4-102/4-103
Vibration Transducer

4-102/4-103

Description

The fluid-damped moving elements in CEC's 4-102 and 4-103 Vibration Transducers are free of friction, assuring long life and reliability. This frictionless design also features outstanding dynamic range. It can be used to measure displacement to 0.5 inches, with low-levels limited only by system noise.

These transducers are used to measure vibration in many applications, such as fans, high speed motors, rotating machinery, in test cells and on dynamic balancing equipment. The output signal is proportional to velocity, often considered the best measurement for machine health monitoring. The low impedence, high level output can drive AC meters and recorders without using special amplifiers, simplifying your system.

These transducers use a seismic mass magnet suspended by springs, and a coil fixed to the case. The output signal results from relative movement between the magnet and coil when the case vibrates. The system is fluid damped, and operates above its natural frequency. The special "C" springs, which support the mass, withstand high transverse accelerations and rough handling. Positive hermetic sealing prevents damage to the instrument when used in severe environments.

Application

- **Vibration Analysis and Monitoring**
- **Dynamic Balancing Equipment**
- **Engineering Test and Research**
- **Production & Quality Testing**
- **Compressors**

Features

- **Friction-free design for large dynamic range and long life**
- **Self-generated, high level, low impedence output simplifies your system**

ISO 9001:2000/AS 9100 Rev B

4-102/4-103 Vibration Transducer

4-102 Specifications

Sensitivity: 110 mV ±2 mV/in/sec at 100 Hz
1 in/sec peak velocity at +77°F (+25°C) into a 10,000 ohm resistive load.

Dynamic Range
Frequency Response: 8 to 700 Hz
Amplitude: 0.5" peak-to-peak, maximum
Acceleration: 50 g's peak

Frequency Response: ±5% of mean sensitivity, between 8 and 700 Hz at +77°F (+25°C)

Linearity: ±5% at 100 Hz within the dynamic range

Transverse Response: 2% minimum

Temperature Range: +32°F to +150°F (0°C to +66°C)

Thermal Coefficient of Sensitivity: +0.06%/°F

Damped Resonant Frequency: 6 Hz nominal

Excitation: Self-generating

Insulation Resistance: 50 megohm minimum over temperature range at 45 VDC

Polarity: Pin B to be positive with an upward velocity of the case

Shock: 100 g's peak maximum in the sensitive axis

Weight: 1 lb. maximum, including cable

Static Acceleration: 2.2 g's along sensitive axis produces full travel of moving mass

Electrical Connection: 18" cable with connector type MS3451W10SL-3P (CEC P/N 700775-00-0002)

Transducer Mating Connector: Type MS3456W10SL-3S (CEC P/N 700775-00-0001)

Warning

Do not open. Damping fluid mixture contains tetrachloroethylene which is known to the state of California to cause cancer.

Ordering Information

When ordering, specify Type 4-102-0001 or 4-103-0001. Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

4-103 Specifications

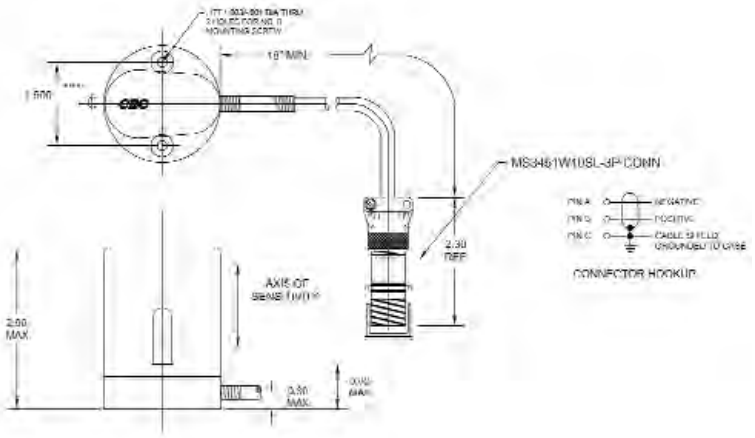
Note - Specifications match that of the Model 4-102 except as follows:

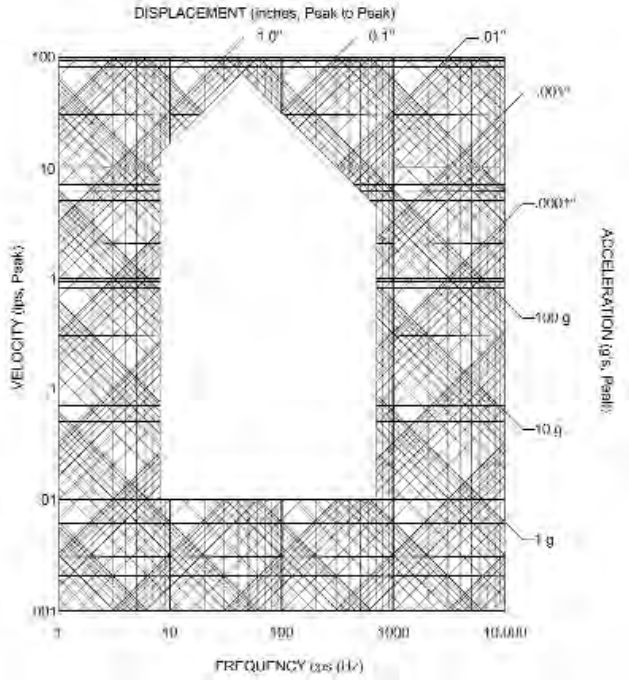
Sensitivity: 110 mV ±2 mV/in/sec at 100 Hz, 1 in/sec peak velocity at +225°F (+107°C) into a 10,000 ohm resistive load.

Frequency Response: ±7% of mean sensitivity between 8 and 700 Hz at +225°F (+107°C)

Temperature Range: +150°F to +250°F (+66°C to +121°C)

Thermal Coefficient of Sensitivity: +0.05%/°F





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4-118
Vibration Transducer

4-118

Applications

- **Vibration Analysis and Monitoring**
- **Dynamic Balancing Equipment**
- **Engineering Test and Research**
- **Production and Quality Testing**

Features

- **Miniature, for space limited applications**
- **Self-generated, high level, low impedence output**
- **Operates to +500°F (+260°C)**
- **Weighs only 2.2 ounces**

Description

CEC's miniature 4-118 Vibration Transducers are especially valuable where space is limited, and where heavier transducers would invalidate your results. These transducers can be used in high temperatures, have low sensitivity to transverse accelerations, and can be mounted in any plane. The measurement system is simplified because the low impedence, high level output can drive AC meters and recorders without using special amplifiers. These features make them suitable for many applications on jet engines, turbines, high speed motors, superchargers, internal combustion engines and in test cells..

CEC's 4-118 Vibration Transducers use a seismic mass coil, suspended by springs, moving on bearings of gold and sapphire. A high flux magnet is attached to the base. The output signal results from relative movement between the magnet and coil when the case is in motion. This magnetically damped system operates above its natural frequency so the output is proportional to velocity. The gold on saphire bearings provide nearly friction-free movement, extending the instrument life and reliability. These instruments are available in two configurations: the 4-118-0001 with an integral cable, and the 4-118-0002 with a top connector for a detachable cable.

