



Model 103B11

Acoustic ICP® pressure sensor, 10 psi, 500 mV/psi, integral 2-wire cable, accel. comp.

Installation and Operating Manual

**For assistance with the operation of this product,
contact the PCB Piezotronics, Inc.**

**Toll-free: 716-684-0001
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com**



OPERATION MANUAL FOR MICROPHONE Series 103A

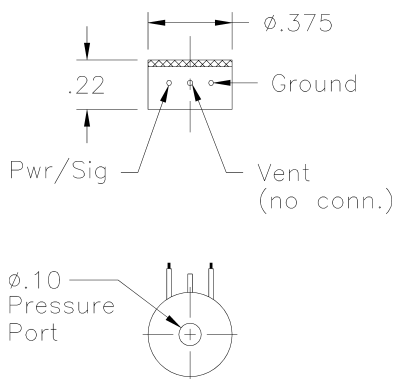
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1.0 DESCRIPTION

The Series 103A microphones are high-sensitivity pressure sensors featuring miniature size, built-in solid state electronics and acceleration compensation.

The Model 103A (see installation drawing) has pigtail leads extending radially from the side of the unit and has a nominal sensitivity of 1500 mV/psi.

The Model 103A11 is similar in appearance and in mode of electrical connection, but differs from the Model 103A in that the sensitivity is nominally 500 mV/psi.

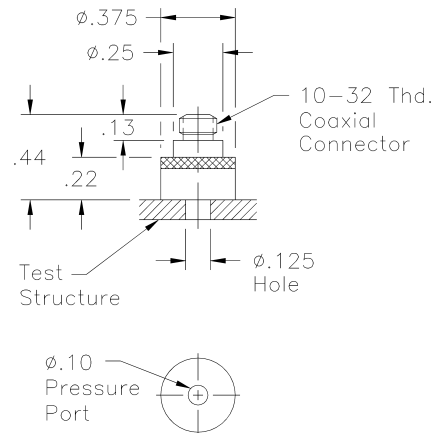


Models 103A and 103A11: ICP® Sound Pressure Sensors

The Model 103A02 is similar physically to the 103A and has similar sensitivity (1500 mV/psi), but the electrical connection is made through a top mounted 10-32 coaxial connector.

The Model 103A12 also has the top connector like the 103A02 but the sensitivity is 500 mV/psi.

These units are ideal for wind tunnel testing of models because of the small size and high sensitivity.



Models 103A02 and 103A12: ICP® Sound Pressure Sensors

2.0 DESCRIPTION

(Refer to installation drawing no. 103-1010-90 included as part of this manual.)

The 103A Series Sensors utilize a bimorph bender crystal cantilevered from the side wall and attached to the center of a thin recessed invar diaphragm. Pressure acting on the surface of the diaphragm results in a net force which strains (or deflects) the diaphragm in proportion to the applied pressure. The diaphragm bends the crystal creating an output voltage which is also proportional to applied pressure.

This voltage is fed to the gate of a miniature MOSFET source follower amplifier which reduces the output impedance to less than 100 Ohms allowing the driving of long cables and permitting operating directly into most readout instruments.

Refer to Bulletin G-0001B, "General Guide to ICP® Instrumentation" for a detailed description of the built-in amplifier concept.

Models 103A, A02, A11, and A12 have output signals superimposed upon a +4 V (approx.) bias level at the amplifier output. All PCB signal conditioners are designed to eliminate this bias voltage while supplying power to the internal amplifier.

OPERATION MANUAL FOR MICROPHONE Series 103A

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The result is a two-wire system, precluding the need for multi-conductor cabling.

A second diaphragm, located behind the pressure diaphragm and attached to another bimorph bender crystal acting in opposition to the pressure crystal, provides acceleration compensation to the Series 103A Sensors.

3.0 INSTALLATION

As shown in installation drawing 103-1010-90, the Series 103A Microphones may be properly mounted in several ways, the exact method chosen being a function of the space available along with other use dictated parameters.

The simplest method of mounting, and also the one that utilizes the least volume, is the adhesive method. The microphone is simply bonded directly to the mounting surface with an (at least) .10" diameter hole through the surface to feed the pressure signal to the diaphragm.

