



# MODAL ANALYSIS

ADVANCED SENSORS FOR A DYNAMIC WORLD



Image courtesy of Vibrant Technologies

# MODAL ANALYSIS ACCELEROMETERS

Analyze and define the dynamic properties of structures with Dytran modal analysis sensors. Dytran offers high-quality uniaxial and triaxial accelerometers for monitoring small, medium or large structures.

## Low Mass Accelerometers for Small Structures

Small structures resonate at higher frequencies and the quality of the measurement can be adversely affected by the mass of response accelerometers. Excessive mass can change the natural response of the structure or test article by imparting unwanted damping effects. It is critical when studying modal responses of small structures to select accelerometers of the lowest possible mass. The accelerometers in this section are among the lowest mass sensors in the industry, assuring a proper measurement response.



**3224A Series**

### Ultra Miniature Accelerometer

**Applications:** Shock and vibration testing of small consumer electronics, white goods/appliances, musical instruments

**Features:** Low mass prevents mass loading test article, high frequency, IEPE, titanium

- Ranges ( $\pm$ ): 500; 1,000; 2,500; 5,000; 25,000 g
- Sensitivities: 0.2, 1, 2-5, 5-10, 9-14 mV/g
- Frequency ranges ( $\pm 10\%$ ): 0.3-20,000 Hz; 1.2-20,000 Hz
- Weight: 0.2 grams



**Model 3224B**

### Ground Isolated Miniature Accelerometer

**Applications:** Brake rotors, fuel injectors, turbine blade testing

**Features:** Base isolated to prevent ground loop interference, high-temp operation, high frequency, IEPE, titanium

- Range ( $\pm$ ): 500 g
- Sensitivity: 9 to 14 mV/g
- Frequency ranges: ( $\pm 10\%$ ) 0.3-20,000 Hz; ( $\pm 3\text{db}$ ) 0.15-60,000 Hz
- Weight: 0.3 grams



**Model 3225F7**

### High Sensitivity Miniature Accelerometer

**Applications:** Aircraft wing structural analysis, PCB boards, consumer appliance testing

**Features:** Removable cable, hermetically sealed, low mass, IEPE, titanium

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 10\%$ ): 100 mV/g
- Frequency range ( $\pm 10\%$ ): 2-10,000 Hz
- Weight: 1.0 gram



**3133A Series**

### Ultra Miniature Triaxial Accelerometer

**Applications:** Small UAV's, non-vacuum space vehicle components, planetary rover monitoring, and medical leads testing

**Features:** Ideal low frequency response, high sensitivity, low mass, TEDS available, IEPE, titanium

- Ranges ( $\pm$ ): 500; 2,500; 1,000; 5,000; 20,000 g
- Sensitivities ( $\pm 15\%$ ): 10, 2, 5, 0.7, 0.2 mV/g
- Frequency ranges: ( $\pm 5\%$ ) 0.34-6,000 Hz to 1.62-6,000 Hz
- Weight: 0.8 grams

## Ultra Miniature Sensors



Characterized by their exceptionally small size, the products in this section can be mounted in spaces that are inaccessible to other types of accelerometers.



**3133B Series**

### Ground Isolated Triaxial Accelerometer

**Applications:** Electric vehicles, torpedoes, missile components, scroll compressor testing

**Features:** Anodized aluminum isolation cup, IEPE, titanium

- Ranges ( $\pm$ ): 500; 2,500; 1,000; 20,000; 5,000 g
- Sensitivities ( $\pm 15\%$ ): 10, 2, 5, 1, 0.2 mV/g
- Frequency ranges: ( $\pm 5\%$ ) 0.3-6,000 Hz to 0.7-6,000 Hz
- Weight: 0.8-1.5 grams (varies per model)



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### 3274A Series

#### Ultra Miniature Accelerometer

**Applications:** Helicopter rotors, electric vehicles, unmanned aerial vehicle monitoring

**Features:** Base isolated to prevent ground loop interference, removable cable, hermetically sealed, TEDS available, IEPE, titanium