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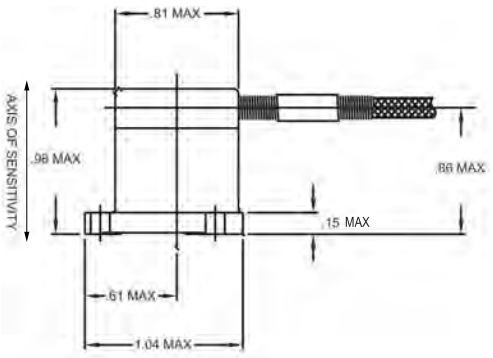
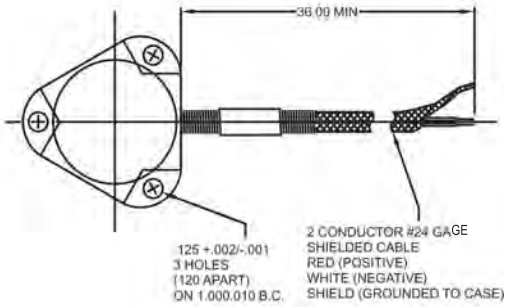
4-118 Vibration Transducer

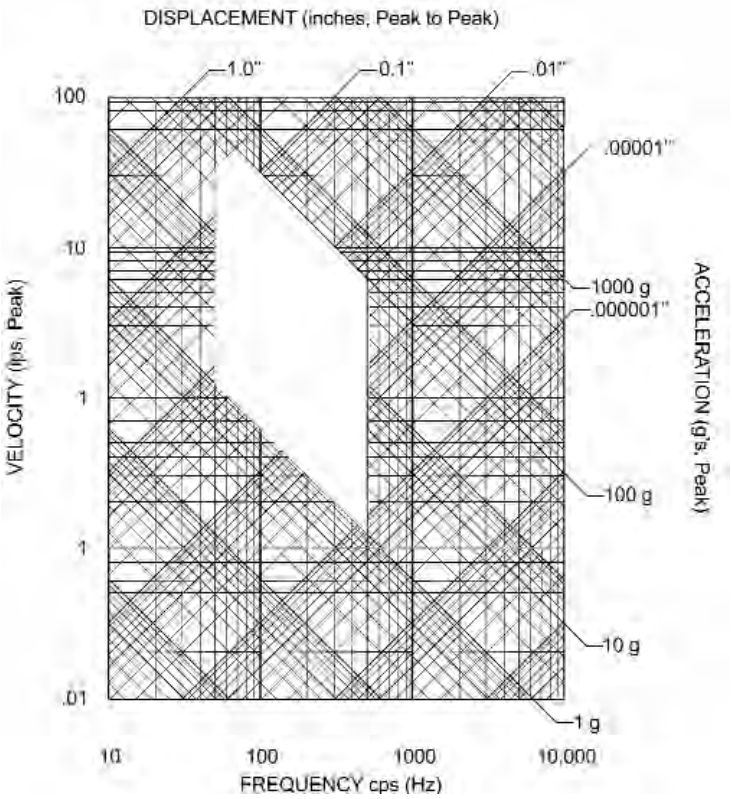
Specifications

Sensitivity:	105 ±5 mV/in/sec referenced at 77°F (+25°C) at 250Hz, 0.5 ips RMS in the vertical position, into a 10,000 ohm resistive load
Dynamic Range	
Frequency:	50 Hz to 500 Hz
Amplitude:	0.2 inch peak-to-peak, maximum
Acceleration:	1g to 50g
Frequency Response:	±10% of mean sensitivity
Transverse Response:	2% maximum
Linearity:	±5% of the 10 g's output within the dynamic range
Temperature Range:	-65°F to +300°F continuous, to +500°F intermittent (100 max)
Thermal Coefficient of Sensitivity:	±0.10%/°F
Damped Resonant Frequency:	30 Hz nominal
Excitation:	Self-generating
Coil Resistance:	800 ohms ±15% 77°F
Insulation Resistance:	100 megaohm, minimum
Polarity:	Output is positive when the case is moved upward
Maximum Static Acceleration:	8 g's in sensitive axis produces full travel of moving mass
Shock:	100 g's peak without damage
Weight:	-0001: 2.2 oz maximum -0002: 1.5 oz maximum
Electrical Connection:	-0001: Integral 3-foot shielded cable with tinned leads -0002: 2-pin connector on top of case

	-0001	-0002
+Output	Red	Pin 2
-Output	White	Pin 1
Case	Shield	







Optional Accessories

-0002: 3-foot cable and mating connector, Part No. 82406-0036

Ordering Information

When ordering, specify type 4-118-0001 or 4-118-0002. Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

4-123 Vibration Transducer

4-123

Applications

- **Aircraft Engines**
- **Industrial Turbines**
- **Power Generators**
- **Test Cells**
- **Test and Research**

Features

- **Self-generated, high level, low impedance output**
- **Operates to +500°F (+260°F C)**
- **Weighs only 4.25 ounces**

CEC's 4-123 Vibration Transducers are particularly suited to turbine applications. They operate to 500°F, have low sensitivity to transverse accelerations, and can be mounted in any plane. The low impedance, high level output requires no special amplifiers, simplifying your measurement system. Precision jewel bearings provide nearly function-free movement for long life and reliability.

These vibration transducers use a seismic mass magnet, positioned by springs moving on ruby and sapphire bearings. A coil is attached to the base. The output signal results from relative motion between the magnet and coil when the case vibrates. The air damped system operates above its natural frequency, producing an output proportional to velocity. The sealed, lightweight aluminum case insures complete and permanent protection from contamination.

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4-123 Vibration Transducer

Specifications

Sensitivity: ..... 135 mV ±2mV/in/sec at 100 Hz, 2 in/sec velocity into a 10,000 ohm load at +77°F (+25°C)

Dynamic Range:
- **Frequency:** ..... 45 Hz to 2000 Hz
- **Amplitude:** ..... 0.15 inch peak-to-peak, max.
- **Acceleration:** ..... 0.5 g to 50 g

Frequency Response: ..... ±8% of mean sensitivity, 45 to 2000 Hz throughout the operating temperature range

Linearity: ..... ±3% within the dynamic range

Transverse Response: ..... Less than 2%

Temperature Range: ..... -40°F to +500°F

Thermal Coefficient of Sensitivity: . ±0.03%/°F

Sensitivity Shift with Position: .. ±3% of the mean sensitivity betweenvertical and horizontal

Damped Resonant Frequency: ..... 18 Hz nominal

Excitation: ..... Self-generating

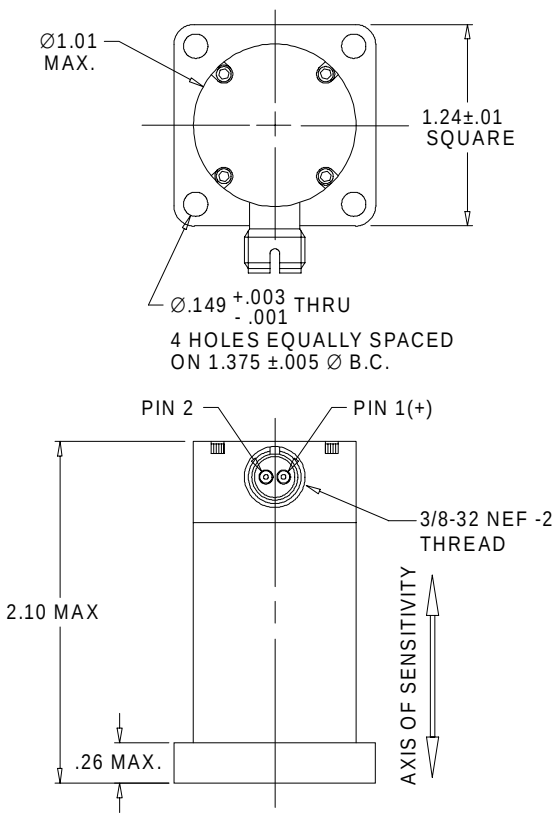
Insulation Resistance: ..... 1 megohm, minimum

Polarity: ..... Pin 1 is positive when case moved upward

Maximum Static Acceleration: ..... 6 g's in sensitive axis produces full travel of the moving mass

Shock: ..... 100 g's at 11ms without damage

Weight: ..... 4.5 oz. (121 grams)



Dimensions are in inches.

