

# Multicomponent Force Plate

-15 ... 30 kN, Mounting Plate 600x400 mm

Type 9253B...

Quartz multicomponent force plate for measuring forces and moments. Large measuring range and wide frequency response.

- Top plate: aluminum or steel
- Top plates available with tapped holes or T-slots, too
- Easy mounting
- Stable and reliable

### Description

The multicomponent force plate consists of four force measuring elements. Each element contains a preloaded force sensor. The force sensor contains quartz rings which are mounted between two steel plates in the housing of the sensor.

Two quartz rings are sensitive to shear and measure the force components  $F_x$  and  $F_y$ , while a quartz ring sensitive to pressure measures the component  $F_z$  of a force acting in any direction on the force plate. The electrical charges proportional to the different components are led via electrodes to the connector contacts.

The 12 outputs of the four force measuring elements are connected in the summing box so that the 3 force components  $F_x$ ,  $F_y$ ,  $F_z$  can be measured whereas the 3 moment components  $M_x$ ,  $M_y$ ,  $M_z$  can be calculated.

The four sensors are mounted ground-isolated. Therefore ground loop problems are largely eliminated.

The force plate is corrosion-resistant and protected against penetration of splashwater and cooling agents. Together with a connecting cable Type 1687B5 or 1677A5 the force plate corresponds to the degree of protection IP67.

An apron protects both sensor and cable from mechanical damage.



### Applications

- Dynamic and quasistatic measurement of the three orthogonal components of a force.
- Cutting force measurements while milling and grinding in larger machines and in machining centers.
- Measurements on stamping machines.
- Measurements on wind tunnel models.
- Measurements of supporting forces on machinery foundations.
- Measurements on rocket propulsion units.
- Measurements of wheel forces.
- Measurements of impact forces.

### Technical Data

			9253B11/B12	9253B21/22	9253B23
Range	$F_x, F_y$	kN	-10 ... 10	-15 ... 15	-12 ... 12
	$F_z$	kN	-10 ... 20	-15 ... 30	-12 ... 25
Calibrated partial range	$F_x, F_y$	kN	0 ... 1	0 ... 1,5	0 ... 1,2
	$F_z$	kN	0 ... 2	0 ... 3	0 ... 2,5
Overload	$F_x, F_y$	kN	-15/15	-20/20	-15/15
	$F_z$	kN	-15/30	-20/40	-15/30
Threshold		N	<0,01	<0,01	<0,01
Sensitivity	$F_x, F_y$	pC/N	≈-7,8	≈-7,8	≈-7,8
	$F_z$	pC/N	≈-3,7	≈-3,7	≈-3,7
Variation of the sensitivity with a force acting within the top plate	$F_x, F_y, F_z$	%	±1	±1	±1

Other Technical Data			9253B11/12	9253B21/B22	9253B23
Linearity, all ranges		%FSO	$\leq \pm 0,5$	$\leq \pm 0,5$	$\leq \pm 0,5$
Hysteresis, all ranges		%FSO	$\leq 0,5$	$\leq 0,5$	$\leq 0,5$
Cross talk		%	$\leq \pm 2$	$\leq \pm 2$	$\leq \pm 2$
Rigidity	$c_x$	N/ $\mu$ m	$\approx 625$	$\approx 750$	$\approx 850$
	$c_y$	N/ $\mu$ m	$\approx 650$	$\approx 850$	$\approx 750$
	$c_z$	N/ $\mu$ m	$\approx 250$	$\approx 450$	$\approx 250$
Natural frequency	$f_n(x)$	Hz	$\approx 800$	$\approx 580$	$\approx 610$
	$f_n(y)$	Hz	$\approx 750$	$\approx 550$	$\approx 570$
	$f_n(z)$	Hz	$\approx 850$	$\approx 720$	$\approx 570$
Operating temperature		$^{\circ}$ C	-20 ... 70	-20 ... 70	-20 ... 70
Capacitance (each channel)	$F_x, F_y$	pF	$\approx 600$	$\approx 600$	$\approx 600$
	$F_z$	pF	$\approx 600$	$\approx 600$	$\approx 600$
Insulation resistance (20 $^{\circ}$ C)		$\Omega$	$> 10^{13}$	$> 10^{13}$	$> 10^{13}$
Ground isolation		$\Omega$	$> 10^8$	$> 10^8$	$> 10^8$
Degree of protection EN60529			IP67	IP67	IP67
Weight		kg	40	90	85

