SENSORS FOR ENVIRONMENTAL TESTING

Including **ENDEVCO** sensors, electronics, and cables

PCB PIEZOTRONICS
AN AMPHENOL COMPANY

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ABOUT PCB PIEZOTRONICS

PCB AT A GLANCE

Since 1967, PCB Piezotronics has been a leader in developing piezoelectric quartz sensors and integrated electronics for dynamic pressure, force, and acceleration measurements. A key innovation has been incorporating microelectronic signal conditioning within the sensors, enhancing user-friendliness and environmental resilience. These advancements solidified the popularity of ICP® sensors and laid the foundation for the company's ongoing success.

Through continuous investment in facilities, equipment, and research, PCB® has expanded its sensor technology offerings to include piezoceramic, tourmaline, capacitive, piezoresistive, and metal strain gage sensors. Today, our extensive product lineup includes accelerometers, pressure sensors, microphones, torque and force sensors, load cells, and calibration tools.

In 2019, PCB welcomed Endevco®—an industry leader in test and measurement sensors since 1947—into the family. Combining Endevco's cutting-edge innovations with PCB's commitment to Total Customer Satisfaction (TCS), we continue to deliver industry-leading products and services.

OUR COMMITMENT TO QUALITY & COMPLIANCE

At PCB Piezotronics, we uphold internationally recognized standards, ensuring quality and consistency across the entire product lifecycle—from design and manufacturing to inspection and testing. Our Quality Management Systems are certified to meet the following standards:

- A**S9100:2016 QMS (Certified by DQS, Inc.)**: Quality requirements for Aviation, Space, and Defense industries.
- **ISO 9001:2015 QMS (Certified by DQS, Inc.)**: Global standard for Quality Management Systems.
- **ISO17025 & ANSI-Z-540-1**: Competence standards for Testing and Calibration Laboratories.
- **EN13980 & Directive 94/9/EC**: Standards for Quality Systems in Potentially Explosive Atmospheres.

Our in-house calibration services are fully traceable to National and International Standards (N.I.S.T., P.T.B.), with a complete list of A2LA-accredited calibration services available in our "Scope of Calibration" documents.

Additionally, PCB adheres to legacy standards such as ISO 10012-1, MIL-STD-45662A, and MIL-Q-9858, and complies with nuclear power plant specification 10CFR50 Appendix B. Our sensors are also equipped for military standard testing, including MIL-STD-810 and MIL-STD-461.

For specific product or application compliance information, such as RoHS, European CE Marking, or US MIL-STD-740-2, please contact us directly.

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HALT/HASS ICP® TEST ACCELEROMETERS

Environmental Stress Screening (ESS) subjects electronic products to environmental stresses to uncover potential defects and failures. Two common ESS methods are HALT and HASS:

- **Highly Accelerated Life Testing (HALT)**: A design verification process that rapidly subjects products to extreme changes in vibration and temperature to identify design and assembly weaknesses.
- **Highly Accelerated Stress Screening (HASS)**: A 100% product screening method that identifies components with a higher likelihood of early failure.

ESS GENERAL PURPOSE QUARTZ SHEAR ICP® ACCELEROMETER

PCB MODEL 320C18

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 1 - 10k Hz

ESS GENERAL PURPOSE QUARTZ SHEAR ICP® ACCELEROMETER

PCB MODEL 320C03

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 1 - 6k Hz

ESS GENERAL PURPOSE QUARTZ SHEAR ICP® ACCELEROMETER

PCB MODEL 320C04

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%): 1 - 6k Hz

ESS GENERAL PURPOSE QUARTZ SHEAR ICP® ACCELEROMETER

PCB MODEL 320C15

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%): 1 - 10k Hz

ESS HIGH SENSITIVITY QUARTZ SHEAR ICP® ACCELEROMETER

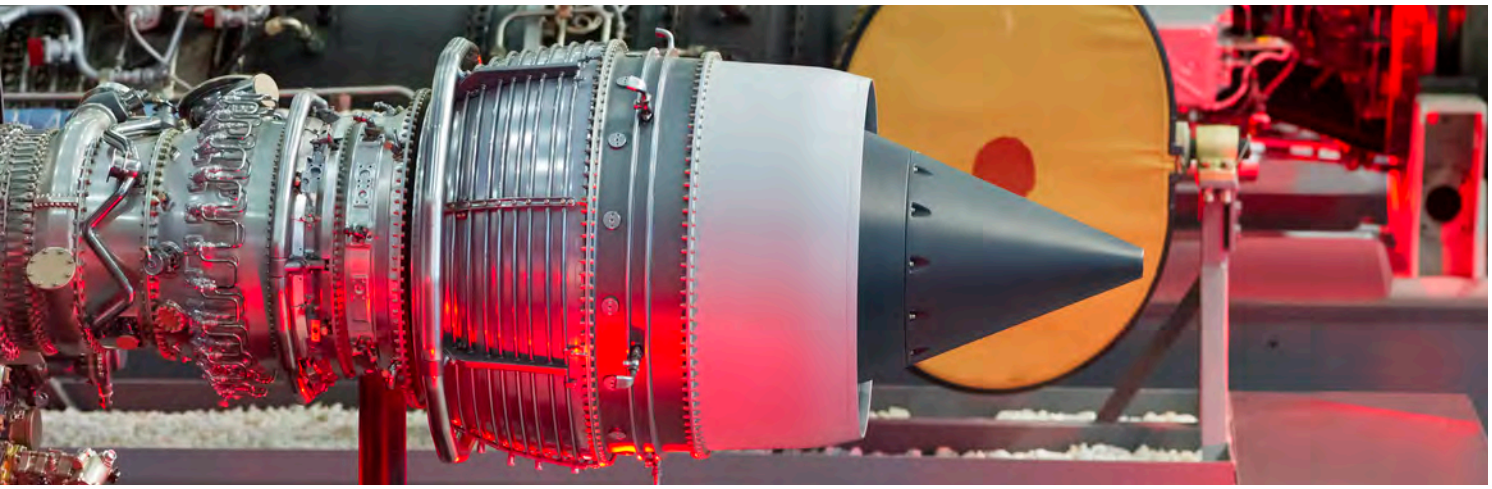
PCB MODEL 320C20

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 2 - 5k Hz

HIGH FREQUENCY IEPE ACCELEROMETER

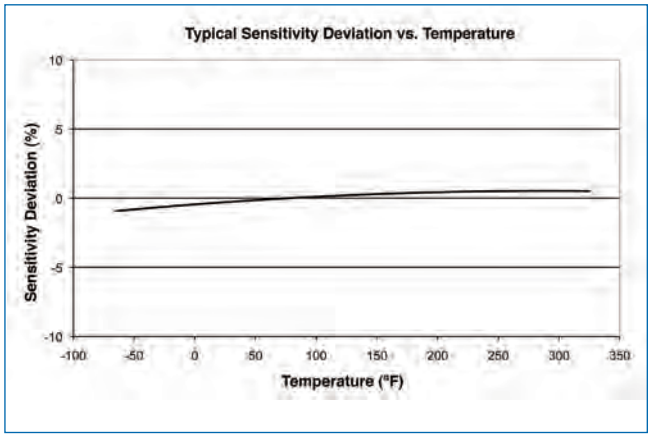
ENDEVCO MODEL 7250B & 7250BM1

- Sensitivity: 2 & 10 mV/g options
- Measurement Range: ±2500 & ±500 g pk options
- Model 7250BM1 includes light weight cable & 10-32 connector



HIGH TEMPERATURE ICP® ACCELEROMETERS

PCB single-axis and triaxial ICP® accelerometers offer precision with a low temperature coefficient (0.005%/°F or 0.009%/°C), broad operating temperature range, and excellent broadband resolution. Designed for applications requiring tight control of amplitude sensitivity across wide thermal gradients, some models also feature integrated low-pass filters to ensure accurate data by minimizing high-frequency overloads.



UHT-12™ MINIATURE ICP® ACCELEROMETER

PCB MODEL 320C52

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 1 - 10k Hz
- Temperature Range: -100 to 325 °F (-73 to 163 °C)

UHT-12™ MINIATURE ICP® ACCELEROMETER

PCB MODEL 320C53

- Sensitivity: 1 mV/g
- Measurement Range: ±5k g pk
- Frequency Range: (±5%) 1 - 5k Hz
- Temperature Range: -100 to 325 °F (-73 to 163 °C)

UHT-12™ TRIAXIAL ICP® ACCELEROMETER

PCB MODEL 339A30

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 2 - 8k Hz
- Temperature Range: -65 to +325 °F (-54 to +163 °C)

UHT-12™ TRIAXIAL ICP® ACCELEROMETER

PCB MODEL HT339C31

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 2 - 8k Hz
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

UHT-12™ LOW-PROFILE ICP® ACCELEROMETER

PCB MODEL 339B32

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 2 - 10k Hz
- Temperature Range: -65 to +325 °F (-54 to +163 °C)

UHT-12™ LOW-PROFILE ICP® ACCELEROMETER

PCB MODEL TLD339A34

- Sensitivity: 50 mV/g
- Measurement Range: ±100 g pk
- Frequency Range: (±5%) 2 - 5k Hz
- Temperature Range: -65 to +325 °F (-54 to +163 °C)

TRIAXIAL ICP® ACCELEROMETER WITH TEDS

PCB MODEL TLD339A36

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 2 - 5k Hz
- Temperature Range: -65 to +325 °F (-54 to +163 °C)

UHT-12™ TRIAXIAL ICP® ACCELEROMETER WITH TEDS

PCB MODEL TLD339A37

- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Frequency Range: (±5%) 0.3 - 4k Hz
- Temperature Range: -65 to 356 °F (-54 to 180 °C)

LIGHTWEIGHT TRIAXIAL ICP® ACCELEROMETER

PCB MODEL HT356B01

- Sensitivity: 5 mV/g
- Measurement Range: ±1k g pk
- Frequency Range: (±5%) 1 - 5k Hz
- Temperature Range: -65 to 356 °F (-54 to 180 °C)

FILTERED ICP® ACCELEROMETERS

Aerospace impact testing often subjects components to dynamic stimuli, leading to broadband excitation. This can cause resonance in brackets or subassemblies, transmitting unwanted vibration throughout the test structure and potentially distorting key measurement data. To address this, internal low-pass filters are used to remove high-frequency signals that exceed the structural range of interest, ensuring accurate results.

