

Test and measurement **PRODUCT CATALOG**

Accelerometers · Pressure sensors · Electronics

Signal conditioners · Microphones · Calibration · Cable assemblies

Meggitt PLC

Meggitt Sensing Systems

The Meggitt group, comprising a 12,000-plus workforce over 53 operating sites worldwide, specializes in smart engineering for extreme environments—high performance components and sub-systems for aerospace, defence and energy markets. Its sensing and control technologies are also deployed in land and marine-based gas turbines, oil and gas applications and the medical, mainstream industrial, test engineering and transportation sectors. The group is managed via five divisions.

Meggitt Aircraft Braking Systems is the number one producer of wheels, brakes and brake control systems for business jets and military and regional aircraft. With leading positions on commercial transports, its products, which include brake temperature and tire pressure monitoring, are on an active fleet of over 34,000 aircraft which include helicopters.

Meggitt Control Systems is a leading supplier of aircraft fire protection and control systems, aerospace and industrial fuel and bleed air control valves, heat exchangers, high performance electro-mechanical fans, pumps, compressors, electric motors and controllers and high pressure ducting and ground refueling products.

Meggitt Polymers & Composites designs and develops engine and aerodynamic seals (fire-proof variant goes into oil and gas), flexible fuel tanks and fuel systems for military and civil aircraft, advanced composite engine components, radomes and secondary structures, electro-thermal ice protection systems and sub-assemblies and interior panels and accessories.

Meggitt Sensing Systems excels in high performance sensing and monitoring systems for aircraft and landbased turbines; test and measurement; avionics; electrical power systems; and aircraft safety and security.

The **Meggitt Equipment Group** was created to enable a set of strong, yet technologically-distinct businesses to market their offerings to specialist customers and yet benefit from the wider Meggitt group's investment in shared services and common processes. Its capabilities include unique heat transfer equipment for hydrocarbon processing, linear motion control, combat support (ammunition-handling, military electronics cooling and countermeasure launch and recovery) and training systems (live and virtual fire).

www.meggitt.com

Meggitt Sensing Systems is the Meggitt division specializing in sensing and monitoring systems. We measure physical parameters in the extreme environments of aircraft, space vehicles, power generators, nuclear, oil and gas installations and test laboratories.

Our primary markets

Aerospace	Energy
 Engine sensing 	 Vibration sensing
 Fluid sensing 	 Fire and flame detection
 Inertial systems 	 Ignition systems
 Ignition systems 	 Combustion monitoring
 Engine monitoring 	 Blade health monitoring
 Landing gear monitoring 	 Condition monitoring system

Meggitt Sensing Systems, a Meggitt group division, has operated through its antecedents since 1852 under the names of Endevco[®], Wilcoxon Research, Sensorex, ECET, Vibro-Meter, Lodge Ignition, Piezotechnologies and Ferroperm Piezoceramics, aligning some of the world's notable companies in the sensing industry with related products, services and applications.

Today, the capabilities and facilities of Meggitt Sensing Systems are integrated under one business unit. Providing complete systems with these renowned product brands, from a single supply base.

Our unique yet wide portfolio includes high technology products and systems for civil and military aerospace applications. We are leaders in the energy, power generation, nuclear, oil and gas, industrial, laboratory measurement, automotive and space markets. Meggitt Sensing Systems deploys a wide array of technologies, including piezoelectric, piezoresistive, variable capacitance, inertial, capacitive, resistive, inductive, magnetic, microwave and optical, to address its key customer challenges in high-temperature, high shock, limited space and weight, biocompatibility and communications.

Leading the way in measurement

With our eight development and manufacturing sites located in Switzerland, France, United Kingdom, Denmark and the United States, we have unmatched capabilities to deliver more critical sensing solutions. An extensive sales and support network extends across Europe, Asia and the Americas to serve our customers worldwide.

Sensing solutions for challenging measurement applications

Our facility in Irvine, California, formerly known as Endevco (www.endevco.com), specializes in missioncritical measurement in the aerospace, defence, automotive, industrial and medical sectors. Products include piezoelectric, piezoresistive and variable capacitance accelerometers; pressure transducers; microphones; laboratory and airborne; signal conditioning; electronics and systems calibration equipment.

Industrial sensing and simplified condition-based maintenance

Our facility in Germantown, Maryland, formerly known as Wilcoxon Research (www.wilcoxon.com), specializes in highly reliable industrial vibration sensors and condition-based monitoring and predictive maintenance applications. The facility produces a wide range of vibration sensors for industrial, process control, military and test measurement. Its laboratories focus on state-of-the-art basic and applied research for military and government agencies.



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Wilcoxon Research

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Product technology introductions

Variable Capacitance accelerometers

Variable capacitance (VC) accelerometers are DC-responsive sensors for measuring motion (constant acceleration) and long duration events. 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. Anisotropically-etched silicon microsensors are produced at Meggitt's specialized MEMS facility in Sunnyvale, California, and available in single-axis and triaxial configurations.

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. Sensing elements are micro-machined at Meggitt's specialized MEMS facility in Sunnyvale, California. Some units are damped to prevent over saturation of frequency content, while others are undamped to provide high bandwidth. Multiple package configurations support the mounting requirements of a variety of applications.

Piezoresitive 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 wideband frequency response with exceptional sensitivity for improved resolution, high resonance frequency, exceptional linearity and hysteresis performance.

Piezoelectric accelerometers

Piezoelectric (PE) accelerometers are high-impedance charge-mode sensors known for their long mean time between failures and extreme temperature operation. They are used with a charge amplifier, such as our 133 three-channel signal conditioner, or in-line charge converter, like the 2771C series. Offered in a variety of sizes and configurations to meet your testing needs, special purpose units are available for onboard flight, spacecraft and satellites, from cryogenic to extreme-high temperatures and in radiation environments.

Piezoelectric pressure sensors

Miniature piezoelectric dynamic pressure sensors are designed for harsh environment applications including combustion monitoring, engine test cells, wind tunnels and propulsion systems. Rugged, shock-resistant assemblies allow continuous operation and temperature stability up to +538°C (+1000°F). Models are available in single-ended or differential outputs.



Isotron accelerometers

Isotron accelerometers integrate the electronic charge converter into the sensor housing, eliminating the need for an external charge amplifier. They can drive signals across long cables with minimal distortion and noise pick-up. Isotron electronics are compatible with the industry standard IEPE current sources that are built into many FFT analyzers and data acquisition systems, not exclusively those available from Meggitt. These accelerometers are available in a wide selection of sensitivities, ranges, sizes and shapes. Meggitt has pioneered specialty Isotron accelerometers such as lightweight versions with a 30 kHz bandwidth, high sensitivity units for seismic measurements, and sensors which operate above industry-accepted temperature limitations for integral electronics.

Electronics signal conditioners and amplifiers

Meggitt offers a comprehensive family of highperformance electronics, ranging from simple battery operated signal conditioners to computercontrolled laboratory quality instrumentation. They are compatible with Meggitt's own Isotron, PE, VC and PR accelerometers and pressure sensors, as well as those commonly available in industry.

Cables

For optimal performance, Meggitt relies upon inhouse expertise to design and manufacture cables and connectors. Off-the-shelf and custom assemblies include low-noise treated, high-temperature and multiconductor options.

Microphones piezoelectric

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.

Shakers electrodynamic and piezoelectric

Vibration generators, or "exciters", produce a dynamic force for structural research and modal testing. Meggitt offers both low-frequency electromagnetic shakers and high-frequency piezoelectric shakers, as well as compatible power amplifiers and impedance matching networks.



Endevco variable capacitance accelerometers

Variable capacitance (VC) accelerometers are expressly designed to measure motion, long duration transient events and low-frequency vibration. They provide high sensitivities at very low frequencies, down to DC, with outstanding temperature stability.

VC accelerometers are known for exceptionally high measurement accuracy, shock survivability and fast recovery times over years of use. With internal MEMS sensing elements manufactured at Meggitt's own US facility, all aspects of quality control are carefully monitored throughout the process. The sensors operate from an unregulated DC power source and require no special signal conditioning for operation.

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



while maintaining a full analog signal path. Each axis of the triaxial accelerometer utilizes a patented variable capacitance MEMS sensing element. Gas damping and internal overrange stops enable the the sensor to withstand high shock and acceleration loads. The triaxial sensor arrangement is housed in a truly hermetic bolt-mount package featuring an integral Glenair[®] Mighty Mouse 800-013 series hermetic receptacle. When used with a mating plug (Glenair[®] series 800-006 thru 800-009) the connector assembly (see Model 3907) is protected against water ingress, making the 7298 an ideal choice for permanent installations in hose-down locations.











Model number	7290A	7290D	7290E	7290EM5
Description	Flight test standard DC response Gas damped	High accuracy DC response with iTEDS Extreme temperatures	Wide bandwidth DC response Digital compensation	Watertight to IP67 PFA Cable Temperature Compensated
Linear range g	±2/±10/±30/±50/ ±100	±2/±10/±30/±50/±100	±2/±5/±10/±30/±50/ ±100	±2/±5/±10/±30/±50/ ±100
Sensitivity mV/g typical	1000 / 200 / 66 / 40 / 20	1000 / 200 / 66 / 40 / 20	1000 / 400 / 200 / 66 / 40 / 20	1000 / 400 / 200 / 66 / 40 / 20
Frequency response $\pm 5\%$	0–15 / 0–500 / 0–800 / 0–1000 / 0–1000	0–15 / 0–500 / 0–800 / 0–1000 / 0–1000	0–15 / 0–30 / 0–500 / 0–1000 / 0–2000 / 0–2000	0–15 / 0–30 / 0–500 / 0–1000 / 0–2000 / 0–2000
Non linearity % FSO typical	0.2 / 1.0 (100g)	0.2 / 1.0 (100g)	0.2 / 1.0 (100g)	0.2 / 1.0 (100g)
Shock limit g	5000 (2g / 10g) / 10,000	5000 (2g / 10g) / 10,000	5000 (2g / 5g / 10g) / 10,000	5000 (2g / 5g / 10g) / 10,000
Operating temperature $\ ^{\circ}C \ [^{\circ}F]$	-55 to +121 (-67 to +250)	-55 to +125 (-67 to +257)	-55 to +121 (-67 to +250)	-55 to +121 (-67 to +250)
Dimensions mm (in)	25.4 x 21.6 x 7.6 (1.00 x 0.85 x 0.30)	25.4 x 21.6 x 9.1 (1.00 x 0.85 x 0.36)	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)
Weight grams	12	15	10	10
Excitation voltage Vdc	9.5 to 18	8.0 to 30	9.5 to 36	9.5 to 36
Mounting method	Screw 4-40	Screw 4-40	Screw 4-40	Screw 4-40



Endevco model 7298

Model 7298 triaxial accelerometer family is designed to provide the high thermal stability and global accuracy that is typically required for the measurement of relatively low-level accelerations in aerospace and automobile environments. Typical applications require the measurement of whole body motion in three mutually orthogonal directions immediately following shock motion or in the presence of severe vibrational inputs. State of the art temperature compensation electronics provide for precise compensation over a wide temperature range,

Internal signal conditioning allows the 7298 to operate from an excitation voltage from 6 Vdc to 45 Vdc while providing a high level, low impedance output. For each axis, the single-ended output is DC coupled and varies linearly from 0.5 Vdc to 4.5 Vdc over the input range. For operating in differential mode, a precision 2.5 Vdc reference voltage is available at the connector, providing a DC coupled ±2 Vdc differential output. The signal conditioning includes factory programmable temperature compensation in order to maintain stringent thermal characteristics and high accuracy.





7298	7591A
Triaxial DC response Hermetic	Flatpack DC response Temperature output
±2 / ±5 / ±10 / ±30 / ±50 / ±100	±2 / ±5 / ±10 / ±30 / ±50 / ±100
1000 / 400 / 200 / 66 / 40 / 20	1000 / 400 / 200 / 66 / 40 / 20
0–15 / 0–30 / 0–500 / 0–1000 / 0–1500 / 0–1500	0–15 / 0–30 / 0–500 / 0–800 / 0–1000 / 0–2000
0.5 / 1.0 (30g / 100g)	0.2 / 1.0 (30g / 100g)
5000 (2g / 10g) / 10,000	5000 (2g / 10g) / 10,000
-55 to +125 (-67 to +257)	-54 to +121 (-65 to +250)
31.5 x 21 x 14.2 (1.24 x 0.825 x 0.56)	15.88 x 15.88 x 3.43 (0.625 x 0.625 x 0.135)
22	7
6.0 to 45.0	8.5 to 30
Screw 4-40	Board mount



Endevco piezoresistive accelerometers

Since the earliest days of vehicle safety testing, Meggitt has worked with OEMs, test laboratories, ATD manufacturers and their associated design and test personnel to ensure accurate measurements of front, side and rear impact; crush zones; and in-vehicle occupant and pedestrian safety.

High-precision, DC responding Endevco piezoresistive accelerometers are widely specified within these applications, due to their high-output, low mass designs and compact size for mounting within difficult-to-reach areas. Their high-impact shock and vibration, rotational acceleration, long duration transient motion, and lowfrequency measurement capabilities offer solutions for a diverse set of automobile testing requirements.

- > Frontal, rear and side impact
- Low-frequency crash event detection
- > Vehicle crush zones, crash sleds and rollover
- > Global regulatory compliance testing
- > Anthropomorphic Test Devices (ATD)
- Pedestrian safety



Endevco model 727

Model 727 is an extremely lightweight piezoresistive accelerometer, designed for accurate shock measurement during the drop testing of consumer electronic devices. The anodized aluminum package is suitable for adhesive mounting and comes with an integral 10 foot cable.

Available in four different ranges, 2000 g, 6000 g, 20,000 g and 60,000 g, model 727 can measure shocks in g ranges well above current drop test sensors. The 0.28 inch diameter package is designed to be mounted with adhesive, and at only 0.3 grams for the accelerometer body and 1.1 grams per foot for the cable, mass loading to the test object is minimal. The 727 has exceptional frequency response, from DC to 10 kHz for the 2 kg range all the way to DC to 100 kHz for the 60 kg range, to capture the entire frequency range of interest. The 727 has been tested and is rated to survive shocks up to 1.5 times its range. The standard unit comes with an A2LA certified calibration taken at 10 volts, other input voltages should be specified at time of order.

With its exceptional bandwidth and shock survivability, model 727 is suited to many shock and impact testing environments. Model 42894 removal tool is included with each unit.



Model number	2262A
Description	Rugged Critically damped High sensitivity
Linear range g	±1000/±2000
Sensitivity mV/g typical	0.5 / 0.25
Frequency response ±5%, Hz	1500 / 3000
Shock limit g	2500 / 5000
Operating temperature $\ ^{\circ}C$ ($^{\circ}F]$	-18 to +93 (0 to +200)
Dimensions mm (in)	15.9 x 25.4 (5/8 Hex x 1.00)
Weight gram	28
Mounting method	10-32 detachable stud





7265A / A-HS	727
Low mass Critically damped High sensitivity	Lightweight Broad frequency response Drop testing
±100/±20	±2000/±6000/±20,000/±60,000
5 / 25	10 / 3 / 1 / 0.3 uV/V/g
0 to 800 / 0 to 500	10 / 20 / 50 / 100 kHz
2000	3000 / 9000 / 30,000 / 90,000
-18 to +66 (0 to +150)	0 to +70 (+32 to +158)
11.94 x 16 x 7.75 (0.470 x 0.630 x 0.305)	7.11 (0.28) 0.3 diameter
5/5.9	0.3
Screw	Adhesive

Endevco model 7264H



Model 7264H is a very low mass accelerometer weighing only 1.4 grams. This accelerometer is designed for crash testing and similar applications that require minimal mass loading, broad frequency response, and minimum zero shift following the event. It is equivalent in form and fit to the model 7264C.

Model 7264H utilizes a unique and advanced micro-machined piezoresistive sensor, which includes integral mechanical stops and damping. This monolithic sensor incorporates the latest MEMS technology for ruggedness, stability and reliability over previous designs. The accelerometer has a two active arm, full bridge circuit with fixed completion resistors to facilitate shunt calibration. Fullscale output is 200 mV nominal with 10 Vdc excitation. With a frequency response extending down to DC (steady state acceleration), this accelerometer is ideal for measuring long duration transient shocks.

7264H has a full scale range of 1000 g and gas damping. It is available with less than 1% transverse sensitivity and less than \pm 25 mV Zero Measurand Output as the "TZ" option. 7264H comes standard with calibration data for 2 V, 5 V and 10 V excitation.



7302BM5 has a stable frequency to 1600 Hz and offers high angular and linear shock resistance. The accelerometer also provides a nominal sensitivity of 5.0 mV per krad/sec² at 10 Vdc excitation voltage or 2.5 mV per krad/sec² at 5 Vdc excitation voltage (nominal 250 mV full-scale output).
7302BM5 is designed for a variety of automotive, industrial, and aerospace applications. The accelerometer is ideal for dynamic automotive applications.

7302BM5 is designed for a variety of automotive, industrial, and aerospace applications. The accelerometer is ideal for dynamic automotive applications including crash testing, suspension and chassis vibration monitoring, and rollover detection. The accelerometer can also be mounted in anthropomorphic test dummies to measure rotational body accelerations experienced under impact. Additional applications for this accelerometer include motion analysis in shaft and drive train rotation for machine and turbine monitoring. Typical aerospace applications include flight control systems and ejection seat testing.