- Ranges ( $\pm$ ): 1,000, 500, 200 g
- Sensitivities ( $\pm 15\%$ ): 5, 10, 25 mV/g
- Frequency ranges: ( $\pm 5\%$ ) 1.1-10,000 Hz
- Weight: 2.0 grams



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### 3133D Series

#### Low Outgassing Miniature Triaxial Accelerometer

**Applications:** Low outgassing environments, space vehicles, satellites, transmission testing

**Features:** Low outgassing, low base strain sensitivity, hermetically sealed, TEDS available, IEPE, titanium

- Ranges ( $\pm$ ): 500; 2,500; 1,000; 5,000; 20,000 g
- Sensitivities ( $\pm 25\%$ ): 10, 2, 5, 0.7, 0.25 mV/g
- Frequency ranges: ( $\pm 5\%$ ) 0.3-6,000 Hz to 0.7-6,000 Hz
- Weight: 0.8 grams

## High Sensitivity Accelerometers for Medium Structures

Medium-size structures need a wide range of impulse excitation due to their broadband response to high frequency and low frequency events. High sensitivity, single-axis, and triaxial adhesive mounted accelerometers with excellent high and low-frequency response cover the broadband response needed for test articles in this category.



### Model 3263A2T

#### High Sensitivity Triaxial Accelerometer

**Applications:** Consumer goods, virtual reality hardware, laptop product testing

**Features:** Low noise, hermetically sealed, TEDS available, IEPE, titanium

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 10\%$ ): 100 mV/g
- Frequency Ranges: ( $\pm 5\%$ ) 0.5-4,000 Hz; ( $-10\%/+15\%$ ) 0.3-10,000 Hz
- Weight: 5.6 grams



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### Model 3097A2

#### IEPE Miniature Accelerometer

**Applications:** Airframes, aircraft elevators, vertical stabilizer testing

**Features:** Low noise, low mass, hermetically sealed, multi-face mounting, TEDS available, IEPE, titanium

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 5\%$ ): 100 mV/g
- Frequency Ranges: ( $\pm 5\%$ ) 0.3-5,000 Hz; ( $\pm 15\%$ ) 0.15-10,000 Hz
- Weight: 4.3 grams



### Models 3055D2 and 3056D2

#### General Purpose Accelerometers

**Applications:** Electric aircraft, vehicle seats, tire balancing, automotive connectors, exhaust manifold testing

**Features:** Base isolated, ideal low frequency response, hermetically sealed, TEDS available, IEPE, titanium, top or side connector options available

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 5\%$ ): 100 mV/g
- Frequency Range ( $\pm 10\%$ ): 1-10,000 Hz
- Weight: 10.0 grams



### Models 3055D7 and 3056D12

#### High Temp General Purpose Accelerometers

**Applications:** Engine NVH, brake testing, AGREE, HALT/HASS chambers, vibration controls, general purpose vibration monitoring

**Features:** 325°F (163°C) operation, base isolated, ideal low frequency response, hermetically sealed, TEDS available, IEPE, titanium, top or side connector options available

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 5\%$ ): 100 mV/g
- Frequency Range ( $\pm 10\%$ ): 1-10,000 Hz
- Weight: 10.0 grams

# MODAL ANALYSIS ACCELEROMETERS

## High Sensitivity Accelerometers for Medium Structures



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**Model 3333A2**

### Miniature Triaxial Accelerometer

**Applications:** Aircraft stabilizers and rudders, vehicle component testing: doors, mirrors, and headlamps

**Features:** Ultra low noise, extended low frequency response, hermetically sealed, TEDS available, IEPE, titanium

- Range ( $\pm$ ): 50 g
- Sensitivity (+15/-10%): 100 mV/g
- Frequency Range (+15/-10%): 0.54-10,000 Hz
- Weight: 2.3 grams



**Model 3312A2T**

### Extended Low Frequency Accelerometer

**Applications:** Automotive body monitoring, medical room equipment testing, seismic testing

**Features:** Ideal low frequency response, hermetically sealed, IEPE, titanium

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 5\%$ ): 100 mV/g
- Frequency ranges: ( $\pm 5\%$ ) 0.1 to 4,000 Hz, ( $\pm 10\%$ ) 0.06 to 10,000 Hz
- Weight: 25 grams



