



# Acoustic Measurement Sensors & Instrumentation





# PCB® — Trusted by Companies and Laboratories Worldwide



**PCB Piezotronics, Inc.** provides a variety of acoustic measurement products, including prepolarized and externally polarized condenser, array, probe, low-profile surface, and special purpose microphones. Microphone products are complemented by an assortment of preamplifiers, signal conditioners, A-weighting filters, handheld calibrators, and accessories.

All PCB® acoustic products are manufactured from the highest quality materials. They are used by a variety of industries and customers including automotive, aerospace & defense, OEM's, universities, consultants, white goods (appliance), and consumer goods manufacturers.

## Over 45 Years Experience

PCB® designs, manufactures, and sells sensors worldwide. With over 1000 employees across the globe, there are several Ph.D.'s on our large engineering staff. These skilled resources enable PCB® to offer a variety of products ranging from microphones to accelerometers, force, torque, pressure, load, MEMS sensors, dosimeters, and sound level meters. At PCB®, we understand the complexities of your test environment and requirements, therefore we can recommend the best solution for your application.

## Innovation

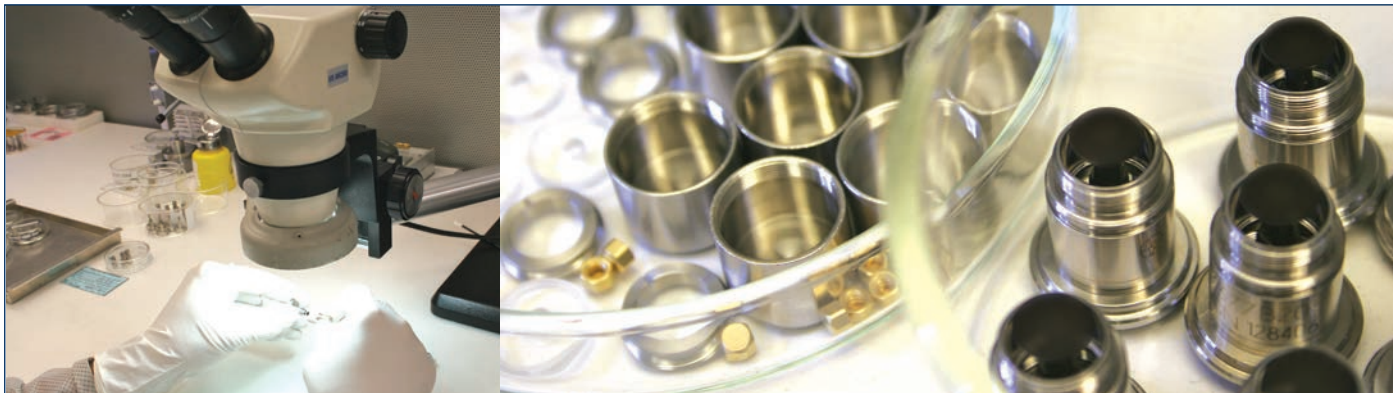
**PCB® is the inventor of ICP® technology.** PCB® heavily invests in employees, manufacturing, and R&D equipment. This keeps us a leader in sensor technology. Whether it is introducing the industry's first commercial prepolarized high temperature and first prepolarized low noise microphones, or enabling our business partners to measure the lowest noise level in the world with a custom 3" microphone, you can be assured that PCB® is on the leading edge of acoustic design.



**Manufacturing Sensors Since 1967!**



**Model HT378B02**



## In-house Manufacturing

PCB® uses only the highest quality material and components for its microphones. While other sensor providers outsource their manufacturing, PCB® has invested heavily in on-going employee training as well as in a state of the art, in-house CNC machining facility. This allows us to control all factors that affect quality and delivery. PCB® has made significant investments in our people and operations, including:



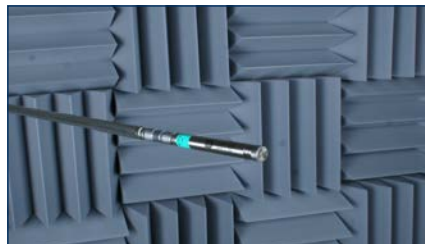
### High Volume Robotic Machining Cells

PCB's in-house machining facilities control factors that affect quality, production quantities, and delivery. This reduces dependency on outside sources, enables PCB® to meet urgent requests, and keeps cost down so savings can be passed through to our customers.



### Laser Welding

Microphones are welded in clean areas to ensure stability and robustness.



### Anechoic Chamber

This special sound proof room enables our large team of engineers to design, test, and verify acoustic sensors.



### Clean Rooms

Assembly is performed in clean rooms to ensure consistency and compliance with Working Class IEC standards. Certified professionals manufacture and assemble all microelectronics in controlled environments.



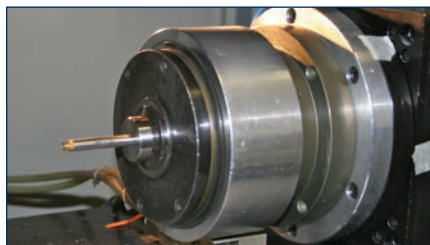
### Environmental Chambers

Environmental stress relieving and testing ensures long term stability in the harshest environments.



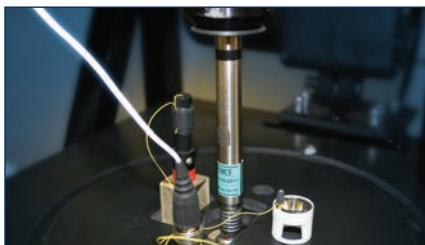
### Nitrogen Storage Chambers

All critical components and assemblies are stored in nitrogen chambers to minimize contamination and maximize stability.



### Laser Etching

Model and serial numbers are etched on the microphone assemblies. Large easy-to-read fonts are on the external housings. Disassembly is not required to read these designations.



### Calibration

Every PCB® microphone and preamplifier is calibrated with traceable certifications. Some competitors only offer sensitivity readings, typical responses, or certifications of compliance.



### Inspection

Every PCB® microphone and preamplifier is individually inspected to ensure a quality product gets shipped each and every time.





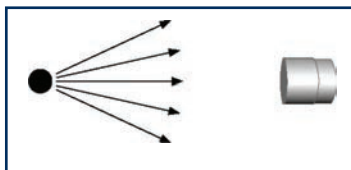
## Selecting the Right Microphone

There are several product options to consider when choosing a microphone and preamplifier system to measure sound or unwanted sound, called noise. In some cases, multiple products can be used for the same application. The PCB® Microphone Handbook provides detailed information about microphone selection, maintenance, calibration, associated standards, and more. To download this handbook, visit [www.pcb.com/acoustics](http://www.pcb.com/acoustics).