Model number	7264B	7264C	7264D	7264H
Description	Crash test Undamped Meets SAE J211 / J2570	Industry standard Undamped Meets SAE J211 / J2570	High resonance Undamped Meets SAE J211 / J2570	Extremely rugged Damped Pedestrian safety testing
Linear range g	±500/±2000	±500/±2000	±2000	±1000
Sensitivity mV/g typical	0.80 / 0.20	0.80 / 0.20	0.20	0.20
Frequency response $\pm 5\%$, Hz	3000 / 5000	3000 / 5000	6000	3,500 (± 4%)
Shock limit g	5000 / 10,000	5000 / 10,000	10,000	10,000
Operating temperature °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)
Dimensions 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)
Weight gram	1	1.4	1.4	1.4
Mounting method	Screw	Screw	Screw	Screw



Model number	7231C	7268C	7286 / 7287	7302BM5
Description	ATD standard Undamped Optional cable	Triaxial Undamped World SID ATD	Lightweight Undamped Optional cable	Angular World SID ATD Undamped
Linear range g	±750	±500/±2000	±2000	50,000 rad/sec ²
Sensitivity mV/g typical	0.20	0.80 / 0.20	0.003 / 0.2	5 mV/ krad/sec²
Frequency response ±5%, Hz	2000	3000 (Z) / 1500 (X&Y)	4000	3 to 1000
Shock limit g	2500	5000 / 10,000	10,000	2500
Operating temperature °C (°F)	-73 to +149 (-100 to +300)	-18 to +66 (0 to +150)	10 to +30 (50 to +86)	-18 to +121 (0 to +250)
Dimensions mm (in)	12.7 x 19.05 x 22.9 (0.500 x 0.750 x 0.900)	12.70 x 13.84 x 10.57 (0.500 x 0.545 x 10.67)	7.8 x 11.3 (0.31 x 0.45)	15.9 x 29.97 (0.625 dia x 1.18)
Weight gram	24	8	less than 1	35
Mounting method	10-32 detachable stud	Screw	Adhesive or screw	Screw

Endevco model 7302BM5

Model 7302BM5 angular accelerometer is designed to provide accurate measurements of rotational acceleration. The sensing device consists of a temperature compensated piezoresistive accelerometer, uniquely designed to reject cross axis angular and linear accelerations. The sensor is fluid-damped to optimize frequency and phase response throughout the operating temperature range of 0°F to +250°F (-18°C to +121°C).









Endevco piezoresistive high-g accelerometers

High-g piezoresistive accelerometers are available in both damped and undamped models to provide high-reliability shock and vibration measurements in extreme environments.

With available measurement ranges from 2000 to 200,000 g, these accelerometers feature rugged piezoresistive MEMS sensing elements. Our in-house MEMS manufacturing techniques enable a product with compact size, high sensitivity and exceptional overrange, while ensuring the repeatability and reliability required for mission critical applications. Product variations include single axis or triaxial configurations and screw, stud and surface mounting options, including fully SMT compatible models.

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





Model 74 utilizes the same sensing element as the Model 72, 7280A and 7284 accelerometer families. Each axis uses a unique micro-machined, piezoresistive sensor with light gas damping to attenuate resonant amplitudes, and mechanical stops to reduce breakage under over load conditions. Model 74 is available in 20,000 g and 60,000 g full scale ranges, with all three axes having the same range.



Model number	7280A
Description	Extremely rugged Lightly damped Low power consumption
Linear range g	±20,000/±60,000
Shock limit g	80,000 / 240,000
Operating temperature $\ ^\circ C \ (\ ^\circ F)$	-55 to +121 (-67 to +250)
Weight gram	1.4
Mounting method	4-40 screws



Model number	71M	72	73	74	75
Description	Surface mount Undamped Low mass	Lightly damped Rugged ESD protection	Triaxial Undamped Surface mount	Triaxial Lightly damped Surface mount LCC	Triaxial Undamped Surface mount LCC
Linear range g	±2000/±6000/ ±20,000/±60,000	±20,000/±60,000	±2000/±6000/ ±20,000/±60,000	±20,000/±60,000	±2000/±6000/ ±20,000/±60,000
Shock limit g	10,000 / 18,000 / 60,000 / 120,000	80,000 / 240,000	10,000 / 18,000 / 60,000 / 120,000	60,000 / 180,000	10,000 / 18,000 / 60,000 / 80,000
Operating temperature $\ ^{\circ}C\ (^{\circ}F)$	-54 to +66 (-65 to +150)	-54 to +71 (-65 to +160)	-54 to +66 (-65 to +150)	-55 to +121 (-67 to +250)	-55 to +121 (-67 to +250)
Weight gram	0.06	0.16	0.92	1.2	1.2
Mounting method	Adhesive	SMT	Adhesive or solder	SMT or adhesive	SMT or adhesive

outside the U.S. and other restrictions may apply.







Model number	7270A	7270AM4	7270AM6	7274
Description	High resonance Undamped Shock standard	High resonance Undamped Stud mount	Rugged Mechanical filter Stud mount	Triaxial Undamped High resonance
Linear range g	±2000/±6000/±20,000/ ±60,000/±200,000	±2000/±6000/±20,000/ ±60,000/±200,000	±2000/±6000/±20,000/ ±60,000	±2000/±6000/±20,000/ ±60,000
Shock limit g	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
Operating temperature °C (°F)	-55 to +121 (-67 to +250)	-55 to +66 (-67 to +150)	-34 to +66 (-30 to +150)	-55 to +66 (-67 to +150)
Weight gram	1.5	1.5	8.4	2.9
Mounting method	Screw	1/4-28 integral stud	1/4-28 integral stud	Screw

Models detailed here are subject to International Traffic in Arms Regulations (ITAR), and as such a license is required for shipments outside the U.S. and other restrictions may apply.

Endevco model 74

Model 74 series is a family of rugged, lightly damped, piezoresistive triaxial accelerometers designed for high-acceleration shock measurements in three mutually perpendicular axes. This family uses three sensors that are packaged in a mutually orthogonal arrangement in a leadless chip carrier (LCC) package that supports mounting by surface mount technology (SMT) re-flow soldering (with epoxy under fill) or adhesive mounting (with hand soldering).











Models detailed here are subject to International Traffic in Arms Regulations (ITAR), and as such a license is required for shipments



Endevco piezoresistive pressure transducers

Miniature piezoresistive pressure transducers are designed to measure both dynamic and static pressure to a high degree of accuracy. MEMS sensing elements feature a unique diaphragm design manufactured at Meggitt's US based MEMS facility, resulting in a range of pressure sensors with an extremely high output signal and high resonant frequency, as well as extraordinary linearity and repeatability, and virtually no hysteresis.

All models feature internal temperature compensation to provide stable performance over temperature. The 8540 offers high temperature operation to +260°C (+500°F). Absolute pressure sensors are available in ranges as low as 0–15 psia and as high as 0–2000 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. Many modifications to our standard pressure transducers are available on request.

- > Jet airflow fields and inlet pressure
- > Hypersonic, transonic and "quiet flow" wind tunnel testing
- > Turbulent airflow measurements
- Process control
- Blast testing
- > Automotive airbag inflation testing
- Rocket motor analysis
- Vehicle transmission testing
 Hydraulics measurements
- inyurautics measurements



Model number	8507C	8510B	8510C	8511A	8515C
Description	Gage High sensitivity Temp compensation	Gage Vent tube Temp compensation	Gage High resonance Temp compensation	Rugged Gage High pressure	Absolute 0.03 inch thin Surface mount
Full scale pressure psi	1 / 2 / 5 / 15	1 / 2 / 5 / 200 / 500 / 2000	15 / 50 / 100	5000 / 10,000 / 20,000	15 / 50
Sensitivity 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	13.3 / 4.0
Resonance frequency kHz	55 / 70 / 85 / 130	55 / 70 / 85 / 320 / 500 / 900	180 / 320 / 500	<1000	180 / 320
Non linearity (typ) %FS0	1.5 / 1.0 / 0.5 / 0.2	1.0 / 1.0 / 0.5 / 0.25 / 0.25 / 0.25	0.15/0.1/0.1	1.2 / 2.5 / 2.5	0.2
Operating temperature $\ ^{\circ}C \ (\ ^{\circ}F)$	-54 to +107 (-65 to +225)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)
Burst pressure psi	20 / 40 / 100 / 150	25 / 40 / 100 / 1000 / 2500 / 10,000	75 / 250 / 400	20,000 / 30,000 / 40,000	75 / 250
Face diameter mm (in)	2.34 (0.092)	3.86 (0.152)	3.86 (0.152)	8.13 (0.320)	6.35 (0.25)
Weight gram	0.3	2.3	2.3	11	0.08
Mounting method	RTV bond	10-32 UNF-2A	10-32 UNF-2A	3/8-24 UNF-2A	RTV bond



Model 8530B is a miniature, high sensitivity piezoresistive pressure transducer for measuring absolute pressure. The volume behind the diaphragm is evacuated and glass sealed to provide an absolute pressure reference. Full scale output is 300 mV with high overload capability and high frequency response. It is available in ranges from 200 psia to 2000 psia. See model 8530C for lower pressure ranges.

Endevco brand pressure transducers feature an active four arm strain gage bridge diffused into a sculptured silicon diaphragm for maximum sensitivity and wideband frequency response. Self-contained hybrid temperature compensation provides stable performance over the temperature range of 0°F to 200°F (-18°C to +93°C). Meggitt's Endevco brand transducers also feature excellent linearity (even to 3X range), high shock resistance, and high stability during temperature transients. Also available with an integral connector as the M37 option.



Model number	8523	8530B	8530BM37	8530C	8540
Description	Gage High temperature Temp compensation	Absolute High resonance Temp compensation	Absolute Detachable cable ABS braking studies	Absolute High sensitivity Temp compensation	Absolute High temperature Temp compensation
Full scale pressure psi	45 / 115 / 215 / 415 / 1015	200 / 500 / 1000 / 2000	200 / 500 / 1000 / 2000	15 / 50 / 100	15 / 50 / 100 / 200 / 500
Sensitivity mV/psi	20/6/3/1.5/0.6	1.5 / 0.6 / 0.3 / 0.3	1.5 / 0.6 / 0.3 / 0.3	15 / 4.5 / 2.25	20/6/3/1.5/0.6
Resonance frequency kHz	140 / 240 / 350 / 450 / 900	750 / 1000 / >1000 / >1000	750 / 1000 / >1000 / >1000	180 / 320 / 500	140 / 240 / 350 / 450 / 900
Non linearity (typ) %FS0	0.25 / 0.25 / 0.25 / 0.4 / 0.4	0.2	0.2	0.15/0.1/0.1	0.25 / 0.25 / 0.25 / 0.4 / 0.4
Operating temperature $\ ^{\circ}C \ (\ ^{\circ}F)$	-54 to +260 (-65 to +500)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +121 (-65 to +250)	-54 to +260 (-65 to +500)
Burst pressure psi	30 / 100 / 200 / 400 / 1000	800 / 2000 / 4000 / 4000	800 / 2000 / 4000 / 4000	75 / 250 / 400	30 / 100 / 200 / 400 / 1000
Face diameter mm (in)	3.86 (0.152)	3.86 (0.152)	3.86 (0.152)	3.86 (0.152)	3.86 (0.152)
Weight gram	8.5	2.3	2.3	2.3	8.5
Mounting method	10-32 UNF-2A	10-32 UNF-2A	10-32 UNF-2A	10-32 UNF-2A	10-32 UNF-2A

Endevco model 8530B



Endevco piezoelectric accelerometers

Meggitt piezoelectric accelerometers are charge mode accelerometers that require use of an external charge amplifier, allowing for reliable operation over wider temperature and amplitude ranges. Piezoelectric accelerometers are popular choices for acceleration, shock and vibration measurements, due to their wide frequency ranges, easy installation, and availability in multiple shapes, weights, sizes and sensitivities. Special purpose piezoelectric accelerometers are also available for flight test, extreme lowand high-temperatures and radiation environments.

- > Aircraft flight testing
- Ground vibration testing
- Automotive ride quality testing
- Product testing
- Quality assurance >
- Research and development
- Test and measurement
- > Turbine maintenance
- Engine testing
- Medical devices (non-critical)
- > OEM design and test applications



source for operation. Model 2221F features Endevco's Piezite® type P-8 crystal element operating in annular shear mode. This unit exhibits excellent output sensitivity stability over time. Signal ground is connected to the outer case of the unit and, when used with an isolated mounting screw, the accelerometer is electrically isolated from ground. A low-noise coaxial cable is supplied for error-free operation. The transducer has a centrally located thru bolt, allowing for 360° cable orientation. The unit may also be adhesively mounted if the application permits











				mm (mm
Model number	2221D	2221F	2222C	2222D
Description	Thru-hole mount 360° cable orientation	Thru-hole mount 360° cable orientation	Miniature teardrop	Miniature teardrop Hermetic
Sensitivity pC/g typical	17	10	1.4	1.1
Sinusoidal limit g	1000	1000	1000	1000
Shock limit g	5000	3000	10,000	10,000
Frequency response $\pm 1 \text{ dB Hz}$	0.1-10,000	0.1-12,000	1-10,000	0.1-12,000
Min temperature °C (°F)	-55 (-67)	-55 (-67)	-73 (-100)	-55 (-67)
Max temperature °C (°F)	+177 (+350)	+260 (+500)	+177 (+350)	+175 (+347))
Signal/ground isolation	Yes	Yes	Yes	No
Hermetic seal	No	Yes	No	Yes
Weight gram (without cable)	12	11	0.5	1.0
Dimensions mm (in)	Ø 15.24 x 8.0 [Ø 0.6 x 0.315]	Ø 15.24 x 8.9 [Ø 0.60 x 0.35]	Ø 6.35 x 3.3 [Ø 0.25 x 0.13]	Ø 6.35 x 4.1 [Ø 0.25 x 0.16]
Mounting method	Screw	Screw	Adhesive	Adhesive
Cable included	3090C-120	3090C-120	3090C-120	3053V-120

Piezoelectric accelerometers

Endevco model 2221F

Model 2221F piezoelectric accelerometer is designed specifically for high temperature vibration measurement on small structures and objects. The unit is hermetically sealed and is ideal for use in extreme environmental conditions. Its light weight (11 grams) effectively minimizes mass loading. The accelerometer is a self-generating device that requires no external power

Endevco model 2225M5A



Models 2225 and 2225M5A are lightweight piezoelectric accelerometers designed specifically for measuring high-g shock on structures and test articles. These sensors are the industry standard for shock accelerometers. The model 2225 features a 10-32 threaded hole, while the model 2225M5A features a 1/4-28 threaded hole for additional mounting integrity needed during high-g shock. The accelerometer is a self-generating device that requires no external power source for operation.

Models 2225 and 2225M5A feature Endevco's Piezite[®] Type P-8 and P-10 crystal elements respectively, operating in annular shear mode. These specially designed crystals exhibit low base strain sensitivity, high resonance frequency, and excellent output stability over time. Signal ground is connected to the outer case of the unit. The accelerometer features a 10-32 top connector and requires a low-noise coaxial cable for error-free operation.



2230E/2230EM1 features Endevco's Piezite Type P-8 crystal elements, operating in annular shear mode, which exhibit excellent output sensitivity stability over time. Signal ground is connected to case and mounting surface of the unit. Low-noise, flexible coaxial cables are supplied for error-free operation.





Model number	2224C	2225	2225M5A	2226C	2228C
Description	General purpose	High g shock	Very high g shock	Lightweight Miniature	Triaxial Ground isolated
Sensitivity pC/g typical	12	0.75	0.025	2.8	2.8
Sinusoidal limit g	1000	10,000	NA	1000	1000
Shock limit g	2000	20,000	100,000	2000	2000
Frequency response $\pm 1 \text{ dB Hz}$	0.1-10,000	1-10,000	NA	0.1-7000	0.1-6000
Min temperature °C (°F)	-55 (-67)	-55 (-67)	-18 (0)	-55 (-67)	-55 (-67)
Max temperature $\ ^\circ C \ [\ ^\circ F]$	+177 (+350)	+177 (+350)	+66 (+150)	+177 (+350)	+177 (+350)
Signal/ground isolation	No	No	No	No	Yes
Hermetic seal	No	No	No	No	No
Weight gram (without cable)	16	13	13	2.8	15
Dimensions mm (in)	14.2 hex x 13.7 [9/16 hex x 0.54]	14.2 hex x 13.7 [9/16 hex x 0.54]	14.2 hex x 13.7 [9/16 hex x 0.54]	9.53 hex x 5.8 [3/8 hex x 0.19]	18.72 x 18.72 x 11.68 [0.737 x 0.737 x 0.460]
Mounting method	Stud	Stud	Stud	Adhesive	Screw
Cable included	3090C-120	3090C-120	3060D-120	3060D-120	3060D-120 (3)



Model number	2229C	2230E
Description	Miniature Stud mount	Triaxial Adhesive mou
Sensitivity pC/g typical	2.8	3
Sinusoidal limit g	1000	1000
Shock limit g	2000	2000
Frequency response $\pm 1 \text{ dB Hz}$	0.1-7000	1-10,000
Min temperature $\ ^\circ C \ (\ ^\circ F)$	-55 (-67)	-55 (-67)
Max temperature $\ ^{\circ}C\ (^{\circ}F)$	+177 (+350)	+260 (+500)
Signal/ground isolation	Yes	No
Hermetic seal	No	Yes
Weight gram (without cable)	4.9	17
Dimensions mm (in)	11.13 hex x 5.5 [7/16 hex x 0.22]	17.15 x 11.68 [0.675 x 0.46 x
Mounting method	Stud	Adhesive
Cable included	3060D-120	3053V-120 (3)

Endevco model 2220EM1

Model 2230E/2230EM1 is a miniature triaxial piezoelectric accelerometer designed specifically for vibration measurement in three orthogonal axes on small structures and objects. This high temperature (+260°C) transducer features three M3 receptacles for output connection. 2230E is designed to be mounted with adhesive. 2230EM1 is mounted with two supplied cap screws. Its light weight (17 grams) effectively minimizes mass-loading effects. The accelerometer is a self-generating device that requires no external power source for operation.

