

3-Component Dynamometer

with built-in Charge Amplifiers up to 10 kN

Type 9257BA, 9403, 5233A1

Quartz dynamometer for measuring the three orthogonal components of a force.

- Reliable force measurement system
- For measuring cutting forces measuring in milling, grinding and turning
- Built-in charge amplifiers – simple operation
- 4 switchable measuring ranges
- Conforms to CE per directive 89/336/EEC

Description

The dynamometer consists of four 3-component force sensors fitted under high preload between a base plate and a cover plate. The force components are measured practically without displacement.

The four sensors are fitted so that they are ground-isolated. This largely excludes ground loop problems.

The dynamometer is corrosion-resistant and protected against penetration by spray water and cutting fluid (IP 67).

The cover plate is fitted with a special thermal insulation layer which makes the dynamometer largely insensitive to temperature influences.

A 3-channel charge amplifier is built-in the dynamometer. Therefore, the output signal at the dynamometer is of low impedance. The integrated cable is connected to the control unit Type 5233A1. The control unit can select the four measuring ranges in two groups (F_x and F_y resp. F_z).

The dynamometer and the control unit meet CE requirements according to EU Directive 89/336/EEC and comply with EMC standards for industrial equipment (interference emission EN 50081-2 and interference immunity EN 50082-2). The control unit is easy to operate and contains power pack, keyboard with status displays together with a connector for signal input. The output voltages are proportional to the forces occurring.



Application

- General 3-component force measurement (dynamic and quasistatic)
- Cutting force measurements for optimization of the manufacturing process (temporary measurement)
- Cutting force measurements (turning, milling, grinding) for training purposes

Technical Data

Dynamometer Type 9257BA

Range 1	F _x , F _y	kN	-0,5 ... 0,5
	F _z	kN	-1 ... 1
Range 2	F _x , F _y	kN	-1 ... 1
	F _z	kN	-2 ... 2
Range 3	F _x , F _y	kN	-2 ... 2
	F _z	kN	-5 ... 5
Range 4 F _z for F _x and F _y ≤ 0,5 F _z	F _x , F _y	kN	-5 ... 5 ¹⁾
	F _z	kN	-5 ... 10 ²⁾
Overload F _z for F _x and F _y ≤ 0,5 F _z	F _x , F _y , F _z	kN	-7,5/7,5
	F _z	kN	-7,5/15
Threshold		N	<0,01
Sensitivity Range 1	F _x , F _y	mV/N	10,0
	F _z	mV/N	5,00
Linearity, all ranges		% FSO	≤±1
Hysteresis, all ranges		% FSO	≤0,5
Cross talk		%	≤±3
Rigidity	c _x , c _y	kN/μm	>1
	c _z	kN/μm	>2
Natural frequency (mounted on flanges)	f _n (x,y)	kHz	≈2,0
	f _n (z)	kHz	≈3,5
Operating temperature range		°C	0 ... 60
Drift (charge amplifier) at 25 °C	F _x , F _y	N/s	≤±0,005
	F _z	N/s	≤±0,01
Ground isolation		MΩ	>100
Connecting cable (integral)	l	m	5
Degree of protection			IP 67
Weight		kg	7,4

1) Application of force inside and max. 25 mm above top plate area.

2) Range for turning, application of force at point A.

Control Unit Type 5233A1

Number of channels		3
Number of ranges per channel		4
Output signal	V	±5
Cut-off frequency of the built-in filter	Hz	200
Output connector	3xBNC neg. 37 pin D-Sub	
Operating temperature range	°C	0 ... 60
Power supply (switchable)	V/AC	230/115
	%	+15/-22
Power consumption	VA	<23
Dimensions	mm	170x126x55
Weight	kg	1,52

