

# EXTREME ENVIRONMENTS

## TEST & MEASUREMENT SENSOR CATALOG

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Accelerometers

Pressure Transducers

Signal Conditioners

Inertial Sensors

Cable Assemblies

Supporting Instrumentation

Calibration Services



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# Product Technology



## Variable capacitance accelerometers

Variable capacitance (VC) accelerometers are DC-response sensors for measuring low frequency vibration, motion (constant acceleration) and tilt. With gas damping and internal over-range stops, Endevco VC accelerometers are capable of measuring whole body motion immediately after being subjected to a shock motion, even in the presence of severe vibrational inputs and variable temperatures.



## Piezoresistive accelerometers

Piezoresistive (PR) accelerometers are ideal for measuring impacts and shock events. Typical applications include automotive crash testing, commercial drop testing and high g weapons testing. These highly specialized MEMS sensing elements are micro-machined at the facility in Sunnyvale, California. Some units are damped to prevent ringing, while others are undamped to provide high bandwidth. Various packaging configurations are available to meet diverse mounting requirements.



## Inertial sensors

Angular rate sensors measure relative rotational motion directly and provide an output in degrees per second. This measurement of angular velocity offers great improvement over the previous method of using three accelerometers and doing complex calculations. Multiple ranges are provided to enable measurement of slow or fast moving events.



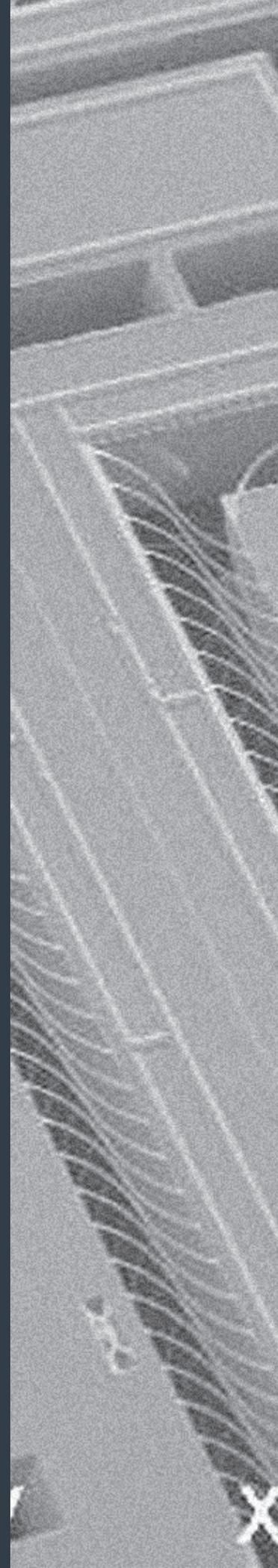
## Piezoresistive pressure sensors

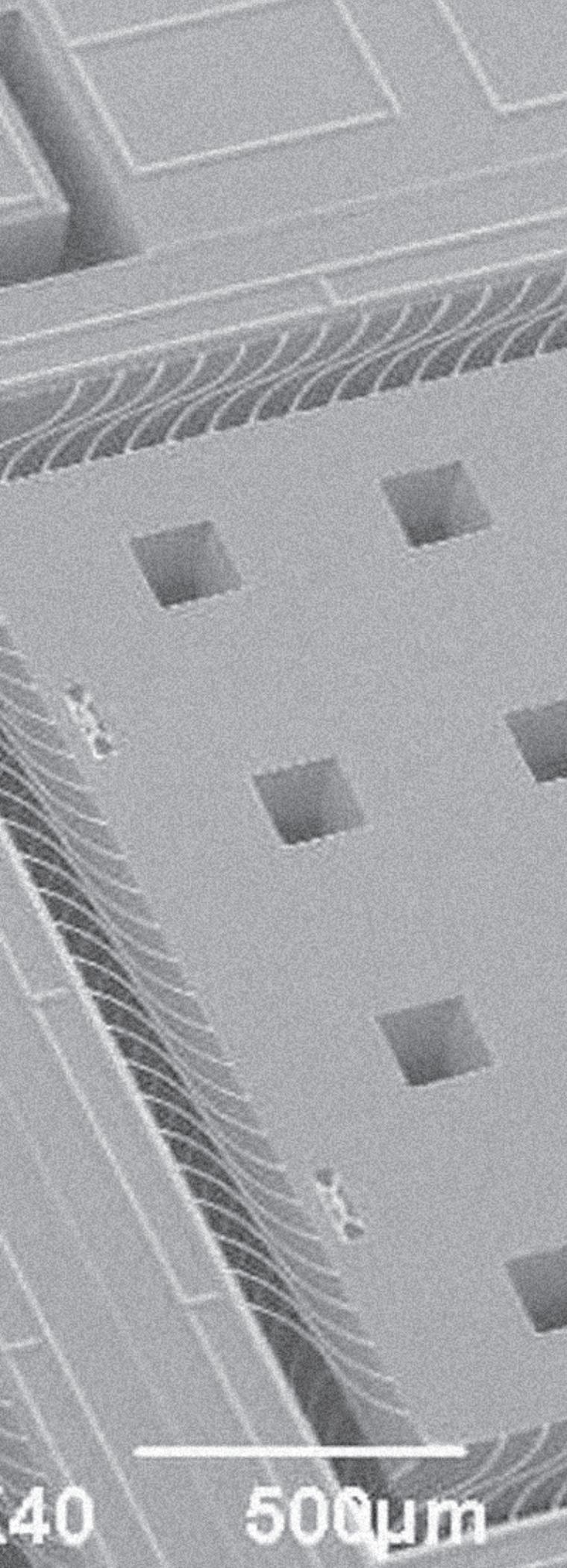
Miniature piezoresistive pressure sensors measure both dynamic and static pressure in process control applications, blast testing, automotive airbag testing, rocket motor analysis, jet engine inlet pressure measurements, transmission testing and hydraulics measurements. A four-arm strain gage bridge MEMS sensing element, implanted into a sculpted diaphragm, offers a wideband frequency response with outstanding sensitivity for improved resolution, high resonance frequency, exceptional linearity, and reliable hysteresis performance.



## Signal conditioners and supportive instrumentation

Endevco provides a comprehensive range of high-performance electronics, from simple battery-operated signal conditioners to computer-controlled, laboratory-grade instrumentation. These devices are compatible with Endevco's IEPE, PE, VC, and PR accelerometers and pressure sensors, as well as other commonly used industry models.





### **Piezoelectric accelerometers**

Piezoelectric (PE) accelerometers are charge-mode accelerometers that require the use of an external charge amplifier. This allows for long term, reliable operation over wide temperature and amplitude ranges. These accelerometers are ideal for use in extreme environment conditions, from cryogenic to extreme-high temperatures and in radiation environments. They are offered in a wide variety of sizes and configurations.



### **IEPE accelerometers**

Integrated electronics piezoelectric (IEPE) accelerometers feature an integral electronic charge converter. Integrated electronics eliminate the need for in-line amplifiers and specialty cable.



### **High intensity microphones**

Piezoelectric microphones measure high-intensity acoustic noise parameters and very low pressure fluctuations. Hermetically sealed units operate over a wide temperature range and are insensitive to altitude changes and ambient vibration.



### **Cable assemblies**

For optimal performance, Endevco relies upon in-house expertise to design and manufacture its own cables and connectors. Standard and custom assemblies include low-noise, high-temperature, and multi-conductor options. .

# There is more than one type of accelerometer!

Endevco designs and manufactures a variety of accelerometers for measurements of vibration, shock and inertial motion. To meet various testing requirements, several types of accelerometer technologies are available each differing in terms of their recommended usage, performance specifications, power requirements and signal conditioning characteristics. The following is a general overview of accelerometer technology types and their application considerations.

## Piezoelectric (PE) accelerometers

All mechanical accelerometer designs are based on a simple spring-mass principle in which strain is generated in relation to amplitude and frequency of the dynamic motion. In a piezoelectric (PE) accelerometer, this strain is applied directly to the PE element, which develops an electrical charge proportional to mechanical motion. Different material and configurations of PE accelerometer elements are used to support specific applications.

### Advantages of PE sensors

- The dynamic range of PE accelerometers can be greater than 130dB. When used with a proper charge converter/amplifier, they offer unmatched performance in terms of total measurement range and reliability. Transduction efficiency may also be optimized with PE crystals to allow for the miniaturization of accelerometer within a given physical envelope.
- Single-ended compression types are optimal for low-level measurements due to the high sensitivity achieved by stacking multiple PE crystals in parallel.
- A shear mode design allows for the construction of miniature, lightweight sensors suitable for monitoring small components and test articles.  
A key advantage of the shear design is the isolation of the sensing element from the base, which provides excellent protection from base strain and temperature transients.

- Due to the broad temperature range of most piezoelectric materials, PE accelerometers are often specified for extreme high or low temperature applications, from cryogenic conditions in rocket engines to the extreme heat environment of a turbine generator.
- PE accelerometers are available in a wide range of shapes and sizes, from micro-miniature in electronics component testing to larger sizes used in seismic or engine applications.

## Piezoresistive (PR) accelerometers

Strain gauge accelerometer designs based on a Wheatstone bridge arrangement consist of a rugged monolithic assembly with solid-state MEMS resistors that change in resistance in proportion to applied mechanical strain.

### Advantages of PR sensors

- PR accelerometers feature DC response, making them suitable for measuring long-duration pulses. Their acceleration outputs can be integrated to accurately determine velocity and displacement.
- Monolithic MEMS sensors exhibit high sensitivity with an excellent signal-to-noise ratio and outstanding stability.
- The simplicity and miniature size of the MEMS PR element enable broad bandwidth (>100,000 Hz) and wide dynamic range (>100,000 g) designs.



### Integrated electronics piezoelectric (IEPE) accelerometers

The acronym IEPE refers to a type of piezoelectric (PE) accelerometer with internal electronics (IE) that allows it to convert charge to a low-impedance voltage output. Its temperature response is somewhat limited due to its onboard electronics. This type of accelerometer is primarily specified for applications in which environmental conditions permit its use, including HALT/HASS/ESS testing, industrial vibration monitoring, and general-purpose vibration and shock testing.

Since both PE and IEPE types are AC-coupled designs, the acceleration output of these accelerometers cannot be used to yield correct velocity and displacement information by numerical integration.

#### Advantages of IEPE sensors

- Less operator attention, training and installation expertise required.
- Uses standard coaxial cable.
- Drives long cables without noise increase or loss of resolution.
- Operates directly into many data collectors with built-in constant current input.

### Variable capacitance (VC) accelerometers

Endevco's VC accelerometers feature a silicon MEMS capacitive sensing element, anodically bonded to a lid and base to create a parallel-plate differential capacitor. They provide DC response, gas damping for broad frequency coverage, and rugged construction for reliable performance. Integrated electronics with DC excitation ensure a stable, high-level, low-impedance output signal.

#### Advantages of VC sensors

- Designed for low-g measurement, yet can also withstand very high g shocks.
- Suitable for trajectory monitoring, modal analysis, flutter testing, and vehicle dynamics measurements, including automotive suspensions and ride quality.

# Accelerometer Performance Characteristics

To obtain meaningful acceleration data, it's essential to understand the performance characteristics of the accelerometers being used.

## Parameters include:



### Sensitivity

Higher sensitivity typically results in a higher signal-to-noise ratio. Interfering electrostatic and electromagnetic noise will be less bothersome with a higher-sensitivity device. Higher sensitivity, however, may bring two disadvantages: greater accelerometer mass and a lower resonance frequency.



### Low-frequency response

With a PE accelerometer, the low-end response can only be assessed together with the charge converter as a system. With IEPE sensors, the charge converter is built into the sensor, which has a preset low frequency cutoff. The cutoff in a typical charge converter is often set at 1 to 5 Hz to reject any pyroelectric output. PR and VC accelerometers offer DC response and have no roll-off characteristics at low frequency.



### Temperature sensitivity

Accelerometer sensitivity varies with temperature. Many models are optimized for stable sensitivity over a wide temperature range. Typically, the higher the temperature, the higher the degree of measurement error potential, unless compensated. Temperature sensitivity compensation can be passive (using capacitors and resistors) or active (using ASICs), each with its own advantages and disadvantages in implementation.



### Transient temperature effects

Compression-mode PE and IEPE accelerometers may produce output signals during rapid temperature changes, known as pyroelectric output. This problem has been virtually eliminated with the advent of shear mode accelerometers (most Endevco accelerometers are shear mode types). Thermal transient response errors tend to manifest themselves as low frequency signals and often go undetected. PR and VC devices have no significant response to rapid temperature changes.



### High-frequency response

This is a function of both mechanical characteristics and the method used to attach the device. Most accelerometers exhibit an undamped single degree-of-freedom response when securely mounted. Response is relatively flat, to about 20% of the mounted resonant frequency. Correction factors can be derived for data obtained at higher frequencies. Electronic filtering can increase flat response to 50% of the mounted resonant frequency.



