

Low Level Force Sensor

Type 9207

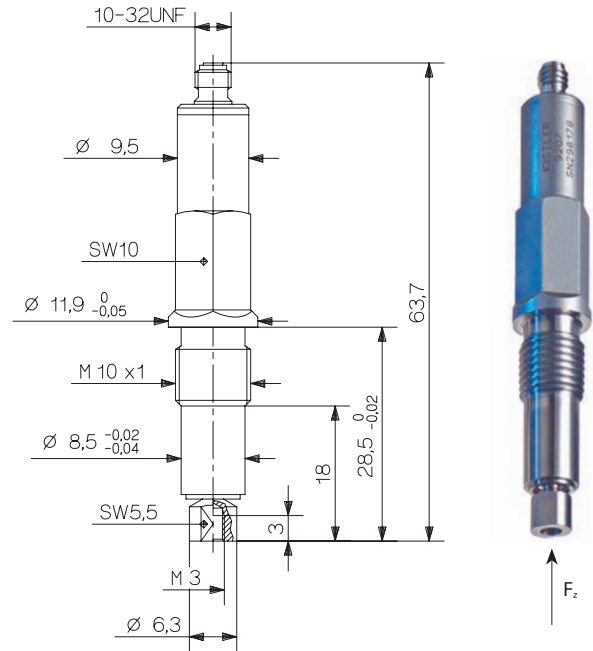
M10x1, Axial Connector, -50 ... 50 N

Quartz force sensor with high sensitivity for measuring quasi-static and dynamic tensile and compressive forces in the range of less than 1 mN to 50 N. General applications. The sensor is mounted in a bore with a M10x1 thread and the force is introduced at its front end. The sensor has a hermetically sealed housing and is well suited for laboratory and industrial applications.

- 3 calibrated measuring ranges
- Dynamic measuring range 1 : 100 000
- Highly sensitive, for forces of 1 mN and over
- For tensile and compression forces
- Low sensitivity to transverse forces and temperature
- High rigidity

Description

The sensor possesses a highly sensitive, transversal quartz element, which is mounted without preload. Therefore the sensor is largely insensitive to thermal influences. The force is introduced through the cylindrical front end which is supported on the housing by a diaphragm of special design. The ceramic insulated connector is hermetically sealed.



Technical Data

Measuring range	F_z	N	-50 ... 50
Overload	F_z	N	-75/150
Calibrated measuring ranges			
100 %	F_z	N	-50 ... 50
10 %	F_z	N	-5 ... 5
1 %	F_z	N	-0,5 ... 0,5
Threshold	F_z	N	$<0,5 \cdot 10^{-3}$
Sensitivity	F_z	pC/N	≈ -115
Linearity, all measuring ranges		%FSO	$\leq \pm 1$
Hysteresis, all measuring ranges		%FSO	$\leq 0,5$
Transverse force ¹⁾ , max.	$F_{x,y}$	N	10
Transverse force sensitivity	$F_{x,y} \rightarrow F_z$	N/N	$\leq \pm 0,05$
Bending moment, max.	$M_{x,y}$	N·m	0,25
Sensitivity to bending moment	$M_{x,y} \rightarrow F_z$	N/N·m	$\leq \pm 3$
Torque, max.	M_z	N·m	0,15
Rigidity	c_z	N/ μ m	≈ 4

¹⁾ Force application in the plane of the cylindrical front end.

Natural frequency	kHz	>10
Acceleration sensitivity		
axial	N/g	$<0,03$
radial	N/g	$<3 \cdot 10^{-3}$
Operating temperature range	°C	-50 ... 150
Temperature coefficient of sensitivity	%/°C	$\approx -0,02$
Insulation resistance, at 20 °C	Ω	$>10^{13}$
Capacitance	pF	≈ 26
Connector (ceramic insulator)		KIAG 10-32 neg.
Degree of protection (with cable connected)	EN60529	IP65
Case material	DIN	1.4542
Weight	g	19
Tightening torque, max.		
M10x1	N·m	10
M3	N·m	0,2

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Application Examples

- Measuring contact forces on keys, buttons, switches, relays etc.
- Measuring spring characteristics.
- Measuring extraction forces of plug-in contacts.
- Construction of highly sensitive miniature force plates, e.g. for measurements in wind tunnels.
- Force measurements on automatic assembly units, robots, micro-manipulators, etc.

Mounting

Mounting in a bore with M10x1 thread and force introduction at the front end with M3 thread (see Fig. 1).

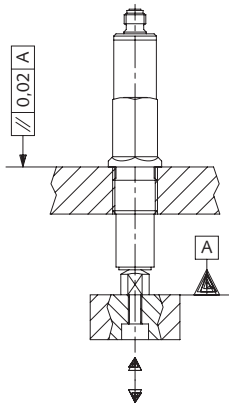


Fig. 1: Mounting with M10x1 thread, front sided force introduction

The force introducing cap (Fig. 2) is used for point force introduction. The coupling element Type 9405 (Fig. 3) is used to reduce transverse forces and bending moments acting on the sensor.

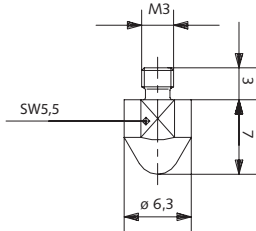


Fig. 2: Force introducing cap
Art. No. 3.220.139

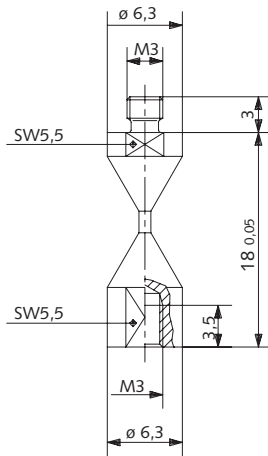


Fig. 3: Coupling element Type 9405

Caution!

This force sensor is a very sensitive measuring instrument. Greatest care is compulsory when handling the sensor as no overload protection is provided.

Accessories Included

- Force introducing cap **Type** 3.220.139
- Fork wrench SW 5,5 **Type** 5.210.096

Optional Accessories

- Coupling element **Type** 9405
- Connecting cable KIAG 10-32 pos. – BNC pos.
 - Length 1 m **Type** 1631C1
 - Length 2 m **Type** 1631C2
 - Length 5 m **Type** 1631C5
 - Length 10 m **Type** 1631C10

(see also data sheet cables for force, torque and strain sensors 1631C_000-346)

Ordering Key

- Low Level Force Sensor **Type** 9207
M10x1, Axial Connector, –50 ... 50 N

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