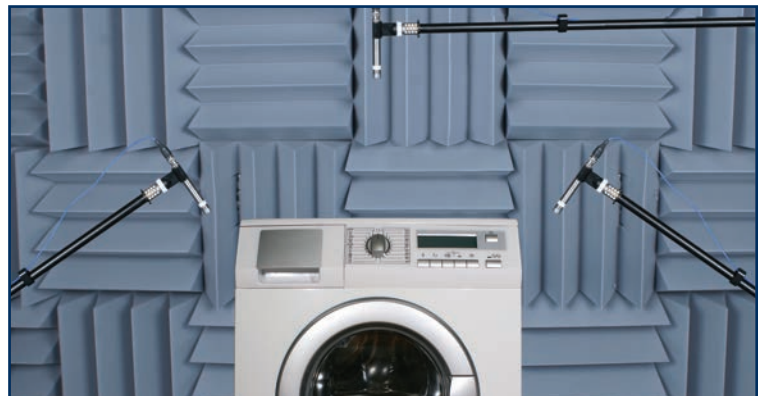
## Microphone Field Types

### Free-field Response

**Free-field microphones** are designed for use in environments without reflections. They are ideal for outdoor applications, as well as laboratory applications in an anechoic chamber. Common free-field testing includes automotive pass-by, loudspeakers, appliances, and disk drive sound measurements.



Free-field

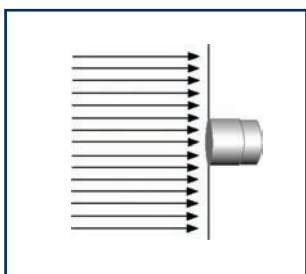


Sound Source Location for Noise Reduction



## Pressure Response

**Pressure microphones** are specifically designed to be flush-mounted to a surface at the boundary of the sound field. This allows accurate measurement of sound pressure in ducts, wind tunnels, and couplers. Pressure microphones are ideal for use as reference microphones, as they are designed to have very flat frequency response within a sound coupler or calibrator. Pressure microphones are also required for most ear simulator applications.



Pressure Response

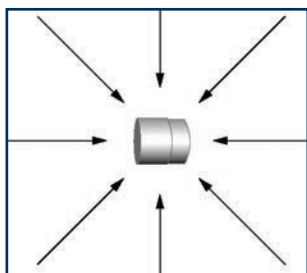


Image courtesy of Spectronics, Inc.

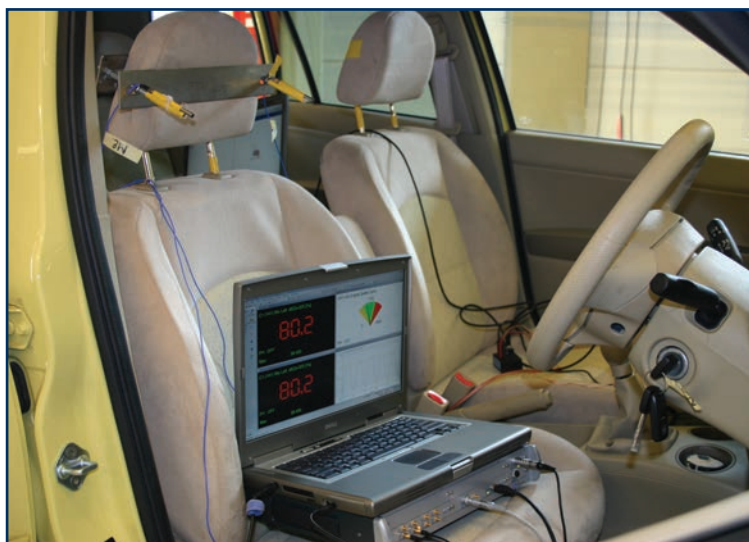
Flush Mounted Microphone Measurements in an Impedance Tube

## Random Incidence Response

**Random incidence microphones** are designed for use in areas where the sound field could come from any direction. The best uses for these microphones are to perform measurements in reverberant chambers and for many indoor noise applications. They are well suited for room acoustics, as well as for aerospace and automotive cabin noise measurements.



