

131A-02/BH Specifications

The REF TEK 131A-02/BH is a triaxial Borehole Accelerometer that offers a powerful combination of low noise and excellent stability for subsurface monitoring of ground motion. The 131A-02/BH Accelerometer is housed in a 3-inch diameter stainless steel cylindrical case with a sealed connector, which can be deployed at depths up to 2300 feet (700 meters).

The 131A-02/BH Accelerometer provides the industry standard analog output of -5V to 5V full scale. The performance of the accelerometer includes exceptional linearity over a broad dynamic range, excellent bias stability, and little hysteresis errors or offset drift problems that are usually associated with other accelerometer designs.

The 131A-02/BH electronics employ three sensors mounted orthogonally in a rigid internal frame and anchored to the case at the top and bottom. The modular electronics design consumes low power, only 50mA @ 12 VDC.

Configuration: Triaxial

Electrical:

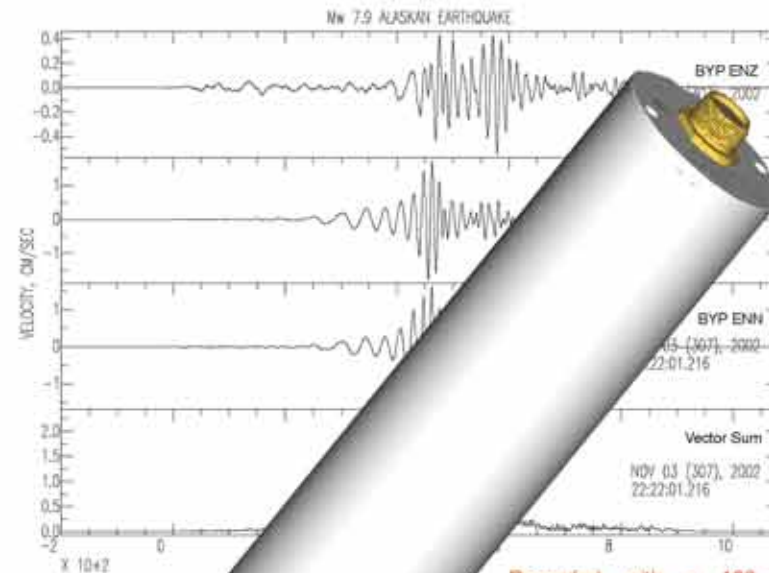
- | | |
|-----------------------------|---|
| Full-scale operation range: | • $> \pm 3.5g$ |
| Full-scale output: | • ± 5 VDC for $\pm 4g$ |
| Type: | • Force-balance |
| Frequency response: | • DC to > 400 Hz |
| Natural frequency: | • $> 2,000$ Hz |
| Damping: | • 0.6–0.7 of critical |
| Amplitude response: | • Flat $\pm 1\%$ |
| Linearity: | • $< 0.1\%$ over \pm full scale |
| Noise floor: | • $200 \text{ ng}^2/\text{Hz}$ |
| Cross-axis sensitivity: | • $< 1\%$ g/g |
| Temperature effects: | • $< 0.5\%$ from -40 to $+80^\circ\text{C}$ |
| Orientation: | • Will operate to specification in any orientation |
| Self test: | • Logic level input will produce 0.5g positive output |
| Zero offset: | • $< 25 \mu\text{V}$ |
| Case: | • Electrically isolated |

Power:

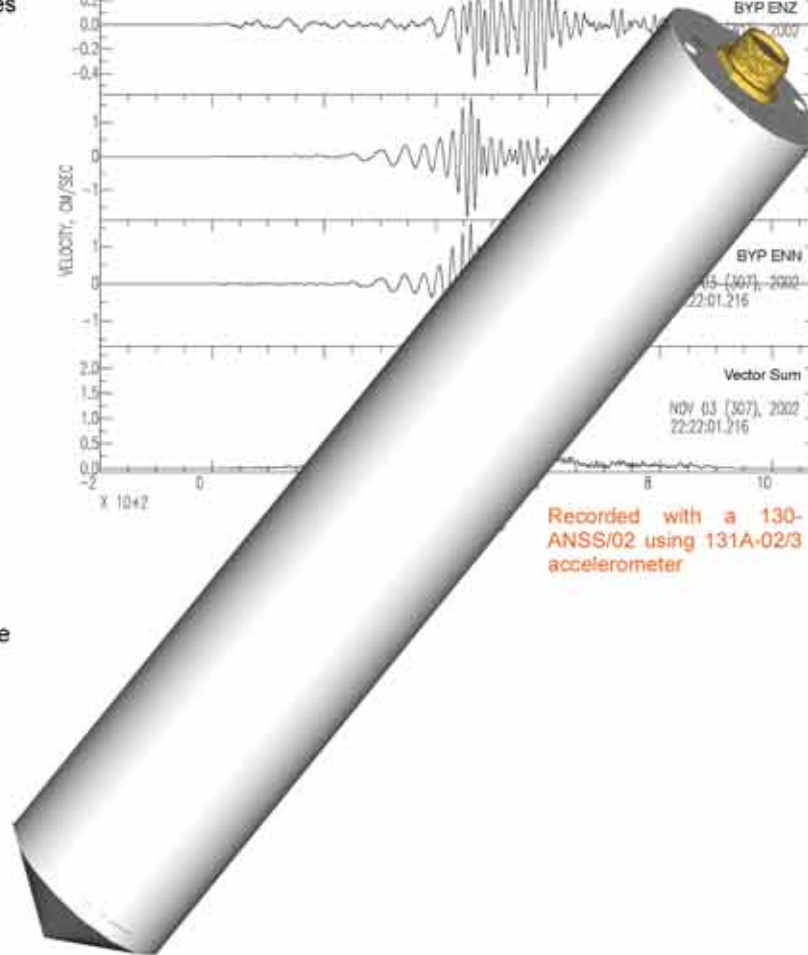
- | | |
|----------|------------------|
| Voltage: | • 10 - 15 VDC |
| Current: | • 50 mA @ 12 VDC |

