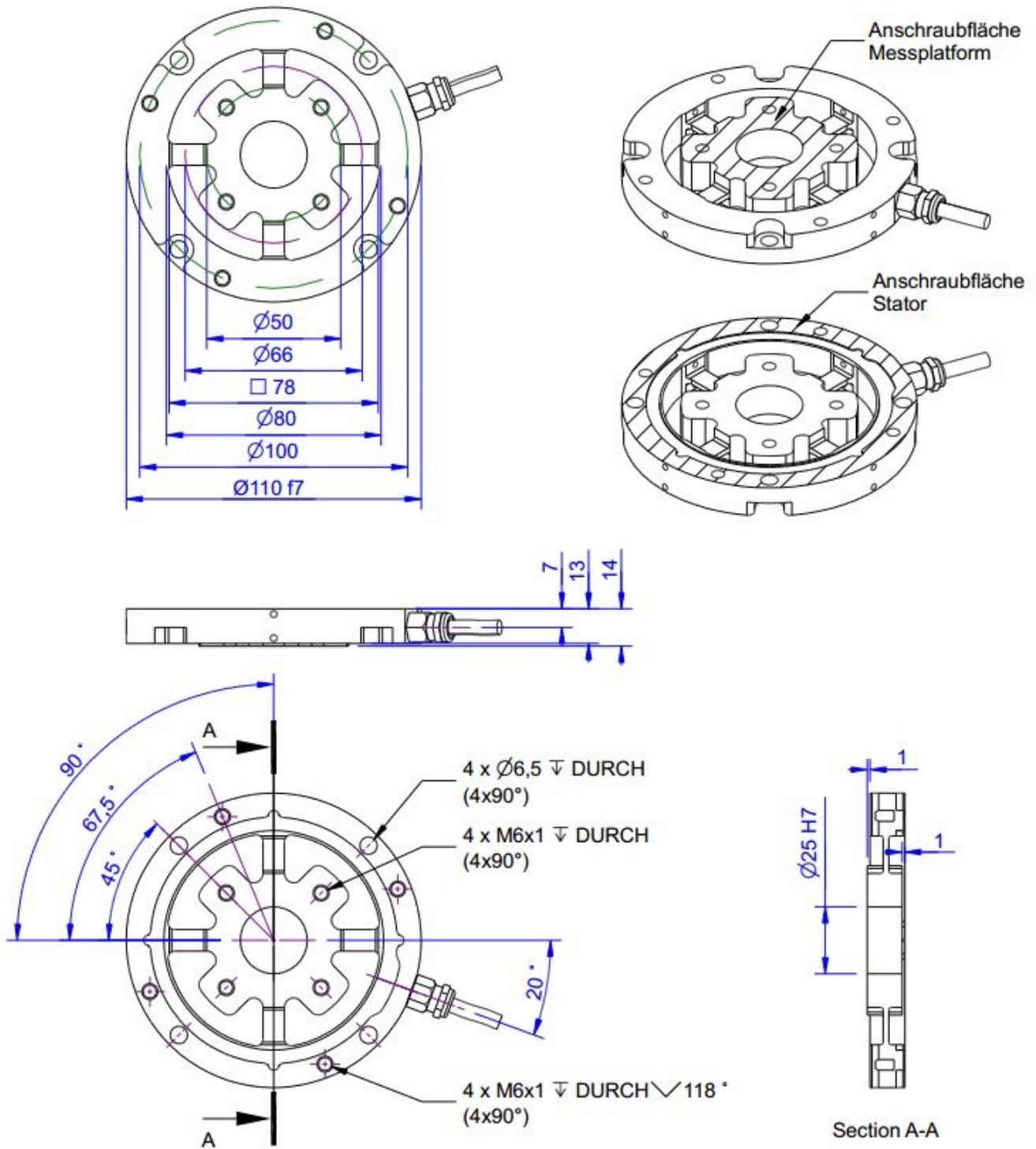
The force sensor K3R110 suitable because of its compact design, ideal for inspection tasks in quality assurance as well as in materials testing.

