

# Quartz Transverse Measuring Pin for Indirect Force Measurement in Machines and Tools

Type 9241CA3, 9241CAsp,  
9241CBsp

Piezoelectric sensor for indirect force measurement in machine structures, tools, etc. in industrial monitoring tasks.

- Preloading allows measuring compression and tension forces
- Can be fixed in any direction and depth in the mounting bore
- Ground-isolated

### Description

The front part of the sensor is sensitive to transversal forces. Shaped as a cylindrical pin, all it needs for its installation is a 10 mm borehole. An integrated clamping system is used to preload the sensor in the borehole enabling it to detect tensile and compressive forces in the machine structure. The ceramic-coated body sleeve allows to mount the sensor ground insulated.

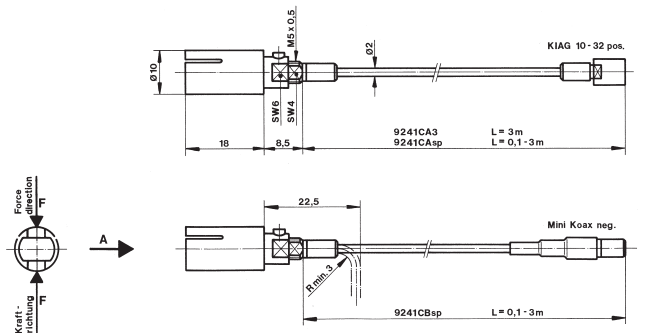
### Application

The sensor is easily mountable and allows to measure forces within a machine part or a tool.

Once installed, the sensor can be calibrated by comparative measurement, e.g. with a calibrating force sensor.

The main application field is the industrial monitoring of machine forces (machine monitoring, tool monitoring, etc.).

In combination with a ControlMonitor (CoMo®) it can be used to monitor limit values of forces that are decisive in the safety and reliability of machines and tools.



### Technical Data

Range			
with preload 750 N	$\mu\epsilon$		0 ... 500
with preload 1 250 N	$\mu\epsilon$		-150 ... 350
with preload 1 750 N	$\mu\epsilon$		-300 ... 200
Overload			
with preload 750 N	$\mu\epsilon$		850
with preload 1 250 N	$\mu\epsilon$		700
with preload 1 750 N	$\mu\epsilon$		550
Threshold in test object	$\mu\epsilon$		0,005
Sensitivity in test object	$\rho C/\mu\epsilon$		$\approx -15$
Force sensitivity for preload	$\rho C/N$		$\approx -4$
Linearity	% FSO		$\leq \pm 1$
Hysteresis	% FSO		$\leq 1,5$
Repeatability of sensitivity after demounting and remounting	%		$\pm 2$
Acceleration sensitivity (measuring direction)	$\mu\epsilon/g$		$\leq 0,1$
Operating temperature range	$^{\circ}C$		-40 ... 200
Insulation resistance at 20 $^{\circ}C$	$\Omega$		$\geq 10^{13}$
Ground insulation	$\Omega$		$\geq 10^8$
Capacitance	pF		322
Protection class			IP 64
Weight	g		38

1  $\mu\epsilon$  = 1 microstrain =  $10^{-6}$  m/m;  
1 N (Newton) =  $1 \text{ kg}\cdot\text{m}\cdot\text{s}^{-2} = 0,1019\dots \text{ kp} = 0,2248\dots \text{ lbf}$ ,  
1 kp = 1 kgf = 9,80665 N

**Mounting**

By adjusting the nut the sensor is preloaded using a charge amplifier and a display unit.

The mounting tool Type 1393B... is used for deep hole mounting.

**Mounting Examples**

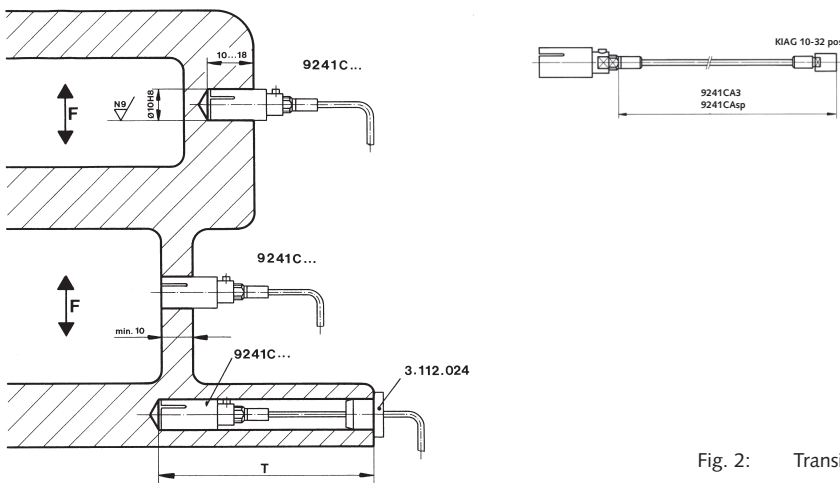


Fig. 1: T = 10 ... 118 mm mounting tool with Type 1393B  
T = 10 ... 318 mm mounting tool with Type 1393Bsp100-300