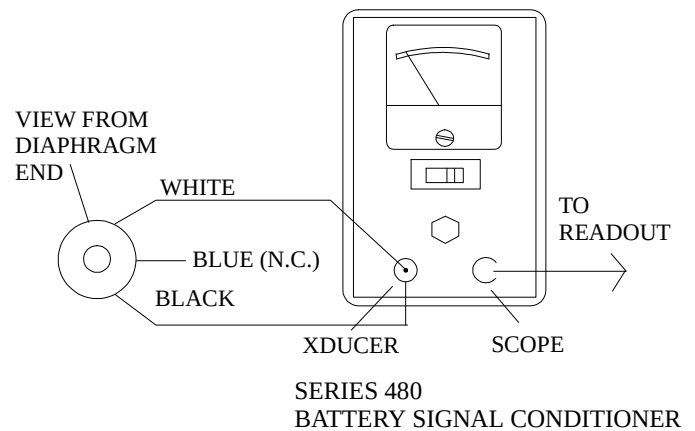
Many different types of adhesives may be used to bond the 103A in this manner. The important point being to apply the adhesive very sparingly so that removal does not damage the sensor.

The 103A may also be mounted using the Model 061A04 Servo clamps if space is available.

The Model 060A11 Clamp Nut may only be used with the top connector Models 103A02 and 103A12 since the radial wire leads of the Model 103A and 103A11 would interfere with the clamp nut. The installation drawing gives detailed instructions on preparation of the port for this type of installation.

3.1 ELECTRICAL

For the Models 103A and 103A11 (pigtail models), connect the center conductor from the "Xducer" output of any ICP® power unit to the white (Pwr/Sig) lead and connect the outer shell of the "Xducer" connector to the black (ground) lead. The black lead is electrically connected to the outer case. (See figure below.)

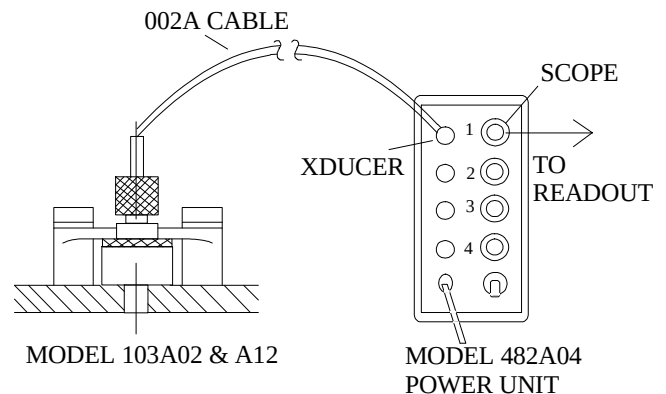


Models 103A & All: Electrical Connection

NOTE: No electrical connection is made to the blue (vent) lead. This lead serves to vent internal pressure within the sensor when the 103A and 103A11 are used in evacuated chambers. The internal pressure bleeds out slowly around the wires of this lead. This lead may be cut off flush with body if the sensor will never be used in this manner.

To make the electrical connection to the Models 103A02 and 103A12 (top connector models), simply connect the "Xducer" output of the power unit to the 10-32 coaxial connector using a PCB Model 002C Series coaxial cable.

The output signal is taken from the power unit connector labeled "Scope" or "Output". (See figure below.)



Models 103A02 & A12: Electrical Connection

OPERATION MANUAL FOR MICROPHONE Series 103A

Refer to Guide G-0001B for tips on power and signal utilization.

NOTE: The internal low-noise amplifier in the Model 103A, A02, A11 and A12 differ from the standard ICP[®] amplifiers described in Guide G-0001B in that the turn-on (or bias) voltage is nominally +4 volts.

Proper turn-on for Models 103A02, A11 and A1 2 will not give center scale reading on the fault monitor meters found on most PCB signal conditioners but will show a reading of approximately 20% of F.S. on these meters. This puts it at the lower limit of the green (or normal) area of the meters. This is normal and in no way indicates faulty operation.

4.0 OUTPUT SIGNAL

The output signal from the 103A Series is a voltage proportional to input pressure. The polarity is positive-going for increasing input pressure.

The signal is of high enough level and low enough output impedance to be fed directly into most oscilloscopes, tape recorders, strip chart recorders, A to D converters, etc.

Consult the factory for information regarding galvo driving since special amplifiers are needed to drive most high-current galvanometers.

Low-frequency response is limited by sensor discharge TC (given in the specification sheet) and by coupling time constants throughout the system. To take full advantage of the TC of the sensor, make sure that coupling TC's from power unit to readout are at least an order of magnitude longer than the discharge TC or use a direct-coupled signal conditioner such as the Model 484B. Consult factory for details.