Random Incidence

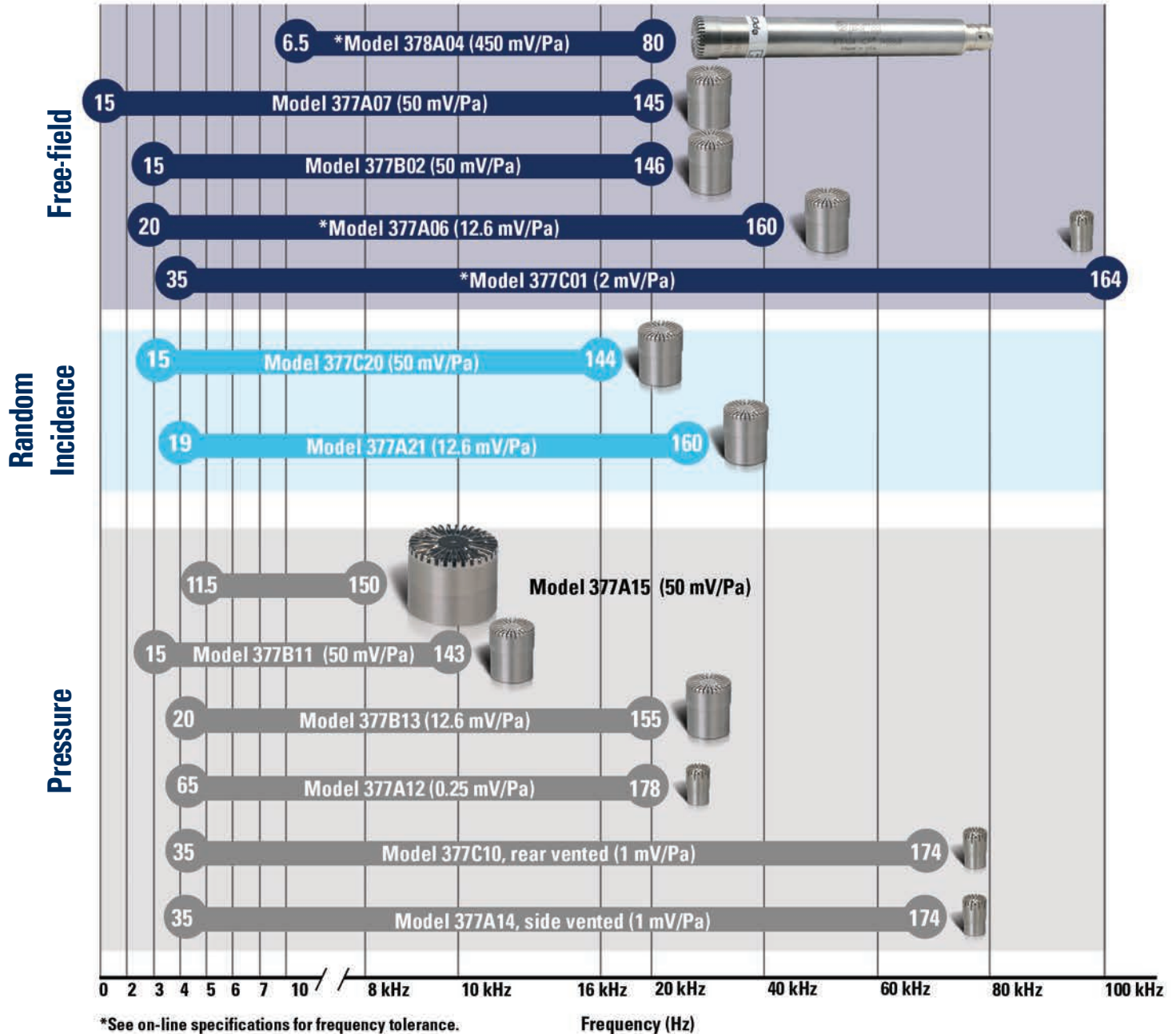


Cabin Noise Measurements for Operator Comfort

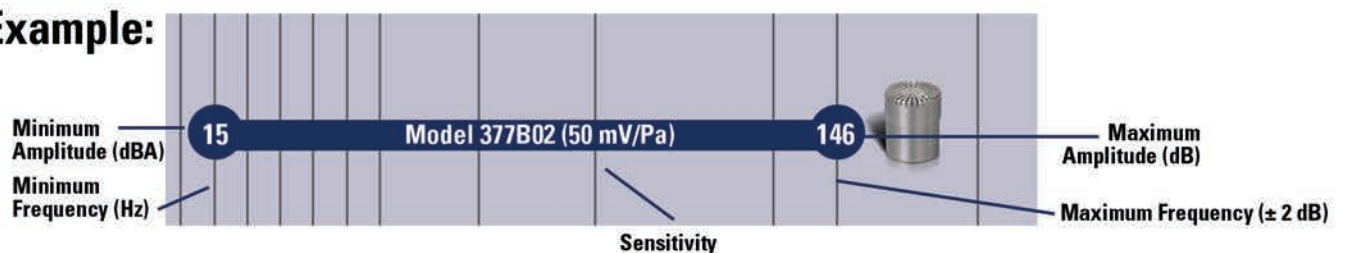


# Microphone Comparison

## PREPOLARIZED (0 V)

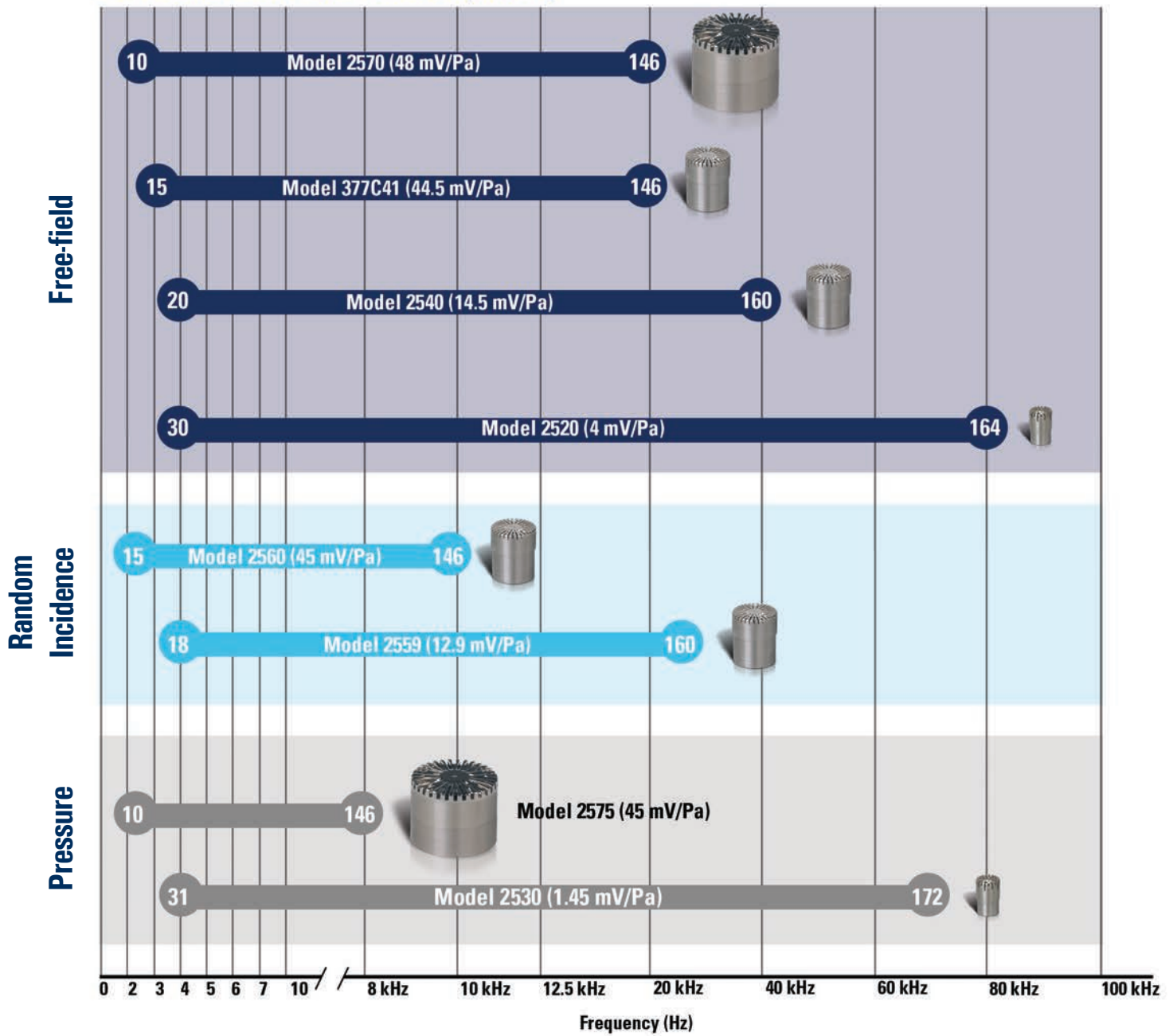


### Example:





## EXTERNALLY POLARIZED (200 V)



Size:



1/4"

1/2"

1"

(Not to scale)





## Prepolarized ICP® Precision Condenser Microphones and Preamplifiers

Prepolarized microphones have many advantages over externally polarized models. They use low power circuitry and do not require an external polarization voltage. PCB® invented ICP® power. Applying a polymer coating to the top of the backplate and embedding a charge on it eliminates the need for expensive 200 V power supplies and cables, and allows use of a 2-20 mA constant current supply or signal conditioner as the power source.