Mechanical:

- | | |
|----------------------------|---|
| Size: | • 3" diameter x 18-3/4" long (optional 6" long) |
| Direction of acceleration: | • Marked on the case |
| Watertight integrity: | • 1000 psi |
| Material: | • Stainless steel type 316 |
| Connector type: | • Glenaire |
| Interconnection: | • 2300 feet max. |



Recorded with a 130-ANSS/02 using 131A-02/3 accelerometer



Ordering Information

Part No.	Description
131A-02/1	• Accelerometer, Force-balance, Uniaxial
131A-02/3	• Accelerometer, Force-balance, Triaxial
131A-02/BH	• Accelerometer, Force-balance, Triaxial Borehole

Specifications subject to change without notice. Rev 3.3

Related Sub-systems:

- Third Generation Broadband Seismic Recorder, Model 130-01, 130-02
- 24-Bit Strong Motion Accelerographs, Models 130-ANSS/02, 130-SM
- Miniature Seismic Recorder, Model 125
- Stephenson Probe Model 141-01
- Advanced Seismic Networks

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REF TEK



MEMS Force-Balance Accelerometers

Series 131A



MEMS Accelerometer element shown ~1/2 scale

Seismic Applications

- Free Field Reference
- Building Arrays
- Structural Monitoring
- Aftershock Studies

Features

- State-of-the-Art MEMS Force-Balance Accelerometer
- Low Noise
- Sensitivity and offset stable over wide temperature range
- Available in triaxial, uniaxial, and borehole models



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REFRACTION TECHNOLOGY: Providing Solutions That Work

131A-02/3 Specifications

The REF TEK 131A-02/3 Low Noise Accelerometer provides dynamic range useful with 24-bit digitizers like the REF TEK 130 series. These accelerometers use a micro-electro-mechanical system (MEMS) for the variable capacitance displacement sensor. Because no coils or magnets are used, the accelerometer is inherently stable over temperature, with excellent stability, linearity, hysteresis, and noise levels. More than 15,000 of the MEMS elements are in use for oil and gas exploration.

The standard model shown here is +/-3.5g full scale with 200 ng²/Hz noise level. Lower cost models are available with 2.5g and 5g full scale.

The 131A-02/3 housing is anodized aluminum. Mounting is accomplished with a single bolt and 3 point level. The case is sealed to meet IP67 standards for watertight integrity.

131A-02/3 General Characteristics

Configuration: • Triaxial
 Full-scale range: • ±3.5g Full Scale
 Full-scale output: • ±10V