CERAMIC SHEAR ICP® ACCELEROMETER

PCB MODEL 352A60

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 5 to 60k Hz

MINIATURE LIGHTWEIGHT ICP® ACCELEROMETER

PCB MODEL 352A72

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 0.5 - 4.5k Hz

TRIAXIAL MINIATURE ICP® ACCELEROMETER

PCB MODEL 356A63

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 2 - 4k Hz

TRIAXIAL CERAMIC SHEAR ICP® ACCELEROMETER

PCB MODEL 356A66

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 2 - 4k Hz

SINGLE AXIS MINIATURE ICP® ACCELEROMETER

PCB MODEL 353B77

- Sensitivity: 2 mV/g
- Measurement Range: ±2500 g pk
- Frequency Range: (±5%) 1 - 10k Hz

HIGH AMPLITUDE ICP® ACCELEROMETER

PCB MODEL 350B50

- Sensitivity: 0.5 mV/g
- Measurement Range: ±10k g pk
- Frequency Range (±1dB): 3 - 10k Hz

HIGH AMPLITUDE ICP® ACCELEROMETER

ENDEVCO MODEL 65HTLPF

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5dB): 1k / 5k Hz

HIGH AMPLITUDE ICP® ACCELEROMETER

ENDEVCO MODEL 7259B

- Sensitivity: 10 / 25 / 100 mV/g
- Measurement Range: ±500 / 200 / 50 g pk
- Frequency Range (±5dB): 90k Hz

HIGH AMPLITUDE ICP® SHOCK ACCELEROMETERS

Piezoelectric ICP® accelerometers deliver high signal output (+/- 5 volts full scale) with easy two-wire connectivity. Built for rugged environments, they can withstand severe over-ranging without damage. Internal mechanical isolation reduces high-frequency stress on the sensing elements, while a 2-pole electrical filter ensures accurate data up to 10 kHz and 100k g's. Full-scale linearity is verified according to MIL-STD-810 calibration standards.

SHOCK ICP® ACCELEROMETER

PCB MODEL 350C23

- Sensitivity: 0.5 mV/g
- Measurement Range: ±10k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz

SHOCK ICP® ACCELEROMETER

PCB MODEL 350C24

- Sensitivity: 1 mV/g
- Measurement Range: ±5k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz

SHOCK ICP® ACCELEROMETER

PCB MODEL 350B01

- Sensitivity: 0.05 mV/g
- Measurement Range: ±100k g pk
- Frequency Range (±1dB): 4 - 10k Hz

SHOCK ICP® ACCELEROMETER

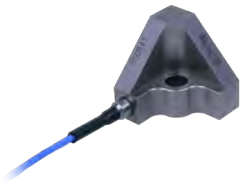
PCB MODEL 350D02

- Sensitivity: 0.1 mV/g
- Measurement Range: ±50k g pk
- Frequency Range (±1db): 4 - 10k Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER

PCB MODEL 350B41

- Sensitivity: 0.05 mV/g
- Measurement Range: ±100k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz



TRIAXIAL SHOCK ICP® ACCELEROMETER

PCB MODEL 350B42

- Sensitivity: 0.1 mV/g
- Measurement Range: ±50k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER

PCB MODEL 350B43

- Sensitivity: 0.5 mV/g
- Measurement Range: ±10k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER

PCB MODEL 350B44

- Sensitivity: 1 mV/g
- Measurement Range: ±5k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz

PIEZORESISTIVE ACCELEROMETERS

Piezoresistive high-g shock accelerometers, available in undamped and lightly damped models, deliver reliable shock and vibration measurements in extreme environments. With ranges from 2k to 200k g, these accelerometers feature rugged MEMS sensing elements for high sensitivity and exceptional overrange capabilities. Our in-house MEMS manufacturing ensures compact designs, repeatability, and reliability for mission-critical applications. Available in single-axis or triaxial configurations with screw, stud, and surface mounting options.

Our in-house MEMS manufacturing techniques allow us to offer 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.

APPLICATIONS:

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

HIGHLIGHTS:

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

UNDAMPED PIEZORESISTIVE ACCELEROMETERS

The Endevco brand of undamped shock accelerometers has a legacy of over four decades, trusted in long-standing programs that require high-frequency performance. Primarily used in research and development applications, these accelerometers are favored by experienced customers who focus on precise instrumentation details, including sample rates, anti-aliasing filter selection, and thorough post-process analysis.

HIGH RESONANCE UNDAMPED PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7270A

- Sensitivity: 10 / 3 / 1 / .3 / .1 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K / ±200K g
- Frequency Range (+/-5%): 10 / 20 / 50 / 100/ 150 kHz

HIGH RESONANCE UNDAMPED PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7270AM4

- Sensitivity: 10 / 3 / 1 / .3 / .1 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K / ±200K g
- Frequency Range (+/-5%): 10 / 20 / 50 / 100/ 150 kHz

RUGGED UNDAMPED PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7270AM6

- Sensitivity: 10 / 3 / 1 / .3 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K g
- Frequency Range (+/-5%): 10 kHz

EXTREMELY RUGGED UNDAMPED PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7270AM7

- Sensitivity: 10 / 3 / 1 / .3 / .1 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K / ±200K g
- Frequency Range (+/-5%): 10 / 20 / 50 / 100/ 150 kHz

HIGH RESONANCE UNDAMPED PIEZORESISTIVE TRIAXIAL ACCELEROMETER

ENDEVCO MODEL 7274A

- Sensitivity: 10 / 3 / 1 / .3 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K g
- Frequency Range (+/-5%): 18 / 36 / 70 / 140 kHz

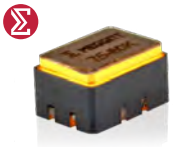
UNDAMPED PIEZORESISTIVE SURFACE MOUNT ACCELEROMETERS

Endevco undamped surface mount accelerometers are designed for seamless integration into circuit board OEM applications, providing reliable performance in high-frequency environments.

UNDAMPED PIEZORESISTIVE SURFACE MOUNT ACCELEROMETER

ENDEVCO MODEL 71M

- Sensitivity: 10 / 3 / 1 / .3 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K g
- Frequency Range (+/-5%): 10 / 20 / 50 / 100 kHz



UNDAMPED PIEZORESISTIVE SURFACE MOUNT TRIAXIAL ACCELEROMETER

ENDEVCO MODEL 75

- Sensitivity: 10 / 3 / 1 / .3 uV/V/g
- Measurement Range: ±2K / ±6K / ±20K / ±60K g
- Frequency Range (+/-5%): 18 / 36 / 70 / 140kHz

LIGHTLY DAMPED PIEZORESISTIVE SURFACE MOUNT SHOCK ACCELEROMETERS

PCB and Endevco lightly damped accelerometers offer a balance between damping and responsiveness, making them ideal for applications requiring high-frequency shock measurements with minimal signal distortion. Overrange stops enhance survivability, while the light damping improves data resolution, delivering accurate results in moderate shock environments.

LIGHTLY DAMPED PIEZORESISTIVE SURFACE MOUNT SHOCK ACCELEROMETER

ENDEVCO MODEL 72

- Sensitivity: 30 / 1.6 / .6 uV/V/g
- Measurement Range: 2K / 20K / 60K g
- Frequency Range (+/-5%): 10 / 10 / 20 kHz

LIGHTLY DAMPED PIEZORESISTIVE SURFACE MOUNT SHOCK ACCELEROMETER

ENDEVCO MODEL 74

- Sensitivity: 30 / 1.6 / .5 uV/V/g
- Measurement Range: 2K / 20K / 60K g
- Frequency Range (+/-5%): 5 / 10 / 13 kHz

DAMPED PIEZORESISTIVE ACCELEROMETERS

PCB and Endevco damped accelerometers are designed for more extreme shock conditions, where damping is crucial for protecting the sensor and ensuring accurate data capture. Overrange stops provide increased durability and improve data recorder resolution, particularly in high-amplitude shock applications.