Prepolarized microphones are especially useful in applications that require battery powered equipment. Prepolarized microphones are less susceptible to the influence of high humidity environments because of the high electrical resistance of the polymer coating on the backplate.

Prepolarized microphone systems use common coaxial cables with BNC connectors and can be shared with other ICP® compatible products including: accelerometers, force, and pressure sensors. Portability and interchangeability with other sensors minimizes test set-up time and reduces the cost per-channel.

**NEW!**



**Low Noise Free-field  
Microphone & Preamplifier  
Model 378A04**



**Computer Fan and Disk Drive  
Noise Test (Model 378A04)**

TEDS Microphone & Preamplifier Systems, IEEE 1451.4 Compliant						
	Free-field System					
TEDS Version 1.0	378C01	378B02	HT378B02	378A04	378A06	378A07
Mated Pair	377C01	377B02	377B02	Single piece	377A06	377A07
System Components	426B03	426E01	HT426E01	construction	426E01	426E01
Diameter	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"
Notes	High amplitude, high frequency measurements	Audible range, low to medium amplitudes, most common	High temperature version of 378B02	Extreme low noise measurements	Medium to high amplitude and frequency measurements	Extreme low frequency infrasound measurements
Application	Ultrasound, blast, gun shot, noise identification	Pass-by, noise identification, sound power, sound intensity, Class 1 sound level meters	Engine analysis, exhaust testing, HVAC, leak detection	Computer fan and disk drives, appliance testing, electric vehicle sound quality	Railway and horn testing, alarm monitoring	Wind turbine testing, sonic boom detection

Transducer Electronic Data Sheets (TEDS) enhance the identification of each microphone. All PCB® microphone and preamplifier systems come standard with TEDS functionality and are compliant with the IEEE 1451.4 standard.

	Pressure System					Random Incidence System		
TEDS Version 1.0	378A12	378A14	378C10	378B11	378A13	378A21	378C20	HT378C20
Mated Pair	377A12	377A14	377C10	377B11	377A13	377A21	377C20	377C20
System Components	426A03	426A05	426B03	426E01	426E01	426E01	426E01	HT426E01
Diameter	1/4"	1/4"	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"
Notes	Extreme high amplitude measurements	High frequency, high amplitude measurements side vented	High frequency, high amplitude measurements rear vented	High sensitivity, low frequency, low noise measurements	Mid range frequency and amplitude measurements	Medium to high amplitude and frequency measurements	Audible range, high sensitivity, low - medium amplitudes	High temperature version of 378C20
Application	Blast detection, cavity analysis, gunshot noise measurements	Ultrasound, impedance tubes, cavity analysis	Ultrasound, impedance tubes, cavity analysis	Infrasound, impedance tubes, cavity analysis, panel testing	Impedance tubes, cavity analysis, panel testing	Cabin noise, consumer product testing	Cabin testing, environmental noise, room acoustics, Class 1 sound level meters	Environmental noise, HVAC testing

### Engineered to Maximize System Performance

For optimum performance, PCB® matches the microphone and preamplifier to complement each other. The model 378 microphone system series takes the precision and durability of the standard model 377 microphone series line and mates it with one of PCB's model 426 preamplifiers. This system approach provides a convenient and user friendly option for purchasing acoustic measurement equipment and allows for use of TEDS to store calibration data.



**1/4" Microphones**

Models  
377C01  
377C10  
377A12  
377A14

**1/2" Microphones**

Models  
377B02  
377A06  
377A07  
377B11  
377B13  
377C20  
377A21

**1" Microphone**  
Model 377A15**1/2" Preamplifier Model 426A11****1/2" Preamplifier Models HT426E01, 426E01, 426A10****1/4" Preamplifier**  
Model 426B03, 426A05**1/4" Short Preamplifier**  
Model 426A07**1/2" Short Preamplifier**  
Model 426A13**Prepolarized (0 V) Precision Condenser Microphones**

Model Number	Free-field				Pressure						Random Incidence	
	377C01	377B02	377A06	377A07	377A12	377A14	377C10	377B11	377B13	377A15	377C20	377A21
Diameter	1/4"	1/2"	1/2"	1/2"	1/4"	1/4"	1/4"	1/2"	1/2"	1"	1/2"	1/2"
Open Circuit Sensitivity	2 mV/Pa	50 mV/Pa	12.6 mV/Pa	50 mV/Pa	0.25 mV/Pa	1 mV/Pa	1 mV/Pa	50 mV/Pa	12.6 mV/Pa	50 mV/Pa	50 mV/Pa	12.6 mV/Pa
Frequency Range ( $\pm 2$ dB)	4 Hz to 80 kHz	3.15 Hz to 20 kHz	3 Hz to 31.5 kHz	0.07 Hz to 20 kHz	4 Hz to 20 kHz	4 Hz to 70 kHz	4 Hz to 70 kHz	3.15 Hz to 10 kHz	4 Hz to 20 kHz	5 Hz to 8 kHz	3.14 Hz to 16 kHz	4 Hz to 25 kHz
Dynamic Range Upper Limit - 3% Distortion Limit [1]	164 dB	146 dB	160 dB	145 dB	178 dB	174 dB	174 dB	143 dB	155 dB	150 dB	144 dB	160 dB
Dynamic Range Lower Limit - Cartridge Thermal Noise [1]	35 dB (A)	15 dB (A)	20 dB (A)	15 dB (A)	65 dB (A)	35 dB (A)	35 dB (A)	15 dB (A)	20 dB (A)	11.5 dB (A)	15 dB (A)	19 dB (A)
Temperature Range	-40 to +248 °F -40 to +120 °C	-40 to +302 °F -40 to +150 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C	-40 to +248 °F -40 to +120 °C

**Notes**[1] re 20  $\mu$ Pa

These low noise, general purpose, preamplifiers are powered by any constant current (2-20 mA) ICP® sensor power supply. They are designed to be used with prepolarized microphones.



All preamplifiers are CE marked and contain TEDS memory circuitry.