**Model 3255C**

### High Temperature Accelerometer

**Applications:** Turbochargers, turret monitoring, engine under hood testing

**Features:** 375°F (190°C) operation, charge mode, hermetically sealed, titanium

- Sensitivity ( $\pm 15\%$ ): 15 pC/g
- Frequency Range ( $\pm 5\%$ ): Up to 5,000 Hz\*
- Weight: 10.0 grams

\* Low frequency response is the function of the discharge time constant of the charge amplifier used.



**Model 3273A**

### Low Noise Triaxial Accelerometer

**Applications:** Consumer goods, airframes, autoframes, castings, naval hull vibration testing

**Features:** Extended low frequency response for excellent phase response at low frequencies and great signal-to-noise ratio, hermetically sealed, miniature, IEPE, titanium

- Ranges ( $\pm$ ): 500, 50, 100 g
- Sensitivities ( $\pm 10\%$ ): 10, 100, 50 mV/g
- Frequency ranges: ( $\pm 15\%$ ) 0.3 to 10,000 Hz, ( $\pm 5\%$ ) 0.5 to 3,000 Hz
- Weight: 2.7 grams



Image courtesy of Vibrant Technologies

## Large Structures/ Seismic/ Civil Engineering

Large structures vibrate at lower frequencies and lower amplitudes, and they are harder to excite with sufficient energy to support good coherence between excitation and response sensors. Dytran high sensitivity, low noise accelerometers assure high level, high quality response signals and integrity of data, even on the largest structures.



**Model 3100D24**

### Seismic Accelerometer

**Applications:** Bridge monitoring, motor testing

**Features:** Case isolated to prevent ground loop interference, hermetically sealed, TEDS available, IEPE, stainless steel

- Range ( $\pm$ ): 5 g
- Sensitivity ( $\pm 5\%$ ): 1 V/g
- Frequency ranges: ( $\pm 5\%$ ) 0.6 to 1,000 Hz, ( $\pm 10\%$ ) 0.5 to 5,000 Hz
- Weight: 55 grams



**Model 3192A**

### Low Noise Industrial Accelerometer

**Applications:** Monitoring dams, buildings, and large pumps

**Features:** Case isolated, 2-pin military connector, low frequency response, hermetically sealed, IEPE, stainless steel

- Range ( $\pm$ ): 5 g
- Sensitivity ( $\pm 5\%$ ): 1 V/g
- Frequency range ( $\pm 5\%$ ): 0.5 to 1,000 Hz
- Weight: 190 grams



**7500A Series**

### High Precision MEMS Accelerometer

**Applications:** Motorbike components, recreational vehicles, watercraft testing

**Features:** Differential output, ultra low noise, hermetically sealed, variable capacitance, titanium

- Ranges ( $\pm$ ): 2, 5, 10, 25, 50, 100, 200, 400 g
- Sensitivities ( $\pm 10\%$ ): 1,000, 400, 200, 80, 40, 20, 10, 5 mV/g
- Frequency ranges ( $\pm 3\text{dB}$ ): 0-400 Hz to 0-4,000 Hz
- Weight: 13 grams



**3191A Series**

### Seismic Accelerometer

**Applications:** Medical room surveys, large structure monitoring

**Features:** Ultra high sensitivity, case isolated to prevent ground loop interference, hermetically sealed, IEPE, stainless steel

- Ranges ( $\pm$ ): 1, 0.5 g
- Sensitivities ( $\pm 5\%$ ): 5, 10 V/g
- Frequency ranges: ( $\pm 5\%$ ) 0.08 to 1,000 Hz, ( $\pm 10\%$ ) 0.065 to 1,500 Hz, ( $\pm 3\text{dB}$ ) 0.045 to 3,000 Hz
- Weight: 775 grams



