



Model 130B40

ICP® ELECTRET SURFACE MICROPHONE

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**



The information contained in this document supersedes all similar information that may be found elsewhere in this manual.

Total Customer Satisfaction – PCB Piezotronics guarantees Total Customer Satisfaction. If, at any time, for any reason, you are not completely satisfied with any PCB product, PCB will repair, replace, or exchange it at no charge. You may also choose to have your purchase price refunded in lieu of the repair, replacement, or exchange of the product.

Service – Due to the sophisticated nature of the sensors and associated instrumentation provided by PCB Piezotronics, user servicing or repair is not recommended and, if attempted, may void the factory warranty. Routine maintenance, such as the cleaning of electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the physical material of construction, is acceptable. Caution should be observed to insure that liquids are not permitted to migrate into devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth and never submerged or have liquids poured upon them.

Repair – In the event that equipment becomes damaged or ceases to operate, arrangements should be made to return the equipment to PCB Piezotronics for repair. User servicing or repair is not recommended and, if attempted, may void the factory warranty.

Calibration – Routine calibration of sensors and associated instrumentation is

recommended as this helps build confidence in measurement accuracy and acquired data. Equipment calibration cycles are typically established by the users own quality regimen. When in doubt about a calibration cycle, a good “rule of thumb” is to recalibrate on an annual basis. It is also good practice to recalibrate after exposure to any severe temperature extreme, shock, load, or other environmental influence, or prior to any critical test.

PCB Piezotronics maintains an ISO-9001 certified metrology laboratory and offers calibration services, which are accredited by A2LA to ISO/IEC 17025, with full traceability to N.I.S.T. In addition to the normally supplied calibration, special testing is also available, such as: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For information on standard recalibration services or special testing, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment – *Following these procedures will insure that your returned materials are handled in the most expedient manner.* Before returning any equipment to PCB Piezotronics, contact your local distributor, sales representative, or factory customer service representative to obtain a Return

Materials Authorization (RMA) Number. This RMA number should be clearly marked on the outside of all package(s) and on the packing list(s) accompanying the shipment. A detailed account of the nature of the problem(s) being experienced with the equipment should also be included inside the package(s) containing any returned materials.

A Purchase Order, included with the returned materials, will expedite the turn-around of serviced equipment. It is recommended to include authorization on the Purchase Order for PCB to proceed with any repairs, as long as they do not exceed 50% of the replacement cost of the returned item(s). PCB will provide a price quotation or replacement recommendation for any item whose repair costs would exceed 50% of replacement cost, or any item that is not economically feasible to repair. For routine calibration services, the Purchase Order should include authorization to proceed and return at current pricing, which can be obtained from a factory customer service representative.

Warranty – All equipment and repair services provided by PCB Piezotronics, Inc. are covered by a limited warranty against defective material and workmanship for a period of one year from date of original purchase. Contact

PCB for a complete statement of our warranty. Expendable items, such as batteries and mounting hardware, are not covered by warranty. Mechanical damage to equipment due to improper use is not covered by warranty. Electronic circuitry failure caused by the introduction of unregulated or improper excitation power or electrostatic discharge is not covered by warranty.

Contact Information – International customers should direct all inquiries to their local distributor or sales office. A complete list of distributors and offices can be found at www.pcb.com. Customers within the United States may contact their local sales representative or a factory customer service representative. A complete list of sales representatives can be found at www.pcb.com. Toll-free telephone numbers for a factory customer service representative, in the division responsible for this product, can be found on the title page at the front of this manual. Our ship to address and general contact numbers are:

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OPERATING GUIDE FOR 130B SERIES SURFACE MICROPHONES

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Figure 1: 130B40 Surface Microphone

1.0 Introduction

Congratulations on the purchase of a quality ICP[®] Microphone. In order to ensure the highest level of performance of the Microphone, we recommend that you follow the product's basic installation and operation procedures. By following these procedures and using this Microphone in conjunction with other PCB equipment (Signal Controllers, Power Supplies, Cables, Calibrators, etc.), you will ensure years of trouble free usage. If after reading this manual, you have additional questions concerning the Microphone or its application, feel free to call a factory Application Engineer at 716-684-0001, or your local dedicated PCB Sales Engineer.