**ICP® Preamplifiers for Prepolarized Microphones**

Model Number	426B03	426A05	426A07	426E01	HT426E01	426A10	426A11	426A13
Diameter	1/4"	1/4"	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"
Gain (Attenuation)	-0.08 dB [1]	-0.19 dB [1]	-0.19 dB [1]	-0.05 dB [1]	-0.06 dB [2]	-0.1 dB [1]	-0.16 dB [1]	-0.20 dB [1]
Frequency Response ( $\pm 0.1$ dB)	5 Hz to 126 kHz	5 Hz to 126 kHz	2.5 Hz to 126 kHz	6.3 Hz to 125 kHz	6.3 Hz to 126 kHz	80 Hz to 125 kHz	5 Hz to 125 kHz	10 Hz to 126 kHz
Electrical Noise (A-weight)	$\leq 3.2 \mu$ V [1]	$\leq 3.2 \mu$ V [1]	$\leq 2.5 \mu$ V [1]	$\leq 2.8 \mu$ V [1]	$\leq 4.9 \mu$ V [2]	$\leq 3.6 \mu$ V [1]	$\leq 7.5 \mu$ V [1]	$\leq 3 \mu$ V [1]
Electrical Noise (Linear)	$\leq 5.6 \mu$ V [1]	$\leq 5.6 \mu$ V [1]	$\leq 5.6 \mu$ V [1]	$\leq 5 \mu$ V [1]	$\leq 13.4 \mu$ V [2]	$\leq 11.2 \mu$ V [1]	$\leq 5.7 \mu$ V [1]	$\leq 6 \mu$ V [1]
Output Voltage (Maximum)	$\pm 8$ V pk	$\pm 8$ V pk	$\pm 8$ V pk	$\pm 7$ V pk	$\pm 7$ V pk	$\pm 7$ V pk	$\pm 5$ V pk	$\pm 8$ V pk
Temperature Range	-40 to +158 °F -40 to +70 °C	-40 to +158 °F -40 to +70 °C	-40 to +158 °F -40 to +70 °C	-40 to +176 °F -40 to +80 °C	-40 to +257 °F -40 to +125 °C	-40 to +176 °F -40 to +80 °C	-4 to +158 °F -20 to +70 °C	-40 to +158 °F -40 to +70 °C
Output Connector	10-32 Coaxial jack	10-32 Coaxial jack	10-32 Coaxial jack	BNC jack	BNC jack	BNC jack	BNC jack	BNC jack
TEDS IEEE 1451.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Application	General purpose	Used with side vented microphones	Confined areas	General purpose	High temperature	High pass filter	Gain, filter	Confined areas

**Notes**

[1] Measured with an 18 pF reference microphone [2] Measured with a 12 pF reference microphone



## Prepolarized ICP® Array Microphones

Prepolarized ICP® array microphones are a cost-effective alternative to the higher end, test and measurement microphones. They are suitable for sound measurements within the normal human hearing range. Array microphones have excellent phase characteristics and can be combined with the appropriate software to effectively map acoustic energy flow. The number of microphones, spacing and predetermined patterns, which are typically dictated by the software and application, allow you to analyze spatial transformation of complex sound fields to understand hot spots. The location of a noise source can be pinpointed and the speed and direction of sound can be determined.

These value-priced array microphones are an excellent choice for large channel count applications such as noise identification, nearfield acoustic holography, sound pressure mapping, acoustic cameras, and beamforming.

All PCB® array microphones come standard with Transducer Electronic Data Sheets (TEDS) for microphone identification.

### Highlights

- Low Per Channel Cost
- Powered by ICP® Sensor Signal Conditioners
- Integrated Preamplifier
- Water & Dust Resistant Model Available

### Applications

- Holography
- Sound Pressure Mapping
- Noise Source Identification
- Beamforming



**Water and Dust Resistant Microphone**  
Model 130A24



**(SMB Connector)**  
Model 130A23



**(BNC Connector)**  
Model 130E20



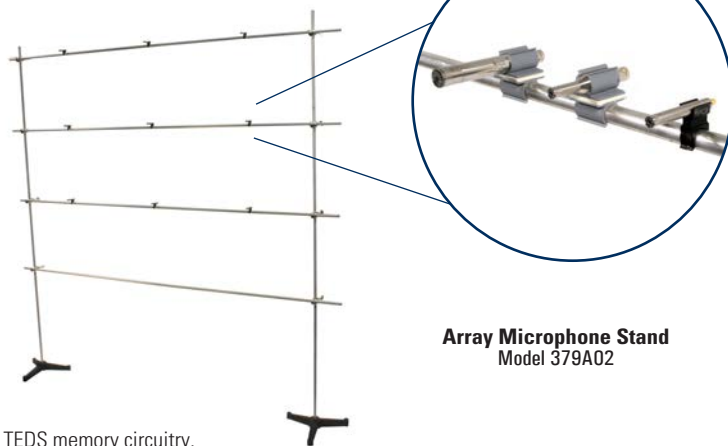
**(10-32 Connector)**  
Model 130E21



**(SMB Connector)**  
Model 130E22



**Low Profile Surface Microphone**  
Model 130B40



**Array Microphone Stand**  
Model 379A02



All array microphones are CE marked and contain IEEE 1451.4 TEDS memory circuitry.

### ICP® Array Microphones with Integral Preamplifier

Model Number	130A23	130A24	130E20	130E21	130E22	130B40
Microphone Diameter	1/4"	1/2"	1/4" [4]	1/4"	1/4"	1/4"
Response	Free-field	Free-field	Free-field	Free-field	Free-field	Pressure
Sensitivity ( $\pm 3$ dB at 250 Hz)	14 mV/Pa	14 mV/Pa	45 mV/Pa	45 mV/Pa	45 mV/Pa	8.5 mV/Pa
Frequency response ( $\pm 2$ dB)	20 Hz to 20k Hz	20 Hz to 16k Hz [5]	20 Hz to 20k Hz [1]	20 Hz to 20k Hz [1]	20 Hz to 20k Hz [1]	20 Hz to 10k Hz [2]
Dynamic Range	30 dBA to 143 dB [3]	30 dBA to 143 dB [3]	30 dBA to 122 dB	30 dBA to 122 dB	30 dBA to 122 dB	32 dBA to 142 dB [3]
Polarized Voltage	0 V	0 V	0 V	0 V	0 V	0 V
Temperature Range	+14 to +122 °F -10 to +50 °C	+14 to +122 °F -10 to +50 °C	+14 to +122 °F -10 to +50 °C	+14 to +122 °F -10 to +50 °C	+14 to +122 °F -10 to +50 °C	-40 to +176 °F -40 to +80 °C
Connector	SMB socket	BNC jack	BNC jack	10-32 jack	SMB socket	10-32 jack
Application	High frequency and high amplitudes	Rugged water and dust resistant	General purpose	General purpose	Quick release connectivity	Low profile and surface mount minimizes wind noise

### Notes

[1]  $\pm 5$  dB. [2]  $\pm 3$  dB, 20 to 20k Hz  $\pm 6$  dB. [3] 150 dB max without clipping. [4] 1/2" preamplifier diameter. [5]  $\pm 3$  dB



## Externally Polarized Precision Condenser Microphones and Preamplifiers

Externally polarized microphones were the original standard for all acoustic measurement applications. This design utilizes a separate 200 V power supply and special cables with 7 pin style connectors. Their ease of design enables a large product offering. Externally polarized microphones are typically used to replace microphones in existing systems or when a prepolarized alternative is not available.