HIGH SENSITIVITY MULTI-MODE DAMPING PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 2262B

- Sensitivity: 0.45 / 0.3 / 0.015 uV/V/g
- Measurement Range: ±1K / ±2K / ±6K g
- Frequency Range (+/-5%): 3 kHz

LIGHTLY DAMPED STUD MOUNT PIEZORESISTIVE ACCELEROMETER

PCB MODEL 3501B1220KG

- Sensitivity: 1 uV/V/g
- Measurement Range: ±20K g
- Frequency Range (+/-5%): 10 kHz

EXTREMELY RUGGED LIGHTLY DAMPED PIEZORESISTIVE ACCELEROMETER

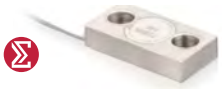
ENDEVCO MODEL 7280AM4

- Sensitivity: 30 / 1.6 / .5 uV/V/g
- Measurement Range: ±2K / ±20K / ±60K g
- Frequency Range (+/-5%): 5 / 10 / 13 kHz

EXTREMELY RUGGED LIGHTLY DAMPED PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7280AM7

- Sensitivity: 30 / 1.6 / .5 uV/V/g
- Measurement Range: ±2K / ±20K / ±60K g
- Frequency Range (+/-5%): 5 / 10 / 13 kHz



LOW POWER LIGHTLY DAMPED PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7280A

- Sensitivity: 30 / 1.6 / .5 uV/V/g
- Measurement Range: ±2K / ±20K / ±60K g
- Frequency Range (+/-5%): 5 / 10 / 13 kHz

LIGHTLY DAMPED THRU HOLE MOUNT PIEZORESISTIVE ACCELEROMETER

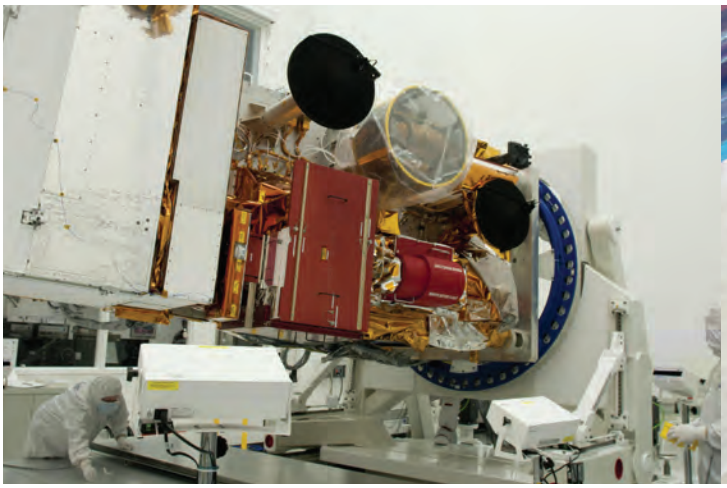
PCB MODEL 3503A1120KG

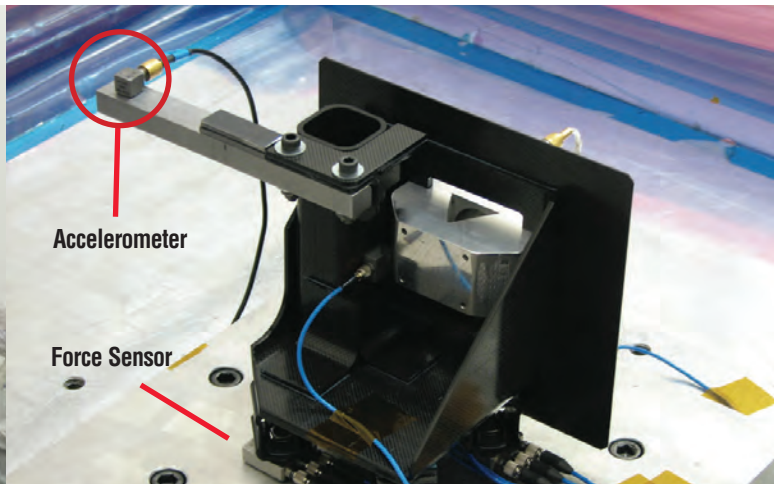
- Sensitivity: 1 uV/V/g
- Measurement Range: ±20K g
- Frequency Range (+/-5%): 10 kHz

LIGHTLY DAMPED THRU HOLE MOUNT PIEZORESISTIVE ACCELEROMETER

ENDEVCO MODEL 7284A

- Sensitivity: 30 / 1.6 / .5 uV/V/g
- Measurement Range: ±2K / 20K / 60K g
- Frequency Range (+/-5%): 10 / 10 / 20 kHz





PCB® Model 356M208 accelerometer & force sensors used during vibration testing of bracket assembly at Utah State Space Dynamics Lab

LOW OUTGASSING ICP® & CHARGE MODE ACCELEROMETERS AND CABLES

PCB's low outgassing accelerometers and cables meet stringent specifications to prevent outgassing and preserve the integrity of sensitive equipment in thermal vacuum vibration testing.

THERMAL VACUUM VIBRATION TESTING

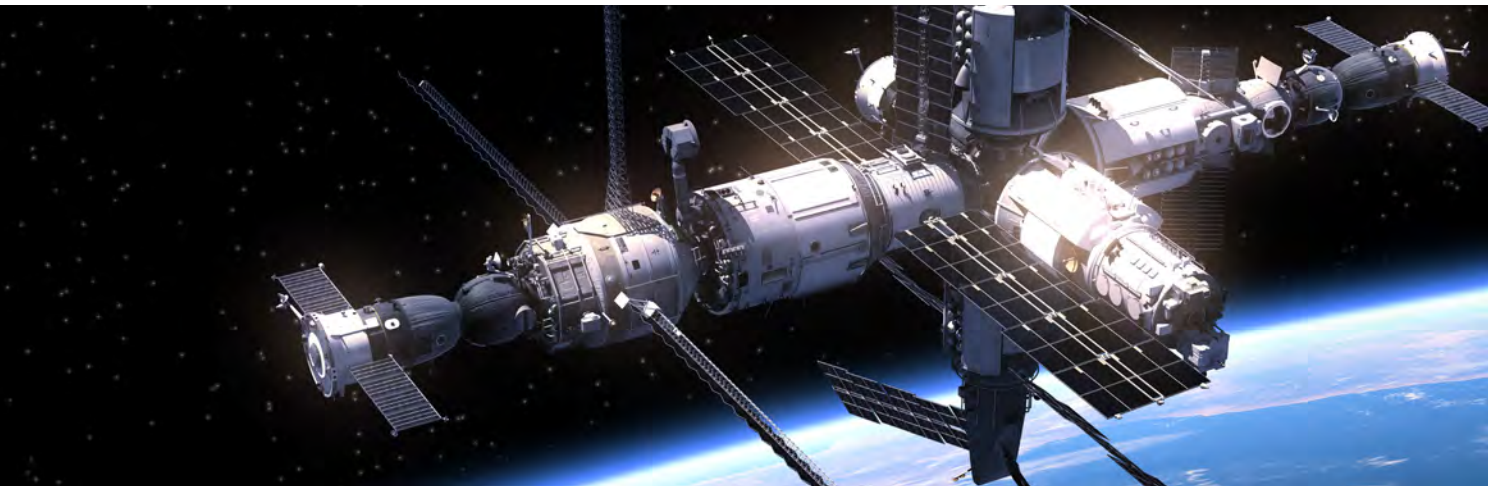
Designed for high-vacuum environments such as satellite ground testing and space applications, PCB's low outgassing accelerometers and cables ensure reliable performance while minimizing contamination risks. Ordinary accelerometers and cables in vacuum environments can release trapped gasses, which may condense on nearby surfaces, obstructing functionality.

Many hermetic accelerometer designs inherently possess low outgassing properties. However, cables with rubberized boots or shrink tubing typically do not meet low outgassing requirements. PCB verifies non-metallic materials outside of hermetic packages for vacuum environments, ensuring less than 1% total mass loss (TML) and a collected volatile condensable mass (CVCM) of 0.1% or less, as per NASA guidelines or external laboratory results.

When selecting low outgassing accelerometers and cables, key considerations include welded hermetic housings, polymers and epoxies with low TML and CVCM values, and leak testing services to verify compliance.

Highlights:

- Vibration measurements in thermal vacuum or space environment
- Welded hermetic accelerometer designs have low outgassing qualities
- Hermeticity testing is performed on all hermetic products at PCB
- Cables with strain relief use polymers are verified for total mass loss and collected volatile condensable material
- Materials selected using NASA guidelines



LOW OUTGASSING ACCELEROMETERS

LOW OUTGASSING MINIATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357A07

- Sensitivity: 1.7 pC/g
- Measurement Range: ±2k g pk
- Frequency Range (+5%): 15k Hz

LOW OUTGASSING MINIATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357A09

- Sensitivity: 1.7 pC/g
- Measurement Range: ±2k g pk
- Frequency Range (+5%): 1 - 10k Hz

MINIATURE CHARGE OUTPUT ACCELEROMETER WITH CABLE

PCB MODEL P357A09 & 030EK001PH

- Sensitivity: 1.7 pC/g
- Measurement Range: ±2k g pk
- Frequency Range (+5%): 10k Hz

LOW OUTGASSING SHOCK ICP® ACCELEROMETER

PCB MODEL 350M88A

- Sensitivity: 0.5 mV/g
- Measurement Range: ±10k g pk
- Frequency Range (±1dB): 0.4 - 10k Hz

LOW OUTGASSING TEARDROP ICP® ACCELEROMETER

PCB MODEL 352M212

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 0.5 - 10k Hz

LOW OUTGASSING MINIATURE ICP® TRIAXIAL ACCELEROMETER

PCB MODEL 356M57

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%):
  2 - 10k Hz (y or z axis)
  2 - 7k Hz (x axis)

LOW OUTGASSING MINIATURE LIGHTWEIGHT ICP® TRIAXIAL ACCELEROMETER

PCB MODELS 356A06/NC & 356A09/NC

- Sensitivity: Available in 5 mV/g and 10 mV/g
- Measurement Range: ±1k g pk
- Frequency Range (±5%):
  2 - 8k Hz (y or z axis)
  2 - 5k Hz (x axis)

LOW OUTGASSING MINIATURE LIGHTWEIGHT ICP® TRIAXIAL ACCELEROMETER

PCB MODELS 356M208/NC & 356M239

- Sensitivity: Available in 5 mV/g and 10 mV/g
- Measurement Range: ±1k g pk
- Frequency Range (±5%):
  2 - 8k Hz (y or z axis)
  2 - 5k Hz (x axis)

