Quartz, Free-field, ICP® Blast Pressure Pencil Probe

New Series 137B pencil probes with 10-32 or BNC jack connectors, with single and dual output available

Highlights

- One-piece design improves alignment
- Micro-second rise time
- 400 kHz resonant frequency
- Two pressure outputs in one probe

Applications

- Air Blast Measurement
- Peak Pressure and Total Impulse
- Explosive Research and Structural Loading
- Shock Wave Velocity and/or Time-of-Arrival Determinations

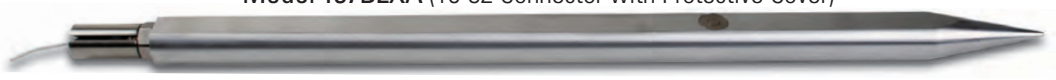
The Pencil Probe is designed to measure shock waves caused from explosions in air. Such explosions are found in the industries of Defense and Mining, or wherever explosives research is conducted.

Series 137B pencil probes incorporate acceleration-compensated quartz sensing elements and integral ICP® microelectronics that assist driving the blast signal over long cables, with improved stability and durability.

Series 137B quartz, free-field, ICP® blast pressure pencil probes are offered with both 10-32 coaxial jack connector and BNC electrical connectors. New to the series are two-sensor probes that allow an easy way to capture shock speed close to the explosion. The pencil probes continue to feature an extremely fast micro-second response time, with resonant frequency above 400k Hz.

Model 137B2XB (BNC Connector)

Model 137B2XA (10-32 Connector with Protective Cover)



Model 137B25 (4-pin Connector with 2-Channel Output)

Photo 1: Pencil Probes are often mounted in multiple locations from the blast source.

Series 137B quartz, free-field, ICP® blast pressure probes have an unique pencil shape that allows the shock wave to progress smoothly across the sensor, providing distortion free measurements. Applications include measuring blast pressure to obtain peak pressure, total impulse, shock wave and time-of-arrival measurements often used to study blast effects.

A blast wave, usually incident to the longitudinal axis of the pencil probe, will become distorted at its higher frequencies (shorter wavelengths) when encountering the probe tip. The unique shape of the probe allows the blast wave to reconstitute itself by the time it arrives at the sensing face, which is located transverse to the longitudinal axis of the probe. A machined "flat" along the side of the probe minimizes distortion of the blast wave that would otherwise occur due to the flat sensing face of the sensor protruding from a cylindrical probe body. When the probe is pointed at blast waves, the configuration permits accurate measurement of static overpressure.

The sensors require ICP® (IEPE) constant current power supply. Signal conditioners with a minimum of 100 kHz are recommended, but 1 MHz is desired. A list of 1 MHz PCB® ICP® signal conditioners can be found on page 4.

"Placebo" transducers enable data validation to be accomplished. The placebo transducer should respond only to extraneous "environmental factors." Ideally, its output would be zero. PCB® can assist by supplying "placebo" transducers to support this validation process, Model 137BPBO.

Photo 2: Typical mounting of a Pencil Probe.

Free-field ICP® Blast Pressure Probe

Model 137B2XB (BNC Connector)

Model 137B2XA (10-32 Connector with Protective Cover)

Model 137B25 (4-pin Connector with 2-Channel Output)

Model Number	137B21B	137B22B	137B23B	137B24B
Measurement Range	1 kpsi [3] 6895 kPa [3]	500 psi 3447 kPa	50 psi 345 kPa	250 psi 1724 kPa
Useful Overrange	—	1 kpsi [1] 6895 kPa [1]	100 psi [1] 690 kPa [1]	500 psi [1] 3447 kPa [1]
Sensitivity	1 mV/psi 0.145 mV/kPa	10 mV/psi 1.45 mV/kPa	100 mV/psi 14.5 mV/kPa	20 mV/psi 2.9 mV/kPa
Maximum Pressure	5 kpsi 34,475 kPa	5 kpsi 34,474 kPa	1 kpsi 6895 kPa	5 kpsi 34,474 kPa
Resolution	8.5 mpsi 0.059 kPa	1 mpsi 0.007 kPa	10 mpsi 0.069 kPa	0.7 mpsi 0.005 kPa
Resonant Frequency	> 400 kHz	> 400 kHz	> 400 kHz	> 400 kHz
Rise Time (Incident)	< 4 µsec	< 4 µsec	< 4 µsec	< 4 µsec
Non-linearity	< 1 % [2]	< 1 % [2]	< 1 % [2]	< 1 % [2]
Temperature Range	-100 to +275 °F -73 to +135 °C	-100 to +275 °F -73 to +135 °C	-100 to +275 °F -73 to +135 °C	-100 to +275 °F -73 to +135 °C
Discharge Time Constant(at room temp)	> 0.2 sec	> 0.2 sec	> 0.2 sec	> 0.2 sec
Electrical Connector	BNC Coaxial Jack	BNC Coaxial Jack	BNC Coaxial Jack	BNC Coaxial Jack
Housing Material	Aluminum	Aluminum	Aluminum	Aluminum
Diaphragm Material	Invar	Invar	Invar	Invar
Sealing	Epoxy	Epoxy	Epoxy	Epoxy
Additional Accessories				
Mating Cable Connectors	—	—	AC	—
Recommended Stock Cables (29 pF/ft, 95 pF/m)	—	—	002 Multi-strand for Blast	—
Dual Output Cable	010AYXXXQM	X	X	010AYXXXQM
Additional Versions				
10-32 Coaxial Jack Connector with Protective Cover	137B21A	137B22A	137B23A	137B24A
Placebo, BNC Jack Only	137BPBO	137BPBO	137BPBO	137BPBO
Two-Sensor Pencil Probe	137B28	137B27	137B25	137B26
Active Sensor in front, Placebo in rear	—	—	—	137B32
Notes				
[1] For +10 volt output, minimum 24 VDC supply voltage required. Negative 10 volt output may be limited by output bias. [2] Zero-based, least-squares, straight line method. [3] For +/- 1V output.				

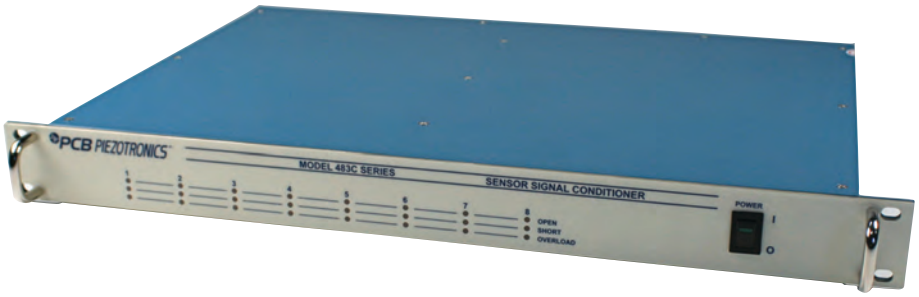
Recommended Signal Conditioners

Series 137B require standard ICP® power with the ability to adjust constant current. It is important to account for extra cable capacitance found in long cables used in blast test environments by increasing the constant current. The signal conditioner should also have at least 100 kHz bandwidth, preferably 1 MHz.

Model 482A21

- Single & 4-channel versions
- Unity gain, low-noise, AC and DC powerable
- 1M Hz response

TEDS CIRCUITRY COMPATIBLE



Series 483C05

- AC-powered
- 8-channel
- 1M Hz response

TEDS CIRCUITRY COMPATIBLE

Models 482C05

- AC-powered
- 4-channel version
- 1M Hz response

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