### 1/4" Microphones

Models  
2520  
2530

### 1/2" Microphones

Models  
2540  
2559  
2560  
377C41

### 1" Microphones

Models  
2570  
2575



Building and Room Acoustic Analysis

### Externally Polarized (200 V) Precision Condenser Microphone Cartridges

	Free-field				Pressure		Random Incidence	
Model Number	2520	2540	377C41	2570	2530	2575	2559	2560
Diameter	1/4"	1/2"	1/2"	1"	1/4"	1"	1/2"	1/2"
Open Circuit Sensitivity	4 mV/Pa	14.5 mV/Pa	44.5 mV/Pa	48 mV/Pa	1.4 mV/Pa	45 mV/Pa	12.9 mV/Pa	45.2 mV/Pa
Frequency Range ( $\pm 2$ dB)	4 Hz to 80 kHz	4 Hz to 40 kHz	3.15 Hz to 20 kHz	2.6 Hz to 20 kHz	4 Hz to 70 kHz	2.6 Hz to 80 kHz	4 Hz to 25 kHz	2.6 Hz to 10 kHz
Dynamic Range Upper Limit - 3% Distortion Limit [1]	164 dB	160 dB	146 dB	146 dB	172 dB	146 dB	160 dB	146 dB
Dynamic Range Lower Limit - Cartridge Thermal Noise [1]	30 dB (A)	20 dB (A)	15 dB (A)	10 dB (A)	31 dB (A)	10 dB (A)	18 dB (A)	15 dB (A)
Temperature Range	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C	-40 to +302 °F -40 to +150 °C

#### Notes

[1] re 20  $\mu$ Pa

### Preamplifiers for Externally Polarized Microphones

Model 426A30 is a rugged 1/2" diameter preamplifier optimized for use with externally polarized microphones. It is compatible with microphones as defined in the international standard IEC 61094, and connects to a 200 V power supply requiring a 7 pin cable with connectors. Model 426B31 is a 1/4" diameter preamplifier with integral 10 ft. cable that terminates with a 7 pin connector.

CE



1/2" Preamplifier Model 426A30

CE



1/4" Preamplifier and cable Model 426B31

TEDS  
RELIABILITY  
SIGNATURE

### Preamplifiers

Model Number	426B31	426A30
Diameter	1/4"	1/2"
Gain (Attenuation)	-0.14 dB [2]	-0.2 dB [1]
Frequency Response ( $\pm 0.5$ dB)	3.98 Hz to 126 kHz	3.0 Hz to 126 kHz
Electrical Noise (A-weight)	$\leq 4.8 \mu$ V [2]	$\leq 2.8 \mu$ V [1]
Electrical Noise (Linear) [1]	$\leq 12 \mu$ V [2]	$\leq 5 \mu$ V [1]
Output Voltage (Maximum)	$\pm 25$ V pk	$\pm 14$ V pk
Temperature Range	-4 to +167 °F -20 to +75 °C	-40 to +185 °F -40 to +85 °C
Output Connector	Integral Cable with 7 Pin	7 Pin
TEDS IEEE (P)1451.4	Yes	No

#### Notes

[1] Measured with an 18 pF reference microphone [2] Measured with a 6.8 pF reference microphone

### Microphone Power Supply

- 0 V and 200 V polarization options
- Extended battery life (40 hours)
- 0, 20, and 40 dB gain
- Selectable flat (Z), A, and C-weighting

Microphone  
Preamplifier  
Power Supply  
Model 2221

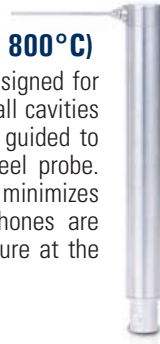




## Additional Acoustic Products and Accessories

### High Temperature Probe Microphone (up to 800°C)

Model 377B26 Prepolarized Probe Microphone is designed for use in difficult measurement situations, such as small cavities and very high temperatures. The acoustic signal is guided to the microphone through a detachable, stainless-steel probe. The high acoustic input impedance of the probe tip minimizes its influence on the acoustic field. Probe microphones are internally compensated to equalize the static pressure at the probe tip with the internal microphone pressure.



### In-line "A-weighting" Filter

Model 426B02 In-line A-weighting Filter is powered by constant current excitation and is compatible with ICP® microphone preamplifiers. When using this filter, a minimum of 4 mA excitation current is required of the ICP® sensor signal conditioner or readout device which incorporates ICP® sensor power.



**A-weighting Filter**  
Model 426B02



### Adaptors

- 079A02 – 1/4" Microphone to 1/2" Preamplifier Adaptor
- 079B03 – 1/2" Microphone to 1/4" Preamplifier Adaptor
- 079B25 – 1" Microphone to 1/2" Preamplifier Adaptor
- 079A24 – Tripod Stand Adaptor to Convert 5/8" Stud to 1/4" for Microphone Holder
- 079A29 – Swivel Head, Stand to Holder Adaptor
- 079A41 – Right Angle Adapter for 1/4" Microphone
- 079A42 – Right Angle Adapter for 1/2" Microphone



### Cables (additional lengths available)

- EXA010 – 10' Cable with 7 Pin Connector
- 003C10 – 10' Coaxial Cable with 10-32 Plug and BNC Plug
- 003D10 – 10' Coaxial Cable with BNC Plugs
- 003U10 – 10' Coaxial Cable with SMB Plugs
- 003V10 – 10' Coaxial Cable with SMB Plug and BNC Plug
- 003V30 – 30' Coaxial Cable with SMB Plug and BNC Plug



### Calibration Accessories

- ADP021 – CAL250 to 1/4" Microphone Adaptor
- ADP024 – CAL200 to 1/4" Microphone Adaptor
- 079A31 – 8-Channel Coupler for the CAL250 Calibrator