### Transverse sensitivity

Also referred to as crosstalk, transverse sensitivity describes the sensor's ability to minimize responses to motion applied along lateral axes. Endevco sensors achieve exceptional performance, limiting sensitivity to lateral motion to less than 5% of the primary axis sensitivity.



### Amplitude linearity

PE accelerometers have a predictable nonlinearity that can be expressed as a percentage increase in sensitivity as acceleration increases, such as 1% per 500 g. The upper limit can be determined and expressed for each model. With most Endevco PE and PR models, the output of the device can still be usable at two to three times its rated full scale range if the higher non-linearity is acceptable to the application.



### Strain effects

The test item may flex, stretch, or bend at the point where an accelerometer is mounted, causing it to produce an erroneous output due to the deformation. The situation may be improved by using mounting adapters but at the expense of reduced transmissibility. Shear type PE/IEPE accelerometers are much less sensitive to such errors than conventional compression types. The output of PR and VC types are less susceptible to strain effect in general.



### Mass loading

Frequency response of the unit under test can be appreciably changed if the dynamic mass of the accelerometer approaches the dynamic mass of the test article. Consequently, it is recommended to use an accelerometer which weighs no more than 10% of the unit under test.



### Damping

Most commonly used accelerometers are undamped, making them susceptible to resonance in applications involving mechanical impacts. When an accelerometer resonates, it runs a risk of amplifier overload, offset error, or even damage to the device. A more suitable approach incorporates damping such that high frequency content above the passband of interest is directly mitigated. Certain PR and VC sensor use gas damping built into the sensing element design to control resonance.

## APPLICATION

# Automotive Design & Test

Endevco has sensors for all your automotive development applications. Our IEPE accelerometers are best for vehicle dynamic testing of engines, exhaust systems, and other components due to their miniature packaging, high temperature performance and rugged construction. Endevco VC accelerometers feature high stability, low frequency measurement suited to suspension and ride quality testing. Our PR pressure sensors are ideal for testing automotive systems such as Anti-Lock Brake Systems (ABS), transmissions, fuel systems, and oil systems due to their wide frequency response and miniature, high-output design.

## Applications

- Road load
- Powertrain
- Transmission testing
- Modal/chassis design
- Component qualification testing
- Noise, Vibration, and Harshness (NVH)

## Features

- TEDS enabled for high channel count applications
- Static and dynamic pressure measurements
- Miniature size



Model	Application attributes	Find on page
770A - 770F	Low g DC accelerometer for suspension testing	<a href="#">19</a>
773	Triaxial low g DC accelerometer for suspension testing	<a href="#">19</a>
7250B	High frequency, miniature single axis accelerometer with versatile mounting configuration	<a href="#">33</a>
8510B	Pressure sensor in high and low ranges for automotive development	<a href="#">27</a>



# Automotive Safety Testing

Since the earliest days of vehicle safety testing, Endevco has collaborated with OEMs, test laboratories, and ATD manufacturers' design and test personnel to ensure precise measurements for front, side, and rear impacts, crush zones, in-vehicle occupant safety, and pedestrian protection. Endevco's high-precision, DC-responding piezoresistive accelerometers are widely used in these applications due to their high output, low mass, and compact design, making them suitable for mounting in challenging locations. Their durability, miniature size, and DC response capabilities provide reliable solutions for a wide range of automotive testing needs.

## Applications

- Anthropomorphic Test Device (ATD)
- Pedestrian safety study
- Frontal, rear and side impact
- Vehicle roll-over testing
- Global regulatory compliance testing
- Vehicle crush zones and crash sleds

## Features

- SAE J211, J2570 and ISO 6487 compliant
- Standard equipment on all ATDs
- Exceptional frequency response
- Small and lightweight
- Rugged to 10,000g
- Multi-mode damping



Model	Application attributes	Find on page
701AH-701FH	Damped, rugged accelerometer for on-vehicle crash testing	<a href="#">21</a>
713AL-713FL	Damped triaxial accelerometer for on-vehicle crash testing	<a href="#">20</a>
726CH	Damped accelerometer for ATD, cg meets NHTSA standard	<a href="#">21</a>
757AH-757FH	Damped, miniature accelerometer for on-vehicle crash testing	<a href="#">21</a>
758H	Damped, rugged accelerometer for on-vehicle crash testing	<a href="#">21</a>
7264B	Undamped accelerometer for ATD, cg between the screws	<a href="#">21</a>
7264C	Undamped accelerometer for ATD. Meets NHTSA SA-572	<a href="#">21</a>
7264H	Multi-mode damped accelerometer for pedestrian head form studies	<a href="#">21</a>
7268C	Undamped triaxial accelerometer for World SID ATD	<a href="#">20</a>
7310A	Angular rate sensor for whiplash and rollover measurements	<a href="#">25</a>
8510B	Pressure sensor in high and low ranges for automotive development	<a href="#">27</a>
8530BM37	Pressure sensor in high ranges for airbag and ABS	<a href="#">27</a>



# Aircraft / Spacecraft Design & Test

As the leading sensor provider for development and flight test of aircraft and spacecraft, Endevco's advanced measurement devices are proven to withstand the challenges of extreme environments. Our accelerometers, pressure sensors and electronics are trusted solutions used in hundreds of flight tests worldwide, delivering industry-leading performance and reliability for several decades.

Aircraft / Spacecraft  
Design & Test

## Applications

- Flutter testing
- Turbulent airflow measurements
- Rocket engine testing
- Vibroacoustic testing
- Vehicle dynamics studies
- Missile and rocket launches

## Features

- Cryogenic temperatures (-452°F, -269°C)
- Flight / space qualified electronics
- High thermal stability
- Low frequencies down to DC



Model	Application attributes	Find on page
2262B	Highest damping, stud mount for ship shock	<a href="#">22</a>
2510	High temperature microphone for high intensity acoustic measurements	<a href="#">36</a>
2680BMX	Compact and lightweight charge amplifier with gain and filter options	<a href="#">35</a>
4830B	Handheld accelerometer simulator. A highly configurable tool for verification and troubleshooting of test systems	<a href="#">44</a>
7290G	DC response accelerometer for low frequency flight and flutter measurements	<a href="#">19</a>
7722 / 7724	Cryogenic accelerometer [-268°C, 452°F] with grounded or isolated designs available	<a href="#">30</a>
8510B	General purpose pressure in high and low ranges for aircraft development	<a href="#">27</a>
8515C	0.03 inch thin surface mount pressure for aerodynamic studies	<a href="#">27</a>



# High g Shock Testing

Endevco's high g accelerometers have long been the industry standard for reliable shock measurements in extreme environments. Our piezoresistive accelerometers provide DC response with minimal zero shift to avoid integration errors, which is critical to the quality of your measurements. Advanced in-house MEMS technology enables a compact design, high sensitivity, and exceptional over-range performance, while ensuring the repeatability and reliability needed for mission-critical applications. Our newest generation of gas-damped accelerometers are the most survivable in the world. They are available in single-axis or triaxial configurations with multiple mounting options, including screw, stud, and surface mounts, and are fully SMT compatible.

## Applications

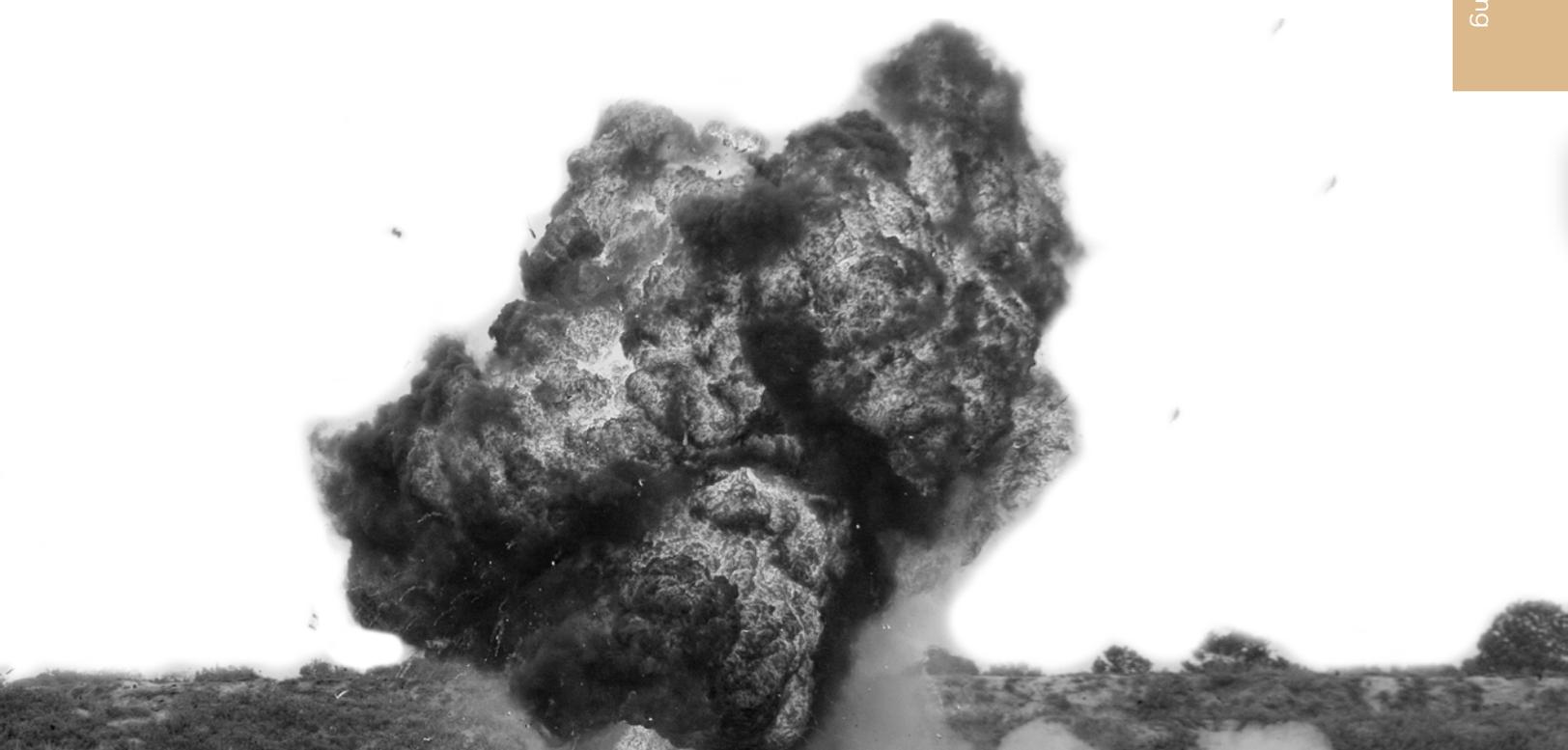
- Weapons and rocket testing
- High-shock data recorders
- Shock wave monitoring
- Drop and impact testing
- Portable electronic device testing
- Near- and far-field pyroshock testing
- Fuze/safe and arm
- Mechanical shock testing

## Features

- Undamped for broad frequency response or damped for exceptional survivability
- Multiple mounting configurations
- Minimal zero shift after shock
- High survivability in overrange environments
- DC response for long duration transient events
- Ranges up to 200,000 g
- Miniature SMT versions for embedded applications



Model	Application attributes	Find on page
71M	High bandwidth surface mount for missiles, fuzes	<a href="#">22</a>
72	High survivability surface mount for missiles, fuzes	<a href="#">22</a>
74	Damped triaxial, surface mount for data recorders, fuzes	<a href="#">22</a>
75	Undamped triaxial, surface mount for data recorders, fuzes	<a href="#">22</a>
7270A	Highest bandwidth, screw mount for weapons testing	<a href="#">23</a>
7270AM4	Highest bandwidth, stud mount for weapons testing	<a href="#">23</a>
7270AM6	Mechanical damping for pyroshock	<a href="#">23</a>
7270AM7	Highest bandwidth, ruggedized for blast conditions	<a href="#">23</a>
7274A	Undamped triaxial, screw mount for weapons testing	<a href="#">23</a>
7280A	Highest survivability, screw mount for weapons testing	<a href="#">23</a>
7280AM4	Highest survivability, stud mount for weapons testing	<a href="#">23</a>
7280AM7	Highest survivability, ruggedized for pyroshock	<a href="#">23</a>
7284A	Damped triaxial, screw mount for pyroshock	<a href="#">23</a>



## APPLICATION

# Pressure Testing

Endevco's miniature piezoresistive pressure sensors offer accurate and reliable performance at pressure extremes. For several decades, Endevco's pressure sensors have been addressing demanding test environments for automobiles, trains, aircraft and weapons. The MEMS sensing elements are designed for extremely high output and high resonance combined with exceptional linearity and hysteresis performance. Whether your application calls for measurement of 1 psi or 20,000 psi, a light wind or an explosive blast, Endevco has a pressure sensor that will give you the data you need.