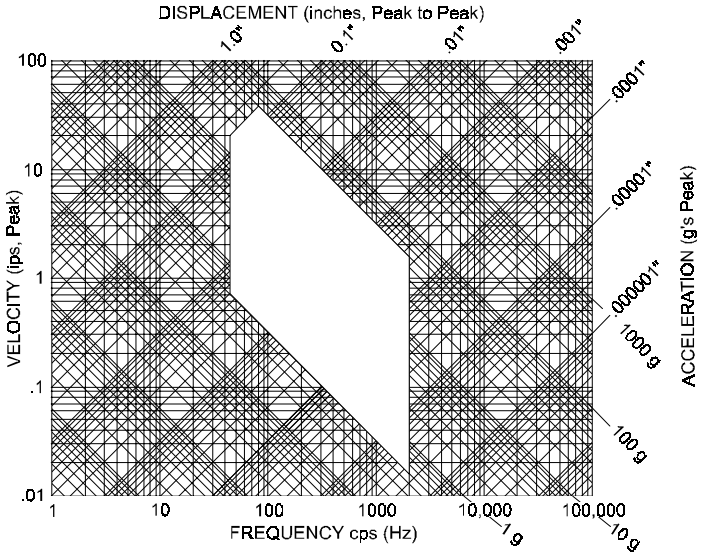
Optional Accessories

1. Cable and connector assembly P/N 82406-XXXX (length is identified in inches; e.g.; 36-inch cable is P/N 82406-0036)
2. Connector P/N 173960
3. Operation and Maintenance Manual P/N 992175

Ordering Information

When ordering, specify Type 4-123-0001. Mating connector and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

VIBRATION NOMOGRAPH
Model 4-123 Operating Range



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4-125
Vibration Transducer

4-125

Description

CEC designed the 4-125 Vibration Transducer for turbine applications. You can use them in turbine hot sections, such as the turbine case, where high temperatures can cause problems with other transducers. The low impedence, high level output requires no special amplifiers, simplifying your measurement system. They have low sensitivity to transverse accelerations, and you can mount them in any plane.

CEC's 4-125 Vibration Transducers use a seismic magnet that moves on gold bearings. A coil is attached to the case, and movement between the magnet and coil produces the ouput signal when the case vibrates. This air damped system operates above its natural frequency so the output is proportional to velocity. Rugged construction and design simplicity insure high reliability and long service life.

Applications

- Aircraft Engines
- Industrial Turbines
- Test Cells

Features

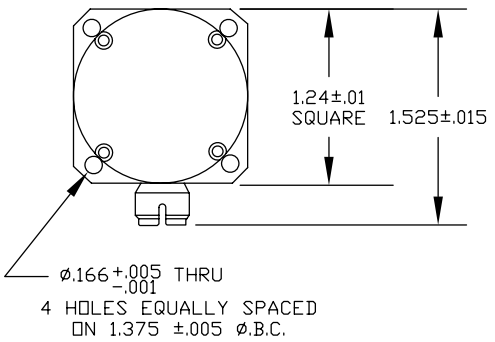
- Self-generated, high level, low impedence output
- Operates to +700°F (+371°C)
- Field Repairable

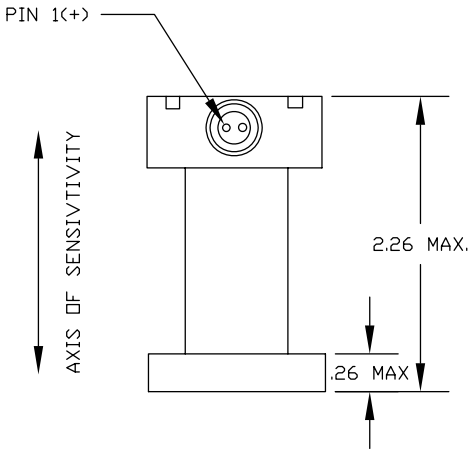
ISO 9001:2000/AS 9100 Rev B

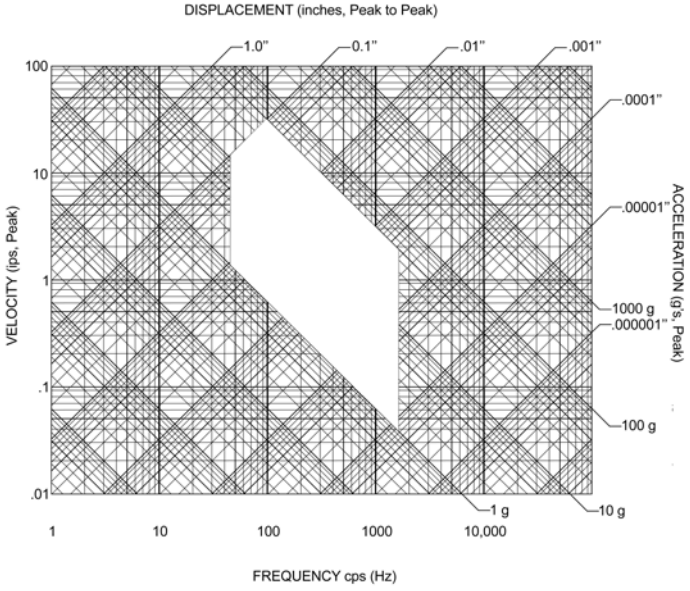
4-125 Vibration Transducer

Specifications

Sensitivity:	105 ±3 mV/in/sec at 100 Hz, 75°F (+24°C) into a 10,000 ohm resistive load impedence
Dynamic Range	
Frequency:	45 Hz to 1500 Hz
Amplitude:	0.1 inch peak-to-peak, maximum
Acceleration:	1 g to 50 g
Frequency Response:	±6% of the mean sensitivity
Transverse Response:	2% of maximum
Linearity:	±1% of output at 20 g's within dynamic range (vertical at 100 Hz)
Temperature Range:	-65°F to +700°F (-54°C to +371°C)
Thermal Coefficient of Sensitivity:	±0.02%/°F
Sensitivity Shift with Position:	±10% maximum
Damped Resonant Frequency:	15 Hz nominal
Excitation:	Self-generating
Coil Resistance:	465 ohms ±24% max. at 75°F
Insulation Resistance:	0.1 megohm, minimum
Polarity:	Pin 1 is positive when the case is moved upward
Maximum Static Acceleration:	2.2 g's in sensitive axis produces full travel of moving mass
Shock:	50 g's maximum in any direction
Weight:	8 oz. nominal







Optional Accessories

1. Cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)
2. Connector P/N 173960
3. Operation and Maintenance Manual: P/N 992330

Ordering Information

When ordering, specify type 4-125-0001. Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

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4-126
Vibration Transducer

4-126

Description

CEC designed the 4-126 Vibration Transducer for turbine applications. You can use them in turbine hot sections, such as the turbine case, where high temperatures can cause problems with other transducers. The low impedence, high level output requires no special amplifiers, simplifying your measurement system. They have low sensitivity to transverse accelerations, and you can mount them in any plane.

CEC's 4-126 Vibration Transducers use a seismic magnet that moves on gold bearings. A coil is attached to the case, and movement between the magnet and coil produces the ouput signal when the case vibrates. This air damped system operates above its natural frequency so the output is proportional to velocity. The sealed case insures complete protection from contamination. Rugged construction and design simplicity insure high reliability and long service life.

