

# Uniaxial accelerometer

## High temperature accelerometer 700 °C

Type 8209A



IECEx



RoHS

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

- Temperature range -55 ... 700 °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 over 700 °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 over 700 °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 700 °C
- Ex-certification for use in potentially explosive environment
- Integrated hardline cable
- EMI immune measuring chain

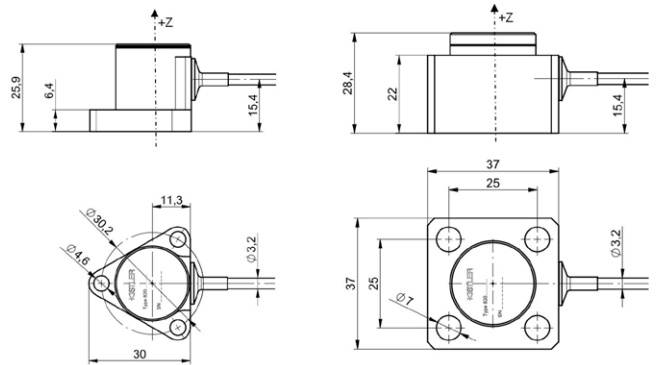


Fig. 1: Accelerometer dimensions

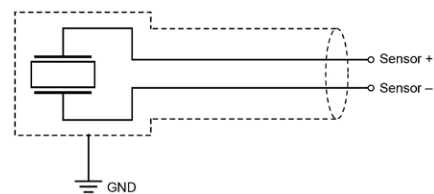


Fig. 2: Electrical schematic, 2-wire, internally case isolated

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

**Dynamic characteristics**

Sensitivity @ 159.15 Hz	pC/g	5 ±3%
	pC/ms <sup>-2</sup>	5,01 ±3%
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	%	<2
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.

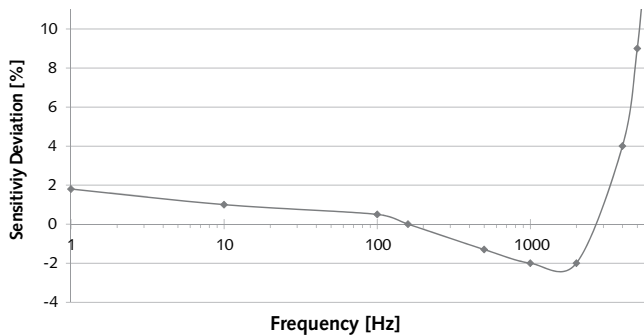


Fig. 3: Typical frequency response; relative to reference value at 159 Hz

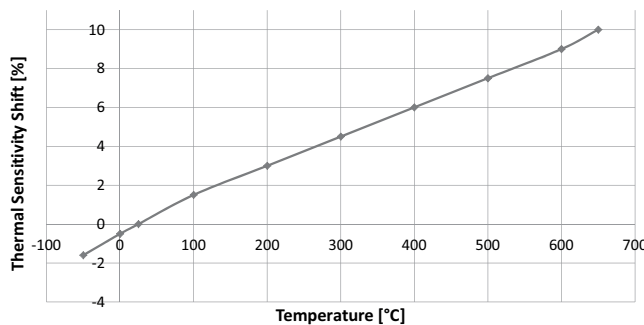


Fig. 4: Typical thermal sensitivity shift

**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 (t < 100 h)	°C	-55 ... 750
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>

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**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
li	mA	≤130
Ci	pF	≤15 + 170 pF/m
Li	μH	0
Pi	W	≤0,8

**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 (2,9 N·m)
Square footprint		4xM6x30 (4 N·m)

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

INCONEL alloy 600 are registered trademarks of INCO family of companies.

