EXPLOSIVE, GUN & IMPACT TESTING
EXPLOSIVE, GUN & IMPACT TESTING

SENSORS FOR BLAST MEASUREMENTS

Shock Accelerometers: Our high amplitude shock accelerometers represent state-of-the-art industry technology for miniature, high amplitude, DC response acceleration sensors, capable of measuring long duration transient motion, as well as responding to and surviving extremely fast rise times typical of a high-G shock event. Both a packaged and an OEM configuration are offered to fulfill a variety of installation requirements.

Pressure Sensors: Our pressure sensors are designed for a broad range of explosion, blast, and shock wave testing. They are frequency tailored to capture both peak pressure and total impulse measurements. Applications include measuring air-blast pressure in free-field or closed bunker arenas to obtain peak pressure, total impulse, shock wave and time-of-arrival measurements often used to study blast effects on structures, vehicles, or other objects.

In this catalog, you will find a listing of PCB®'s most popular blast, high-G shock sensors and other hardware for these applications. Please log onto www.pcb.com, and search the model series for detailed specifications. You can also contact us at 866-816-8892, or sales@pcb.com, to discuss your specific requirement with an Application Engineer.

CIVILIAN APPLICATIONS INCLUDE:

- Mining
- Construction
- Demolition
- Pyrotechnics

DEFENSE APPLICATIONS INCLUDE:

- Aerial Bombs
- Mines
- Torpedoes
- Breeching Operations
- Ballistics
- Tactical Missiles & More
# TABLE OF CONTENTS

MEMS High-G Shock Accelerometers ............................................................................................................. 4 - 5

Piezoelectric Accelerometers ........................................................................................................................... 6 - 9
  Low Cost, Embeddable Accelerometers Series 660 .................................................................................. 6- 8
  High Amplitude ICP® Shock Accelerometers Series 350 ....................................................................... 9

Pressure Products for Blast Testing .................................................................................................................. 10 - 17
  High Frequency Series 113B ..................................................................................................................... 11 - 12
  Ground Isolated Series 102B .................................................................................................................. 13
  ICP® High Intensity, Acoustic Sensors Series 106B ................................................................................ 14
  Time of Arrival ICP Micro-pressure Sensors Series 132 ....................................................................... 15
  Tourmaline Pressure Bar Series 134 .......................................................................................................... 15
  Free Field Blast Pressure Pencil Probe Series 137 ................................................................................... 16
  Tourmaline Underwater Blast Series 138 ................................................................................................. 17

Pressure Products for Ballistic Testing .......................................................................................................... 18 - 22
  ICP® Ballistic Sensors Series 109 .......................................................................................................... 19
  Conformal Ballistic Sensors Series 117B ............................................................................................... 20
  Shot Shell Sensor Series 118A07 ........................................................................................................... 22

Force & Strain Products for Structural Impact ............................................................................................... 23 - 24
  Impact Force Sensors 201B and 208C .................................................................................................... 23
  Dynamic Force Strain 740B02 ............................................................................................................. 24

Placebo Transducers ...................................................................................................................................... 26 - 27

Calibration Products ......................................................................................................................................... 28 - 31
  Calibration Systems .................................................................................................................................. 28
  Special Purpose ........................................................................................................................................ 29
  Shock Accelerometer Calibration Model 9525C ....................................................................................... 31

Specialized Instrumentation ............................................................................................................................. 32 - 33
  Firearms Detection Systems Model LXT1-QPR ...................................................................................... 32
  Ballistic Peak Pressure Monitoring System Model 444A53 ................................................................... 33

Signal Conditioning and Converters ............................................................................................................... 34 - 36

Cables and Adapters ...................................................................................................................................... 37 - 47
  Coaxial Cable Assemblies ....................................................................................................................... 39 - 41
  4-Conductor Cable Assemblies ............................................................................................................... 37 - 38
  Custom Cable Assemblies ...................................................................................................................... 43
  Coaxial Custom Cable Assemblies ....................................................................................................... 42
  Cable Connectors ..................................................................................................................................... 44 - 45
  Connector Adapters ............................................................................................................................... 46 - 47
Piezoresistive shock accelerometers, manufactured by MEMS technology, have low power consumption while still providing +/- 200 mV full scale output at acceleration levels greater than 50 kg. The accelerometers are electrically compatible with the same type 4-wire circuit used to condition a strain gauge full bridge and since they have much greater output compared to a strain gauge, the requirement for signal amplification is greatly reduced. They afford a wider operating temperature range when compared to mechanically isolated ICP® accelerometers. Their frequency response, dependent on model, can be uniform from DC (0 Hz) to values as high as 20 kHz. To lessen the severity of response when their resonant frequency is excited, they incorporate squeeze film damping, achieving values of 0.02 to 0.06 of critical. These damping values are much higher than those found in legacy MEMS accelerometers. Since silicon is a brittle material, over range stops are also incorporated to minimize breakage of the sensing element, and then the sensing element is sealed within a hermetic package. At comparable G levels, MEMS technology enables the smallest package size to be attained for individual accelerometers.

**HIGHLIGHTS:**

- Single axis and triaxial arrangements
- Mechanical over-range stops improves survivability
- Slight damping reduces resonance amplification
- Excellent amplitude linearity
- Low power consumption

**APPLICATIONS:**

- Metal-to-metal impact & pyroshock
- Data recorders, penetrator & launch tests
- Consumer electronics drop testing
- Sporting goods and impact tool testing
- Blast loading & survivability of structures
- Fuze, safe and arm
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Endevco 2262B</th>
<th>PCB 3501B12xxKG</th>
<th>Endevco 7280AM4</th>
<th>PCB 3991B12xxKG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>High Sensitivity Multi-mode damping Rugged to 10000 g shocks</td>
<td>Stud mount Lightly damped</td>
<td>Extremely rugged Lightly damped</td>
<td>Thru hole mount Lightly damped</td>
</tr>
<tr>
<td>Range (g)</td>
<td>±1000 / ±2000 / ±6000</td>
<td>±20000 / ±6000</td>
<td>±2000 / ±20000 / ±60000</td>
<td>±20000 / ±60000</td>
</tr>
<tr>
<td>Sensitivity (uV/V/g)</td>
<td>0.45 / 0.3 / 0.015</td>
<td>1 / .3</td>
<td>30 / 1.6 / .5</td>
<td>1 / .3</td>
</tr>
<tr>
<td>Frequency response (kHz)</td>
<td>0 to 3000</td>
<td>0-10 / 0-20</td>
<td>0-5 / 0-10 / 0-13</td>
<td>0-10 / 0-20</td>
</tr>
<tr>
<td>Shock limit (g pk)</td>
<td>10000</td>
<td>60000 / 100000</td>
<td>10000 / 80000 / 240000</td>
<td>60000 / 100000</td>
</tr>
<tr>
<td>Temperature Range - Operating</td>
<td>-67 to 257 °F</td>
<td>-65 to 250 °F</td>
<td>-67 to +250 °F</td>
<td>-65 to 250 °F</td>
</tr>
<tr>
<td>Dimensions (in(mm))</td>
<td>0.935 x 0.655 x 0.79</td>
<td>0.375 HEX</td>
<td>0.12 x 0.56 x 0.28</td>
<td>0.312 HEX, 7.92</td>
</tr>
<tr>
<td>Weight (gm)</td>
<td>22</td>
<td>2.5</td>
<td>2.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Mounting method</td>
<td>10-32 detachable stud</td>
<td>1/4-28 UNF-3A stud</td>
<td>1/4-28 UNF-3A stud</td>
<td>4-40 screws</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Endevco 7280AM7</th>
<th>Endevco 7280A</th>
<th>PCB 3583A11xxKG</th>
<th>Endevco 7284A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Extremely rugged Lightly damped Low noise cable</td>
<td>Extremely rugged Lightly damped Low power consumption</td>
<td>Thru hole mount Lightly damped</td>
<td>Thru hole mount Lightly damped</td>
</tr>
<tr>
<td>Range (g)</td>
<td>±2000 g / ±20000 g / ±60000</td>
<td>±2000 g / ±20000 g / ±60000</td>
<td>±20000 g / ±60000</td>
<td>±2000 g / ±20000 / ±60000</td>
</tr>
<tr>
<td>Sensitivity (uV/V/g)</td>
<td>30 / 1.6 / .5</td>
<td>30 / 1.6 / .5</td>
<td>1 / .3</td>
<td>30 / 1.6 / .5</td>
</tr>
<tr>
<td>Frequency response (kHz)</td>
<td>0-5 / 0-10 / 0-13</td>
<td>0-5 / 0-10 / 0-13</td>
<td>0-10 / 0-20</td>
<td>0-10 / 0-10 / 0-20</td>
</tr>
<tr>
<td>Shock limit (g pk)</td>
<td>10000 / 80000 / 240000</td>
<td>10000 / 80000 / 240000</td>
<td>60000 / 80000</td>
<td>10000 / 60000 / 180000</td>
</tr>
<tr>
<td>Temperature Range - Operating</td>
<td>-67 to 250 °F</td>
<td>-67 to 250 °F</td>
<td>-67 to +250 °F</td>
<td>-67 to +250 °F</td>
</tr>
<tr>
<td>Dimensions (in(mm))</td>
<td>0.56 x 0.35 x 0.16 (14.2 x 8.90 x 4.06)</td>
<td>0.56 x 0.35 x 0.16 (14.2 x 8.90 x 4.06)</td>
<td>0.25 x 0.47 x 0.47 (6.35 x 11.81 x 11.81)</td>
<td>0.56 x 0.35 x 0.16 (14.2 x 8.90 x 4.06)</td>
</tr>
<tr>
<td>Weight (gm)</td>
<td>4</td>
<td>4</td>
<td>2.83</td>
<td>3.6</td>
</tr>
<tr>
<td>Mounting method</td>
<td>4-40 screws</td>
<td>4-40 screws</td>
<td>4-40 screws</td>
<td>4-40 screws</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Endevco 7280AM7</th>
<th>Endevco 7280A</th>
<th>PCB 3583A11xxKG</th>
<th>Endevco 7284A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Extremely rugged Lightly damped Low noise cable</td>
<td>Extremely rugged Lightly damped Low power consumption</td>
<td>Thru hole mount Lightly damped</td>
<td>Thru hole mount Lightly damped</td>
</tr>
<tr>
<td>Range (g)</td>
<td>±2000 g / ±20000 g / ±60000</td>
<td>±2000 g / ±20000 g / ±60000</td>
<td>±20000 g / ±60000</td>
<td>±2000 g / ±20000 / ±60000</td>
</tr>
<tr>
<td>Sensitivity (uV/V/g)</td>
<td>30 / 1.6 / .5</td>
<td>30 / 1.6 / .5</td>
<td>1 / .3</td>
<td>30 / 1.6 / .5</td>
</tr>
<tr>
<td>Frequency response (kHz)</td>
<td>0-5 / 0-10 / 0-13</td>
<td>0-5 / 0-10 / 0-13</td>
<td>0-10 / 0-20</td>
<td>0-10 / 0-10 / 0-20</td>
</tr>
<tr>
<td>Shock limit (g pk)</td>
<td>10000 / 80000 / 240000</td>
<td>10000 / 80000 / 240000</td>
<td>60000 / 80000</td>
<td>10000 / 60000 / 180000</td>
</tr>
<tr>
<td>Temperature Range - Operating</td>
<td>-67 to 250 °F</td>
<td>-67 to 250 °F</td>
<td>-67 to +250 °F</td>
<td>-67 to +250 °F</td>
</tr>
<tr>
<td>Dimensions (in(mm))</td>
<td>0.56 x 0.35 x 0.16 (14.2 x 8.90 x 4.06)</td>
<td>0.56 x 0.35 x 0.16 (14.2 x 8.90 x 4.06)</td>
<td>0.25 x 0.47 x 0.47 (6.35 x 11.81 x 11.81)</td>
<td>0.56 x 0.35 x 0.16 (14.2 x 8.90 x 4.06)</td>
</tr>
<tr>
<td>Weight (gm)</td>
<td>4</td>
<td>4</td>
<td>2.83</td>
<td>3.6</td>
</tr>
<tr>
<td>Mounting method</td>
<td>4-40 screws</td>
<td>4-40 screws</td>
<td>4-40 screws</td>
<td>4-40 screws</td>
</tr>
</tbody>
</table>
PIEZOELECTRIC ACCELEROMETERS

SERIES 660 (TO-5 PACKAGE) LOW COST, EMBEDDABLE ACCELEROMETERS

Series 660 accelerometers are ideal for continuous vibration monitoring in high-volume and commercial OEM applications.