Endevco model 2280

Model 2280 is a very high temperature triaxial piezoelectric accelerometer for shock and vibration measurements at temperatures up to +900°F (+482°C). This accelerometer is 1.35 inch (35 mm) square and weighs less than 0.6 pounds (270 grams). It features three 10-32 side connectors and is mounted with two 8-32 bolts.

Model 2280 features Endevco's Piezite Type P-14 crystal elements in our patented Isobase[®] construction that provides mechanical isolation of the sensing assembly from the mounting surface, minimizing base strain sensitivity. The unit is hermetically sealed and signal ground is isolated from the outer case of the unit. The unit is fully compliant to European Union's Low Voltage directive 2014/35/EU, EMC directive 2014/30/EU and RoHS directive 2011/65/EU and bears the CE mark.







ENDEVO ISOBASI CELEROMI 2273AM²

Model number	2271A	2271AM20	2273AM1	2273AM20
Description	Cryogenic	Cryogenic	Radiation tested 10-32 side connector	Radiation tested 10-32 top connector
Sensitivity pC/g typical	11.5	11.5	10	10
Sinusoidal limit g	1000	1000	500	500
Shock limit g	10,000	10,000	3000	3000
Frequency response $\pm 1 \text{ dB Hz}$	1-8000	1-8000	1-7000	1-7000
Min temperature °C (°F)	-269 (-452)	-269 (-452)	-55 (-67)	-55 (-67)
Max temperature °C (°F)	+260 (+500)	+260 (+500)	+399 (+750)	+399 (+750)
Signal/ground isolation	Yes	Yes	Yes	Yes
Hermetic seal	Yes	Yes	Yes	Yes
Weight gram (without cable)	27	27	32	34
Dimensions mm (in)	15.9 hex x 19.8 [5/8 hex x 0.78]	15.9 hex x 24.9 [5/8 hex x 0.98]	15.9 hex x 26.9 [5/8 hex x 1.06]	15.9 hex x 34.5 [5/8 hex x 1.36]
Mounting method	Stud	Stud	Stud	Stud
Cable included	3090C-120	3090C-120	3075M6-120	3075M6-120



Model number	2276	2280	62225	6233C
Description	Radiation tested High temperature	Triaxial High temperature	ARINC mount Differential output	ARINC mount High temp Differential output
Sensitivity pC/g typical	10	3	20 / 50 / 100	10 / 50 / 100
Sinusoidal limit g	500	500	2000 / 1000 / 500	1000 / 1000 / 500
Shock limit g	3000	3000	4000 / 2000 / 1000	2000 / 2000 / 1000
Frequency response $\pm 1 \text{ dB Hz}$	1-7000	10-4000	1-12,000 / 1-9000 / 1-9000	1-8000 / 0.1-5000 / 0.1-3000
Min temperature °C (°F)	-55 (-67)	-54 (-65)	-54 (-65)	-55 (-67)
Max temperature $\ ^\circ C \ [^\circ F]$	+482 (+900)	+482 (+900)	+260 (+500)	+482 (+900)
Signal/ground isolation	No	Yes	Yes	Yes
Hermetic seal	Yes	Yes	Yes	Yes
Weight gram (without cable)	30	250	91	75 / 110 / 110
Dimensions mm (in)	15.9 hex x 25.4 [5/8 hex x 1.00]	34.29 x 34.29 x 34.29 [1.35 x 1.35 x 1.35]	41.4 x 30.2 x 20.3 [1.63 x 1.19 x 0.80]	41.6 x 30.2 x 25.4 / 81.8 / 38.1 [1.64 x 1.19 x 1.00 / 1.25 / 1.50]
Mounting method	Stud	Screw	Screw	Screw
Cable included	3075M6-120	3075M6-120 (3)	No	No





Endevco model 6243 series

The models 6243M series piezoelectric accelerometers are designed specifically for use in extremely high temperature environments such as aircraft and ground-based gas turbines. These accelerometers are designed for continuous operation at +1200°F (+650°C) and intermittent operation (defined as 5 minutes over a 60 minute period) up to +1400°F (+760°C). The small size and light weight of these accelerometers facilitate installation in cramped locations with minimal structural support.

Model 6243M series incorporates Meggitt's MC2 shear mode crystal. 6243M1 and 6243M3 have sensitive axis located in line with the mounting screw. 6243M2 and 6243M4 have sensitive axis located perpendicular to the mounting screw. The sensing elements and integral shield are isolated from the case. The accelerometer features an integral hardline cable of customer specified length, in which the standard length is 120 inches. The connector is designed to operate in an environment up to +900°F [+482°C].











Model number	6237M70	6243M1/M2	6243M3/M4	7201
Description	Very high temperature	Extreme high temperature No thermal velocity spikes	Extreme high temperature No thermal velocity spikes Differential output	General purpose
Sensitivity pC/g, typical	10	5.5	5.5	10 / 50 / 100
Sinusoidal limit g	500	500	500	2000
Shock limit g	2000	2000	2000	20,000 / 10,000 / 5000
Frequency response $\pm 1 \text{ dB Hz}$	1-5000	1-3900	1-3900	1-15,000 / 1-10,000 1-8000
Min temperature °C (°F)	-55 (-67)	-55 (-65)	-55 (-65)	-73 (-100)
Max temperature °C (°F)	+650 (+1200)	+650 (+1200)	+650 (+1200)	+260 (+500)
Signal/ground isolation	Yes	Yes	Yes	No
Hermetic seal	No	Yes	Yes	Yes
Weight gram (without cable)	30	30	30	18 / 20 / 25
Dimensions mm (in)	24.4 x 14.2 x 14.2 [0.96 x 0.56 x 0.56]	24.4 x 14.2 x 14.2 (0.96 x 0.56 x 0.56)	24.4 x 14.2 x 14.2 (0.96 x 0.56 x 0.56)	15.88 hex x 19.8 [5/8 hex x 0.78]
Mounting method	Screw	Screw	Screw	Stud
Cable included	Integral	Integral	Integral	3090C-120

Model number	7240C	7703A	7704A	7722
Description	Very high frequency	General purpose Radiation tested	General purpose Radiation tested	Cryogenic
Sensitivity pC/g, typical	3.0	50 / 100 / 200 / 300 / 1000	50 / 100	3.7
Sinusoidal limit g	1000	2000 / 1000 / 850 / 675 / 500	2000 / 1000	500
Shock limit g	5000	10,000 / 5000 / 2000 / 1600 / 1000	10,000 / 5000	2500
Frequency response $\pm 1 \text{ dB Hz}$	1-20,000	1–9000 / 1–8000 / 1-6000 / 1-5000 / 1-3000	1-9000 / 1-8000	1-6000
Min temperature $\ ^\circ C \ (\ ^\circ F)$	-55 (-67)	-55 (-67)	-55 (-67)	-184 (-300)
Max temperature $\ ^\circ C \ (\ ^\circ F)$	+260 (+500)	+288 (+550)	+288 (+550)	+177 (+350)
Signal/ground isolation	No	Yes	Yes	No
Hermetic seal	Yes	Yes	Yes	Yes
Weight gram (without cable)	4.8	25 / 29 / 62 / 70 / 120	25 / 29	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]	15.88 hex x 23.1 (5/8 hex x 0.91)
Mounting method	Stud	Stud	Stud	Stud
Cable included	3053V-120	3090C-120	3090C-120	3090C-120









Endevco force sensors

Our force sensors are designed to measure dynamic compression and tension. They are robust devices capable of measuring small force fluctuations under high static loads.

Force sensors are ideal to measure quick transient forces due to their high resonance frequencies. Force sensors are available in both charge and voltage mode outputs. Maximum compression ranges from 200 lbf to 40,000 lbf. Maximum tension ranges from 200 lbf to 1000 lbf.

- Modal testing
- Material testing
- Fatigue testing
- Force monitoring









Model number	2311	2312	2313
Description	Isotron force sensor 1/4-28 tapped holes	Force sensor, charge mode 1/4-28 tapped holes	Force sensor, charge mode 3/8-18 tapped holes
Sensitivity pC/lbf, typical	1 / 10 / 100 / 500 mV/lbf	-18	-9
Compression range lbf	5000 / 500 / 50 / 10	5000	25,000
Tension range lbf	500 / 500 / 50 / 10	500	500
Compression max lbf	15,000 / 10,000 / 1000 / 200	15,000	40,000
Tension max lbf	500 / 500 / 500 / 200	1000	1000
Min temperature °C (°F)	-55 (-67)	-73 (-100)	-73 (-100)
Max temperature °C (°F)	+125 (+257)	+260 (+500)	+260 (+500)
Hermetic seal	No	No	No
Weight gram	28	32	420
Dimensions mm (in)	19.1 x15.9 (0.75 x 0.625)	19.1 x 15.9 (0.75 x 0.625)	50.8 x 31.8 (2.00 x 1.25)
Cable included	3061-120	None	None

Model number	522M17	522M35A	522M37A
Description	High temperature Use with single-ended charge amplifiers	Differential output 24 inch length	Differential output Customer specified cable lenth
Sensitivity pC/psi, typical	12	17	17
Resonant frequency kHz	45	20	20
Vibration sensitivity pC/g	0.05	0.05	0.05
Max temperature sensor $\ ^\circ C \ (\ ^\circ F)$	+538 (+1000)	+530 (+986)	+530 (+986)
Max temperature connector $\ ^{\circ}C\ (^{\circ}F)$	+177 (+351)	+260 (+500)	+260 (+500)
Operating static pressure psi	2500	400	2500
Dynamic range psi	500	20	500
Weight gram (without cable)	25	250 (including cable)	18 (sensor only)
Exit type/connector	10-32	EN2997 3-pin	EN2997 3-pin

Endevco piezoelectric pressure sensors

Model 522M series is a family of piezoelectric pressure transducers, expressly designed for the high-reliability dynamic measurement of pressure fluctuations, even in extreme temperatures of up to +1000°F continuous and up to +1200°F intermittent and within high static pressure environments.

Featuring an all-welded Inconel® construction for maximum temperature survivability, 522M series features an integral metal-sheathed hardline cable of triaxial construction, that offers output signal-to-case isolation. The electrical design of these sensors is fully optimized for use with both single-ended and differential amplifiers.

- > Combustion monitoring
- > High pressure steam
- Propulsion systems testing
- > Test cell environmental pressures
- Gas turbine testing







Endevco Isotron® accelerometers

Isotron accelerometers, also known as IEPE-type or voltage mode, feature an integral electronic charge converter, eliminating the need for an external charge amplifier. They can drive long cables with minimal distortion and noise pickup. Isotron electronics are compatible with industry standard IEPE current sources built into most industry standard data acquisition systems.

These accelerometers are available with a wide selection of ranges, sizes and shapes. Some units are also available with TEDS onboard memory storage (per IEEE 1451.4-2004), facilitating their use within larger channel count applications. Special version lsotron accelerometers include lightweight versions with a 30 kHz bandwidth, high sensitivity units for seismic measurements, and ultra low-noise accelerometers for measuring whole body motion.

- > Aircraft flight testing
- Ground vibration testing
- Automotive ride quality testing
- Product testing
- > Quality assurance > Research and development
- > Test and measurement
- Heavy machinery maintenance
- Engine testing
- > OEM design and test applications



Model 27BLPF accelerometer. Meggitt's highest temperature, single-axis IEPE accelerometer features an integral two-pole low-pass filter between the sensing element and the IEPE circuit and comes in a miniature, lightweight package.

The latest addition to the model 27 family has a 10 mV/g sensitivity and operates reliably up to +175°C (+347°F). Two standard options are available; the 27BLPF-10-02 has a 2 kHz corner frequency and the 27BLPF-10-10 has a 10 kHz corner frequency. Low-pass filtering at 2 or 10 kHz enables attenuation of highfrequency, high-g signals in order to prevent obscuring low-frequency data of interest. Potential applications that will benefit from low-pass filtering include vibration measurements on compressors, during flight tests (aircraft, launch vehicles, missiles) and during vehicle testing. Two-pole filtering provides a steeper roll-off than competitive miniature sensors, which have a single-pole filter.



Model number	25A	25B	27F11 / F12	27AM1	27BLPF
Description	World's smallest Isotron	World's smallest Isotron	Lightweight teardrop TEDS	Lightweight teardrop	Lightweight teardrop Integrated low-pass filter High temperature
Sensitivity mV/g typical	5	5	10 / 100	10 / 100	10
Range g	±740	±740	±500/±50	±500/±50	±500
Shock limit g	2000	2000	5000	5000	5000
Frequency response $\pm 1 \text{ dB Hz}$	1-12,000	1-12,000	2-10,000 / 3-10,000	2-10,000 / 3-10,000	3-1400 (2 kHz filter) 3 to 7000 (10 kHz filter)
Broadband noise (µg rms)	7000	7000	2000 / 400	2000 / 400	8000
Min temperature $\ ^\circ C \ (\ ^\circ F)$	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)
Max temperature $\ ^\circ C \ (\ ^\circ F)$	+125 (+257)	+125 (+257)	+125 (+257)	+125 (+257)	+175 (+347)
Signal/ground isolation	Yes	Yes	No	No	No
Hermetic seal	No	No	Yes	Yes	Yes
Weight gram (without cable)	0.2	0.2	0.8 / 1.0	0.8 / 1.0	0.8
Dimensions mm (in)	Ø 0.381 x 2.54 [Ø 0.15 x 0.10]	Ø 0.381 x 2.74 [Ø 0.15 x 0.108]	Ø 6.35 x 6.6 [Ø 0.25 x 0.26]	Ø 6.35 x 4.8 [Ø 0.25 x 0.19]	Ø 6.35 x 6.6 [Ø 0.25 x 0.26]
Mounting method	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive
Cable included	3024-120	3006-120 (attached to accelerometer)	3053VM1-120	3053VM1-120	3053VM1-120

Endevco model 27BLPF







Endevco model 35B



Model 35B is an ultra-miniature, adhesive mounted triaxial IEPE accelerometer with integral electronics. Its tiny size, 0.235 inch cube, and light weight, 0.55 grams (sensor only), make it ideal for measuring vibration on very small objects. 35B has an integral three-foot cable that terminates to a single threaded 1⁄4-28 4-pin connector. The 35B is available in three sensitivities – 2.5 mV/g, 5 mV/g and 10 mV/g.

35B features Endevco's Piezite Type P-8 crystal elements operating in radial shear model which exhibits excellent output sensitivity stability over time. The accelerometer incorporates an internal hybrid signal conditioner in a two-wire system, which transmits its low impedance voltage output through the same cable that supplies the required constant current power. The case is isolated from the mounting surface by an anodized coating over the accelerometer's aluminum housing. A removal tool is included with the accelerometer to ensure proper removal in the field.



Model 66FXX is a miniature triaxial IEPE accelerometer featuring Smart Isotron® capabilities. One of the key design characteristics is the low unit-to-unit phase deviation at low frequency, ideal for modal analysis of large rigid bodies. The Smart Isotron feature allows digital ID communication between a dedicated signal conditioner and the accelerometer which is IEEE P1451.4 compliant. Smart Isotron dramatically reduces set-up time in multi-channel measurements.

66FXX features Endevco's Piezite Type P-8 crystal elements which exhibit excellent output sensitivity stability over time. 66FXX incorporates the transducer electronic data sheet (TEDS) which contains sensor specific and application specific information. This accelerometer incorporates three stand-alone, low noise internal hybrid signal conditioners, each operating in a two-wire system. Its low impedance voltage outputs are connected to the same cables that supply the required constant current power. A factory installed outer case can be ordered for ground isolation.