LOW OUTGASSING ICP® TRIAXIAL ACCELEROMETER WITH LOW MASS CABLE

PCB MODEL 356M234

- Sensitivity: 5 mV/g
- Measurement Range: ±1k g pk
- Frequency Range (±5%):
  2 - 8k Hz (y or z axis)
  2 - 5k Hz (x axis)

HIGH AMPLITUDE ICP® TRIAXIAL ACCELEROMETER WITH LOW-PASS FILTER

PCB MODEL 350B50/XXXBZ/NC

- Sensitivity: (±30%) 0.5 mV/g
- Measurement Range: ±10k g pk
- Frequency Range (±1 dB): 3 to 10k Hz

LOW OUTGASSING ICP® TRIAXIAL ACCELEROMETER

PCB MODEL TLD356M131

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 2 - 3k Hz

LOW OUTGASSING TITANIUM ICP® TRIAXIAL ACCELEROMETER

PCB MODEL 356M98

- Sensitivity: 1k mV/g
- Measurement Range: ±5 g pk
- Frequency Range (±5%): 0.5 - 3k Hz

LOW OUTGASSING HIGH SENSITIVITY ICP® TRIAXIAL ACCELEROMETER

PCB MODEL 356M132

- Sensitivity: 500 mV/g
- Measurement Range: ±10 g pk
- Frequency Range (±5%): 0.5 - 3k Hz

LOW OUTGASSING MINIATURE ICP® TRIAXIAL ACCELEROMETER

PCB MODEL 354M56

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 2 - 8k Hz

LOW OUTGASSING MINIATURE ICP® TRIAXIAL ACCELEROMETER

PCB MODEL 356M41

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 1 - 10k Hz

LOW OUTGASSING ICP® TRIAXIAL ACCELEROMETER WITH TEDS

PCB MODEL TLD356M155

- Sensitivity: 2.5 mV/g
- Measurement Range: ±2k g pk
- Frequency Range (±5%):
  1 - 10k Hz (y or z axis)
  1 - 6k Hz (x axis)

LOW OUTGASSING ICP® TRIAXIAL ACCELEROMETER WITH TEDS

PCB MODEL 356A19

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%):
  1 - 13k Hz (all axis)

LOW OUTGASSING CABLES FOR SINGLE AXIS & TRIAXIAL ACCELEROMETERS

PCB MODEL 002A10

- Sensor connecting cable for ICP®
- General purpose, coaxial, FEP
- -130 to +400 °F (-90 to +204 °C)
- 10-ft, 10-32 plug to 10-32 plug

PCB MODEL 003A10

- Sensor connecting cable
- Low-noise, coaxial, FEP
- -320 to +500 °F (-196 to +260 °C)
- 10-ft, 10-32 plug to 10-32 plug

PCB MODEL 003M208/XXX

- Sensor connecting cable
- Low-noise, coaxial, FEP
- -320 to +500 °F (-196 to +260 °C)
- Multiple lengths available, 5-44 plug to 10-32 plug

PCB MODEL 003M269/XXX

- Connecting cable
- Low-noise, coaxial, FEP
- -85 to +329 °F (-65 to +165 °C)
- Multiple lengths available, 10-32 plug to BNC plug

PCB MODEL 030B10

- Sensor connecting cable
- Low-noise, coaxial, FEP
- -76 to +500 °F (-60 to +260 °C)
- 10-ft, M3 plug to 10-32 plug

PCB MODEL 030A10

- Sensor connecting cable
- Low-noise, coaxial, FEP
- -130 to +500 °F (-90 to +260 °C)
- 10-ft, 3-56 plug to 10-32 plug

PCB MODEL 030EKXXXPH

- Sensor connecting cable
- Low-noise, coaxial FEP
- -76 to +500 °F (-60 to +260 °C)
- Multiple lengths available, 3-56 plug to 10-32 jack

PCB MODEL 098EBXXXEB

- Extension cable
- Low-noise, coaxial TFE
- -130 to +500 °F (-90 to +260 °C)
- Multiple lengths available, 10-32 plug to 10-32 plug

PCB MODEL 003M276/XXX

- Low-noise, coaxial, FEP
- -320 °F to +500 °F (-196° C to 260 °C)
- Multiple lengths available, 5-44 plug to 10-32 jack

PCB MODEL 003M285/XXX

- Low-noise, coaxial, FEP
- -85 °F to +257 °F (-65° C to 125 °C)
- Multiple lengths available, 2-socket 5/8-24 MS3106 connector to BNC plug

PCB MODEL 034M36/XXX

- Low-noise, 4-conductor, shielded, FEP
- -76 °F to +325 °F (-60° C to 163 °C)
- Multiple lengths available, 1/4-28 4-socket plug to blunt cut

PCB MODEL 034M42/XXX

- Low-noise, 4-conductor, shielded, FEP
- -76 °F to +325 °F (-60° C to 163 °C)
- Multiple lengths available, 4-socket plug to 4-pin jack

PCB MODEL 034M62/XXX

- Low-noise, 4-conductor, shielded, FEP
- -65 °F to +325 °F (-54° C to 163 °C)
- Multiple lengths available, mini 4-socket 8-36 plug to 4-pin jack

PCB MODEL 037M23/XXX

- 10-conductor, Shielded, FEP
- -31 °F to +250 °F (-35° C to 121 °C)
- Multiple lengths available, 9-socket 5/16-24 plug to blunt-cut

PCB MODEL 098EBXXXPW

- Low-noise, Coaxial, FEP
- -85 to +329 °F (-65 to +165 °C)
- Multiple lengths available, 10-32 plug to BNC plug

PCB MODEL 098M01/XXX

- Low-noise, coaxial, FEP
- -130 to +500 °F (-90 to +260 °C)
- Multiple lengths available, 10-32 plug to 10-32 plug

PCB MODEL 034M22/XXX

- Sensor connecting cable
- Low-noise, 4-conductor, shielded, FEP
- -67 to +230 °F (-55 to +110 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to (3) BNC plugs

PCB MODEL 034M28/XXX

- Sensor connecting cable
- Low-noise, 4-conductor, shielded, FEP
- -67 to +230 °F (-55 to +110 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to (3) 10-32 plugs

PCB MODEL 034M51/XXX

- Extension cable
- Low-noise, 4-conductor, shielded, FEP
- -76 to +325 °F (-60 to +163 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to 4-socket 1/4-28 plug

PCB MODEL 068M01/XXX

- Sensor connecting cable
- 4-conductor, 85% shield for low mass, FEP
- -76 to +325 °F (-60 to +163 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to pigtail leads

PCB MODEL 068M03/XXX

- 4-conductor, 85% shield for low mass, FEP
- -76 to +325 °F (-60 to +163 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to (3) 10-32 plugs

PCB MODEL 080M233

- Hermetic bulkhead feed-thru adaptor
- -4 °F to +325 °F (-20° C to 121 °C)
- 4-pin 1/4-28 jack to 4-pin 1/4-28 jack

PCB MODEL 034M21/XXX

- Sensor connecting cable
- Low-noise, 4-conductor, shielded, FEP
- -67 to +230 °F (-55 to +110 °C)
- Multiple lengths available, mini 4-socket 8-36 plug to (3) BNC plugs

PCB MODEL 010M157/XXX

- Sensor connecting cable
- 4-conductor, shielded, FEP
- -67 °F to +230 °F (-55° C to 110 °C)
- Multiple lengths available, 1/4-28 4-pin jack to (3) 10-32 plugs

PCB MODEL 034M50/XXX

- Low-noise, 4-conductor, shielded, FEP
- -65 °F to +356 °F (-54° C to 180 °C)
- Multiple lengths available, mini 4-socket 8-36, plug to pigtails

PCB MODEL 010M128/XXX

- Extension cable
- 4-conductor, shielded, FEP
- -76 to +325 °F (-60 to +163 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to 4-pin 1/4-28 jack

PCB MODEL 068M02/XXX

- 4-conductor, 85% shield for low mass, FEP
- -76 to +325 °F (-60 to +163 °C)
- Multiple lengths available, 4-socket 1/4-28 plug to (3) BNC plugs

PCB MODEL 070B14

- Hermetic bulkhead feed-thru adaptor
- 10-32 jack to 10-32 jack

HIGH TEMPERATURE CHARGE MODE ACCELEROMETERS

PCB high-temperature charge mode accelerometers are engineered to withstand the extreme conditions of aircraft gas turbine engines, industrial turbines, rocket propulsion systems, and exhaust systems. These demanding environments require sensors that deliver accurate and reliable measurements under high heat and complex vibration conditions. With over 30 years of experience, PCB has developed advanced piezoelectric materials and technologies trusted by customers for precise, repeatable results.