The Series 660 low cost accelerometers offer an affordable solution for vibration and shock measurements in high-volume and commercial OEM applications. The units are particularly well suited for shock and impact detection of packages or components, as well as bearing and gear mesh vibration measurements in predictive maintenance and condition monitoring requirements. The compact designs may be imbedded into machinery at the OEM level to provide value-added monitoring protection.

The units employ field-proven, solid-state, piezoelectric sensing elements for durability and broadband performance. Choose from either charge mode types, which achieve high operating temperatures or voltage mode ICP® types, with built-in signal conditioning microelectronics, for simplified operation and connectivity to data acquisition and vibration monitoring instrumentation.

HIGHLIGHTS:

- Choice of standard TO-5 or TO-8 transistor-style packages
- Choice of charge mode piezoelectric, voltage mode ICP®, and 3-wire low power varieties
- Mountable via adhesive or soldering and choice of either integral cable or solder pin electrical connections
- Variety of sensitivities to accommodate a wide variety of applications
- Broad bandwidth, high shock survivability, wide operating temperature range, high resolution, and large dynamic range

OPTIONS:

- Low Output Bias Voltage
- High Temperature Operation to 365 °F (185 °C)
- High Range (less sensitivity)
- Temperature Output Signal
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Package Size</th>
<th>Low Profile TO-5</th>
<th>TO-5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2-Wire ICP Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Model Sensitivity (± 20%)</td>
<td>10 mV/g</td>
<td>100 mV/g</td>
</tr>
<tr>
<td></td>
<td>1.02 mV/m/s²</td>
<td>10.2 mV/m/s²</td>
</tr>
<tr>
<td>Measurement Range</td>
<td>500 g</td>
<td>50 g</td>
</tr>
<tr>
<td></td>
<td>5000 m/s²</td>
<td>500 m/s²</td>
</tr>
<tr>
<td>Frequency Range (± 3 dB)</td>
<td>0.4 to 10 kHz</td>
<td>0.32 to 10 kHz</td>
</tr>
<tr>
<td>Resonant Frequency</td>
<td>&gt;30 kHz</td>
<td>&gt;25 kHz</td>
</tr>
<tr>
<td>Broadband Resolution</td>
<td>0.003 g pk</td>
<td>0.0003 g pk</td>
</tr>
<tr>
<td>Excitation Voltage</td>
<td>18 to 28 VDC</td>
<td>18 to 28 VDC</td>
</tr>
<tr>
<td>Excitation Constant Current</td>
<td>2 to 20 mA</td>
<td>2 to 20 mA</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>&lt;100 ohm</td>
<td>&lt;100 ohm</td>
</tr>
<tr>
<td>Output Bias Voltage</td>
<td>8 to 12 VDC</td>
<td>8 to 12 VDC</td>
</tr>
<tr>
<td>Discharge Time Constant</td>
<td>≥0.4 sec</td>
<td>≥0.5 sec</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-65 to +185 °F</td>
<td>-54 to +85 °C</td>
</tr>
<tr>
<td></td>
<td>-54 to +85 °C</td>
<td>-54 to +85 °C</td>
</tr>
<tr>
<td>Weight</td>
<td>0.08 oz</td>
<td>3 gm</td>
</tr>
<tr>
<td></td>
<td>2.2 g</td>
<td>3 gm</td>
</tr>
<tr>
<td>Other Available Sensitivities</td>
<td>1 mV/g</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>0.102 mV/m/s²</td>
<td></td>
</tr>
<tr>
<td><strong>3-Wire, Low-Power Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Model Sensitivity (± 20%)</td>
<td>10 mV/g</td>
<td>100 mV/g</td>
</tr>
<tr>
<td></td>
<td>1.02 mV/m/s²</td>
<td>10.2 mV/m/s²</td>
</tr>
<tr>
<td>Measurement Range</td>
<td>200 g</td>
<td>20 g</td>
</tr>
<tr>
<td></td>
<td>2000 m/s²</td>
<td>200 m/s²</td>
</tr>
<tr>
<td>Frequency Range (± 3 dB)</td>
<td>0.32 to 10 kHz</td>
<td>0.32 to 10 kHz</td>
</tr>
<tr>
<td>Resonant Frequency</td>
<td>&gt;30 kHz</td>
<td>&gt;25 kHz</td>
</tr>
<tr>
<td>Broadband Resolution</td>
<td>0.003 g pk</td>
<td>0.001 g pk</td>
</tr>
<tr>
<td></td>
<td>0.03 mV²/s pk</td>
<td>0.01 mV²/s pk</td>
</tr>
<tr>
<td>Excitation Voltage</td>
<td>3 to 5 VDC</td>
<td>3 to 5 VDC</td>
</tr>
<tr>
<td>Current Draw</td>
<td>0.75 mA</td>
<td>0.75 mA</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>&lt; 100 ohm</td>
<td>&lt; 100 ohm</td>
</tr>
<tr>
<td>Output Bias Voltage (±10%)</td>
<td>0.5 × Excitation Voltage</td>
<td>0.5 × Excitation Voltage</td>
</tr>
<tr>
<td>Discharge Time Constant</td>
<td>≥0.5 sec</td>
<td>≥0.5 sec</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-65 to +185 °F</td>
<td>-54 to +85 °C</td>
</tr>
<tr>
<td></td>
<td>-54 to +85 °C</td>
<td>-54 to +85 °C</td>
</tr>
<tr>
<td>Weight</td>
<td>0.08 oz</td>
<td>0.1 oz</td>
</tr>
<tr>
<td></td>
<td>2.2 gm</td>
<td>3 gm</td>
</tr>
<tr>
<td><strong>Charge Mode Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity (± 20%)</td>
<td>5 pC/g</td>
<td>11 pC/g</td>
</tr>
<tr>
<td></td>
<td>0.51 pC/m/s²</td>
<td>1.12 pC/m/s²</td>
</tr>
<tr>
<td>Measurement Range</td>
<td>500 g</td>
<td>50 g</td>
</tr>
<tr>
<td>Frequency Range (± 3 dB)</td>
<td>10 kHz</td>
<td>10 kHz</td>
</tr>
<tr>
<td>Resonant Frequency</td>
<td>&gt;30 kHz</td>
<td>&gt;25 kHz</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-65 to +185 °F</td>
<td>-54 to +85 °C</td>
</tr>
<tr>
<td></td>
<td>-54 to +85 °C</td>
<td>-54 to +85 °C</td>
</tr>
<tr>
<td>Capacitance</td>
<td>350 pF</td>
<td>350 pF</td>
</tr>
<tr>
<td>Weight</td>
<td>0.08 oz</td>
<td>0.1 oz</td>
</tr>
<tr>
<td></td>
<td>2.2 gm</td>
<td>3 gm</td>
</tr>
<tr>
<td><strong>Common Specifications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transverse Sensitivity</td>
<td>≤5%</td>
<td>≤5%</td>
</tr>
<tr>
<td>Non-Linearly</td>
<td>≤1%</td>
<td>≤1%</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>0.10 %/°F</td>
<td>0.10 %/°F</td>
</tr>
<tr>
<td></td>
<td>0.18 %/°C</td>
<td>0.18 %/°C</td>
</tr>
<tr>
<td>Shock Limit</td>
<td>7000 g pk</td>
<td>7000 g pk</td>
</tr>
<tr>
<td></td>
<td>70 k m/s² pk</td>
<td>70 k m/s² pk</td>
</tr>
<tr>
<td>Housing Material</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Mounting</td>
<td>Adhesive or Solder</td>
<td>Adhesive or Solder</td>
</tr>
<tr>
<td>Sealing (welded)</td>
<td>Hermetic</td>
<td>Hermetic</td>
</tr>
<tr>
<td>Size</td>
<td>0.36 × 0.26 in</td>
<td>0.36 × 0.38 in</td>
</tr>
<tr>
<td></td>
<td>9.1 × 6.6 mm</td>
<td>9.1 × 9.7 mm</td>
</tr>
</tbody>
</table>

**Note:**
- * Measurement range achieved is dependent upon excitation voltage supplied, i.e.: Measurement Range =
**HIGH AMPLITUDE ICP® SHOCK ACCELEROMETERS**

Piezoelectric ICP® accelerometers afford a very high signal output (+/- 5 volts full scale) and the ease of two-wire electrical connectivity. Their inherent ruggedness enables them to be severely over ranged without damage. The addition of internal mechanical isolation minimizes the high frequency stress that would otherwise be encountered by their ceramic sensing elements. This mechanical isolation, coupled with an internal 2-pole electrical filter, built into the ICP® circuitry, tailors the overall accelerometer response to assure data quality to frequencies as high as 10 kHz. Depending on the specific model, accelerations in excess of 50 kg can be successfully measured. These modern designs, with their internal elastomeric isolation materials are verified through calibration to remain dynamically linear and are enabling piezoelectric accelerometers to operate in increasingly severe acceleration environments.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Sensitivity</th>
<th>Measurement Range</th>
<th>Frequency Range (±1dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHOCK ICP® ACCELEROMETER MODEL 350C24</td>
<td>1 mV/g (0.1 mV/(m/s²))</td>
<td>±5000 g pk (±490000 m/s² pk)</td>
<td>0.4 - 10000 Hz</td>
</tr>
<tr>
<td>SHOCK ICP® ACCELEROMETER MODEL 350C23</td>
<td>0.5 mV/g (0.05 mV/(m/s²))</td>
<td>±10000 g pk (±98000 m/s² pk)</td>
<td>0.4 - 10000 Hz</td>
</tr>
<tr>
<td>SHOCK ICP® ACCELEROMETER MODEL 350D02</td>
<td>0.1 mV/g (0.01 mV/(m/s²))</td>
<td>±50000 g pk (±490000 m/s² pk)</td>
<td>4 - 10000 Hz</td>
</tr>
</tbody>
</table>
SHOCK ICP® ACCELEROMETER
MODEL 350B01
Sensitivity: 0.05 mV/g
(0.005 mV/(m/s²))
Measurement Range:
±100000 g pk (±981000 m/s² pk)
Frequency Range (±1 dB):
4 - 10000 Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER
MODEL 350B44
Sensitivity: 1 mV/g
(0.1 mV/(m/s²))
Measurement Range:
±5000 g pk (±49000 m/s² pk)
Frequency Range (±1dB):
0.4 - 10000 Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER
MODEL 350B43
Sensitivity: 0.5 mV/g
(0.05 mV/(m/s²))
Measurement Range:
±10000 g pk (±98000 m/s² pk)
Frequency Range (±1dB):
0.4 - 10000 Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER
MODEL 350B42
Sensitivity: 0.01 mV/g
(0.001 mV/(m/s²))
Measurement Range:
±50000 g pk (±490000 m/s² pk)
Frequency Range (±1dB):
4 - 10000 Hz

TRIAXIAL SHOCK ICP® ACCELEROMETER
MODEL 350B41
Sensitivity: 0.05 mV/g
(0.005 mV/(m/s²))
Measurement Range:
±100000 g pk (±98000 m/s² pk)
Frequency Range (±1dB):
4 - 10000 Hz
PRESSURE PRODUCTS FOR BLAST TESTING

MEASURING EXPLOSIONS AND PROPELLANT BURNS

Pressure sensors with quartz, ceramic and tourmaline sensing elements are used for a wide variety of shock wave, blast and explosive testing. Typical applications include measurement of shock and blast waves, combustion or detonation in closed bombs, projectile velocity, free field or underwater explosive testing, and squib lot acceptance testing. All of these applications require high frequency response and durability, ability to drive long cables, and operate in adverse environments.

In applications involving long input cables to data acquisition systems, care must be exercised to assure the measurement system has adequate frequency response. Capacitance associated with the long cables can act as a low pass filter. Sensor output voltage, cable capacitance and constant current are factors to be considered. More current is required to drive higher voltages over longer cables. PCB® signal conditioners can be easily field-adjusted up to 20 mA to drive long cables. Selecting a sensor to provide about 1 V full scale for the expected pressure to be measured, rather than 5 V, will provide 5 times greater frequency response for a given current and cable length.

