

# Uniaxial accelerometer

## High temperature accelerometer

Type 8209A



Accelerometer Type 8209A... is designed for permanent vibration monitoring in harsh and high temperature environments and is available with different footprints.

- Permanent temperature range  $-55 \dots 700 \text{ }^{\circ}\text{C}$
- Short time operating temperature  $-55 \dots 1\,000 \text{ }^{\circ}\text{C}$
- Internally case isolated; differential charge output
- Frequency response up to 5 kHz ( $\pm 10 \%$ )
- Highest reliability
- Not pyroelectric
- ARINC triangular fixation or 25x25 hole pattern
- ATEX / IECEx certified

### Description

Core of the sensor is the single crystal PiezoStar measuring element, which has a temperature capability of up to  $1\,000 \text{ }^{\circ}\text{C}$  and is not pyroelectric. The sensor features a shear design, which significantly reduces the influence of temperature and base strain. Other features are high frequency response and a hermetic construction of the housing and a compact design.

The sensor Type 8209A... is available with two different footprints. A compact and rugged standard ARINC triangular footprint and a square footprint with 25x25 hole pattern. The sensitive axis of the sensor lies in the Z - direction.

To reach highest resolution in harsh environment, the sensor provides a differential signal output and features an internally case isolated design. The integrated hardline cable is robust, low noise and has a temperature rating of up to  $1\,000 \text{ }^{\circ}\text{C}$ . The cable is available in a standard length of 3 m as well as in customer specific lengths.

The accelerometer is ATEX / IECEx certified for applications in hazardous areas.

### Application

Main applications are condition monitoring of gas turbines, structural analysis of turbomachinery and general purpose high temperature applications, which require:

- Temperature capability up to  $1\,000 \text{ }^{\circ}\text{C}$
- Ex-certification for use in potentially explosive environment
- Integrated hardline cable
- EMI immune measuring chain

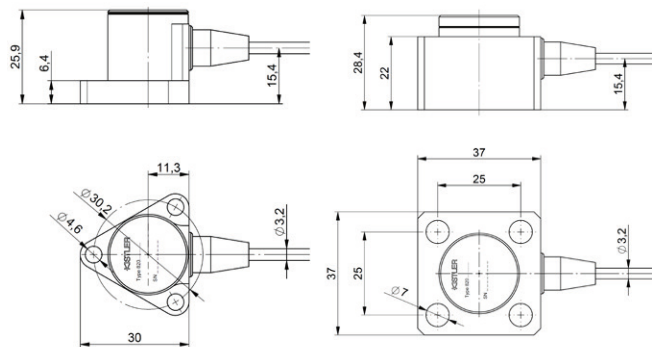
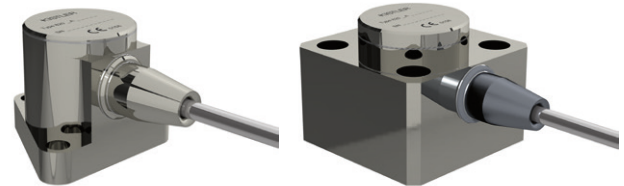


Fig. 1: Accelerometer dimensions

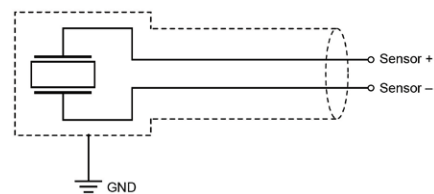


Fig. 2: Electrical schematic, 2-wire, internally case isolated

**Technical data<sup>1)</sup>**
**Dynamic characteristics**

Sensitivity @ 159.15 Hz	pC/g	4.7 ± 10%
	pC/ms <sup>-2</sup>	0.48 ± 10%
Measuring range	g <sub>pk</sub>	±500
	ms <sup>-2</sup>	±4905
Frequency response		
upper freq. (+5 %)	Hz	1 ... 4000
upper freq. (+10 %)	Hz	1 ... 5000
lower freq. (–3 dB) <sup>2)</sup>	Hz	0.5
Resonance frequency, typical		
@ 25 °C	kHz	>12
@ 480 °C	kHz	>10
Thermal sensitivity shift, typical	% / 100 °C	1.4
Transverse sensitivity	%	<13
Amplitude linearity	%	<1

<sup>1)</sup> Reference temperature for performance specifications is 25 °C unless otherwise noted.

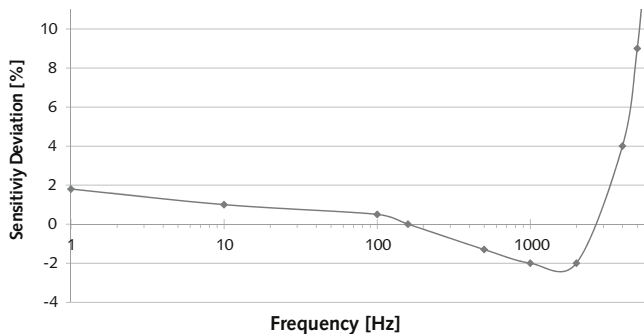
<sup>2)</sup> In combination with differential charge amplifier 5181, 5183, 5185.


