1 Description

The Brüel & Kjær Model 4511A is a small piezoelectric accelerometer designed specifically for measuring vibration in structures and objects. The unit is hermetically sealed against environment contamination, offers high output sensitivity and wide frequency bandwidth. Its light weight (35 gm) effectively minimizes mass loading effects.

Model 4511A features PZ23 crystal elements, operating in annular shear mode, which exhibits low base strain sensitivity, and excellent stability over time. This accelerometer incorporates an internal hybrid signal conditioner in a two wire system, which transmits its low impedance voltage output through the same cable that supplies the constant current power. Signal ground is electrically isolated from the outer case of the unit and provides a complete internal shield of the output signal. Output is through a miniature 3-pin connector. The centrally located mounting bolt permits 360° cable orientation.

The following product data are typical values at approx. +23 °C and 4 mA, unless measurement uncertainty or tolerance is specified.All uncertainty values are specified at 2σ (i.e. expanded uncertainty using a coverage factor of 2). Calibration data is traceable to the National Institute of Standards and technology, USA and Physikalich-Technische Bundesanstalt, Germany.

2 Dynamic Characteristics

2.1	**Sensitivity**	**10 mV/g ±10% (1 mV/ms^{-2} +12/-8%)**
2.2	**Measuring Range, -54 to +150 °C**	**±500 g pk**
2.3	**Frequency Response**	
2.3.1	Mounted resonance	43 kHz
2.3.2	Amplitude response	Ref. 160 Hz 10 Hz to 10 kHz ±5 % 10 kHz to 20 kHz ±2 dB 20 kHz to 30 kHz +6, -2 dB
2.3.3	Phase response (±5 %)	2 Hz to 10 kHz
2.4	**Transverse sensitivity**	**<5%**
2.5	**Polarity**	**Positive electrical signal for an acceleration directed into the base**

3 Electrical Characteristics

3.1	**Warm up time (10% of final bias)**	**<2 seconds**
3.2	**Constant current supply**	**+2 to +20 mA**
3.3	**Unloaded supply voltage**	**+18 to +30 Vdc**
3.4	**Output impedance**	**<100 Ω**
3.5	**Electrical Insulation (50 V)**	**>100 M Ω**
3.6	**Dielectric withstand (case to sensing element)**	**>600 V pk**
3.7	**Bias Voltage**	

3.7.1	@ room temperature	10.5 to 11.5 Vdc
3.7.2	In full temperature range	+8.5 Vdc to 14 Vdc
3.8	**Residual noise**	
3.8.1	2 Hz to 25 kHz	<2 milli-g
3.8.2	1 Hz to 15 kHz	<1 milli-g
3.8.3	Spectral noise	160 μg/√Hz @ 10 Hz 50 μg/√Hz @ 100 Hz 16 μg/√Hz @ 100 Hz

4 Environmental Characteristics

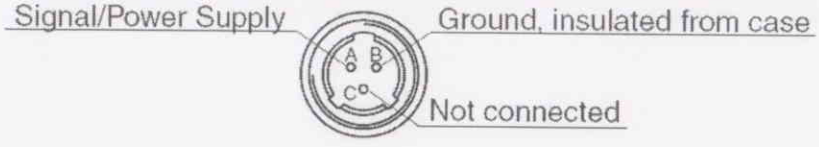
4.1	**Temperature range**	**-54 to +150 °C (-65 to +302 °F)**
4.2	**Temperature coefficient of sensitivity**	**0.09 %/°C**
4.3	**Temperature transient sensitivity**	
4.3.1	3 Hz LLF, -3 dB, 6 dB/oct	1 ms^{-2}/°C
4.4	**Magnetic sensitivity (50 Hz, 0.038 T)**	**20 ms^{-2}/T**
4.5	**Base Strain Sensitivity (@ 250 με in base plane)**	**0.01 ms^{-2}/με**
4.6	**Maximum non-destructive shock**	**>5000 g**
4.7	**Humidity**	**100% RH**
4.8	**Sealing**	**Hermetic**

5 Physical Characteristics

5.1	**Case material**	**Stainless Steel, AISI 316 L**
5.2	**Sensing element**	**PZ 23**
5.3	**Construction**	**Annular Shear, Center Bolt**
5.4	**Weight**	**35 grams**
5.5	**Mounting Surface Flatness**	**<3 μm**
5.6	**Mounting Thread**	
5.6.1	Thread	10-32 UNF-28
5.6.2	Depth	3.2 mm
5.6.3	Max. Torque	3.5 Nm
5.6.4	Min. Torque	0.5 Nm
5.7	**Connector**	**3-pin hermetic**

5.7.1	Connector type	Glenair 257-347-3p or HiRel 43008-3P-539

5.7.2 Pin designation



6 Calibration Data Supplied

6.1	**Reference Sensitivity (@ 160 Hz)**	**mV/ms^{-2} and mV/g**
6.2	**Maximum Transverse Sensitivity (@ 30 Hz)**	**%**
6.3	**Frequency Response**	**1 to 10 kHz**
6.4	**Verification of data**	
6.4.1	Resonance frequency	>40 kHz
6.4.2	Frequency response	10 kHz to 30 kHz
6.4.3	Electrical Isolation	>100 M ohms
6.4.4	Sealing	<1 x 10^{-3} atm cc/sec
6.4.5	Power age burn-in	Bias voltage stability
6.4.6	Examination of product	Dimensions Workmanship Identification

7 Dimensions