Most of the sensors listed in this section incorporate acceleration-compensating sensing elements with integral electronics, which provide a frequency-tailored, non-resonant response. Frequency tailored sensors have microsecond rise time and suppressed resonance to faithfully follow shock wave events without the characteristic “ringing” common in other sensors.

APPLICATIONS:

- Air Blast Measurement
- Underwater Explosion Measurement
- Peak and Total Impulse
- Explosive Research and Structural Loading
- Shock Tube or Closed Bomb Testing
- Wave Velocity and/or Time of Arrival Determinations
- Explosive Component (e.g., Squib) Lot Acceptance
SERIES 113B - HIGH FREQUENCY, GENERAL PURPOSE PRESSURE SENSORS

PCB® Series 113B dynamic pressure sensors set the standard for extremely fast, micro-second response and a wide amplitude and frequency range that allows them to excel in high-frequency applications where minimum sensor diameter is required. Typical applications include combustion studies, explosive component testing (e.g. detonators, explosive bolts), airbag testing, and measurement of air blast shock waves resulting from explosions.

HIGHLIGHTS:

- Fast rise time ≤ 1 μsec from quartz element
- Ultra-high resonant frequency of ≥ 500 kHz
- Frequency-tailored output without the “ringing” characteristic of most other sensors
- Internal acceleration compensation minimizes shock and vibration sensitivity

HIGH FREQUENCY ICP® PRESSURE SENSOR
MODEL 113B28

- Sensitivity: 100 mV/psi (14.5 mV/kPa)
- Measurement Range (±5 Volt Output): 50 psi (345 kPa)
- Low Frequency Response: 0.5 Hz

HIGH FREQUENCY ICP® PRESSURE SENSOR
MODEL 113B27

- Sensitivity: 50 mV/psi (7.25 mV/kPa)
- Measurement Range (±5 Volt Output): 100 psi (690 kPa)
- Low Frequency Response: 0.5 Hz

HIGH FREQUENCY ICP® PRESSURE SENSOR
MODEL 113B21

- Sensitivity: 25 mV/psi (3.6 mV/kPa)
- Measurement Range (±5 Volt Output): 200 psi (1380 kPa)
- Low Frequency Response: 0.5 Hz
HIGH FREQUENCY ICP® PRESSURE SENSOR  
MODEL 113B26

- Sensitivity: 10 mV/psi (1.45 mV/kPa)
- Measurement Range (±5 Volt Output): 500 psi (3450 kPa)
- Low Frequency Response: 0.01 Hz

HIGH FREQUENCY ICP® PRESSURE SENSOR  
MODEL 113B24

- Sensitivity: 5 mV/psi (0.725 mV/kPa)
- Measurement Range (±5 Volt Output): 1 kpsi (6895 kPa)
- Low Frequency Response: 0.005 Hz

HIGH FREQUENCY ICP® PRESSURE SENSOR  
MODEL 113B22

- Sensitivity: 1 mV/psi (0.145 mV/kPa)
- Measurement Range (±5 Volt Output): 5 kpsi (34475 kPa)
- Low Frequency Response: 0.001 Hz

HIGH FREQUENCY ICP® PRESSURE SENSOR  
MODEL 113B23

- Sensitivity: 0.5 mV/psi (0.073 mV/kPa)
- Measurement Range (±5 Volt Output): 10 kpsi (68950 kPa)
- Low Frequency Response: 0.0005 Hz

HIGH FREQUENCY ICP® PRESSURE SENSOR  
MODEL 113B03

- Sensitivity: 0.44 pC/psi (0.064 pC/kPa)
- Measurement Range (±5 Volt Output): 15 kpsi (103420 kPa)
- Low Frequency Response: ---

MOUNTING ADAPTOR  
MODEL 061A01, 061A10, 062A01

- Model 061A01: 3/8-24
- Model 061A10: M10
- Model 062A01: 1/8-NPT

MOUNTING ADAPTOR  
MODEL 061A59

- 3/8-24 Delrin, ground isolated, up to 500 psi
SERIES 102B - GROUND ISOLATED VERSION OF THE SERIES 113B

These sensors have all of the same features and benefits of the Series 113B, plus the added benefit of having their output electrically isolated from ground, which helps prevent ground loop problems. This series can accommodate an optional ablative coating (Prefix: CA) to protect the diaphragm from thermal shock in flash-temperature applications.

HIGHLIGHTS:
- Ultra-high frequency > 500 kHz
- Fast rise time < 1 μsec
- Peak pressure and total impulse

APPLICATIONS:
- Shock Tubes and Closed Bombs
- Time-of-arrival Measurements
- Explosion, Blast, and Shock Wave

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B18
- Sensitivity: 100 mV/psi (14.5 mV/kPa)
- Measurement Range (±5 Volt Output): 50 psi (345 kPa)
- Low Frequency Response: 0.5 Hz

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B16
- Sensitivity: 50 mV/psi (7.25 mV/kPa)
- Measurement Range (±5 Volt Output): 100 psi (690 kPa)
- Low Frequency Response: 0.5 Hz

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B15
- Sensitivity: 25 mV/psi (3.6 mV/kPa)
- Measurement Range (±5 Volt Output): 200 psi (1380 kPa)
- Low Frequency Response: 0.5 Hz

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B06
- Sensitivity: 10 mV/psi (1.45 mV/kPa)
- Measurement Range (±5 Volt Output): 500 psi (3450 kPa)
- Low Frequency Response: 0.01 Hz

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B
- Sensitivity: 1 mV/psi (0.145 mV/kPa)
- Measurement Range (±5 Volt Output): 5 kpsi (34475 kPa)
- Low Frequency Response: 0.001 Hz

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B04
- Sensitivity: 5 mV/psi (0.725 mV/kPa)
- Measurement Range (±5 Volt Output): 1 kpsi (6895 kPa)
- Low Frequency Response: 0.005 Hz

GROUND ISOLATED, DYNAMIC PRESSURE SENSOR
MODEL 102B03
- Sensitivity: 0.5 mV/psi (0.073 mV/kPa)
- Measurement Range (±5 Volt Output): 10 kpsi (68950 kPa)
- Low Frequency Response: 0.0005 Hz
SERIES 106B - ICP® HIGH INTENSITY, ACOUSTIC PRESSURE SENSORS

Model 106B and 106B50 are high sensitivity, acceleration-compensated, ICP® quartz pressure sensors suitable for measuring intense acoustic phenomena. In fact, the series is widely used for measuring acoustic fields in operating launch vehicles and their associated payloads. The Series 106 family range spans from acoustic pressures of less than 80 dB to several psi. Similar piezoelectric technology is employed in PCB’s complete range of hermetically sealed dynamic pressure sensors. These products measure pressure fluctuations from acoustic levels to tens of thousands of psi and frequencies from nearly DC to tens of kHz. Their ability to measure only pressure fluctuations above a specified frequency imposed on large static pressure fields makes them uniquely suited for such applications as combustion instability monitoring.

HIGH SENSITIVITY, ICP® ACOUSTIC PRESSURE SENSOR
MODEL 106BS2

Sensitivity: 5000 mV/psi (725 mV/kPa)
Measurement Range: 1 psi (6.89 kPa)
Low Frequency Response (-5%): 2.5 Hz

HIGH SENSITIVITY, ICP® ACOUSTIC PRESSURE SENSOR
MODEL 106B50

Sensitivity: 500 mV/psi (72.5 mV/kPa)
Measurement Range: 5 psi (34.45 kPa)
Low Frequency Response (-5%): 0.5 Hz

HIGH SENSITIVITY, ICP® ACOUSTIC PRESSURE SENSOR
MODEL 106B

Sensitivity: 300 mV/psi (43.5 mV/psi)
Measurement Range: 8.3 psi (57.2 kPa)
Low Frequency Response (-5%): 0.5 Hz
SERIES 132 - TIME OF ARRIVAL, ICP® MICRO-PRESSURE SENSORS

High-Sensitivity Micro-Pressure Sensors are well suited for short wavelength acoustic and shock wave measurements associated with high-frequency projectile detection systems. Incorporating a 1 mm diameter sensing element and integral microelectronics in a 3 mm housing, these sensors have very high sensitivity and microsecond response capable of identifying the bow and stern wave from a passing projectile. An internal 8 kHz high-pass filter eliminates low-frequency inputs. Series 132 Microsensors are available in five different physical configurations to accommodate a wide range of application requirements.

Series 132A30 Microsensors all have a sensitivity of 100 mV/psi and come in a variety of external configurations to suit your specific application.

HIGHLIGHTS:
- Shock wave time-of-arrival ICP® microsensors
- 50 psi (344 kPa) range
- Rise time <3 µsec
- Resonant frequency >1M Hz
- 0.124” (3.15 mm) diameter diaphragm

TIME OF ARRIVAL, ICP® MICRO-PRESSURE SENSORS
MODEL 132B38

- Sensitivity: 140 mV/psi (20.3 mV/kPa)
- Measurement Range: 50 psi (345 kPa)
- Low Frequency Response (-5%): 11 kHz

SERIES 134 - TOURMALINE PRESSURE BAR

This unique non-resonant sensor is designed for instantaneous, reflected (face-on) shock wave pressure measurements. A shock wave pressure impacting the very thin tourmaline crystal which operates into a silver alloyed “pressure bar”, eliminates sensor structure response. The sensor has a 0.2-microsecond rise time. Since the sensor diaphragm end is coated with a conductive silver epoxy, the sensor should not be used in water or chemical environments. Series 134 can be used for shock tube calibration in a dry gas environment.

HIGHLIGHTS:
- Designed for reflected shock wave pressure measurement
- Unique non-resonating design, Tourmaline sensing element
- Pressure ranges from 1000 to 20k psi (6894 to 137,900 kPa)
- Rise time ≤ 0.2 µsec

TOURMALINE PRESSURE BAR
SERIES 134

- Sensitivity: 5 mv/psi to 0.25 mv/psi (0.73 mV/kPa to 0.04 mV/kPa)
- Measurement Range: 1000 psi to 20 kpsi (6895 kPa to 137900 kPa)
- Low Frequency Response (-5%): 0.25 kHz
SERIES 137 - ICP® FREE-FIELD BLAST PRESSURE “PENCIL” PROBE

Series 137 incorporates acceleration-compensated quartz elements and integral microelectronics for long cabledriving, improved stability and low thermal sensitivity.

**HIGHLIGHTS:**

- Designed for reflected shock wave pressure measurement
- Unique non-resonating design, Tourmaline sensing element
- Pressure ranges from 1000 to 20k psi (6894 to 137,900 kPa)
- Rise time ≤ 0.2 µsec