Fig. 3: Typical frequency response; relative to reference value at 159 Hz

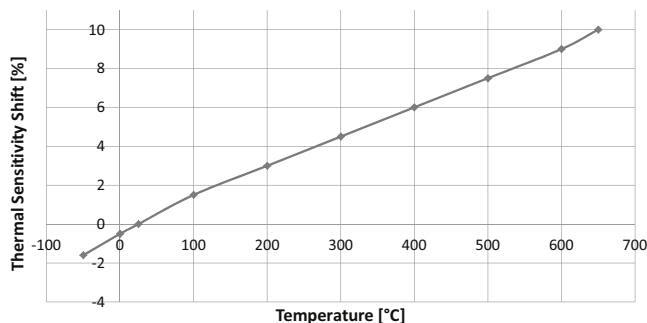


Fig. 4: Typical thermal sensitivity shift

**Electrical characteristics**

Insulation resistance		
Pin – Pin @ 25 °C	Ω	≥1·10 <sup>10</sup>
Pin – Pin @ 700 °C	Ω	≥1·10 <sup>6</sup>
Pin – Case @ 25 °C	Ω	≥1·10 <sup>10</sup>
Pin – Case @ 700 °C	Ω	≥1·10 <sup>6</sup>
Capacitance		
Pin – Pin @ 25 °C	pF	<15 + 60 pF/m
Pin – Case @ 25 °C	pF	<8 + 60 pF/m
Polarity		
acceleration in plus Z- direction	charge	negative

**Environmental characteristics**

Operating temperature range sensor and hardline cable		
Continuous	°C	–55 ... 700
Extreme <sup>3)</sup>	°C	–55 ... 1 000
Operating temperature range termination		
LEMO PCA.0S.302	°C	–55 ... 180
7/16" -27 UNS-2A	°C	–55 ... 200
Open leads	°C	–55 ... 180
Humidity (ingress protection)		Hermetically sealed (IP68)
Max. ambient pressure @T <sub>max</sub>		
Triangular footprint	bar	25
Square footprint	bar	500
Sinusoidal vibration limit	ms <sup>-2</sup> <sub>pk</sub>	±15 000
Shock limit (1ms half sine)	ms <sup>-2</sup> <sub>pk</sub>	±25 000
Base strain sensitivity	gpk/μϵ	<5·10 <sup>-5</sup>

<sup>3)</sup> For detailed information please contact the local Kistler sales office.

Technical data (continuation)

Hazardous area

Type of protection		
Ex-nA	ATEX	II 3G Ex nA IIC T6 ...T710 °C Gc SEV 17 ATEX0140x
	IECEX	Ex nA IIC T6 ...T710 °C Gc IECEX SEV 17.0021X
Ex-ia	ATEX	II 1G Ex ia IIC T6 ...T710 °C Ga SEV 17 ATEX0140X
	IECEX	Ex ia IIC T6 ...T710 °C Ga IECEX SEV 17.0012X
Entity parameter (intrinsic safe) <sup>3)</sup>		
Ui	V	≤30
Ii	mA	≤130
Ci	pF	≤15 + 170 pF/m
Li	μH	0
Pi	W	≤0.8

<sup>3)</sup> Special conditions for safe use in potentially explosive areas are described in the instruction manual.

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Physical characteristics

Weight sensor and cable		
Triangular footprint	gram	75 + 47 g/m
Square footprint	gram	110 + 47 g/m
Sensing mode		shear
Material		
Case		INCONEL alloy 600
Cable jacket		INCONEL alloy 600
Wire		Nickel
Mounting		
Triangular footprint		3xM4x12 (29 N·m)
Square footprint		4xM6x30 (4 N·m)