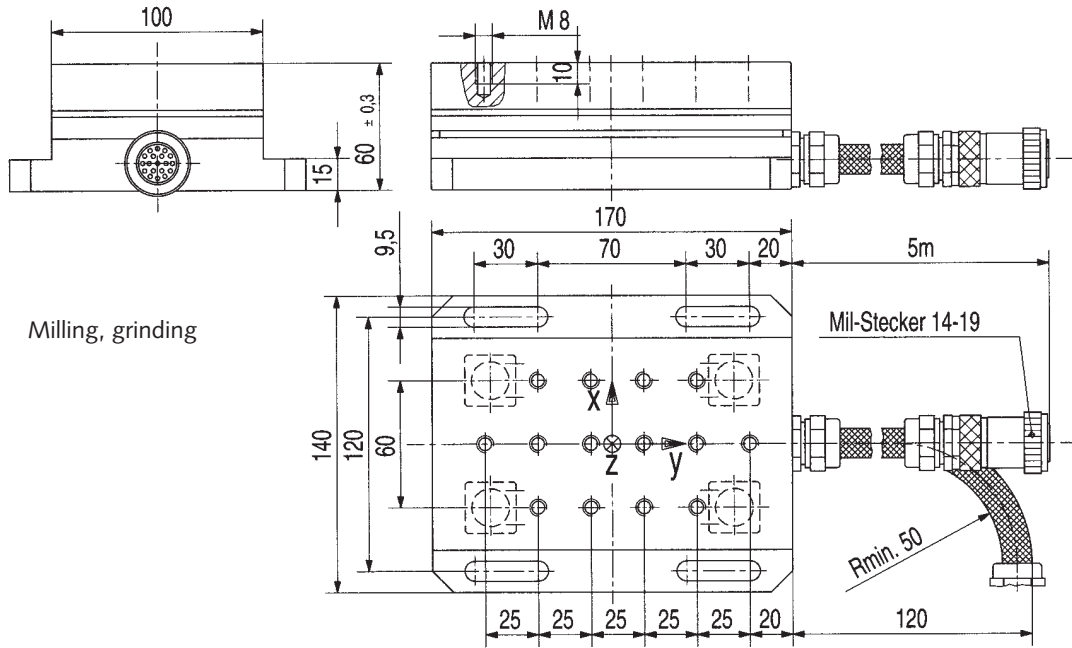


Fig. 1: Dimensions of Dynamometer Type 9257BA

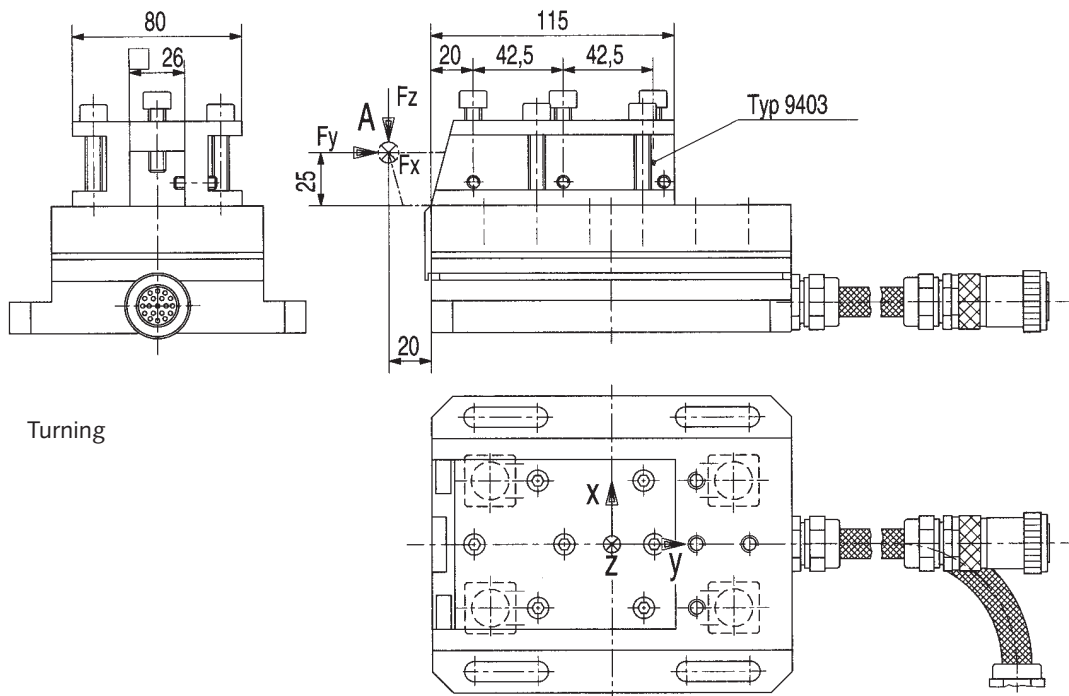


Fig. 2: Dimensions of Dynamometer Type 9257BA with tool holder Type 9403 mounted

000-150e-06.03 (DB06.9257BAe)

Mounting

The dynamometer can be mounted with screws or clamps to any face-ground, clean mounting surface such as, for example, on a machine tool table. It must be noted that uneven contact surfaces may cause internal distortions, placing additional heavy stresses on the individual measuring elements and increasing the cross talk.

