

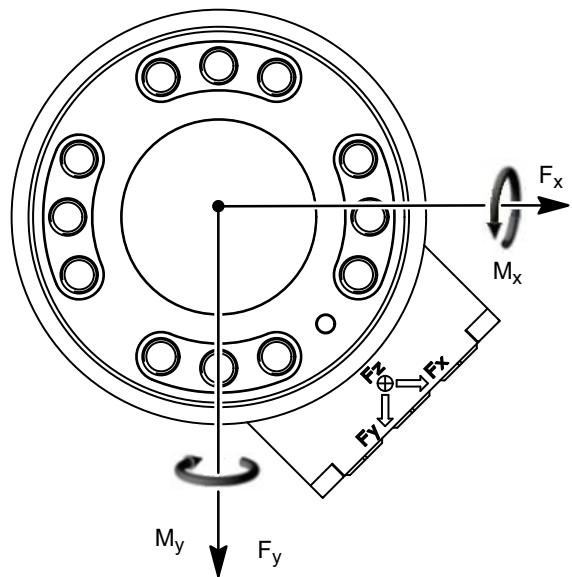
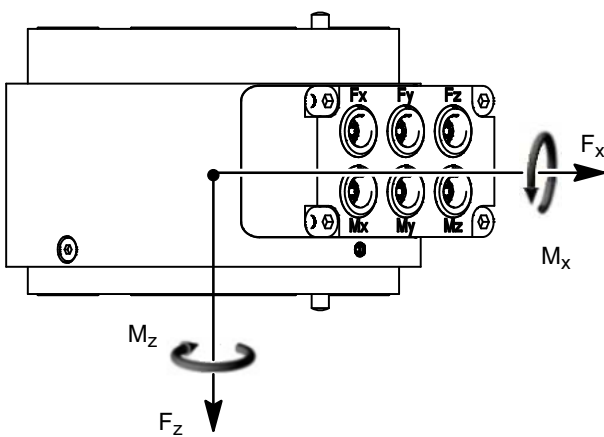
# MCS10

## Multicomponent sensor

### Special features

- Compact multicomponent sensor
- Different nominal (rated) measuring ranges
- Up to 6 components; each in every direction: tension & compression, clockwise & counterclockwise
- Can be adapted to many measurement tasks by choosing the required measurement outputs
- Flange connection with centering and pin for positioning
- Degree of protection IP67
- TEDS
- Customization possible

Data sheet



## Specifications

Size			BG1	BG2			BG3
Type			005	010	025	050	100
<b>Accuracy class</b>			0.2		0.1		
<b>Nominal lateral force <math>F_x</math> &amp; <math>F_y</math></b>	$F_{x,nom}; F_{y,nom}$	kN	1	2	5	10	20
<b>Nominal axial force <math>F_z</math></b>	$F_{z,nom}$	kN	5	10	25	50	100
<b>Nominal bending moment <math>M_x</math> &amp; <math>M_y</math></b>	$M_{x,nom}; M_{y,nom}$	kN·m	0.05	0.15	0.35	0.7	2
<b>Nominal torsional moment <math>M_z</math></b>	$M_{z,nom}$	kN·m	0.05	0.15	0.25	0.5	1.5
<b>Nominal sensitivity <math>F_x</math> &amp; <math>F_y</math><sup>1)</sup></b>	$C_{F_x,nom}; C_{F_y,nom}$	mV/V	1.5±0.3				1.3±0.3
<b>Nominal sensitivity <math>F_z</math><sup>1)</sup></b>	$C_{F_z,nom}$	mV/V	1.4±0.3				1.3±0.3
<b>Nominal sensitivity <math>M_x</math> &amp; <math>M_y</math><sup>1)</sup></b>	$C_{M_x,nom}; C_{M_y,nom}$	mV/V	1.8±0.3				
<b>Nominal sensitivity <math>M_z</math><sup>1)</sup></b>	$C_{M_z,nom}$	mV/V	1.4±0.3	1.6±0.3	1.1±0.3		
<b>Relative zero signal error, related to nominal sensitivity</b>	$d_{S,0}$	%	±1				
<b>Temperature effect per 10K in the nominal (rated) temperature range</b>							
on the output signal, related to the actual value	$TC_c$	%	<±0.2		<±0.1		
on the zero signal, related to the nominal (rated) sensitivity	$TC_0$	%	<±0.1		<±0.1		
<b>Linearity deviation, related to nominal sensitivity</b>	$d_{lin}$	%	<±0.05				
<b>Rel. reversibility error (<math>0.2F_{nom}</math> to <math>F_{nom}</math>), related to nominal sensitivity</b>	$U(d_{hy})$						
Forces ( $F_x, F_y$ & $F_z$ )		%	<±0.1				
Moments ( $M_x, M_y$ & $M_z$ )		%	<±0.1	<±0.15	<±0.1		
<b>Rel. creep over 30 mins.</b>	$d_{crF+E}$	%	<0.15				
<b>Rel. standard deviation of repeatability</b> per DIN 1319, related to the variation of the output signal	$\sigma_{rel}$	%	<±0.05				
<b>Input resistance<sup>2)</sup></b>	$R_i$	$\Omega$	300 ... 800				
<b>Output resistance<sup>2)</sup></b>	$R_o$	$\Omega$	300 ... 800				
<b>Insulation resistance</b>	$R_{is}$	$\Omega$	> $2 \times 10^9$				
<b>Reference excitation voltage</b>	$U_{ref}$	V	5				
<b>Operating range of the excitation voltage</b>	$B_{U,G}$	V	0.5 to 12				
<b>Nominal temperature range</b>	$B_{t,nom}$	°C	-10 to +70				
<b>Operating temperature range</b>	$B_{t,G}$	°C	-10 to +85				
<b>Storage temperature range</b>	$B_{t,s}$	°C	-30 to +85				
<b>Reference temperature</b>	$t_{ref}$	°C	+23				