**Model 3233A**

### High Sensitivity Seismic Triaxial Accelerometer

**Applications:** Civil structure monitoring, cell tower testing

**Features:** Base isolated, thru-hole mount for 360° cable orientation, hermetically sealed, TEDS available, IEPE, titanium

- Ranges ( $\pm$ ): 5; 1,000; 5,000; 200; 500 g
- Sensitivities ( $\pm 5\%$ ): 1,000, 5, 1, 25, 10 mV/g
- Frequency ranges ( $\pm 10\%$ ): Axis 1 & 2: 0.3-3,000, Axis 3: 0.3-6,000 Hz
- Weight: 30 grams



**7503D Series**

### High Precision Triaxial MEMS Accelerometer

**Applications:** Recreational vehicle and watercraft testing, civil structure monitoring

**Features:** Low noise, differential output, measures lower level vibrations, hermetically sealed, variable capacitance, titanium

- Range ( $\pm$ ): 50 g
- Sensitivity ( $\pm 5\%$ ): 80 mV/g
- Frequency ranges: ( $\pm 5\%$ ) 0-100 Hz to 0-1,700 Hz
- Weight: 38 grams

# MODAL ANALYSIS ACCELEROMETERS

## Forcing Function

Dytran force sensors are used to define a wide range of fast-transient dynamic events encountered in testing activities such as drop testing of protective headgear and helmets, stamping, forming, reciprocating tool development, "air cannon" projectile impacts to test articles, end-of-line testing for product shock survivability and for shaker driving point. These rugged quartz and ceramic sensors exhibit high stiffness and contain no moving parts, making them ideal for real-world industrial environments as well as for the test lab.



**Model 1022V**

### Miniature Force Sensor

**Applications:** Small satellite structures, door panel testing, force limited vibration testing

**Features:** Low mass, top and bottom 10-32 tapped holes, IEPE, titanium

- Range ( $\pm$ ): 50 lbf
- Sensitivity ( $\pm 10\%$ ): 100 mV/lbf
- Frequency Range, Unloaded: 50 kHz
- Weight: 4.5 grams



**Model 5860B**

### Impedance Head

**Applications:** Obtaining driving point measurements using a shaker

**Features:** Simultaneously measures force and acceleration, IEPE, stainless steel

- Range ( $\pm$ ): 50 lbf, 50 g
- Sensitivity ( $\pm 10\%$ ): 100 mV/lbf, 100 mV/g
- Frequency Ranges ( $\pm 5\%$ ): 1-8,000 Hz
- Weight: 60.0 grams

## Accessories

Dytran is known for our innovative sensors and industry leading accessories that enable your sensors to perform better. Visit [dytran.com/Accessories](http://dytran.com/Accessories) or scan the QR code below to view our extensive line of accessories.



**Model 6677**  
Rotational Mounting Base



Get the vibration data from your stud mounted accelerometer sent in the right direction with the Dytran Rotational Mounting Base. Dytran model 6677 allows the end user to orient the connector on a stud-mounted sensor to their preferred position. Our team of engineers designed this mounting base to accommodate almost any test environment. With stainless steel housing, these accessories are made to take the heat. The three-piece system (sensor mounting base, mounting stud, hex nut) allows the flexibility of 360° rotation, ensuring that the connector can be oriented in any direction. This mounting base only weighs 13 grams, so it adds minimal mass to the test article.



**Model 6196**  
Magnetic Mounting Base



**Model 6552**  
Triaxial Mounting Block



**Model 6213**  
Adhesive Mounting Base

Explore our  
mounting accessories

 [dytran.com/Accessories](http://dytran.com/Accessories)



## Impulse Hammers

On the excitation side, we offer the industry's broadest range of impulse hammers to cover almost any size test article, from small structures like turbine blades and castings to large structures like ships and airframes. The hammers in this section are designed with interchangeable impact tips of various durometers and hardness to allow structural engineers and dynamicists to arrive at the correct combination of pulse width and frequency content of the forcing function to efficiently excite all of the modes of a test article or structure.



