

ServoK-Beam Accelerometer

Type 8330B3

Force Feedback Capacitive Accelerometer

A single axis capacitive accelerometer for measuring static acceleration or low-level, low-frequency vibration. Type 8330B3 features high resolution, excellent frequency response and insensitivity to thermal transients and transverse acceleration.

- Static and dynamic response
- 1 200 mV/g sensitivity
- 1,3 µg resolution @ <10 Hz
- High immunity to thermal transients
- Low transverse acceleration
- 95 gram weight
- 1 500 g_{pk} shock rating
- Conforming to CE

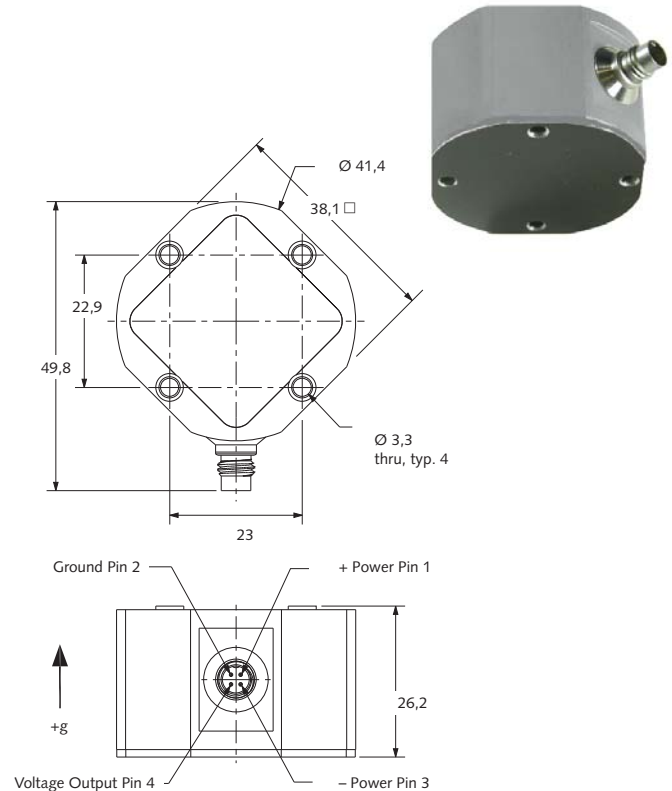
Description

Type 8330B3 ServoK-Beam accelerometer is an analog force feedback sensor incorporating a silicon micro-machined variable capacitance sensing element that provides excellent bandwidth, dynamic range, stability, and robustness. The ServoK-Beam is a three terminal variable capacitance sensor made by a bulk MEMS process. The silicon proof mass is supported by silicon springs between the upper and lower fixed electrodes. A custom switched capacitor integrated circuit (ASIC) measures the mass position and provides the feedback force to restore the mass to the center position. The sensing circuit determines the position of the proof mass by measuring the charge difference between the upper and lower electrodes. A compensation circuit generates an electrostatic feedback voltage which when applied to the proof mass electrode restores the mass to the center position where the capacitance of both sides are equal.

The sensing element and conditioning electronics are integrated into a hermetic titanium housing. A hard anodized housing provides ground isolation. The unit is powered by a bipolar supply between ±6 and ±12 V DC.

Mounting

Reliable and accurate measurements require that the mounting surface be clean and flat. The accelerometer can be attached to the test structure with adhesive or with the supplied screws. The Instruction Manual for Type 8330B3 provides detailed information regarding mounting surface preparation.



Application

The characteristics of the ServoK-Beam make it an ideal candidate in applications requiring the measurement of low level acceleration in steady-state or low frequency environment.