Applications

- Aircraft Engines
- Industrial Turbines
- Test Cells

Features

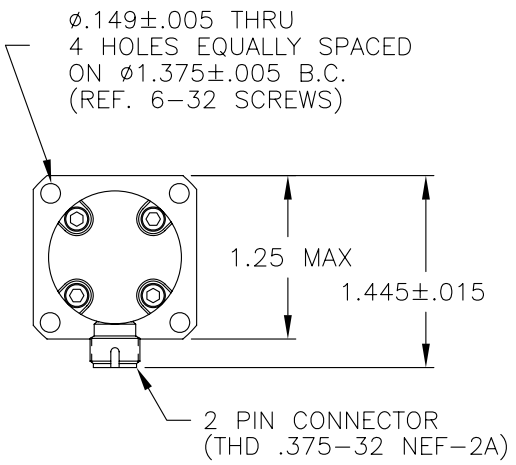
- Self-generated, high level, low impedence output
- Operates to +700°F (+371°C)

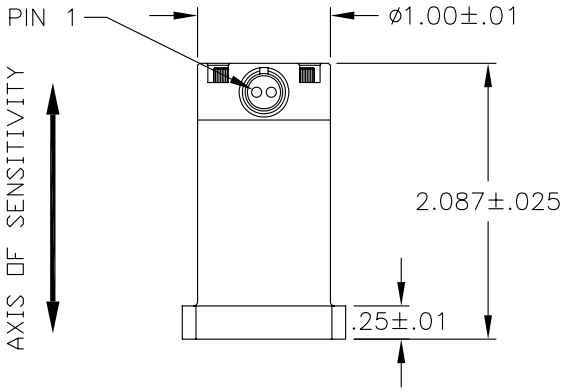
ISO 9001:2000/AS 9100 Rev B

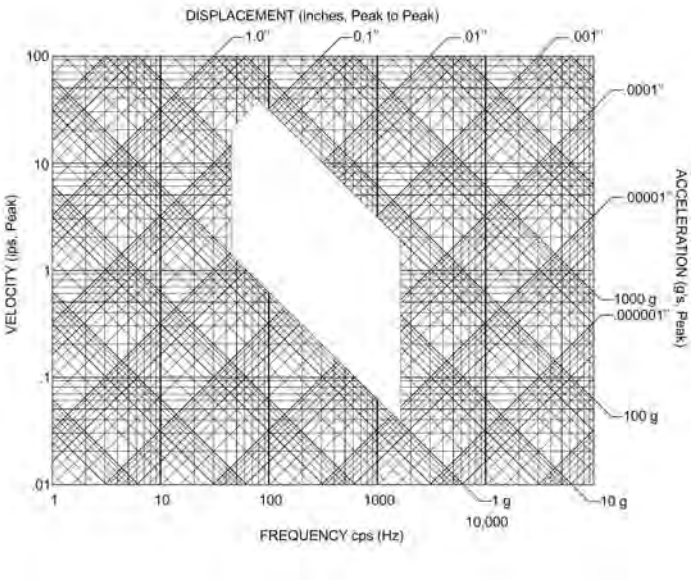
4-126 Vibration Transducer

Specifications

Sensitivity:	145 ±4 mV/in/sec at 100 Hz, 2 ips RMS at +75°F (+24°C) into a 10,000 ohm resistive load impedence
Dynamic Range:	
Frequency:	45 Hz to 1500 Hz
Amplitude:	0.15 inch peak-to-peak, maximum
Acceleration:	1g to 50g
Frequency Response:	±7% of the mean sensitivity
Transverse Response:	2% of maximum
Linearity:	±1% of output at 20 g's within dynamic range (vertical at 100 Hz)
Temperature Range:	-65°F to +700°F (-54°C to +371°C)
Thermal Coefficient of Sensitivity:	±0.02%/°F from reference 77°F
Sensitivity Shift with Position:	10% maximum
Damped Resonant Frequency:	Less than 15 Hz nominal
Excitation:	Self-generating
Insulation Resistance:	100K ohms, minimum
Polarity:	Pin 1 is positive when the case is moved upward
Shock:	50 g's maximum in any direction
Weight:	6 oz. nominal
Calibration:	Calibration record furnished
Environmental Tests:	Meets requirements of applicable procedures of MIL-E-5272C for temperature, humidity, altitude, salt spray, vibration, fungus, sand dust, immersion, shock and acceleration.







Optional Accessories

1. Cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)
2. Connector P/N 173960

Ordering Information

When ordering, specify type 4-126-0001. Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

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4-128
Vibration Transducer

4-128

Applications

- **Aircraft Engines**
- **Industrial Turbines**
- **Test Cells**

Features

- **Self-generated, high level, low impedence output**
- **Operates to +700°F (+900°F versions are available)**
- **Weighs only 2 ounces**

Description

CEC designed the 4-128 Vibration Transducer for turbine applications. You can use them in turbine hot sections where high temperatures can cause problems with other transducers. The system is simplified due to the low impedence, high level output that can drive AC meters, recorders, and control electronics without using special amplifiers. They have low sensitivity to transverse accelerations, and you can mount them in any plane.

These instruments are especially valuable where space is limited, and where heavier transducers would invalidate test results. They adapt easily to your installation because models are available in a variety of of mounting configurations, connector orientations and sensitivities.

Rugged construction and design simplicity insure high reliability and long service life. The 4-128 is factory repairable.

CEC's 4-128 Vibration Transducers use a seismic magnet that moves on gold bearings. A coil is attached to the case, and movement between the magnet and coil produces the ouput signal when the case vibrates. This air damped system operates above its natural frequency so the output is proportional to velocity.

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4-128 Vibration Transducer

Specifications

Sensitivity:	60 mV/in/sec through 105 mV/in/sec at +77°F into a 10,000 ohm load at 100 Hz
Dynamic Range	
Frequency:	45 Hz to 1500 Hz
Amplitude:	0.10 inch peak-to-peak, maximum
Acceleration:	0.5g to 50g (vertical position)
Frequency Response:	±6% of the mean sensitivity, 45 to 1500 Hz throughout the operating temperature range
Linearity:	±6% within dynamic range
Transverse Response:	Less than 2%
Temperature Range:	-65°F to +700°F; (-53°C to +371°C)
Thermal Coefficient of Sensitivity:	-0.02%/°F
Damped Resonant Frequency:	15 Hz nominal
Excitation:	Self-generating
Insulation Resistance:	0.1 megaohm, minimum
Polarity:	Pin 2 is positive when the case is moved upward
Shock:	50 g's maximum in any direction
Maximum Static Acceleration:	3 g's in the sensitive axis produces full travel of moving mass
Weight:	2.0 oz. nominal

Optional Accessories

1. Cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)
2. Connector P/N 173960

Table 1

Type Number	Sensitivity
4-128-0001	60 ± 2 mV/in/sec
4-128-0002	60 ± 2 mV/in/sec
4-128-0005	105 ± 3 mV/in/sec
4-128-0006	105 ± 3 mV/in/sec
4-128-0009	105 ± 3 mV/in/sec
4-128-0010	105 ± 3 mV/in/sec

Note:

1. Units available on special order with higher sensitivity and/or lower frequency units.
2. The four cap screws must be safety wired together and to the connector to prevent inadvertant disassembly. Safety wires are provided in the cap screws