## Applications

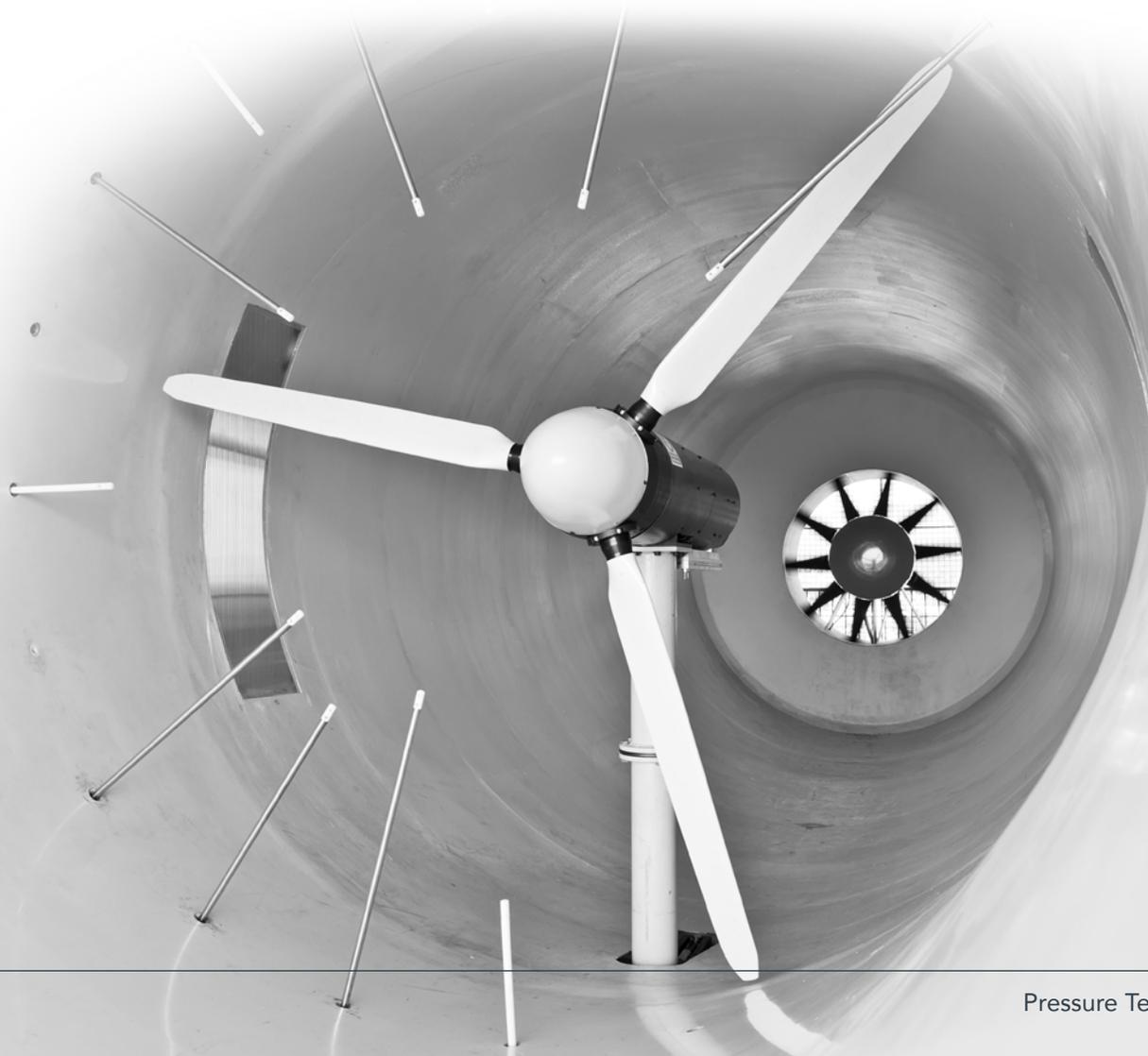
- Hypersonic, transonic and "quiet flow" wind tunnel testing
- Blast testing
- Automotive airbag inflation testing
- Jet airflow fields and inlet pressure
- Rocket acoustics
- Turbulent airflow measurements
- Vehicle transmission testing
- Hydraulics measurements

## Features

- Gage and absolute models
- High sensitivity for better signal-to-noise ratio
- High resonance frequency for fast response time
- Industry leading over-range (3x) and burst pressure
- Excellent linearity (to 3x full scale on some models)
- Insensitive to vibration
- Many special modifications available including metric threads, integral connectors, and special protections against humidity or photo-flash



Model	Application attributes	Find on page
8507C	0.092 diameter for wind tunnel, scale models	<a href="#">27</a>
8510B	General purpose in high and low ranges for automotive development	<a href="#">27</a>
8510C	General purpose in mid ranges for launch vehicle	<a href="#">27</a>
8511A	Rugged, high pressure for blast testing	<a href="#">27</a>
8515C	0.03 inch thin surface mount for flight testing	<a href="#">27</a>
8530B	General purpose in high ranges for airbag and ABS	<a href="#">27</a>
8530C	General purpose in mid ranges for rail and launch vehicle	<a href="#">27</a>



# Variable Capacitance Accelerometers

## Applications

- Aircraft flight and flutter testing
- Automotive ride quality testing
- Train ride quality testing
- Engine load cycle
- Road Load Data Acquisition (RLDA)



## Variable capacitance (VC) accelerometers

Endevco's VC accelerometers incorporate a silicon MEMS capacitive sensing element, anodically bonded to a lid and base to form a parallel-plate differential capacitor. They offer DC response, gas damping for broad frequency coverage, and rugged construction. Integrated electronics with DC excitation deliver a stable, high-level, low-impedance output signal.

### Advantages of VC sensors

- Designed for low-g measurement, yet can also withstand very high g shocks.
- Suitable for trajectory monitoring, modal analysis, flutter testing, and vehicle dynamics measurements, including automotive suspensions and ride quality.

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Model number	770A-770F	771	773
<b>Description</b>	Low g DC measurement Rugged Al housing 28 AWG cable	Low g DC measurement Hermetic SS package Military temperatures	Triaxial Low g DC Rugged Al housing Separate power & ground
<b>Linear range</b> g	$\pm 2/\pm 10/\pm 30/\pm 50/\pm 100/\pm 200$	$\pm 10/\pm 30/\pm 50/\pm 100/\pm 200$	$\pm 5/\pm 10/\pm 30/\pm 50/\pm 100/\pm 200$
<b>Sensitivity</b> mV/g typical	1,000/200/66/40/20/10	200/66/40/20/10	400/200/66/40/20/10
<b>Frequency response</b> $\pm 5\%$	0-200/0-900/0-900/0-900/ 0-1500/0-1500	0-900/0-900/0-900/ 0-1,500/0-1,500	0-200/0-750/0-750/0-750/ 0-1,000/0-1,000
<b>Non linearity</b> % FSO typical	0.5	0.5	0.5
<b>Shock limit</b> g	10,000	10,000	10,000
<b>Operating temperature</b> °C (°F)	-40 to +100 (-40 to +212)	-55 to +125 (-67 to +257)	-40 to +100 (-40 to +212)
<b>Dimensions</b> mm (in)	15.24 (0.6) cube (A) 15.24 x 22.88 x 15.24 (0.600 x 0.885 x 0.600) (F)	15.88 hex base x 24.89 (0.625 hex base x 0.980)	22.86 x 22.86 x 19.56 (0.900 x 0.900 x 0.770)
<b>Weight</b> grams	6	29	24
<b>Excitation voltage</b> Vdc	7 to 36 or 5V (R option)	7 to 36 or 5V (R option)	7 to 36 or 5V (R option)
<b>Mounting method</b>	Adhesive (A); 2-56 screws (F)	Stud	4-40 screws

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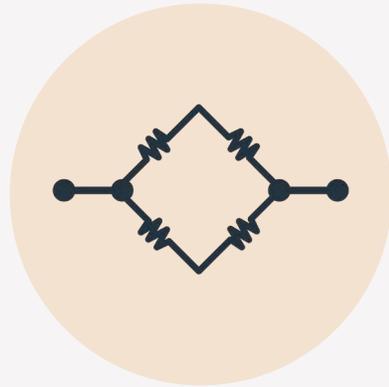


Model number	7290G	7290GM5
<b>Description</b>	Wide bandwidth DC response High stability	DC accelerometer Watertight to IP67 Temperature compensated
<b>Linear range</b> g	$\pm 2 / \pm 5 / \pm 10 / \pm 30 / \pm 50 / \pm 100 / \pm 200$	$\pm 2 / \pm 5 / \pm 10 / \pm 30 / \pm 50 / \pm 100 / \pm 200$
<b>Sensitivity</b> mV/g typical	1,000 / 400 / 200 / 66 / 40 / 20	1,000 / 400 / 200 / 66 / 40 / 20
<b>Frequency response</b> $\pm 5\%$	0-15 / 0-30 / 0-500 / 0-1000 / 0-2000 / 0-2,000	0-15 / 0-30 / 0-500 / 0-1000 / 0-2000 / 0-2,000
<b>Non linearity</b> % FSO typical	0.2 / 1.0 (100g and 200g)	0.2 / 1.0 (100g and 200g)
<b>Shock limit</b> g	5,000 (2g / 5g / 10g) / 10,000	5,000 (2g / 5g / 10g) / 10,000
<b>Operating temperature</b> °C (°F)	-55 to +125 (-67 to +257)	-55 to +125 (-67 to +257)
<b>Dimensions</b> mm (in)	25.4 x 21.6 x 7.6 (1.00 x 0.85 x 0.30)	25.4 x 21.6 x 7.6 (1.00 x 0.85 x 0.30)
<b>Weight</b> grams	10	10
<b>Excitation voltage</b> Vdc	8 to 40	8 to 40
<b>Mounting method</b>	4-40 screws	4-40 screws

# Piezoresistive Accelerometers

## Applications

- Vehicle crush zones, crash sleds and rollover
- Anthropomorphic Test Devices (ATD)
- Pedestrian safety
- Weapons and rocket testing
- High-shock data recorders
- Drop and impact testing
- Fuze/safe and arm



## Piezoresistive (PR) accelerometers

Strain gauge accelerometer designs based on a Wheatstone bridge arrangement consist of a rugged monolithic assembly with solid-state MEMS resistors that change in resistance in proportion to applied mechanical strain.

### Advantages of PR sensors

- PR accelerometers feature DC response, making them suitable for measuring long-duration pulses. Their acceleration outputs can be integrated to accurately determine velocity and displacement.
- Monolithic MEMS sensors exhibit high sensitivity with an excellent signal-to-noise ratio and outstanding stability.
- The simplicity and miniature size of the MEMS PR element enable broad bandwidth (>100,000 Hz) and wide dynamic range (>100,000 g) designs.



Model number	713AL - 713FL	7262A	7268C
<b>Description</b>	Miniature Triaxial Meets SAEJ211/J2570 Frequency Response Multi-mode damping	Rugged Gas damped Temperature compensated	Triaxial Undamped World SID ATD
<b>Linear range</b> g	±2,000	±100 / ±500 / ±1,000	±500 / ±2,000
<b>Sensitivity</b> mV/g typical	0.30	5.0 / 2.0 / 1.0	0.80 / 0.20
<b>Frequency response</b> ±5%, Hz	0 to 3500	0-2,000	0-3,000 (Z) / 0-1500 (X&Y)
<b>Shock limit</b> g	10,000	10,000	5,000 / 10,000
<b>Operating temperature</b> °C (°F)	-40 to +100 (-40 to +212)	-54 to +121 (-65 to +250)	-18 to +66 (0 to +150)
<b>Dimensions</b> mm (in)	16.0 x 16.0 x 6.5 (0.630 x 0.630 x 0.254)	0.862 x 0.63 x 0.37 (21.9 x 16.0 x 9.40)	12.70 x 14.73 x 10.67 (0.500 x 0.580 x 0.420)
<b>Weight</b> grams	3.5 (AL) / 4 (FL)	6	8
<b>Mounting method</b>	Adhesive (AL) / 2x #2-56 socket head cap screws (FL)	Two 2-56 high strength screws, two #2 washes	M2 screw