Specific areas of applications:

- Large structural modal testing (such as bridges)
- Active vibration control during optical or precision manufacturing processes
- Platform leveling; pitch and roll measurements
- High speed trains; tilt and lateral vibration measurements
- Measuring seismic events on structures during quakes
- In-vehicle ride comfort and general vibration for automotive/truck vehicle dynamics

Technical Data

| Specification | Unit | Type 8330B3 |
|--|-----------|----------------|
| Acceleration range | g | ±3 |
| Output clipping | g | ±3,5 |
| Sensitivity, ±10 % (ref 100 Hz) | mV/g | 1 200 |
| Zero g output | mV | 0 ±260 |
| Resolution/threshold typ., 0 ... 10 Hz | µgrms | 1,3 |
| Amplitude non-linearity input ≤ 2 g | %FSO | ±0,25 |
| 2 g < input ≤ 3 g | %FSO | ±1 |
| Resonant frequency nom. | Hz | 6 600 |
| Frequency response, ±5 % min. | Hz | 0 ... 500 |
| Frequency response, ±5 % typ. | Hz | 0 ... 1 000 |
| Frequency response, ±3 dB typ. | Hz | 0 ... 2 000 |
| Noise density (0...100 Hz) typ. | µgrms/√Hz | 0,4 (0,5 max) |
| Noise 0...100 Hz (typ.) | µgrms | 4 |
| Phase shift max. @ 0 Hz | ° | 0 |
| Phase shift max. @ 100 Hz | ° | -0,25 |
| Phase shift max. @ 1 000 Hz | ° | -1,6 |
| Phase shift max. @ ±3 dB, typ. | ° | -11 |
| Sensitive axis misalignment typ. | mrad | 0,25 (0,6 max) |
| Transverse sensitivity typ. (max. 1) | % | 0,4 |

Environmental

| | | |
|--|--------|------------|
| Random vibration 20 ... 2 000 Hz | grms | 20 |
| Shock (half sine, 0,5 ms pulse) | gpk | 1 500 |
| Temperature coeff. of sensitivity typ. | ppm/°C | ±100 |
| Temperature coeff. of bias typ. | µg/°C | ±100 |
| Operating temperature range | °C | -40 ... 85 |
| Storage temperature range | °C | -55 ... 85 |

Output

| | | |
|----------------------|----|--------|
| Impedance (nom.) | Ω | <40 |
| Load resistance min. | kΩ | 5 000 |
| Capacitive load max. | pF | 10 000 |

Power Supply

| | | |
|--------------|-----|------------|
| Voltage | VDC | ±6 ... ±12 |
| Current nom. | mA | 12 |

Physical

| | | |
|---|----------|---------------------|
| Case | | Titanium |
| Sensing element | Type | capacitive/ MEMS |
| Housing/base | material | Anodized Al. |
| Degree of protection case/connector (EN 60529) | | IP 68 |
| Connector | Type | 4-pin pos. |
| Ground isolated | | yes |
| Mounting (3,3" dia hole) | Type | cap screw |
| Mass | grams | 95 |

1 g = 9,80665 m/s², 1 Inch = 25,4 mm, 1 gram = 0,03527 oz, 1 lbf-in = 0,113 Nm

Accessories Included

- Mounting wax
8432
- (4) mounting screws,
4-40 UNC-3A x 1,25" long
431-0517-001
- (4) mounting screws, M3 x 30 mm long
431-0519-001

Optional Accessories

- 2 meter cable, 4-pin neg.
Microtech equivalent to pigtailed
power and signal output cable
1592M1
- Microtech equivalent to three power
banana plugs and a BNC pos. output
signal connector. x = 2, 5, 10 meter
1788A...
- Triaxial mounting cube
8530K01

Ordering Code

- ServoK-Beam accelerometer, ±3g
8330B3





| Measure | Connect | Analyze |
|--|---|--|
|  Type 8330B3 Capacitive accelerometer |  Type 1788A 4-pin neg. BNC pos. (3) banana |  Readout not supplied |
| | | Power Supply |
| | |  Bi-polar power supply not supplied |

Fig. 1: Measuring chain

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