1) The individual sensitivity can be found in the test certificate and is stored in the TEDS. This sensitivity has a maximum deviation of 0.5%

2) Dependent on measuring range and measuring bridge

## Specifications (continued)

Size				BG1	BG2		BG3	
Type				005	010	025	050	100
<b>Crosstalk without matrix compensation</b>								
Determined at uniaxial load. With a smaller, interfering component, crosstalk is reduced by the same factor. Matrix compensation can reduce the crosstalk.								
Influencing component	Affected component			Crosstalk at nominal load				
Lateral force ( $F_{x,nom}$ ; $F_{y,nom}$ )	Axial force ( $F_{z,nom}$ )	$XT_{F_x \rightarrow F_z}$	%	<±1	<±0.5	<±0.5		
		$XT_{F_y \rightarrow F_z}$	%	<±1	<±1	<±1		
Bending moment ( $M_{x,nom}$ ; $M_{y,nom}$ )		$XT_{M_x \rightarrow F_z}$	%	<±3	<±1	<±0.5		
Torsional moment ( $M_{z,nom}$ )		$XT_{M_z \rightarrow F_z}$	%	<±3	<±1	<±0.5		
Axial force ( $F_{z,nom}$ )	Lateral force ( $F_{x,nom}$ ; $F_{y,nom}$ )	$XT_{F_z \rightarrow F_x}$	%	<±3	<±1.5	<±1.5		
		$XT_{F_z \rightarrow F_y}$	%	<±1	<±0.5	<±0.3		
Lateral force ( $F_{x,nom}$ ; $F_{y,nom}$ )		$XT_{F_x \rightarrow F_x}$	%	<±2	<±1.5	<±1		
		$XT_{F_x \rightarrow F_y}$	%	<±2	<±1.5	<±1		
Bending moment ( $M_{x,nom}$ ; $M_{y,nom}$ )		$XT_{M_y \rightarrow F_x}$	%	<±2	<±1.5	<±1		
		$XT_{M_y \rightarrow F_y}$	%	<±2	<±1.5	<±1		
Torsional moment ( $M_{z,nom}$ )		$XT_{M_z \rightarrow F_x}$	%	<±3	<±3	<±1		
		$XT_{M_z \rightarrow F_y}$	%	<±3	<±3	<±1		
Axial force ( $F_{z,nom}$ )	Bending moment ( $M_{x,nom}$ ; $M_{y,nom}$ )	$XT_{F_z \rightarrow M_x}$	%	<±3	<±3	<±1.5		
		$XT_{F_z \rightarrow M_y}$	%	<±3	<±3	<±1.5		
Lateral force ( $F_{x,nom}$ ; $F_{y,nom}$ )		$XT_{F_x \rightarrow M_x}$	%	<±1.5	<±1.5	<±1.5		
		$XT_{F_x \rightarrow M_y}$	%	<±1.5	<±1.5	<±1.5		
		$XT_{F_y \rightarrow M_x}$	%	<±1.5	<±1	<±0.5		
		$XT_{F_y \rightarrow M_y}$	%	<±1.5	<±1	<±0.5		
Bending moment ( $M_{x,nom}$ ; $M_{y,nom}$ )		$XT_{M_x \rightarrow M_x}$	%	<±1.5	<±1	<±0.5		
		$XT_{M_x \rightarrow M_y}$	%	<±1.5	<±1	<±0.5		
Torsional moment ( $M_{z,nom}$ )		$XT_{M_z \rightarrow M_x}$	%	<±1.5	<±1	<±1		
		$XT_{M_z \rightarrow M_y}$	%	<±1.5	<±1	<±1		
Axial force ( $F_{z,nom}$ )	Torsional moment ( $M_{z,nom}$ )	$XT_{F_z \rightarrow M_z}$	%	<±3	<±1.5	<±1.5		
Lateral force ( $F_{x,nom}$ ; $F_{y,nom}$ )		$XT_{F_x \rightarrow M_z}$	%	<±3	<±1	<±1		
		$XT_{F_y \rightarrow M_z}$	%	<±3	<±1	<±1		
Bending moment ( $M_{x,nom}$ ; $M_{y,nom}$ )		$XT_{M_x \rightarrow M_z}$	%	<±1.5	<±1	<±1		
		$XT_{M_y \rightarrow M_z}$	%	<±1.5	<±1	<±1		