Electrical Specifications

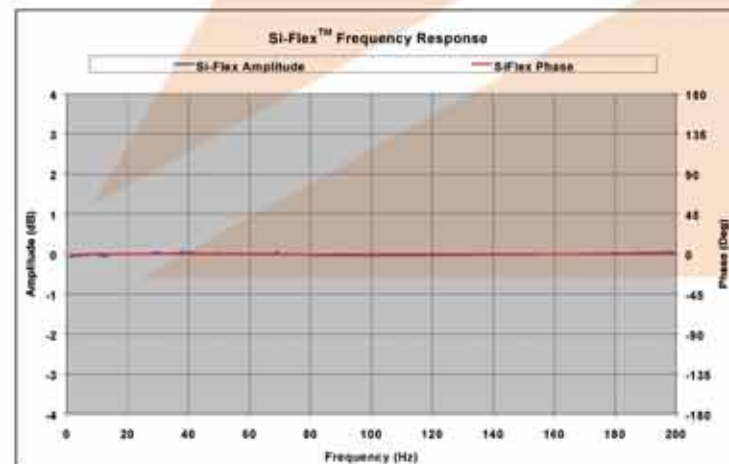
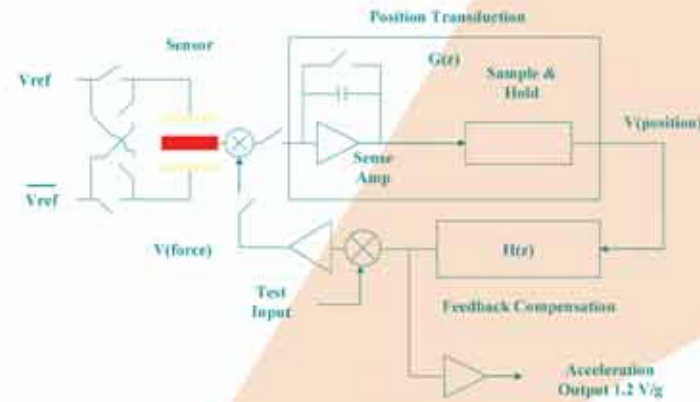
Type: • Force-balance accelerometer
 Self Noise: • 200 ng²/Hz
 Linearity: • <.05% of full scale
 Hysteresis: • <.005% of full scale
 Cross axis sensitivity: • .005 g/g
 Frequency response: • DC->400 Hz
 Damping: • 0.6-0.7
 Output impedance: • ~100ohms
 Shock: • 500g, 5 msec
 Self-test response: • Logic level input will produce 0.5g positive output
 Lightning protection: • Built-in surge protection
 Supply voltage: • 10-16 VDC
 Supply current: • 60 mA typical

Environment

Operating temp: • -25 to 60°C
 Storage temp: • -40 to 85°C
 Humidity: • 0-100% non-condensing

Mechanical

Type: • Anodized aluminum, o-ring sealed access cover
 Size: • 4.1" h x 4.0" w x 4.0" d
 Weight: • 2 lbs (~1 kg)
 Mounting: • Single bolt attachment 3 leveling screws



131A-02/1 Specifications

The REF TEK 131A-02/1 Low Noise Accelerometer provides dynamic range useful with 24-bit digitizers like the REF TEK 130 series. These accelerometers use a micro-electro-mechanical system (MEMS) for the variable capacitance displacement sensor. Because no coils or magnets are used, the accelerometer is inherently stable over temperature, with excellent stability, linearity, hysteresis, and noise levels. More than 15,000 of the MEMS elements are in use for oil and gas exploration.

The standard model shown here is +/-3.5g full scale with 200 ng²/Hz noise level. Lower cost models are available with 2.5g and 5g full scale.

The 131A-02/1 housing is anodized aluminum. Mounting is accomplished with two bolts on one of two axis, thus the sensor may be oriented in any direction. The case is sealed to meet IP67 standards for watertight integrity.

131A-02/1 General Characteristics

Configuration: • Uniaxial
 Full-scale range: • ±3.5g Full Scale
 Full-scale output: • ±10V

Electrical Specifications

Type: • Force-balance accelerometer
 Self Noise: • 200 ng²/Hz
 Linearity: • <.05% of full scale
 Hysteresis: • <.005% of full scale
 Cross axis sensitivity: • .005 g/g
 Frequency response: • DC->400 Hz
 Damping: • 0.6-0.7
 Output impedance: • ~100ohms
 Shock: • 500g, 5 msec
 Self-test response: • Logic level input will produce 0.5g positive output
 Lightning protection: • Built-in surge protection
 Supply voltage: • 10-16 VDC
 Supply current: • 60 mA typical

Environment

Operating temp: • -25 to 60°C
 Storage temp: • -40 to 85°C
 Humidity: • 0-100% non-condensing

Mechanical

Type: • Anodized aluminum, gasket sealed access cover
 Size: • 3" h x 3.3" w x 3.2" d
 Weight: • 1 lbs (~.5 kg)
 Mounting: • Two bolts on one of two axis

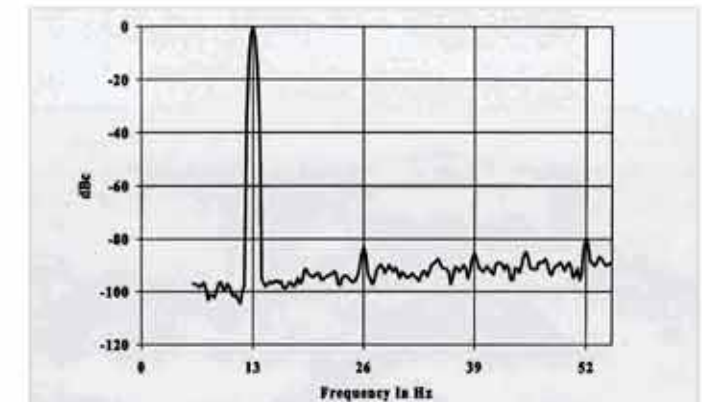


FIG. 7 - A PLOT OF THE SENSOR OUTPUT WITH A 13 Hz EXTERNAL EXCITATION VIBRATION APPLIED. TOTAL HARMONIC DISTORTION IS 0.023%.