UHT-12™ is a proprietary crystal designed for more accurate,lower noise measurements in the most demanding test environments. The technology provides superior data quality, especially compared to ceramic crystals. The main technical advantages include:

- Elimination of pyroelectric noise spikes up to 1200°F (649°C)
- Consistent sensitivity across wide temperature ranges
- Shear mode crystals isolated from base strain and transverse measurement errors
- Hermetically sealed for proven reliability in turbine engine testing and monitoring

Applications:

- High temperature vibration measurements
- Engine compartment studies
- Exhaust component vibration tests
- Steam turbine testing
- Engine vibration analysis

MINIATURE TRIAXIAL CHARGE OUTPUT ACCELEROMETER

PCB MODELS 356A70 & 356A71

- Temperature Range: -94 to +490 °F (-70 to +254 °C)
- Sensitivity: 2.7 to 10 pC/g
- Measuring range: 1500 g
- Weight: 8 grams

MINIATURE RING-STYLE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357B06

- Temperature Rangee: -65 to +500 °F (-54 to +260 °C)
- Sensitivity: 5 pC/g
- Measuring range: 500 g
- Weight: 2.3 grams

HIGH TEMPERATURE MINIATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357B11

- Temperature Range: -95 to +500 °F (-71 to +260 °C)
- Sensitivity: 3 pC/g
- Measuring range: 2300 g
- Weight: 2 grams

CHARGE OUTPUT TRIAXIAL ACCELEROMETER WITH UHT-12™

PCB MODEL EX356A73

- Temperature Range: -67 to +900 °F (-55 to +482 °C)
- Sensitivity: 3.2 pC/g
- Measuring range: ±500 g
- Weight: 150 grams

UHT-12™ HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357A63

- Temperature Range: -65 to +900 °F (-54 to +482 °C)
- Sensitivity: 0.53 pC/g
- Measuring range: ±5k g
- Weight: 8.7 grams

HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357B69

- Temperature Range: -65 to +900 °F (-54 to +482 °C)
- Sensitivity: 3.5 pC/g
- Measuring range: ±500 g
- Weight: 16.0 grams

MINIATURE CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 7240C

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 3 pC/g
- Measuring range: 5k g pk
- Weight: 4.8 grams

MINIATURE CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 2220E

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 3 pC/g
- Measuring range: 5k g pk
- Weight: 3.1 grams

MINIATURE CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 2230E

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 2.8 pC/g
- Measuring range: 2kg pk
- Weight: 17 grams

CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 2221F

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 10 pC/g
- Measuring range: 2k g pk
- Weight: 11 grams

CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 7201-10

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 10 pC/g
- Measuring range: 2k g pk
- Weight: 18 grams

CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 7221A

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 10 pC/g
- Measuring range: 2k g pk
- Weight: 0.37 grams

CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 7703A-50

- Temperature: -67 ºF to +550 ºF (-55 °C to +288 °C)
- Sensitivity: 300 pC/g
- Measuring range: 2k g pk
- Weight: 25 grams

CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 7704A-50

- Temperature: -67 ºF to +550 ºF (-55 °C to +288 °C)
- Sensitivity: 50 pC/g
- Measuring range: 2k g pk
- Weight: 0.9 grams

TRIAXIAL CHARGE OUTPUT ACCELEROMETER

ENDEVCO MODEL 2230EM1

- Temperature Range: -67 ˚F to +500 ˚F (-55 ˚C to +260 ˚C)
- Sensitivity: 3 pC/g
- Measuring range: 2k g pk
- Weight: 17 grams

HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357B69

- Temperature Range: -65 to +900 °F (-54 to +482 °C)
- Sensitivity: 3 pC/g
- Measurement Range: ±500 g pk
- Frequency Response (+5%): 6k Hz

HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357B61

- Temperature Range: -65 to +900 °F (-54 to +482 °C)
- Sensitivity: 10 pC/g
- Measurement Range: ±1k g pk
- Frequency Response (+5%): 5k Hz

UHT-12™ CHARGE OUTPUT ACCELEROMETER

PCB MODELS 357E90 & 357E91 & 357E92 & 357E93

- Temperature Range: -67 to 1200 °F (-55 to 649 °C)
- Sensitivity: 5.0 / 5.0 / 2.3 / 2.3 pC/g
- Measurement Range: ±1k g pk
- Frequency Response (+5%): 3k Hz

UHT-12™ CHARGE OUTPUT ACCELEROMETER

PCB MODEL 357A63

- Temperature Range: -65 to 900 °F (-54 to 482 °C)
- Sensitivity: 0.53 pC/g
- Measurement Range: ±5k g pk
- Frequency Response (+10%): 10k Hz

UHT-12™ CHARGE OUTPUT ACCELEROMETER

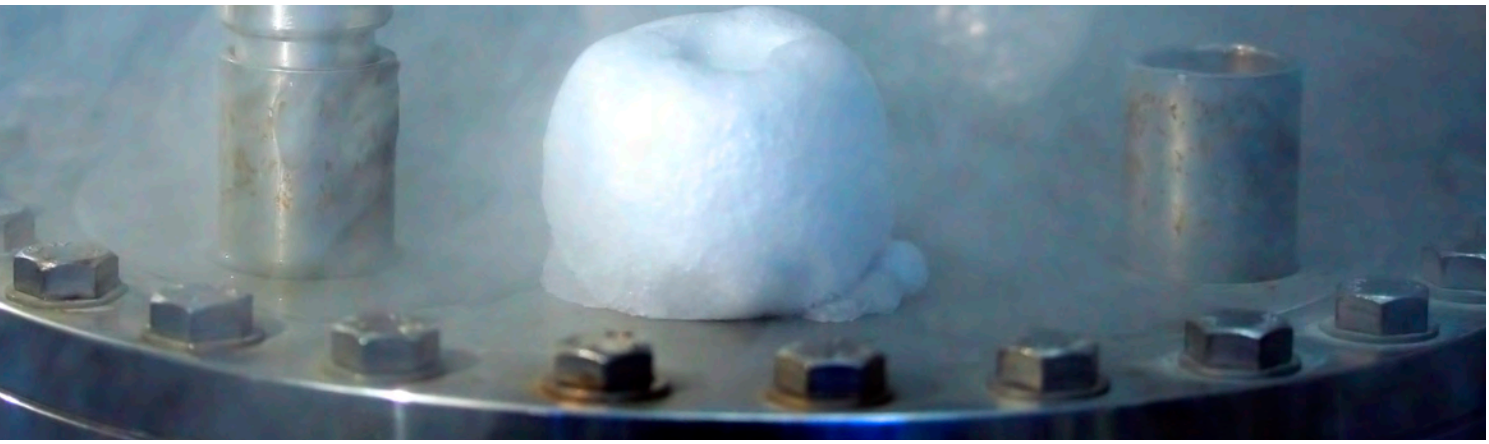
PCB MODEL 357A64

- Temperature Range: -67 to 1200 °F (-55 to 649 °C)
- Sensitivity: 0.53 pC/g
- Measurement Range: ±5k g pk
- Frequency Response (+10%): 10k Hz

UHT-12™ CHARGE OUTPUT DIFFERENTIAL ACCELEROMETER

PCB MODELS EX357A94 & EX357A95

- Temperature Range: -67 to 1200 °F (-55 to 649 °C)
- Sensitivity: 3.3 pC/g
- Measurement Range: ±1k g pk
- Frequency Response (+5%): 3k Hz



CRYOGENIC ICP® ACCELEROMETERS

PCB Cryogenic ICP® accelerometers are engineered for extreme cold, operating below the typical -65°F (-54°C) limit of most voltage mode sensors. Featuring specialized cryogenic ICP® circuitry and quartz shear sensing technology, these accelerometers ensure survivability in demanding environments like liquid nitrogen. Each unit is hermetically sealed and individually tested to ensure reliable operation and accurate measurements at temperatures as low as -320°F (-196°C). Choose from a range of models, including lightweight accelerometers that minimize mass loading effects or high-sensitivity versions designed for detecting low-level vibrations.

CRYOGENIC ICP® ACCELEROMETERS

PCB MODELS 351B03 & 351B04

- Sensitivity: 10 mV/g
- Measurement Range: ±150 g pk
- Frequency Range (±5%): 6k Hz
- Available with ground isolation

CRYOGENIC ICP® ACCELEROMETER

PCB MODEL 351B31

- Sensitivity: 50 mV/g
- Measurement Range: ±30 g pk
- Frequency Range (±5%): 4k Hz
- Available with ground isolation

CRYOGENIC ICP® ACCELEROMETER

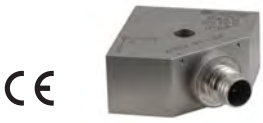
PCB MODELS 351B41 & 351B41

- Sensitivity: 100 mV/g
- Measurement Range: ±15 g pk
- Frequency Range (±5%): 2k Hz
- Available with ground isolation

CRYOGENIC MINIATURE ICP® ACCELEROMETER

PCB MODELS 351B11 & 351B14

- Sensitivity: 5 mV/g
- Measurement Range: ±300 g pk
- Frequency Range (±5%): 10k Hz / 8k Hz
- Available with ground isolation & in metric



CRYOGENIC TRIAXIAL ICP® ACCELEROMETER

PCB MODEL 354A14

- Sensitivity: 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range (±5%): 10k Hz

MINIATURE CRYOGENIC ICP® ACCELEROMETER

PCB MODEL 351A15

- Sensitivity: 5.5 mV/g
- Measurement Range: ±1k g pk
- Frequency Range (±5%): 6.5k Hz

CRYOGENIC CHARGE OUTPUT PIEZOELECTRIC ACCELEROMETERS

Endevco cryogenic piezoelectric accelerometers are designed for vibration measurements in extreme cryogenic environments, operating down to -452°F (-269°C). With stable signal output even at ultra-low temperatures, these accelerometers feature rugged construction to withstand multiple cycles of thermal shock under steep temperature gradients. As self-generating devices requiring no external power or electronics, they operate effectively below the -320°F (-196°C) limit of ICP® accelerometers, providing reliable performance in the harshest conditions.