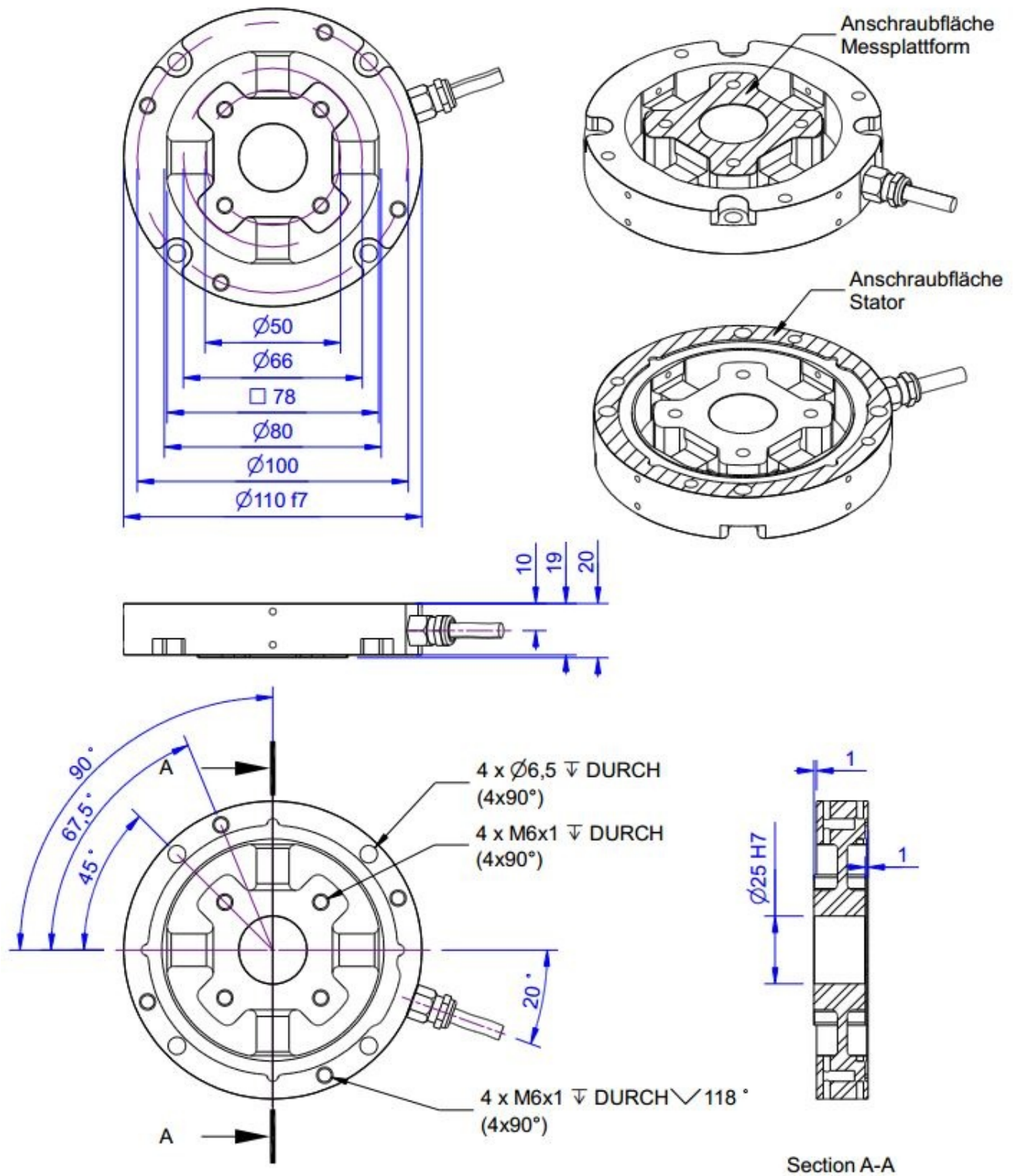
This precision force sensor is characterized by flat design of only 14 mm thickness up to 20 mm thickness.