5.0 CALIBRATION

The 103A Series Sensors must be dynamically calibrated using a known step function or pulse, or with a microphone calibrator.

At PCB, the units are subjected to various calibrated steps of pneumatic pressure to obtain a linearity curve over the full range of the instruments.

6.0 MAINTENANCE AND REPAIR

The small size and sealed construction of the Series 103A precludes field maintenance and repair.

Should the time constant degrade or an abnormality appear in the normal bias voltage, bake the unit out in a +250° F oven for 1 to 2 hours, then re-test.

If this is not effective or if other problems should occur, contact the factory for assistance in tracing the problem or for instructions on returning the unit for repair.

7.0 PRECAUTIONS

- 1.) Do not apply voltage to the unit without a current-limiting device in the line such as incorporated in all PCB signal conditioners, (20 mA maximum) to do so will destroy the internal amplifier.
- 2.) Do not subject these units to temperatures higher than 250° F.
- 3.) Do not attempt to disassemble these units as to do so voids the warranty.
- 4.) Use caution when removing units that have been mounted with epoxies or other strong adhesives. Excessive squeezing or torquing may damage the units and/or cause a calibration shift.
- 5.) In vibratory environments, secure cables and leads to surrounding structures to avoid lead or cable damage.
- 6.) Do not over torque when using the Servo clamps or the clamp nut since this could damage the units.
- 7.) Do not overpressure (see specs for maximum pressure), to do so may change the calibration.

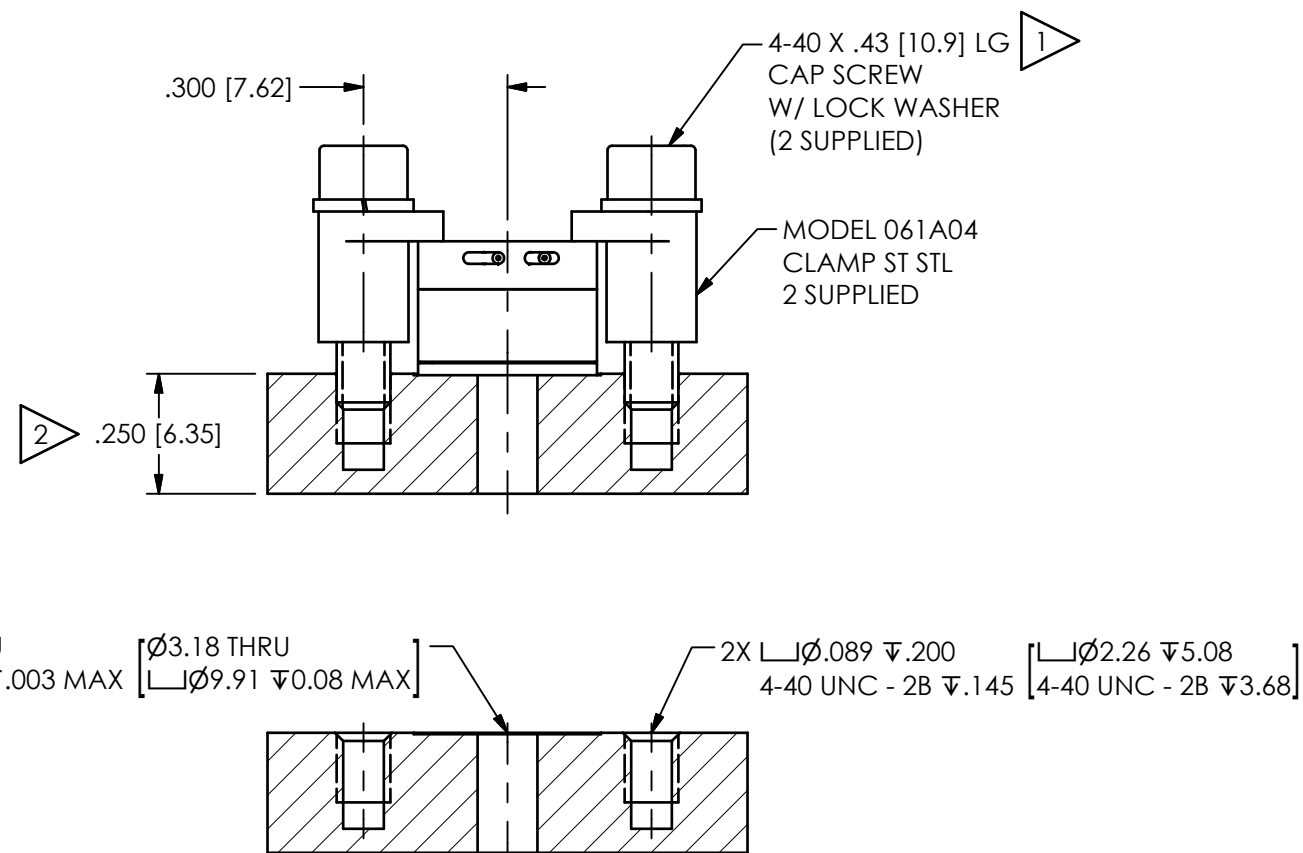
®ICP is a registered trademark of PCB Piezotronics