CRYOGENIC CHARGE PIEZOELECTRIC ACCELEROMETERS

ENDEVCO MODEL 7722

- Sensitivity: 3.7 pC/g
- Shock Limit: 2.5k g
- Frequency Response (±1 dB Hz): 6k Hz

CRYOGENIC CHARGE PIEZOELECTRIC ACCELEROMETERS

ENDEVCO MODEL 7724

- Sensitivity: 3.7 pC/g
- Shock Limit: 2.5k g
- Frequency Response (±1 dB Hz): 6k Hz

CRYOGENIC CHARGE PIEZOELECTRIC ACCELEROMETERS

ENDEVCO MODELS 2271A & 2271AM20

- Sensitivity: 11.5 pC/g
- Shock Limit: 10k g
- Frequency Response (±1 dB Hz): 8k Hz

REMOTE CHARGER CONVERTERS WITH TEDS

ENDEVCO MODEL 2771C-01

- Gain: .1 mV/pC
- Input Type: Single-ended piezoelectric
- Number of channels: 1
- Configuration: In-line

REMOTE CHARGER CONVERTERS WITH TEDS

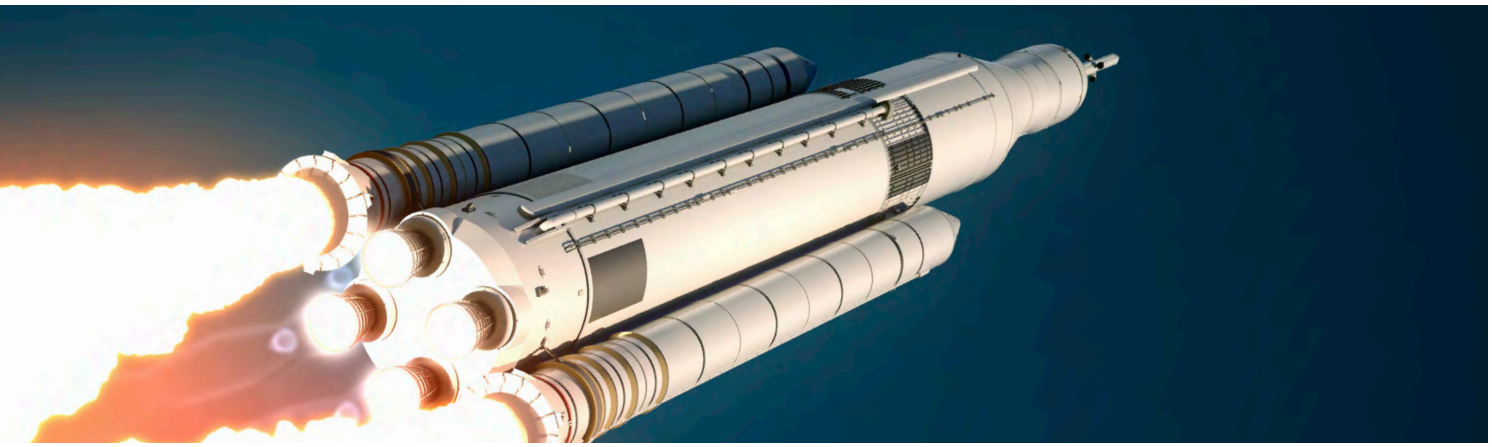
ENDEVCO MODEL 2771C-01

- Gain: 1 mV/pC
- Input Type: Single-ended piezoelectric
- Number of channels: 1
- Configuration: In-line

REMOTE CHARGER CONVERTERS WITH TEDS

ENDEVCO MODEL 2771C-5

- Gain: 5 mV/pC
- Input Type: Single-ended piezoelectric
- Number of channels: 1
- Configuration: In-line



EXTREME ENVIRONMENT ICP® & CHARGE OUTPUT PRESSURE SENSORS

Extreme environment ICP® and charge output pressure sensors are engineered to deliver accurate and reliable performance in the harshest conditions. Designed for high-temperature, high-pressure, and cryogenic environments, these sensors provide precise measurements where conventional sensors may fail.

ROCKET MOTOR ICP® PRESSURE SENSOR

PCB MODELS 123B22 & 123B23 & 123B24

- Sensitivity: 1.0 / 0.5 / 5.0 mV/psi
- Measurement Range: 3k / 10k / 1k psi
- Temperature Range: -100 to +250 °F (-73 to +121 °C)

CHARGE OUTPUT ROCKET MOTOR PRESSURE SENSOR

PCB MODEL 123B

- Sensitivity: 1.1 pC/psi
- Measurement Range: 3k psi
- Temperature Range (with water cooling on): -450 to +500 °F (-268 to +260 °C)

ROCKET MOTOR ICP® PRESSURE SENSOR

PCB MODEL 124A24

- Sensitivity: 5.0 mV/psi
- Measurement Range: 1 kpsi
- Temperature Range: -100 to +250 °F (-73 to +121 °C)

PCB HIGH TEMPERATURE CHARGE OUTPUT SENSORS

PCB high-temperature quartz dynamic pressure sensors are engineered for reliable operation in extreme heat environments, functioning without cooling up to 1200°F (650°C) on compressors, pumps, and similar equipment. These sensors use quartz crystals for accurate measurements under high-temperature conditions, with optional special mounting adaptors for fitting into existing setups. Water-cooled adaptors are also available to provide thermal stability in applications beyond normal operating limits.

For environments exceeding 500°F (260°C), hard-line cables are recommended and can be welded to the sensor for pressurized conditions. These features ensure dependable performance even in the most demanding high-temperature environments.

Highlights:

- Laser welded, hermetically sealed quartz sensing elements
- Fused ceramic insulation connectors
- Internal acceleration compensation minimizes vibration sensitivity
- Calibration supplied at room temperature with thermal coefficients up to 1200 °F (650 °C)

PCB CRYOGENIC ICP® PRESSURE SENSORS

PCB cryogenic quartz dynamic pressure sensors deliver high-resolution measurements, specifically designed for extreme cryogenic environments. These sensors excel in tracking dynamic events, such as those found in cryogenic turbo pumps for liquid fuel systems or biomedical research applications, providing reliable and accurate data where precision is critical.

Highlights:

- Fast rise time of ≤ 2 µsec from quartz element, with high resonant frequency ≥ 250 kHz
- Welded, hermetically sealed, stainless steel construction
- Electrically ground isolated, which helps prevent ground loop challenges
- Calibration supplied at room temperature with thermal coefficients at -320 °F (-196 °C)

WIDE TEMPERATURE RANGE CHARGE PRESSURE SENSORS

PCB MODELS 112B05 & 112A06

- Sensitivity: 1.1 / 2.6 pC/psi
- Measurement Range: 5k psi
- Temperature Range:
  -400 to +500 °F (-240 to +260 °C) /
  -400 to 662 °F (-240 to 350 °C)

WATER-COOLED ADAPTOR

PCB MODEL 064B01

- 1/2-20 External thread
- 1.0” hex (for PCB Model 112A05)

PCB MODEL 064B06

- M20 x 1.5 External thread
- 1.25” hex (for PCB Model 112B05)

HIGH TEMPERATURE PRESSURE SENSOR

PCB MODELS 116A05 & 116B

- Sensitivity: 7 / 6 pC/psi
- Measurement Range: 100 psi
- Temperature Range:
  -400 to +650 °F (-240 to +345 °C)
  -320 to +800 °F (-196 to 427 °C)

CRYOGENIC ICP® PRESSURE SENSOR

PCB MODELS 102B10 & 102B11

- Sensitivity: 50 / 5.0 mV/psi
- Measurement Range: 100 psi / 1k psi
- Temperature Range: -320 to +212 °F
  (-196 to +100 °C)

CRYOGENIC ICP® PRESSURE SENSOR

PCB MODELS 102B13 & 102B14

- Sensitivity: 0.5 / 1 mV/psi
- Measurement Range: 10k / 5k psi
- Temperature Range: -320 to +212 °F
  (-196 to +100 °C)

CHARGE OUTPUT PRESSURE SENSOR

PCB MODEL 176A07

- Sensitivity: 7 pC/psi
- Measurement Range: 725 psi
- Temperature Range: -94 to +1200 °F
  (-70 to +650 °C)

CHARGE DIFFERENTIAL OUTPUT PRESSURE SENSOR

PCB MODEL 176A31

- Sensitivity: 6 pC/psi
- Measurement Range: 3k psi
- Temperature Range: -94 to +1400 °F
  (-70 to +760 °C)

CHARGE SINGLE ENDED OUTPUT PRESSURE SENSOR

PCB MODEL 176A33

- Sensitivity: 6 pC/psi
- Measurement Range: 3k psi
- Temperature Range: -94 to +1400 °F
  (-70 to +760 °C)

CHARGE OUTPUT PRESSURE SENSOR

PCB MODEL 176M47

- Sensitivity: 15 pC/psi
- Measurement Range: 500 psi
- Temperature Range: -70 to +1200 °F
  (-57 to 650 °C)

The Modal Shop's diverse product lineup includes the innovative SmartShaker™ with an integrated power amplifier, mini inertial shakers, and a variety of mini, through-hole modal, dual-purpose, and platform shakers. These exciters are ideal for applications such as experimental modal analysis and general vibration testing of small components and sub-assemblies.

THE MODAL SHOP
AN AMPHENOL COMPANY

Shaker systems, along with accelerometers, force sensors, hammers, microphones, and sound level meters, are also available through the TMS Rental Program. For more information, visit www.modalshop.com or contact TMS at +1-513-351-9919 or info@modalshop.com.

SHAKERS FOR MODAL TESTING

The Modal Shop's modal shakers are trusted solutions in test laboratories worldwide, offering force ratings from 2 to 60 lbf (9 to 133 N), making them ideal for a wide range of modal analysis applications. In experimental modal analysis and structural testing, choosing the right excitation system is critical for achieving accurate results. For many applications, electrodynamic shaker systems are the preferred choice.

Designed for portability, ruggedness, and ease of setup, The Modal Shop's shakers ensure optimal testing performance. The compact Model 2002E Inertial Shaker is perfect for confined spaces where stingers or hammers can't be used. The all-in-one SmartShakers™, Models K2007E01 and K2004E01, with built-in power amplifiers, simplify modal testing for both single and multiple input tests (SIMO or MIMO). The Model 2060E, with its extended 1.4 in (36 mm) stroke, enhances input levels at low frequencies, making it particularly useful for GVT applications. Each shaker system is delivered fully equipped with the necessary amplifier, trunnion base, cables, stingers, and accessories, ready to use for accurate testing.