2.0 Product Description

The PCB 130B series of Surface Microphones are prepolarized, condenser microphones coupled with ICP[®] sensor powered preamps and are thus referred to as ICP[®] microphones. This eliminates the need to purchase a separate preamplifier. The 130B40 Surface Microphone provides an extremely cost effective method for making general purpose measurements on flat and curved surfaces subjected to air movement. Typical applications include measuring wind-induced noise on ground and airborne vehicles, acoustic radiation from surfaces, and noise tests in wind tunnels, as well as comparing the external noise on a moving vehicle with its internal noise, along with other applications. The low profile of the 130B40 Microphones (0.126"/3.2 mm) allows their use in tight-fitting places where other microphones would not fit.

Each 130B series Microphone can measure audio frequencies ranging from 20 Hz to 20 kHz, with a broad dynamic range from 32 dBA to 142 dB. See Figure 2. The Microphone has a built-in TEDS (Transducer Electronics Data Sheet) chip that provides the unit's sensitivity, calibration date, location and other data for traceability. Its light weight minimizes the impact of its mass loading on thin material and facilitates using only a thin, double-sided adhesive pad (provided) to attach the microphone, and its fairing when needed, to the test surface. The Microphone uses a front vent for pressure equalization, making it an excellent choice when it is used on aircraft and on road vehicles in mountainous terrain, and also allowing for adhesive or flush mounting. Additionally, the mesh of the microphone's protective grid repels water.

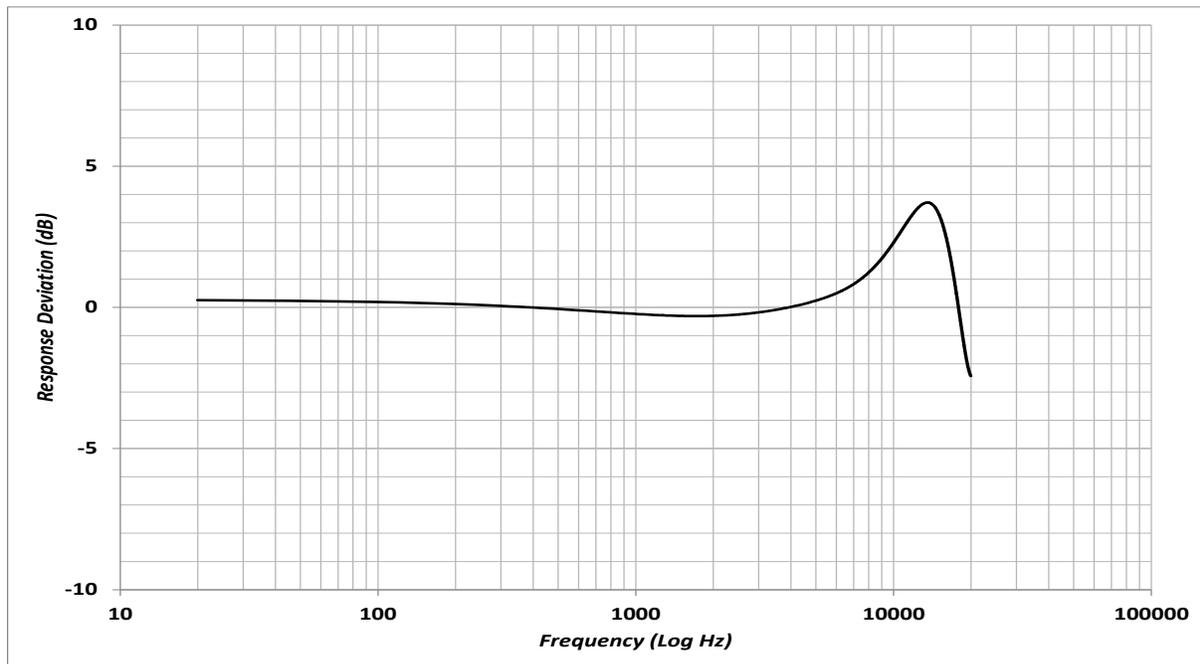
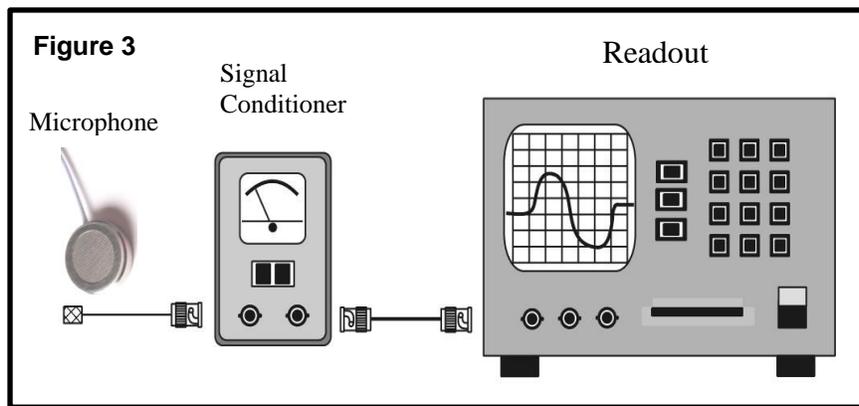