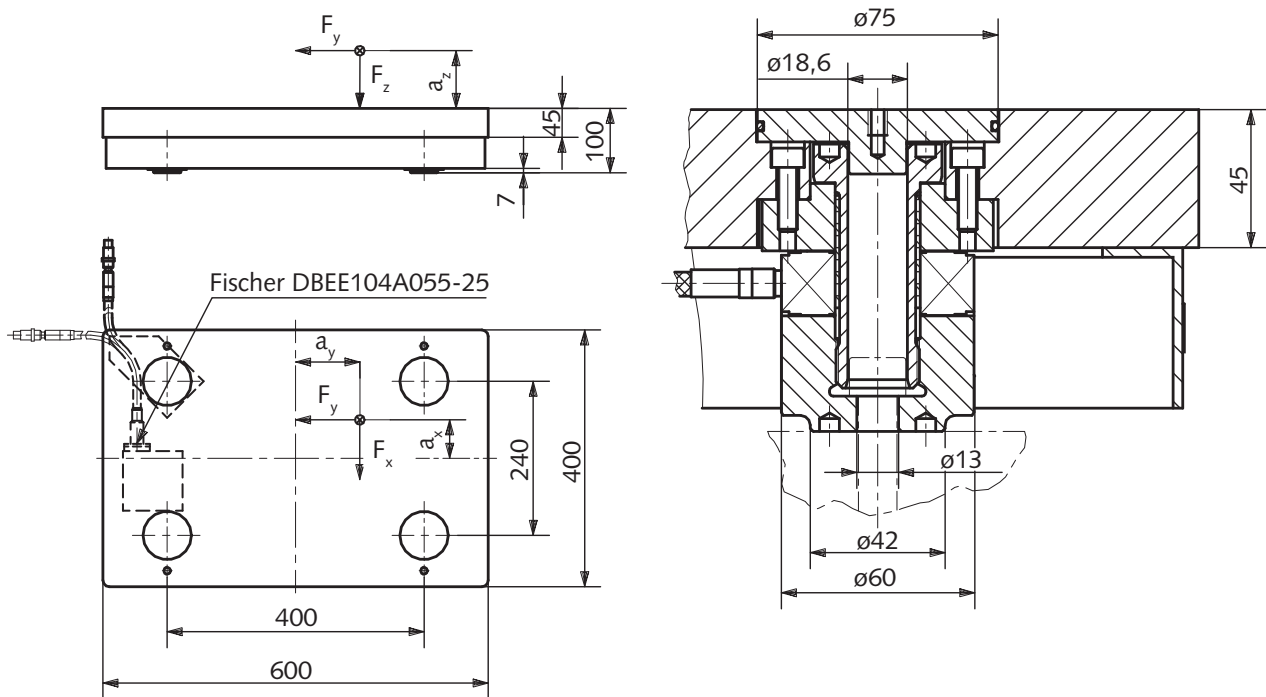


Fig.1: Type 9253B11 (aluminum top plate, smooth)

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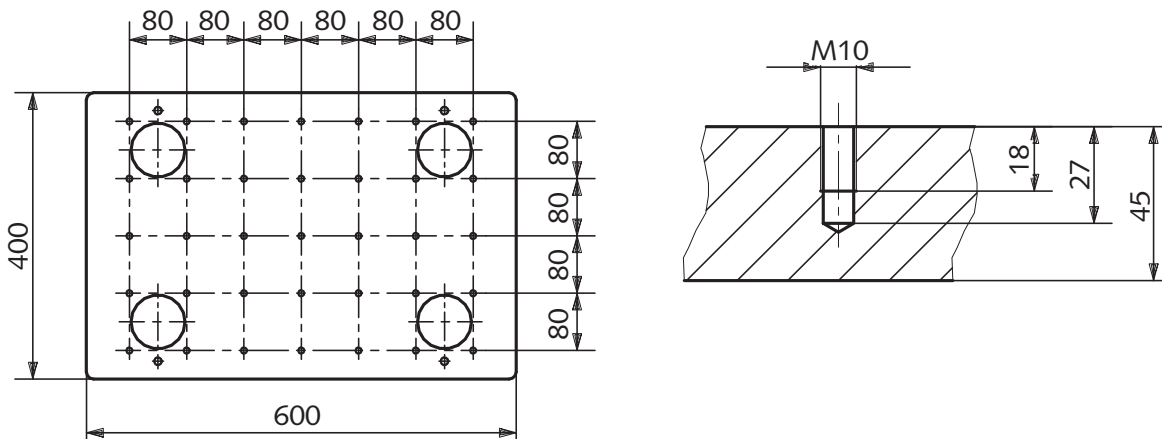