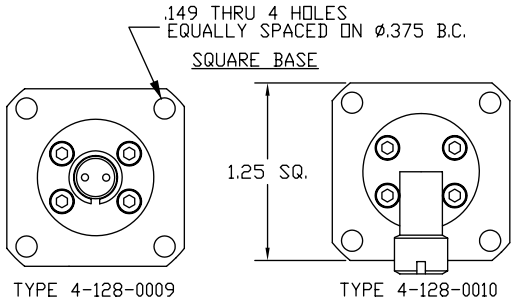
Ordering Information

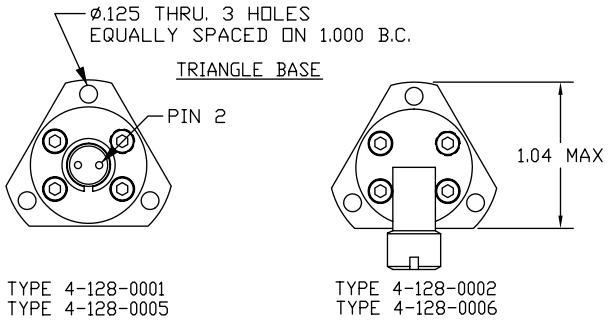
When ordering, use table above. Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

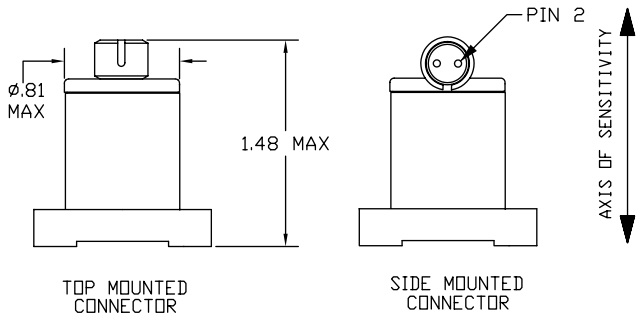
Approvals

CSA C/US certified:
Intrinsically safe Class I, Division 1, Groups A, B, C & D
Hazardous Locations (without barrier)
Class I, Division 2, Groups A, B, C & D

LCIE Certificate of Conformity:
EEx IIB or IIC t1, T2, T3, T4, T5 & T6







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4-130/4-137
Vibration Transducer

4-130/4-137

Applications

- **Aircraft Engines**
- **Industrial Turbines**
- **Test Cells**

Features

- **Ceramic bearings provide exceptional service life**
- **Self-generated, high level, low impedance output**
- **Operates to +700°F**

Description

CEC's 4-130/4-137 Vibration Transducers offer a technology breakthrough in velocity output vibration transducer design. These transducers use a special advanced technology bearing system that extends their service life. Yet, this design preserves the simplicity and reliability that is typical of CEC's self generating, low impedence vibration transducers.

We designed the 4-130/4-137 Vibration Transducers for turbine applications. Use them in hot sections where high temperatures cause problems with other instruments. They simplify your system because low impedence, high level output does not require special amplifiers or low-noise cables. They have low sensitivity to transverse accelerations, and you can mount them in any plane. Their rugged construction and new bearing system insure high reliability and long service life.

These instruments are especially valuable where space is limited. They adapt easily to your installation because models are available in a variety of mounting configurations and sensitivities.

CEC 4-130/4-137 Vibration Transducers use a seismic mass magnet that moves on special ceramic bearings. A coil is attached to the case, and movement between magnet and coil produces the output signal when the case vibrates. This air damped system operates above its natural frequency so the mV output is proportional to velocity.

C US

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4-130/4-137 Vibration Transducer

Performance Specifications

Sensitivity: (Refer to Table 1) Measured at +77°F (+25°C) in the vertical position, with a sinusoidal driving force applied perpendicular to the base at 100 Hz, 1 in/sec RMS (25 mm/sec). Load impedance is 10,000 ohms ±2%

Dynamic Range

- **Frequency:** 45 to 1500 Hz
- **Amplitude:** 0.10 inch peak-to-peak, maximum
- **Acceleration:** 1.0g to 50g peak vertical 1.5g to 50g horizontal
- **Acceleration Threshold:** 0.3g peak in the vertical position 1.0g peak in the horizontal position

Frequency Response: 45 to 1500 Hz ±6% referenced to 100 Hz at +77°F (+25°C) and 1 in/sec RMS (25 mm/sec)

Linearity: The sensitivity at 100 Hz, measured through the acceleration range of 1 g to 50 g's peak, shall not vary more than ±5% from the mean sensitivity.

Transverse Sensitivity: 2% maximum

Temperature Range

- **4-130:** -65°F to +500°F (-54°C to +260°C)
- **4-137:** -65°F to +700°F (-54°C to +371°C)

Thermal Coefficient of Sensitivity: ±0.02%/°F from reference +77°F(±0.036%/°C from refer ence 25°C)

Damped Resonant Frequency: 20 Hz

Excitation: Self-generating

Coil Resistance: 450 ohms ±25%

Insulation Resistance: 0.1 megohm minimum at +700°F (+371°C)

Polarity: Pin 2 is positive when case is moved upward

Shock: The maximum shock in any direction is 50 g's

Sealing: Hermetically sealed, all welded construction

Weight

- **Triangular base:** 2.5 oz. (70.9 g) maximum
- **Square base:** 3.5 oz. (99.2 g) maximum

Optional Accessories

1. High-temperature connector and cable assembly P/N 169500-XXXX (Length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060.

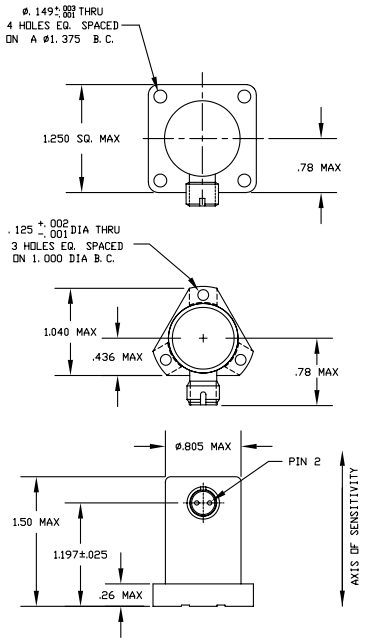
2. High temperature connector P/N 173960

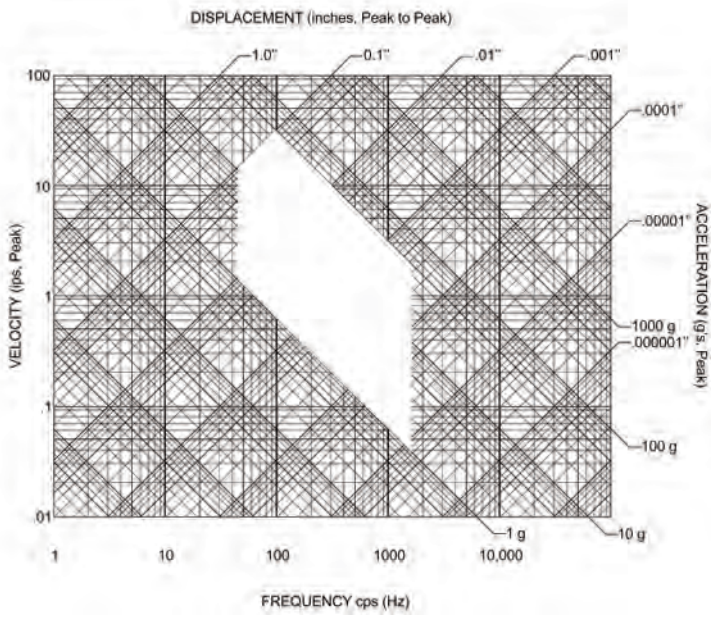
Ordering Information

When ordering, specify the full type number (i.e. 4-130-0001 or 4-137-0001). Refer to Table 1 and the outline drawings to identify the desired unit. Other configurations and sensitivities are available. Please contact CEC for details. Order mating connectors and cable assemblies separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

Table 1

Type	Sensitivity (mV/in/sec)	Configuration
4-130/4-137-0001	60 ±2	Triangle Base, connector
4-130/4-137-0002	105 ±3	Triangle Base, connector
4-130/4-137-0003	105 ±3	Square Base, connector
4-130/4-137-0004	135 ±3	Square Base, connector
4-130/4-137-0005	145 ±3	Square Base, connector





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4-130/4-137

Vibration Transducer

Velocity Sensors

Applications

- **Aircraft Engines**
- **Industrial Turbines**
- **Test Cells**

Features

- **Ceramic bearings provide exceptional service life**
- **Self-generated, high level, low impedance output**
- **Operates to +700°F (+371°C)**

Description

CEC's 4-130/4-137 Vibration Transducers offer a technology breakthrough in velocity output vibration transducer design. These transducers use a special advanced technology bearing system that extends their service life. Yet, this design preserves the simplicity and reliability that is typical of CEC's self-generating, low impedence vibration transducers.