## Specifications (continued)

Size		BG1	BG2			BG3
Type		005	010	025	050	100
<b>Load limits</b>						
<b>Load ratio sum at multiaxial load (theoretical value for calculating load ranges)</b>						
$LRS = \left[ 1.5 \cdot \frac{\sqrt{F_x^2 + F_y^2}}{F_{x,nom}} + \frac{ F_z }{F_{z,nom}} + \frac{\sqrt{M_x^2 + M_y^2}}{M_{x,nom}} + 1.5 \cdot \frac{ M_z }{M_{z,nom}} \right] \cdot 100\%$						
<b>Criterion for the nominal (rated) measuring range</b> to be met at multiaxial load (The load of each individual component must not exceed its maximum capacity)		%	LRS<400		LRS<350	
<b>Criterion for the fatigue strength range</b> to be met at multiaxial <b>pulsating load</b> (The load of each individual component must not exceed its maximum capacity)		%	LRS<400		LRS<320	
<b>Criterion for the fatigue strength range</b> to be met at multiaxial <b>alternating load</b> (The load of each individual component must not exceed its maximum capacity)		%	LRS<300		LRS<250	
<b>Criterion for the static load range</b> to be met at multiaxial load (The load of each individual component must not exceed its limit load)		%	LRS<500		LRS<410	
<b>Lateral force limit (Fx, Fy)</b> , related to $F_{x,nom}; F_{y,nom}$ <sup>3)</sup>	$F_{x(y),L}$	%	150			
<b>Axial force limit (Fz)</b> , related to $F_{z,nom}$ <sup>3)</sup>	$F_{z,L}$	%	150			
<b>Bending moment limit (Mx, My)</b> , related to $M_{x,nom}; M_{y,nom}$ <sup>3)</sup>	$M_{x(y),L}$	%	130			
<b>Torsional moment limit (Mz)</b> , related to $M_{z,nom}$ <sup>3)</sup>	$M_{z,L}$	%	130			
<b>Criterion for the (static) range without break</b> to be met at multiaxial load (The load of each individual component must not exceed its breaking load)		%	LRS <650	LRS <750	LRS <550	LRS <650
<b>Lateral force at break (Fx, Fy)</b> , related to $F_{x,nom}; F_{y,nom}$ <sup>3)</sup>	$F_{x(y),B}$	%	>300			
<b>Axial force at break (Fz)</b> , related to $F_{z,nom}$ <sup>3)</sup>	$F_{z,B}$	%	>300			
<b>Bending moment at break (Mx, My)</b> , related to $M_{x,nom}; M_{y,nom}$ <sup>3)</sup>	$M_{x(y),B}$	%	>300			
<b>Torsional moment at break (Mz)</b> , related to $M_{z,nom}$ <sup>3)</sup>	$M_{z,B}$	%	>300			

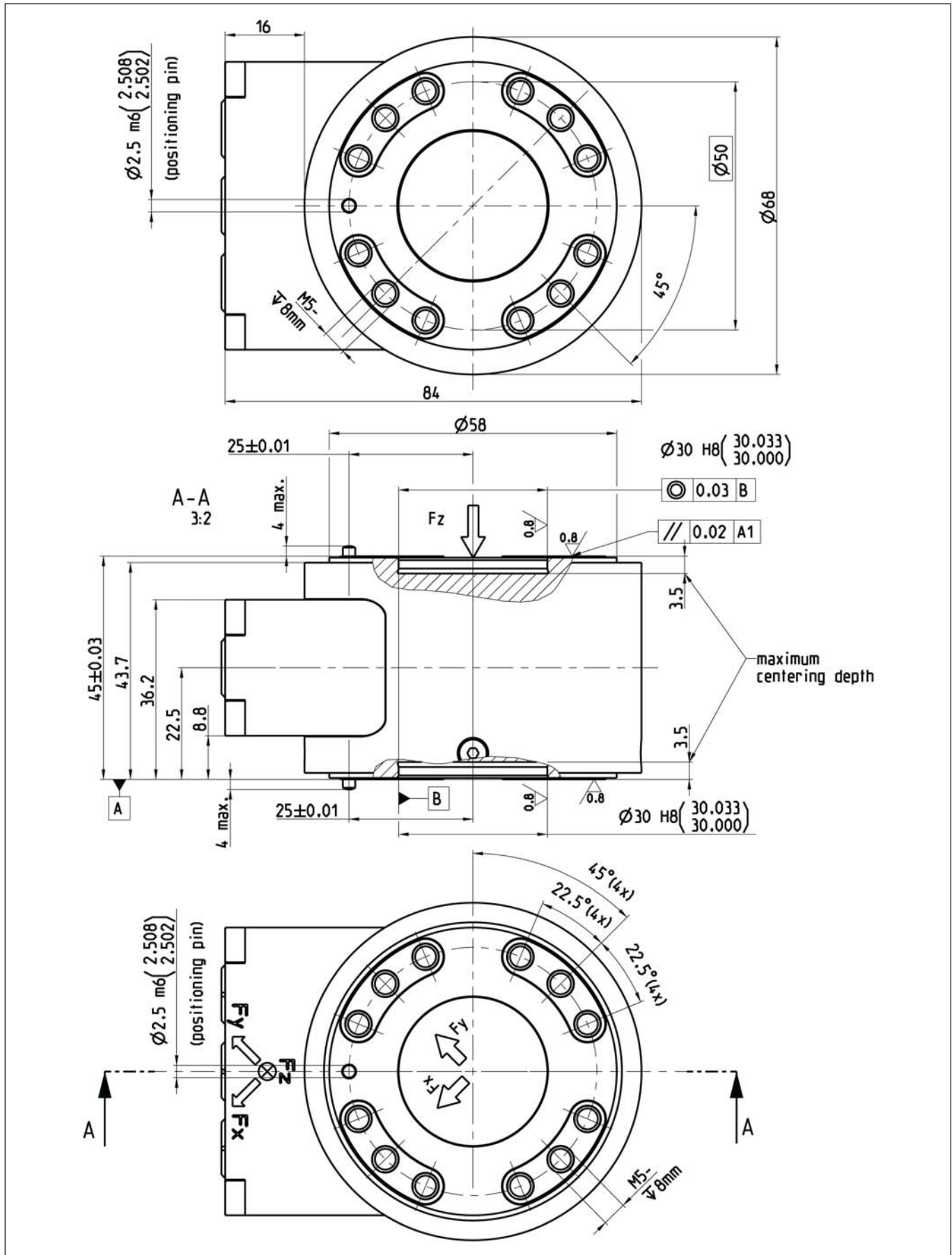
<sup>3)</sup> At static load and uniaxial load