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Model number	701AH-701FH	726CH	757AH-757FH	758H
<b>Description</b>	Rugged Al housing Damped for survivability 28 AWG cable	SAE J211/J2570 Compliant Multi-mode damping Broad frequency response	Small and lightweight Damped for survivability Flexible cable	Rugged Mounting flexibility 28 AWG cable
<b>Linear range</b> g	±1,000	±2,000	±2,000	±2000
<b>Sensitivity</b> mV/g typical	0.3	0.3	0.3	0.3
<b>Frequency response</b> ±5%, Hz	0-4,000	0-5,000	0-3,000	0-4000
<b>Shock limit</b> g	10,000	10,000	10,000	10,000
<b>Operating temperature</b> °C (°F)	-40 to +100 (-40 to +212)	-40 to +100 (-40 to +212)	-40 to +100 (-40 to +212)	-40 to +100 (-40 to +212)
<b>Dimensions</b> mm (in)	8.90 (0.350) cube (A) 8.90 x 15.88 x 9.65 (0.350 x 0.625 x 0.380) (F)	10.16 x 10.16 x 5.13 (0.400 x 0.400 x 0.202)	9.7 x 4.8 x 3.3 (0.380 x 0.190 x 0.130) (A) 11.18 x 10.2 x 3.8 (0.440 x 0.400 x 0.150) (F)	13.97 x 6.35 x 6.35 (0.550 x 0.250 x 0.250)
<b>Weight</b> grams	1.4 (A); 1.7 (F)	1.8	0.5 (A); 1 (F)	2
<b>Mounting method</b>	Adhesive (A); 2-56 screws (F)	0-80 screws	Adhesive (A); 0-80 screws (F)	Adhesive

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Model number	7264B	7264C	7264D	7264H
<b>Description</b>	Crash test Undamped Meets SAE J211 / J2570	Industry standard Undamped Meets SAE J211 / J2570	High resonance Undamped Meets SAE J211 / J2570	Extremely rugged Multi-mode damping Pedestrian safety testing
<b>Linear range</b> g	±500/±2,000	±500/±2,000	±2,000	±2,000
<b>Sensitivity</b> mV/g typical	0.80/0.20	0.80/0.20	0.20	0.20
<b>Frequency response</b> ±5%, Hz	0-3,000/0-5,000	0-3,000/0-5,000	0-6,000	0-6,000
<b>Shock limit</b> g	5,000 / 10,000	5,000 / 10,000	10,000	10,000
<b>Operating temperature</b> °C (°F)	-40 to +93 (-40 to +200)	-18 to +66 (0 to +150)	-18 to +66 (0 to +150)	-18 to +66 (0 to +150)
<b>Dimensions</b> mm (in)	12.2 x 10.2 x 4.7 (0.48 x 0.4 x 0.185)	10.16 x 10.16 x 5.13 (0.400 x 0.400 x 0.202)	10.16 x 10.16 x 5.08 (0.400 x 0.400 x 0.200)	10.16 x 10.16 x 5.13 (0.400 x 0.400 x 0.202)
<b>Weight</b> grams	1	1.4	1.4	1.4
<b>Mounting method</b>	0-80 screws	0-80 screws	0-80 screws	0-80 screws

## Piezoresistive Accelerometers

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Model number	727	728	2262B
<b>Description</b>	Lightweight Broad frequency response Drop testing	Small and lightweight Broad bandwidth Adhesive mount	High Sensitivity Multi-mode damping Rugged to 10000 g shocks
<b>Linear range</b> g	±2,000 / ±6,000 / ±20,000 / ±60,000	±2,000 / ±10,000	±1,000 / ±2,000 / ±6,000
<b>Sensitivity</b> mV/g typical	10 / 3 / 1 / 0.3 uV/V/g	0.20 / 0.016	0.45 / 0.3 / 0.015
<b>Frequency response</b> ±5%, Hz	0-10,000 / 0-20,000 / 0-50,000 / 0-100,000	0 to 8,000 ±1dB	0 to 3,000
<b>Shock limit</b> g	3,000 / 9,000 / 30,000 / 90,000	10,000 / 30,000	10,000
<b>Operating temperature</b> °C (°F)	0 to +70 (+32 to +158)	0 to +70 (-32 to +158)	-67 to 257 °F -55 to 125 °C
<b>Dimensions</b> mm (in)	7.11 (0.28) 0.3 diameter	10.67 x 6.1 x 3.3 (0.420 x 0.240 x 0.130)	0.935 x 0.625 x 0.79 23.68 x 15.88 x 20.1
<b>Weight</b> grams	0.3	0.5	22
<b>Mounting method</b>	Adhesive	Adhesive	10-32 detachable stud

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Model number	71M	72	74	75
<b>Description</b>	Surface mount Undamped Low mass	Lightly damped Rugged ESD protection	Triaxial Damped Surface mount LCC	Triaxial Undamped Surface mount LCC
<b>Linear range</b> g	±2,000 / ±6,000 / ±20,000 / ±60,000	±2,000 / ±20,000 / ±60,000	±2,000 / ±20,000 / ±60,000	±2,000 / ±6,000 / ±20,000 / ±60,000
<b>Shock limit</b> g	10,000 / 18,000 / 60,000 / 120,000	10,000 / 80,000 / 240,000	10,000 / 60,000 / 180,000	10,000 / 18,000 / 60,000 / 80,000
<b>Operating temperature</b> °C (°F)	-54 to +66 (-65 to +150)	-54 to +71 (-65 to +160)	-55 to +121 (-67 to +250)	-55 to +121 (-67 to +250)
<b>Weight</b> grams	0.06	0.16	1.2	1.2
<b>Mounting method</b>	Adhesive	SMT or adhesive	SMT or adhesive	SMT or adhesive

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Model number	7270A	7270AM4	7270AM6	7270AM7	7274A
<b>Description</b>	High resonance Undamped Shock standard	High resonance Undamped Stud mount	Rugged Mechanical filter Stud mount	Extremely rugged Undamped Low noise cable	Triaxial Undamped High resonance
<b>Linear range g</b>	$\pm 2,000 / \pm 6,000 / \pm 20,000 / \pm 60,000 / \pm 200,000$	$\pm 2,000 / \pm 6,000 / \pm 20,000 / \pm 60,000 / \pm 200,000$	$\pm 2,000 / \pm 6,000 / \pm 20,000 / \pm 60,000$	$\pm 2,000 / \pm 6,000 / \pm 20,000 / \pm 60,000 / \pm 200,000$	$\pm 2,000 / \pm 6,000 / \pm 20,000 / \pm 60,000$
<b>Sensitivity uV/g</b>	100/30/10/3/1	100/30/10/3/1	100/30/10/3	100/30/10/3/1	50/15/5/1.5
<b>Frequency response kHz +/-5%</b>	0-10k / 0-20k / 0-50k / 0-100k / 0-150k	0-10k / 0-20k / 0-50k / 0-100k / 0-150k	0-10,000 ( $\pm 10\%$ )	0-10 / 0-20 / 0-50 / 0-100 / 0-150	0-18k / 0-36k / 0-70k / 0-140k
<b>Shock limit g</b>	10,000 / 18,000 / 60,000 / 180,000 / 200,000	10,000 / 18,000 / 60,000 / 180,000 / 200,000	10,000 / 18,000 / 60,000 / 100,000	10,000 / 18,000 / 60,000 / 180,000 / 200,000	10,000 / 18,000 / 60,000 / 180,000
<b>Operating temperature °C (°F)</b>	-55 to +121 (-67 to +250)	-55 to +66 (-67 to +150)	-34 to +66 (-30 to +150)	-55 to +121 (-67 to +250)	-55 to +66 (-67 to +150)
<b>Dimensions mm (in)</b>	14.22 x 7.1 x 2.79 (0.560 x 0.280 x 0.110)	7.92 (0.312) Hex x 8.9 (0.350)	17.15 x 14.73 x 15.78 (0.675 x 0.580 x 0.621)	14.2 x 8.9 x 4.06 (0.560 x 0.350 x 0.160)	14.22 x 7.72 x 6.22 (0.56 x .304 x .245)
<b>Weight grams</b>	1.5	1.5	8.4	4	2.9
<b>Mounting method</b>	Screw	1/4-28 integral stud	1/4-28 integral stud	4-40 screws	Screw

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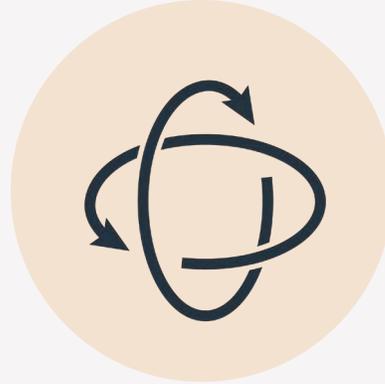


Model number	7280A	7280AM4	7280AM7	7284A
<b>Description</b>	Extremely rugged Lightly damped Low power consumption	Extremely rugged Lightly damped Low power consumption	Extremely rugged Lightly damped Low noise cable	Triaxial Lightly damped Low power consumption
<b>Linear range g</b>	$\pm 2,000 / \pm 20,000 / \pm 60,000$	$\pm 2,000 / \pm 20,000 / \pm 60,000$	$\pm 2,000 / \pm 20,000 / \pm 60,000$	$\pm 2,000 / \pm 20,000 / \pm 60,000$
<b>Sensitivity uV/g</b>	300 / 16 / 5	300/16/5	300 / 16 / 5	150 / 8 / 2.5
<b>Frequency response kHz +/-5%</b>	0-10k / 0-10k / 0-13k	0-10k / 0-10k / 0-13k	0-10k / 0-10k / 0-13k	0-10 / 0-10 / 0-20 (+/-1dB)
<b>Shock limit g</b>	10,000 / 80,000 / 240,000	10,000 / 80,000 / 240,000	10,000 / 80,000 / 240,000	10,000 / 60,000 / 180,000
<b>Operating temperature °C (°F)</b>	-55 to +121 (-67 to +250)	-55 to +121 (-67 to +250)	-55 to +121 (-67 to +250)	-55 to +121 (-67 to +250)
<b>Dimensions mm (in)</b>	14.22 x 7.1 x 3.18 (0.560 x 0.280 x 0.125)	7.92 (0.312) Hex x 9.1 (0.360)	14.2 x 8.9 x 4.06 (0.560 x 0.350 x 0.160)	14.22 x 7.76 x 6.22 (0.560 x 0.304 x 0.245)
<b>Weight grams</b>	1.4	2.1	4	3.6
<b>Mounting method</b>	4-40 screws	1/4-28 UNF-3A stud	4-40 screws	4-40 screws

# Inertial Sensors

## Applications

- Vehicle dynamics
- Automotive rollover
- Whiplash
- Aircraft flight testing
- Spacecraft and satellite
- Motion studies



In typical dynamic measurements, both acceleration and angular rate data are essential parameters needed to fully characterize the complex behavior of a moving object. Until recently, engineers primarily relied on linear accelerometers, as collecting rotational data required large arrays of sensors that were impractical due to cost and space constraints. With Endevco's new angular rate and six-degree-of-freedom (6DoF) sensors, professionals in automotive and aircraft development can measure both linear and rotational dynamics using fewer sensors and less space. Instead of relying on assumptions about these dynamic interactions, these analog-output sensors deliver reliable, empirical data to validate analytical results. What makes our sensors truly unique is that we offer the low acceleration ranges and low angular rate ranges that are most suitable for accurately characterizing motion.



Model number	7310A
Description	Angular rate 2V full scale Rugged
Range deg/sec	$\pm 100 / \pm 500 / \pm 1,500 / \pm 6,000 / \pm 8,000 / \pm 12,000 / \pm 18,000$
Sensitivity mV/deg/sec +/-15%	20 / 4 / 1.333 / 0.333 / 0.25 / 0.167 / 0.111
Frequency response Hz +1dB/-3dB	0-1000 (100/500/1K5/6K/8K); 0-2000 (12K/18K)
Operating temperature °C (°F)	-40 to +105 [-40 to +221]
Dimensions mm (in)	14.6 x 10.2 x 7.62 (0.580 x 0.400 x 0.300)
Weight grams	3
Rate excitation voltage Vdc	5 to 16
Mounting method	0-80 screws



Model number	7360A
Description	6DoF measurement Compact package with 2 cables Rugged to 5000 g shocks
Accelerometer ranges g	$\pm 2 / \pm 10 / \pm 50 / \pm 200 / \pm 500$
Angular Rate ranges deg/sec	$\pm 100 / \pm 500 / \pm 1,500 / \pm 6,000 / \pm 8,000 / \pm 12,000 / \pm 18,000$
Accelerometer sensitivity mV/g typical	1,000 / 200 / 40 / 10 / 4
Angular Rate sensitivity mV/deg/sec +/-15%	20 / 4 / 1.333 / 0.25 / 0.167 / 0.111
Accelerometer frequency response +/-1dB	0-300 / 0-1,500 / 0-1,800 / 0-1,800 / 0-1,800
Angular Rate frequency response Hz +/-3dB	0-1,000 / 0-1,000 / 0-1,000 / 0-1,000 / 0-2,000 / 0-2,000
Operating temperature °C (°F)	-40 to +100 [-40 to +212]
Dimensions mm (in)	30.5 x 30.5 x 27.9 (1.2 x 1.2 x 1.1)
Weight grams	35