Model number	35B	35C	65	65HT	65HTLPF
Description	Ultra-miniature triaxial Ground isolated	Ultra-miniature triaxial Hermetically sealed	Triaxial Miniature	Triaxial High temperature	Triaxial HIgh temperature Integrated low-pass filter
Sensitivity mV/g, typical	2/5/10	2/5/10	10/100	0.5 / 1 / 10	10
Linear range g	±2500/±1000/±700	±2500/±1000/±700	±500/±50	±10,000 / ±5000 / ±500	±500
Shock limit g	3000	5000	10,000	15,000 / 10,000 / 10,000	10,000
Frequency response $\pm 1 \text{ dB}$ Hz	1–12,000 / 1-12,000 / 1-9000	1-12,000 / 1-12,000 / 1-9000	0.4-10,000 / 1.5-6000	3-8000	3-1400 (2 kHz filter) 3-7000 (10 kHz filter)
Broadband noise (µg rms)	2000 / 1600 / 2700	2000 / 1600 / 2700	800 / 400	8000 / 4000 / 1400	4000
Min temperature $\ ^{\circ}C\ (^{\circ}F)$	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)
Max temperature °C (°F)	+125 (+257)	+125 (+257)	+125 (+257)	+175 (+347)	+175 (+347)
Signal/ground isolation	Yes	No	No	No	No
Hermetic seal	No	Yes	Yes	Yes	Yes
Weight gram (without cable)	.55	0.76	5	5	5
Dimensions mm (in)	5.97 cube [0.235 cube]	5.97 cube [0.235 cube]	10 cube [0.39 cube]	10 cube [0.39 cube]	10 cube (0.39 cube)
Mounting method	Adhesive	Adhesive	Stud	Stud	Stud
Cable included	None	None	3027AM3-120	3027AVM13-84 3027AM3-36	3027AVM13-84 3027AM3-36



Model number	65L-100	66F50 / F11 / F12	67	2258A
Description	Triaxial Miniature Low frequency response	Triaxial TEDS	Triaxial High temperature High sensitivity	Triaxial Three 10-32 connectors
Sensitivity mV/g, typical	100	5 / 10 / 100	10 / 100	10 / 100
Linear range g	± 50	±1000/±500/±50	±500/±50	±500/±50
Shock limit g	10,000	10,000	5000	2000
Frequency response $\pm 1 \text{ dB Hz}$	0.5-8000	0.4-7000 / 0.4-14,000 / 1.5-10,000	0.15-8000 / 0.5-8000	1-7000
Broadband noise (µg rms)	400	6000 / 800 / 400	1400 / 450	1000 / 300
Min temperature $\ ^\circ C \ (\ ^\circ F)$	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)
Max temperature $^\circ C (^\circ F)$	+125 (+257)	+125 (+257)	+175 (+347)	+125 (+257)
Signal/ground isolation	No	No	No	Yes
Hermetic seal	Yes	Yes	Yes	Yes
Weight gram (without cable)	5	5	14	15
Dimensions mm (in)	10 cube [0.39 cube]	10 x 10 x 13 [0.39 x 0.39 x 0.52]	14.81 cube [0.58 cube]	18.7 x 18.7 x 11.7 [0.74 x 0.74 x 0.46]
Mounting method	Stud	Stud	Stud	Screw
Cable included	3027AM3-120	3027AM3-120	3027AVM13-84 3027AM3-36	3061A-120 (3)

Endevco model 66F series







Endevco model 87

Model 87 is a piezoelectric accelerometer with integral electronics, designed specifically for measuring ultra-low level, seismic events and low frequency vibration on structures and objects. The unit is hermetically sealed against environmental contamination, features a 1 V/g or 10 V/g sensitivity, state-of-the-art signal-to-noise ratio, and near-dc frequency response.

Model 87 incorporates an advanced ultra low noise hybrid circuit operating in a constant current mode. A simple two-wire system transmits its low-impedance voltage output and the required power. Signal ground is isolated from the outer case and mounting surface to prevent ground loops. A specially designed cable assembly is available as an optional accessory.



Models 2250A/AM1 feature Endevco's Piezite Type P-8 crystal elements, operating in annular shear mode, which exhibits excellent output sensitivity stability over time. These accelerometers incorporate an internal hybrid signal conditioner in a two-wire system, which transmits its low impedance voltage output through the same cable that supplies the constant current power. Signal ground is isolated from the mounting surface by a ceramic mounting base. A tool is included in the package to ensure proper removal of the accelerometer from its mounting surface.











Model number	2250A	2250
Description	Small teardrop Wide bandwidth Removable cable	Sma Wide Solde
Sensitivity mV/g, typical	10	10
Range g	±500	±500
Shock limit g	2000	2000
Frequency response $\pm 1 \text{ dB Hz}$	2-15,000	2–15
Broadband noise (µg rms)	1500	1500
Min temperature °C (°F)	-55 (-67)	-55 (
Max temperature °C (°F)	+125 (+257)	+125
Signal/ground isolation	Yes	Yes
Hermetic seal	No	No
Weight gram (without cable)	0.4	0.4
Dimensions mm (in)	Ø 5.84 x 4.06 [Ø 0.23 x 0.16]	Ø 5.8 [Ø 0.:
Mounting method	Adhesive	Adhe
Cable included	3006-120	3024

Endevco model 2250A

Models 2250A/AM1 are extremely small, adhesive mounting piezoelectric accelerometers with integral electronics, designed specifically for measuring vibration on mini-structures and small objects. These accelerometers offer high resonance frequency and wide bandwidth, their lightweight (0.4 gm) effectively eliminates mass loading effects. A field-replaceable miniature cable is supplied with 2250A-10, and small gage, lightweight hook-up wires are supplied with the 2250AM1-10.





Endevco model 7253D

Model 7253D is an Isotron triaxial accelerometer designed for applications requiring the measurement of shock and vibration simultaneously in three mutually perpendicular axes. 7253D is small and lightweight with a broad frequency response. The thru-hole mounting design allows for 360° cable orientation. The unit is hermetically sealed to protect against environmental contamination. The signal ground is isolated from the mounting surface by a hard anodized insulator. The accelerometer is available in two sensitivities, 10 mV/g (7253D-10) and 100 mV/g (7253D-100).

Each axis utilizes an Endevco's Piezite Type P-8 crystal elements in conjunction with a hybrid charge amplifier to provide a low impedance output of ±5 volt full scale in a two wire system IEPE configuration. A constant current excitation of 2 to 20 mA is required for each axis. Electrical connection is made to each axis through a 4-pin connector.

7253D is ideally suited for applications where the orientation of the connector and sensitive axes are critical. Testing environments include flight testing, aircraft engine testing, industrial engine testing, missile testing, aircraft component testing, spacecraft component testing, and industrial machinery testing.







Model number	7250A	7250AM1	7251A	7253C
Description	Thru-hole mount Lightweight Wide bandwidth	Thru-hole mount Wide bandwidth Solder pins	Thru-hole mount General purpose	Triaxial Wide bandwidth Lightweight
Sensitivity mV/g, typical	2 / 10	2 / 10	10 / 100 / 500	10
Linear range g	±2500/±500	±2500/±500	±500/±50/±10	±500
Shock limit g	10,000	10,000	5000	2000
Frequency response $\pm 1dB Hz$	3-20,000 / 4-20,000	3-20,000 / 4-20,000	2-10,000	2-15,000
Broadband noise (µg rms)	3500 / 1000	3500 / 1000	1000 / 250 / 150	2000
Min temperature °C (°F)	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)
Max temperature °C (°F)	+125 (+257)	+125 (+257)	+125 (+257)	+125 (+257)
Signal/ground isolation	Yes	Yes	Yes	Yes
Hermetic seal	Yes	Yes	Yes	No
Weight gram (without cable)	1.8	1.8	10.5	3.6
Dimensions mm (in)	Ø 9.78 x 5.8 [Ø 0.385 x 0.23]	Ø 9.78 x 5.8 [Ø 0.385 x 0.23]	Ø 15.2 x 8.9 [Ø 0.60 x 0.35]	15.2 x 15.2 x 7.1 [0.60 x 0.60 x 0.28]
Mounting method	Screw	Screw	Screw	Screw
Cable included	3091F-120	3024-120	3061A-120	3027AM3-120



Model humber	72550
Description	Triaxial Thru hole mount Lightweight
Sensitivity mV/g, typical	10 / 100
Linear range g	±500/±50
Shock limit g	5000
Frequency response $\pm 1 \text{ dB Hz}$	1-10,000 / 1.5-10,000
Broadband noise (µg rms)	2000 / 400
Min temperature °C (°F)	-55 (-67)
Max temperature °C (°F)	+125 (+257)
Signal/ground isolation	Yes
Hermetic seal	Yes
Weight gram (without cable)	<10
Dimensions mm (in)	17.8 x 17.8 x 9.5 [0.70 x 0.70 x 0.375]
Mounting method	Screw
Cable included	3027AM3-120





7255A	7259B
Near-field High shock Built in mech filter Solder terminals	Very high frequency Lightweight
0.1/1	10 / 25 / 100
±50,000/±5000	±500/±200/±50
300,000 / 25,000	10,000 / 5000 / 2000
3-10,000 (± 3 dB)	5-10,000
500,000 / 50,000	1500 / 1500 / 200
-18 (0)	-55 (-67)
+66 (+150)	+125 (+257)
Yes	Yes (with 2980M12)
Yes	Yes
5.0	4.4
9.52 hex x 15.5 [0.375 hex x 0.610]	9.53 hex x 11.68 [0.375 hex x 0.46]
Stud	Stud
3024-120	3053VM1-120



Endevco General purpose accelerometers

Models 41A, 42A, 43A, 44A and 45A represent Meggitt's next generation of general purpose Isotron accelerometers designed for a wide range of test applications. The product line embodies decades of sensor design and application expertise. That legacy, combined with Meggitt's global capabilities, yields general purpose accelerometers of the highest quality and performance – at the competitive prices and lead times demanded by today's test professionals.

The product line features multiple mounting configurations and sensitivity options, wide-band frequency response, low noise floor, hermetic package, and TEDS IEEE P1451.4 capability. The single axis models – 41A, 42A and 43A – feature signal ground isolated from the case. The customer may specify a 10-32 stud, ¹/₄-28 stud, M5 stud or M6 stud. A full range of complimentary optional mounting accessories are available.

Endevco 46A accelerometer pods

46A general purpose accelerometer stands ou all other accelerometers on the market becau its unique patent pending design that allows e installation and removal of the accelerometer mount. Available in five sensitivities from 10 t mV/g, it is threaded and can be fitted into a var different mounting blocks (or "pods") with a st adhesive mount, or directly to the test unit itse

NDEVCO

43071-2

Pods offer test technicians the greatest possib flexibility. Whilst the hex and cube pods are de to mount as traditional single axis measurem the tri-hex pod, with slots for three sensors, a technicians to test up to three sensitivities at - ideal if the customer is not sure what g-rand is expected. For multi-axis testing, the triaxial pod enables different sensitivities to be tested different axes. The accelerometers can be rem and replaced, leaving the mount in place on th object.



Model number	41A	42A	43A	44A	45A
Description	General purpose Top connector TEDS	General purpose Side connector TEDS	General purpose Single axis cube TEDS	General purpose Triaxial TEDS	General purpose Triaxial TEDS
Sensitivity pC/g, typical	10 / 25 / 100 / 500 / 1000	10 / 25 / 100 / 500 / 1000	100 / 500 / 1000	10 / 25 / 50 / 100	500 / 1000
Range	±500/±200/±50/ ±10/±5	±500/±200/±50/ ±10/±5	±50/±10/±5	±500 / ±200 / ±100 / ±50	±10/±5
Shock limit g	5000	5000	5000	5000	5000
Frequency response $\pm 1 \text{ dB Hz}$	1-12,000	1-12,000	1-12,000	0.5-6000	0.5-7500 (y & z-axis) 0.5-5500 (x-axis)
Min temperature °C (°F)	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)	-55 (-67)
Max temperature $\ ^\circ C \ (\ ^\circ F)$	+125 (+257)	+125 (+257)	+125 (+257)	+125 (+257)	+125 (+257)
Signal/ground isolation	Yes	Yes	Yes	No	No
Hermetic seal	Yes	Yes	Yes	Yes	Yes
Weight gram (without cable)	8/8/8/10/10	8/8/8/10/10	14 / 16 / 16	13	40
Dimensions mm (in)	12.7 hex x 15.5 [0.5 hex x 0.61]	12.7 hex x 15.5 [0.5 hex x 0.61]	13.5 x 16.5 x 14.7 (0.53 x 0.65 x 0.58)	13.7 cube (0.54 cube)	20 cube (0.79 cube)
Mounting method	Stud	Stud	Stud	Stud	Stud
Cable included	None	None	None	None	None



Model number	43071	43072
Description	Hex mount -1 for isolated mount -2 for grounded mount	Adhesive cube mount -1 for isolated mount -2 for grounded mount
Material	-1 anodized aluminum -2 titanium	-1 anodized aluminum -2 titanium
Compatibility	46A	46A

	Description	ad
	Sensitivity pC/g, typical	10 10
use of	Sinusoidal limit g	±5 ±1
from its	Shock limit g	50
o 1000 ariety of	Frequency response ±1 dB Hz	1-
elf.	Min temperature °C (°F)	-5
	Max temperature °C (°F)	+1
ble esigned	Signal/ground isolation	N
ents,	Hermetic seal	Ye
once	Weight gram (without cable)	7.
ge l d on moved	Dimensions mm (in)	O' Tł Tł H
he test	Mounting method	Tł
	Cable included	Ν

Model number	46A
Description	Threaded pod accelerometer
Sensitivity pC/g, typical	10 / 25 / 100 / 500 / 1000
Sinusoidal limit g	±500/±200/±50/ ±10/±5
Shock limit g	5000
Frequency response ±1 dB Hz	1-12,000
Min temperature °C (°F)	-55 (-67)
Max temperature °C (°F)	+125(+257)
Signal/ground isolation	No
Hermetic seal	Yes
Weight gram (without cable)	7.5
Dimensions mm (in)	Overall h 18.92 [0.745] Thread h 8.64 [0.340] Thread 1/2-28 UNF-2A Hex 12.7 [0.50]
Mounting method	Threaded
Cable included	None





Endevco electronics

Meggitt offers a comprehensive family of high performance electronic instruments from simple battery operated signal conditioners to computer controlled laboratory quality instruments that measure vibration, shock and pressure. Meggitt electronic instruments support piezoelectric (chargemode), variable capacitance, Isotron (voltage-mode) and piezoresistive sensors.

- > Aerospace and defense
- > Automotive and off-highway
- Product testing
- > Quality assurance
- > Research and development > Test and measurement



Single channel

programmable

signal conditioners

Model 6634C vibration amplifier is a microprocessor-based instrument designed to condition and display vibration data from rotating machinery. The instrument accepts inputs from a single-ended, differential PE or Isotron accelerometer, velocity coil, or remote charge convertor. Full scale AC and DC output ranges are programmable in user selected engineering units to represent either acceleration, velocity, or displacement.

Programming of the unit is accomplished from the front panel keyboard or optional RS-232 computer interface. Up to ten different setups can be stored and recalled from the non-volatile memory. An optional 6 pole filter is available, which may be programmed from the front panel. There are two TTL compatible latched alarm outputs provided for warning and alert



Model number	2775B
Input	PE / Isotron / RCC
Channels	1 or 6 / Rack
Gain	0-10,000
Broadband noise rms	1 mV (RT0)
Lower cutoff freq Hz (-3 dB)	0.16
Upper cutoff freq Hz (-3 dB)	120,000
Power requirements VAC	100-240
Type of control	Manual / RS-232
Rack mount	4948A
Features	 Optional plug-in filter and integrato Control software AC / DC / Servo outputs Analog meter





Model number	2680MX	2685MX	2771C	2777A
Input	PE	Isotron	PE	DIFF PE
Channels	1	1	1	1
Gain	0.1–100 mV/pC	0.1–100 mV/mV	0.1 / 1 / 5 / 10 mV/pC	2 / 10 mV/pC
Broadband noise rms	1.5 mV	1.5 mV	5 / 30 / 50 / 50 µV	1/5 mV (RTO)
Lower cutoff freq Hz (-3 dB)	3	0.7	0.4 / 0.4 / 2 / 2	5.73 / 8.59 / 11.5 / 14.3 / 113
Upper cutoff freq Hz (-3 dB)	Selectable	Selectable	8 / 30,000 / 50,000 / 50,000 (±5%)	17,500
Power requirements VDC	20-32	20-32	24-30	22–31
Operating temperature °F (°C)	-67 to +212 (-55 to 100)	-67 to +212 (-55 to 100)	-40 to +257 (-40 to 125)	-5 to +185 (-15 to 85)
Weight g	34	34	57	227
Features	Airborne applicationsSmall, lightweight	Airborne applicationsSmall, lightweight	4 gain optionsSupports TEDs	 2 gain options Airborne applications Acceleration and velocity outputs

Endevco model 6634C





6634C	4416B
SEPE / DIFF PE / Isotron / Velocity coil / RCC	lsotron
1 or 6 / Rack	1
Selectable	1 / 10
1 mV	100 µV RMS (RTO)
2 (±5%)	0.3
20,000 (±5%)	40,000
90-240	Rechargeable battery
Manual / RS-232	Manual
4948	N/A
 Acceleration, velocity and displacement outputs Optional programmable filter Alarm outputs 	 Portable and compact Rechargeable batteries Isotron power supply

Multi-channel desktop and rackmount signal conditioners





Model number	123	126
Input	PE / Isotron / RCC	PR / VC
Channels	3	3
Gain	0.00-999.9	0.00-999.9
Broadband noise rms	20 μV RTI and 400 μV RTO	20 µV RTI
Lower cutoff freq $+5\%$ Hz	1.5	DC
Upper cutoff freq $\pm 5\%$ Hz	230,000	200,000 (-3dB)
Power requirements VAC	110-230	110-230
Type of control	Manual	Manual
Rackmount part number	N/A	N/A
Features	 Low cost User selectable current excitation Optional HP and LP filters Programmable gain Switchable signal/power ground isolation 	 Low cost Programmable excitation voltage Programmable gain Auto-zero Optional LP filter Remote sense







Model number	133	136	2793
Input	PE / Isotron / RCC	PR/VC	Isotron / RCC
Channels	3 or 9 / Rack	3 or 9 / Rack	16
Gain	0-1000	0-1000	1 / 10
Display	DPM	DPM	N/A
Broadband noise rms	20 μV RTI and 400 μV RTO	20 μV RTI and 1 mV RTO	0.4 mV
Lower cutoff freq $~\pm 5~\text{Hz}$	0.1	DC	1
Upper cutoff freq $\pm 5 \text{ Hz}$	50,000	50,000	30,000
Power requirements VAC	90-264 133-1 version: 12-18 VDC	90-264 136-1 version: 9-18 VDC	100-240
Type of control	Manual / RS-232	Manual / RS-232	Manual
Rackmount part number	31979	31979	N/A
Features	 Optional HP and LP filters Sensor fault indicators User selectable current excitation Control software Programmable gain 	 Programmable excitation voltage Programmable gain Auto-zero Optional LP filter Remote sense Control software 	 19" rackmount Field selectable excitation current Field selectable gain setting Sensor fault indicators



Modular signal conditioning cards for 4990A (OASIS)



Model number	433	436	482B	428
Input	PE / Isotron / RCC	PR/VC	Isotron / RCC	PE / Isotron / RCC
Channels	3 or 48 / Rack	3 or 48 / Rack	8 or 128 / Rack	2 or 32 / Rack
Gain	0-1000	0-1000	0-100	0-10,000
Broadband noise rms	$15\mu\text{V}$ RTI and .5 mV RTO	20 μV RTI and 1 mV RTO	15 µV	10 μV RTI and .5 mV RT
Lower cutoff freq $\pm 5\%$ Hz	0.1	DC	0.2	1
Upper cutoff freq $\pm 5\%$ Hz	50,000	50,000	30,000	40,000
Power VAC [through 4990A]	100-240	100-240	100-240	100-240
Type of control	RS-232 / Ethernet	RS-232 / Ethernet	RS-232 / Ethernet	RS-232 / Ethernet
Features	 Optional HP and LP filters Sensor fault indication Control software Programmable gain TEDS compatible 	 Programmable excitation voltage Auto-zero Optional LP filter Control software 	 TEDs compatible Programmable gain Sensor fault indication Control software 	 Selectable isolation Programmable gain Selectable LP filters AC or RMS DC output Control software

Endevco model 4990A

Model 4990A (OASIS), is a highly configurable, multi-rack mounted modular signal conditioning system, which offers management of up to 2,048 channels and support of multiple sensor technologies within the same application environment. The unit's versatility and flexibility make it ideal for use in both small- and large- scale testing applications, including vehicle NVH, modal and structural analysis, and multi-sensor/multi-channel test and measurement applications.