Figure 2: Typical pressure frequency response curve of Series 130B Series Surface Microphones

3.0 Powering

All ICP[®] powered microphones require the correct constant-current excitation for proper operation. For this reason, use only PCB constant-current signal conditioners or other approved constant-current sources. The signal conditioner consists of a regulated, 18–30 VDC source. The power is regulated by a current-limiting circuit, which provides the constant current excitation required for proper operation of the ICP[®] microphone. In general, battery powered devices offer versatility for portable low-noise measurements, whereas line-powered units provide the capability for continuous monitoring. A typical system schematic is shown in Figure 3.



NOTE: Under no circumstances should a voltage be supplied to an ICP[®] microphone without a current-regulating diode or equivalent electrical circuit. This may include ohmmeters, multi-meters and continuity testers. Damage to the built-in electronics resulting from the application of incorrect power, or the use of an unapproved power source is NOT covered under warranty.

Certain models of signal conditioners have Meters or LEDS, which enable users to monitor the bias voltage output signal, check microphone operation, and detect cable faults. Normally, a “yellow” reading indicates an open circuit (e.g., a disconnected cable); “green” indicates normal operation and a “red” reading indicates a short circuit (e.g., a shorted cable). The signal conditioner provides a zero-based, AC-coupled output signal that is compatible with most standard readout devices.

Today, many FFT analyzers, data acquisition modules, and data collectors have the proper constant-current excitation built-in for direct use with ICP[®] microphones. Before using this feature, check that the supply voltage and constant current are within acceptable limits for use with your particular microphone. (Check enclosed **Specification Sheet**.) Consult the Vibration Division’s product catalog for more information about signal conditioners.

4.0 Installation and Operation

4.1. Mounting Methods

Consider the expected air flow across the surface on which the Surface Microphone will be mounted to determine the best way to secure the microphone to the surface. See Figure 4. When no air movement is expected, the double-sided adhesive pad, trimmed to the size of the microphone if desired, is adequate. For low air flow speeds, such as on the side of a vehicle, include the Fairing along with the double-sided adhesive pad to mount the microphone. At moderate to heavy air flow speeds, such as in a wind tunnel, add the single-sided adhesive pad on top of the Fairing. See Figure 5. Regardless of the mounting method, the Surface Microphone’s profile will not exceed 3.2 mm.