Fig. 2: Type 9253B12 (aluminum top plate with tapped holes)

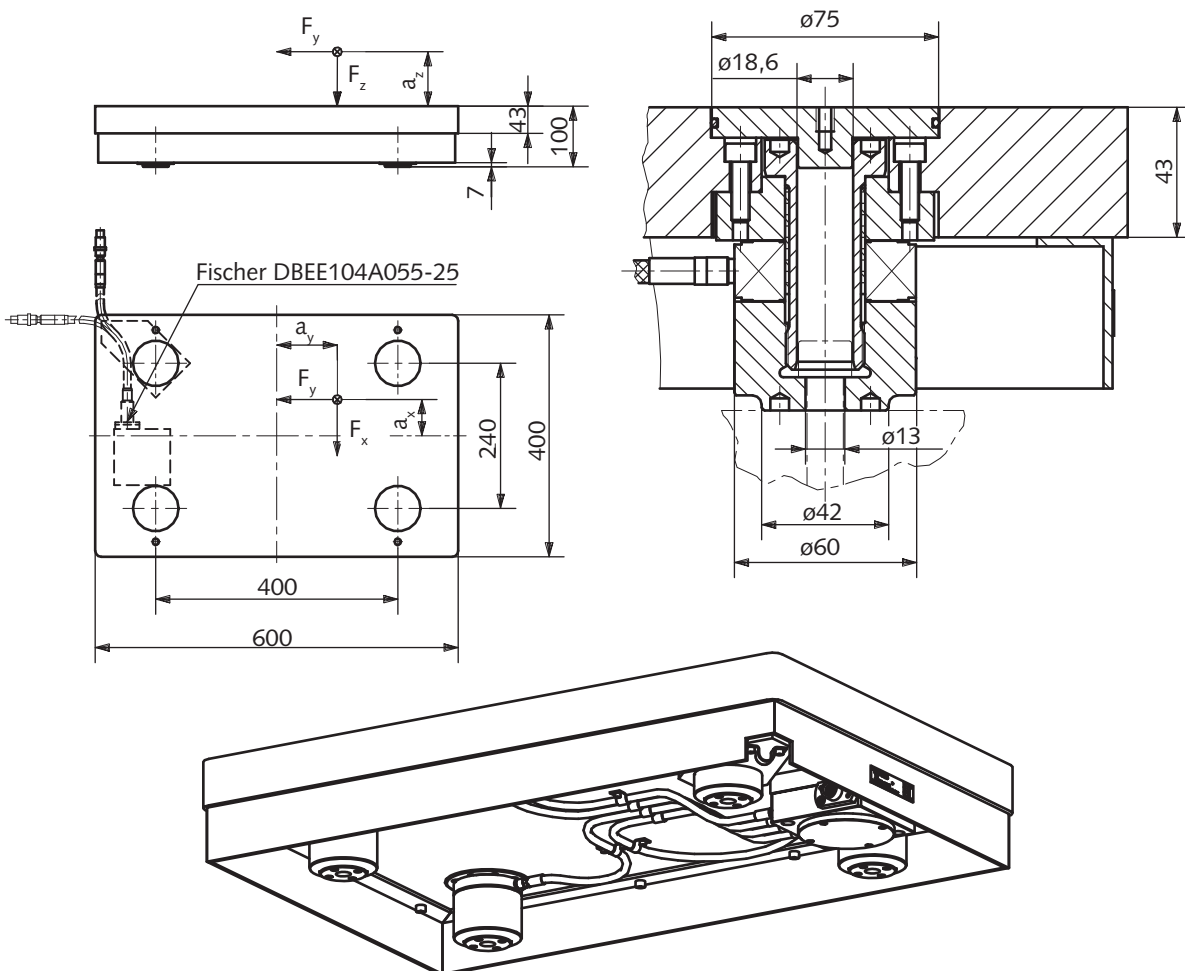


Fig. 3: Type 9253B21 (steel top plate, smooth)