The 4990A seamless design interfaces with multiple sensor types, including piezoelectric (Isotron/IEPE-type and charge output), TEDS (per IEEE P1451.4 protocol), and piezoresistive/DC differential technologies. Cards are housed in a 16-slot, 19 inch rack, and may be used in any configuration or type, allowing for a customized economical system, whether requirements call for several –or several thousand – unique measurement channels.

Using supplied software, the 4990A can be computer controlled via serial or Ethernet communication, for system configuration, and save and recall capabilities, which results in tremendous setup time savings. Additionally, Meggitt offers all necessary sensors, electronics, software, cables and accessories to complete each measurement system.









REF2520R



Portable system verification instruments

Model number	4830B
Description	Handheld accelerometer simulator
Outputs	Single-ended charge Differential charge Single-ended voltage Tachometer Isotron (IEPE)
Frequency range Hz	1-20,000, resolution 0.5
Amplitude	Adjustable up to 10,000 pC or mV pk
Amplitude accuracy	±1%
Broadband noise	< 2 mV or 2 pc
Battery	Rechargeable battery
Features	 FFT input function User defined simulation profiles Utility software for profile setup Front panel calibration USB interface

ReferenceMate[™]

The ReferenceMate portable vibration reference source enables users in the field to easily verify sensor performance and the integrity of the cabling between the sensor and the online system. A built-in reference accelerometer assures that a 1 g test level is maintained for sensors weighing up to 250 grams.

Frequency of operation and measurement type (peak/RMS) are push button selected.

- > 61.4 Hz for imperial measurements, where 1 g is equal to 1 inch per second (ips), for verification of acceleration and velocity
- > 100.0 Hz to confirm sensor calibration value
- > 159.2 Hz for metric measurements, where 1 g is equal to 9.81 m/sec² and 9.81 mm/sec

LEDs notify the user when battery condition falls below operational levels or if the unit is overloaded. For calibration verification, reference test points are provided to verify the output of the internal sensor.

The ReferenceMate is available in two different kits:

- > REF2510 Industrial Kit
- > REF2520 Measurement Kit.

Additionally, ruggedized versions of each kit are also available. The REF2510R and REF2520R include a protective, thermoplastic rubber boot to protect the shaker from scratches, scrapes and drops. The unique design allows access to all controls as well as an anti-roll feature to ensure a lasting investment.





Model number	ReferenceMate REF2520R
Description	Multiple frequency Handheld shaker
Operating frequency H_{Z}	61.4 / 100.0 / 159.2
Acceleration output g	1.00
Distortion	≤ 3%
Load grams	0-250
Power	Internal 4 AA batteries Accepts external DC power supply
Dimensions	2.10" (5.33 cm) Dia. x 9.25" (23.50 cm) H
Mounting thread	1/4-28 female
Features	 User selectable frequency setting Auto-shut off Ruggedized, protective boot Overload indicator Low battery indicator Reference test points



Model number	28959F / 28959FV
Description	Portable accelerometer calibrator
Frequency range Hz	10-10,000
Acceleration level g	10 max
Inputs	PE / Isotron / PR / Velocity
Power requirements	Rechargeable battery 115 VAC - 28959F 220 VAC - 28959FV
Features	 Built-in charge converter for PE of Built in current source for voltage RS-232 interface transfers field of Integrated thermal printer

Model 4830B

4830B accelerometer simulator is a hand held battery operated signal generator designed specifically to simulate the electrical output of common types of accelerometers. The 4830B contains a highly accurate oscillator with an adjustable output level and is ideal for setting up, testing and diagnosis of faults within data acquisition systems, FFT analyzers, environmental test systems or simply as a flexible signal generator.

4830B provides AC output signals which mimic those of either voltage mode accelerometers (generic IEPE, Isotron types etc.) or charge mode accelerometers (both single ended and differential configurations). The simulation outputs are conveniently scaled in units of acceleration, i.e. "g", as mV/g (millivolt) or pC/g (pico-coulomb) signals as appropriate, although the outputs can be configured to be proportional to units of velocity or displacement. An auto-calculating on screen "vibration calculator" provides the user with corresponding values in respect of m/s2, ips, mils, mm and m/s based units.

4830B features a TTL compatible tachometer output which allows operators of condition monitoring systems to set signal conditioning tracking filter center frequencies without the need to generate an external, real time tachometer signal. The tachometer frequency is adjustable as a ratio of the respective output signal frequency.



devices e mode devices lata



Endevco cables

Meggitt designs and manufactures many of its own cables and connectors, specializing in custom cables, lengths, and connectors for dynamic testing. In these tough and challenging environments, accuracy depends as much on cables and connectors as it does on transducers. Our engineers are well versed in all the critical parameters in cable and connector designs that can affect signal transmission. As a result, these parameters are carefully optimized in our products to ensure data quality and reliability. When it comes to this kind of in-house custom capability, ordinary commercial cable and transducer companies don't compare.

1		
Sandia -		Ex

Cable assembly ordering guide

Part number configuration C - WWW - XX - YYY - ZZZZ



Meggitt model C

The Meggitt Model C cable assembly family allows for user selectable cable configurations to meet a wide variety of applications. The family is specifically designed for use with single axis and triaxial accelerometers, as well as other transducers. Users can specify the sensor side connector, cable type, instrumentation side connector, and overall cable assembly length in inches. Part number configuration is listed below. Available connectors and cables are listed on the next page.

Four steps to creating a cable assembly



3. Select instrumentation side connector

ZZZZ 4. Select cable assembly length (inches)

Cc Sp	onnectors pecificatio	ns		- 0		0
	WWW	YYY	001	(002	

WWW YYY	001	002	003	004	005	006
Connector type	10-32 plug	BNC plug	¼-28, 4 pin plug	3x 10-32 plugs	3x BNC plugs	Pigtail (leads stripped and tinned)
Weight oz (g)	0.11 (3.0)	0.36 (10.3	0.08 (2.3)	0.32 (9.0)	1.09 (30.9)	NA
Temperature °F (°C)	-67 to +500 (-55 to +260)	-67 to +392 (-55 to +200)	-40 to +392 (-40 to +200)	-67 to +500 (-55 to +260)	-67 to +392 (-55 to +200)	NA
Strain relief	Silicone molded boot	Silicone molded boot	Viton shrink tubing	3x silicone molded boot	3x silicone molded boot	NA
Connector OD in (mm)	6.8 (0.27)	18.8 (0.54)	7.6 (0.30)	3x 6.8 (0.27)	3x 13.8 (0.54)	NA

XX	AA	AB	AC	AD	СА
Cable type	Coaxial Low noise	Coaxial Low noise	Coaxial General purpose	Coaxial General purpose	4 conductor General purpose
Min bend radius in (mm)	0.850 (21.59)	0.950 (24.13)	0.850 (21.59)	0.850 (21.59)	1.00 (26.67)
Conductor size AWG	30	28	30	30	30
Conductor material	Silver-plated annealed copperweld				
Conductor style	Stranded	Solid	Stranded	Stranded	Stranded
Shield material	Silver-plated copper	Silver-plated copper	Silver-plated copper	Silver-plated copper	Nickel-plated copper
Jacket material	Teflon®	Silicone	Teflon®	Silicone	Teflon®
Jacket color	Red	Red	White	Natural	White
Weight g	3.1	3.1	2.7	2.7	3.3
Diameter max in (mm)	0.090 (2.229)	0.097 (2.46)	0.085 (2.16)	0.90 (2.29)	0.096 (2.44)
Capacitance typ pF	35	40	30	30	30 (1 foot 3x coaxial side) +35
Insulation resistance	1	1	1	1	1
Conductor resistance	0.2	0.2	0.2	0.2	0.2
Temperature °F (°C)	-67 to +500 (-55 to 260)	-40 to +392 (-40 to 200)			
Noise	1.5	1.5	NA	NA	NA
Pull strength typ lbs (min)	20 (16)	20 (16)	20 (16)	20 (16)	20 (16)

Examples of our most popular assemblies

> C-001-AC-002-0120: 10-32, general purpose, Teflon® jacket, BNC, 120 inches (10 ft) > C-001-AA-001-0240: 10-32, low noise, Teflon® jacket, 10-32, 240 inches (20 ft)





Endevco standard cable assemblies

Model number	3003C	3006	3024	3024M1	3027A	3027AM3
Connector 1	1.00 UNM, male receptacle	1.20 UNM	10-32 male plug	10-32 male plug	4 socket plug	4 socket plug
Connector 2	1-64 UNC-2A, female plug	10-32 male plug	Pigtail	Pigtail	Pigtail	3x BNC male plug
Cable Type	Coaxial	Coaxial, shielded	Twisted pair	Twisted pair, shielded	4 conductor, shielded	4 conductor, shielded
Capacitance (max) pF/ft	25	42	N/A	N/A	16	30
Conductor size AWG	Solid, 40	36	Stranded, 28	Stranded, 28	Stranded, 32	Stranded, 28
Jacket material	Teflon®	Teflon®	No overall jacket	Extruded Teflon®	Extruded Silicone	Extruded PVC
Overall diameter (max) in	0.024	0.04	0.055	0.094	0.108	0.105
Bend radius (min) in	0.1	0.12	0.75	0.75	0.5	N/A
Temperature range °C (°F)	-73 to +177 (-100 to +350)	-50 to +125 (-58 to +257)	-184 to +176 (-300 to +350)	-184 to +176 (-300 to +350)	-100 to +125 (-148 to +257)	-55 to +85 (-67 to +185)
Low noise treated	No	No	No	No	No	No



The raw cable, connector and pin assemblies are made in-house to ensure the highest quality product available, making this cable assembly unique to the industry. All cables are 100% tested for noise thus making them "true low-noise" cables. The actual cable capacitance is measured and recorded on the package; an important parameter for long cable runs. The connector employs a fused glass dielectric for maximum reliability, moisture protection and low outgassing. The stainless steel connector pin is welded to the cable's center conductor strands for maximum pull-strength and minimum noise.

Model number	3027AM17	3027AVM13	3053V	3053VM1	3060D	3061
Connector 1	4 socket plug, IP67, hex end	4 socket plug	M3 male plug, hex end	M3 male plug, hex end	10-32 male plug	10-32 male plug
Connector 2	3x BNC male plug	4 pin receptacle	10-32 male plug, hex end	BNC male plug	10-32 male plug	BNC male plug
Cable Type	4 conductor, shielded	4 conductor, shielded	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded
Capacitance (max) pF/ft	30	16	32	32	50	28
Conductor size AWG	Stranded, 28	Stranded, 28	Solid, 33	Solid, 33	Solid, 28	Stranded, 30
Jacket material	Extruded PVC	Extruded Teflon®, VersaFlex	Extruded Teflon®, VersaFlex	Extruded Teflon®, VersaFlex	Extruded Silicon	Extruded Teflon®
Overall diameter (max) in	0.105	0.105	0.053	0.054	0.092	0.08
Bend radius (min) in	N/A	N/A	0.5	0.5	0.95	0.85
Temperature range °C (°F)	-55 to +85 (-67 to +185)	-100 to +200 [-148 to +392]	-254 to +260 (-432 to +500)	-55 to +200 (-67 to +392)	-73 to +260 (-100 to +500)	-100 to +260 (-148 to +500)
Low noise treated	No	No	Yes	Yes	Yes	No
Model number	3061A	3075M6	3090C	3090CM12	3090CM67	3090DV
Model number Connector 1	3061A 10-32 male plug	3075M6 10-32 male plug	3090C 10-32 male plug	3090CM12 10-32 male plug	3090CM67 10-32 male plug, hex	3090DV 10-32 male plug, hex end
Model number Connector 1 Connector 2	3061A 10-32 male plug BNC male plug	3075M6 10-32 male plug 10-32 male plug	3090C 10-32 male plug 10-32 male plug	3090CM12 10-32 male plug BNC male plug	3090CM67 10-32 male plug, hex 10-32 male plug, hex	3090DV 10-32 male plug, hex end 10-32 male plug, hex end
Model number Connector 1 Connector 2 Cable Type	3061A 10-32 male plug BNC male plug Coaxial, shielded	3075M610-32 male plug10-32 male plugCoaxial, hardline	3090C 10-32 male plug 10-32 male plug Coaxial, shielded	3090CM12 10-32 male plug BNC male plug Coaxial, shielded	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded	3090DV 10-32 male plug, hex end 10-32 male plug, hex end Coaxial, shielded
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft	3061A 10-32 male plug BNC male plug Coaxial, shielded 28	3075M610-32 male plug10-32 male plugCoaxial, hardline63	3090C10-32 male plug10-32 male plugCoaxial, shielded40	3090CM12 10-32 male plug BNC male plug Coaxial, shielded 32	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded 35	3090DV 10-32 male plug, hex end 10-32 male plug, hex end Coaxial, shielded 32
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft Conductor size AWG	3061A 10-32 male plug BNC male plug Coaxial, shielded 28 Stranded, 30	3075M6 10-32 male plug 10-32 male plug Coaxial, hardline 63 0.01" OD	3090C10-32 male plug10-32 male plugCoaxial, shielded40Stranded, 30	3090CM12 10-32 male plug BNC male plug Coaxial, shielded 32 Stranded, 30	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded 35 Stranded, 30	3090DV 10-32 male plug, hex end 10-32 male plug, hex end Coaxial, shielded 32 Stranded, 30
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft Conductor size AWG Jacket material	3061A10-32 male plugBNC male plugCoaxial, shielded28Stranded, 30Extruded Silicone	3075M610-32 male plug10-32 male plugCoaxial, hardline630.01" OD304 SS with fiberglass jacket	3090C 10-32 male plug 10-32 male plug Coaxial, shielded 40 Stranded, 30 Wrapped Teflon®	3090CM12 10-32 male plug BNC male plug Coaxial, shielded 32 Stranded, 30 Wrapped Teflon®	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded 35 Stranded, 30 Wrapped Teflon® wih Kevlar® reinforcement and protective metal overbraid	3090DV 10-32 male plug, hex end 10-32 male plug, hex end Coaxial, shielded 32 Stranded, 30 Extruded Teflon®, VersaFlex
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft Conductor size AWG Jacket material Overall diameter (max) in	3061A 10-32 male plug BNC male plug Coaxial, shielded 28 Stranded, 30 Extruded Silicone 0.08	3075M610-32 male plug10-32 male plugCoaxial, hardline630.01" OD304 SS with fiberglass jacket0.07	3090C 10-32 male plug 10-32 male plug Coaxial, shielded 40 Stranded, 30 Wrapped Teflon® 0.08	3090CM12 10-32 male plug BNC male plug Coaxial, shielded 32 Stranded, 30 Wrapped Teflon® 0.08	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded 35 Stranded, 30 Wrapped Teflon® wih Kevlar® reinforcement and protective metal overbraid	3090DV 10-32 male plug, hex end 10-32 male plug, hex end Coaxial, shielded 32 Stranded, 30 Extruded Teflon®, VersaFlex 0.08
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft Conductor size AWG Jacket material Overall diameter (max) in Bend radius (min) in	3061A10-32 male plugBNC male plugCoaxial, shielded28Stranded, 30Extruded Silicone0.080.85	3075M610-32 male plug10-32 male plugCoaxial, hardline630.01" OD304 SS with fiberglass jacket0.070.75	3090C 10-32 male plug 10-32 male plug Coaxial, shielded 40 Stranded, 30 Wrapped Teflon® 0.08 0.85	3090CM12 10-32 male plug BNC male plug Coaxial, shielded 32 Stranded, 30 Wrapped Teflon® 0.08 0.85	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded 35 Stranded, 30 Wrapped Teflon® wih Kevlar® reinforcement and protective metal overbraid 0.12 0.85	3090DV10-32 male plug, hex end10-32 male plug, hex endCoaxial, shielded32Stranded, 30Extruded Teflon®, VersaFlex0.080.75
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft Conductor size AWG Jacket material Overall diameter (max) in Bend radius (min) in	3061A 10-32 male plug BNC male plug Coaxial, shielded 28 Stranded, 30 Extruded Silicone 0.08 0.85 -55 to +200 (-67 to +392)	3075M6 10-32 male plug 10-32 male plug Coaxial, hardline 63 0.01" OD 304 SS with fiberglass jacket 0.07 0.75 -184 to +482 (-300 to +900)	3090C 10-32 male plug 10-32 male plug Coaxial, shielded 40 Stranded, 30 Wrapped Teflon® 0.08 0.85 -254 to +260 (-432 to +500)	3090CM12 10-32 male plug BNC male plug Coaxial, shielded 32 Stranded, 30 Wrapped Teflon® 0.08 0.85 -185 to +260 (-300 to +500)	3090CM67 10-32 male plug, hex 10-32 male plug, hex Coaxial, shielded 35 Stranded, 30 Wrapped Teflon® wih Kevlar® reinforcement and protective metal overbraid 0.12 0.85 -55 to +260 [-67 to +500]	3090DV10-32 male plug, hex end10-32 male plug, hex endCoaxial, shielded32Stranded, 30Extruded Teflon®, VersaFlex0.080.75-254 to +260 (-432 to +500)