We designed the 4-130/4-137 Vibration Transducers for turbine applications. Use them in hot sections where high temperatures cause problems with other instruments. They simplify your system because low impedence, high level output does not require special amplifiers or low-noise cables. They have low sensitivity to transverse accelerations, and you can mount them in any plane. Their rugged construction and new bearing system insure high reliability and long service life.

These instruments are especially valuable where space is limited. They adapt easily to your installation because models are available in a variety of mounting configurations and sensitivities.

CEC 4-130/4-137 Vibration Transducers use a seismic mass magnet that moves on special ceramic bearings. A coil is attached to the case, and movement between the magnet and coil produces the output signal when the case vibrates. This air damped system operates above its natural frequency so the mV output is proportional to velocity.

RoHS COMPLIANT

ISO 9001:2000 AS9100 Certified

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4-130/4-137 Vibration Transducer

Performance Specifications

Sensitivity: (Refer to Table 1) Measured at +77°F (+25°C) in the vertical position, with a sinusoidal driving force applied perpendicular to the base at 100 Hz, 1 in/sec RMS (25mm/sec). Load impedance is 10,000 Ω ±2%

Dynamic Range

- **Frequency:** 45 Hz to 1500 Hz
- **Amplitude:** 0.10 inch peak-to-peak max
- **Acceleration:** 1.0 g to 50 g peak vertical
  1.5 g to 50 g horizontal
- **Acceleration Threshold:** 0.3 g peak in the vertical position
  1.0 g peak in the horizontal position

Frequency Response: ±6% through frequency range referenced to 100 Hz at +77°F (+25°C) and 1 in/sec RMS (25 mm/sec)

Linearity: The sensitivity at 100 Hz, measured through the acceleration range of 1 g to 50 g's peak, shall not vary more than ±5% from the mean sensitivity

Temperature Range

- **4-130:** -65°F to +500°F (-54°C to +260°C)
- **4-137:** -65°F to +700°F (-54°C to +371°C)

Thermal Coefficient of Sensitivity: ±0.02%/°F from reference +77°F (±0.036%/°C from reference +25°C)

Damped Resonant Frequency: 20 Hz

Excitation: Self-generating

Coil Resistance: 450 Ω ±25%

Insulation Resistance: 0.1 megaohm minimum at +700°F (+371°C)

Polarity: Pin 2 is positive when case is moved upward

Shock: The maximum shock in any direction is 50 g's

Sealing: Hermetically sealed, all welded construction

Weight

- **Triangular base:** 2.5 oz. (70.9 g) maximum
- **Square base:** 3.5 oz. (99.2 g) maximum

Hazardous Approvals

North America
CSA C/US — Class I, Division I, Groups A, B, C and D
Class I, Division 2, Groups A, B, C and D

European
ATEX — EEx ia IIB or IIC T6 - T1
EEx nA II T6 - T1 X

Optional Accessories

1. High temperature cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)
2. High temperature connector P/N 173960

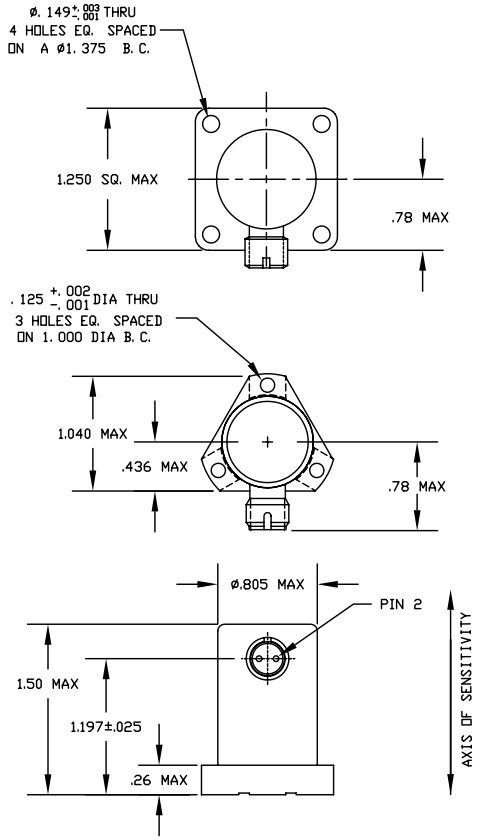
Ordering Information

When ordering, specify the full part number (i.e. 4-130-0001 or 4-137-0001). Refer to Table 1 and the outline drawings to identify the desired unit. Other configurations and sensitivities are available. Please contact CEC for details. Order mating connectors and cable assemblies separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

* Note Frequency Range = 45 Hz to 2000 Hz

Table 1

Type	Sensitivity (mV/in/sec)	Configuration
4-130/4-137-0001	60 ±2	Triangle Base, Connector
4-130/4-137-0002	105 ±3	Triangle Base, Connector
4-130/4-137-0003	105 ±3	Square Base, Connector
4-130/4-137-0004	135 ±3	Square Base, Connector
4-130/4-137-0005	145 ±3*	Square Base, Connector



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4-131 Vibration Transducer

4-131

Applications

- **Industrial Turbines**
- **Turbine-Driven Power Generators and Gas Pumping Systems**

Features

- **Friction-free design for long life**
- **Self-generated, high level, low impedance output**
- **Operates to +700°F (+900°F versions are available)**

The friction-free moving elements in CEC's 4-131 Vibration Transducers assure long life and reliability. Designed for industrial applications on fixed turbines, you can use this instrument in turbine hot sections where high temperatures cause problems with other transducers. The system is simplified due to the low impedance, high level output that can drive AC meters, recorders, and control electronics without using special amplifiers.

The frictionless design also allows measurement of extremely low vibration levels, critical when monitoring precision balanced turbine systems. The low level is limited only by system noise.

These transducers use a seismic mass magnet suspended by springs and a coil attached to the case. The output signal results from relative move ment between the magnet and coil when the case vibrates. The air damped system operates above its natural frequency, so the output signal is proportional to velocity. The sealed case prevents damage to the instrument when used in difficult environments.