079A07



079A06



079C20



079B21



EPS2116

## Environmental Protection

079A07 – 3-1/2" Windscreen for 1/4" Microphone

079A06 – 3-1/2" Windscreen for 1/2" Microphone

079C20 – Nose Cone for 1/4" Microphone

079B21 – Nose Cone for 1/2" Microphone

EPS2116 – Outdoor Protection, 3/4" Mount  
and 1/4" Side Exit Mount


079B10



079A11



079C23



079B32

## Holders

079B10 – Holder for 1/4" Microphone

079A11 – Holder for 1/2" Microphone

079C23 – Swivel Head with 1/4" and 1/2" Holders

079B32 – Clip Holder for 1/4" Microphone



079A15



079B16



079A17



079A18



079A44



379A02

## Stands and Mounts

079A15 – Tripod Stand with Boom Arm

079B16 – Miniature Tripod Stand with Adjustable Legs

079A17 – Camera Tripod Stand

079A18 – Adjustable Clamp

079A44 – 5 Link Extension Arm for Clamp Holders

379A02 – Array Microphone Stand

CE



**Battery Powered ICP® Sensor  
Signal Conditioner**  
Model 480C02

CE



**USB Dual Channel ICP® Sensor  
Signal Conditioner**  
Model 485B36

CE



**3-Channel Battery Powered ICP® Sensor  
Signal Conditioner**  
Model 480B21

CE



**Battery Powered ICP® Sensor  
Signal Conditioner**  
4 mA, Gain x1, x10, x100  
Model 480M122

CE



**8-Channel ICP® Sensor  
Signal Conditioner**  
Model 483C05

CE



**4-Channel ICP® Sensor Signal Conditioner**  
4 to 20 mA  
Model 482C05

## ICP® Signal Conditioners



## Additional Acoustic Products offered by PCB®



### Sound Level Meters

#### Model 831

The Model 831 is the most recent Larson Davis sound level meter platform. This model provides superior performance, reliability, and 2GB of internal memory. Various firmware modules expand the functionality of Model 831 for a variety of environmental noise and architectural acoustics measurements. The Model 831 also includes the easy-to-use personal health and safety measurement features of other advanced SLM products.



#### Soundtrack LxT®

The SoundTrack LxT® sound level meter represents a significant advance in performance, reliability, and ease-of-use. This ergonomically designed meter ensures that gathering, analyzing, and presenting detailed workplace and environmental noise data is simple, fast, and accurate.

**LARSON DAVIS**  
A PCB PIEZOTRONICS DIV.

Please visit [www.LasonDavis.com](http://www.LasonDavis.com) for further details.



### Environmental Protection Shrouds

#### Model EPS2116

Environmental shrouds are complete weather protection systems for ½" microphone systems. The environmental shrouds are the perfect choice for longer-term measurements in inclement weather. Their special acoustic windscreen material and configuration protect the microphones from rain, sleet, and snow. The shroud seals the preamplifier in a desiccated chamber, thus preserving performance in high humidity environments. The desiccant volume is many times greater than that of inline desiccant cartridges, for lasting protection without interference between the microphone and preamplifier. The shroud is also equipped with bird-spikes to deter winged intruders.



### Outdoor Preamplifier & Microphone with Calibration Check

The Larson Davis PRM2103-FF is designed to be used with the Model 831 sound level meter and an environmental shroud. It can be used in a wide range of weather conditions.

The PRM2103-FF provides a five frequency calibration check which is automatically controlled by the Model 831 sound level meter. It does not require routine maintenance. It includes a built-in humidity and temperature sensor and can automatically turn on an internal heater when there is a risk of condensation. The low power usage makes the PRM2103-FF an excellent solution for battery powered applications.



## Acoustic Calibration Products

### Precision Handheld Acoustic Calibrators

PCB® offers calibrators for microphones that meet IEC 60942 and ANSI S1.40 standards. These units are easy-to-use and available with optional adaptors for use with a variety of microphone diameters. Calibrators are lightweight, portable, and battery operated.



**Acoustic Calibrator**  
Model CAL200



**Acoustic Calibrator**  
Model CAL250

#### Precision Calibrators

Model Number	CAL200	CAL250
Microphone Sizes	1/4" (6 mm)*, 1/2" (12 mm)	1/8" (3 mm)*, 1/4" (6 mm)*, 1/2" (12 mm), 1" (25 mm)
Frequency	1 kHz $\pm$ 1%	251.2 Hz $\pm$ 2 Hz
Output Level (re 20 $\mu$ Pa)	94 dB, 114 dB $\pm$ 0.2 dB	114 $\pm$ 0.1 dB
Barometric Pressure Compensation	Automatic	Automatic
ANSI S1.40	Yes	Yes
IEC 60942 Class 1	Yes	Yes
Notes:	* With optional adaptors	

### Turnkey Acoustic Calibration Workstation, Model 9350C

The Precision Acoustic Calibration Workstation Model 9350C is an accurate, turnkey, automated, PC-based system. The 9350C offers efficient and cost-effective calibration of 1/4", 1/2", and 1" microphone cartridges (open-circuit sensitivity), microphone cartridges with preamplifiers (closed-circuit sensitivity), and microphone frequency response function. In addition, the system provides for conformance testing of microphone preamplifiers, and acoustic calibrators.

The 9350C generates ISO 17025 compliant calibration certificates for:

- Microphone Cartridge Calibration
- Microphone and Preamplifier Calibration
- Preamplifier Conformance Test
- Source Calibration (example: pistonphone)

The Modal Shop also provides extensive rental services through a vast inventory of microphones, preamplifiers, and sound level meters. Visit [www.modalshop.com](http://www.modalshop.com).

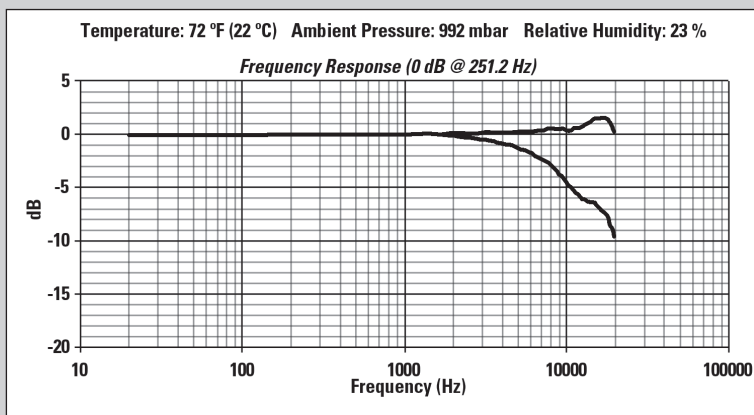


## Acoustic Calibration Services

### PCB® has a "State-of-the-Art" Acoustic Calibration System

All microphone calibrations include test documentation showing the actuator response, corrected responses, the conditions under which the calibration was performed, and the equipment used. Calibrations are performed with reference microphones traceable to national laboratories specializing in acoustic measurements (NIST, PTB, or DFM). PCB's quality management system is certified to AS9100 and ISO9001. PCB's calibration service is accredited to ISO17025 & ANSI-Z540.3 by A2LA (see ILAC MRA) and compliant with ISO10012.