**FREE-FIELD ICP® BLAST PRESSURE PROBE**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>137B21B</th>
<th>137B22B</th>
<th>137B23B</th>
<th>137B24B</th>
<th>137B25B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Range</td>
<td>1 kpsi [3] 6895 kPa</td>
<td>500 psi 3447 kPa</td>
<td>50 psi 345 kPa</td>
<td>250 psi 1724 kPa</td>
<td>25 psi 173 kPa</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>1 mV/psi 0.145 mV/kPa</td>
<td>10 mV/psi 1.45 mV/kPa</td>
<td>100 mV/psi 14.5 mV/kPa</td>
<td>20 mV/psi 2.9 mV/kPa</td>
<td>200 mV/psi 29 mV/kPa</td>
</tr>
<tr>
<td>Maximum Pressure</td>
<td>5 kpsi 34,475 kPa</td>
<td>5 kpsi 34,474 kPa</td>
<td>1 kpsi 6895 kPa</td>
<td>5 kpsi 34,474 kPa</td>
<td>1 kpsi 6895 kPa</td>
</tr>
<tr>
<td>Resolution</td>
<td>6.5 mpsi 0.059 kPa</td>
<td>1 mpsi 0.007 kPa</td>
<td>10 mpsi 0.069 kPa</td>
<td>0.7 mpsi 0.005 kPa</td>
<td>2 mpsi 0.01 kPa</td>
</tr>
<tr>
<td>Resonant Frequency</td>
<td>&gt; 400 kHz</td>
<td>&gt; 400 kHz</td>
<td>&gt; 400 kHz</td>
<td>&gt; 400 kHz</td>
<td>&gt; 300 kHz</td>
</tr>
<tr>
<td>Rise Time (Incident)</td>
<td>&lt; 4 µsec</td>
<td>&lt; 4 µsec</td>
<td>&lt; 4 µsec</td>
<td>&lt; 4 µsec</td>
<td>&lt; 6.5 µsec</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-100 to +275 °F -73 to +135 °C</td>
<td>-100 to +275 °F -73 to +135 °C</td>
<td>-100 to +275 °F -73 to +135 °C</td>
<td>-100 to +275 °F -73 to +135 °C</td>
<td>-100 to +275 °F -73 to +135 °C</td>
</tr>
<tr>
<td>Discharge Time Constant (at room temp)</td>
<td>&gt; 0.2 sec</td>
<td>&gt; 0.2 sec</td>
<td>&gt; 0.2 sec</td>
<td>&gt; 0.2 sec</td>
<td>&gt; 0.2 sec</td>
</tr>
<tr>
<td>Electrical Connector</td>
<td>BNC Coaxial Jack</td>
<td>BNC Coaxial Jack</td>
<td>BNC Coaxial Jack</td>
<td>BNC Coaxial Jack</td>
<td>BNC Coaxial Jack</td>
</tr>
<tr>
<td>Housing Material</td>
<td>Aluminum</td>
<td>Aluminum</td>
<td>Aluminum</td>
<td>Aluminum</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Diaphragm Material</td>
<td>Invar</td>
<td>Invar</td>
<td>Invar</td>
<td>Invar</td>
<td>Invar</td>
</tr>
<tr>
<td>Sealing</td>
<td>Epoxy</td>
<td>Epoxy</td>
<td>Epoxy</td>
<td>Epoxy</td>
<td>Epoxy</td>
</tr>
<tr>
<td>Additional Accessories</td>
<td>—</td>
<td>—</td>
<td>AC</td>
<td>—</td>
<td>AC</td>
</tr>
<tr>
<td>Mating Cable Connectors</td>
<td>—</td>
<td>—</td>
<td>AC</td>
<td>—</td>
<td>AC</td>
</tr>
<tr>
<td>Recommended Stack Cables (29 pF/ft, 95 pF/m)</td>
<td>002ACXXXAC 002ACXXXAC 002ACXXAC 002ACXXXAC 002ACXXXAC</td>
<td>002ACXXXAC 002ACXXXAC 002ACXXXAC 002ACXXXAC 002ACXXXAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Output Cable</td>
<td>010AYXXXQM 010AYXXXQM 010AYXXXQM 010AYXXXQM 010AYXXXQM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Placebo, BNC Jack Only 137BPBO 137BPBO 137BPBO 137BPBO 137BPBO 137BPBO 137BPBO 137BPBO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-Sensor Pencil Probe 137BP28 137BP27 137BP26 137BP25 137BP24 137BP23 137BP22 137BP21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Sensor in front, Placebo in rear — — — 137B32 —</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

[1] For +10 volt output, minimum 24 VDC supply voltage required. Negative 10 volt output may be limited by output bias.
SERIES 138 - ICP® TOURMALINE UNDERWATER BLAST SENSOR

Series 138 Sensors measure shock wave pressures associated with underwater explosion testing. The sensors are structured with a volumetrically sensitive tourmaline crystal, suspended and sealed in an insulating, oil-filled vinyl tube. They have integral microelectronics. These underwater shock wave sensors provide a clean, non-resonant, high-voltage output through long cables in adverse underwater environments. They can be supplied with a sealed cable of appropriate length, ready to operate. Two physical configurations are available.

HIGHLIGHTS:
- ICP® underwater blast explosion pressure probes
- Ranges from 1000 to 50k psi (6894 to 344740 kPa)
- Rise time <1.5 μsec
- Resonant frequency >1M Hz

UNDERWATER TOURMALINE BLAST SENSORS FOR PEAK, OVERPRESSURE AND HIGH-PRESSURE BUBBLE ENERGY MEASUREMENTS

SERIES 138A MODEL NUMBERING SYSTEM

1) Connector Type
   - Default 10-32 Coaxial Jack
   - W Attached Waterproof Cable

2A) ICP® Output Pressure Range and Tube Length / Configuration
   - 138A01 Measurement Range: 1000 psi (6895 kPa) with 7.6 in. (193 mm) Length and Sinker Hole for Vertical Mounting
   - 138A02 Measurement Range: 1000 psi (6895 kPa) with 4.7 in. (120 mm) Length for Horizontal Mounting
   - 138A05 Measurement Range: 5000 psi (34475 kPa) with 7.6 in. (193 mm) Length and Sinker Hole for Vertical Mounting
   - 138A06 Measurement Range: 5000 psi (34475 kPa) with 4.7 in. (120 mm) Length for Horizontal Mounting
   - 138A10 Measurement Range: 10 kpsi (68950 kPa) with 7.6 in. (193 mm) Length and Sinker Hole for Vertical Mounting
   - 138A11 Measurement Range: 10 kpsi (68950 kPa) with 4.7 in. (120 mm) Length for Horizontal Mounting
   - 138A25 Measurement Range: 25 kpsi (172375 kPa) with 7.6 in. (193 mm) Length and Sinker Hole for Vertical Mounting
   - 138A26 Measurement Range: 25 kpsi (172375 kPa) with 4.7 in. (120 mm) Length for Horizontal Mounting
   - 138A50 Measurement Range: 50 kpsi (344750 kPa) with 7.6 in. (193 mm) Length and Sinker Hole for Vertical Mounting
   - 138A51 Measurement Range: 50 kpsi (344750 kPa) with 4.7 in. (120 mm) Length for Horizontal Mounting

2B) Charge Output Pressure Range and Tube Length / Configuration
   - 138A Measurement Range: 25 kpsi (172375 kPa) with 7.6 in. (193 mm) Length and Sinker Hole for Vertical Mounting
   - 138A24 Measurement Range: 25 kpsi (172375 kPa) with 4.7 in. (120 mm) Length for Horizontal Mounting

3) Attached Model 038 Cable Length (add only if ordering the W option)
   - /038CYxxxAC Specify total length xxx in feet. Cable is terminated with BNC plug connector
   - /M038CYxxxAC Specify total length xxx in meters. Cable is terminated with BNC plug connector

Example
   - W 138A05 /038CY300AC Attached 300 ft. 038 cable, 5000 psi measurement range, 7.6 in. length, sinker hole, BNC plug termination
PRESSURE PRODUCTS FOR BALLISTIC TESTING

BALLISTIC PRESSURE SENSORS

PCB® has supplied high frequency, durable, Quartz ballistics pressure sensors in both charge and ICP® voltage mode versions for over forty years. The Series 109 ICP® ballistic pressure sensors are acceleration compensated, and have a ceramic coated integral diaphragm to attenuate thermal shock associated with burning propellants. This series also features a floating clamp nut that reduces strain sensitivity on the sensor body due to mounting torque. The ICP® integral electronics are protected from shock such as that found in gun test applications. Series 119 charge output versions are also available.

In the early 1970’s PCB® worked with members of the Sporting Arms and Ammunition Manufacturers’ Institute (SAAMI) to develop an accurate, durable, standard test method for sporting arms ammunition. Pressure sensors suitable for implementation into a standardized test method for rapid-fire production testing of ammunition were required. This method involved a sensor with a machined curved diaphragm that measures pressure directly through the shell case. Based on this success, the conformal sensor became a SAAMI/ANSI “National Standard” for ammunition testing.

Series 117B conformal pressure sensors measure true gun chamber pressure directly through an unmodified shell case. Since the sensor diaphragm is machined to conform flush to the specific chamber diameter, the measurement process is not altered or changed in any way. There are no cartridges to be drilled or troublesome gas passages to be cleaned when using the conformal method. Conformal sensors have proven to be rugged, stable instruments, lasting thousands of rounds. Since the same sensor may outlast the life of many barrels, it is possible to start and finish ammunition batch qualification testing without experiencing sensor failure during the test.

Keeping with our tradition, PCB® continues to offer a complete line of sensors for conformal and case mouth ballistic measurements. All PCB® sensors are provided with NIST traceable calibration. For pre-calibration stabilization purposes, all ballistic pressure sensors are hydraulically cycled at high pressures and most are test fired in the PCB® ballistic firing range. PCB® also offers a high pressure static calibration system, Model 905C, for on-site use in ballistic labs. Side-by-side dynamic/static comparison calibration services are offered for PCB® and competitors’ ballistic sensors.

APPLICATIONS:
- Ammunition and Gun Testing
- Explosives Testing
- Closed Bombs
- Recoil Mechanisms
- Ultra High-frequency Detonation
SERIES 109 ICP® BALLISTIC SENSORS

PCB® offers a complete line of high pressure ballistic sensors with integral electronics. They operate from a PCB® constant-current signal conditioner and provide a high-voltage, low-impedance output. ICP® sensors are well suited for applications involving long cables and operation in dirty factory or field environments.

These sensors incorporate a captivated floating clamp nut and a more stable structure for improved accuracy, reliability, and lower thermal transient sensitivity. They are structured with quartz sensing elements, built-in microelectronics, and an integral machined ceramic-coated diaphragm for greater durability, overrange capability, high-frequency response, and improved linearity.

Models 109C11 and 109C12 are acceleration-compensated ICP® sensors for high-energy, high-frequency applications, such as detonation, closed bomb combustion, and explosive blast measurements under extreme shock conditions.

SERIES 119 CHARGE MADE BALLISTIC SENSORS

Charge Mode Pressure Sensors are well suited for high-pressure ballistics, detonation, and explosive research and test applications.

These sensors incorporate stable quartz-sensing elements, a durable-machined ceramic-coated integral diaphragm and floating clamp nut.

Models 119B11 and 119B12 are unique, acceleration-compensated, high resolution ballistic sensors designed for high-pressure, high-energy ballistics, detonation, and explosive applications under high-shock conditions, such as those that might be encountered in howitzer and liquid-propellant weapons. Two dynamic ranges of 80,000 and 100,000 psi are available.

HIGH PRESSURE ICP® BALLISTIC PRESSURE SENSOR
MODEL 109C11

Sensitivity: 0.07 mV/psi (0.010 mV/kPa)
Measurement Range: 80000 psi (552000 kPa)
Maximum Pressure: 125000 psi (862000 kPa)

HIGH PRESSURE ICP® BALLISTIC PRESSURE SENSOR
MODEL 119B11

Sensitivity (±15%): 0.25 pC/psi (0.036 pC/kPa)
Measurement Range: 0 to 80000 psi (0 to 552000 kPa)
Maximum Pressure: 100 kpsi (690000 kPa)

HIGH PRESSURE ICP® BALLISTIC PRESSURE SENSOR
MODEL 109C12

Sensitivity: 0.07 mV/psi (0.010 mV/kPa)
Measurement Range: (for ± 7V output) 100000 psi (690000 kPa)
Maximum Pressure: 125000 psi (862000 kPa)

HIGH PRESSURE ICP® BALLISTIC PRESSURE SENSOR
MODEL 119B12

Sensitivity (±15%): 0.25 pC/psi (0 to 827000 kPa)
Measurement Range: 0 to 120000 psi (552000 kPa)
Maximum Pressure: 125 kpsi (862000 kPa)
SERIES 117B - CHARGE MODE
CONFORMAL BALLISTIC SENSORS

Conformal ballistic sensors measure true gun chamber pressure directly through the cartridge case. The diaphragm of the conformal sensor is contoured to match a specific chamber diameter. An alignment guide and spacers help the user to install the sensor flush with the gun chamber walls.

The conformal ballistic sensor, when correctly installed, has a proven life expectancy of hundreds of thousands of rounds, outlasting many test barrels. Rapid-fire testing is possible since there are no cartridges to drill and align, no diaphragm ablatives to apply, and no gas passages to clean. The conformal sensor does not affect operation of the test barrel, nor change the measurement process.

Developed in cooperation with members of SAAMI to provide an accurate rapid-fire electronic production test method to replace the mechanical “copper crusher,” the conformal sensor has experienced 20 years of proven performance.

Conformal calibration through an unfired, unmodified empty cartridge shell case with PCB® Series 090B Calibration Adaptor accounts for the effects of the cartridge case. Output from the conformal sensor is compatible with any charge amplifier. The PCB® Model 443A53 Digital Peak Holding System with a charge amplifier and auto-reset peak meter facilitates rapid-fire testing of production ammunition.