Model number	3091F	3093M10	3095A	3096	3097M1	3907
Connector 1	6-40 UNF-2B female plug	10-32 female socket	1-64 UNC	10-32 male plug, hex	10-32 male plug	Mighty Mouse female plug
Connector 2	10-32 male plug	1-64 UNC	10-32 male plug	10-32 male plug, hex	10-32 male plug	Pigtail
Cable Type	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded	Coaxial, shielded	6 conductor, shielded
Capacitance (max) pF/ft	40	30	30	35	39	23
Conductor size AWG	Solid, 33	Solid, 33	Solid, 33	Stranded, 30	Stranded, 30	Stranded, 30
Jacket material	Wrapped Teflon®	Wrapped Teflon®	Wrapped Teflon®	Wrapped Teflon with Kevlar® reinforcement	Extruded Tefzel	Wrapped Teflon®
Overall diameter (max) in	0.06	0.06	0.06	0.115	0.09	0.13
Bend radius (min) in	0.12	0.12	0.12	0.85	0.85	1
Temperature range °C (°F)	-184 to +260 (-300 to +500)	-73 to +177 (-100 to +350)	-184 to +177 (-300 to +350)	-55 to +260 (-67 to +500)	-55 to +150 (-67 to +302)	-55 to +150 (-67 to +302)
Low noise treated	Yes	Yes	Yes	Yes	Yes	No
Model number	6907M2	6917M169	6917B	6917D	6918M30	6923M18
Model number Connector 1	6907M2 3 socket plug	6917M169 3 socket plug	6917B 7/16-27 female plug (2 socket)	6917D 7/16-27 female plug w/Viton boot (2 socket)	6918M30 7/16-27 female plug (2 socket)	6923M18 MIL 5015C, female plug (2 socket)
Model number Connector 1 Connector 2	6907M2 3 socket plug Pigtail	6917M169 3 socket plug Pigtail	6917B 7/16-27 female plug (2 socket) Pigtail	6917D 7/16-27 female plug w/Viton boot [2 socket] Pigtail	6918M30 7/16-27 female plug (2 socket) 7/16-27 male receptacle	6923M18 MIL 5015C, female plug (2 socket) BNC male plug
Model number Connector 1 Connector 2 Cable Type	6907M2 3 socket plug Pigtail 3 conductor, shielded	6917M169 3 socket plug Pigtail Twisted pair, shielded	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded	6917D 7/16-27 female plug w/Viton boot [2 socket] Pigtail Twisted pair, shielded	6918M307/16-27 female plug (2 socket)7/16-27 male receptacleTwisted pair, hardline	6923M18 MIL 5015C, female plug (2 socket) BNC male plug Twisted pair, shielded
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft	6907M2 3 socket plug Pigtail 3 conductor, shielded N/A	6917M169 3 socket plug Pigtail Twisted pair, shielded 80	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded 80	6917D 7/16-27 female plug w/Viton boot (2 socket) Pigtail Twisted pair, shielded 80	6918M307/16-27 female plug (2 socket)7/16-27 male receptacleTwisted pair, hardline80	6923M18 MIL 5015C, female plug (2 socket) BNC male plug Twisted pair, shielded 20
Model number Connector 1 Connector 2 Cable Type Capacitance (max) pF/ft Conductor size AWG	6907M2 3 socket plug Pigtail 3 conductor, shielded N/A Stranded, 22	6917M169 3 socket plug Pigtail Twisted pair, shielded 80 Stranded, 20	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20	6917D7/16-27 female plug w/Viton boot (2 socket)PigtailTwisted pair, shielded80Stranded, 20	6918M307/16-27 female plug (2 socket)7/16-27 male receptacleTwisted pair, hardline80N/A	6923M18 MIL 5015C, female plug (2 socket) BNC male plug Twisted pair, shielded 20 Stranded, 20
Model numberConnector 1Connector 2Cable TypeCapacitance (max) pF/ftConductor size AWGJacket material	6907M2 3 socket plug Pigtail 3 conductor, shielded N/A Stranded, 22 Extruded Teflon®	6917M169 3 socket plug Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon®	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon®	6917D 7/16-27 female plug w/Viton boot (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon®	6918M307/16-27 female plug (2 socket)7/16-27 male receptacleTwisted pair, hardline80N/ASteel sheath with SS overbraid	6923M18 MIL 5015C, female plug (2 socket) BNC male plug Implement of the plug Shutter of the plug Stranded, 20 Extruded Teflon®
Model numberConnector 1Connector 2Cable TypeCapacitance (max) pF/ftConductor size AWGJacket materialOverall diameter (max) in	6907M2 3 socket plug Pigtail 3 conductor, shielded N/A Stranded, 22 Extruded Teflon® 0.15	6917M169 3 socket plug Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21	6917D 7/16-27 female plug w/Viton boot (2 socket) Pigtail Nisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21	6918M307/16-27 female plug (2 socket)7/16-27 male receptacleTwisted pair, hardline80N/ASteel sheath with SS overbraid0.25	6923M18 MIL 5015C, female plug (2 socket) BNC male plug Invisted pair, shielded 20 Stranded, 20 Extruded Teflon® 0.17
Model numberConnector 1Connector 2Cable TypeCapacitance (max) pF/ftConductor size AWGJacket materialOverall diameter (max) inBend radius (min) in	6907M2 a socket plug Pigtail a conductor, shielded N/A Stranded, 22 Extruded Teflon® 0.15 0.5	6917M169 3 socket plug Pigtail Twisted pair, 80 Stranded, 20 Wrapped Teflon® 0.21 0.6	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21 0.6	6917D 7/16-27 female plug w/Viton boot [2 socket] Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21 0.6	6918M307/16-27 female plug [2 socket]7/16-27 male receptacleTwisted pair, hardline80N/ASteel sheath with SS overbraid0.250.8	6923M18 MIL 5015C, female plug (2 socket) BNC male plug INSted pair, shielded 20 Stranded, 20 Extruded Teflon® 0.17 0.52
Model numberConnector 1Connector 2Cable TypeCapacitance (max) pF/ftConductor size AWGJacket materialOverall diameter (max) inBend radius (min) inTemperature range °C (°F)	6907M2 3 socket plug Pigtail 3 conductor, shielded N/A Stranded, 22 Extruded Teflon® 0.15 0.55 to +125 (-67 to +257)	6917M169 3 socket plug Pigtail Twisted pair, shielded 80 Stranded, 20 Vrapped Teflon® 0.21 0.6 -54 to +260 (-65 to +500)	6917B 7/16-27 female plug (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21 0.6 -54 to +260 (-65 to +500)	6917D 7/16-27 female plug w/Viton boot (2 socket) Pigtail Twisted pair, shielded 80 Stranded, 20 Wrapped Teflon® 0.21 0.6 -54 to +288 (-65 to +550)	6918M30 7/16-27 female plug (2 socket) 7/16-27 male receptacle Twisted pair, hardline 80 N/A Steel sheath with SS overbraid 0.25 0.8 -54 to +482 (-65 to +900)	6923M18 MIL 5015C, female plug (2 socket) BNC male plug Image: Distribution of the plug Twisted pair, shielded 20 Stranded, 20 Extruded Teflon® 0.17 0.52 -54 to +200 (-65 to +392)

Endevco model 3090C

3090C coaxial cable assembly is a high reliability cable designed for use with charge-mode piezoelectric accelerometers. The cable enjoys a long history of reliable use in a wide variety of applications, spanning from laboratory use to low outgassing, long-term space applications.



Endevco piezoelectric 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.





Model number	2510	2510M4A
Description	High intensity sound High temperature Vibration compensated	High intensity sound High temperature Vibration compensated
Туре	Pressure	Pressure
Sensitivity pC rms@140 dB SPL	31	31
Frequency range ±1 dB Hz	2-4000	2-4000
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



Model number	2301	2302	2303	2304	2305
Description	Mini modal hammer 0.1" impact tip diameter	Modal hammer Fiberglass handle Rubber grip	Modal hammer Wood handle	Modal hammer Wood handle	Modal hammer Wood handle
Sensitivity mV/lbf	100	5 / 10 / 50 / 100	1	1	1
Range lbf	50	1000 / 500 / 100 / 50	5000	5000	5000
Maximum force lbf	200	1000	8000	8000	8000
Resonance frequency kHz	300	50	50	50	75
Head mass gm	2	100	454	1362	5448
Head diameter in (mm)	0.44 (11)	0.75 (19)	1.0 (25)	2.0 (50)	3.0 (75)
Head material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connector	10-32	BNC	BNC	BNC	BNC

Endevco modal hammers

Endevco hammers feature an Isotron impedance converter that provides an IEPE-type output, compatible with most FFT analyzers and data acquisition systems, and are designed to properly excite structures in modal and structural analysis applications.

Modal impact hammers are portable and cost-effective, providing controlled excitation to structures with no undesirable mass loading to the structure under test. Scaled modal models also require precise force measurement, which can be achieved via a modal hammer fitted with a piezoelectric force transducer. Applications with high crest factor and ability to shape the input force spectrum of minimal concern because impact hammers are an ideal source of excitation. Hammers are designed to excite the test structure with a constant force over a frequency range of interest. In addition, certain selected models are acceleration compensated, to avoid spectrum glitches due to hammer structural resonances.









Wilcoxon Research shakers

Wilcoxon Research piezoelectric and electromagnetic shakers are used to provide reliable structural excitation of a test article within a controlled, localized environment. By simulating such dynamic forces and natural frequencies, shakers can be used along with sensors and other vibration monitoring devices to reveal cracks, defects, weaknesses or other abnormalities, allowing an engineer or test technician to better predict structural behavior over time. Electromagnetic shakers excite primarily at low frequencies to measure components, such as first bending mode of airframes and ship hulls. Piezoelectric shakers excite at higher frequencies, typically above the acoustic range, where materials such as semiconductor components and high-strength metals begin to break apart.

- Structural testing
- Material studies
- Product testing
- > Quality assurance
- > Research and development
- Modal testing



Wilcoxon Research model number	F7
Description	Piezoelectric shaker
Compatible impedance head	Included
Frequency range Hz	500-20,000
Nominal force output lb [kg]	100 (45.4)
Diameter in (cm)	2.20 (5.59)
Weight lbs [kg]	2.5 (1.1)
Matching network recommended	N7FS



Wilcoxon Research model number	F3 / Z602WA	F4 / Z820WA	F5B / Z11	F10 / Z820WA
Description	Electromagnetic shaker system	Electromagnetic shaker system	Electromagnetic shaker system	Electromagnetic shaker system
Compatible impedance head	Included, available without Z602WA	Included, available without Z820WA	Included, available without Z11	Included, available without Z820WA
Frequency range Hz	25-10,000	10-7500	10-10,000	5-2000
Nominal force output lb (kg)	1 (0.45)	10 (4.5)	0.4 (0.2)	20 (9.1)
Diameter in (cm)	2.26 (5.74)	5.10 (12.95)	1.35 (3.43)	8.25 (20.96)
Weight lbs (kg)	0.83 (0.38)	6.8 (3.1)	0.376 (0.17)	28 (12.7)







F7-1	F4 / F7
Piezoelectric shaker	Electromagnetic / piezoelectric dual vibration shaker system
N/A	Included
1-80,000	10-20,000
10 (4.5)	100 (45.4)
2.20 (5.59)	5.10 (12.95)
2.8 (1.3)	8.2 (3.7)
N8HFS	N7FS





	D60L	D125L
es	Piezoelectric shaker tables	Piezoelectric shaker tables
	N/A	N/A
	2000-20,000	2000-20,000
	1500	1800
	4.0 (10.16)	7.5 (19.05)
	13.0 (6.0)	99 (45)
	N8FS	N8FS

Accessories

Meggitt Sensing Systems 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 are used to properly affix a sensor to the test structure or mounting surface with minimum additional mechanical stress and optimize the frequency response. When selecting an accessory for a given measurement requirement, it is important to note that selection of and adherence to proper sensor mounting techniques, as well as preparation of the mounting surface, is absolutely critical.









Model number	2950	2950M3	2950M16	2950M18	2980M4
Description	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 Adhesive mount	Triaxial mounting block 2-56 threaded holes 4-40 mounting screw provided	Isolated mounting adapter 10-32 stud .495 inch diameter
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum	Stainless steel
Compatibility	Accelerometers with 10-32 stud	2221D, 2221F, 7221A, 7251A	25A, 25B	2220E, 7250A, 7250AM1	10-32 threaded hole accelerometers
Brand	Endevco	Endevco	Endevco	Endevco	Endevco







Model number	2980M12	2981-3	2981-4	2981-12	2985
Description	Isolated mounting adapter 10-32 stud to 10-32 stud 3/8 inch hex	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	Isolated mounting adapter 10-32 stud to 10-32 stud 5/8 inch hex
Material	Anodized aluminum	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Compatibility	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	10-32 threaded hole accelerometersl	10-32 threaded hole accelerometers
Brand	Endevco	Endevco	Endevco	Endevco	Endevco









Model number	2986B	2986M3	2988	41013
Description	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	Adhesive mounting base to 10-32 stud 1/2 inch hex	Mounting clip
Material	Stainless steel	Stainless steel	Anodized aluminum	Beryllium copper
Compatibility	10-32 threaded hole accelerometer	10-32 threaded hole accelerometers	10-32 threaded hole accelerometers	65, 65HT, 65L
Brand	Endevco	Endevco	Endevco	Endevco



Model number	42673-1	42673-2	42673-3		42673-4	
Description	Isolated mounting adapter 10-32 stud to 10-32 stud 1 inch hex	Isolated mounting a 10-32 stud to 1/4-2 1 inch hex	adapter Isolated m 8 stud 10-32 stud 1 inch hex	ounting adapter to M6 stud	Isolated mounting adapter, 10-32 stud to M5 stud, 1 inch hex	
Material	Anodized aluminum	Anodized aluminun	n Anodized a	luminum	Anodized aluminum	
Compatibility	41A, 42A, 43A, 45A	41A, 42A, 43A, 45A	41A, 42A, 4	3A, 45A	41A, 42A, 43A, 45A	
Brand	Endevco	Endevco	Endevco		Endevco	
	4	4	4	4		
Model number	42674-1	42674-2	42674-3	42674-4	42675	
Description	Isolated mounting adapter 6-32 stud to 10-32 stud 3/4 inch hex	Isolated mounting adapter 6-32 stud to 1/4-28 stud 3/4 inch hex	Isolated mounting adapter 6-32 stud to M6 stud 3/4 inch hex	Isolated mounting adapter 6-32 stud to M5 stud 3/4 inch hex	Adhesive mounting adapter d -1 has 10-32 stud -2 has 6-32 stud	
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum	
Compatibility	44A	44A	44A	44A	-1 for 41A/42A/43A/45A -2 for 44A	
Brand	Endevco	Endevco	Endevco	Endevco	Endevco	
Model number	42676-1	42676-2	42676-3		42676-4	
Houce Humber		42070 2			46010 4	





Model number	42673-1	42673-2	42673-3		42673-4	
Description	Isolated mounting adapter 10-32 stud to 10-32 stud 1 inch hex	Isolated mounting a 10-32 stud to 1/4-2 1 inch hex	adapter Isolated m 8 stud 10-32 stud 1 inch hex	ounting adapter to M6 stud	Isolated mounting adapter, 10-32 stud to M5 stud, 1 inch hex	
Material	Anodized aluminum	Anodized aluminun	n Anodized a	luminum	Anodized aluminum	
Compatibility	41A, 42A, 43A, 45A	41A, 42A, 43A, 45A	41A, 42A, 4	3A, 45A	41A, 42A, 43A, 45A	
Brand	Endevco	Endevco	Endevco		Endevco	
	Ļ	4	Ļ	4		
Model number	42674-1	42674-2	42674-3	42674-4	42675	
Description	Isolated mounting adapter 6-32 stud to 10-32 stud 3/4 inch hex	Isolated mounting adapter 6-32 stud to 1/4-28 stud 3/4 inch hex	Isolated mounting adapter 6-32 stud to M6 stud 3/4 inch hex	Isolated mounting adapter 6-32 stud to M5 stud 3/4 inch hex	Adhesive mounting adapter d -1 has 10-32 stud -2 has 6-32 stud	
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum	
Compatibility	44A	44A	44A	44A	-1 for 41A/42A/43A/45A -2 for 44A	
Brand	Endevco	Endevco	Endevco	Endevco	Endevco	
Model number	42474-1	(2474-2	12474-2		12474-4	
Model Humber	42070-1	42070-2	420/0-3		42070-4	