Model number	7330	773A	776
Description	Modular 6DoF Stackable Family Triaxial angular rate sensor	Modular 6DoF Stackable Family Triaxial variable capacitance accelerometer	Modular 6DoF Stackable Family Triaxial piezoresistive accelerometer
Range deg/sec	$\pm 100 / \pm 500 / \pm 1,500 / \pm 6,000 / \pm 8,000 / \pm 12,000 / \pm 18,000$ deg/sec	$\pm 8 / \pm 15 / \pm 50 / \pm 100 / \pm 200$ g	$\pm 2,000$ g
Sensitivity mV/g/sec +/-15%	20 / 4 / 1.333 / 0.333 / 0.25 / 0.167 / 0.111 mV/deg/sec	250 / 133 / 40 / 20 / 10 mV/g	0.30 mV/g
Frequency response Hz	0-1000 (100 / 500 / 1K5 / 6K / 8K); 0-2000 (12K / 18K) (+1dB / -3dB)	0-450 / 0-450 / 0-750 / 0-1200 / 0-1200 ( $\pm 5\%$ )	0-5000 ( $\pm 5\%$ )
Operating temperature °C (°F)	-40 to +105 [-40 to +221]	-40 to +125 [-40 to +257]	-40 to +105 [-40 to +221]
Dimensions mm (in)	20.3 x 20.3 x 12.4 (0.80 x 0.80 x 0.49)	20.3 x 20.3 x 8.1 (0.80 x 0.80 x 0.32)	20.3 x 20.3 x 9.53 (0.80 x 0.80 x 0.37)
Weight grams	9	9	9
Rate excitation voltage Vdc	5 to 16	7 to 36 (R option for 5V)	5 or 10
Mounting method	2-56 screws	2-56 screws	2-56 screws

# Piezoresistive Pressure Transducers

## Applications

- Jet airflow fields and inlet pressure
- Hypersonic, transonic and “quiet flow” wind tunnel testing
- Turbulent airflow measurements
- Blast testing
- Automotive airbag inflation testing
- Rocket motor analysis
- Vehicle transmission testing
- Hydraulics measurements

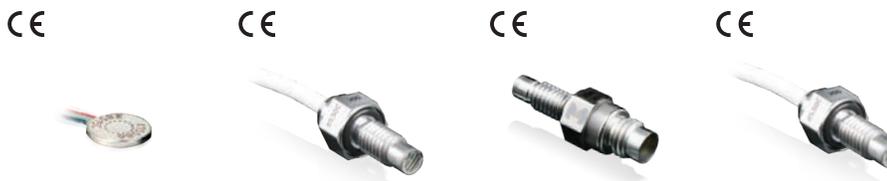


Miniature piezoresistive pressure transducers are designed to measure both dynamic and static pressure to a high degree of accuracy. Their MEMS sensing elements incorporate a unique diaphragm design, manufactured at Endevco’s U.S.-based MEMS facility. This results in pressure sensors with extremely high output signals, high resonant frequencies, exceptional linearity, outstanding repeatability, and virtually no hysteresis.

All models feature internal temperature compensation to provide stable performance over temperature. Absolute pressure sensors are available in ranges as low as 0–15 psia and as high as 0–2,000 psia, with gage/differential sensor models available in ranges as low as 0–1 psig and as high as 0–20,000 psig. All units are shipped in specially designed electrostatic discharge (ESD) packaging to reduce the potentially harmful effects of static electricity on critical components, as well as to further support customer in-house ESD control procedures.

Gage  
pressure transducers


Model number	8507C	8510B	8510C	8511A
<b>Description</b>	Gage High sensitivity Temp compensation	Gage Vent tube Temp compensation	Gage High resonance Temp compensation	Rugged Gage High pressure
<b>Full scale pressure</b> psi	1 / 2 / 5 / 15	1 / 2 / 5 / 200 / 500 / 2,000	15 / 50 / 100	5,000 / 10,000 / 20,000
<b>Sensitivity</b> mV/psi	200 / 100 / 60 / 20	200 / 100 / 60 / 1.5 / 0.6 / 0.15	15 / 4.5 / 2.25	0.1 / 0.05 / 0.025
<b>Resonance frequency</b> kHz	55 / 70 / 85 / 130	55 / 70 / 85 / 320 / 500 / 900	180 / 320 / 500	<1000
<b>Non linearity</b> (typ) %FSO	1.5 / 1.0 / 0.5 / 0.2	1.0	0.15 / 0.1 / 0.1	1.2 / 2.5 / 2.5
<b>Operating temperature</b> °C (°F)	-54 to +107 (-65 to +225)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)
<b>Burst pressure</b> psi	20 / 40 / 100 / 150	25 / 40 / 100 / 1000 / 2,500 / 10,000	75 / 250 / 400	20,000 / 30,000 / 40,000
<b>Face diameter</b> mm (in)	2.34 (0.092)	3.86 (0.152)	3.86 (0.152)	8.13 (0.320)
<b>Weight</b> grams	0.3	2.3	2.3	11
<b>Mounting method</b>	RTV bond	10-32 UNF-2A	10-32 UNF-2A	3/8-24 UNF-2A

 Absolute  
pressure transducers


Model number	8515C	8530B	8530BM37	8530C
<b>Description</b>	Absolute 0.03 inch thin Surface mount	Absolute High resonance Temp compensation	Absolute Detachable cable ABS braking studies	Absolute High sensitivity Temp compensation
<b>Full scale pressure</b> psi	15 / 50	200 / 500 / 1,000 / 2,000	200 / 500 / 1,000 / 2,000	15 / 50 / 100
<b>Sensitivity</b> mV/psi	13.3 / 4.0	1.5 / 0.6 / 0.3 / 0.3	1.5 / 0.6 / 0.3 / 0.3	15 / 4.5 / 2.25
<b>Resonance frequency</b> kHz	180 / 320	750 / 1,000 / >1,000 / >1,000	750 / 1,000 / >1,000 / >1,000	180 / 320 / 500
<b>Non linearity</b> (typ) %FSO	0.2	0.2	0.2	0.15 / 0.1 / 0.1
<b>Operating temperature</b> °C (°F)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)
<b>Burst pressure</b> psi	75 / 250	800 / 2,000 / 4,000 / 4,000	800 / 2,000 / 4,000 / 4,000	75 / 250 / 400
<b>Face diameter</b> mm (in)	6.35 (0.25)	3.86 (0.152)	3.86 (0.152)	3.86 (0.152)
<b>Weight</b> grams	0.08	2.3	2.3	2.3
<b>Mounting method</b>	Adhesive	10-32 UNF-2A	10-32 UNF-2A	10-32 UNF-2A

# Piezoelectric Accelerometers

## Applications

- Satellite
- Turbine development
- HALT & HASS testing
- Quality assurance
- Nuclear power plant monitoring
- Cryogenic testing
- Automotive engine testing



## Piezoelectric (PE) accelerometers

All mechanical accelerometer designs are based on a simple spring-mass principle in which strain is generated in relation to amplitude and frequency of the dynamic motion. In a piezoelectric (PE) accelerometer, this strain is applied directly to the PE element, which develops an electrical charge proportional to mechanical motion. Different material and configurations of PE accelerometer elements are used to support specific applications.

### Advantages of PE sensors

- The dynamic range of PE accelerometers can be greater than 130dB. When used with a proper charge converter/amplifier, they offer unmatched performance in terms of total measurement range and reliability. Transduction efficiency may also be optimized with PE crystals to allow for the miniaturization of accelerometer within a given physical envelope.
- Single-ended compression types are optimal for low-level measurements due to the high sensitivity achieved by stacking multiple PE crystals in parallel.
- A shear mode design allows for the construction of miniature, lightweight sensors suitable for monitoring small components and test articles. A key advantage of the shear design is the isolation of the sensing element from the base, which provides excellent protection from base strain and temperature transients.
- Due to the broad temperature range of most piezoelectric materials, PE accelerometers are often specified for extreme high or low temperature applications, from cryogenic conditions in rocket engines to the extreme heat environment of turbine generators.
- PE accelerometers are available in a wide range of shapes and sizes, from micro-miniature in electronics component testing to larger sizes used in seismic or engine applications.

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## Precision lab testing

Model number	2224C	2228C
Description	Precision lab testing	Triaxial Ground isolated
Sensitivity $\mu\text{C/g}$ typical	12	2.8
Sinusoidal limit g	1,000	1,000
Shock limit g	2,000	2,000
Frequency response $\pm 1$ dB Hz	0.1–10,000	0.1–6,000
Operating temperature $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	-55 to +177 (-67 to +350)	-55 to +177 (-67 to +350)
Signal/ground isolation	No	Yes
Hermetic seal	No	No
Weight grams (without cable)	16	15
Dimensions mm (in)	14.2 hex x 13.7 (9/16 hex x 0.54)	18.72 x 18.72 x 11.68 (0.737 x 0.737 x 0.460)
Mounting method	Stud	Screw
Cable included	3090C/120	3060D/120 (3)



## Piezoelectric Accelerometers

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Cryogenic  
-269°C (-452°F)

Model number	7722 / 7724
Description	Immune to thermal transients
Sensitivity pC/g typical	3.7
Sinusoidal limit g	500
Shock limit g	2500
Frequency response ±1 dB Hz	1-6000
Operating temperature °C (°F)	-269 to +177 [-452 to +350]
Signal/ground isolation	7722 - No / 7724 - Yes
Hermetic seal	Yes
Weight grams (without cable)	29
Dimensions mm (in)	16.0 hex x 23.1 [5/8 hex x 0.91]
Mounting method	Stud
Cable included	3090C/120

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+260°C (+500°F)

Model number	2221F	2230EM1	6222S
Description	Thru-hole mount 360° cable orientation	Triaxial Flange mount	ARINC mount Differential output
Sensitivity pC/g typical	10	3	20 / 50 / 100
Sinusoidal limit g	1,000	1,000	2,000 / 1,000 / 500
Shock limit g	3,000	2,000	4,000 / 2,000 / 1,000
Frequency response ±1 dB Hz	0.1-12,000	1-10,000	1-12,000 / 1-9,000 / 1-9,000
Operating temperature °C (°F)	-55 to +260 [-67 to +500]	-55 to +260 [-67 to +500]	-54 to +260 [-65 to +500]
Signal/ground isolation	Yes	No	Yes
Hermetic seal	Yes	Yes	Yes
Weight grams (without cable)	11	22.5	91
Dimensions mm (in)	Ø 15.24 x 8.9 (Ø 0.60 x 0.35)	17.15 x 11.68 x 15.24 (0.675 x 0.460 x 0.60)	41.4 x 30.2 x 20.3 (1.63 x 1.19 x 0.80)
Mounting method	Screw	Screw	Screw
Cable included	3090C/120	3053V/120 (3)	No

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+260°C/+288°C  
(+500°F/+550°F)

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Model number	7240C	7703A	7704A
Description	Very high frequency	General purpose Radiation tested	General purpose Radiation tested
Sensitivity pC/g typical	3.0	50 / 100 / 200 / 300 / 1,000	50 / 100
Sinusoidal limit g	1,000	2,000 / 1,000 / 850 / 675 / 500	2,000 / 1,000
Shock limit g	5000	10,000 / 5,000 / 2,000 / 1,600 / 1,000	10,000 / 5,000
Frequency response $\pm 1$ dB Hz	1–20,000	1–9,000 / 1–8,000 / 1–6,000 / 1–5,000 / 1–3,000	1–9,000 / 1–8,000
Operating temperature °C (°F)	-55 to +260 (-67 to +500)	-55 to +288 (-67 to +550)	-55 to +288 (-67 to +550)
Signal/ground isolation	No	Yes	Yes
Hermetic seal	Yes	Yes	Yes
Weight grams (without cable)	4.8	25 / 29 / 62 / 70 / 120	25 / 29
Dimensions mm (in)	9.53 hex x 11.68 (3/8 hex x 0.46)	for -50 / -100: 16.0 hex x 19.8 (5/8 hex x 0.78) for -200 / -300 / -1000: 25.4 hex x 23.1 (1.0 hex x 0.91)	16.0 hex x 21.1 (5/8 hex x 0.83)
Mounting method	Stud	Stud	Stud
Cable included	3053V/120	3090C/120	3090C/120

# IEPE Accelerometers

## Applications

- Aircraft flight testing
- Ground vibration testing
- Modal analysis
- Quality assurance
- Product R & D
- Heavy machinery maintenance
- Powertrain development
- OEM design and test applications



## Integrated electronics piezoelectric (IEPE) accelerometers

The acronym IEPE refers to a type of piezoelectric (PE) accelerometer with internal electronics (IE) that allows it to convert charge to a low-impedance voltage output. Its temperature response is somewhat limited due to its onboard electronics. This type of accelerometer is primarily specified for applications in which environmental conditions permit its use, including HALT/HASS/ESS testing, industrial vibration monitoring and general purpose vibration and shock testing.

Since both PE and IEPE types are AC-coupled designs, the acceleration output of these accelerometers cannot be used to yield correct velocity and displacement information by numerical integration.

