

# Multicomponent Dynamometer

-20 ... 40 kN, Mounting Plate 260x260 mm

Type 9255B

Quartz 3-component dynamometer for measuring the three orthogonal components of a force. The dynamometer has a great rigidity and consequently a high natural frequency. Its high resolution enables the smallest dynamic changes in large forces to be measured.

- Wide measuring range
- For heavy duty application
- Compact design

## Description

The dynamometer consists of four 3-component force sensors fitted under high preload between a baseplate and a top plate. Each sensor contains three pairs of quartz plates, one sensitive to pressure in the z direction and the other two responding to shear in the x and y directions respectively. The force components are measured practically without displacement.

The outputs of the four built-in force sensors are connected inside the dynamometer in a way to allow multicomponent measurements of forces and moments to be performed. The eight output signals are available at the 9-conductor flange socket. The four sensors are mounted ground-insulated. Therefore ground loop problems are largely eliminated.

The dynamometer is rustproof and protected against penetration of splashwater and cooling agents. Together with the connecting cable Type 1687B5/1689B5 and Type 1677A5/1679A5 it corresponds to the protection class IP67.

## Application Examples

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



## Technical Data

Range	$F_x, F_y$	kN	-20 ... 20 <sup>1)</sup>
	$F_z$	kN	-10 ... 40 <sup>1)</sup>
Calibrated partial range	$F_x, F_y$	kN	0 ... 2
	$F_z$	kN	0 ... 4
Overload	$F_x, F_y$	kN	-24/24
	$F_z$	kN	-12/48
Threshold		N	<0,01
Sensitivity	$F_x, F_y$	pC/N	≈-8
	$F_z$	pC/N	≈-3,7
Linearity, all ranges		%FSO	≤±1
Hysteresis, all ranges		%FSO	≤0,5
Cross talk		%	≤±2
Rigidity	$c_x, c_y$	kN/μm	>2
	$c_z$	kN/μm	>3
Natural frequency	$f_n (x, y, z)$	kHz	≈3
Natural frequency (mounted on flanges)	$f_n (x, y)$	kHz	≈1,7
	$f_n (z)$	kHz	≈2
Natural frequency (mounted on flanges and through top plate)	$f_n (x, y)$	kHz	≈2
	$f_n (z)$	kHz	≈3,3
Operating temperature range		°C	0 ... 70
Temperature coefficient of sensitivity		%/°C	-0,02
Capacitance (of channel)		pF	≈500
Insulation resistance (20 °C)		Ω	>10 <sup>13</sup>
Ground insulation		Ω	>10 <sup>8</sup>
Protection class EN60529		-	IP67 <sup>2)</sup>
Weight		kg	52

<sup>1)</sup> Application of force inside and max. 100 mm above top plate area.

<sup>2)</sup> With connecting cable Types 1687B5, 1689B5, 1677A5, 1679A5

1 N (Newton) = 1 kg · m · s<sup>-2</sup> = 0,1019... kp = 0,2248... lbf; 1 inch = 25,4 mm; 1 kg = 2,2046... lb; 1 N·m = 0,73756... lbft

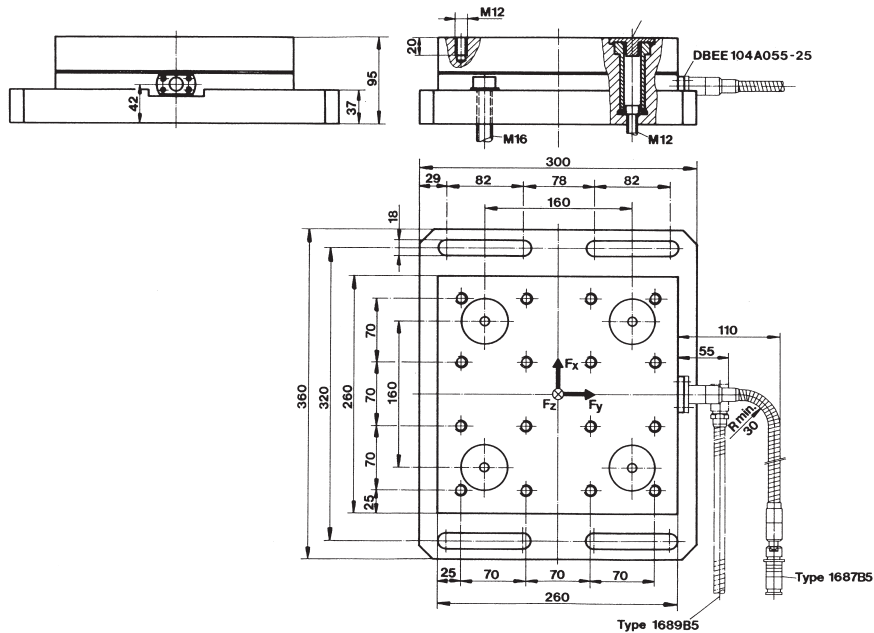


Fig. 1: Dimensions of dynamometer Type 9255B

### Mounting

The dynamometer may be mounted with screws or claws on any clean, face-ground supporting surface, such as the table of a machine tool for example.

In order to provide a still better coupling of the measuring instrument with the mounting surface, the dynamometer can, if necessary, additionally be screwed down through the four bores in the top plate. This measure allows to reach a higher resonant frequency of the measuring system. Uneven supporting surface may set up internal stresses, which will impose severe additional loads on the individual measuring elements and may also increase cross talk.

For mounting the force-introducing components, mainly workpieces, sixteen M12 mm blind tap holes in the cover plate are available.

The supporting surfaces for the force-introducing parts must be face-ground to obtain good mechanical coupling to the cover plate.

### Signal Conditioning

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

### Optional Accessories

#### For 3-Component Force Measurements

$F_x, F_y, F_z$

- Connecting cable, length  $l = 5$  m (3 leads)
- Extension cable, length  $l = 5$  m (3 leads)

Type

1687B5  
1689B5  
1688B5

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

$F_x, F_y, F_z / M_x, M_y, M_z$

- Connecting cable, length  $l = 5$  m (8 leads)
- Extension cable, length  $l = 5$  m (8 leads)

Type

1677A5  
1679A5  
1678A5

#### Ordering Code

- Multicomponent Dynamometer

Type

9255B

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