

Calibration Chart for  
DeltaTron® Accelerometer  
Type 4397

Serial No.: 2234035

Reference Sensitivity<sup>1)</sup> at 159.2 Hz ( $\omega = 1000 \text{ s}^{-1}$ ), 20 ms<sup>-2</sup> RMS,  
4 mA supply current and 23 °C: 0.988 mV/ms<sup>2</sup> (9.69 mV/g)

Frequency Range: Amplitude ( $\pm 10\%$ ): 1 Hz to 25 kHz  
Phase ( $\pm 5^\circ$ ): 4 Hz to 2.5 kHz

Mounted Resonance Frequency: 53 kHz

Transverse Sensitivity<sup>2)</sup>:  
Maximum (at 30 Hz, 100 ms<sup>-2</sup>): 1.3 % re Reference Sensitivity  
Angle of minimum,  $\alpha$ : (see drawing) 35 °

Transverse Resonance Frequency: 17 kHz

Calculated values for TEDS<sup>3)</sup>: Resonance frequency: 45.6 kHz  
Quality factor @  $f_{\text{res}}$ : 349  
Amplitude slope: -1.4 %/decade  
High pass cut-off frequency: 0.11 Hz  
Low pass cut-off frequency: 45 kHz

Measuring Range: T < 100°C:  $\pm 7500 \text{ ms}^{-2}$  peak ( $\pm 750 \text{ g}$  peak)  
T < 125°C:  $\pm 5000 \text{ ms}^{-2}$  peak ( $\pm 500 \text{ g}$  peak)

Polarity of the electrical signal is positive for an acceleration in the direction of the arrow on the drawing.

<sup>1)</sup> This calibration is obtained on a modified Brüel & Kjær Calibration System Type 9610 System No.: 750717.4 and is traceable (amplitude only) to the National Institute of Standards and Technology, USA and Physikalisch-Technische Bundesanstalt, Germany.  
The expanded uncertainty 5 Hz to 4 kHz: 1.0%, 4 kHz to 7 kHz: 1.4% and 7 kHz to 10 kHz: 2.0% is determined in accordance with EAL-R2. A coverage factor  $k=2$  is used. This corresponds to a coverage probability of 95% for a normal distribution.

<sup>2)</sup> The uncertainty is 0.3% of Reference Sensitivity and 5° on the angle.

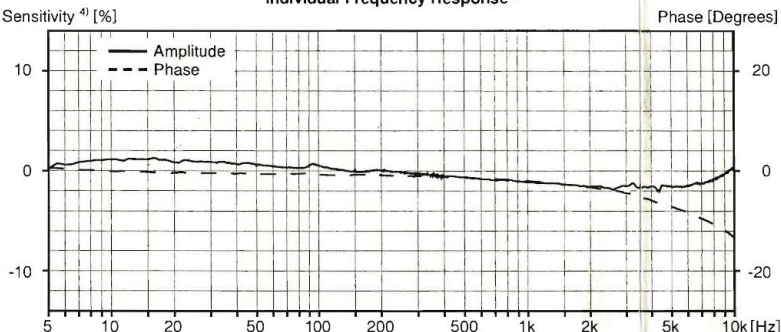
<sup>3)</sup> Transducer Electronic Data Sheet according to IEEE P1451.4. Built-in ID-information not included.

<sup>4)</sup> Deviation from Reference Sensitivity.

For further information, please see <http://www.bksv.com> and Product Data Sheet BP 1288 and BP 1849.



Individual Frequency Response<sup>1)</sup>



Electrical:

Bias Voltage: at 25°C and 4 mA: + 12 V  $\pm$  0.5 V  
at full temperature and current range: + 8 V to + 15 V

Power Supply requirements: Constant Current: T < 100°C: + 2 to + 20 mA  
T < 125°C: + 2 to + 10 mA  
Unloaded Supply Voltage: + 24 V to + 30 V

Output Impedance: 10  $\Omega$

Start-up time (to final bias  $\pm 10\%$ ): 5 s

Inherent Noise (RMS): Broadband (1 Hz to 22 kHz): < 15  $\mu$ V  
corresponding to < 0.015 ms<sup>-2</sup> (< 1500  $\mu$ g)