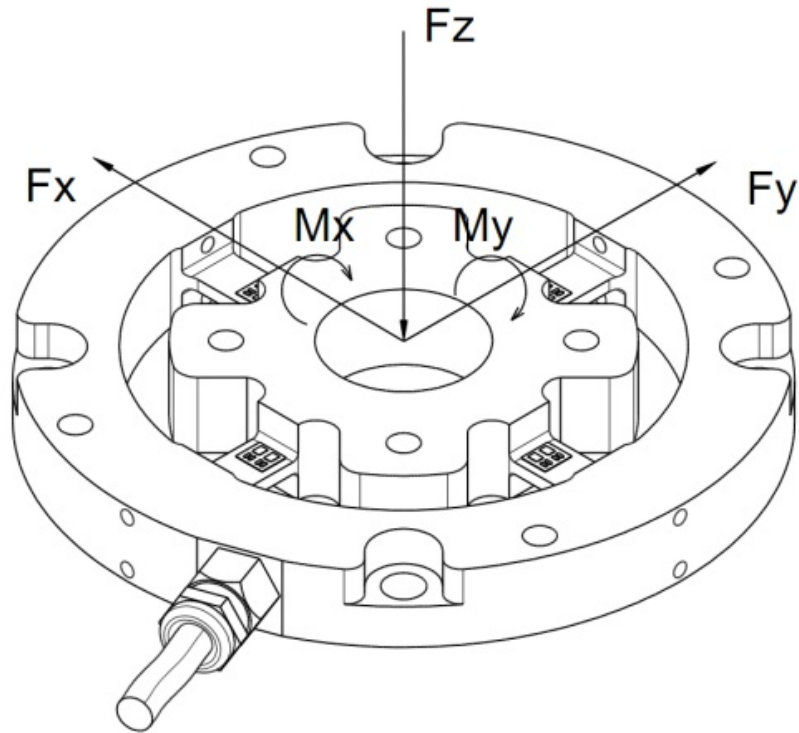
The axial force  $F_z$  and the bending moments  $M_x$  and  $M_y$  are calculated from the strain gage signals of the 4 cantilever springs.

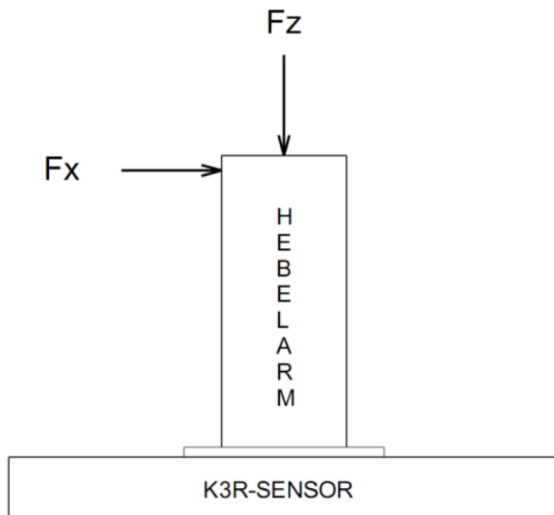
With the aid of a simple calibration matrix the forces and distances can be calculated as well.

## Dimensions

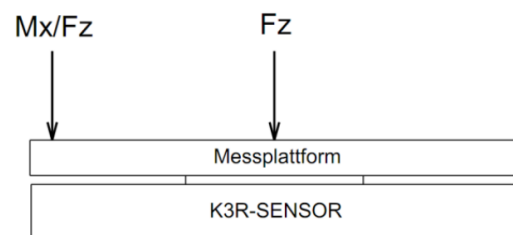








Anwendung als 3D Kraftsensor



Anwendung als Kraft - Momenten Sensor  
bzw. Kraft-Schwerpunkt Sensor



## Technical Data

### Kraftsensoren

|                    |                       |
|--------------------|-----------------------|
| Type               | 3-axis force sensor   |
| Force direction    | Tension / Compression |
| Force introduction | Inner thread          |
| Dimension 1        | 4x M6x1               |
| Sensor Fastening   | Inner thread          |
| Dimension 2        | 4x M6x1               |
| Operating force    | 150 %FS               |
| Rated displacement | 0.1 mm                |
| Dimensions         | Ø 110 x 14 mm x mm    |
| Length or Diameter | 110 mm                |
| Torque limit       | 200 %                 |