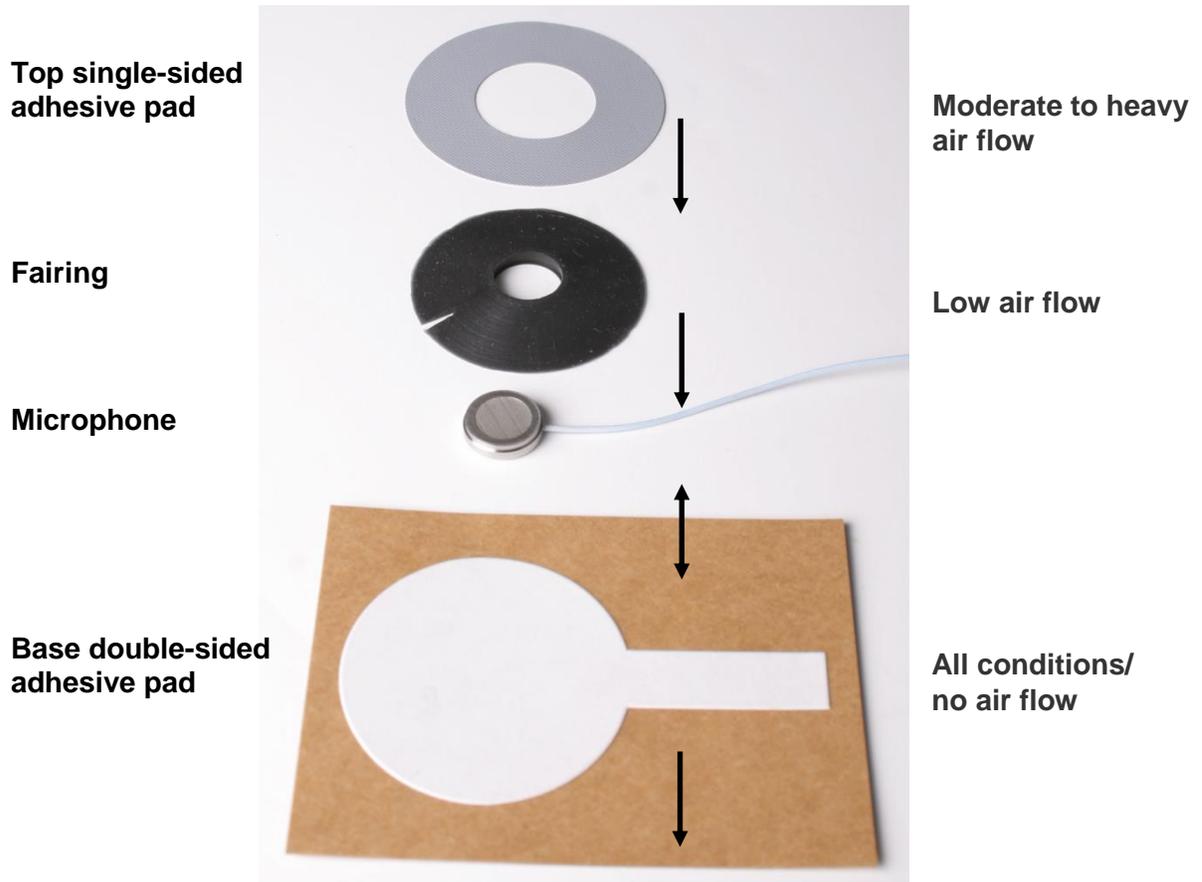


Figure 4: Methods of securing the Surface Microphone to its mounting surface

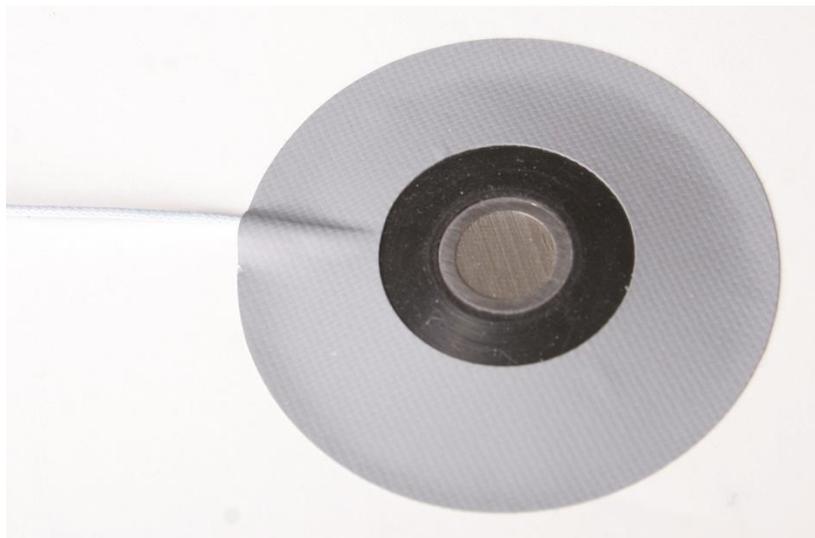


Figure 5: One sided Adhesive Pad securing the Surface Microphone and Fairing in place

4.2. Mounting Procedure

- 1) Use the cleansing tissue (provided) to clean the location where the Surface Microphone will be mounted. (Alternatively, clean the surface with isopropanol or cleaning benzene.)
- 2) To attach the Surface Microphone using the double-sided adhesive pad (see Figure 6), peel off the protective paper on one side of the pad to expose its adhesive surface, apply firmly to the underside of the microphone, then peel off the protective paper on the other side of the pad to expose the other adhesive surface, and press it onto the clean surface.

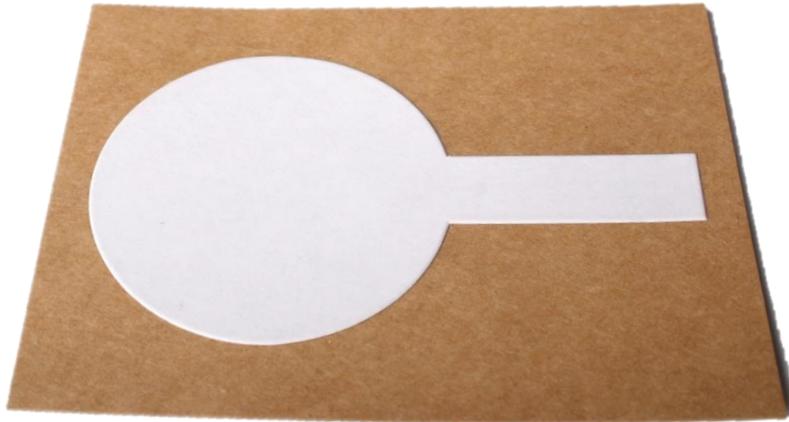


Figure 6: Double-sided adhesive pad