Factory Mutual System Approved

ISO REGISTERED 9001

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4-131 Vibration Transducer

Specifications

Sensitivity: ..... 135 mV/in/sec ±3% at 80 Hz, and 77°F (25°C) ±4°F at 0.5 ips drive

Dynamic Range:
- **Frequency:** ..... 15 Hz to 2000 Hz
- **Amplitude:** ..... 0.07 inch peak-to-peak, maximum
- **Acceleration:** ..... 0.02 g to 50 g

Frequency Response: ..... ±15% over the frequency range, referenced to 80 Hz

Linearity: ..... Included in frequency response

Temperature Range: ..... -65°F to +700°F; (-65°F to +900°F available on special order)

Thermal Coefficient of Sensitivity: ... ±0.02%/°F from reference 77°F

Sensitivity Shift with Position: ..... 10% maximum

Damped Resonant Frequency: ..... Less than 15 Hz nominal

Excitation: ..... Self-generating

Insulation Resistance: ..... 100K ohms, minimum

Polarity: ..... Pin 1 is positive when the case is moved upward

Shock: ..... 50 g's maximum in any direction

Weight: ..... 5.8 oz. nominal

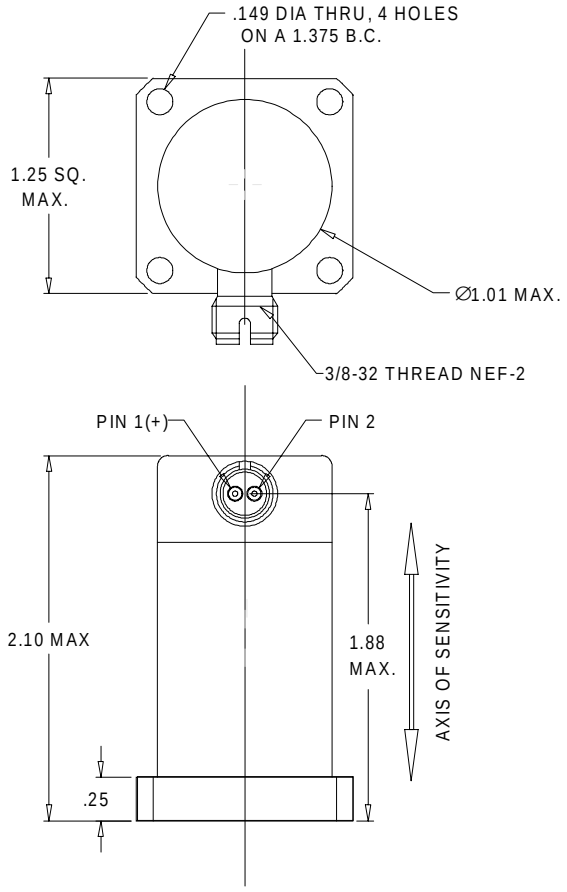
Cross Axis: ..... Must not exceed 2 g's maximum in continuous operation

Optional Accessories

1. Cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)
2. Connector P/N 173960

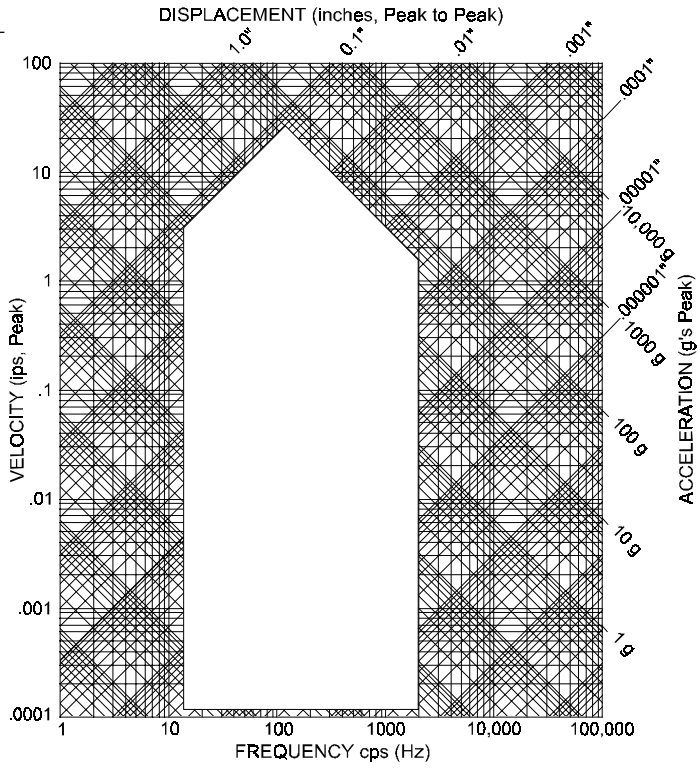
Ordering Information

When ordering, specify Type 4-131-0001. Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.



Dimensions are in inches.

VIBRATION NOMOGRAPH
Model 4-131 Operating Range



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4-131

Vibration Transducer

Applications

- **Industrial Turbines**
- **Turbine-Driven Machinery**
- **Power Generators**
- **Gas Pumping Systems**

Features

- **Friction-free design for long life**
- **Self-generated, high level, low impedance output**
- **Operates to +700°F (+900°F versions are available)**

Velocity Sensors

Description

The friction-free moving elements in CEC's 4-131 Vibration Transducers assure long life and reliability. Designed for industrial applications on fixed turbines, you can use this instrument in turbine hot sections where high temperatures cause problems with other transducers. The system is simplified due to the low impedence, high level output that can drive AC meters, recorders, and control electronics without using special amplifiers.

The frictionless design also allows measurement of extremely low vibration levels, critical when monitoring precision balanced turbine systems. The low level is limited only by system noise.

These transducers use a seismic mass magnet suspended by springs and a coil attached to the case. The output signal results from relative movement between the magnet and coil when the case vibrates. The air damped system operates above its natural frequency, so the output signal is proportional to velocity. The sealed case prevents damage to the instrument when used in difficult environments.

RoHS COMPLIANT

ISO 9001:2000 AS9100 Certified

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4-131 Vibration Transducer

Performance Specifications

Sensitivity:	(refer to table 1) mV/in/sec ±3% at 80 Hz and +77°F (+25°C) ±4°F at 0.5 in/sec (ips), load impedance is 10,000 Ω ±2%
Dynamic Range	
Frequency:	15 Hz to 2000 Hz
Amplitude:	0.07 inch peak-to-peak, maximum
Acceleration:	0.2 g to 50 g
Acceleration Threshold:	0.01 g peak
Linearity:	±6% along straight line between 0.1 & 1.0 ips at 80 Hz & 77°F
Frequency Response:	±15% of reference sensitivity through the frequency range
Temperature Range:	-65°F to +700°F (-54°C to +371°C) +900°F available on special order
Thermal Coefficient of Sensitivity:	±0.02%/°F from reference +77°F
Sensitivity Shift with Position:	10% maximum
Damped Resonant Frequency:	Less than 15 Hz nominal
Excitation:	Self-generating
Insulation Resistance:	100K Ω, minimum
Polarity:	Pin 1 is positive when the case is moved upward
Shock:	50 g's maximum in any direction
Weight:	5.8 oz. nominal
Cross Axis:	Must not exceed 2 g's maximum in continous operation
Coil Resistance:	450 to 550 Ω @ 77°F ±4°F

Approvals

North American:
Intrinsically Safe Class I, Division 1, Groups A, B, C & D
Hazardous Locations (without barrier)
Class I, Division 2, Groups A, B, C, & D

European:
EEx ia IIB or IIC T1...T6
EEx nA II T1...T6 X

Ordering Information

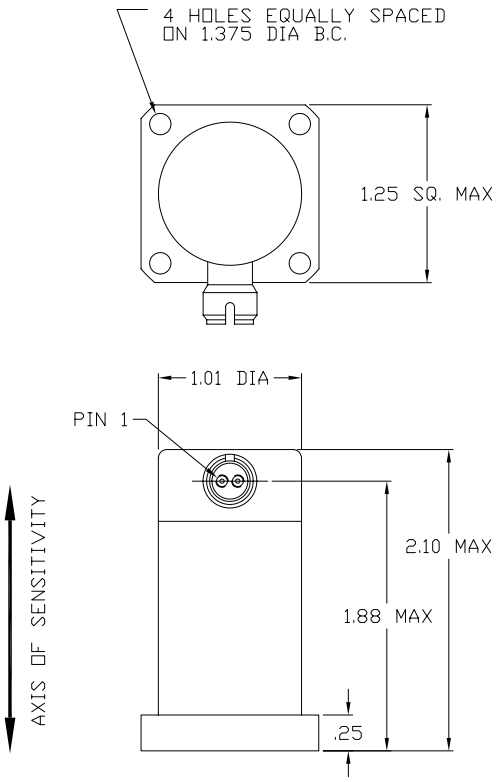
In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.