**Sensor configuration and hardline cable termination options**

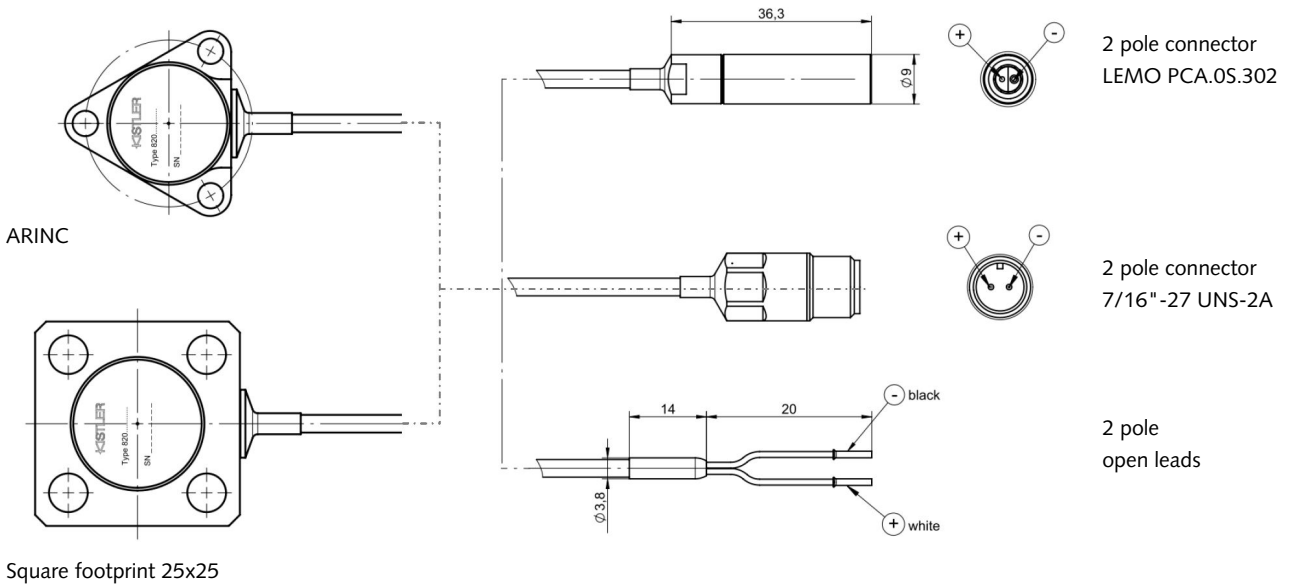


Fig. 5: Configuration options

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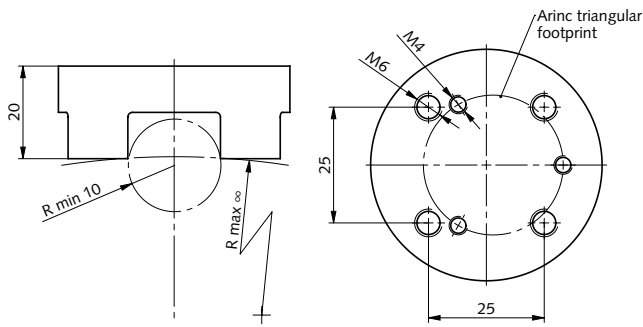


Fig. 6: Mounting adapter for tubes, Ø25... ∞  
Type 8433AP20  
(high temp. cement or spot welding attachment)

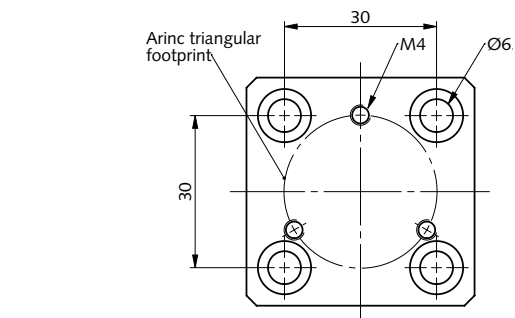


Fig. 7: Mounting adapter to 30x30 mm hole pattern with adaption to ARINC triangular footprint  
Type 8433AS30

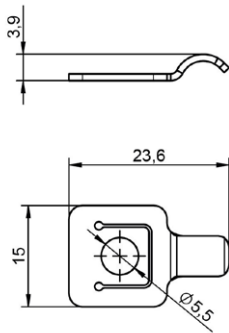


Fig. 8: Mounting bracket for hardline cable  
Type 1423A1

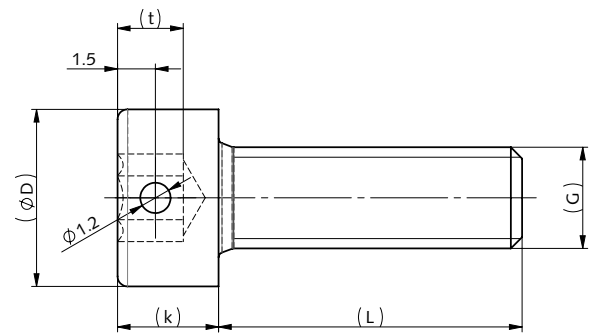


Fig. 9: Mounting screw  
Type 8445AS1 M4 for triangular footprint, <350°C  
Type 8445AS1HT M4 for triangular footprint, >350°C  
Type 8445AS2 M6 for square footprint, <350°C  
Type 8445AS2HT M6 for square footprint, >350°C

**Scope of delivery**

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

**Optional accessories**

- |   |                       |
|---|-----------------------|
|   | <b>Type/Mat. No.</b>  |
| • 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 

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**Ex-certification**

No Ex-certification	-
Ex-ia; Ex-nA	E

**Footprint**

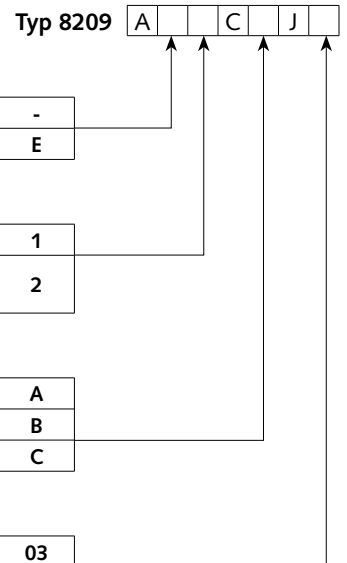
ARINC	1
Square footprint; hole pattern 25x25	2

**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



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