Sensor configuration and hardline cable termination options

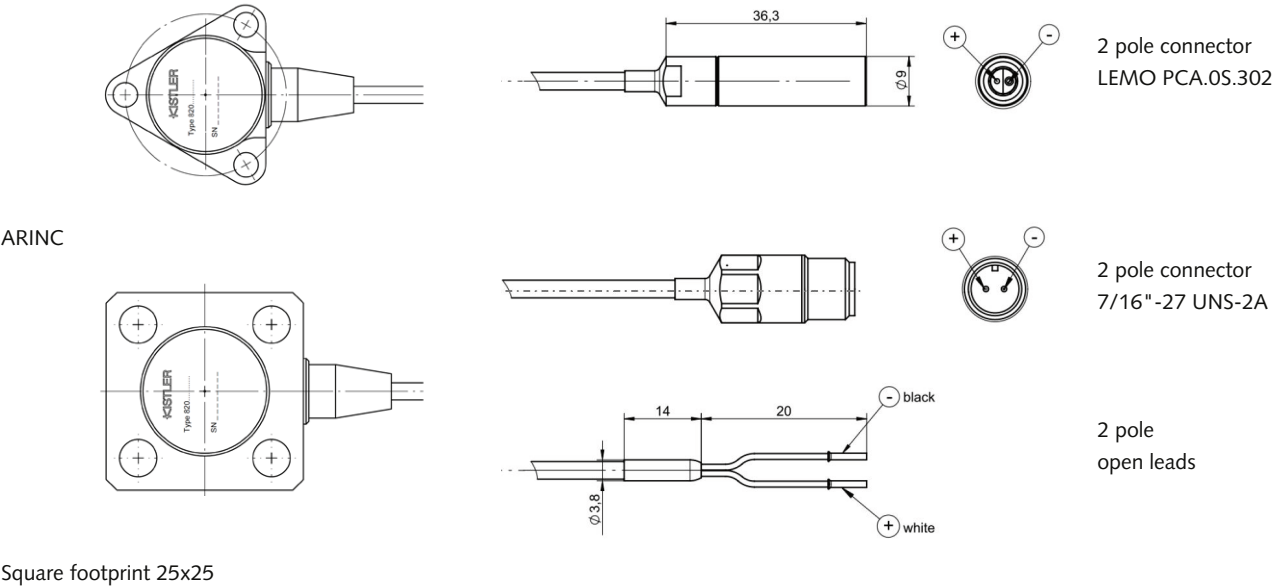


Fig. 5: Configuration options

The information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes without advance notice. Liability for consequential damages arising from the application of Kistler products is excluded.

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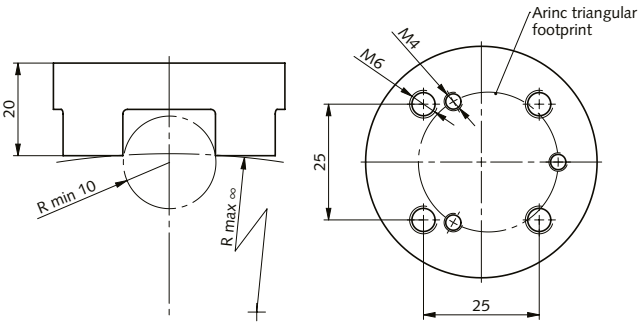


Fig. 6: Mounting adapter for tubes, Ø25... ∞  
Type 8433AP20  
(high temp. cement or spot welding attachment)

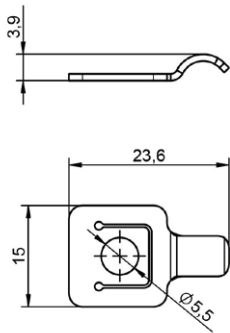


Fig. 8: Mounting bracket for hardline cable  
Type 1423A1

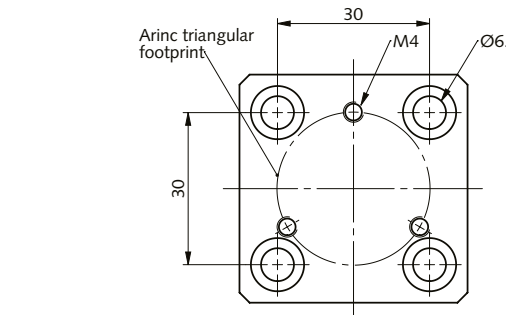


Fig. 7: Mounting adapter to 30x30 mm hole pattern with  
adaption to ARINC triangular footprint  
Type 8433AS30

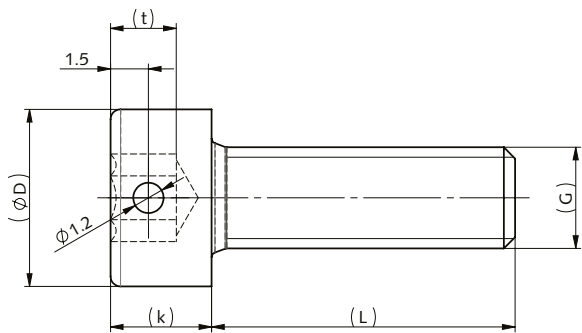


Fig. 9: Mounting screw  
Type 8445AS1 M4 for triangular footprint, <350°C  
Type 8445AS1HT M4 for triangular footprint, >350°C  
Type 8445AS2 M6 for square footprint, <350°C  
Type 8445AS2HT M6 for square footprint, >350°C

**Scope of delivery**

- High temperature sensor 8209A...
- individual calibration sheet

**Optional accessories**

- |   | Type/Mat. No.         |
|---|-----------------------|
| • High temperature mounting screw           | 8445AS1HT / 8445AS2HT |
| • Mounting screw                            | 8445AS1 / 8445AS2     |
| • Mounting adapter to 30x30 mm hole pattern | 8433AS30              |
| • Mounting adapter for tubes, Ø25 – ∞       | 8433AP20              |
| • Mounting bracket for hardline cable,      | 1423A1                |
| • High temperature thread paste             | 1059                  |
| • Softline cable                            | 1652A...              |

**Ordering key**

Typ 8209		A		C	J
Ex-certification					
No Ex-certification	-				
Ex-ia; Ex-nA	E				
Footprint					
ARINC	1				
Square footprint; hole pattern 25x25	2				
Hardline cable termination					
Lemo 2 pol. connector	A				
7/16" 2 pol. connector	B				
Open leads	C				
Cable length					
3m	03				
SP (0.5 ... 10 m)	SP				