### Elektrische Daten

|   |             |
|---|-------------|
| Input resistance                        | 87 Ohm      |
| Tolerance input resistance              | 2 Ohm       |
| Output resistance                       | 350 Ohm     |
| Tolerance output resistance             | 5 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                             | 0.05 mV/V   |
| Rated output                            | 1 mV/V / FS |

### Precision

|  |            |
|--|------------|
| Accuracy class                             | 0,5%       |
| Relative linearity error                   | 0.1 %FS    |
| Relative zero signal hysteresis            | 0.1 %FS    |
| Temperature effect on zero signal          | 0.01 %FS/K |
| Temperature effect on characteristic value | 0.01 %RD/K |
| Relative creep                             | 0.1 %FS    |

### Connection Data

|                 |                 |
|-----------------|-----------------|
| Connection type | 10-Leiter offen |
|-----------------|-----------------|

ME-SYSTEME.DE 24-10



|                        |               |
|------------------------|---------------|
| Name of the connection | PUR / 10x0,14 |
| Cable length           | 3 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      | IP66          |

Abbreviation : RD: „Reading“; FS: „Full Scale“;

1) The exact rated output is reported in the test report .



## Pin Configuration

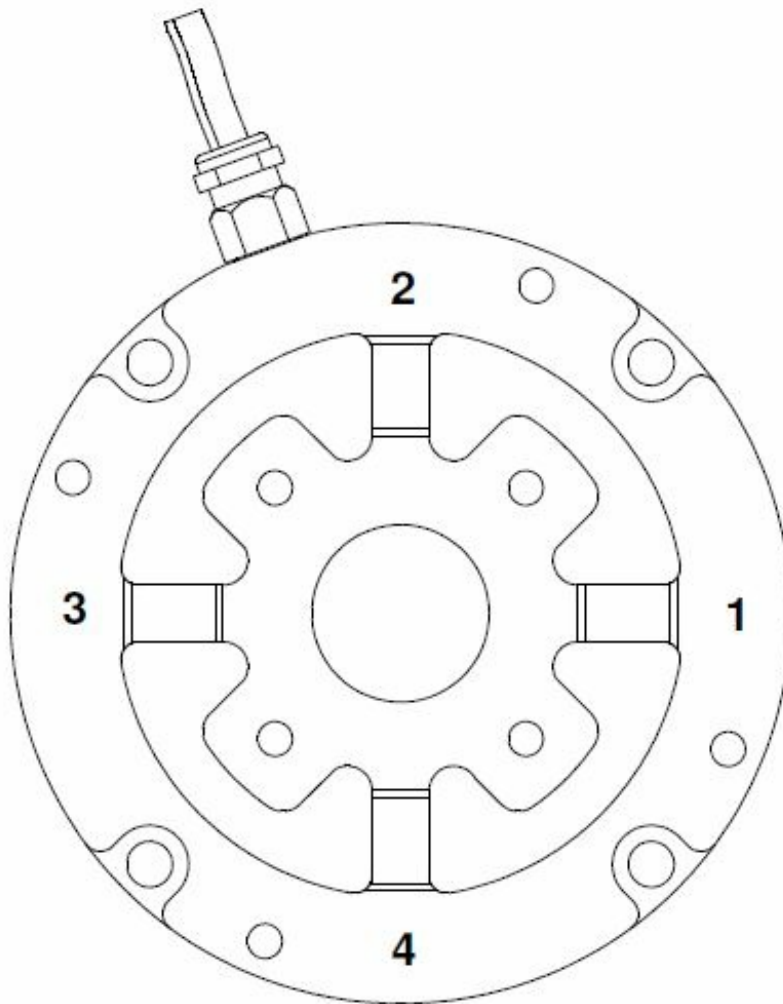
| Channel | Symbol | Description            | Wire colour |
|---------|--------|------------------------|-------------|
| 1       | +Us    | positive bridge supply | brown       |
|         | -Us    | negative bridge supply | white       |
|         | +Ud    | positive bridge output | green       |
|         | -Ud    | negative bridge output | yellow      |
| 2       | +Us    | positive bridge supply | nc          |
|         | -Us    | negative bridge supply | nc          |
|         | +Ud    | positive bridge output | gray        |
|         | -Ud    | negative bridge output | pink        |
| 3       | +Us    | positive bridge supply | nc          |
|         | -Us    | negative bridge supply | nc          |
|         | +Ud    | positive bridge output | blue        |
|         | -Ud    | negative bridge output | red         |
| 4       | +Us    | positive bridge supply | nc          |
|         | -Us    | negative bridge supply | nc          |
|         | +Ud    | positive bridge output | black       |
|         | -Ud    | negative bridge output | purple      |

