

Quartz Crystal Miniature Force Sensor

Type 9211B

for Measuring Dynamic and Quasistatic Forces

Miniature quartz crystal force sensor for measuring dynamic and quasistatic forces from a few mN up to 2,5 kN. The Type 9211B has the highest resolution, high natural frequency, extremely small size. Welded design with high-temperature cable sealed into the housing.

- Extremely compact
- 2 calibrated measuring ranges
- Extremely rigid

Description

The charge signal (pC = Pico-Coulomb) yielded by the force sensor is converted into a proportional output voltage in the Kistler charge amplifier; the output voltage is largely independent of the length of the sensor cable. The maximum possible output voltage from the standard amplifier is 10 V. In the most sensitive range, this gives 25 N/V for miniature force sensor Type 9211B.

Application

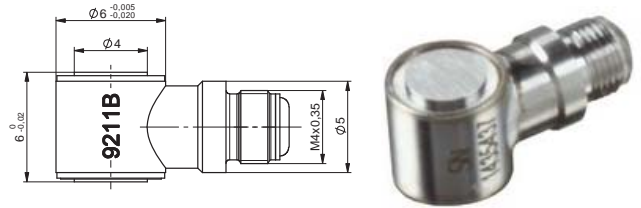
Owing to its compactness, the miniature force sensor is especially suitable for measuring dynamic and quasistatic forces in situations where space is limited but relatively large forces have to be measured.

Typical Applications

- Mechanical and apparatus engineering:
Measuring of stamping forces in small punches and presses.
Measuring of bearing reaction forces in small machines and apparatus.
- Medicine:
Measuring of joint forces, chewing force, etc.

Mounting

The miniature force sensor has a precision ground face. The bearing surface of the object being measured must also be finely machined, flat, rigid and exactly parallel. A hardened thrust washer will be useful when mounting in a blind hole.



Technical Data

Measuring range	kN	0 ... 2,5
Calibrated partial range	kN	0 ... 0,25
Overload	kN	0 ... 3
Threshold	mN	10
Sensitivity	pC/N	-4,4
Linearity	%FSO	≤±1
Hysteresis	%FSO	≤1
Rigidity	N/μm	≈400
Natural frequency	kHz	≈200
Operating temperature range	°C	-40 ... 150
Temperature coefficient of sensitivity	%/°C	-0,2
Capacitance	pF	≈50
Insulation resistance		
at 20 °C	Ω	≥10 ¹³
at 120 °C	Ω	≥10 ¹²
Connector		M4 x 0,35
Weight		
without cable and connector	g	1,5
Protection		
(with connected cable)	EN 60526	IP65

1 N (Newton) = 1 kg·m·s⁻² = 0,1019... kp = 0,2248... lbf;
1 kgf = 9,80665 N; 1 inch = 25,4 mm; 1 g = 0,03527... oz;
1 N·m = 0,73756... lbft

Mounting examples

For cavity pressure sensors use datasheet 000-555.

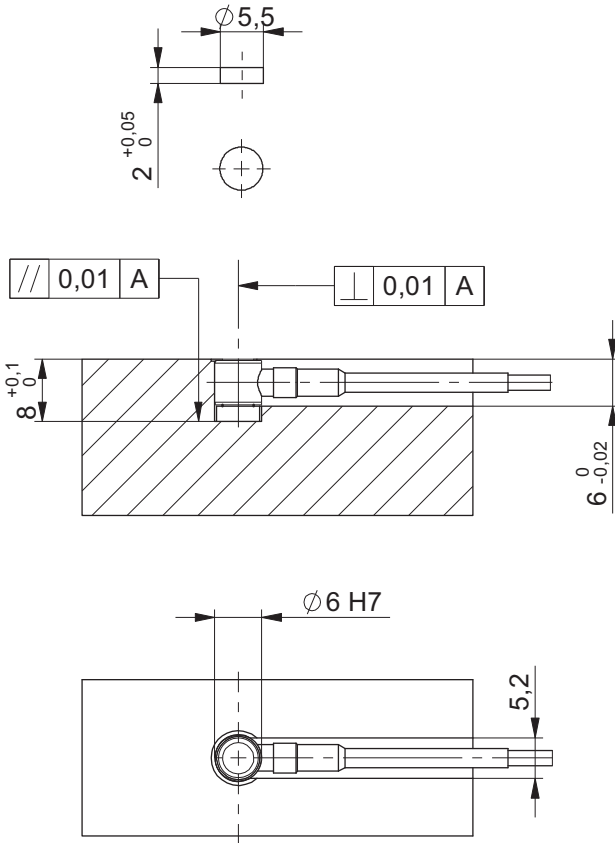


Fig. 1: Mounting in blind hole with hardened thrust washer $\phi 5.5$ Type 9411

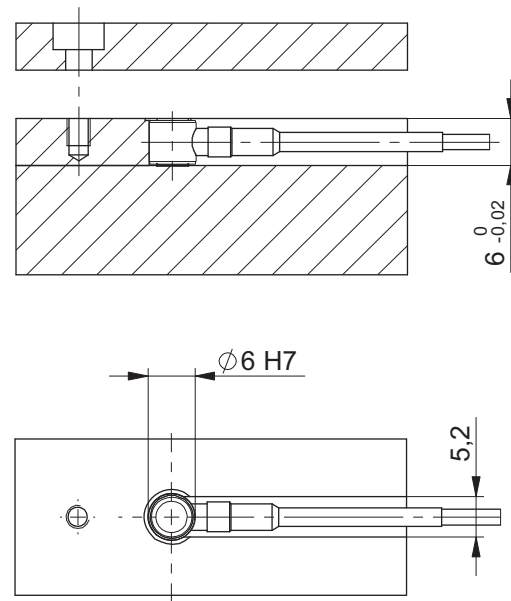


Fig. 2: Mounting in retaining plate

Accessories

	Typ
• Thrust washer	9411
• Connection cable M4 x 0,35 pos. - BNC pos.	9211B
Length 0,5 m	1651C
Length 1 m	1651C1
Length 2 m	1651C2
Length 5 m	1651C5
Length 10 m	1651C10
Length SP ($L_{\min} = 0,3 \text{ m} / L_{\max} = 10 \text{ m}$)	1651CSP

Ordering key

- Force sensor
Measuring range 0 ... 2,5 kN

Type

Type 9211B0,0