**5800B Series**

### Dynapulse™ Impulse Hammer

**Applications:** Airbag system frequency monitoring, headlight component testing, seat rails, helicopter rotors

**Features:** IEPE, BNC connector, TEDS available

- Ranges: 50; 100; 500; 1,000 lbf
- Sensitivities ( $\pm 10\%$ ): 100, 50, 10, 5 mV/lbf
- Head Weight: 3.5 oz (100 g)



**Model 5800SL**

### Ultra Miniature Impulse Hammer

**Applications:** Brake rotor, turbine blade, small pump testing

**Features:** IEPE, 10-32 connector, high frequency

- Range: 50 lbf
- Sensitivity ( $\pm 10\%$ ): 100 mV/lbf
- Head Weight: 3.0 oz (85.05 g)



**Model 5802A**

### 3-Pound Impulse Hammer

**Applications:** Bridge piers, building girder testing, machinery monitoring

**Features:** IEPE, BNC connector, TEDS available

- Range: 5,000 lbf
- Sensitivity ( $\pm 10\%$ ): 1 mV/lbf
- Head Weight: 3.0 lbs (1.36 kg)



**Model 5803A**

### 12-Pound Impulse Hammer

**Applications:** Bridge, building or dam monitoring, acoustic mirror testing

**Features:** IEPE, BNC connector, TEDS available

- Range: 5,000 lbf
- Sensitivity ( $\pm 10\%$ ): 1 mV/lbf
- Head Weight: 12.0 lbs (5.44 kg)



**Model 5805A**

### 1-Pound Impulse Hammer

**Applications:** Genset generator and heavy duty construction equipment testing

**Features:** IEPE, BNC connector, 1 pound head weight

- Range: 5,000 lbf
- Sensitivity ( $\pm 10\%$ ): 1.0 mV/lbf
- Head Weight: 1.0 lbs (0.45 kg)



**Model 5850B**

### Three Range Dynapulse™ Impulse Hammer

**Applications:** Helicopter rotors, airframes, headlight components, seat rail testing

**Features:** IEPE, BNC connector, 3-position sensitivity toggle switch

- Selectable ranges: 5,000; 500; 50 lbf
- Sensitivities ( $\pm 10\%$ ): 1, 10, 100 mV/lbf
- Head Weight: 5.3 oz (150 g)



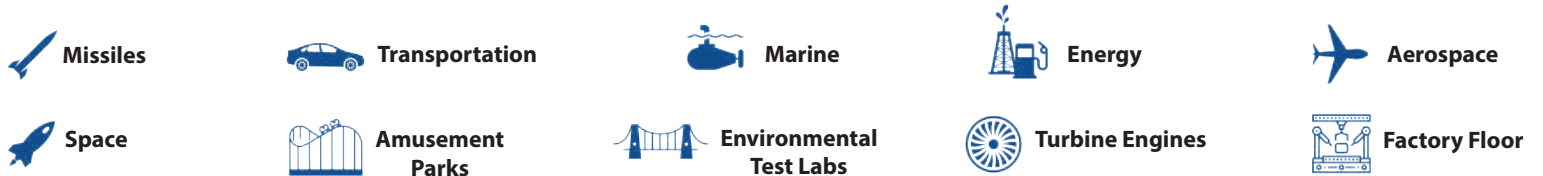
# THE DYTRAN DIFFERENCE

Over **40** years of experience



Distribution in over **72** countries

## Markets Served



## Customer Benefit Programs



### Sensor Select™ Inventory Stocking Program & Lifetime Warranty

The program ensures availability & rapid delivery of our most popular selling models.



### Sensor Exchange™ Qualified Sensor Trade-In Program

Customers are offered an additional 15% off the purchase of a new Dytran sensor to replace a qualifying competitor's model.



### The Educational Sensor Donation Program

Engineering students & faculty members may obtain Dytran sensors for their thesis papers & research projects, free of charge.



### 5-2-1 Warranty Program

We guarantee our products to be free of defects in materials and workmanship as follows:

Standard Products: 5 years from date of shipment | Modified "M-Number" Products: 2 years from date of shipment | Cables and Accessories: 1 year from date of shipment

Learn more



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