



**Model M132A36**

**Micro ICP® pressure sensor, 140 mV/psi, 1/2-20 mtg thd (for high frequency  
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](mailto:info@pcb.com)  
Web: [www.pcb.com](http://www.pcb.com)**



## Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

## Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

## Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

## Contact Information

PCB Piezotronics, Inc.  
3425 Walden Ave.  
Depew, NY14043 USA  
Toll-free: (800) 828-8840  
24-hour SensorLine: (716) 684-0001  
General inquiries: [info@pcb.com](mailto:info@pcb.com)  
Repair inquiries: [rma@pcb.com](mailto:rma@pcb.com)

For a complete list of distributors, global offices and sales representatives, visit our website, [www.pcb.com](http://www.pcb.com).

## Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

## Definition of Terms and Symbols

The following symbols may be used in this manual:



### **DANGER**

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

**The following symbols may be found on the equipment described in this manual:**



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
住房	0	0	0	0	0	0
PCB板	X	0	0	0	0	0
电气连接器	0	0	0	0	0	0
压电晶体	X	0	0	0	0	0
环氧	0	0	0	0	0	0
铁氟龙	0	0	0	0	0	0
电子	0	0	0	0	0	0
厚膜基板	0	0	X	0	0	0
电线	0	0	0	0	0	0
电缆	X	0	0	0	0	0
塑料	0	0	0	0	0	0
焊接	X	0	0	0	0	0
铜合金/黄铜	X	0	0	0	0	0
本表格依据 SJ/T 11364 的规定编制。						
0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。						
X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。						
铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。						

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

## 1.0 INTRODUCTION

132 Series Microsensors are small, piezoelectric pressure sensors featuring extremely fast response for measurement of short wavelength pressure pulses. The short time constant of some models filters off the longer duration portion of pressure pulses, allowing differentiation of consecutive pressure pulses.

132 Series Microsensors contain integrated ICP<sup>®</sup> circuit amplifiers which operate as source followers and provide very high-frequency response. These micro-integrated circuit amplifiers convert the high-impedance voltage from the crystals into low-impedance voltage of less than 100 ohms.

Output from the microsensors may be coupled directly into oscilloscopes, recorders and A to D converters. Power to operate the IC amplifier and the output signal are conducted over a single conductor, two-wire cable with the ground serving as signal return. Special low-noise cables are not required. The calibrated mV/psi output of these microsensors is not attenuated nor is noise appreciably increased by the cable.

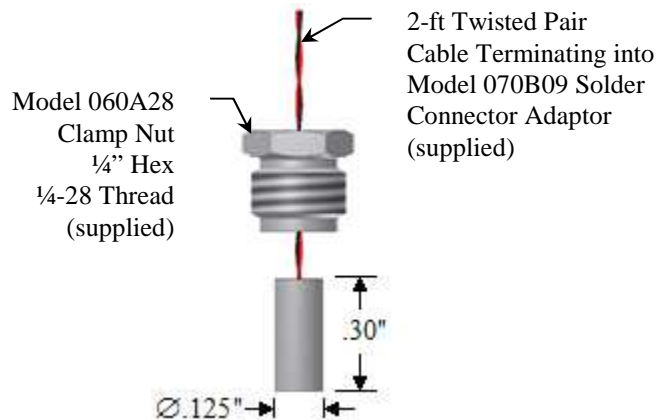
## 2.0 DESCRIPTION

132 Series Microsensors feature small diameter pressure-sensing surfaces incorporating very small (< 1 mm) piezoelectric sensing elements. The small size of the sensing elements imparts extremely fast response time to the microsensors.

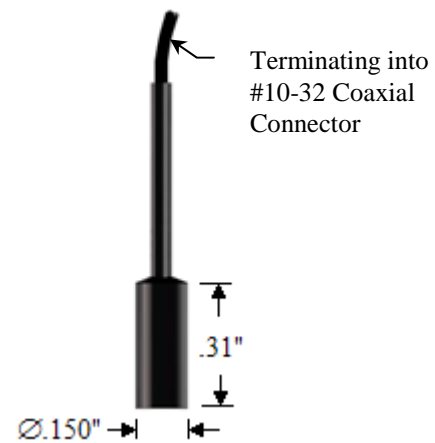
The charge generated by deflection of the piezoelectric element when subjected to shock pressures creates a voltage on the input capacitance at the gate of the microsensor ICP<sup>®</sup> amplifier. The amplifier, in conjunction with the source element, transforms the input into a low-impedance output signal of equal amplitude. The DC bias that exists on the signal lead is removed from the output signal by a coupling capacitor in the power supply. Resistors in the internal ICP<sup>®</sup> amplifiers of the microsensors set the internal discharge time constant, which

determines the low-frequency response of the microsensors. (Refer to General Guide to ICP<sup>®</sup> Instrumentation, G-0001, for complete details.)