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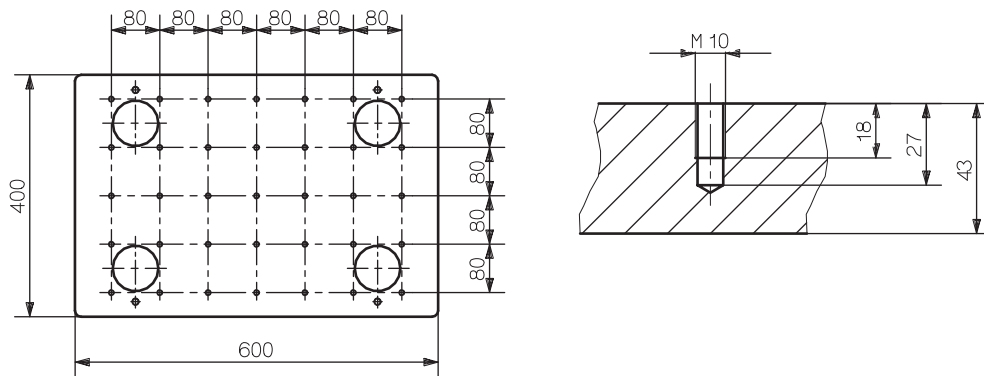


Fig. 4: Type 9253B22 (steel top plate with tapped holes)

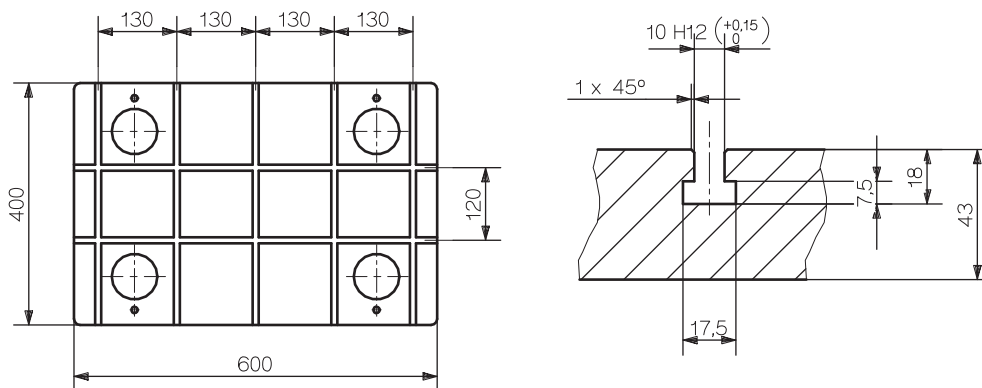


Fig. 5: Type 9253B23 (steel top plate with T-slots)

**Mounting**

The force plate can be fixed with four M12-bolts on a flat, clean mounting surface.

**Signal Conditioning**

A multichannel charge amplifier (e.g. Type 5070A...) is also needed to build a complete measuring system. The measurement signal is converted into an electrical voltage in the individual channels. The measured value is exactly proportional to the force acting.

**Accessories (Optional)**

**For 3-Component Force Measurements**

- | $F_x, F_y, F_z$                          | Type   |
|--|--------|
| • Connecting cable, length 5 m (3 leads) | 1687B5 |
| • Extension cable, length 5 m (3 leads)  | 1688B5 |

**For 6-Component Force and Moment Measurements**

- | $F_x, F_y, F_z, M_x, M_y, M_z$           | Type   |
|--|--------|
| • Connecting cable, length 5 m (8 leads) | 1677A5 |
| • Extension cable, length 5 m (8 leads)  | 1678A5 |

**Ordering Key**

Type 9253B

**Aluminum top plate**

smooth	11
with tapped holes	12

**Steel top plate**

smooth	21
with tapped holes	22
with T-slots	23

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