Screen - transparent.

Pressure load : positive output signal;

nc: not occupied





#### Description of channels



## Mounting

### Variant table

| Variant  | 50N | 100N | 200N | 200N VA | 500N VA | 1000N VA |
|----------|-----|------|------|---------|---------|----------|
| Fz in N  | 50  | 100  | 200  | 200     | 500     | 1000     |
| Mx in Nm | 1   | 2    | 4    | 4       | 10      | 20       |
| My in Nm | 1   | 2    | 4    | 4       | 10      | 20       |

## Calibration matrix

### Application as 3D Force-Torque Sensor

|    | Ch1            | Ch2            | Ch3             | Ch4            |
|----|----------------|----------------|-----------------|----------------|
| Fz | +100N / 1mV/V  | +100N / 1mV/V  | +100N / 1mV/V   | +100N / 1mV/V  |
| Mx | 0Nm / 1.5 mV/V | -2Nm / 1.5mV/V | 0Nm / 1.5 mV/V  | +2Nm / 1.5mV/V |
| My | +2Nm / 1.5mV/V | 0Nm / 1.5 mV/V | -2Nm / 1.5 mV/V | 0Nm / 1.5 mV/V |

With the 12 elements of the calibration matrix **A** the relationship between the output signal **U** = (U1, U2, U3, U4) of the sensor and the load vector **L** (Fz, Mx, My) is established:

$$\underline{L} = \underline{A} \times \underline{U}.$$

Manual: <http://www.me-systeme.de/docs/de/manuals/a5/ba-k6d.pdf>

The measuring amplifier GSV-8 or the software GSV multi have the appropriate mathematical functions.



### Application as Force / Focus Sensor

Alternatively can be calculated the focus of force transmission.

For the coordinates  $s_x$  and  $s_y$  (distance from center in x- and y- directions) is valid:

$$s_x = M_x / F_z$$

$$s_y = M_y / F_z$$




### Application as 3D Force Sensor

If the distance  $s_z$  from the sensor surface is known, the torques  $M_x$  and  $M_y$  can be converted into appropriate forces  $F_y$  and  $F_x$ :

$$F_y = M_x / s_z$$

$$F_x = M_y / s_z$$

## accessories

| Description   | Description   |
|---|---|
|  | Configuration<br>SubD44/m/HD Connector Type SubD, 44 pins, male (male), with hood   |
|  | K3R-<br>CalibrationMatrix Calibration matrix with 12 calibration factors for scaling of the sensor output signals on forces Fz and moments Mx and My.   |
|  | 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. |



## Orderoptions

| Type | Description |
|------|-------------|
|------|-------------|

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