Below are the available configurations for the 132 Series Microsensors.



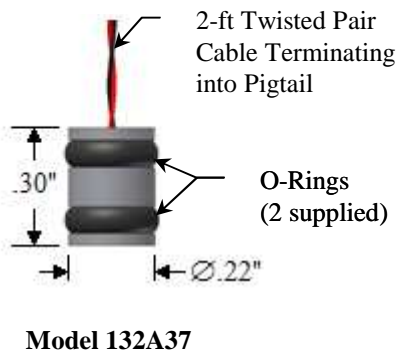
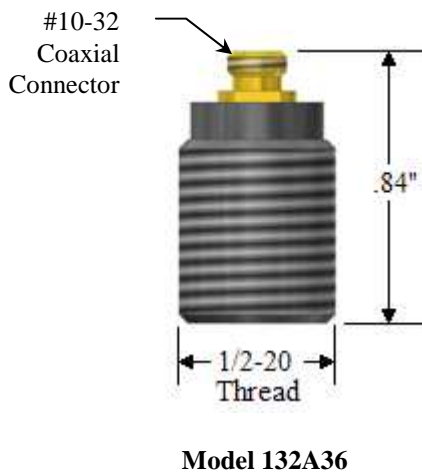
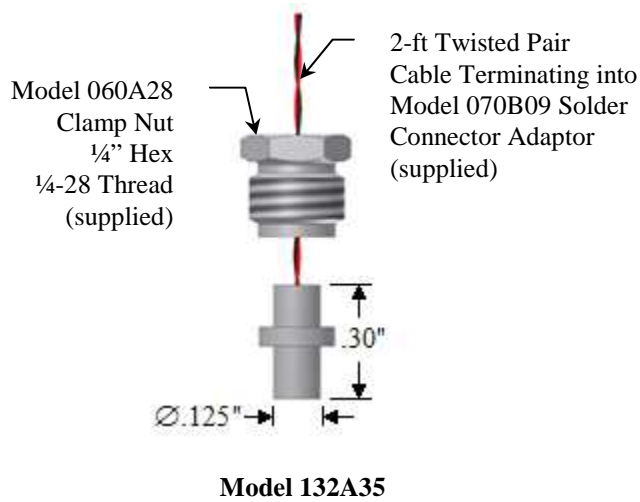
**Model 132A31 Time-of-Arrival  
ICP<sup>®</sup> Microsensor**



**Model 132A32**

# OPERATION MANUAL FOR MICROSENSORS

## 132 Series



### 3.0 INSTALLATION

Refer to the installation drawing for details. If the microsensors are to be subjected to pressures beyond their specified range, be sure to use backing nuts to prevent the sensors from backing out of their mounting ports. (Thread adaptors are available from PCB to facilitate mounting.)

Connect the microsensors to an ICP® power supply. Use standard two-conductor cable between the sensor and the ICP® power unit.

Next, connect the power unit to a readout device, e.g., oscilloscope, recorder or high-speed A to D converter.

### 4.0 OPERATION

Switch the ICP® power unit on and observe reading of bias-monitoring voltmeter on front panel of power unit.

If indicator is in green section of indicator panel, the IC amplifier is providing proper bias (normally +11 VDC), cable connections are normal and the system is ready to operate.

If the needle moves to the red area of the fault monitor meter, output is zero and a short is indicated. The short could be located in the amplifier cable connectors or in the power unit.

If the pointer moves into the yellow area of the fault monitor meter, an open circuit is indicated with full power supply voltage. An open circuit could be the result of a faulty amplifier, an open cable or open connectors.

Allow the sensor to thermally stabilize for about one minute. A signal drift may occur when the output cable is connected to the readout instrument.

The drift occurs during charging of the coupling capacitor in the power unit. The signal will stabilize in several minutes.