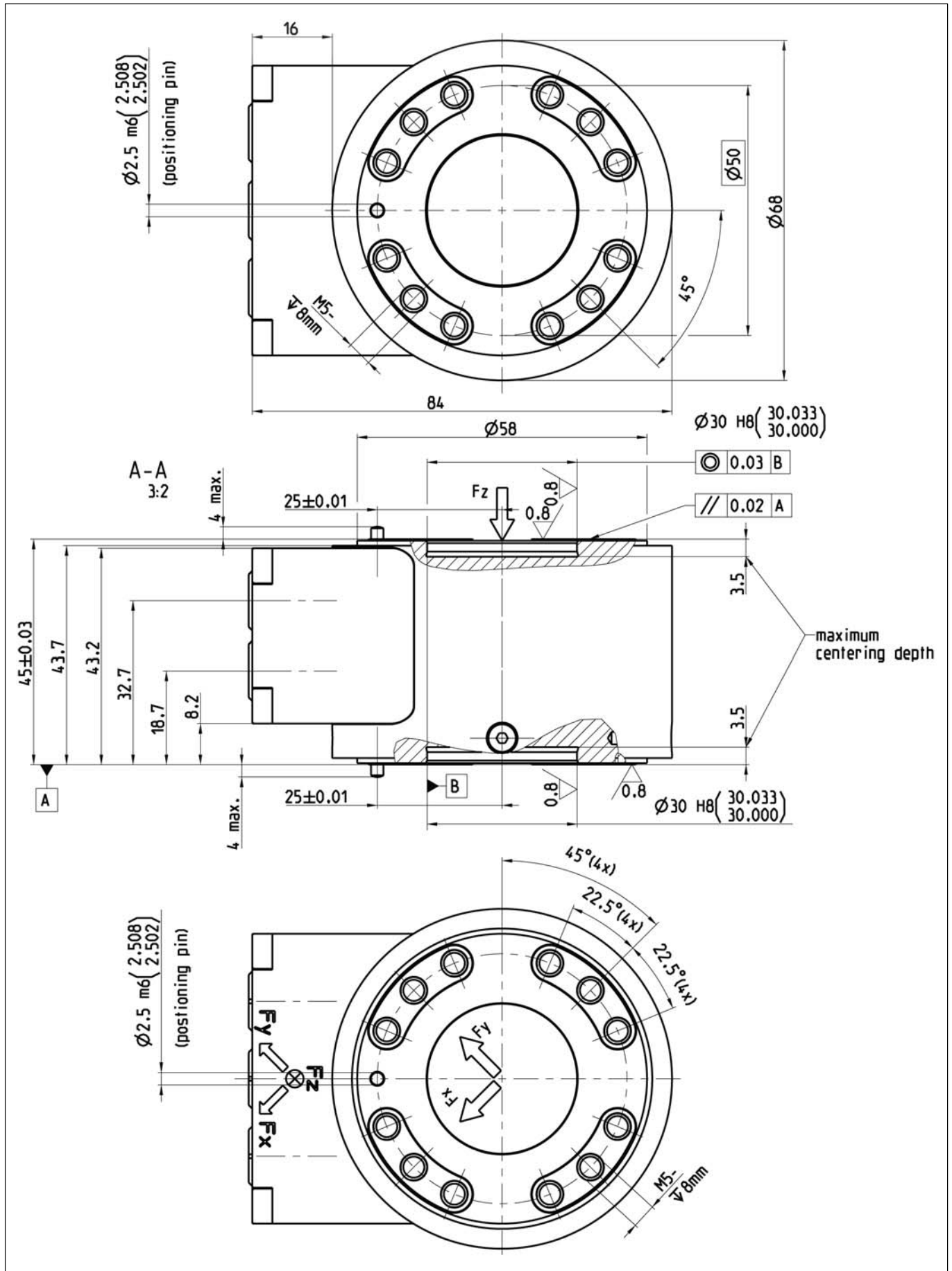
The load criteria apply to the sum of all simultaneously occurring loads, regardless of whether these are measured or parasitic.