Model Number 103B11	ACOUSTIC ICP® PRESSURE SENSOR			Revision: E ECN #: 55076
Performance		ENGLISH	SI	OPTIONAL VERSIONS
Measurement Range(± 5 V output)	10 psi	190.7 dB		Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.
Useful Overrange(± 10 V output)	20 psi	196.7 dB	[1]	
Sensitivity(± 15 %)	500 mV/psi	72.5 mV/kPa		
Maximum Pressure	250 psi	1,724 kPa		
Resolution	0.06 mpsi	86.3 dB	[2]	M - Metric Mount Supplied Accessory: Model M061A04 Clamp (2)
Resonant Frequency	≥ 13 kHz	≥ 13 kHz		
Rise Time	≤ 25 μ sec	≤ 25 μ sec		
Low Frequency Response(- 5 %)	5 Hz	5 Hz		
Non-Linearity	≤ 2.0 % FS	≤ 2.0 % FS	[3]	
Environmental				
Acceleration Sensitivity	0.0005 psi/g	0.0035 kPa/(m/s ²)	[2]	
Temperature Range(Operating)	-100 to 250 °F	-73 to 121 °C		
Temperature Coefficient of Sensitivity	≤ 0.2 %/°F	≤ 0.36 %/°C		
Maximum Flash Temperature	1,000 °F	538 °C		
Maximum Shock	1,000 g pk	9,807 m/s ² pk		
Maximum Vibration	1,000 g pk	9,807 m/s ² pk		
Electrical				
Output Polarity(Positive Pressure)	Positive	Positive		
Discharge Time Constant	0.1 to 2.0 sec	0.1 to 2.0 sec		
Excitation Voltage	20 to 30 VDC	20 to 30 VDC		
Constant Current Excitation	2 to 20 mA	2 to 20 mA		
Output Impedance	≤ 100 Ohm	≤ 100 Ohm		
Output Bias Voltage	7 to 13 VDC	7 to 13 VDC		
Physical				
Sensing Element	Ceramic	Ceramic		
Housing Material	Stainless Steel	Stainless Steel		
Diaphragm	316L Stainless Steel	316L Stainless Steel		
Sealing	Epoxy	Epoxy		
Electrical Connector	Integral Cable	Integral Cable		
Cable Termination	Pigtail Ends	Pigtail Ends		
Weight	0.115 oz	3.260 gm		
Cable Type	32 AWG stranded wires	32 AWG stranded wires		
Cable Length	15 in	38.1 cm		
NOTES: [1]For +10 volt output, minimum 24 VDC supply voltage required. Negative 10 volt output may be limited by output bias. [2]Typical. [3]Zero-based, least-squares, straight line method. [4]See PCB Declaration of Conformance PS023 for details.				
SUPPLIED ACCESSORIES: Model 061A04 Sleeve clamp 4-40 cap screw (2) Model 065A66 Adhesive Mounting Ring (3) Model 070B09 Solder adaptor Model PCS-1 Calibration of dynamic pressure sensors at 100% full scale, max 15 kpsi range. Model PCS-24 Sensor sensitivity calibration with Pistonphone				
Entered: ND	Engineer: AJA	Sales: RWM	Approved: RPF	Spec Number:
Date: 08/13/2024	Date: 08/13/2024	Date: 08/13/2024	Date: 08/13/2024	24846
  3425 Walden Avenue, Depew, NY 14043 Phone: 716-684-0001 Fax: 716-684-0987 E-Mail: info@pcb.com				
All specifications are at room temperature unless otherwise specified. In the interest of constant product improvement, we reserve the right to change specifications without notice. ICP® is a registered trademark of PCB Piezotronics, Inc.				

