Measuring dynamic forces with piezoelectric quartz sensors permits accurate capture of fast, transient forces associated with manufacturing processes and product testing. Unlike strain gage sensors that are suitable for slow changing or static loads, quartz dynamic force sensors possess the endurance to survive, and the response necessary, to quickly and accurately follow fast-rising, short-duration crimping, stamping, punching, and impact events.

In addition to the wide array of sensors that accommodate a multitude of measurement tasks, a comprehensive assortment of signal conditioning equipment is offered to complete the measurement chain. When complemented with today’s powerful data acquisition equipment and control software, creation of a complete, automated monitoring system is easily achievable.

All sensors are designed and manufactured in an ISO 9001 certified facility and provided with A2LA accredited calibration with traceability to N.I.S.T.

As with all equipment from PCB®, these sensors are complemented with toll-free applications assistance, 24-hour customer service, and are backed by a no risk policy that guarantees satisfaction or your money refunded.
# Dynamic Force Sensors

<table>
<thead>
<tr>
<th>Style</th>
<th>General Purpose</th>
<th>Ring</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typical Appearance</strong></td>
<td><img src="image1" alt="Typical Appearance" /></td>
<td><img src="image2" alt="Typical Appearance" /></td>
<td><img src="image3" alt="Typical Appearance" /></td>
</tr>
<tr>
<td><strong>Series / Models</strong></td>
<td>ICP® Series: 208, Charge Output Series: 218</td>
<td>ICP® Series: 201 to 207, Charge Output Series: 211 to 217</td>
<td>CP® Series: 221 to 227, Charge Output Series: 231 to 237</td>
</tr>
<tr>
<td><strong>Capacities</strong></td>
<td>10 lb to 5000 lb Compression 45 N to 22k N Compression 10 lb to 500 lb Tension 45 N to 2200 N Tension</td>
<td>10 lb to 100k lb Compression 45 N to 450k N Compression</td>
<td>10 lb to 50k lb Compression 45 N to 220k N Compression 10 lb to 30k lb Tension 45 N to 130k N Tension</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>10-32 Tapped Holes  Supplied Mounting Studs  Supplied Impact Cap</td>
<td>Supplied Mounting Stud  Through Bolt</td>
<td>Tap Threaded Hole, Both Ends  3/8-24 to 1 1/4-12</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>Stainless Steel Construction  Hermetically Sealed  Flexible Mounting  Low Deflection  Compact  ICP® and Charge Output Models  Axial or Radial Connector Models</td>
<td>Stainless Steel Construction  Hermetically Sealed  Low Weight  Low Deflection  ICP® and Charge Output Models</td>
<td>Stainless Steel Construction  Hermetically Sealed  Factory Preloaded  Low Deflection  ICP® and Charge Output Models</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>Amplitude Linearity: 1% FS  Upper Freq. Limit: 36k Hz</td>
<td>Amplitude Linearity: 1% FS  Upper Freq. Limit: 35k to 90k Hz</td>
<td>Amplitude Linearity: 1% FS  Upper Freq. Limit: 4000 to 15k Hz</td>
</tr>
</tbody>
</table>

## Typical Measurement Systems for Dynamic Force Sensors

Please consult factory to discuss your particular dynamic force measurement application and to request certified documents prior to designing mounting hardware.

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ICP® Sensor System

- ICP® Force Sensor
- ICP® Sensor Signal Conditioner
- Readout or Analysis Equipment

PCB Piezotronics Inc. Toll-Free in USA 800-828-8840 716-684-0001 www.pcb.com
<table>
<thead>
<tr>
<th>Impact</th>
<th>Three Component Rings</th>
<th>Strain</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Impact Sensor" /></td>
<td><img src="image2.png" alt="Three Component Rings" /></td>
<td><img src="image3.png" alt="Strain Sensor" /></td>
<td><img src="image4.png" alt="Penetration Sensor" /></td>
</tr>
</tbody>
</table>