The origin of the sensor coordinates is in the geometric center (half the height of the sensor). In the application, the bending moment generated by a lateral force must be taken into account when determining the maximum bending moment that can occur. Please note that half the height of the sensor must be taken into account as an additional lever arm.

## Specifications (continued)

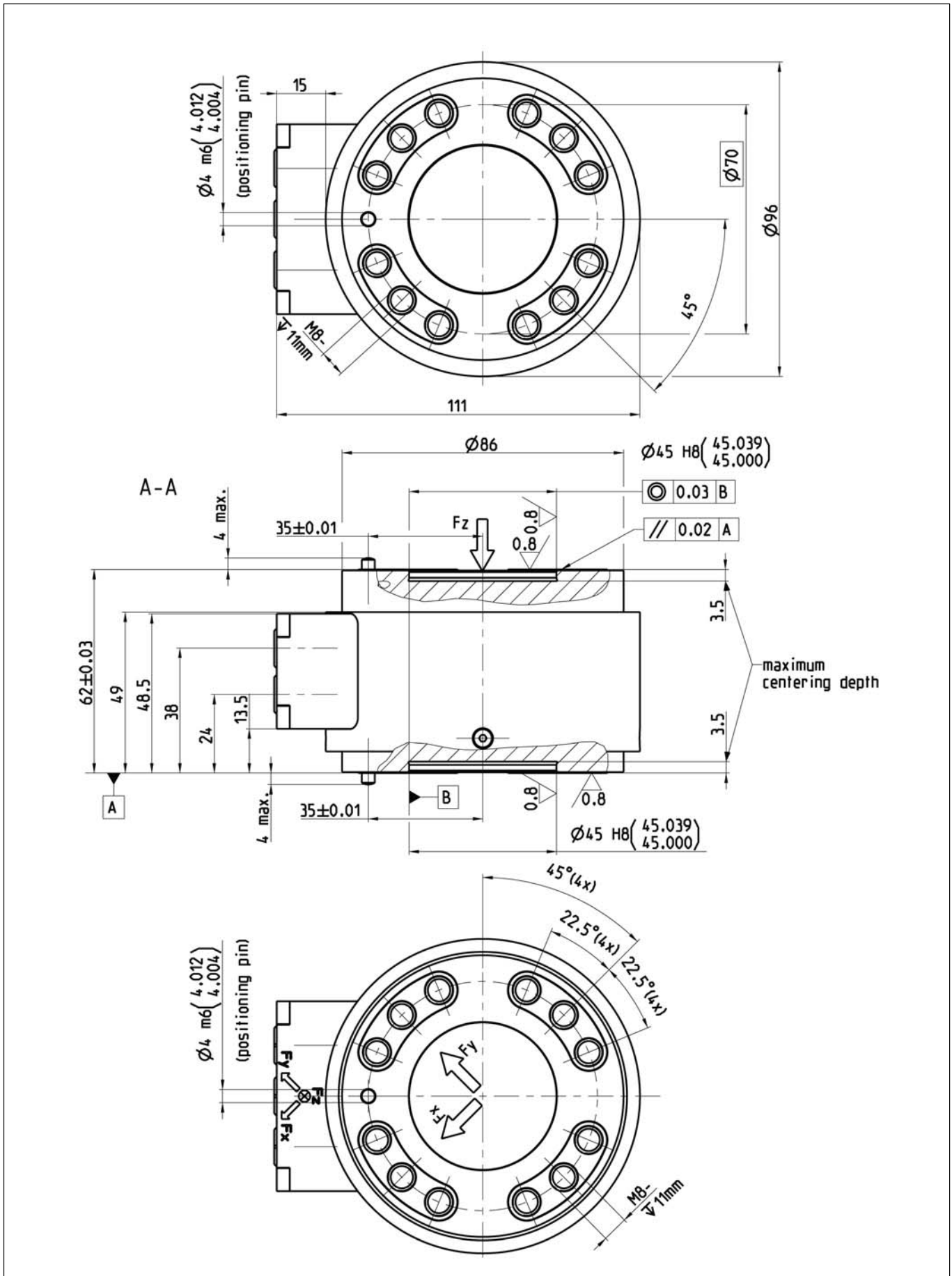
Size		BG1	BG2			BG3
Type		005	010	025	050	100
<b>Mechanical values</b>						
Nominal (rated) displacement at lateral force F <sub>x</sub> & F <sub>y</sub>	mm	<0.02	<0.03	<0.03	<0.04	<0.04
Nominal (rated) displacement at axial force F <sub>z</sub>	mm	<0.03	<0.04	<0.05	<0.05	<0.05
Tilt angle at M <sub>x,nom</sub> ; M <sub>y,nom</sub>	degrees	<0.04	<0.05	<0.05	<0.06	<0.05
Torsion angle at M <sub>z,nom</sub>	degrees	<0.08	<0.08	<0.06	<0.07	<0.08
Stiffness in the axial direction (z)	kN/mm	353	471	993	1664	3018
Stiffness in the radial direction (x or y)	kN/mm	37	54	117	202	452
Stiffness during the bending moment round a radial axis (x or y)	kN·m/degrees	1.37	3.75	7.93	13.34	41.45
Stiffness during the torsional moment round the axial axis (z)	kN·m/degrees	0.69	2.14	4.59	7.59	27.43
<b>General information</b>						
Weight (approx.)	kg	0.5	1.0	1.8	3.8	
Material: Measuring body		Titanium alloy		Stainless steel		
Material: Housing		Aluminum alloy, powder coated				
Degree of protection per EN 60529		IP67				
Maximum cable length (6-wire configuration) of the standard cable for multiple components	m	50				
Transducer identification		TEDS, per IEEE 1451.4				
Emission (EME) (EN 61326-1, Section 7) RFI field strength		Class B				
Immunity to interference (EN 61326-1, Table 2)						
Electromagnetic fields (AM)	V/m	10				
Power-frequency magnetic fields	A/m	100				
Electrostatic discharge (ESD)						
Contact discharge	kV	4				
Air discharge	kV	8				
Fast transients (burst)	kV	1				
Impulse voltages (surge)	kV	1				
Conducted interference (AM)	V	10				
Mechanical shock (EN 60068-2-27)						
Number	n	1000				
Duration	ms	3				
Acceleration (half sine)	m/s <sup>2</sup>	650				
Vibration in 3 directions (EN 60068-2-6)						
Frequency range	Hz	10...2000				
Duration	h	2.5				
Acceleration (amplitude)	m/s <sup>2</sup>	150				