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REVISIONS		
REV	DESCRIPTION	DIN
B	UPDATED TITLE BLOCK	50900

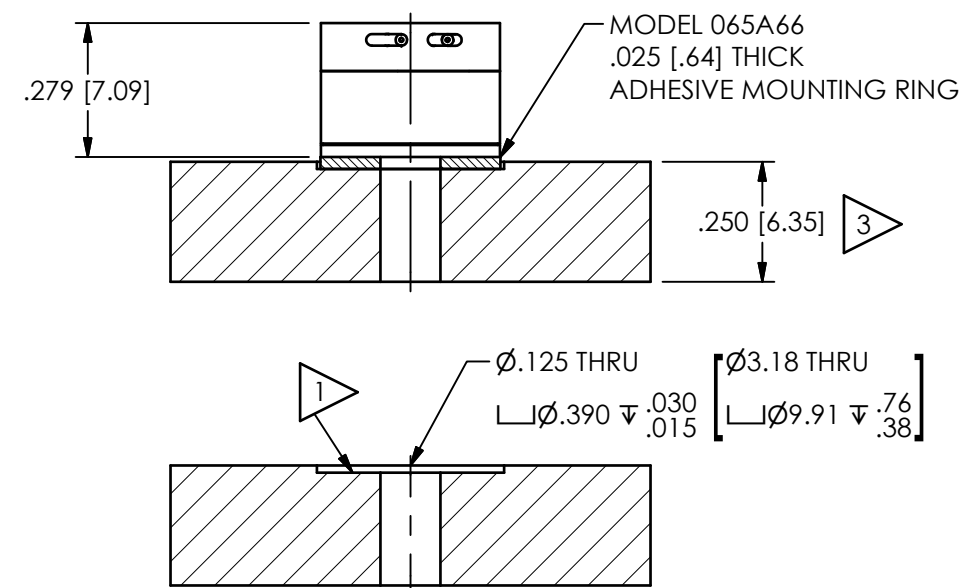
Diagram illustrating the top view of the pressure sensor assembly. The assembly features a central pressure sensor, two hexagonal mounting points, and a width dimension of .600 [15.24].



$\varnothing.125$ THRU
 $\varnothing.390 \nabla .003$ MAX
 $\varnothing.18$ THRU
 $\varnothing.91 \nabla 0.08$ MAX
 $2X \varnothing.089 \nabla .200$
 $4-40 \text{ UNC} - 2B \nabla .145$
 $\varnothing.226 \nabla 5.08$
 $4-40 \text{ UNC} - 2B \nabla 3.68$

- 2 EXCEEDING THIS DIMENSION WILL START LOWERING FREQUENCY RESPONSE
- 1 MOUNTING TORQUE SHOULD BE BETWEEN 4-5 in-lbs [4.5-5.6 Nm]

Top view of the pressure sensor assembly. The circular sensor has a diameter of $\varnothing.375$ [$\varnothing9.53$]. A label "PRESSURE SENSOR" points to the circular component.



3 PREP SURFACE WITH A Ø.500[12.70] SPOTFACE, .015-.030 [.38-.76] x, 32 FINISH MIN. CENTER SPOTFACE TO .125[3.18]. APPLY 065A66 ADHESIVE MOUNTING RING, THEN SENSOR. LET SELF-CURE FOR 12 HRS. PRIOR TO TESTING. MAKE SURE SURFACE IS FREE OF DIRT, OIL, AND DEBRIS BEFORE APPLICATION.

2.) PRESSURE SHOULD NOT EXCEED 20 PSI WHEN USING ADHESIVE MOUNTING RING

1 EXCEEDING THIS DIMENSION WILL START LOWERING FREQUENCY RESPONSE

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER		 PCB PIEZOTRONICS™ 3425 WALDEN AVE. DEPEW, NY 14043 (716) 684-0001 E-MAIL: sales@pcb.com
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	JDM	7/8/20	JDM	7/8/20	RF	7/8/20	
DECIMALS XX ±.01 XXX ±.005	DECIMALS X ±.03 XX ±.013	TITLE INSTALLATION DRAWING PRESSURE SENSOR						
ANGLES ± 2 DEGREES	ANGLES ± 2 DEGREES							
FILLETS AND RADII .003 - .005	FILLETS AND RADII 0.07 - 0.13	CODE IDENT. NO. 52681		DWG. NO. 24844				
		SCALE: 2.5X		SHEET 1 OF 1				