The two machined flats near the connector end, an alignment guide, and a captive retaining nut facilitate installation. The nut automatically extracts the sensor when it is unscrewed. Series 090B Calibration Adaptor permits static calibration of the Model 117B Sensor, with pressures to be applied to the empty cartridge case. Spacer set is supplied to facilitate flush installation of the sensor.

HIGHLIGHTS:

- Proven long life
- Outlasts life of many barrels
- ANSI/SAAMI standards Z299 test method
- Allows rapid-fire testing
- No drilled cases or recessed passages
- Cost effective

Conformal vs. Standard Case Mouth Installation
Typical Conformal Calibration Adaptor System

### BALLISTIC PRESSURE SENSORS SMALL ARMS TESTING

<table>
<thead>
<tr>
<th>Conformal Gages</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Number</strong></td>
<td><strong>117B Small Caliber</strong></td>
<td><strong>117B Large Caliber</strong></td>
</tr>
<tr>
<td>Measurement Range</td>
<td>35 kpsi</td>
<td>60 kpsi</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.110 pC/psi</td>
<td>0.140 pC/psi</td>
</tr>
<tr>
<td>Maximum Pressure</td>
<td>275 kPa</td>
<td>552 kPa</td>
</tr>
<tr>
<td>Resolution</td>
<td>2 psi</td>
<td>2 psi</td>
</tr>
<tr>
<td>Resonant Frequency</td>
<td>&gt; 300 kHz</td>
<td>&gt; 300 kHz</td>
</tr>
<tr>
<td>Rise Time (Reflected)</td>
<td>&lt; 2 µsec</td>
<td>&lt; 2 µsec</td>
</tr>
<tr>
<td>Non-linearity</td>
<td>&lt; 2 %</td>
<td>&lt; 2 %</td>
</tr>
<tr>
<td>Acceleration Sensitivity</td>
<td>&lt; 0.02 psi/g</td>
<td>&lt; 0.02 psi/g</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-100 to +400 °F</td>
<td>-100 to +400 °F</td>
</tr>
<tr>
<td>Electrical Connector</td>
<td>10-32 Coaxial Jack</td>
<td>10-32 Coaxial Jack</td>
</tr>
<tr>
<td>Housing Material</td>
<td>17-4SS</td>
<td>17-4SS</td>
</tr>
<tr>
<td>Diaphragm Material</td>
<td>17-4SS</td>
<td>17-4SS</td>
</tr>
</tbody>
</table>

### Additional Accessories

<table>
<thead>
<tr>
<th>Conformal Calibration Adaptors</th>
<th>090B</th>
<th>090B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass Calibration</td>
<td>Contact factory for assistance, requires customer supplied brass casings and conformal adaptor</td>
<td></td>
</tr>
<tr>
<td>Mating Cable Connectors</td>
<td>EB</td>
<td>EB</td>
</tr>
<tr>
<td>Recommended Stock Cables</td>
<td>003</td>
<td>003</td>
</tr>
</tbody>
</table>

**Notes**

MODEL 118A07 - CHARGE MODE SHOT SHELL SENSOR

For production testing of shotshell ammunition per SAAMI recommendations, this upgraded sensor measures chamber pressure through the case wall of an unmodified cartridge. The number of rounds capability has increased due to a recently modified design.

Recommended Ballistic Peak Pressure Monitoring System

BALLISTIC SHOT SHELL PRESSURE SENSOR
MODEL 118A07

- Sensitivity (±15%): 0.28 pC/psi (0.041 pC/kPa)
- Measurement Range: 15000 psi (103400 kPa)
- Maximum Pressure: 35000 psi (241316 kPa)

MODEL 444A53
Ballistic Peak Pressure Monitoring System See Details on page 23.
FORCE & STRAIN PRODUCTS FOR STRUCTURAL IMPACT

IMPACT FORCE SENSORS
Quartz, piezoelectric force, and strain sensors are durable measurement devices, which possess exceptional characteristics for the measurement of dynamic force and strain events.

ICP® QUARTZ FORCE RING FOR PERFORMANCE APPLICATIONS
SERIES 201B

- Sensitivity: 50 to 1 mV/lb (11240 to 224.8 mV/kN)
- Measurement Range: 100 to 5000 lb (0.4448 to 22.24 kN)
- Low Frequency Response (-5%): 0.006 to 0.0003 Hz

GENERAL PURPOSE QUARTZ FORCE SENSORS
SERIES 208C

- Sensitivity: 500 - 1 mV/lb (112.41 - 0.2248 mV/N)
- Measurement Range: 10 - 5000 lb (44.5 - 22.24 kN)
- Low Frequency Response (-5%): 0.0003 - 0.01 Hz

APPLICATIONS:
- Crash Testing
- Crushing
- Drop Testing
- Fatigue Testing
- Fracture Testing
- Materials Testing
- Penetration Testing
- Dynamic Tension & Compression
- Impact & Repetitive Applications
- Drop Testing
- Materials Testing
MODEL 740B02 - DYNAMIC ICP® STRAIN SENSORS

Structured with a quartz sensing element and microelectronic circuitry in a low-profile titanium housing, this sensor is ideal for high-resolution measurements of dynamic strain. This unit is compatible with PCB’s ICP® Sensor signal conditioners and is capable of driving long cables. Typical applications include: active vibration control, noise-path analysis, modal testing, and use on aircraft and marine hulls, composite materials, and “smart” structures.

This product is CE-marking compliant to European Union EMC Directive, based upon conformance testing to the following European norms:

EN 50081-1: 1992 Emissions
EN 50082-1: 1992 Immunity

HIGHLIGHTS:

- Measures small strain on top of large static loads
- Provides high resolution and wide dynamic range
- Designed with low profile and integral cable
- Contains built-in microelectronic circuitry
- Detects wave propagation for material velocity characterization
**TYPICAL APPLICATION:**

An epoxy-bonded Model 740B02 Strain Sensor provides a control signal for an actively damped flexible robot manipulator, illustrated above. The electronic controller, with vibration feedback from the strain sensor, provides a signal to the amplifier, such that vibration amplitude is minimized. The active control system permits rapid settling time for a step rotation of the manipulator arm.

**ICP® PIEZOELECTRIC STRAIN SENSOR**

MODEL 740B02

- Sensitivity (±20%): 50 mV/μe
- Measurement Range: 0 to 120000 psi (552000 kPa)
- Maximum Pressure: 125 kpsi (862000 kPa)

**ICP® PIEZOELECTRIC STRAIN SENSOR**

MODEL 740M04

- Sensitivity (±20%): 5 mV/μe
- Measurement Range: 0 to 120000 psi (552000 kPa)
- Maximum Pressure: 125 kpsi (862000 kPa)
For any testing in which the environmental operating conditions of a transducer vary with time and/or location, several requirements must be fulfilled before measurement uncertainty analysis is justified. Included among the requirements are good measurement system design practices, such as adequate low- and high-frequency response and data-sampling rates, appropriate anti-aliasing filter selection, proper grounding and shielding, and much more.

In addition to these requirements, data validation must be performed to establish that each transducer responds only to the environmental stimulus for which it is intended. For piezoelectric and piezoresistive transducers, “placebo” (IEST-RP-DTE011.1) transducers enable data validation to be accomplished. The referenced IEST standard defines a placebo transducer as ‘identical to a “live” unit in every parameter except for mechanical sensitivities.’ The placebo transducer should respond only to extraneous “environmental factors.” Ideally, its output would be zero. Any signal output from it would indicate that signals from the “live” transducers could be corrupted.

Every transducer responds to its environment in every way it can. For example, accelerometer specifications include their response to thermal, acoustic, strain, and radiation stimuli, to name a few. While accelerometers must have their response to acoustic pressure specified, pressure transducers must have their response to acceleration specified. Thus, one transducer’s desired response becomes another’s undesired response.

These undesired responses can cause a change in transducer sensitivity or can result in additive, spurious signals at the transducer’s output attributable to thermoelectric, electromagnetic, triboelectric and other self-generating noise phenomena. Since the test or instrumentation engineer has the best understanding of the test environment, he/she becomes responsible for data validation. The transducer manufacturer can assist by supplying “placebo” transducers to support this validation process.
Other models available upon special request. Contact your local Sales Representative for more information.
CALIBRATION PRODUCTS

PRESSURE CALIBRATION SYSTEMS

In addition to the products listed below, PCB® is also able to perform a number of special calibration and testing services, upon request. These include acceleration sensitivity, ballistics firing range, cold gas shock tube, discharge time constant, temperature effects from –320 to +1000 °F (-196 to +535 °C), hydrostatic and hermeticity, mechanical shock, and PIND (Particle Impact Noise Detection).

LOW PRESSURE CALIBRATION SYSTEM
MODEL K9903C
- Maximum pressure: 1 MPa (150 psi)
- Pneumatic calibration media
- ‘Step’ pressure input
- 5 ms rise time
- Automated pressure controller

MEDIUM PRESSURE CALIBRATION SYSTEM
MODEL K9907C
- Maximum pressure: 6.9 MPa (1000 psi)
- Compressed air or industrial helium media
- ‘Step’ pressure input
- Fastest rise times using poppet valve mechanism

HIGH PRESSURE CALIBRATION SYSTEM
MODEL K9913C
- Maximum pressure: 103 MPa (15000 psi)
- Silicon oil media
- ‘Impulse’ pressure input
- 3 ms rise time with 7 ms pulse duration using drop mass
ULTRA HIGH PRESSURE CALIBRATION SYSTEM
MODEL K9905D

- Maximum pressure: 550 MPa (80000 psi)
- Hydraulic calibration media
- ‘Step’ pressure input
- Quasi-static method available for ballistics sensors and brass calibration
- SAAMI standard brass calibration

INSTRUMENTED SHOCK TUBE
MODEL K9901C

- Enables high frequency resonant frequency measurement
- High speed time of arrival measurements
- Operates with compressed air or inert gas
- Max burst pressure 9.6 MPa (1400 psi)
MODEL 9155D - ACCELEROMETER CALIBRATION WORKSTATION

The Accelerometer Calibration Workstation Model 9155D is a turnkey solution that provides all the necessary components out of the box. Principal components include a Windows® PC Controller, software, printer and 24-bit data acquisition card. System options allow custom configuration of the modular system with a variety of shakers and shock towers, accelerometer signal conditioning, test software modules and mounting accessories.

The system often includes the 9155D-830 or 9155D-831 air bearing shaker. With our air bearing shakers, customers benefit from two things: PCB’s R&D investment in precision metrology and years of experience on PCB’s accelerometer production line. The real world experience these shakers have in our factory results in a mature design that has been ‘hardened’ for durability and optimized for usability.

HIGHLIGHTS:

- Wide frequency range of 0.1 Hz to 20 kHz
- Resonant frequency testing up to 50 kHz
- Drastically reduces uncertainty by virtually eliminating transverse motion
- Integral quartz ICP® reference for long-term stability
- Lorentz force coil enables rapid centering of sensors with varying mass
MODEL K9525C - SHOCK ACCELEROMETER CALIBRATION WORKSTATION

The PneuShockTM Model K9525C is a turnkey calibration solution for shock accelerometers. Shocks pulses are created at accelerations from 20 g to 10000 g using a pneumatically operated projectile to strike an anvil and excite the sensor. By controlling both the level and the duration of the air pressure applied, the user gains greater control and consistency of the impacts. PneuShock provides verification and linearity check. We also offer Model 9155D-525 as an optional module for the 9155D Accelerometer Calibration Workstation.

HIGHLIGHTS:

- Amplitude linearity calibration of shock and crash sensors from 20 g to 10000 g, per ISO 16062-22
- Controlled and consistent impacts using state-of-the-art pneumatically
- Easy refinement of impulse shape and frequency content using a wide variety of impact anvils
- Superior impact control through drive pressure and duration control
SPECIALIZED INSTRUMENTATION

MODEL LXT1-QPR
TYPE 1 SOUND LEVEL METER
FIREARMS DETECTION SYSTEMS

Model LxT1-QPR handheld sound level meter features a small, lightweight ergonomic design, available real-time 1/1 and 1/3 octave frequency analysis, and comes standard with a 100dB dynamic range and a 377C10 microphone for measuring 178 dB typical. When configured with PCB Models 377C01 or 377A12 1/4” microphones, the system can safely measure high level acoustic signatures typically associated with gun-fire.