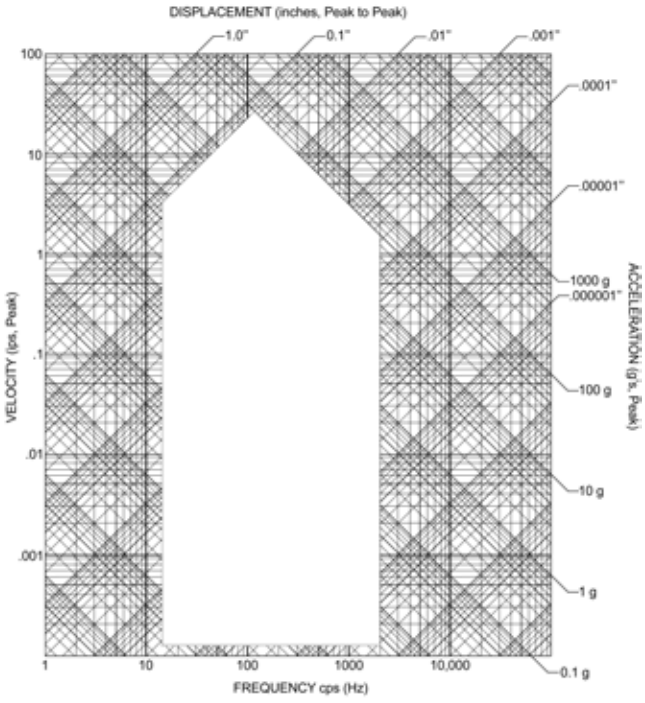
Optional Accessories

1. Cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)
2. Connector P/N 173960

Table 1

Part Number	Sensitivity	Max Temp
4-131-0001	135 mV	+700°F (+371°C)
4-131-0103	150 mV	+700°F (+371°C)
4-131-0107	145 mV	+700°F (+371°C)
4-131-0116	200 mV	+700°F (+371°C)
4-131-0123	135 mV	+900°F (+482°C)





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4-138

Vibration Transducer

Applications

- **Industrial Turbines**
- **Turbine-Driven Machinery**
- **Power Generators**
- **Gas Pumping Systems**

Features

- **Friction-free design for long life**
- **Self-generated, high level, low impedence output**
- **Operates to +700°F**

Description

The friction-free moving elements in CEC's 4-138 Vibration Transducers assure long life and reliability. Designed for industrial applications on fixed turbines, you can use this instrument in turbine hot sections where high temperatures cause problems with other transducers. The system is simplified due to the low impedence, high level output that can drive AC meters, recorders, and control electronics without using special amplifiers.

The frictionless design also allows measurement of extremely low vibration levels, critical when monitoring precision balanced turbine systems. The low level is limited only by system noise.

The 4-138 is a seismic mass type velocity transducer designed for measuring vertical vibrations at low frequencies and high temperatures up to +700°F (+371°C). A coil is suspended by springs around a stationary magnet which is attached to the case. The output signal results from relative movement between the coil and magnet when the case vibrates. This magnetic damped system operates above its natural frequency. The self-generated sensor output is proportional to velocity.

ISO 9001:2000/AS 9100 Rev B

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4-138 Vibration Transducer

Specifications

Sensitivity: (refer to table) measured at 80 Hz and +77°F (+25°C) ±4% at 1.0 in/sec (ips) peak, load impedance is 100,000 ohms ±2%

Dynamic Range

Frequency:	15 Hz to 2000 Hz
Amplitude:	0.07 inch peak-to-peak, max
Acceleration:	0.02 g to 50 g
Acceleration Threshold:	0.01g peak

Frequency Response:

Linearity: ±3% along straight line between 0.1 & 1.0 ips peak at 80 Hz & 77°F

Temperature Range: -65°F to +700°F (-54°C to + +371°C)

Thermal Coefficient of Sensitivity: <±0.02% / °F

Sensitivity Shift with Position: ±10%

Damped Resonant Frequency: <15 Hz

Excitation: self-generating

Insulation Resistance: >10 megohms at +77°F
>0.5 megohm at +500°F

Polarity: pin 1 is positive with an upward vertical movement

Shock: 50 g's peak in sensitive axis, 2 g's peak in cross axis

Weight: 7.0 to 7.5 oz.

Cross Axis: < ±5% of specified sensitivity

Approvals

CSA C/US certified:
Intrinsically safe Class I, Division I, Groups A, B, C & D
Hazardous Locations (without barrier)
Class I, Division 2, Groups A, B, C & D

LCIE certificate of conformity (pending)
EEx ia IIB or IIC T1, T2, T3, T4, T5 or T6
Ex nA IIC T1, T2, T3, T4, T5 or T6 (pending)

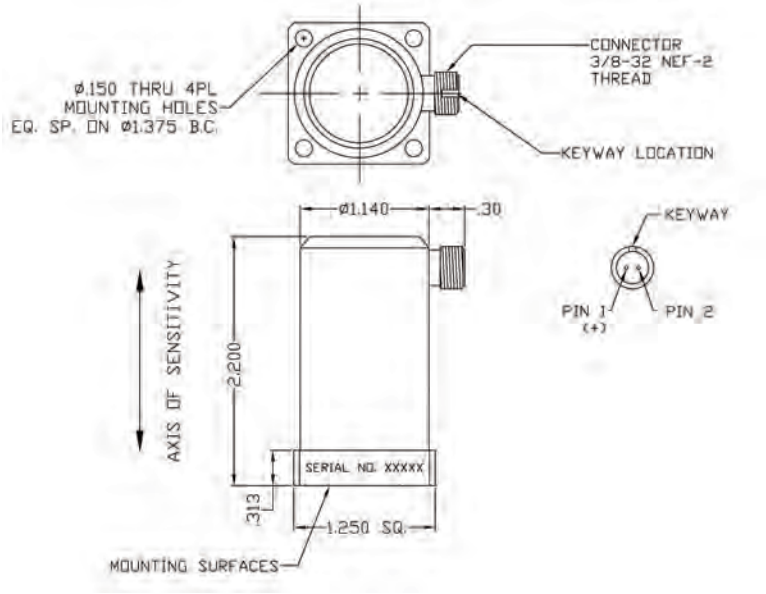
Optional Accessories

1. Cable and connector assembly P/N 169500-XXXX (length is identified in inches; e.g.: 60-inch cable is P/N 169500-0060)

2. Connector P/N 173960

Ordering Information

When ordering, specify type 4-138-XXXX (see table). Mating connectors and cable assemblies are not furnished and must be ordered separately. In keeping with CEC's policy of continuing product improvement, specifications may be changed without notice.



Part Number	Cable Length	Output Sensitivity
4-138-0001		135 mV/ips, Peak
4-138-0002		145 mV/ips, Peak
4-138-0003		150 mV/ips, Peak
4-138-0004		200 mV/ips, Peak
4-138-1001	-XXX	135 mV/ips, Peak
4-138-1002	-XXX	145 mV/ips, Peak
4-138-1003	-XXX	150 mV/ips, Peak
4-138-1004	-XXX	200 mV/ips, Peak

Where -XXX = length of cable in feet
Standard Cable lengths available

-010	10 ft. (3 m)
-015	15 ft.
-017	17 ft. (5 m)
-020	20 ft.
-030	30 ft.
-033	33 ft. (10 m)
-044	40 ft.
-050	50 ft.

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