NOTE: If the Surface Microphone will be mounted in a location where no air movement is expected, the pad can be trimmed beforehand to fit the microphone if desired. If the Microphone will be mounted in moving air and will thus require use of the Fairing, center the microphone on the pad to ensure adhesion of the Fairing.

- 3) When the Surface Microphone will be mounted in a location where air movement is expected, attach the Fairing: align the Fairing's slot with the Microphone's cable and press the Fairing down over the microphone and onto the exposed adhesive surface of the double-sided adhesive pad, smoothing out the Fairing as necessary. See Figure 7.

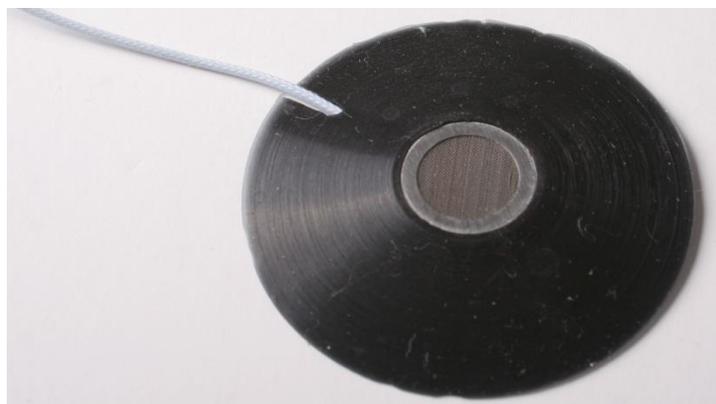


Figure 7: Fairing installed over Surface Microphone

- 4) To attach the single-sided adhesive pad (see Figure 8) when the Surface Microphone will be used in moderate to heavy air flow, peel off the protective paper to expose the pad's adhesive surface and press it onto the Fairing as shown in Figure 5.