Model LxT1-QPR can be upgraded to allow easy comparison of multiple shots, high-speed data logging and a large LCD display which is easily readable in all lighting conditions. In addition, the unit can be powered for 16 hours on 4xAA batteries for ease of use in the field. Finally, Model LxT1-QPR has 2GB of on-board memory and a USB connection to PC for data downloading and reporting.

A full line of accessories is available including software, sound level calibrators, outdoor microphone systems, weatherproof enclosures for short and long-term monitoring and a variety of tripods and mounting hardware. For complete specifications on Model LxT1-QPR, please visit Larson Davis at http://www.larsondavis.com/Products/soundlevelmeters/modelxt1qpr.

DB LIMIT (1/4” MICROPHONE)

377C01 = 168dB
377A12 = 182dB
MODEL 444A53: BALLISTIC PEAK PRESSURE MONITORING SYSTEM

The Model 444A53 is a modular-style signal conditioner that combines a dual-mode amplifier module (443B102), a peak voltage monitoring module (444A152), and an AC power supply module (441A101) into one, integrated device. The unit connects directly with an ICP® or charge output pressure sensor, normalizes sensor sensitivity, and displays peak transient measurement signals in voltage or pressure units.

Unlike a digitizing peak detector, which is limited in accuracy by the sampling rate, the 444A152 peak monitoring module captures the true peak voltage of the transient event. Additionally, the module incorporates a 20 kHz low pass filter, offers reset capability between events, and delivers an analog output signal to profile the entire pressure event.

This device is ideal for barrel chamber pressure testing, lot testing of ammunition, and cartridge load studies. Two alternative versions (Models 444A51 and 444A52) eliminate the dual mode amplifier module and are intended for direct connection to ICP® pressure sensors, any direct voltage input, or for existing systems that already utilize a separate charge amplifier.

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>444A53</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td></td>
</tr>
<tr>
<td>Channels</td>
<td>1</td>
</tr>
<tr>
<td>Input Sensor Type (selectable)</td>
<td>ICP®, charge, voltage</td>
</tr>
<tr>
<td>Input Sensitivity Adjustment (normalization)</td>
<td>0.001 to 9999 (pC or mV per unit)</td>
</tr>
<tr>
<td>Excitation Supplied (ICP® mode)</td>
<td>24 VDC @ 0 to 20 mA</td>
</tr>
<tr>
<td>Voltage Gain (ICP® or voltage mode)</td>
<td>0.1 to 1000</td>
</tr>
<tr>
<td>Charge Converter (charge mode)</td>
<td>0.1 to 10000 mV/pC</td>
</tr>
<tr>
<td>Charge Input Limit</td>
<td>100000 pC</td>
</tr>
<tr>
<td>Drift (long DTC mode)</td>
<td>&lt;0.03 pC/sec</td>
</tr>
<tr>
<td>Discharge Time Constant (selectable)</td>
<td>0.18, 1.8, 10, 100, 1000, &gt;100000 sec</td>
</tr>
<tr>
<td>Peak / DVM Display</td>
<td>4-digit LCD</td>
</tr>
<tr>
<td>Peak Voltage Display Range (infinite hold)</td>
<td>± 10 V</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 1%</td>
</tr>
<tr>
<td>Display Mode</td>
<td>Peak, DVM, Bias Test (for ICP® sensors)</td>
</tr>
<tr>
<td>Rise Time</td>
<td>&lt;1 µsec</td>
</tr>
<tr>
<td>Low Pass Filter</td>
<td>20 kHz</td>
</tr>
<tr>
<td>Peak Reset</td>
<td>Manual, Remote, or Auto (1 to 99 sec)</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td></td>
</tr>
<tr>
<td>Temperature Range</td>
<td>+32 to +120 °F 0 to +50 °C</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
</tr>
<tr>
<td>Power Required</td>
<td>100 to 240 VAC, 50 to 60 Hz</td>
</tr>
<tr>
<td>Relays (2 Form C each with HI or LOW setpoint)</td>
<td>1 A @ 30 VDC, 1/2 A @ 125 VAC</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td></td>
</tr>
<tr>
<td>Size (h x w x d)</td>
<td>6.2 x 6.06 x 10.2 in 157.5 x 153.9 x 259.1 mm</td>
</tr>
<tr>
<td>Electrical Connectors (input, peak/DVM output, analog output, remote reset)</td>
<td>BNC Jack</td>
</tr>
</tbody>
</table>
SIGNAL CONDITIONING & CONVERTERS

PCB® SIGNAL CONDITIONING

LINE POWERED, ICP® SIGNAL CONDITIONER
MODEL 483C28
- Sensor Input Type(s): ICP®, Voltage, Bridge/Differential
- Channels: 8
- Frequency Range (-5%): 0.05 to 100000 Hz

LINE POWERED, ICP® SIGNAL CONDITIONER
MODEL 482C05
- Sensor Input Type(s): ICP®
- Channels: 4
- Frequency Range (-5%): 0.1 to >1000 kHz

LINE POWERED, ICP® SIGNAL CONDITIONER
SERIES 483C
- Sensor Input Type(s): ICP®
- Channels: 8
- Frequency Range (-5%): 0.1 to >1000 kHz

LINE POWERED, ICP® SIGNAL CONDITIONER
MODEL 482C64
- Sensor Input Type(s): ICP®, Voltage, Charge
- Channels: 4
- Frequency Range (-5%): 0.05 to 75000 Hz

LINE POWERED, ICP® SIGNAL CONDITIONER
MODEL 482C27
- Sensor Input Type(s): ICP®, Voltage, Bridge/Differential
- Channels: 4
- Frequency Range (-5%): 0.05 to 100000 Hz

LINE POWERED, ICP® SIGNAL CONDITIONER
MODEL 482C16
- Sensor Input Type(s): ICP®, Voltage
- Channels: 4
- Frequency Range (-5%): 0.05 to 100000 Hz
BATTERY-POWERED, ICP® SENSOR SIGNAL CONDITIONER
MODEL 482A21
Sensor Input Type(s): ICP®, Voltage
Channels: 3
Voltage Gain (±1%): 1:1

BATTERY-POWERED, ICP® SENSOR SIGNAL CONDITIONER
MODEL 482B11
Sensor Input Type(s): ICP®, Voltage
Channels: 1
Voltage Gain (±1%): x1 x10 x100

BATTERY-POWERED, ICP® SENSOR SIGNAL CONDITIONER
MODEL 480C02
Sensor Input Type(s): ICP®, Voltage
Channels: 4
Frequency Range (-5%): 0.05 to 100000 Hz

BATTERY-POWERED, ICP® SENSOR SIGNAL CONDITIONER
MODEL 480E09
Sensor Input Type(s): ICP®, Voltage
Channels: 4
Frequency Range (-5%): 0.05 to 100000 Hz

BATTERY-POWERED, ICP® SENSOR SIGNAL CONDITIONER
MODEL 480B21
Sensor Input Type(s): ICP®, Voltage
Channels: 3
Frequency Range (-5%): 0.05 to 100000 Hz
SERIES 422 IN LINE ICP POWERED CHARGE CONVERTERS

IN-LINE CHARGE CONVERTER
MODEL 422E52
Sensitivity (Charge Conversion) (±2.5%): 10 mV/pC
Output Voltage: ±5.0 V
Temperature Range (Operating): -65 to +250 °F (-54 to +121 °C)

IN-LINE CHARGE CONVERTER
MODEL 422E36
Sensitivity (±2%): 100 mV/pC
Output Voltage: ±2.5 V
Temperature Range: -65 to +250 °F (-54 to +121 °C)

IN-LINE CHARGE CONVERTER
MODEL 422E51
Sensitivity (±5.0%): 1000 mV/pC
Output Voltage: ±5.0 V
Temperature Range: -65 to +250 °F (-54 to +121 °C)

IN-LINE CHARGE CONVERTER
MODEL 422E35
Sensitivity (±2%): 1 mV/pC
Output Voltage: ±2.5 V
Temperature Range: -65 to +250 °F (-54 to +121 °C)

SERIES 402 IMPEDANCE CONVERTERS AND IN-LINE VOLTAGE FOLLOWER AMPLIFIER

Series 402A In-line voltage follower amplifiers, similar to the Series 422E charge converters, serve to convert charge output sensor signals to low-impedance voltage signals. They are recommended for applications requiring high frequency response up to 1 MHz, and for applications where sensor output (pC/unit) exceeds the maximum input range (pC) allowed in the Series 422E.

The voltage sensitivity, V, of a system including a charge output sensor, low-noise cable and voltage follower amplifier can be determined mathematically by the equation V = Q/C where Q is the charge sensitivity of the sensor in Coulombs and C is the total system capacitance in Farads. The total system capacitance is the result of the sum of the capacitance of the sensor, the capacitance of the interconnect cable, and the input capacitance of the voltage amplifier. Choose a voltage follower amplifier with an input capacitance that provides the sensitivity desired, while keeping the total output voltage (range x sensitivity) within the ±10 volt limit. Voltage follower amplifiers do not invert the polarity of the measurement signal.
# 4-CONDUCTOR CABLE ASSEMBLIES

<table>
<thead>
<tr>
<th>Base Model</th>
<th>5 ft (1.5 m)</th>
<th>10 ft (3.0 m)</th>
<th>15 ft (4.6 m)</th>
<th>20 ft (6.1 m)</th>
<th>25 ft (7.6 m)</th>
<th>30 ft (9.1 m)</th>
<th>50 ft (15.2 m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>034H</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>FEP, Lightweight</td>
</tr>
<tr>
<td>034K</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>FEP, Lightweight</td>
</tr>
<tr>
<td>019B</td>
<td>05 10 15</td>
<td>20</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silicone, Flexible, Lightweight</td>
</tr>
<tr>
<td>010P</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>FEP, General Purpose</td>
</tr>
<tr>
<td>034A</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>FEP, Lightweight</td>
</tr>
<tr>
<td>010D</td>
<td>05 10 15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td>FEP, General Purpose</td>
</tr>
<tr>
<td>034D</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>FEP, Lightweight</td>
</tr>
<tr>
<td>078D</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>Polyurethane, Flexible</td>
</tr>
<tr>
<td>010F</td>
<td>05 10 15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td>FEP, General Purpose</td>
</tr>
<tr>
<td>034F</td>
<td>05 10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>FEP, Lightweight</td>
</tr>
<tr>
<td>078F</td>
<td>10 15</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>Polyurethane, Flexible</td>
</tr>
<tr>
<td>010G</td>
<td>05 10 15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td>FEP, General Purpose</td>
</tr>
<tr>
<td>034G</td>
<td>05 10 15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td>FEP, Lightweight</td>
</tr>
<tr>
<td>038G</td>
<td>05 10 15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td>Silicone, Flexible</td>
</tr>
<tr>
<td>078G</td>
<td>05 10 15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td>Polyurethane, Flexible</td>
</tr>
</tbody>
</table>

Series 010F

Series 034D

Mini 4-Socket Plug

4-Socket Plug

BNC Plug

10-32 Plug
### 4-CONDUCTOR CABLE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>010</th>
<th>034</th>
<th>019</th>
<th>036</th>
<th>078</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Style</td>
<td>General Purpose</td>
<td>Low Noise</td>
<td>Flexible Lightweight</td>
<td>Flexible</td>
<td>Flexible</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-130 to +392 °F</td>
<td>-90 to +200 °C</td>
<td>-76 to +500 °F</td>
<td>-60 to +260 °C</td>
<td>-76 to +392 °F</td>
</tr>
<tr>
<td>Capacitance</td>
<td>16 pF/ft</td>
<td>14 pF/ft</td>
<td>15 pF/ft</td>
<td>15 pF/ft</td>
<td>25 pF/ft</td>
</tr>
<tr>
<td></td>
<td>52.4 pF/m</td>
<td>46 pF/m</td>
<td>49.2 pF/m</td>
<td>48 pF/m</td>
<td>81 pF/m</td>
</tr>
<tr>
<td>Cable Jacket Material</td>
<td>FEP</td>
<td>FEP</td>
<td>Silicone</td>
<td>Silicone</td>
<td>Polyurethane</td>
</tr>
<tr>
<td>Cable Jacket (Diameter)</td>
<td>0.1 in</td>
<td>0.077 in</td>
<td>0.070 in</td>
<td>0.104 in</td>
<td>0.119 in</td>
</tr>
<tr>
<td></td>
<td>2.54 mm</td>
<td>1.96 mm</td>
<td>1.77 mm</td>
<td>2.64 mm</td>
<td>3.02 mm</td>
</tr>
</tbody>
</table>
## COAXIAL CABLE ASSEMBLIES