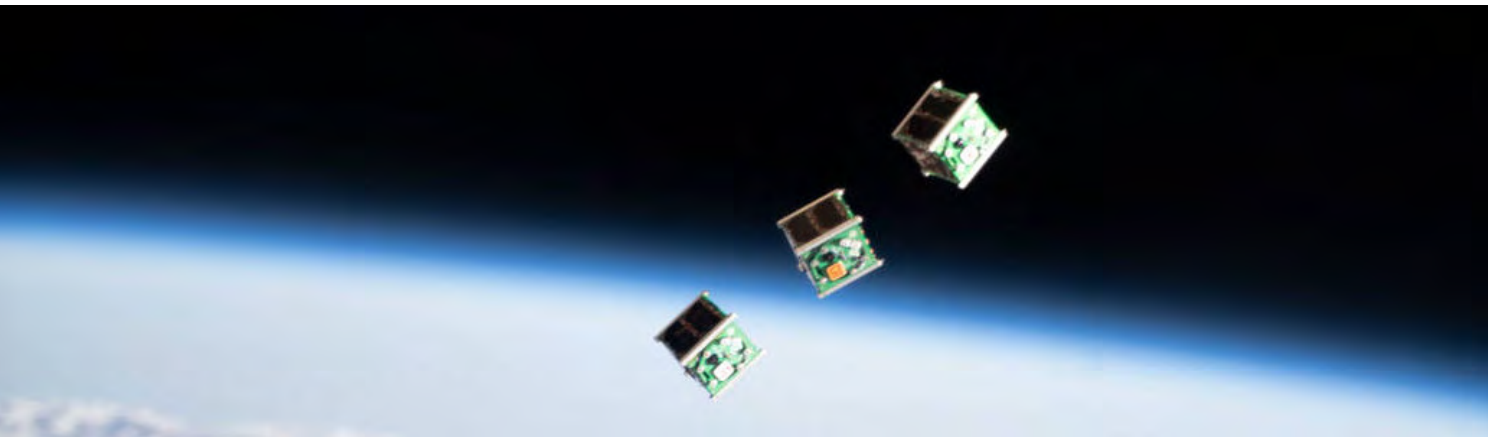
MODEL 2060E

MODEL 2025E

MODELS 2004E & 2007E

SMARTSHAKER™
MODELS K2004E01 & K2007E01

MODEL 2002E



CUBESAT VIBRATION TESTING WITH MODAL-POD™

Simplify your CubeSat vibration testing with The Modal Shop's Electrodynamic Shaker Model 2500E paired with the Modal-Pod™ Model 2000X15. The 2500E is a powerful 500 lbf force shaker with a 6-inch (15.2 cm) diameter mounting platform, designed for general vibration testing of small components and stress screening of electronic and mechanical sub-assemblies across R&D, reliability, and quality assurance applications.

The Modal-Pod™ 2000X15 serves as a dedicated CubeSat test fixture for use with the 2500E shaker, offering a standardized mounting system for 1U, 2U, and 3U CubeSats. It allows for quick and easy horizontal or vertical satellite mounting, facilitating critical vibration qualification and acceptance testing to meet NASA or other industry standards, ensuring CubeSat survivability during launch.

Model 2500E Shaker with 2000X15 Mounted

SHAKERS FOR VIBRATION TESTING

The Modal Shop offers a versatile range of vibration shakers, from miniature inertial shakers to large-scale test systems, designed for applications in laboratory research, automotive, and aerospace component testing. These shakers provide force ratings from 4.5 lbf (20 N) to 500 lbf (2224 N), catering to a wide variety of testing needs.

The compact SmartShaker™ Series, Models K2007E01 and K2004E01, integrates a built-in power amplifier, making it an all-in-one solution for both modal and vibration testing. For high-frequency applications, the Model 2025E-HF, with its 2.125-inch (5.4 cm) diameter table, offers extended capabilities up to 20 kHz. Dual-purpose models, such as the 2075E and 2110E, feature a 3.25-inch (8.3 cm) platform for vibration testing and a through-hole armature for modal testing, providing a flexible solution for various applications.

Larger shakers, including the 2500E, 2075E, and 2110E, are also available with Head Expanders and Horizontal Table configurations, supporting payloads that require specific orientations or cannot be directly attached to the shaker.

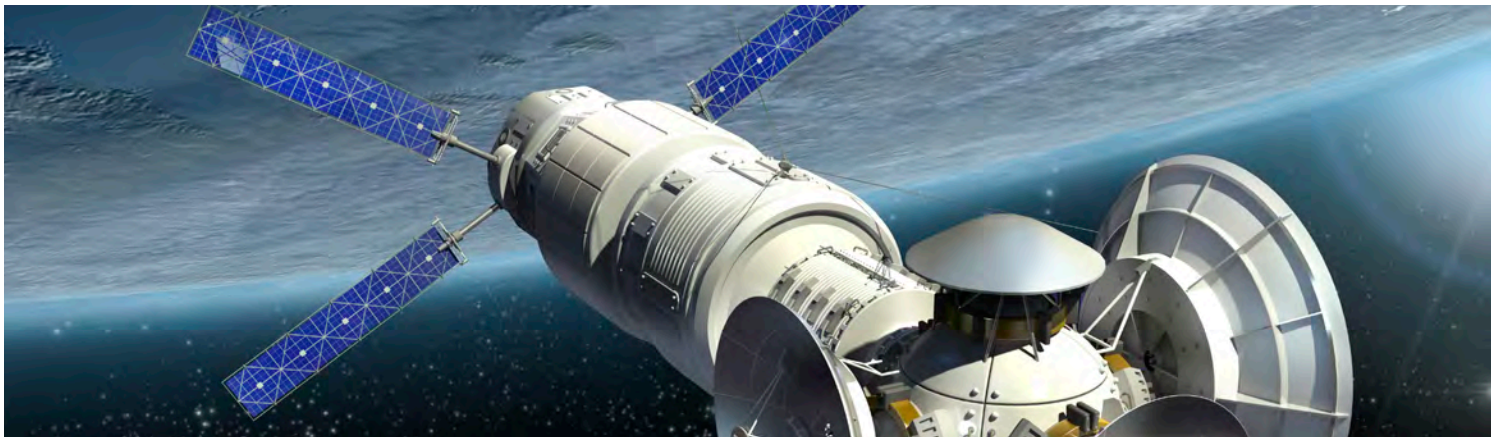
MODEL 2110E

MODEL 2075E

MODEL 2025E-HF

MODELS 2004E & 2007E

SMARTSHAKER™
MODELS K2004E01 & K2007E01



FORCE LIMITED VIBRATION TESTING SYSTEMS

Force limited vibration testing systems are essential for protecting sensitive equipment during vibration qualification tests. These systems measure and control the input force applied to a unit, preventing over-testing and damage to components.

PCB's force limited vibration testing systems provide precise input force measurement, a critical factor for safeguarding high-value aerospace and other advanced equipment during vibration qualification testing. Conventional testing methods, which rely solely on acceleration control, often lead to over-testing, resulting in potential damage to the unit under test (UUT). Force limited vibration testing addresses this by measuring and controlling the total input force exerted on the UUT.

Our testing systems meet most requirements for limiting the reaction force between the shaker and unit under test in random vibration testing. The use of piezoelectric, 3-component force sensors facilitates easy and accurate measurement of the input force. This force relates directly, using Newton's Second Law, F=ma, to the "quasi-static "acceleration of the structure's center-of-gravity. Since design loads for aerospace equipment are often given in terms of the "quasi-static" acceleration, the use of force sensors represents an ideal measurement approach for this application.

Highlights:

- Minimizes over-testing
- Reduces risk of damage to critical structures
- Measures summed forces
- Measures force differences (moments)
- Simplifies and expedites the test process
- Convenient and easy to implement

3-COMPONENT ICP® & CHARGE OUTPUT QUARTZ FORCE RINGS

TRIAXIAL ICP® FORCE SENSOR

PCB MODEL 260B01

- Sensitivity (z-axis): 2.5 mV/lb
- Sensitivity (x or y axis): 10 mV/lb
- Measurement Range (z-axis): 1k lb
- Measurement Range (x or y axis): ±500 lb
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

TRIAXIAL ICP® FORCE SENSOR

PCB MODEL 260B02

- Sensitivity (z-axis): 2.5 mV/lb
- Sensitivity (x or y axis): 5 mV/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±1k lb
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

TRIAXIAL ICP® FORCE SENSOR

PCB MODEL 260B03

- Sensitivity (z-axis): 0.25 mV/lb
- Sensitivity (x or y axis): 1.25 mV/lb
- Measurement Range (z-axis): ±10k lb
- Measurement Range (x or y axis): ±4k lb
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

TRIAXIAL CHARGE OUTPUT FORCE SENSOR

PCB MODEL 260B11

- Sensitivity (z-axis): 15 pC/lb
- Sensitivity (x or y axis): 32 pC/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±500 lb
- Temperature Range: -100 to +350 °F (-73 to +177 °C)

TRIAXIAL CHARGE OUTPUT FORCE SENSOR

PCB MODEL 260B12

- Sensitivity (z-axis): 15 pC/lb
- Sensitivity (x or y axis): 32 pC/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±1k lb
- Temperature Range: -100 to +350 °F (-73 to +177 °C)

TRIAXIAL CHARGE OUTPUT FORCE SENSOR

PCB MODEL 260B13

- Sensitivity (z-axis): 15 pC/lb
- Sensitivity (x or y axis): 32 pC/lb
- Measurement Range (z-axis): ±10k lb
- Measurement Range (x or y axis): ±4k lb
- Temperature Range: -100 to +350 °F (-73 to +177 °C)