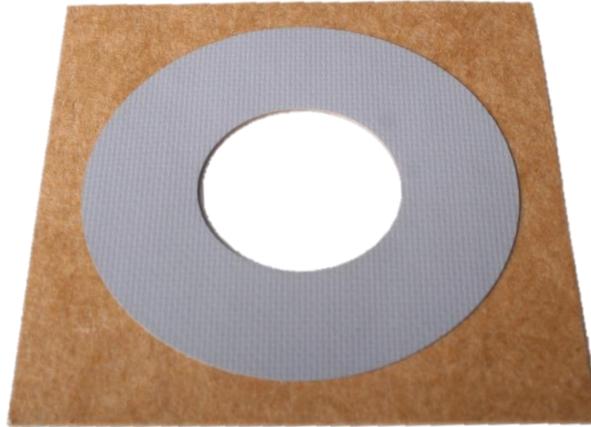


Figure 8: Single sided adhesive pad

4.3. Operation

After completing the system setup, switch the signal conditioner on and allow 1 to 2 minutes for the system to stabilize. The meter (or LED) on the signal conditioner should be reading “green”. This indicates proper operation and you may begin taking measurements. If a faulty condition is indicated (red or yellow reading), first check all system connections, then check the functionality of the cable and signal conditioner. If the system still does not operate properly, consult a PCB factory representative.

5.0 Calibration

All PCB microphones come with certificate of calibration and compliance with ISO 9001, and ANSI/NCSL Z540.3. The microphone is traceable to one or more of the following National Labs (NIST, PTB or DFM), and calibration records are on file. PCB utilizes the “Back-to-Back Reference” form of calibration. The microphone is checked against a test and measurement working standard microphone and must meet specifications before it can be shipped. An example of the result of one of the tests is shown above.

See Figure 2.

Microphone calibration provides, with a definable degree of accuracy, the necessary link between the physical quantity being measured and the electrical signal generated by the microphone. In addition, other useful information concerning operational limits, physical parameters, electrical characteristics or environmental influences may be determined. Under normal conditions, microphones are very stable. However, the microphone may be temporarily or permanently affected by harsh influences, such as moisture, dirt, being dropped accidentally or other unusual conditions that may cause the microphone accuracy to deviate from the normal specifications. This may manifest itself in a number of ways, ranging from a loss in frequency range to total failure of the built-in microelectronic circuit due to high mechanical shock.

It is for this reason that PCB recommends that a recalibration cycle be established for each microphone. This schedule is unique and is based upon a variety of factors, such as: extent of use, environmental conditions, accuracy requirements, trend information obtained from previous

calibration records, contractual regulations, and risk associated with incorrect readings. PCB recommends 12 to 24 month intervals, depending upon the above factors. Contact your PCB representative to schedule factory recalibration of your microphone, or you can also calibrate the microphone on site using PCB's handheld CAL250 Acoustic Calibrator.

In addition, environmental factors will impact the microphone's sensitivity. Changes in temperature, humidity and atmospheric pressure can cause a microphone's sensitivity to change. To account for this, many end users perform a single-point sensitivity, in-the-field calibration. To perform this calibration for the 130B40 Microphone we recommend using a handheld CAL250 Acoustic Calibrator.

If you have a handheld calibrator, before performing a calibration, ensure the microphone has stabilized in the environment in which it will be used. This can take a few seconds to a few minutes, depending upon the extent of the environmental change. To perform the calibration, install the fairing pad onto the 130B40 Surface Microphone to help ensure a proper seal. Place the microphone and fairing pad on a flat, level surface. Turn the handheld calibrator upside down, and place the 1" (25mm without the adapters) opening onto the fairing, centered around the microphone sensing element. Press down slightly to ensure a seal and to minimize outside noise, then perform the calibration using the instructions provided in the calibrator's manual.