The following table lists the available coaxial cable assemblies along with their specifications and usage scenarios:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Length Options</th>
<th>Connectors</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>030A</td>
<td>3-56 Plug to 10-32 Plug</td>
<td>03 05 10 20 30</td>
<td>PTFE, Low Noise, Miniature</td>
<td>3-56 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>030C</td>
<td>5-44 Plug to 10-32 Plug</td>
<td>05 10 20 30 50</td>
<td>PTFE, Low Noise, Miniature</td>
<td>5-44 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>018G</td>
<td>5-44 Plug to 10-32 Plug</td>
<td>03 05 10 20 30</td>
<td>PVC, Miniature</td>
<td>5-44 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>003G</td>
<td>5-44 Plug to BNC Plug</td>
<td>03 05 10 20 30</td>
<td>TFE, Low Noise</td>
<td>5-44 Plug to BNC Plug</td>
</tr>
<tr>
<td>002P</td>
<td>FEP Plug to BNC Plug</td>
<td>03 05 10 20 30</td>
<td>FEP</td>
<td>5-44 Plug to BNC Plug</td>
</tr>
<tr>
<td>003P</td>
<td>TFE, Low Noise 5-44 Plug to BNC Plug</td>
<td>03 05 10 20 30</td>
<td>TFE, Low Noise</td>
<td>5-44 Plug to BNC Plug</td>
</tr>
<tr>
<td>018C</td>
<td>PVC, Miniature 5-44 Plug to BNC Plug</td>
<td>03 05 10 20 30</td>
<td>PVC, Miniature</td>
<td>5-44 Plug to BNC Plug</td>
</tr>
<tr>
<td>030B</td>
<td>M3 Plug to 10-32 Plug</td>
<td>05 10 20</td>
<td>PTFE, Low Noise, Miniature</td>
<td>M3 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>003R</td>
<td>M3 Plug to 10-32 Plug</td>
<td>05 10 20</td>
<td>PVC, Miniature</td>
<td>M3 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>002A</td>
<td>10-32 Plug to 10-32 Plug</td>
<td>03 05 10 20 30 50</td>
<td>FEP</td>
<td>10-32 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>003A</td>
<td>10-32 Plug to 10-32 Plug</td>
<td>01 03 05 10 20 30 50</td>
<td>TFE, Low Noise</td>
<td>10-32 Plug to 10-32 Plug</td>
</tr>
<tr>
<td>023A</td>
<td>Hardline 10-32 Plug to 10-32 Jack</td>
<td>10</td>
<td>Hardline</td>
<td>10-32 Plug to 10-32 Jack</td>
</tr>
<tr>
<td>002C</td>
<td>10-32 Plug to BNC Plug</td>
<td>03 05 10 20 30 50</td>
<td>FEP</td>
<td>10-32 Plug to BNC Plug</td>
</tr>
<tr>
<td>003C</td>
<td>10-32 Plug to BNC Plug</td>
<td>03 05 10 20 30 50</td>
<td>TFE, Low Noise</td>
<td>10-32 Plug to BNC Plug</td>
</tr>
<tr>
<td>002B</td>
<td>10-32 Plug to BNC Jack</td>
<td>01 03</td>
<td>FEP</td>
<td>10-32 Plug to BNC Jack</td>
</tr>
<tr>
<td>003B</td>
<td>10-32 Plug to BNC Jack</td>
<td>01 03</td>
<td>TFE, Low Noise</td>
<td>10-32 Plug to BNC Jack</td>
</tr>
<tr>
<td>003U</td>
<td>10-32 Plug to 10-32 Plug</td>
<td>10</td>
<td>TFE, Low Noise</td>
<td>SMB Female Plug to SMB Female Plug</td>
</tr>
<tr>
<td>003V</td>
<td>SMB Female Plug to BNC Plug</td>
<td>10</td>
<td>TFE, Low Noise</td>
<td>SMB Female Plug to BNC Plug</td>
</tr>
<tr>
<td>002T</td>
<td>BNC Plug to BNC Plug</td>
<td>03 05 10 20 30</td>
<td>FEP</td>
<td>BNC Plug to BNC Plug</td>
</tr>
<tr>
<td>003D</td>
<td>BNC Plug to BNC Plug</td>
<td>03 05 10 20</td>
<td>TFE, Low Noise</td>
<td>BNC Plug to BNC Plug</td>
</tr>
<tr>
<td>012A</td>
<td>PVC, RG58/U BNC Plug to BNC Plug</td>
<td>03 05 10 20 30 50</td>
<td>PVC, RG58/U</td>
<td>PVC, RG58/U</td>
</tr>
<tr>
<td>012E</td>
<td>2-Socket Env. Sealed to BNC Plug</td>
<td>10 20 50</td>
<td>PVC, RG58/U</td>
<td>2-Socket Env. Sealed to BNC Plug</td>
</tr>
<tr>
<td>012R</td>
<td>2-Socket MIL to BNC Plug</td>
<td>10 20 50</td>
<td>PVC, RG58/U</td>
<td>2-Socket MIL to BNC Plug</td>
</tr>
</tbody>
</table>

**Construct cable assembly model by combining base model with desired length, e.g., 002C10.**

### Additional Notes
- **Series 023A**
- **Series 002C**
- **Series 018C**
- **Series 003A**
- **Series 012A**

---

---

39
## COAXIAL CABLE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>002</th>
<th>003</th>
<th>012</th>
<th>018</th>
<th>030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Style</td>
<td>General Purpose</td>
<td>Low Noise</td>
<td>General Purpose</td>
<td>General Purpose</td>
<td>Low Noise</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-130 to +400 °F -90 to +204 °C</td>
<td>-320 to +500 °F -196 to +260 °C</td>
<td>-40 to +176 °F -40 to +80 °C</td>
<td>-22 to +221 °F -30 to +105 °C</td>
<td>-130 to +500 °F -90 to +260 °C</td>
</tr>
<tr>
<td>Impedance</td>
<td>50 Ohm</td>
<td>50 Ohm</td>
<td>52 Ohm</td>
<td>32 Ohm</td>
<td>50 Ohm</td>
</tr>
<tr>
<td>Capacitance</td>
<td>29 pF/ft 95 pF/m</td>
<td>30 pF/ft 98 pF/m</td>
<td>29 pF/ft 95 pF/m</td>
<td>55 pF/ft 180 pF/m</td>
<td>30 pF/ft 98 pF/m</td>
</tr>
<tr>
<td>Cable Jacket Material</td>
<td>FEP</td>
<td>TFE</td>
<td>PVC</td>
<td>PVC</td>
<td>PTFE</td>
</tr>
<tr>
<td>Cable Jacket Diameter</td>
<td>0.075 in 1.9 mm</td>
<td>0.079 in 2.01 mm</td>
<td>0.193 in 4.9 mm</td>
<td>0.054 in 1.37 mm</td>
<td>0.042 in 1.09 mm</td>
</tr>
</tbody>
</table>

## OTHER COAXIAL CABLE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>005</th>
<th>006</th>
<th>023</th>
<th>038</th>
<th>098</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Style</td>
<td>Ruggedized</td>
<td>Low Noise Ruggedized</td>
<td>Hardline</td>
<td>Low Noise</td>
<td>Low Noise Flexible</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-67 to +275 °F -55 to +135 °C</td>
<td>-67 to +275 °F -55 to +135 °C</td>
<td>-300 to +1200 °F -184 to +650 °C</td>
<td>-58 to +250 °F -50 to +121 °C</td>
<td>-130 to +500 °F -90 to +260 °C</td>
</tr>
<tr>
<td>Impedance</td>
<td>50 Ohm</td>
<td>50 Ohm</td>
<td>—</td>
<td>50 Ohm</td>
<td>50 Ohm</td>
</tr>
<tr>
<td>Capacitance</td>
<td>29 pF/ft 95 pF/m</td>
<td>30 pF/ft 98 pF/m</td>
<td>100 pF/ft 328 pF/m</td>
<td>30 pF/ft 100 pF/m</td>
<td>35 pF/ft 115 pF/m</td>
</tr>
<tr>
<td>Cable Jacket Material</td>
<td>Polyolefin over Steel Braid</td>
<td>Polyolefin over Steel Braid</td>
<td>Stainless Steel</td>
<td>Polyurethane</td>
<td>TFE</td>
</tr>
<tr>
<td>Cable Jacket Diameter</td>
<td>0.200 in 5.08 mm</td>
<td>0.200 in 5.08 mm</td>
<td>0.059 in 1.5 mm</td>
<td>0.119 in 3.02 mm</td>
<td>0.079 in 2.01 mm</td>
</tr>
</tbody>
</table>
HOW TO CONFIGURE CUSTOM CABLE MODELS

1. Choose the cable length format desired, either English (ft) or Metric (m) unit lengths.
2. Choose the desired raw cable type.
3. Choose desired sensor connector type.
4. Determine the cable length required in English (ft) or Metric (m) unit lengths.
5. Choose desired termination connector type.

Example: Model 003AK025AC defines a 25 ft, low-noise cable with right angle 10-32 plug sensor connector, BNC plug termination connector.

RAW CABLE TYPE

<table>
<thead>
<tr>
<th>Coaxial Cables</th>
<th>Diameter</th>
<th>Max. Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>002 General Purpose, White FEP Jacket</td>
<td>0.075 in</td>
<td>1.9 mm</td>
</tr>
<tr>
<td>003 Low Noise, Blue TFE Jacket</td>
<td>0.079 in</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>005 Ruggedized 002 Type, General Purpose</td>
<td>0.2 in</td>
<td>5.08 mm</td>
</tr>
<tr>
<td>006 Ruggedized 003 Type, Low Noise</td>
<td>0.2 in</td>
<td>5.08 mm</td>
</tr>
<tr>
<td>012 RG-58/U, Black Vinyl Jacket</td>
<td>0.193 in</td>
<td>4.90 mm</td>
</tr>
<tr>
<td>018 Lightweight, Black PVC Jacket</td>
<td>0.054 in</td>
<td>1.37 mm</td>
</tr>
<tr>
<td>030 Low Noise, Mini, PTFE Jacket</td>
<td>0.043 in</td>
<td>1.1 mm</td>
</tr>
<tr>
<td>038 Low Noise, Blue Polyurethane Jacket</td>
<td>0.119 in</td>
<td>3.02 mm</td>
</tr>
<tr>
<td>098 Flexible, Low Noise, Green TFE Jacket</td>
<td>0.079 in</td>
<td>2.06 mm</td>
</tr>
</tbody>
</table>

Twisted/Shielded Pair Cable

<table>
<thead>
<tr>
<th>Twisted/ Shielded Pair Cable</th>
<th>Diameter</th>
<th>Max. Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>024 General Purpose, Black Polyurethane Jacket</td>
<td>0.250 in</td>
<td>6.35 mm</td>
</tr>
<tr>
<td>032 Lightweight, FEP Jacket</td>
<td>0.085 in</td>
<td>2.16 mm</td>
</tr>
<tr>
<td>045 High Temperature, Red PFA Jacket</td>
<td>0.204 in</td>
<td>5.18 mm</td>
</tr>
<tr>
<td>053 High Temperature, Red FEP Jacket</td>
<td>0.157 in</td>
<td>3.99 mm</td>
</tr>
</tbody>
</table>

Shielded 4-Conductor Cable

<table>
<thead>
<tr>
<th>Shielded 4-Conductor Cable</th>
<th>Diameter</th>
<th>Max. Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>010 General Purpose, FEP Jacket</td>
<td>0.1 in</td>
<td>2.54 mm</td>
</tr>
<tr>
<td>034 Lightweight, FEP Jacket</td>
<td>0.077 in</td>
<td>1.96 mm</td>
</tr>
<tr>
<td>019 Lightweight, Blue Silicon Jacket</td>
<td>0.068 in</td>
<td>1.73 mm</td>
</tr>
<tr>
<td>036 General Purpose, Blue Silicon Jacket</td>
<td>0.104 in</td>
<td>2.64 mm</td>
</tr>
<tr>
<td>078 General Purpose, Blue Polyurethane Jacket</td>
<td>0.119 in</td>
<td>3.02 mm</td>
</tr>
</tbody>
</table>

Hardline Cable

<table>
<thead>
<tr>
<th>Hardline Cable</th>
<th>Diameter</th>
<th>Max. Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>013 Hardline, 2-conductor, Inconel Jacket</td>
<td>0.125 in</td>
<td>3.20 mm</td>
</tr>
<tr>
<td>023 Hardline, Coaxial, 304L Stainless Steel Jacket</td>
<td>0.059 in</td>
<td>1.5 mm</td>
</tr>
</tbody>
</table>

Miscellaneous Cable

<table>
<thead>
<tr>
<th>Miscellaneous Cable</th>
<th>Diameter</th>
<th>Max. Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>031 Red/White Twisted Pair, PTFE Jacket</td>
<td>0.03 in*</td>
<td>0.8 mm*</td>
</tr>
<tr>
<td>037 10-cond. Shielded, Black Poly Jacket</td>
<td>0.024 in</td>
<td>0.61 mm</td>
</tr>
</tbody>
</table>

* diameter of each conductor

The combination of cables and connectors listed are only recommended configurations; other configurations may be available. Consult PCB® before ordering.