**ICP® Series:**
- Charge Output Series: 200
- Charge Output Series: 210
- Charge Output Series: 260A11 to A13
- Charge Output Series: M240
- Charge Output Series: 208

**Force Range:**
- 10 lb to 50 lb Compression
- 45 N to 220 kN Compression
- Fz: 1000 lb (4500 N) to 10k lb (45k N)
- Fx: 500 lb (2200 N) to 4000 lb (18k N)
- Fy: 500 lb (2200 N) to 4000 lb (18k N)
- 50 με to 300 με
- 100 lb to 5000 lb Compression
- 450 N to 220k N Compression
- 500 lb Tension (Select Models)
- 2200 N Tension (Select Models)

**Applications:**
- Impact Measurements
- Crash Testing
- Punch and Tablet Presses
- Package Drop Testing
- Stamping
- Metal Forming
- Force Limited Vibration Testing
- Cutting Tool Forces
- Force Dynamometers
- Engine Mount Analysis
- Biomechanics Research
- Modal Analysis
- Impact Testing
- Material Strength Testing
- Drop Testing
- Polymer and Plastics Testing
- Penetration Testing
- Injection Molded Specimen Testing

**Features:**
- Stainless Steel Construction
- Hermetically Sealed
- Compact Size
- Enclosed Mounting Stud
- Supplied Impact Cap
- Supplied Mounting Stud
- Supplied Impact Cap
- Supplied Impact Cap
- Through Bolt
- M6 x 1 mm Mounting Screw
- Stainless Steel Housing
- Amplitude Linearity: 1% FS
- Upper Freq. Limit: 30k to 75k Hz
- Amplitude Linearity: 1% FS
- Cross Talk Fx to Fy: ± 3%
- Cross Talk Fx or Fy to Fz: ± 5%
- Upper Freq. Limit: 39k to 90k Hz
- Amplitude Linearity: 2% FS
- Upper Freq. Limit: 18k to 25k Hz

**ICP® and Charge Output Models:**
- Amplitude Linearity: 1% FS
- Upper Freq. Limit: 18k to 25k Hz

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**Dynamic Force Sensors**

**Charge Output Sensor System**

*When weighing or measuring load, request information on our complete line of strain gage load cells for general purpose and fatigue-rated use.*
Series 484 Line-Powered, DC Coupled, ICP® Sensor Signal Conditioners

Condition ICP® sensors and provide a DC coupled signal path for long duration, quasi-static measurements.
- Selectable AC or DC coupled signal path
- Versions offering gain x1, x10, x100
- Versions offering clamped zero output for applications involving repetitive pulse inputs
- Convenient, line-powered, benchtop styles
- Supports calibration requirements as well as punching, crimping, and stamping operations

Series 421A10 Industrial Charge Amplifiers

Condition charge output piezoelectric sensors in demanding, harsh environments.
- Choice of 1, 2, or 3 channels
- Rugged, surface mountable, sealed aluminum enclosures
- Three-user, selectable input ranges for each channel
- Electronic reset capability
- Long discharge time constant for quasi-static and low frequency measurements

Series 440 Modular Signal Conditioners

Mix and match modules into a variety of chassis to achieve the functions and number of channels desired.
- Modules for conditioning ICP® and charge output sensors
- AC or DC coupled options
- Expands as needs grow
- Line or battery powered

Series 480 Battery Powered, ICP® Sensor Signal Conditioners

For portable measurement and testing applications.
- Unity or variable gain versions
- Powered by standard 9 VDC batteries
- Rechargeable option
- AC power adaptor option

PCB Piezotronics Test & Measurement Force, Strain and Torque product offering includes piezoelectric and strain gage force sensors, load cells, and torque sensors for research & development, process monitoring, assembly force control, end-of-line quality check requirements and general component test. Additional Test & Measurement products include sensors for acoustics, pressure, acceleration, shock, vibration, and supporting electronics. PCB® products are backed by our Total Customer Satisfaction policy, which guarantees your satisfaction or your money refunded.

Visit wwwpcb.com to locate your nearest sales office