Spectral: 10 Hz:  $7.9 \times 10^{-4} \text{ ms}^{-2}/\sqrt{\text{Hz}}$  (79  $\mu$ g/ $\sqrt{\text{Hz}}$ )  
100 Hz:  $2.1 \times 10^{-4} \text{ ms}^{-2}/\sqrt{\text{Hz}}$  (21  $\mu$ g/ $\sqrt{\text{Hz}}$ )  
1000 Hz:  $1.4 \times 10^{-4} \text{ ms}^{-2}/\sqrt{\text{Hz}}$  (14  $\mu$ g/ $\sqrt{\text{Hz}}$ )

Ground Loops can introduce error signals. These can be avoided by insulating the accelerometer from the mounting surface using Insulating Stud UA 1216.

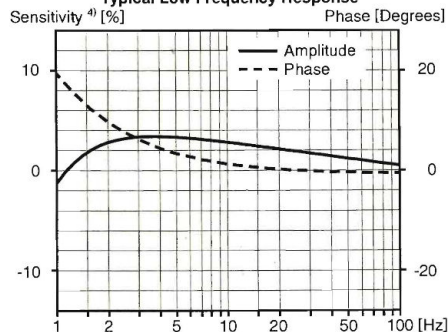
Recommended cable: AO 1381

Mounting Technique:

Examine the mounting surface for cleanliness and smoothness.  
If necessary, machine surface to a flatness < 10  $\mu$ m and a roughness < 2  $\mu$ m.  
Fasten the accelerometer using the appropriate stud. Take care not to exceed the recommended mounting torque and that the stud does not bottom in the mounting hole.

A thin film of oil or grease between the accelerometer and the mounting surface helps achieve good contact and improves mounting stiffness.  
See also ISO 5348. For other types of mounting, see the Brüel & Kjær handbook "Piezoelectric Accelerometers and Vibration Preamplifiers" (available from your local Brüel & Kjær representative).

Typical Low Frequency Response



Environmental:

Temperature Range: - 50 to + 125°C (- 58 to + 257°F)

Temperature Coefficient of Sensitivity: + 0.05%/°C

Temp. Transient Sensitivity (3 Hz Low. Lim. Frq. (-3 dB, 6 dB/oct)): 2 ms<sup>-2</sup>/°C

Magnetic Sensitivity (50 Hz, 0.038 T): 50 ms<sup>-2</sup>/T

Acoustic Sensitivity (154 dB SPL): 0.01 ms<sup>-2</sup>

Base Strain Sensitivity (at 250  $\mu$ ε in base plane): 0.005 ms<sup>-2</sup>/ $\mu$ ε

Max. Non-destructive Shock: Axial: 100 kms<sup>-2</sup> peak (10000 g peak)  
Transverse: 50 kms<sup>-2</sup> peak (5000 g peak)

Humidity: 90 % RH non-condensing

Mechanical:

Case Material: Titanium ASTM Grade 2

Sensing Element: Piezoelectric, Type PZ 23

Construction: Delta Shear®

Sealing: Welded

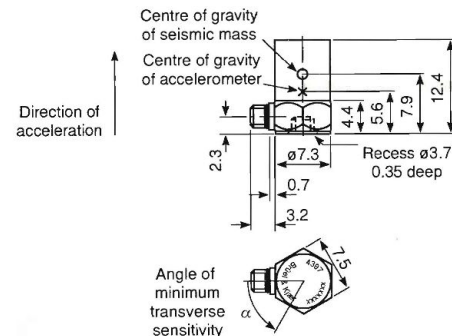
Weight: 2.4 gram (0.085 oz)

Electrical Connector: Coaxial M3

Mounting Thread: M3. Depth 2.4 mm

Mounting Surface Flatness: < 3  $\mu$ m

Mounting Torque: Max. 0.6 Nm (5.3 lbf-in), Min. 0.2 Nm (1.8 lbf-in)



All dimensions in millimetres

Date 13 Mar 2001 Operator EJ

Specifications obtained in accordance with ANSI S2.11-1969 and parts of ISO 5347.

All values are typical at 25°C (77°F) unless measurement uncertainty is specified.

BC 0325-13

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