### Advantages of IEPE sensors

- Less operator attention, training and installation expertise required.
- Uses standard coaxial cable.
- Drives long cables without noise increase or loss of resolution.
- Operates directly into many data collectors with built-in constant current input.

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## Small single axis

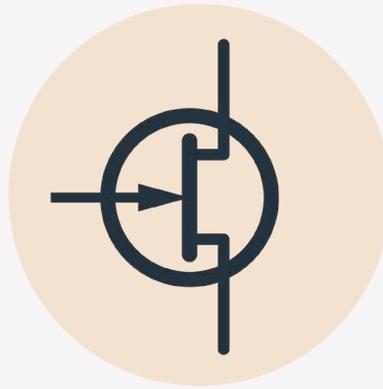
Model number	7250B	7251A-R
Description	Ultra wide bandwidth Thru-hole mount	Thru-hole mount
Sensitivity mV/g, typical	2 / 10	10 / 100
Linear range g	±2,500 / ±500	±500 / ±50
Shock limit g	10,000	5,000
Frequency response ± 1dB Hz	1 to 40,000 (±3 dB)	2-10,000 (±10%)
Broadband noise (µg rms)	3,500 / 1,000	1,000 / 250
Operating temperature °C (°F)	-55 to +125 (-67 to +257)	-55 to +125 (-67 to +257)
Signal/ground isolation	Yes	Yes
Hermetic seal	Yes	Yes
Weight grams (without cable)	1.9	10.5
Dimensions mm (in)	Ø 9.65 x 6.2 (Ø 0.381 x 0.25)	Ø 15.2 x 8.9 (Ø 0.60 x 0.35)
Mounting method	Screw	Screw
Cable included	3091F/120	None



# Signal Conditioners

## Configurations

- Bench top
- Rack mounted
- In-line, remote
- Airborne installation
- Battery operated



Endevco provides a comprehensive range of high-performance electronics, from simple battery-operated signal conditioners to computer-controlled, laboratory-grade instrumentation. These devices are compatible with Endevco's IEPE, PE, VC, and PR accelerometers and pressure sensors, as well as other commonly used industry models.

## Single channel in-line signal conditioners



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Model number	2680BMX	2777A	2771C	2771CM2
<b>Features</b>	Airborne applications Small, lightweight	2 gain options Airborne applications Acceleration and velocity outputs	4 gain options Supports TEDS	Designed for use with extreme high temp sensors, 1200°F (650°C)
<b>Input</b>	PE	DIFF PE	PE	PE
<b>Channels</b>	1	1	1	1
<b>Gain</b>	0.1–100 mV/pC	2 / 10 mV/pC	0.1 / 1 / 5 / 10 mV/pC	1 mV/pC
<b>Broadband noise rms</b>	1.5 mV	1/5 mV (RTO)	5 / 30 / 50 / 50 µV	10 µV
<b>Lower cutoff freq Hz (-3 dB)</b>	3	5.73 / 8.59 / 11.5 / 14.3 / 113	0.4 / 0.4 / 2 / 2	2
<b>Upper cutoff freq Hz (-3 dB)</b>	Selectable	17,500	8 / 30,000 / 50,000 / 50,000 (±5%)	30
<b>Power requirements VDC</b>	20-32	22–31	24-30	24-30
<b>Operating temperature °C (°F)</b>	-67 to +212 (-55 to 100)	-5 to +185 (-15 to 85)	-40 to +257 (-40 to 125)	-40 to +257 (-40 to +125)
<b>Weight grams</b>	34	227	57	57

## Single channel battery powered signal conditioners



CE



CE

## Single channel fully adjustable signal conditioners



CE



CE

Model number	4416C	4418
<b>Features</b>	IEPE power supply Portable and compact Rechargeable battery	Bridge signal conditioner Portable and compact ZMO adjustment
<b>Input</b>	IEPE	PR, VC
<b>Channels</b>	1	1
<b>Gain</b>	1, 10, 100 selectable	1, 10, 100 selectable
<b>Broadband noise rms</b>	< 20 µV	<20 uV
<b>Lower cutoff freq Hz (-3 dB)</b>	0.1	DC
<b>Upper cutoff freq Hz (-3 dB)</b>	100,000	10,000
<b>Power requirements</b>	Battery powered, rechargeable	Battery powered, rechargeable
<b>Type of control</b>	Manual	Manual
<b>Rack mount</b>	N/A	N/A

Model number	6634D	2775C
<b>Inputs</b>	PE, Diff PE, IEPE, RCC, Velocity Coil	PE, IEPE, RCC
<b>Outputs</b>	Acceleration, velocity and displacement	AC, DC, Servo Acceleration, Velocity, Displacement
<b>Channels</b>	1	1
<b>Filtering</b>	Programmable 6-pole HP, LP, BP Filter	Programmable 2-pole HP, LP, BP Filter
<b>Lower cutoff freq Hz (-5%)</b>	2	0.5
<b>Upper cutoff freq Hz (-5%)</b>	26,000	50,000
<b>Power requirements</b>	12 VDC	12 VDC
<b>Type of control</b>	Front Panel, Ethernet, Serial	Front Panel, Ethernet, Serial
<b>Rack mount</b>	6 per 4948A rack	6 per 4948A rack
<b>Additional Features</b>	<ul style="list-style-type: none"> <li>Warning/Alert Alarms</li> <li>User Selectable English/Metric Units</li> </ul>	<ul style="list-style-type: none"> <li>Switchable Isolation</li> <li>Calibration Input</li> </ul>

# High Intensity Microphones

Piezoelectric microphones measure high intensity acoustic noise and very low pressure fluctuations over a frequency range of 1 Hz to 10 kHz with a measurement range of 100 to >180 dB SPL. These hermetically sealed microphones are designed for operation in harsh environments and operate over a temperature range of -55°C to +260°C (-67°F to +500°F). Other outstanding features include insensitivity to altitude changes and ambient vibration.



CE



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Model number	2510	2510M4A
Description	High intensity sound High temperature Vibration compensated	High intensity sound High temperature Vibration compensated
Type	Pressure	Pressure
Sensitivity pC rms@140 dB SPL	31	31
Frequency range $\pm 1$ dB Hz	2-4,000	2-4,000
Temperature range °C (°F)	-55 to +260 (-67 to +500)	-55 to +260 (-67 to +500)
Dynamic range dB	100-180	100-180
Diameter mm (in)	20.70 (0.815)	20.70 (0.815)
Cable included	3090C/120	3090C/120

# Cable Assemblies

Endevco designs and manufactures many of its own cables and connectors, specializing in custom configurations, lengths, and connectors for dynamic testing applications. In tough and challenging environments, accuracy relies as much on cables and connectors as on transducers. Our engineers understand the critical design parameters that affect signal transmission and carefully optimize them to ensure superior data quality and reliability. With this level of in-house custom capability, ordinary commercial cable and transducer providers simply can't compare.



## Miniature

CE

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Model number	3053V	3053VM1
Connector 1	Hex/knurled M3 plug	Hex/knurled M3 plug
Connector 2	Hex/knurled 10-32 plug	BNC plug
Cable type	Coaxial, shielded	Coaxial, shielded
Capacitance pF/ft, nom	33	35
Conductor size AWG	Solid, 33	Solid, 33
Jacket material	PFA	PFA
Overall diameter mm (in), nom	1.37 (0.054)	1.37 (0.054)
Bend radius mm (in), min	13 (0.5)	13 (0.5)
Temperature range °C (°F)	-254 to +260 [-432 to +500]	-55 to +85 [-67 to +185]
Low noise treated	Yes	Yes

CE

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Model number	3091F	3093M10	3095A
Connector 1	6-40 UNF-2B plug	1-64 RH male	1-64 UNC-2A jack
Connector 2	10-32 plug	10-32 jack	10-32 plug
Cable type	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded
Capacitance pF/ft, nom	36	30	30
Conductor size AWG	Solid, 33	Solid, 33	Solid, 33
Jacket material	PTFE	PTFE	PTFE
Overall diameter mm (in), max	1.5 (0.06)	1.5 (0.06)	1.5 (0.06)
Bend radius mm (in), min	15.2 (0.60)	15.2 (0.60)	15.2 (0.60)
Temperature range °C (°F)	-184 to +260 [-300 to +500]	-73 to +177 [-100 to +350]	-184 to +177 [-300 to +350]
Low noise treated	Yes	Yes	Yes

## Standard coaxial

CE

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CE

CE

Model number	3090C	3090CM6	3090CM12	3090CM14
Connector 1	10-32 plug	10-32 plug	10-32 plug	Hex 10-32 plug
Connector 2	10-32 plug	Pigtails	BNC plug	Hex 10-32 plug
Cable type	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded
Capacitance pF/ft, nom	36	35	32	36
Conductor size AWG	Stranded, 30	Stranded, 30	Stranded, 30	Stranded, 30
Jacket material	PTFE	PTFE	PTFE	PTFE
Overall diameter mm (in), max	2.67 (0.105)	2.67 (0.105)	2.67 (0.105)	2.67 (0.105)
Bend radius mm (in), min	21.6 (0.85)	21.6 (0.85)	21.6 (0.85)	21.6 (0.85)
Temperature range °C (°F)	-269 to +260 [-452 to +500]	-269 to +260 [-452 to +500]	-65 to +165 [-85 to +329]	-269 to +260 [-452 to +500]
Low noise treated	Yes	Yes	Yes	Yes

CE

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CE

Model number	3090CM67	3060D	3061	3096
Connector 1	Hex 10-32 plug	10-32 plug	10-32 plug	Hex 10-32 plug
Connector 2	Hex 10-32 plug	10-32 plug	BNC plug	Hex 10-32 plug
Cable type	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded
Capacitance pF/ft, nom	35	50	28	35
Conductor size AWG	Stranded, 30	Solid, 28	Stranded, 30	Stranded, 30
Jacket material	PTFE with aramid reinforcement and protective metal overbraid	Silicone rubber	FEP	PTFE with aramid reinforcement
Overall diameter mm (in), max	3.0 (0.12)	2.34 (0.092)	2.0 (0.08)	2.67 (0.105)
Bend radius mm (in), min	21.6 (0.85)	24.1 (0.95)	21.6 (0.85)	26.7 (1.05)
Temperature range °C (°F)	-55 to +260 [-67 to +500]	-73 to +260 [-100 to +500]	-65 to +165 [-85 to 330]	-55 to +260 [-67 to +500]
Low noise treated	Yes	Yes	No	Yes

## Cable Accessories

Model	Description
26574	Plug assembly for 6917B cable
EDVEJ1085	4 socket plug, used on 3027A series cable assemblies
EJ66	Feed-thru bulkhead microdot connector

Model	Description
EDVEP316	Twinax BNC Plug
EDVEP685	10-32 plug
EDVEP686	BNC plug

## Multi conductor

	CE	CE	CE	CE	CE	CE	CE
Model number	6917B	6917D	6917M113	3024	3024M10	3024M14	3024M8
Connector 1	2-socket 7/16-27 UNS-2B plug	2-socket 7/16-27 UNS-2B plug w/ splash proof boot	2-socket 7/16-27 UNS-2B plug	10-32 plug	M3 plug	TNC plug	Hex 10-32 plug
Connector 2	Pigtail	Pigtail	Twinax	Pigtail	Pigtails	Pigtails	Pigtail
Cable type	Twisted pair, shielded	Twisted pair, shielded	Twisted pair, shielded	Twisted pair	Twisted pair, shielded	Twisted pair, shielded	Twisted pair, shielded
Capacitance pF/ft, max	80	80	80	N/A	N/A	N/A	N/A
Conductor size AWG	Stranded, 20	Stranded, 20	Stranded, 20	Stranded, 28	Stranded, 32	Stranded, 32	Stranded, 26
Jacket material	PTFE	PTFE	PTFE	No overall jacket	FEP	FEP	ETFE
Overall diameter mm (in), nom	4.8 (0.19)	4.8 (0.19)	4.8 (0.19)	1.40 (0.055)	1.85 (0.073)	1.85 (0.073)	2.18 (0.086)
Bend radius mm (in), min	48.3 (1.90)	48.3 (1.90)	48.3 (1.90)	19.1 (0.75)	18.5 (0.73)	18.5 (0.73)	19.1 (0.75)
Temperature range °C (°F)	-54 to +260 [-65 to +500]	-54 to +288 [-65 to +550]	-54 to +288 [-65 to +550]	-184 to +176 [-300 to +350]	-106 to +200 [-158 to +392]	-106 to +200 [-158 to +392]	-184 to +176 [-300 to +350]
Low noise treated	Yes	Yes	Yes	No	No	No	No