6.0 Service

See the supplemental sheet, contained with this manual, for information on our service, repair and return policies, procedures and instructions. When unexpected problems arise, call our 24-Hour SensorLineSM (716-684-0001) to discuss your immediate dynamic instrumentation needs with a factory representative.

7.0 Warranty

All equipment and repair services provided by PCB Piezotronics, Inc. are covered by a limited warranty against defective material and workmanship for a period of one year. Contact PCB for a complete statement of our warranty.

PCB guarantees **Total Customer Satisfaction**. If, at any time, for any reason, you are not completely satisfied with any PCB product, PCB will repair, replace, or exchange it at no charge. You may also choose within the warranty period to have your purchase price refunded.

| | |
|--|---|
| 3425 Walden Avenue, Depew, NY 14043-2495 | 24-hour SensorLine SM : 716-684-0001 |
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Manual Number: 56071
Manual Revision: C
ECO#: 42623



VIB-130B Manual – 09-13
Printed in the U.S.A.

| Model Number 130B40 | ICP® ELECTRET SURFACE MICROPHONE | | | Revision: C ECN #: 42373 | | | | | | | | | | |
|--|--|--|------------------|---|-------------|---------------|-----------|--------------|--------------|------------------|------------------|------------------|------------------|--------------|
| Performance Frequency Response Characteristic Frequency Response(+/-1 dB) Frequency Response(+/-3 dB) Frequency Response(+/-6 dB) Sensitivity(@ 250 Hz) Sensitivity(+/-3 dB)(@ 250 Hz) Inherent Noise Dynamic Range(High) Dynamic Range(3% Distortion Limit) TEDS Compliant(Per IEEE 1451.4) | ENGLISH Pressure 100 to 3000 Hz 20 to 10,000 Hz 20 to 20,000 Hz 8.5 mV/Pa -41.4 dB re 1 V/Pa <32 dB(A) re 20 µPa 150 dB re 20 µPa >142 dB re 20 µPa Yes | SI Pressure 100 to 3000 Hz 20 to 10,000 Hz 20 to 20,000 Hz 8.5 mV/Pa -41.4 dB re 1 V/Pa <32 dB(A) re 20 µPa 150 dB re 20 µPa >142 dB re 20 µPa Yes | [2][3] | OPTIONAL VERSIONS Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used. | | | | | | | | | | |
| Environmental Temperature Range(Operating) | -40 to +176 °F | -40 to +80 °C | [1] | NOTES: [1] Sensitivity can change with significant variations in temperature. [2] Max without clipping. [3] Typical. [4] See PCB Declaration of Conformance PS023 for details. | | | | | | | | | | |
| Electrical Excitation Voltage Constant Current Excitation Output Bias Voltage Output Impedance Physical Housing Material Electrical Connector(Output) Cable Type Cable Length Cable Termination Size (Diameter)(Without fairing) Size (Diameter)(With fairing) Size (Height) Weight Weight(without cable) | 18 to 30 VDC 2 to 20 mA 9 to 14 VDC ≤ 50 Ohm Stainless Steel Integral Cable 030 Coaxial 5 ft 10-32 Coaxial Plug 0.52 in 1.62 in 0.126 in 0.3 oz 0.03 oz | 18 to 30 VDC 2 to 20 mA 9 to 14 VDC ≤ 50 Ohm Stainless Steel Integral Cable 030 Coaxial 1.5 m 10-32 Coaxial Plug 13.2 mm 41.0 mm 3.20 mm 7 gm 0.8 gm | [3] [3] | SUPPLIED ACCESSORIES: Model 070A02 Scope input adaptor (micro 10-32 jack to BNC plug) (1) Model 100-11180-10 IPA Wipe (2) Model 54924-01 Double Sided Base Adhesive Pad (5) Model 54925-01 Single Sided Top Adhesive Pad (5) Model 55739-01 Silicone Fairing (1) Model ACS-21 Calibration of Electret Microphone (1) | | | | | | | | | | |
|  | | <table border="1"> <tr> <td>Entered: AP</td> <td>Engineer: MJN</td> <td>Sales: MV</td> <td>Approved: MT</td> <td>Spec Number:</td> </tr> <tr> <td>Date: 12/16/2013</td> <td>Date: 12/16/2013</td> <td>Date: 12/16/2013</td> <td>Date: 12/16/2013</td> <td>56068</td> </tr> </table> | | | Entered: AP | Engineer: MJN | Sales: MV | Approved: MT | Spec Number: | Date: 12/16/2013 | Date: 12/16/2013 | Date: 12/16/2013 | Date: 12/16/2013 | 56068 |
| Entered: AP | Engineer: MJN | Sales: MV | Approved: MT | Spec Number: | | | | | | | | | | |
| Date: 12/16/2013 | Date: 12/16/2013 | Date: 12/16/2013 | Date: 12/16/2013 | 56068 | | | | | | | | | | |
| <p>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.</p> <p>ICP® is a registered trademark of PCB Group, Inc.</p> | |  <p>3425 Walden Avenue, Depew, NY 14043</p> <p>Phone: 716-684-0001 Fax: 716-684-0987 E-Mail: info@pcb.com</p> | | | | | | | | | | | | |