Model number	42677-1	42677-2
Description	Mounting stud 6-32 to 10-32 stud Slotted head	Mounting stud 6-32 to 1/4-28 Slotted head
Material	Stainless steel	Stainless steel
Compatibility	44A	44A
Brand	Endevco	Endevco

E







	42676-3	42676-4
stud	Mounting stud 10-32 to M6 stud Slotted head	Mounting stud 10-32 to M5 stud Slotted head
	Stainless steel	Stainless steel
5A,	41A, 42A, 43A, 45A, 46A	41A, 42A, 43A, 45A, 46A
	Endevco	Endevco





42677-3	42677-4
Mounting stud 6-32 to M6 stud Slotted head	Mounting stud 6-32 to M5 stud Slotted head
Stainless steel	Stainless steel
44A	44A
Endevco	Endevco



Model number	7953A	7964B	7970	7990	30042
Description	Triaxial mounting block, 0-80 threaded holes, 2-56 screw mount provided	Triaxial mounting block, 0-80 threaded holes, 2-56 screw mount (provided)	Triaxial mounting block, 4-40 threaded holes, 6-32 screw mount (provided)	Triaxial mounting block, 4-40 threaded holes	Aerodynamic mounting pad
Material	Magnesium alloy	Aluminum	Titanium	Aluminum alloy	Rubber
Compatibility	7264-2000, 7264C, 7264D, 7264H	7264B	7270A	7290A, 7290D, 7290E	8515C
Brand	Endevco	Endevco	Endevco	Endevco	Endevco



Additional electronic accessories

Electronic accessories	Description
16678	Blank panel for 4948 Rack
17180	Power cord assembly for 6634C, for 120V operation
21997	Plug accessory kit for 2680 and 2685
26574	Plug assembly for 6917B cable
30279	PR/VC mounting fixture
31979	Rack mount kit for 133 and 136 holds 3 units
33268	10-32 to 10-32 in-line adaptor, +900F
36020	32 Channel output breakout panel, 19" rack mount, OASIS
36021	24-Channel output break-out panel, 19" rackmount, OASIS
40150	Blank panel for 4948A rack
17180V	Power cord assembly for 6634C, 230V operation
4948A	Rack mount kit for 2775B, holds 6 units
4948	Rack mount kit for 6634C, holds 6 units
EBT26	Replacement battery pack for 4430A accelerometer simulator
EHM1159	Power adaptor, 12VDC, for 4416B
EHM1409	Automotive power plug, for 133-1 and 136-1
EHM1413	Desktop DC power supply, for 133-1 and 136-1
EHM1471	Blank panel for 31979 rack mount kit
EHM1477	Stud adaptor, 1/4-28 to 10-32 UNF, for 28959F and 28959FV
EJ1085	4 socket plug, used on 3027A series cable assemblies

Electronic accessories	Description
EJ21	10-32 Microdot to BNC adaptor
EJ34	10-32 to 10-32 in-line adaptor
EJ600	25 pin D connector
EJ66	Feed-thru bulkhead microdot connector
EJ720	Input connector, Bendix 2 pin straight plug for 2777A
EJ721	Output connector, Bendix 6 pin socket plug for 2777A
EJ724-U	9 Pin D-sub connector for 126 and 136
EJ807	Serial DB9F to RJ-11 adapter, 133 / 136
EJ822	Modular splitter adapter, 1 (6x4) male to 3 (6x4) female, 133 / 136
EJ847	RJ11 (6x4) straight wired inline coupler, 133 / 136
EP171	Adaptor, 10-32 to female BNC
EP31	Potting sleeve for 2680 and 2685
EP310	Adaptor, 10-32 plug to 10-32 receptacle, right angle
EP316	Twinax BNC Plug
EP35	Connector hood for 2680 and 2685
EP38	Mating plug for 2680 and 2685
EP685	10-32 plug
EP686	BNC plug
EP695	10-32 to BNC adaptor for 4830B
EW1196	D-sub cable, DB25 male / female, 2.5 ft
EW1400	USB cable for 4830B



Calibration services

Meggitt offers complete calibration services to regularly calibrate sensors and maintain a high level of precision and accuracy. Many types of calibrations are available, including absolute vibration calibration for the lowest uncertainty, as well as comparison techniques for shock and vibration. Meggitt can also perform customized calibrations including environmental calibrations to verify amplitude linearity or frequency, or high shock impact testing. Our calibration team is committed to providing the most accurate calibrations available with conformance to the National Metrology Institute (NMI: NIST, PTB, etc.). All calibration services are A2LA accredited.

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

Annual calibration is recommended for accelerometers and their associated instrumentation to ensure the continued accuracy of your dynamic measurements. Accelerometer calibration is available from the same people who design, build, and calibrate hundreds of accelerometers on a daily basis. Calibration is conducted by gualified technicians who are under the supervision of our experienced Engineering staff. Meggitt offers a wide selection of calibration services to meet your needs. These include simple back-to-back calibrations and highly accurate absolute calibrations.

For those that require the highest levels of reporting, services are available with comprehensive reports that include a description of methods used, the reference standards used and their current calibration dates, report numbers and traceability to the National Metrology Institute (NMI: NIST, PTB, etc.), the estimated uncertainty of the calibrations, the temperature and

humidity during the calibrations. The report also includes measurement data points and a graphical display of output data. Additionally, fast turnaround services are available that supply a standard one page calibration certificate.

For vibration services, Meggitt uses precision, low noise air bearing shakers with a beryllium armature to ensure the highest accuracy with high frequency capabilities. We can also perform a resonance search to further determine the condition of the sensor. Meggitt designed equipment is used to test cross-axis sensitivity, another important test of the accelerometers performance. For shock services, Meggitt equipment is used for testing up to 100,000 gs.

What we do

When we receive your sensor, it will be fully inspected and tested. Once your sensor is determined to be operating properly, we will proceed with the requested calibration. If during inspection and testing we determine

that the unit is defective, we will advise you regarding the repair or replacement alternatives. In the event we are unable to make the necessary repairs, we can offer an attractive trade-in on a new Endevco product. Contact your local Representative to discuss other options or alternatives.

What we calibrate

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

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 list

Absolute calibration

Absolute (Primary) calibration by reciprocity provides a measurement uncertainty of 0.5 % at 2 g and a reference frequency of 80, 100, or 160 Hz, as specified by the customer.

Calibration service number	CS120	CS120H	CS120L	CS120LH	CS120S	CS120LH-S	CS120LS
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 ³	No	No	No	No	Yes	Yes	Yes
Transverse sensitivity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Report/certificate ¹	Full report	Full report	Full report	Full report	Full report	Full report	Full report
Resonance search ²	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Comparison calibration

Secondary calibration by comparison provides a measurement uncertainty of ± 1.2 % (100 Hz), ± 1.5 % (20 Hz to 2500 Hz), ± 2.5 %.

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 ³	No	No	No	No	Yes	Yes
Transverse sensitivity	Yes	Yes	Yes	Yes	Yes	Yes
Report/certificate ¹	Full report	Full report	Full report	Full report	Full report	Full report
Sensor manufacturer	Endevco	Endevco	Endevco	Endevco	Endevco/ Non-Endevco	Endevco
Resonance search ²	Yes	Yes	Yes	Yes	Yes	Yes
Calibration service number	CS130LS	CS130T4	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 ³	Yes	No	No	No	No	No
Transverse sensitivity	Yes	Yes	No	No	No	Yes
Report/ certificate ¹	Full report	Full report	Full report	Full report	Full report	Standard cert
Sensor manufacturer	Endevco	Endevco	Endevco	Endevco	Endevco	Endevco
Resonance search ²	Yes	Yes	Yes	Yes	Yes	Yes

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 ³	No	No	No	No	Yes	Yes
Transverse sensitivity	Yes	Yes	Yes	Yes	Yes	Yes
Report/certificate ¹	Full report	Full report	Full report	Full report	Full report	Full report
Sensor manufacturer	Endevco	Endevco	Endevco	Endevco	Endevco/ Non-Endevco	Endevco
Resonance search ²	Yes	Yes	Yes	Yes	Yes	Yes
Calibration service number	CS130LS	CS130T4	CS135	CS135L	CS135LH	CS410
Calibration service number Frequency range	CS130LS 1 Hz to 10 kHz	CS130T ⁴ 20 Hz to 10 kHz	CS135 20 Hz to 10 kHz	CS135L 1 Hz to 10 kHz	CS135LH 1 Hz to 20 kHz	CS410 20 Hz to 10 kHz
Calibration service number Frequency range System cal ³	CS130LS 1 Hz to 10 kHz Yes	CS130T⁴ 20 Hz to 10 kHz No	CS135 20 Hz to 10 kHz No	CS135L 1 Hz to 10 kHz No	CS135LH 1 Hz to 20 kHz No	C5410 20 Hz to 10 kHz No
Calibration service numberFrequency rangeSystem cal³Transverse sensitivity	CS130LS 1 Hz to 10 kHz Yes Yes	CS130T ⁴ 20 Hz to 10 kHz No Yes	CS135 20 Hz to 10 kHz No No	CS135L 1 Hz to 10 kHz No No	CS135LH 1 Hz to 20 kHz No No	CS410 20 Hz to 10 kHz No Yes
Calibration service numberFrequency rangeSystem cal3Transverse sensitivityReport/ certificate1	CS130LS 1 Hz to 10 kHz Yes Yes Full report	CS130T ⁴ 20 Hz to 10 kHz No Yes Full report	CS135 20 Hz to 10 kHz No No Full report	CS135L 1 Hz to 10 kHz No No Full report	CS135LH 1 Hz to 20 kHz No No Full report	CS410 20 Hz to 10 kHz No Yes Standard cert
Calibration service numberFrequency rangeSystem cal³Transverse sensitivityReport/ certificate¹Sensor manufacturer	CS130LS 1 Hz to 10 kHz Yes Yes Full report Endevco	CS130T ⁴ 20 Hz to 10 kHz No Yes Full report Endevco	CS135 20 Hz to 10 kHz No No Full report Endevco	CS135L 1 Hz to 10 kHz No No Full report Endevco	CS135LH 1 Hz to 20 kHz No No Full report Endevco	CS410 20 Hz to 10 kHz No Yes Standard cert Endevco
Calibration service numberFrequency rangeSystem cal³Transverse sensitivityReport/ certificate¹Sensor manufacturerResonance search²	CS130LS 1 Hz to 10 kHz Yes Yes Full report Endevco Yes	CS130T ⁴ 20 Hz to 10 kHz No Yes Full report Endevco Yes	CS135 20 Hz to 10 kHz No No Full report Endevco Yes	CS135L 1 Hz to 10 kHz No No Full report Endevco Yes	CS135LH 1 Hz to 20 kHz No No Full report Endevco Yes	CS410 20 Hz to 10 kHz No Yes Standard cert Endevco Yes

Calibration service number	CS415	CS410TEDS⁵	CS420	CS425	CS420L	CS210 ⁶
Frequency range	20 Hz to 10 kHz	1 Hz to 10 kHz	20 Hz to 10 kHz			
System cal ³	No	No	No	No	No	No
Transverse sensitivity	No	Yes	Yes	No	Yes	Yes
Report/ certificate ¹	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 ²	Yes	Yes	Yes	Yes	Yes	Yes

Calibration services list

Shock calibration

Half-sine shock calibration by comparison provides a measurement uncertainty of ± 1.9 % (20 to 2 000 g) and 2.7% (2 000 to 10 000 g).

Calibration service number	CS110	CS110S	CS220	CS220S	CS111	CS115
Shock range	20 g to 10 Kg, 5 levels	10 Kg to 100 Kg, 5 levels	10 Kg to 100 Kg, 5 levels			
Frequency range ⁷	20 Hz to 10 kHz	20 Hz to 10 kHz	NA	NA	NA	NA
System cal ²	No	Yes	No	Yes	No	No
Transverse sensitivity	Yes	Yes	Yes	Yes	Yes	No

Environmental calibration

Sensitivity calibration at temperature.

Calibration service number	CS310	CS315	CS330
Description	Sensitivity measurement at single	Sensitivity measurement at single	Sensitivity measurement at single
	frequency, at customer specified	frequency, at customer specified	frequency, at customer specified
	temperature	temperature	temperature
Temperature range $C^{\circ}\left(F^{\circ}\right)$	-55 to +175	-55 to +175	-173 to +760
	(-67 to +345)	(-67 to +345)	(-280 to +1400)
Transverse sensitivity	No	Yes	Customer specified

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

Incentive programs

To make it even easier to do business with us, Meggitt offers a number of customer incentive programs, ranging from comprehensive 5-year product line warranties, to stocking and availability guarantees, to competitor tradein allowances and test fixture upgrade discounts. All are designed to provide even greater confidence, reliability and performance when choosing Meggitt sensors and instrumentation for your application requirements.



In early 2009, Meggitt was the first in the industry to offer a true 5-year product warranty across all of its transducer and electronic instrumentation lines, worldwide. This warranty is without hidden loopholes or "fine print." It is simply the confidence we have placed in our own product performance, and in turn, the same trust we invite our customers to place in us. As this warranty accompanies each of our products, it is simply another value added reason for choosing Endevco products. For full warranty details visit www.endevco.com

GSA



Get added reliability and value for your application by making the switch to Endevco brand sensors and instrumentation. Send us your working or non-working competitive product, let us help you to find the best Endevco standard product replacement for your application, and receive a 15% trade-in discount, issued simultaneously with your product purchase. It's as easy as that. Our trade-in allowance is applicable across all Endevco standard product offerings. Purchases under the CTi program are also still covered by Meggitt's 5-year product warranty.

University discount Meggitt offers a 15% Endevco brand product discount to university customers. To qualify, "university" must be in the name of the ordering account.



Five-year product line warranty

US General Services Administration (GSA) pricing

If you are a Government customer or a contractor authorized to use General Services Administration (GSA) sources to fulfill your Government requirements, Meggitt (Orange County), Inc. helps to simplify your acquisition activity by providing a variety of products through their GSA Contract, GS-07F-173BA.

To view all products offered through GSA, visit www.gsaadvantage.gov.

-R Replacement sensors program

Our -R Replacement sensors program is a cost-effective way to upgrade existing test fixtures, without sacrificing quality or performance. This program allows customers to choose from among dozens of our most popular Isotron (IEPE-type) and charge output piezoelectric accelerometers, at specially discounted prices.

Competitive Trade-in program (CTi)

Isotron®. Endevco®. Wilcoxon Research®. are registered trademarks of Meggitt.

Selecting accelerometers for test applications

Meggitt designs and manufactures a variety of accelerometers for high-reliability 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

Uses a simple spring-mass principle in which a force is generated that relates to amplitude and frequency. This force is applied to the PE element, which develops an electrical charge proportional to mechanical motion. Different configurations of PE accelerometer elements are used to support specific applications.

Advantages of PE sensors

- > Single-ended compression type is optimum for low-level measurements because of the high sensitivity that can be achieved by stacking multiple crystals and connecting them in parallel.
- > A shear mode design allows for the construction of small, lightweight sensors suitable for monitoring of 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.
- > PE accelerometers are often specified where the use of an extremely rugged high-temperature device is required and can measure a wide range of temperatures, from cyrogenic conditions to the extreme heat environment of turbine engines.
- > Gain also may be optimized with PE accelerometers to allow for substitution of a smaller accelerometer within a given application. The upper end of the frequency response can be tailored with electronic filtering to match the anticipated measurement range and suppress natural mechanical resonances. The low-frequency response typically is set at 1 Hz for PE accelerometers and can be pushed close to 50 kHz.
- > PE accelerometers are available in a wide range of shapes and sizes, from micro-miniature for PC circuit board or small electronic device testing to larger sizes used in seismic or turbofan applications.

Isotron accelerometers

The trade name Isotron refers to a type of piezoelectric (PE) accelerometer with internal electronics (IEPE) that allows

it to convert charge to a low-impedance voltage output. Its temperature response is somewhat limited due to its onboard electronics. These internal electronics can further increase susceptibility to electrostatic discharge (ESD). 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.

Piezoresistive (PR) accelerometers

Strain gauge accelerometer designs consist of a rugged monolithic assembly with solid-state MEMS resistors that change in resistance in proportion to applied mechanical stress.

Advantages of PR sensors

- > The monolithic MEMS sensor exhibits high sensitivity with an excellent signal-to-noise ratio and a typical temperature range of -20°C to +120°C (-4°F to +248°F).
- > PR accelerometers feature DC response characteristics which make it useful for measuring long duration pulses such as those experienced during automotive crash events and munitions blast testing.

Variable capacitance (VC) accelerometers

Feature a MEMS sensing element sandwiched between a lid and a base and electrostatically bonded to form a parallel-plate capacitor. The accelerometers features DC response, stable damping for good frequency coverage and rugged construction. Integral electronics with DC excitation provides a high-level, low-impedance output signal that is stable from -20°C to +120°C (-4°F to +248°F). Designed for low-g measurement, yet can also withstand higher g shocks. Suitable for trajectory monitoring, structural evaluation, flutter testing, and vehicle dynamics testing of automotive suspensions and brakes.