**Transition Coupling for Type 9241CA...**

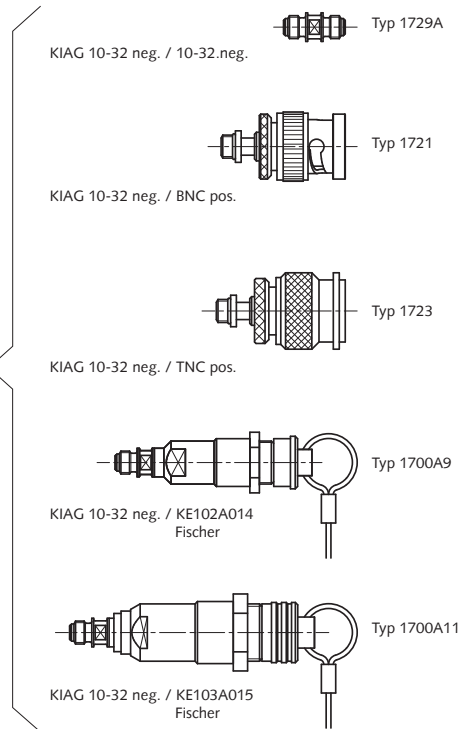


Fig. 2: Transition coupling

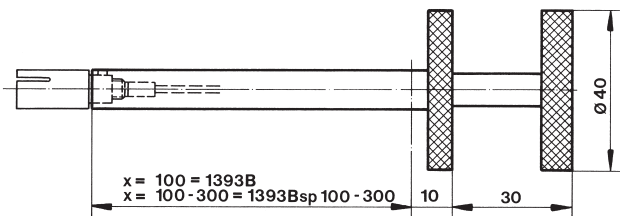


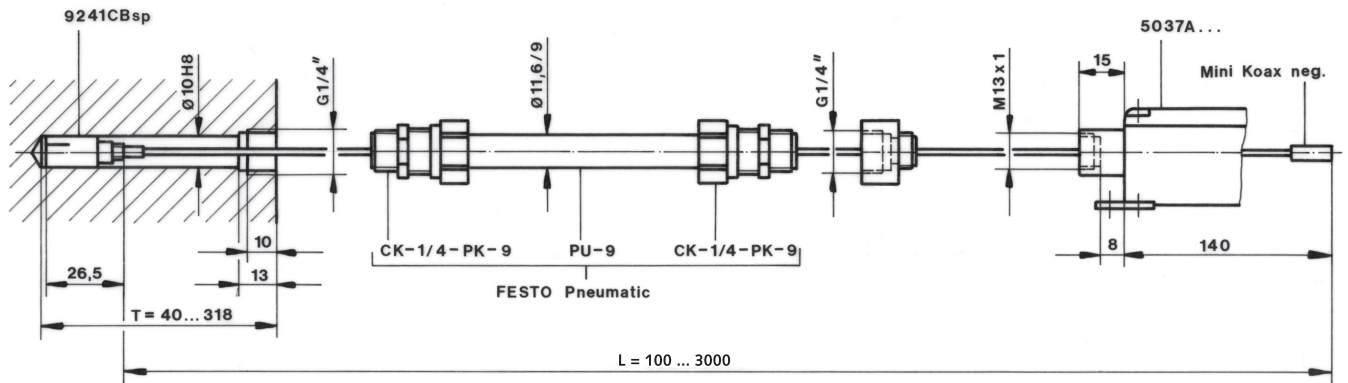
Fig. 3: Mounting tool

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**Examples with Common Protection Hoses**

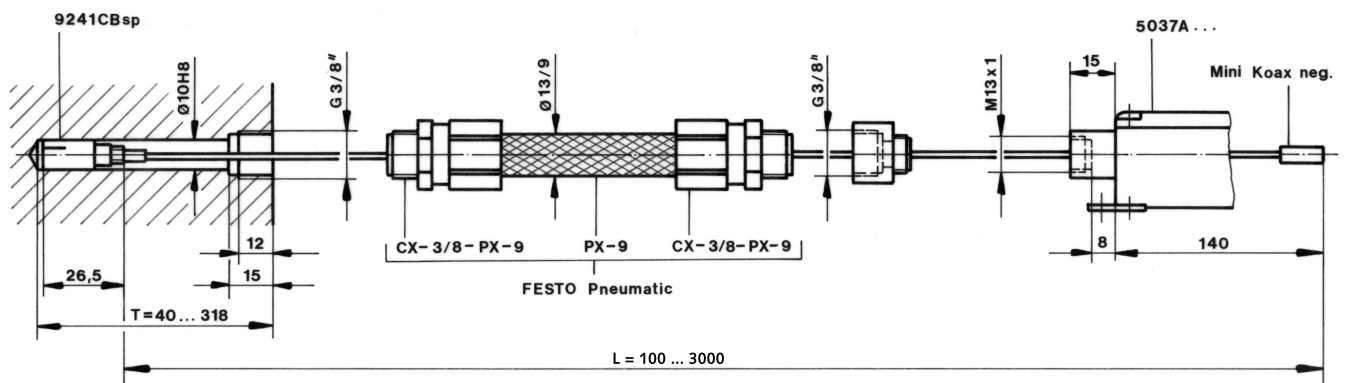
**Variant I**

Plastic protection hose and fast screwing by FESTO Pneumatic



**Variant II**

Flexopneu hose with metal braiding and fast screwing by FESTO Pneumatic



**Accessories**

- Mounting tool
- Connecting cable

**Type/Art. No.**

1393B  
1393Bsp100-300  
1937A1

**Ordering Key**

Sensor with integrated high temperature cable, KIAG 10-32 pos. connector (l = 3 m)	3
Sensor with integrated high temperature cable, KIAG 10-32 pos. connector (l = 3 m)	sp
Please specify length at order ( $l_{min} = 0,1 \text{ m}$ , $l_{max} = 3 \text{ m}$ )	

Type 9241CA

Type 9241CB

Sensor with integrated high temperature cable, mini coax. neg. connector	sp
Please specify length at order ( $l_{min} = 0,1 \text{ m}$ , $l_{max} = 3 \text{ m}$ )	

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