There are 14 M8x1,25 threaded holes provided in the cover plate for clamping the force-inducing components such as turning tools and workpieces. The contact surfaces of the force-introducing parts must be surface ground to achieve good mechanical coupling to the cover plate.

The tool holder Type 9403 can be used for problem-free mounting of cutting tools up to a shaft cross-section of 26x26 mm.

The tool holder is not included in the parts supplied and must be ordered separately.

Accessories Included

Accessories Included	Type
• Cover	3.322.275
• Mounting screw	6.150.058
• Connector	3.640.603
• Mounting screw	6.131.030

Optional Accessories

Optional Accessories	Type
• Tool holder (for cutting force measurements when turning)	9403
• Control Unit	5233A1
• Connecting cable	1500B5

Ordering Key

Ordering Key	Type
3-Component Dynamometer	9257BA

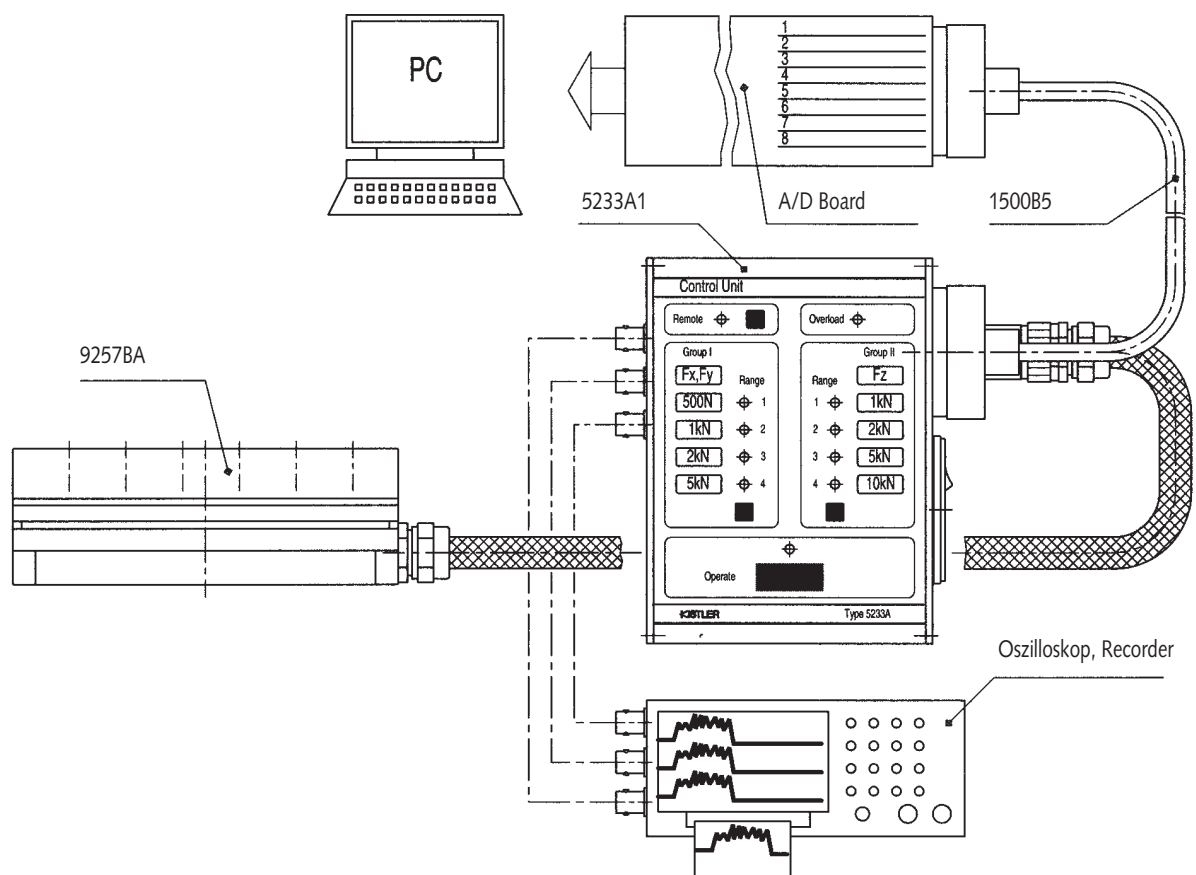


Fig. 3: Measuring system