Sensors with on-board memory

Commonly referred to as smart sensors, these sensors provide an inherently improved signal-to-noise ratio. A key feature is conformance to the IEEE 1451.4 Transducer Electronic Data

Sheet (TEDS) specification, which allows for onboard storage of accelerometer serial number and calibration data, for simplified test setups with reduced errors.

Accelerometer performance characteristics

To obtain meaningful acceleration data, one must fully understand the performance characteristics of the accelerometers under consideration. There are several types of accelerometers and many designs within each category. The most critical trade-offs relate to sensitivity, weight and frequency response, and include:

- > Strain effects—The test item may flex, stretch, or bend at the point where an accelerometer is mounted, causing it to > Sensitivity—Higher sensitivity results in a higher signal-to-noise produce an erroneous output. Isolation may be improved by ratio. Interfering electrostatic and electromagnetic noise will using insulated studs or adhesive mounting adapters. Shear be less bothersome with a higher-sensitivity device. Higher accelerometers are much less sensitive to such errors than sensitivity, however, may bring two disadvantages: greater conventional compression types. accelerometer mass and a lower resonant frequency.
- > Dirty environments—Every component in the measurement > Mass loading—Motion of the equipment under test will be chain must be kept clean and dry to achieve optimum attenuated if the dynamic mass of the accelerometer approaches performance. PE accelerometers require more care because the dynamic mass of the structure on which it is mounted. they are very sensitive to external contamination due to their Consequently, a lightweight sensor must be used for the high output impedance. accurate evaluation of low-mass test articles.
- > Low-frequency response—With a PE accelerometer, the lowfrequency cutoff often is set at 1 to 5 Hz to reject any pyroelectric output. Some models, however, extend the cutoff to near DC. PR and VC accelerometers offer such DC response characteristics.
- > 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—The sensor must not produce any significant response when motion is applied in the lateral axes. Sensitivity to lateral motion can be held to less than 5% of normal sensitivity on an Endevco device.
- > 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. PR and VC sensors are extremely linear and specified for their combined nonlinearity, hysteresis, and non-repeatability specifications.
- > 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.

> Transient temperature effects—Compression mode PE and Isotron accelerometers can produce an output with temperature changes. This problem has been virtually eliminated with the advent of shear mode accelerometers (most Endevco accelerometers are shear mode types). Thermal transient errors tend to occur at very low frequencies and often go undetected. PR and VC devices have no significant response to temperature changes.

Product selection guide—application index

Absolute pressure products

8515C	Pressure transducer, low profile, surface mount, 0.030" thin	See pg 16
8530B	Pressure transducer, miniature, 10-32 mount	See pg 17
8530BM37	Pressure transducer, miniature, 10-32 mount, integral connector	See pg 17
8530C	Pressure transducer, miniature, 10-32 mount	.See pg 17
8540	Pressure transducer, high temperature, 10-32 mount	See pg 17

Automotive crash test products

7231C	ATD standard, undamped, optional cable	See pg 13
7264B	Crash test, undamped, meets SAE J211/J2570	See pg 12
7264C	Industry standard, undamped, meets SAE J211/J2570	See pg 12
7264D	High resonance, undamped, meets SAE J211/J2570	See pg 12
7264H	Extremely rugged, damped, safety testing	See pg 12
7268C	Triaxial, undamped, world SID ATD	See pg 13
7286 / 7287	Lightweight, undamped, optional cable	See pg 13
7302BM5	Angular, World STD ATD, undamped	See pg 13

Electronics products

133	3 channel PE/Isotron amplifier 100 kHz bandwidth	See pg 40
136	3 channel DC amplifier, auto zero, shunt calibration	See pg 40
433	3 channel PE/Isotron signal for i -TEDS™	See pg 41
436	3 channel DC amplifier, auto-gain, auto zero, OASIS card	See pg 41
482B	8 channel Isotron amplifier for i -TEDS™ (IEEE P1451.4) sensors and	See pg 41
	Isotron sensors, modal testing, OASIS card	
2680MX	1 channel PE amplifier, biased/unbiased outputs, 2 pole filter options	See pg 38
2685MX	1 channel Isotron amplifier, dual gain outputs, 2 pole filter options	See pg 38
2771C	Ultra low noise, 1 channel PE remote charge converter gain of 0.1, 1.0, 10	See pg 38
2775B	1 channel PE/Isotron amplifier, AC/DC/servo outputs, isolated	See pg 39
2777A	1 channel PE remote charge converter	See pg 38
4416B	1 channel Isotron amplifier, battery operated, low-cost	See pg 39
4830B	Handheld accelerometer simulator, test system integrity, single-ended and differential	See pg 42
6634C	1 ch. multiple input, test cell amplifier	See pg 39

Extreme temperature products

2248M1	+482°C, lightweight, flange mount	See pg 21
2271A	Operational from -269°C to +260°C, side connector, ground isolated	See pg 22
2271AM20	Operational from -269°C to +260°C, top connector, ground isolated	See pg 22
2276	+482°C, radiation hardened, case grounded, side connector	See pg 23
6233C	+482°C, balanced differential output, three hole mount	See pg 23
2280	+482°C triaxial PE accelerometer, 3 side connectors	See pg 23
6237M70	+650°C, coaxial output, ground isolated, 10-32 connector	See pg 24
6243MX	+650°C PE accelerometer, no thermal velocity spiking	See pg 24
7722	Operational from -184°C to +177C, top connector	See pg 25
8523	+260°C, gage miniature pressure transducer, 10-32 mount	See pg 17
8540	+260°C, absolute miniature pressure transducer, 10-32 mount	See pg 17

Gage and differential pressure products

8507C	Pressure transducer, miniature, flush mount	See pg 16
8510B	Pressure transducer, miniature,10-32 mount	See pg 16
8510C	Pressure transducer, miniature,10-32 mount	See pg 16
8511A	Pressure transducer, 3/8-24 UNF-2A mount	See pg 16
8523	+260°C, gage miniature pressure transducer, 10-32 mount	See pg 17

Gas turbines

522M17	High temperature piezoelectric dynamic pressure
522M35A	High temperature piezoelectric dynamic pressure, bala
522M37A	High temperature piezoelectric dynamic pressure, bala
6222S	Balanced differential output, three hole mount
6233C	+482°C, balanced differential output, three hole mount
6237M70	+650°C, coaxial output, ground isolated, 10-32 connect
6243MX	+650°C, piezoelectric accelerometer, no thermal veloci

High g shock

71M	Surface mount, undamped, low mass
72	Lightly damped, rugged, ESD protection
73	Triaxial, undamped, surface mount
74	Triaxial, lightly damped, surface mount LCC
75	Triaxial, undamped, surface mount LCC
2225	High g shock, industry standard, PE, 20,000 g shock
2225M5A	Very high g shock, industry standard, PE, 100,000 g sh
2255B	Isotron shock accelerometer, built-in 30 kHz LP filter,
7255A	lsotron, shock accelerometer, built-in 10 kHz mechani
7270A	High resonance, undamped, shock standard
7270AM4	High resonance, undamped, stud mount
7270AM6	Rugged, mechanical filter, stud mount
7274	Triaxial, undamped, high resonance
7280A	Extremely rugged, lightly damped, low power consum
7280AM4	Extremely rugged, lightly damped, stud mount
7284	Triaxial, lightly damped, surface mount LCC

Industrial machine monitoring

5220B-100	Rugged, isolated	l Faraday shield,	100 mV/g
02208 100		ai'ddad y oiniolai	, g

Lightweight products

22	Ultra-miniature, piezoelectric accelerometer, 0.14 gm
23	Ultra-miniature triaxial, lightweight, piezoelectric acc
25A	World's smallest Isotron, adhesive mount, 5 mV/g, gro
25B	World's smallest Isotron, adhesive mount, 5 mV/g, det
27F11 / F12	World's smallest iTEDS, hermetically sealed, 10 mV/g
27AM1	Lightweight Isotron teardrop
35B	World's smallest Isotron triaxial accelerometer, adhes
35C	World's smallest Isotron triaxial accelerometer, adhes
65-100	Miniature Isotron, triaxial, 10 and 100 mV/g
65HT	Miniature high temperature Isotron, 0.5, 1 and 10 mV/
65L	Miniature Isotron, triaxial, 100 mV/g, frequency respo
66F50/F11/F12	Miniature Isotron with iTEDS, 5, 10 and 100 mV/g
67	High temperature Isotron, triaxial, 10 and 100 mV/g
727	Miniature accelerometer, drop test, 0.3 grams
2222C	Industry standard, adhesive mount
2250A	Miniature, lightweight (0.4 gram), 10 mV/g, adhesive
2250AM1	Lightweight (0.4 gram), 10 mV/g, adhesive mount, so
7250A	360° cable orientation, lightweight, flight test applicat
7253C	Low profile triaxial Isotron, 10 mV/g, bolt or adhesive
8507C	Miniature pressure sensor, flush mount, 0.3 grams
8515C	Low profile pressure sensor, surface mount, 0.08 gram

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Product selection guide—application index

Low frequency and low level accelerometers

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87	Very high sensitivity, high resolution, 1 or 10 V/g	See pg 32
7265A/A-HS	DC response, damped, 500 mV FS0	See pg 11
7290A	DC response, low-level acceleration and inclination, gas damped	See pg 08
7290D	High accuracy, DC response with iTEDS, extreme temperatures	See pg 08
7290E	Wide bandwidth, DC response, digital compensation	See pg 08
7290EM5	Watertight to IP67, PFA cable, gas damped	See pg 08
7298	Triaxial, DC response, hermetic	See pg 09
7591A	Flatpack, DC response, temperature output	See pg 09
7703A	+288°C, signal return isolated from case, sensitivity options up to 1000 pC/g, 10-32 side connector .	See pg 25

Multi purpose accelerometers

41A	General purpose Isotron, top connector	See pg 36
42A	General purpose Isotron, side connector	See pg 36
43A	General purpose Isotron, cube shape	See pg 36
44A	General purpose triaxial Isotron, 14 mm cube	See pg 36
45A	High sensitivity general purpose triaxial Isotron, 20 mm cube	See pg 36
46A	Isotron pod accelerometers	See pg 37
65	Miniature Isotron, triaxial, 10 and 100 mV/g	See pg 30
256	Low-cost, modal ready, 10 mV/g, hermetically sealed, Isotron	See pg 32
256HX	Low-cost, stud mount, isolated case, 10 mV/g, Isotron	See pg 32
2220E	Industry standard, screw mount 360° cable orientation, hermetic, 3 pC/g	See pg 18
2221D	Screw mount 360° cable orientation, 17 pC/g	See pg 19
2221F	Industry standard, screw mount 360° cable orientation, hermetic, 10 pC/g	See pg 19
2222C	Industry standard, adhesive mount	See pg 19
2222D	Industry standard, adhesive mount, connectorized	See pg 19
2224C	Top connector, general purpose	See pg 20
2225	High g shock, industry standard	See pg 20
2226C	+177°C, lightweight, top connector, adhesive mount	See pg 20
2228C	+177°C, triaxial, ground isolated	See pg 20
2230E	Triaxial, adhesive mount, 3 pC/g	See pg 21
2230EM1	Triaxial, bolt mount, 3 pC/g	See pg 21
2255B	Isotron shock accelerometer, built-in 30 kHz LP filter	See pg 33
2258A	Triaxial, hermetically sealed, ground isolated	See pg 31
7201	General purpose accelerometer, side connector, 10, 50 and 100 pC/g	See pg 24
7251A	Wide bandwidth, center bolt mount, low profile	See pg 34
7253D	Triaxial Isotron, 360° cable orientation	See pg 35
7255A	Isotron, shock accelerometer, built-in 10 kHz mechanical LP filter	See pg 35

Microphones

2510	Vibration compensated, high temperature, 100 to >180 dB SPL	See pg 48
2510M4A	Special mounting for flush diaphragms, high temperatureS	See pg 48
8507C	Miniature, -97 dB sensitivity, flush mount	See pg 16
8510B	Miniature, -92 dB sensitivity, 10-32 mounting	See pg 16

Nuclear applications

2248M1 +482°C, lightweight, integral studSee	e pg 21
2273AM1 Radiation hardened, ground isolated, side connector PE accelerometerSee	e pg 22
2273AM20 Radiation hardened, ground isolated, top connector PE accelerometerSee	e pg 22
2276 +482°C, radiation hardened, case grounded, side connectorSee	e pg 23
2280 +482°C triaxial PE accelerometer, 3 side connectorsSee	e pg 23
2771C Ultra low noise in line charge converter	e pg 38
7703A +288°C, signal return isolated from case, 10-32 side connectorSee	e pg 25
7704A +288°C, signal return isolated from case, 10-32 top connectorSee	pg 25

Products for testing movement

7290A	DC response, low-level acceleration, gas damped
7290E	Wide bandwidth, DC response, digital compensation
7298	Triaxial, DC response, hermetic
7591A	Flatpack, DC response, temperature output

Space and flight products

2221F 2510 2510M4A	+260°C, 10 pC/g, center mount, PE accelerometer 100 to >180 dB SPL, vibration compensated, high temp Special mounting for flush diaphragms, high tempera
7250A 7250AM1	Flight test ready, lightweight (1.8 gm), hermetically s
7290A	DC response, low-level acceleration, flutter test
7290D 7290E	High accuracy, DC response with iTEDS, extreme tem Wide bandwidth, DC response, digital compensation
7290EM5 7293A	Watertight to IP67, PFA cable, gas damped FMI protection_DC response_gas damped
7298	Triaxial, DC response, hermetic
8507C 8510B	Pressure transducer (microphone), miniature, -97 dB Pressure transducer (microphone), -92 dB sensitivity,
8515C	Pressure transducer, low profile, surface mount, 0.03

Specialized application products

27BLPF	Miniature high temperature Isotron with integral 2-pole filter in front of charge converter	See pg 29
65HTLPF	Triaxial Isotron with integral 2-pole filter in front of charge converter	See pg 30
2270	Back-to-back PE calibration accelerometer	See pg 21
2273AM1	+399°C radiation hardened, ground isolated, side connector	See pg 22
2273AM20	+399°C radiation hardened, ground isolated, top connector	See pg 22
2276	+482°C radiation hardened, case grounded, side connector	See pg 23
2301	Miniature Isotron modal hammer	See pg 49
2302	Isotron modal hammer, rubber grip	
2303	Isotron modal hammer, wood handle	See pg 49
2304	Isotron modal hammer, wood handle	See pg 49
2305	Isotron modal sledgehammer, wood handle	See pg 49
2311	lsotron force sensor	See pg 26
2312	Charge mode force sensor	See pg 26
2313	Charge mode force sensor	See pg 26
2680MX	1 ch. PE amplifier, biased/unbiased outputs, 2 pole filter options	See pg 38
2685MX	1 ch. Isotron amplifier, dual gain outputs, 2 pole filter options	See pg 38
6237M70	+650°C, coaxial output, ground isolated, 10-32 connector	See pg 24
7240C	High frequency PE accelerometer (20 kHz)	See pg 25
7259B	lsotron, high frequency (30 kHz), lightweight (4.6 gm), 10 mV/g	See pg 35
D60H	Piezoelectric shaker table	See pg 51
D60L	Piezoelectric shaker table	See pg 51
D125L	Piezoelectric shaker table	See pg 51
F3 / Z602WA	Electromagnetic shaker system	See pg 50
F4 / F7	Electromagnetic/piezoelectric dual vibration shaker system	See pg 51
F4 / Z820WA	Electromagnetic shaker system	See pg 50
F5B / Z11	Electromagnetic shaker system	See pg 50
F7	Piezoelectric shaker	See pg 51
F7-1	Piezoelectric shaker	See pg 51
F10 / Z820WA	Electromagnetic shaker system	See pg 50

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Contacts

General information

Meggitt Sensing Systems 14600 Myford Road Irvine California 92606 USA

Tel: +1 949 493 8181 +1 949 661 7231 Fax:

www.endevco.com www.meggittsensingsystems.com www.meggitt.com

International contacts

Meggitt Sensing Systems France Countries covered: France, Switzerland (French speaking area)

10, rue Mercoeur 75011 Paris France

Tel: +33 1 53 27 61 61 Fax: +33 1 53 27 61 62 Email: pierre.delubac@meggitt.com

Meggitt Sensing Systems Germany Countries Covered: Germany, Switzerland (German speaking area)

Hügelhof 44 88634 Herdwangen-Schönach Germany

Tel: +49 4721 4257095 Fax: +41 26 407 12 25 Email: dirk.mahler@de.meggitt.com

Meggitt Sensing Systems Europe Countries covered: Rest of Europe (including all CIS countries), Ukraine, Middle East and Africa

Route de Moncor, 4 CH-1701 Fribourg Switzerland

Tel: +41 26 407 1406 Fax: +41 26 407 1225 Email: massimo.ravazzini@ch.meggitt.com

Meggitt Sensing Systems UK

Countries covered: United Kingdom and Ireland

The Laurels Jays Close Viables Industrial Estate Basingstoke, Hants RG22 4BS

Tel: +44 (0)7950 444884 Email: david.copley@meggitt.com

Meggitt Sensing Systems Shanghai

Far East International Plaza, Building A, room 1107 No. 319, Xianxia Road, Changning District, Shanghai 200051 China Tel: +86 21 6278 1092 Fax: +86 21 6278 1094 Email: Lizzie.li@meggitt.com

Please go to www.endevco.com to find your local representative or distributor.

Meggitt Sensing Systems 14600 Myford Road Irvine, CA 92606 USA Tel: +1 949 493 8181 Fax: +1 949 661 7231

www.endevco.com www.meggittsensingsystems.com www.meggitt.com