	CE	CE	CE	CE	CE	CE
Model number	3024M1	3027B	3027AM5	3027BVM13	3027BVM14	3915
Connector 1	10-32 plug	1/4-28 4-socket plug	Pigtails	1/4-28 4-socket plug	Wire lock hex 1/4-28 4-socket plug	1/4-28 4-socket plug
Connector 2	Pigtail	Pigtail	3x BNC plug	1/4-28 4-socket jack	Pigtail	Pigtail
Cable type	Twisted pair, shielded	4-conductor, shielded	4-conductor, shielded	4-conductor, shielded	4-conductor, shielded	4-conductor, shielded
Capacitance pF/ft, max	N/A	16	30	16	16	-
Conductor size AWG	Stranded, 28	Stranded, 32	Stranded, 28	Stranded, 28	Stranded, 28	Stranded, 28
Jacket material	FEP	Silicone Rubber	PVC	PFA	PFA	Silicone rubber
Overall diameter mm (in), nom	2.39 (0.094)	2.67 (0.105)	2.67 (0.105)	2.51 (0.099)	2.51 (0.099)	2.46 (0.097)
Bend radius mm (in), min	19.1 (0.75)	12.7 (0.50)	26.7 (1.05)	25.1 (0.99)	25.1 (0.99)	24.6 (0.97)
Temperature range °C (°F)	-184 to +176 [-300 to +350]	-100 to +125 [-148 to +257]	-55 to +85 [-67 to +185]	-100 to +200 [-148 to +392]	-100 to +200 [-148 to +392]	-60 to +121 [-76 to +250]
Low noise treated	No	No	No	No	No	Yes

	CE	CE	CE	CE	CE	CE
Model number	EDV16833A	EDV26877A	EDV27952A	EDV27784A	22588A	30779A
Cable Type	Twisted Pair					
Low Noise	Yes	Yes	Yes	Yes	Yes	Yes
Center Conductor AWG	20 (19/32) SPC	20 (19/32) SPC	22 (19/34) SPC	22 (19/34) SPC	20 (19/32) SPC	20 (19/32) NPC
Shield	Single, ≥90%	Double, ≥90%	Single, ≥90%	Double, ≥90%	Single, ≥90%	Single, ≥90%
Outer Jacket	Red PTFE	Red PTFE	Red PTFE	Red PTFE	Red PFA	White PTFE
Cable OD mm (in), in	4.8 (0.19)	5.8 (0.23)	4.8 (0.19)	5.6 (0.22)	5.1 (0.20)	4.8 (0.19)
Bend radius mm (in)	10x OD					
Weight g/m (lbs/ft)	47.6 (0.032)	78.9 (0.053)	43.2 (0.029)	50.6 (0.034)	37.2 (0.025)	47.6 (0.032)
Capacitance						
Capacitance to Conductor pF/ft	70, max	70, max	70, max	70, max	70, nom	70, max
Capacitance to Inner Shield pF/ft	140, max	140, max	140, max	140, max	140, nom	140, max
Insulation Resistance						
Conductor to Conductor G ohms-ft	200, min					
Conductor to Inner Shield G ohms-ft	200, min					
Conductor to Outer Shield G ohms-ft	N/A	200, min	N/A	200, min	N/A	N/A
Noise pC pk-pk	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Environmental Characteristics						
Temperature °F [°C]	-65 to +500 [-54 to +260]	-65 to +550 [-54 to +288]				

# Accessories

Endevco manufactures a complete range of accessories designed and fully tested to be directly compatible with our sensors, transducers and related instrumentation. To ensure high-reliability sensor performance and repeatable results, appropriately selected mounting studs, blocks, bases, adapters and other accessories are highly recommended. These tools ensure proper sensor attachment to the test structure or mounting surface, minimizing additional mechanical stress and optimizing frequency response. When selecting an accessory for a specific measurement requirement, it is essential to follow proper sensor mounting techniques and ensure the mounting surface is correctly prepared, as both are critical to achieving accurate results.

## Mounting Accessories

### Mounting blocks



Model number	2950	2950M3	2950M18
<b>Description</b>	Triaxial mounting block 10-32 threaded holes 4-40 screw mount provided	Triaxial mounting block 6-32 threaded holes 4-40 Screw mount provided	Triaxial mounting block 2-56 threaded holes 4-40 mounting screw provided
<b>Material</b>	Anodized aluminum	Anodized aluminum	Anodized aluminum
<b>Compatibility</b>	Accelerometers with 10-32 stud	2221F, 7221A, 7251A	2220E, 7250A, 7250AM1
<b>Dimensions mm (in)</b>	25.4 x 25.4 x 17.0 (1.0 x 1.0 x 0.67)	22.22 x 22.22 x 15.88 (0.875 x 0.875 x 0.625)	12.7 x 12.7 x 10.16 (0.50 x 0.50 x 0.40)
<b>Weight grams</b>	20.5	20.5	3.7

### Mounting blocks



Model number	7930	7953A	7964B	7973
<b>Description</b>	Triaxial and 6DOF Block 2-56 screws for mounting 0-80 threaded holes	Triaxial mounting block 2-56 screws for mounting 0-80 threaded holes	Triaxial mounting block 2-56 screws for mounting 0-80 threaded holes	Adhesive Mounting Plate 2-56 screws for mounting 0-80 threaded holes
<b>Material</b>	Aluminum alloy	Magnesium alloy	Aluminum alloy	Aluminum alloy
<b>Compatibility</b>	7310 (rate), 7264C, 7264H, 726C (accels)	7264C, 7264D, 7264H, 726C, 757F	7264B	7330, 773A, 776
<b>Dimensions mm (in)</b>	21.72 x 21.72 x 11.56 (0.855 x 0.855 x 0.455)	16.51 x 16.51 x 10.92 (0.650 x 0.650 x 0.430)	16.51 x 16.51 x 10.92 (0.650 x 0.650 x 0.430)	20.32 x 20.32 x 6.35 (0.80 x 0.80 x 0.25)
<b>Weight grams</b>	9.7	5.1	7.9	7.0



## Mounting blocks

Model number	7980	7970	7990
<b>Description</b>	Triaxial mounting block 6-32 screws for mounting 4-40 threaded holes	Triaxial mounting block 6-32 screws for mounting 4-40 threaded holes	Triaxial mounting block 6-32 screws for mounting 4-40 threaded holes
<b>Material</b>	Titanium	Titanium	Aluminum alloy
<b>Compatibility</b>	7270AM7, 7280AM7	7270A, 7280A	7290D
<b>Dimensions</b> mm (in)	27.94 x 15.24 x 10.16 (1.100 x 0.600 x 0.400)	20.32 x 15.24 x 10.39 (0.800 x 0.600 x 0.409)	26.04 x 25.40 x 25.40 (1.025 x 1.0 x 1.0)
<b>Weight</b> grams	21	10.6	40



## Adapters

Model number	2980M4	2980M12	2985	2986B	2986M3
<b>Description</b>	Isolated mounting adapter 10-32 stud .495 inch diameter	Isolated mounting adapter 10-32 stud to 10-32 stud 3/8 inch hex	Isolated mounting adapter 10-32 stud to 10-32 stud 5/8 inch hex	Isolated mounting adapter 10-32 stud to 10-32 stud 5/8 inch hex	Isolated mounting adapter 10-32 stud to M5 stud 14 mm hex
<b>Material</b>	Stainless steel	Anodized aluminum	Stainless steel	Stainless steel	Stainless steel
<b>Compatibility</b>	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers

## Accessories



### Mounting bases

Model number	2988	30042
Description	Adhesive mounting base to 10-32 stud 1/2 inch hex	Aerodynamic mounting pad
Material	Anodized aluminum	Urethane
Compatibility	10-32 threaded hole accelerometers	8515C
Dimensions mm (in)	12.7 hex (0.5 hex)	111.76 OD; 0.79 thick (4.400 OD; 0.03 thick)



### Mounting studs

Model number	2981-3	2981-4	2981-12
Description	Mounting stud 10-32 stud to 10-32 stud Slotted head	Mounting stud 10-32 stud to M5 stud Slotted head	Mounting stud 10-32 stud Hex socket head
Material	Stainless steel	Stainless steel	Stainless steel
Compatibility	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers

## Reference A

## Accelerometers

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Model number	2270	2270M8
Description	Back-to-back calibration	Transfer standard accelerometer
Sensitivity pC/g typical	2.2	2.2
Sinusoidal limit g	1,000	1,000
Shock limit g	15,000	15,000
Frequency response $\pm 1$ dB Hz	2–20,000 (for accelerometers up to 35 grams)	2 – 10,000 (+/-5%)
Operating temperature °C (°F)	-55 to +177 (-67 to +350)	-54 to +177 (-65 to +350)
Signal/ground isolation	Switchable	Yes
Hermetic seal	No	Yes
Weight grams (without cable)	40	16.5
Dimensions mm (in)	15.88 hex x 28.4 (5/8 hex x 1.12)	15.88 hex x 17.8 (5/8 hex x 0.7)
Mounting method	Stud	Stud
Cable included	3090C/120	3090C/120

## Portable system verification instruments

CE



CE



Model number	4330B	4840
Description	Handheld accelerometer simulator	Handheld sensor simulator
Outputs	Single-ended charge Differential charge Single-ended voltage IEPE Tachometer	Single-ended charge Differential charge Single-ended voltage IEPE Differential Bridge
Frequency range Hz	1-20,000, resolution 0.5	1-20,000, resolution 0.5
Amplitude	Adjustable up to 10,000 pC or mV pk	Adjustable up to 10,000 pC or mV pk
Amplitude accuracy	$\pm 1\%$	$\pm 1\%$
Broadband noise	< 2 mV or 2 pc	< 2 mV or 2 pc
Battery	Rechargeable battery	Rechargeable battery
Features	<ul style="list-style-type: none"> <li>• User defined simulation profiles</li> <li>• Utility software for profile setup</li> <li>• Front panel calibration</li> <li>• USB interface</li> </ul>	<ul style="list-style-type: none"> <li>• User defined simulation profiles</li> <li>• Utility software for profile setup</li> <li>• Front panel calibration</li> <li>• USB interface</li> <li>• Configurable units of measure: g, PSI, Bar, dB, dBA, kPa</li> </ul>

# Calibration Services

## Features

- Full range of sensor calibration services available
- Comprehensive calibration reports
- A2LA accredited, National Metrology Institute traceable
- Custom calibration services available
- Fast turnaround



Endevco offers comprehensive calibration services to ensure sensors maintain a high level of precision and accuracy. A variety of calibration options are available, including absolute vibration calibration for the lowest uncertainty, and comparison techniques for shock and vibration. Endevco also provides customized calibrations, such as environmental calibrations to verify amplitude linearity or frequency, and high-shock impact testing. Our calibration team is dedicated to delivering the most accurate calibrations, conforming to standards set by National Metrology Institutes (NMI) such as NIST or PTB. All calibration services are A2LA accredited.

## What we calibrate

- Piezoelectric accelerometers (PE and IEPE)
- Piezoresistive accelerometers
- Variable capacitance accelerometers
- Pressure transducers
- Both Endevco and non-Endevco transducers
- System calibration (sensor + amplifier/signal conditioner)

Annual calibration is recommended for accelerometers and their associated instrumentation to ensure the continued accuracy of your dynamic measurements. At Endevco, calibration is performed by the same experts who design, build, and calibrate hundreds of accelerometers daily. Our qualified technicians, supervised by experienced engineering staff, ensure precise and reliable results. Endevco offers a wide selection of calibration services, including simple back-to-back calibrations and highly accurate absolute calibrations to meet diverse requirements.

For those requiring the highest levels of reporting, we offer comprehensive calibration reports that include detailed descriptions of the methods used, reference standards and their current calibration dates, report numbers, and traceability to National Metrology Institutes (NMI), such as NIST or PTB. The reports also provide estimated calibration uncertainties, environmental conditions (temperature and humidity) during calibration, measurement data points, and a graphical display of output data. For faster service, a standard one-page calibration certificate with essential details is also available.

For vibration services, Endevco uses precision, low-noise air-bearing shakers with a beryllium armature to ensure exceptional accuracy and high-frequency capabilities. We also perform resonance searches to assess the sensor's condition. Endevco-designed equipment is used to test cross-axis sensitivity, a critical measure of accelerometer performance. For shock services, Endevco equipment enables testing up to 100,000 g.

## What we do

When we receive your sensor, it undergoes a full inspection and testing process. If the sensor is found to be operating properly, we will proceed with the requested calibration. If any issues are identified during inspection or testing, we will inform you of repair or replacement options. Should repairs not be possible, we can offer an attractive trade-in opportunity for a new Endevco product. For further assistance or to discuss alternative options, please contact your local representative.

## Traceability and accreditation

Accelerometer calibrations are conducted in our A2LA accredited laboratory. The methods used are in accordance with ANSI/NCSL Z540-1-1994 and ISO/IEC 17025-2005. Traceability to the National Metrology Institute (NMI: NIST, PTB, etc.) is shown as required by military quality control standards.

## Calibration Services

### Primary calibration with frequency sweep

Primary Calibration by Laser Interferometer. Includes frequency sweep in the specified range below.