PCB® is equipped to calibrate most competitors' microphones and preamplifiers.

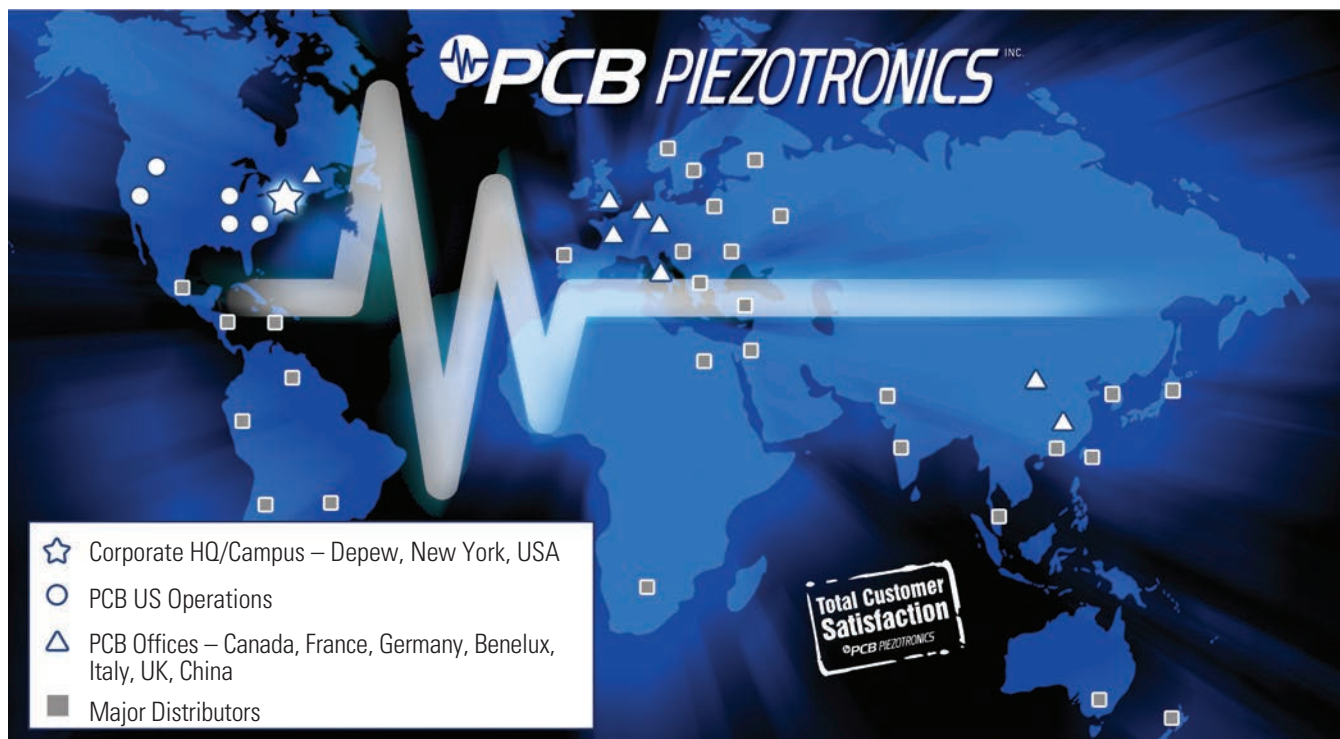


Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)
20.0	-0.08	-0.08	1584.9	-0.14	0.07	6683.4	-2.14	0.38
25.1	-0.02	-0.02	1678.8	-0.16	0.07	7079.5	-2.35	0.43
31.6	0.00	0.00	1778.3	-0.17	0.08	7498.9	-2.61	0.46
39.8	0.01	0.01	1883.7	-0.19	0.09	7943.3	-2.94	0.45
50.1	0.01	0.01	1995.3	-0.22	0.09	8414.0	-3.24	0.49
63.1	0.02	0.02	2113.5	-0.24	0.10	8912.5	-3.58	0.53
79.4	0.02	0.02	2238.7	-0.26	0.11	9440.6	-3.98	0.54
100.0	0.02	0.02	2371.4	-0.30	0.11	10000.0	-4.54	0.41
125.9	0.01	0.01	2511.9	-0.33	0.13	10592.5	-4.98	0.42
158.5	0.01	0.01	2660.7	-0.37	0.14	11220.2	-5.32	0.54
199.5	0.01	0.01	2818.4	-0.41	0.15	11885.0	-5.77	0.55
251.2	0.00	0.00	2985.4	-0.46	0.16	12589.3	-6.06	0.71
316.2	0.00	0.01	3162.3	-0.51	0.17	13335.2	-6.16	1.03
398.1	-0.01	-0.01	3349.7	-0.57	0.17	14125.4	-6.41	1.18
501.2	-0.02	0.02	3548.1	-0.64	0.18	14962.4	-6.50	1.47
631.0	-0.03	0.01	3758.4	-0.72	0.18	15848.9	-6.83	1.52
794.3	-0.04	0.05	3981.1	-0.82	0.18	16788.0	-7.13	1.59
1000.0	-0.06	0.06	4217.0	-0.91	0.20	17782.8	-7.63	1.48
1059.3	-0.07	0.06	4466.8	-1.01	0.22	18836.5	-8.50	1.01
1122.0	-0.08	0.06	4731.5	-1.12	0.25	19952.6	-9.83	0.10
1188.5	-0.08	0.07	5011.9	-1.25	0.28	-	-	-
1258.9	-0.09	0.07	5308.8	-1.41	0.29	-	-	-
1333.5	-0.10	0.08	5623.4	-1.57	0.31	-	-	-
1412.5	-0.11	0.08	5956.6	-1.75	0.32	-	-	-
1496.2	-0.13	0.07	6309.6	-1.94	0.35	-	-	-

Upper curve: Free-field response of microphone at 0° sound incidence with grid cover

Lower curve: Pressure response as tested with electrostatic actuator





Visit [www.pcb.com](http://www.pcb.com) for a directory of over 120 international distributors, or call to schedule an assessment of your requirements by a local Application Engineer.

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