3-COMPONENT ICP® & CHARGE OUTPUT QUARTZ FORCE LINKS

TRIAXIAL ICP® FORCE LINK

PCB MODEL 261B01

- Sensitivity (z-axis): 2.5 mV/lb
- Sensitivity (x or y axis): 10 mV/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±500 lb
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

TRIAXIAL ICP® FORCE LINK

PCB MODEL 261B02

- Sensitivity (z-axis): 2.5 mV/lb
- Sensitivity (x or y axis): 5 mV/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±1k lb
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

TRIAXIAL ICP® FORCE LINK

PCB MODEL 261B03

- Sensitivity (z-axis): 0.25 mV/lb
- Sensitivity (x or y axis): 1.25 mV/lb
- Measurement Range (z-axis): ±10k lb
- Measurement Range (x or y axis): ±4k lb
- Temperature Range: -65 to +250 °F (-54 to +121 °C)

TRIAXIAL CHARGE FORCE LINK

PCB MODEL 261B11

- Sensitivity (z-axis): 15 pC/lb
- Sensitivity (x or y axis): 32 pC/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±500 lb
- Temperature Range: -100 to +350 °F (-73 to +177 °C)

TRIAXIAL CHARGE FORCE LINK

PCB MODEL 261B12

- Sensitivity (z-axis): 15 pC/lb
- Sensitivity (x or y axis): 32 pC/lb
- Measurement Range (z-axis): ±1k lb
- Measurement Range (x or y axis): ±1k lb
- Temperature Range: -100 to +350 °F (-73 to +177°C)

TRIAXIAL CHARGE FORCE LINK

PCB MODEL 261B13

- Sensitivity (z-axis): 15 pC/lb
- Sensitivity (x or y axis): 32 pC/lb
- Measurement Range (z-axis): ±10k lb
- Measurement Range (x or y axis): ±4k lb
- Temperature Range: -100 to +350 °F (-73 to +177°C)

SIGNAL CONDITIONING SYSTEM COMPONENT SPECIFICATIONS

SUMMING BLOCK FOR CHARGE MODE SENSORS

PCB MODEL 070A15

- Input: 4-Channels of charge input
- Output: 1-Channel of summed charge output

DUAL-MODE CHARGE AMPLIFIER

PCB MODEL 443B102

- 1-channel
- Voltage Gain (ICP® sensor mode): x0.1 to x1k
- Voltage Gain (charge mode): x0.1 to 10k mV/pC

CHARGE SUMMATION NODE MODULE

PCB MODEL 070M70

- Input: 8-Channels of charge mode
- Output: 1-Channel of summed charge output

COMPUTATIONAL SIGNAL CONDITIONER

PCB MODEL 070M69

- Input: 4 to 8-Channels of ICP® sensor or voltage signals
- Output: 1-Channel
- For summing or moment calculations

SUMMING AMPLIFIER FOR ICP® SENSORS

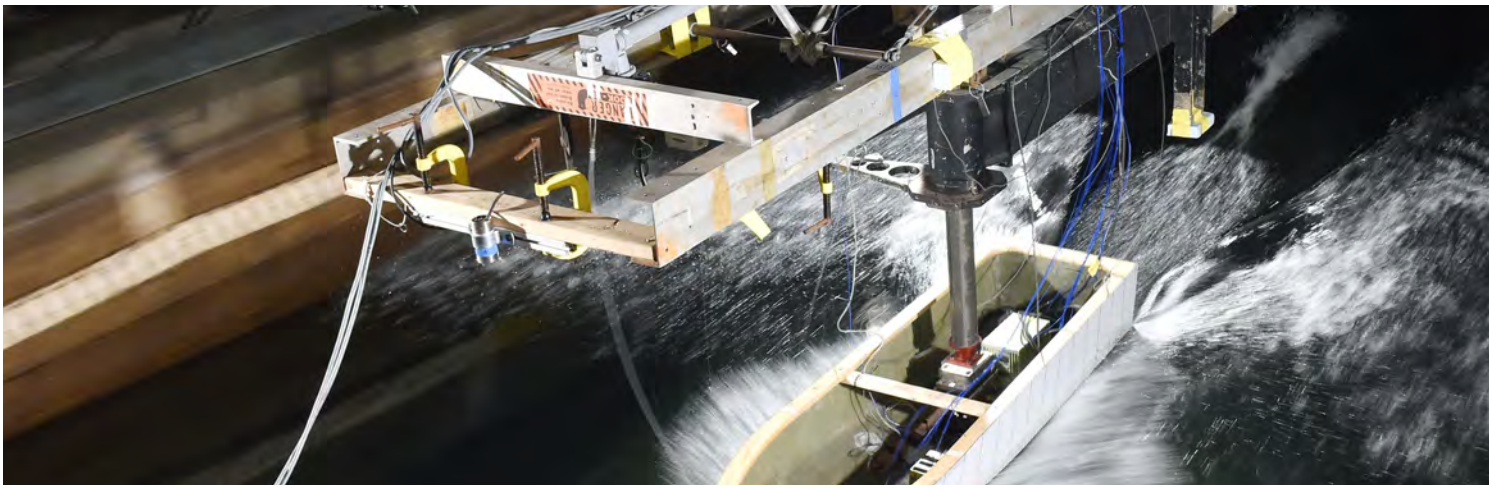
PCB MODEL 070M90

- Input: 12-Channels of ICP® signals
- Output: 1-Channel
- Gain: x0.1, x1, x10

PE/IEPE SIGNAL CONDITIONER

ENDEVCO MODEL 2775C

- Input: 1-Channel Piezoelectric (PE), Integrated Electronics PE (IEPE), or in-line Remote Charge Converter (RCC)
- Output: AC, DC, or SERVO
- Gain up to 10k



RAPIDLY FLUCTUATING PRESSURE, FLOW, SCREW CAVITATION, & WAVE SLAP

Rapidly fluctuating environments, such as those involving pressure changes, fluid flow and cavitation, demand rugged sensors with fast response times and high sensitivity to capture dynamic events without distortion.

PRESSURE & FORCE SENSORS

PCB piezoelectric pressure and force sensors are designed for dynamic pressure measurements in applications such as turbulence and cavitation. These environments demand fast response times, ruggedness, and high stiffness to achieve accurate, high-frequency measurements.

HIGH RESOLUTION ICP® PRESSURE PROBE

PCB MODEL S112A22

- 100 mV/psi, 50 psi
- Stainless steel for corrosion protection
- Acceleration compensated

ICP® QUARTZ FORCE RINGS

PCB MODEL 202M44

- ±100 lbs
- Measures dynamic excitation or reaction forces
- Integral waterproof cable

VIBRATION SENSORS

Shear mode accelerometers are ideal for minimizing thermal transients and signal noise, which can result from base bending effects. This isolation of sensing crystals is especially critical when testing thin-walled vessel hull models during wave slap applications, ensuring reliable data collection and measurement accuracy.

ICP® UNDERWATER ACCELEROMETER

PCB MODEL 352M221

- 10 mV/g, ±500 g
- 2nd order LP filter
- Frequency response: 1 Hz to 6k Hz
- Integral waperproof cable

MINIATURE RING-STYLE, CERAMIC SHEAR CVLD ACCELEROMETER

PCB MODEL 355M87A

- 100 µA/g, ±50 g
- Frequency response: 7 Hz to 9k Hz
- Integral waterproof cable
- Case isolated

MINIATURE RING-STYLE, CERAMIC SHEAR ICP® ACCELEROMETER

PCB MODEL 355M73

- 100 mV/g, ±50 g range
- Frequency response: 7 Hz to 9k Hz
- Integral waterproof cable
- Case isolated

TEARDROP ICP® ACCELEROMETER WITH FLEXIBLE, INTEGRAL CABLE

PCB MODEL 352A74

- 100 mV/g, ±50 g range
- Frequency response: 1 Hz to 8k Hz
- Hermetic housing

RING-STYLE SEISMIC SHEAR CVLD ACCELEROMETER

PCB MODEL 631M21

- 1k µA/g, ±2.5 g range
- Frequency response: 1 Hz to 4k Hz
- Integral waterproof cable
- Case isolated

UNDERWATER BLAST

PCB piezoelectric pressure sensors are engineered to measure shock waves and bubble energy in underwater explosion testing. Utilizing volumetrically sensitive, omnidirectional tourmaline crystals and ICP® microelectronics, these sensors deliver high-frequency, low-impedance output, ensuring precise measurements in demanding underwater environments. Waterproof cables, available in custom lengths, are factory-installed for seamless integration.

TOURMALINE ICP® UNDERWATER BLAST SENSOR

PCB SERIES 138A

- ICP® underwater blast pressure probes
- Ranges from 1k to 50k psi
- Rise time 1.5 µ sec
- Resonant frequency ≥ 1 MHz
- Approximate max depth 1k ft.

Photo Courtesy of Siemens and Belgian Defense

PORTABLE SYSTEM VERIFICATION INSTRUMENTS

PCB MODEL 394C06 HANDHELD SHAKER

The PCB Model 394C06 Handheld Shaker is a compact, battery-powered vibration exciter designed for convenient verification of accelerometer and vibration system performance. It supports sensors up to 210 grams and provides a controlled 1 g mechanical excitation for quick and easy system checks.

ACCELEROMETER SIMULATOR ENDEVCO MODEL 4830B

The Endevco 4830B is a handheld, battery-operated signal generator that simulates the electrical output of common accelerometers. Featuring a highly accurate oscillator with adjustable output, it is ideal for setting up, testing, and diagnosing faults in data acquisition systems, environmental test systems, or as a versatile signal generator.

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