Calibration service number	CS120A	CS120AH	CS120AL	CS120ALH	CS120AS	CS120ALH-S	CS120ALS
Frequency range	20 Hz to 10 kHz	20 Hz to 20 kHz	1 Hz to 10 kHz	1 Hz to 20 kHz	20 Hz to 10 kHz	1 Hz to 20 kHz	1 Hz to 10 kHz
System cal <sup>3</sup>	No	No	No	No	Yes	Yes	Yes
Transverse sensitivity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Report/certificate <sup>1</sup>	Full report	Full report	Full report	Full report	Full report	Full report	Full report
Capacitance Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes

### Primary calibration, single point

Primary Calibration by Laser Interferometer. Measurement taken at a single frequency, customer defined.

Calibration service number	CS120B
Frequency range	Single Frequency
System cal <sup>3</sup>	No
Transverse sensitivity	Yes
Report/certificate <sup>1</sup>	Full report
Capacitance Measurement	Yes

### Comparison calibration

Secondary calibration by comparison provides a measurement uncertainty of  $\pm 1.2\%$  (100 Hz),  $\pm 1.5\%$  (20 Hz to 2500 Hz),  $\pm 2.5\%$  (>2500 Hz to 10,000 Hz), and  $5\%$  (>10,000 Hz to 20,000 Hz).

Calibration service number	CS130	CS130H	CS130L	CS130LH	CS130S	CS130LH-S
Frequency range	20 Hz to 10 kHz	20 Hz to 20 kHz	1 Hz to 10 kHz	1 Hz to 20 kHz	20 Hz to 10 kHz	1 Hz to 20 kHz
System cal <sup>3</sup>	No	No	No	No	Yes	Yes
Transverse sensitivity	Yes	Yes	Yes	Yes	Yes	Yes
Report/certificate <sup>1</sup>	Full report	Full report	Full report	Full report	Full report	Full report
Sensor manufacturer	Endevco	Endevco	Endevco	Endevco	Endevco/ Non-Endevco	Endevco
Resonance search <sup>2</sup>	Yes	Yes	Yes	Yes	Yes	Yes

Calibration service number	CS130LS	CS130T <sup>4</sup>	CS135	CS135L	CS135LH	CS410
Frequency range	1 Hz to 10 kHz	20 Hz to 10 kHz	20 Hz to 10 kHz	1 Hz to 10 kHz	1 Hz to 20 kHz	20 Hz to 10 kHz
System cal <sup>3</sup>	Yes	No	No	No	No	No
Transverse sensitivity	Yes	Yes	No	No	No	Yes
Report/certificate <sup>1</sup>	Full report	Full report	Full report	Full report	Full report	Standard cert
Sensor manufacturer	Endevco	Endevco	Endevco	Endevco	Endevco	Endevco
Resonance search <sup>2</sup>	Yes	Yes	Yes	Yes	Yes	Yes

Calibration service number	CS415	CS410TEDS <sup>5</sup>	CS420	CS425	CS420L	CS210 <sup>6</sup>
Frequency range	20 Hz to 10 kHz	20 Hz to 10 kHz	20 Hz to 10 kHz	20 Hz to 10 kHz	1 Hz to 10 kHz	20 Hz to 10 kHz
System cal <sup>3</sup>	No	No	No	No	No	No
Transverse sensitivity	No	Yes	Yes	No	Yes	Yes
Report/certificate <sup>1</sup>	Standard cert	Standard cert	Standard cert	Standard cert	Standard cert	Standard cert
Sensor manufacturer	Endevco	Endevco	Non-Endevco	Non-Endevco	Non-Endevco	Endevco
Resonance search <sup>2</sup>	Yes	Yes	Yes	Yes	Yes	Yes

## Calibration Services

### Shock calibration

Half-sine shock calibration by comparison provides a measurement uncertainty of  $\pm 1.9\%$  (20 to 2000 g) and  $2.7\%$  (2000 to 10,000 g).

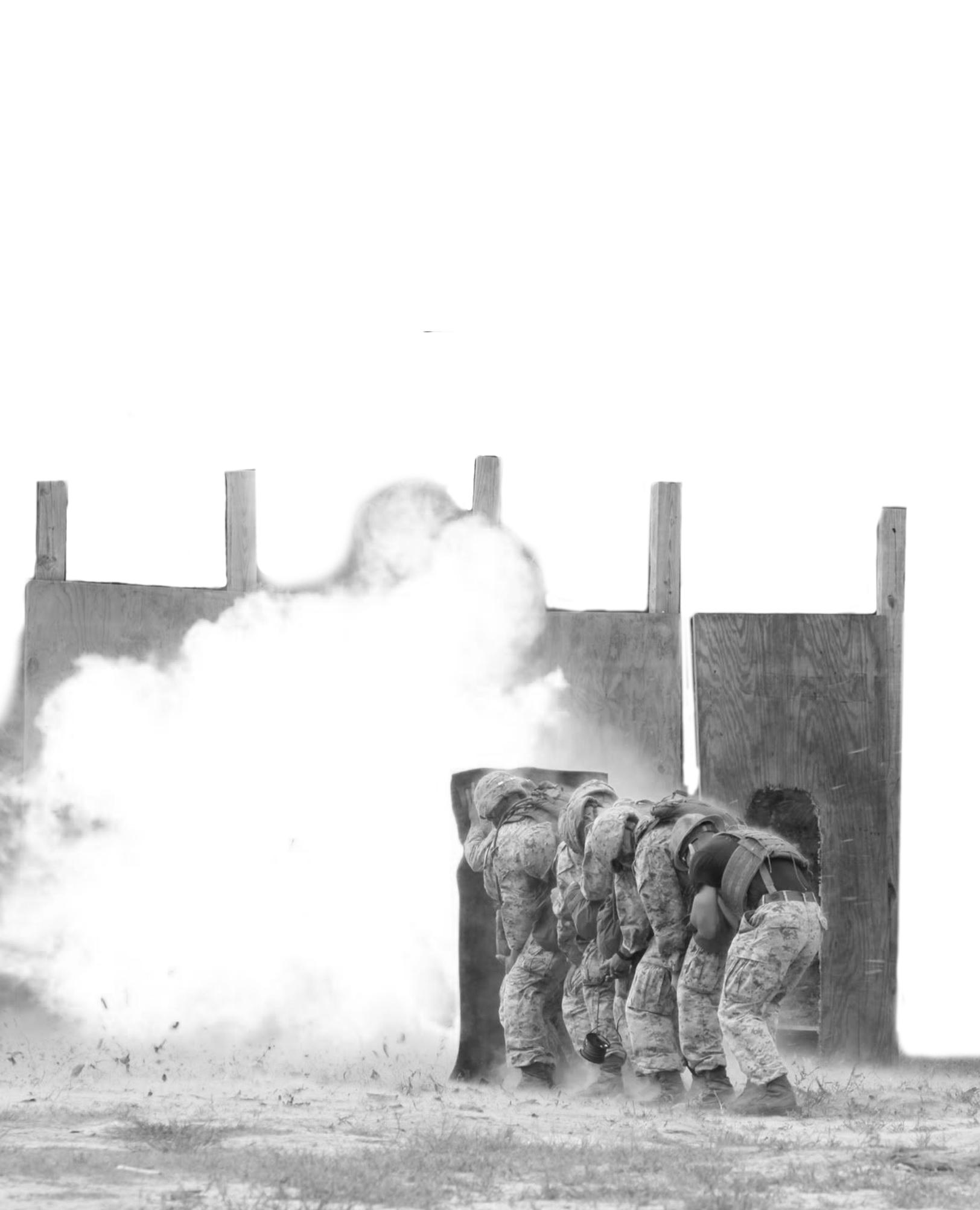
Calibration service number	CS110	CS110S	CS220	CS111	CS115
Shock range	20 g to 10 Kg, 5 levels	20 g to 10 Kg, 5 levels	20 g to 10 Kg, 5 levels	10 Kg to 100 Kg, 5 levels	10 Kg to 100 Kg, 5 levels
Frequency range <sup>7</sup>	20 Hz to 10 kHz	20 Hz to 10 kHz	NA	NA	NA
System cal <sup>2</sup>	No	Yes	No	No	No
Transverse sensitivity	Yes	Yes	Yes	Yes	No

### Environmental calibration

Sensitivity calibration at temperature.

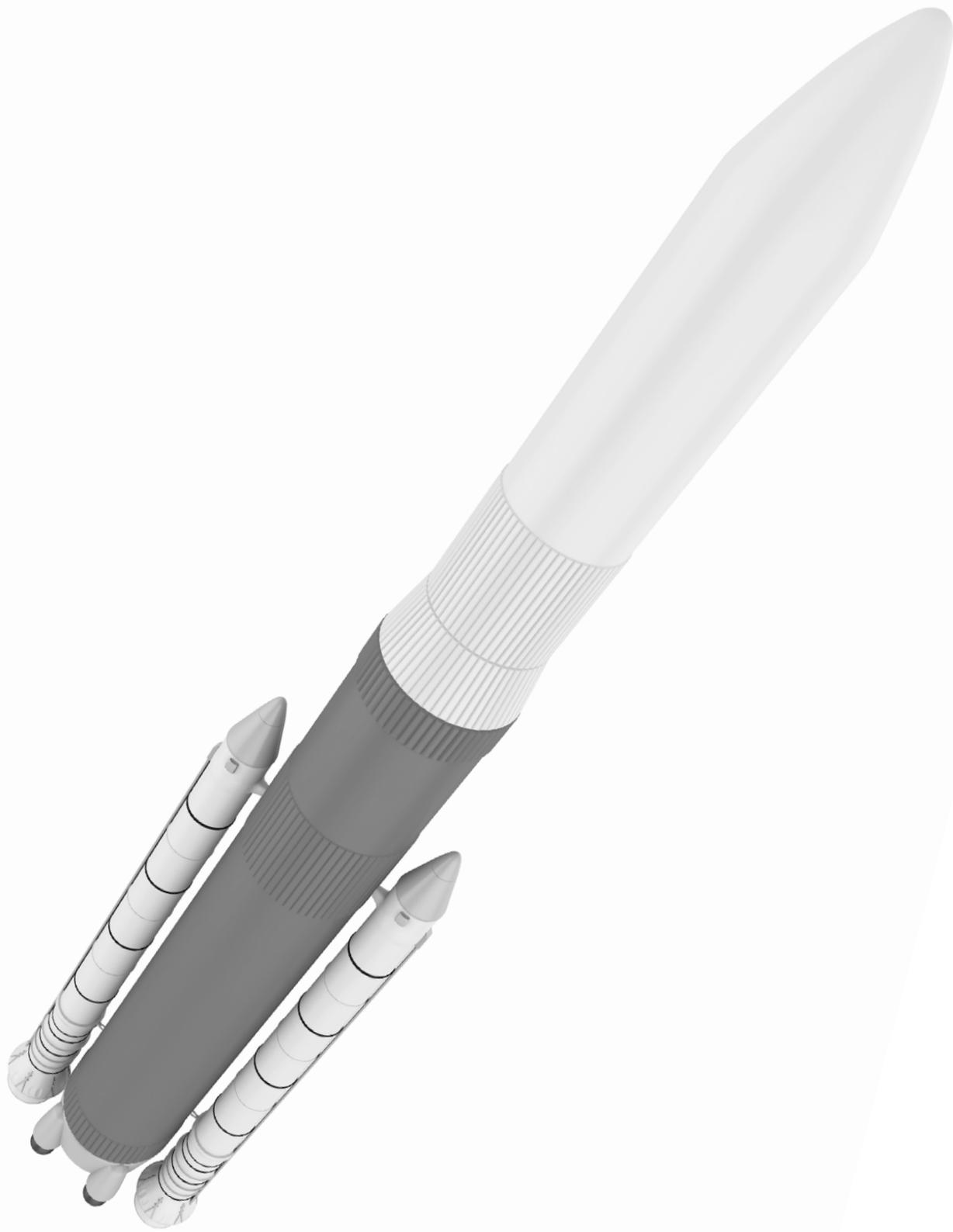
Calibration service number	CS310	CS315
Description	Sensitivity measurement at single frequency, at customer specified temperature	Sensitivity measurement at single frequency, at customer specified temperature
Temperature range °C (°F)	-55 to +175 [-67 to +345]	-55 to +175 [-67 to +345]
Transverse sensitivity	No	Yes

1. Full report includes a 5+ page comprehensive report. Standard Cert includes a 1 page calibration certificate
2. Resonance search is performed up to 50,000 Hz or the sensor's highest specification frequency
3. System cal performs the calibration procedure on the measurement system including a transducer and its associated cable and signal conditioning
4. For triaxial accelerometers
5. Includes TEDS (Transducer Electronic Data Sheet) verification and update
6. Amplitude linearity (5 g levels from 1 g to 100 g, specified by customer)
7. Includes standard frequency sweep



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