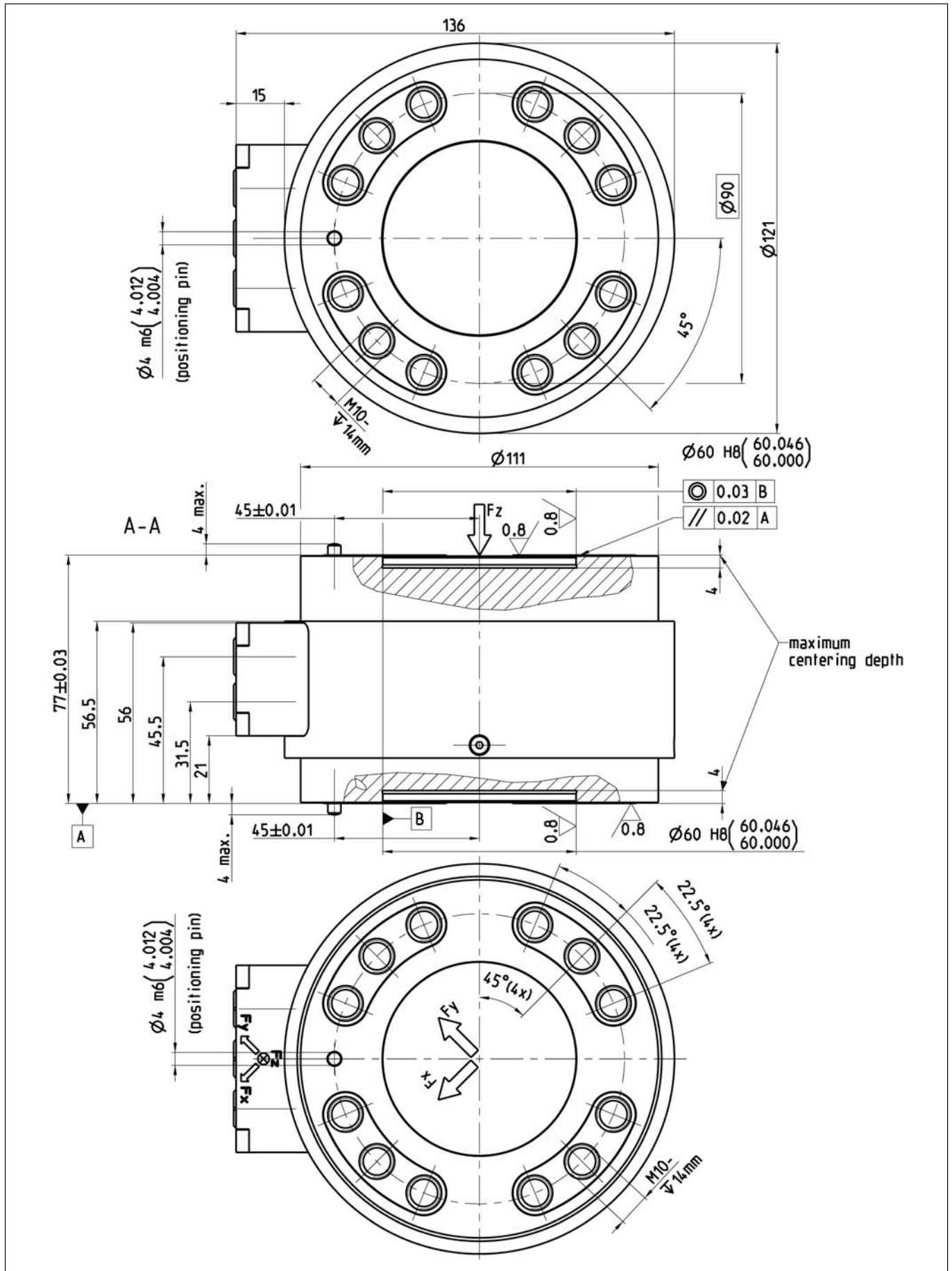




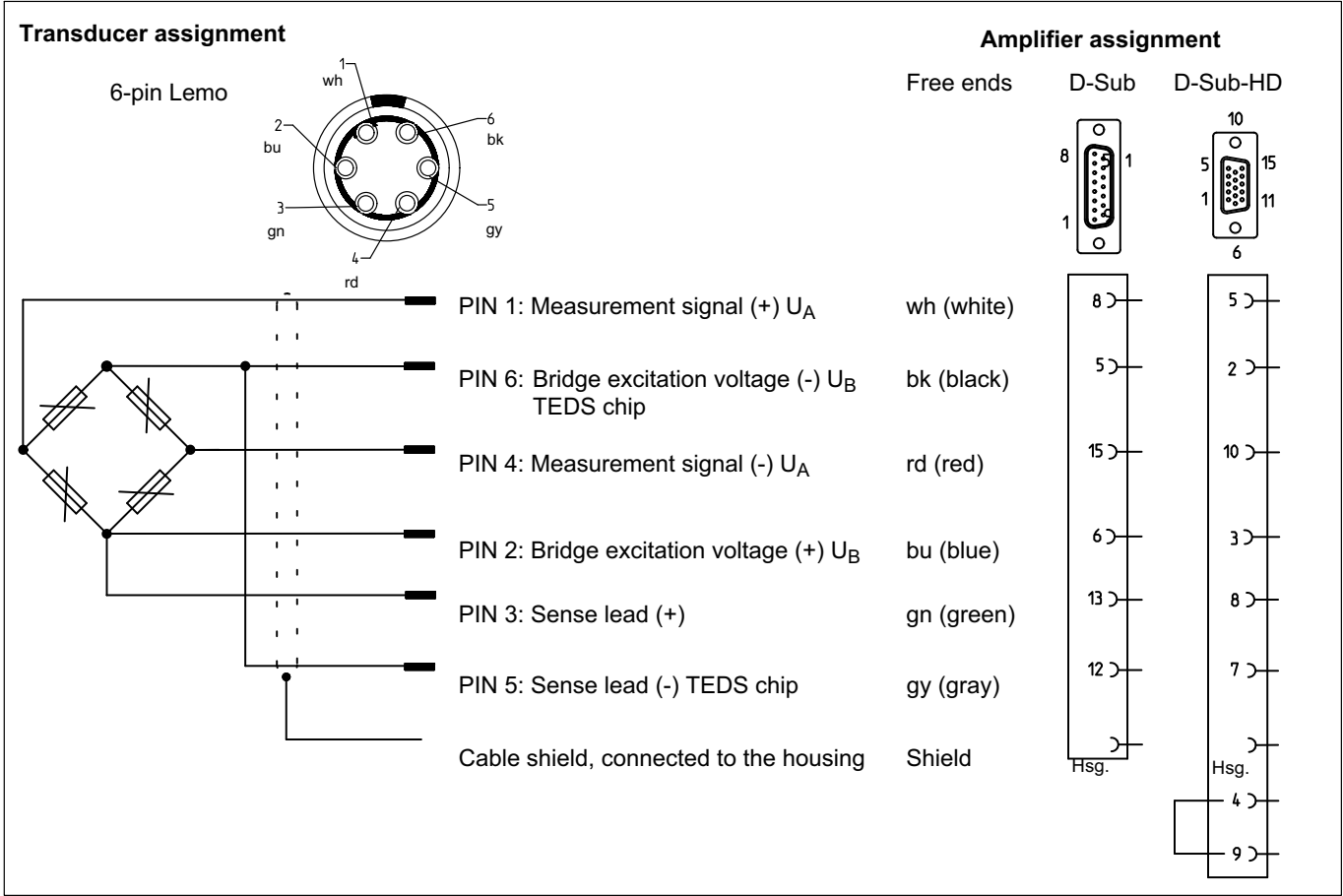




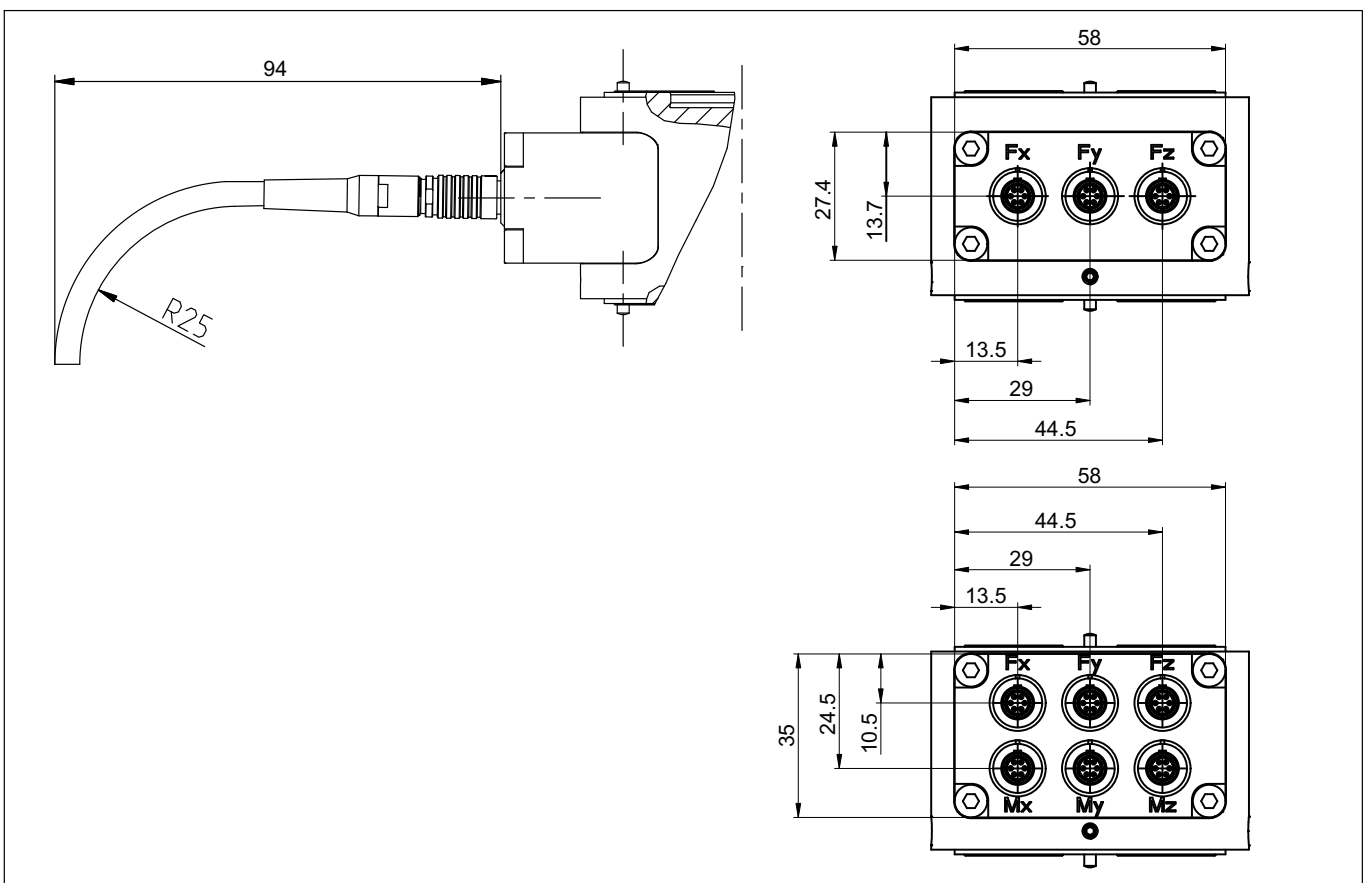
MCS10-100-6C



# Pin assignment



# Cable



## Ordering number MCS10

Ordering number		
<b>K-MCS10</b>		
1	Code	Measurement range
	<b>005</b>	$F_x=1$ kN; $F_y=1$ kN; $F_z=5$ kN; $M_x=0.05$ kNm; $M_y=0.05$ kNm; $M_z=0.05$ kNm
	<b>010</b>	$F_x=2$ kN; $F_y=2$ kN; $F_z=10$ kN; $M_x=0.15$ kNm; $M_y=0.15$ kNm; $M_z=0.15$ kNm
	<b>025</b>	$F_x=5$ kN; $F_y=5$ kN; $F_z=25$ kN; $M_x=0.35$ kNm; $M_y=0.35$ kNm; $M_z=0.25$ kNm
	<b>050</b>	$F_x=10$ kN; $F_y=10$ kN; $F_z=50$ kN; $M_x=0.7$ kNm; $M_y=0.7$ kNm; $M_z=0.5$ kNm
<b>100</b>	$F_x=20$ kN; $F_y=20$ kN; $F_z=100$ kN; $M_x=2$ kNm; $M_y=2$ kNm; $M_z=1.5$ kNm	
2	Code	Version
	<b>3C</b>	Option for 3 components - only forces ( $F_x$ , $F_y$ & $F_z$ )