Model 070B09

**Solder connector adaptor (10-32 plug to solder terminal, straight pins for
Installation and Operating Manual**

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

**Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com**



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070-2090-90

APPLICATION

NEXT ASS'Y

USED ON

VAR

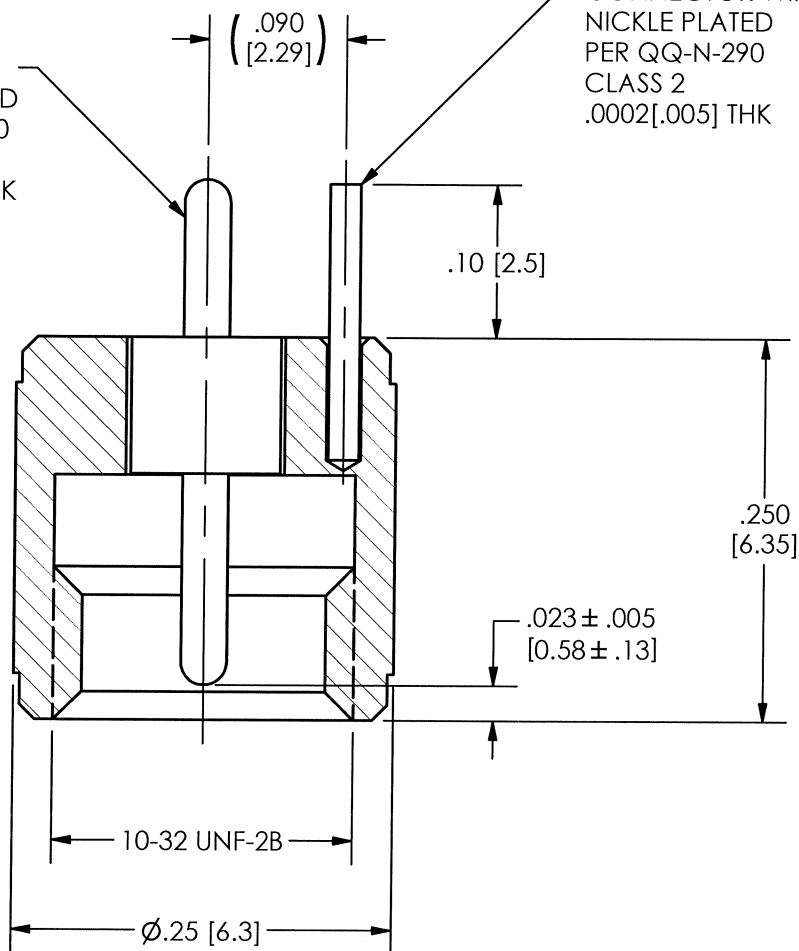
REVISIONS

REV	DESCRIPTION	ECN	APP'D
A	REVISED AND REDRAWN	3283	DM 7/99
B	UPDATE DRAWING	23771	DM 2/06

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ELECTRODE
NICKLE PLATED
PER QQ-N-290
CLASS 2
.0002[.005] THK

CONNECTOR WIRE
NICKLE PLATED
PER QQ-N-290
CLASS 2
.0002[.005] THK



UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

DIMENSIONS IN INCHES

DECIMALS XX ± .03
XXX ± .010
ANGLES ± 2 DEGREES

DIMENSIONS IN MILLIMETERS
[IN BRACKETS]

DECIMALS X ± 0.8
XX ± 0.25
ANGLES ± 2 DEGREES

FILLETS AND RADII
.003 - .005

FILLETS AND RADII
[0.07 - 0.13]

DRAWN	ECB	2/27/06	MFG	RC	2/28/06
CHK'D	DM	2/27/06	ENGR	ECB	2/27/06
APP'D	RE	3/3/06	SALES	DPC	3/3/06
TITLE					

OUTLINE DRAWING
MODEL 070B09
SOLDER CONNECTOR ADAPTOR

PCB PIEZOTRONICS INC.

3425 WALDEN AVE. DEPEW, NY 14043
(716) 684-0001 E-MAIL: sales@pcb.com

CODE
IDENT. NO.
52681

DWG. NO.

070-2090-90

SCALE: 8X

SHEET 1 OF 1

2

1