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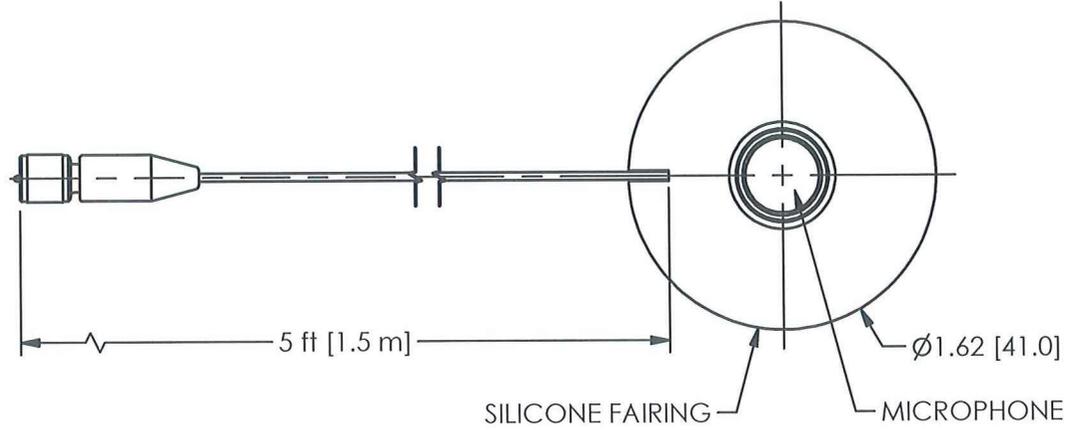
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REVISIONS

| REV | DESCRIPTION | DIN |
|-----|-----------------------|-------|
| A | REMOVED "PRELIMINARY" | 42104 |

56070



UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

| DIMENSIONS IN INCHES | DIMENSIONS IN MILLIMETERS [IN BRACKETS] |
|-------------------------------|---|
| DECIMALS XX ±.03 XXX ±.010 | DECIMALS X ± 0.8 XX ± 0.25 |
| ANGLES ± 2 DEGREES | ANGLES ± 2 DEGREES |

| FILLETS AND RADII | FILLETS AND RADII |
|-------------------|-------------------|
| .003 - .005 | 0.07 - 0.13 |

| DRAWN | | CHECKED | | ENGINEER | |
|-------|----------|------------|----------|----------|----------|
| JDM | 10/11/13 | <i>JDM</i> | 10/11/13 | MJN | 10/11/13 |

TITLE
OUTLINE DRAWING
MODEL 130B40
SURFACE MICROPHONE

PCB PIEZOTRONICS™
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|--------------------------|--------------------------|
| CODE IDENT. NO. 52681 | DWG. NO. 56070 |
| SCALE: FULL | SHEET 1 OF 1 |

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