	<b>6C</b>	Option for 6 components - obligatory for moments
3	Code	Component $F_x$
	<b>FX</b>	Measurement output $F_x$
	<b>00</b>	No measurement output
4	Code	Component $F_y$
	<b>FY</b>	Measurement output $F_y$
	<b>00</b>	No measurement output
5	Code	Component $F_z$
	<b>FZ</b>	Measurement output $F_z$
	<b>00</b>	No measurement output
6	Code	Component $M_x$
	<b>MX</b>	Measurement output $M_x$
	<b>00</b>	No measurement output
7	Code	Component $M_y$
	<b>MY</b>	Measurement output $M_y$
	<b>00</b>	No measurement output
8	Code	Component $M_z$
	<b>MZ</b>	Measurement output $M_z$
	<b>00</b>	No measurement output

For example:

**K-MCS10** - 

0	1	0
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6	C
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 - 

F	X
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 - 

F	Y
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 - 

0	0
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 - 

M	X
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 - 

0	0
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 - 

M	Z
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1            2            3            4            5            6            7            8

### Accessories (to be ordered separately)

Article	Ordering number
Configurable connection cable	K-KAB-M
Connection cable 6 m with free ends	1-KAB146-6

Subject to modifications.  
All product descriptions are for general information only. They are not to be understood as a guarantee of quality or durability.

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**measure and predict with confidence**