CC designates that cable maintains CC conformance

CONNECTOR TYPES

Coaxial Cable Connectors

- EB 10-32 Plug
- EJ 10-32 Plug (Spring Loaded)
- AH 10-32 Plug (Hex)
- AK 10-32 Plug (Right-Angle)
- AW 10-32 Plug (Solder Adaptor)
- FZ 10-32 Plug (for 023 Hardline Cabling)
- AL 10-32 Jack
- GA 10-32 Jack (for 023 Hardline Cabling)
- AG 5-44 Plug
- AF 5-44 Plug (Right-Angle)
- AE 2-Socket Plug MS3106 5/8-24 thd (with Environmental Boot)
- AM 2-Socket Plug MS3106 5/8-24 thd
- AP 2-Socket Plug MS3106 5/8-24 thd (with Strain Relief)
- BP 2-Socket Plug MS3106 5/8-24 thd (High Temperature)
- ET 2-Socket Plug MIL 7/16-27 thd (High Temperature)
- GN 2-Socket Plug MIL 7/16-27 thd (for 013 Hardline Cabling)
- GP 2-Pin Jack MIL 7/16-27 thd (for 013 Hardline Cabling)
- LN 8-Pin Mini DIN (for 4-Wire Bridge)
- BZ Blunt Cut
- DZ Pigtail (Leads Stripped and Tinned for 3711/3713 Series)
- JJ Splice Assembly to (3) EB Connectors
- LA Splice Assembly to (3) EJ Connectors
- JZ Splice Assembly to (3) AL Connectors
- JW Splice Assembly to (3) AC Connectors
- JX Splice Assembly to (3) AB Connectors
- JS Splice Assembly to (3) AY Connectors

Multi-Lead Connectors (For Triaxial Sensors)

- AE 2-Socket Plug MS3106 5/8-24 thd (with Environmental Boot)
- AM 2-Socket Plug MS3106 5/8-24 thd
- AP 2-Socket Plug MS3106 5/8-24 thd (with Strain Relief)
- BP 2-Socket Plug MS3106 5/8-24 thd (High Temperature)
- ET 2-Socket Plug MIL 7/16-27 thd (High Temperature)
- GN 2-Socket Plug MIL 7/16-27 thd (for 013 Hardline Cabling)
- GP 2-Pin Jack MIL 7/16-27 thd (for 013 Hardline Cabling)
- LN 8-Pin Mini DIN (for 4-Wire Bridge)
- BZ Blunt Cut
- DZ Pigtail (Leads Stripped and Tinned for 3711/3713 Series)
- JJ Splice Assembly to (3) EB Connectors
- LA Splice Assembly to (3) EJ Connectors
- JZ Splice Assembly to (3) AL Connectors
- JW Splice Assembly to (3) AC Connectors
- JX Splice Assembly to (3) AB Connectors
- JS Splice Assembly to (3) AY Connectors

Miscellaneous Connectors

- AE 2-Socket Plug MS3106 5/8-24 thd (with Environmental Boot)
- AM 2-Socket Plug MS3106 5/8-24 thd
- AP 2-Socket Plug MS3106 5/8-24 thd (with Strain Relief)
- BP 2-Socket Plug MS3106 5/8-24 thd (High Temperature)
- ET 2-Socket Plug MIL 7/16-27 thd (High Temperature)
- GN 2-Socket Plug MIL 7/16-27 thd (for 013 Hardline Cabling)
- GP 2-Pin Jack MIL 7/16-27 thd (for 013 Hardline Cabling)
- LN 8-Pin Mini DIN (for 4-Wire Bridge)
- BZ Blunt Cut
- DZ Pigtail (Leads Stripped and Tinned for 3711/3713 Series)
- JJ Splice Assembly to (3) EB Connectors
- LA Splice Assembly to (3) EJ Connectors
- JZ Splice Assembly to (3) AL Connectors
- JW Splice Assembly to (3) AC Connectors
- JX Splice Assembly to (3) AB Connectors
- JS Splice Assembly to (3) AY Connectors

* diameter of each conductor

The combination of cables and connectors listed are only recommended configurations; other configurations may be available. Consult PCB® before ordering.

CC designates that cable maintains CC conformance
COAXIAL CUSTOM CABLE ASSEMBLIES

Custom Cable Assemblies

PCB® offers many standard cable assemblies, however, in the event that a standard cable assembly will not fulfill the requirements of the application, the ability to configure a custom cable assembly is offered. Start by ensuring compatibility of the connector type with the cable type desired from the chart below, and then configure the custom cable model number from the steps on the previous page.

<table>
<thead>
<tr>
<th>Cable</th>
<th>002</th>
<th>003</th>
<th>005</th>
<th>006</th>
<th>012</th>
<th>013</th>
<th>018</th>
<th>023</th>
<th>024</th>
<th>030</th>
<th>031</th>
<th>032</th>
<th>038</th>
<th>045</th>
<th>053</th>
<th>098</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AD</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AG</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AH</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AK</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AW</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>BZ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EB</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EJ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EK</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ET</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FW</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>FX</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FZ</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GN</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### MULTI-CONDUCTOR CUSTOM CABLE ASSEMBLIES

#### Cable - Connector Compatibility Matrix

The following table provides compatibility information for cables and cable connectors. A “3” denotes compatibility of the connector type shown in the rows going down the table with the cable type of the intersecting column going across the table.

<table>
<thead>
<tr>
<th>Cable</th>
<th>010</th>
<th>019</th>
<th>034</th>
<th>036</th>
<th>037</th>
<th>078</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AY</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>BZ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>CA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>DZ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EH</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EN</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>GJ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>HJ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>JJ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>JS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>JW</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>JX</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>JY</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>JZ</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>LA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
CABLE CONNECTORS

* Max temp may be less depending on cable assembly

**BNC JACK**
MODEL AB
Max temp: 329 °F (165 °C)

**5-44 COAXIAL PLUG**
MODEL AF
Right angle
Max temp: 329 °F (165 °C)

**10-32 COAXIAL JACK**
MODEL AL
Straight
Max temp: 500 °F (260 °C)

**BNC PLUG**
MODEL AC
Max temp: 329 °F (165 °C)

**5-44 COAXIAL PLUG**
MODEL AG
Straight
Max temp: 500 °F (260 °C)

**2-SOCKET MS3106 PLUG**
MODEL AP
With strain relief
Max temp: 257 °F (125 °C)

**PIGTAIL**
MODEL AD
Leads stripped and tinned
Max temp: 490 °F (254 °C)*

**10-32 COAXIAL PLUG**
MODEL AG
Straight, with wire locking hex
Max Temp: 450 °F (232 °C)

**10-32 COAXIAL PLUG / SOLDER ADAPTOR**
MODEL AW
User repairable
Max temp 500: °F (260 °C)*

**2-SOCKET MS3106 PLUG**
MODEL AD
With environmental boot
Max temp: 325 °F (163 °C)

**10-32 COAXIAL PLUG**
MODEL AK
Right angle
Max temp: 329 °F (165 °C)

**4-SOCKET PLUG, 1/4-28 THREAD**
MODEL AY
For triaxial sensors
Max temp: 325 °F (163 °C)

*Cable connectors may experience reduced maximum temperature based on specific cable assembly.
4-PIN JACK, 1/4-28 THREAD
MODEL CA
Triaxial sensors
Max temp: 329 °F (165 °C)

3-56 COAXIAL PLUG
MODEL EK
Max temp: 500 °F (260 °C)

10-32 COAXIAL JACK
MODEL FZ
For hardline cable
Max temp: 900 °F (482 °C)

10-32 COAXIAL PLUG
MODEL EB
Straight
Max temp: 500 °F (260 °C)

9-SOCKET PLUG
MODEL EN
For triaxial capacitive accelerometers
Max temp: 275 °F (135 °C)

2-SOCKET MS3106 PLUG
MODEL GA
For hardline cable
Max temp: 550 °F (288 °C)

4-SOCKET MINI PLUG, 8-36 THREAD
MODEL EH
For triaxial sensors
Max temp: 356 °F (180 °C)

M3 COAXIAL PLUG
MODEL EP
Max temp: 500 °F (260 °C)

2-SOCKET PLUG, 7/16-27 THREAD
MODEL GN
High temperature
Max temp: 900 °F (482 °C)

10-32 COAXIAL PLUG
MODEL EJ
Straight, o-ring seal, spring loaded
Max temp: 500 °F (260 °C)

2-SOCKET PLUG, 7/16-27 THREAD
MODEL ET
Max temp: 500 °F (260 °C)

2-PIN JACK, 7/16-27 THREAD
MODEL GP
High temperature
Max temp: 900 °F (482 °C)
CONNECTOR ADAPTORS

SCOPE INPUT ADAPTOR
MODEL 070A02
10-32 coaxial jack to BNC plug. For adapting BNC connectors for use with 10-32 coaxial plugs.

CABLE ADAPTOR
MODEL 070A08
10-32 coaxial jack to BNC jack. Joins cables terminating in a BNC plug and a 10-32 coaxial plug.

BNC COUPLER
MODEL 070A12
BNC jack to BNC jack. Joins two cables terminating in BNC plugs.

CONNECTOR ADAPTOR
MODEL 070A03
10-32 coaxial plug to BNC jack. Converts 10-32 connectors for use with BNC plugs. Do not use on sensor connectors.

SOLDER CONNECTOR ADAPTOR
MODEL 070A09

FEED-THRU ADAPTOR
MODEL 070A13
10-32 coaxial jack to BNC jack. Bulkhead connects BNC plug to 10-32 coaxial jack.

1/8 in max wall thickness 1/2 in mtg thd

10-32 COAXIAL COUPLER
MODEL 070A05

BNC T CONNECTOR
MODEL 070A11
BNC plug to two BNC jacks. Used as a cable splitter.

10-32 HERMETIC FEED-THRU
MODEL 070A14
10-32 coaxial jack to 10-32 coaxial jack.

1/4 in max wall thickness 5/16-32 in mtg thd
10-32 COAXIAL RIGHT ANGLE ADAPTOR  
MODEL 070A20

10-32 coaxial jack to 10-32 coaxial plug. For use in confined locations. For ICP® sensors only.

10-32 COAXIAL PLUG  
MODEL 076A05

Microdot connector, screw-on type.

PLASTIC PROTECTIVE CAP  
MODEL 085A18

Provides strain relief for solder connector adaptors, as well as protects 10-32 cable ends.

CONNECTOR TOOL  
MODEL 076A25

Used to install 076A05 screw-on type microdot connector.

10-32 COAXIAL SHORTING CAP  
MODEL 085A40

Used to short charge output sensor connectors during storage and transportation.

COAXIAL CONNECTOR  
MODEL EB

10-32 crimp-on style coaxial connector. Requires tools contained in Model 076C31 kit.

10-32 COAXIAL CRIMP-ON CONNECTOR KIT  
MODEL 070A20

Includes 1 pin insertion tool, 1 sleeve-crimping tool, and 20 Model “EB” connectors with cable strain reliefs. (Wire stripper and soldering iron not included).