#### **4.1 OPERATION BEYOND RANGE SPECIFICATION**

Because 132 Series Microsensors can be installed using RTV-like potting materials to hold them in place, maximum pressure specifications are given to prevent the sensors from being extruded from the mounting holes. Static or slow dynamic overpressures are more apt to cause a problem than a short dynamic shock pulse. Use of backing nuts will minimize the possibility of a problem.

The microsensors are capable of responding to dynamic overpressures up to ten times the specified range. The output will be “clipped” (look flat-topped on the readout) after about 10 volts.

The initial rise of the output will be accurate up to the point of clipping. This can allow for an accurate time-of-arrival measurement, even though the peak pressure cannot be measured.

#### **5.0 CALIBRATION**

A shock tube is used to calibrate the microsensors.


#### **6.0 MAINTENANCE AND REPAIR**

Except for repair of wires, the microsensors are not field-repairable. In case of serious malfunction, contact the PCB at (888) 684-0011.

It is well to observe the following precautions in using the microsensors:

1. Do not exceed specified pressure levels without proper mounting.
2. Do not subject microsensors to temperatures exceeding 174 °F (79 °C).
3. Do not apply voltage to sensors without current-limiting diodes or other current protection. (PCB ICP® power supplies feature proper voltage and current protection.)
4. Do not apply more than 20 mA of current to the microsensors.



Model Number 132A36	<h1>ICP® PRESSURE SENSOR</h1>			Revision: L ECN #: 44634										
<b>Performance</b> Measurement Range Sensitivity(± 30 %) Maximum Pressure(Dynamic) Resolution Resonant Frequency Rise Time(Incident) Rise Time(Reflected) Low Frequency Response(-5 %) <b>Environmental</b> Temperature Range(Operating) <b>Electrical</b> Output Polarity(Positive Pressure) Discharge Time Constant(at room temp) Excitation Voltage Constant Current Excitation Output Impedance Output Bias Voltage <b>Physical</b> Sensing Element Housing Material Sealing Electrical Connector Weight  <i>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 Group, Inc.</i>	<b>ENGLISH</b> 50 psi 140 mV/psi 800 psi 0.001 psi ≥ 1000 kHz ≤ 3 μ sec ≤ 0.5 μ sec 11,000 Hz  0 to +175 °F Positive ≥ .000045 sec 20 to 30 VDC 2 to 20 mA ≤ 100 Ohm 8 to 14 VDC  Ceramic Acetal Epoxy 10-32 Coaxial Jack 0.095 oz	<b>SI</b> 345 kPa 20.3 mV/kPa 5515 kPa 0.007 kPa ≥ 1000 kHz ≤ 3 μ sec ≤ 0.5 μ sec 11,000 Hz  -18 to +79 °C Positive ≥ .000045 sec 20 to 30 VDC 2 to 20 mA ≤ 100 Ohm 8 to 14 VDC  Ceramic Acetal Epoxy 10-32 Coaxial Jack 2.7 gm	[1] [2]	<div data-bbox="1417 235 1669 259" style="text-align: center;"><b>OPTIONAL VERSIONS</b></div> <p data-bbox="1144 259 1946 308">Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.</p> <p data-bbox="1144 332 1302 357">M - Metric Mount</p> <p data-bbox="1144 381 1375 406">W - Water Resistant Cable</p> <hr/> <p data-bbox="1144 462 1228 487"><b>NOTES:</b></p> <p data-bbox="1144 487 1375 511">[1]Rise time in air at Mach 1</p> <p data-bbox="1144 511 1312 535">[2]Rise time at 20mA</p> <hr/> <p data-bbox="1144 576 1417 600"><b>SUPPLIED ACCESSORIES:</b></p> <p data-bbox="1144 600 1491 625">Model 061A30 Spanner Wrench, 2 Pin (1)</p> <table border="1" data-bbox="1134 665 1942 747" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Entered: JM</td> <td style="width: 20%;">Engineer: MJK</td> <td style="width: 20%;">Sales: RWM</td> <td style="width: 20%;">Approved: APB</td> <td style="width: 20%;">Spec Number:</td> </tr> <tr> <td>Date: 10/6/2015</td> <td>Date: 10/6/2015</td> <td>Date: 10/6/2015</td> <td>Date: 10/6/2015</td> <td style="text-align: center;">1911</td> </tr> </table> <div data-bbox="1134 795 1585 876" style="text-align: center;">         3425 Walden Avenue, Depew, NY 14043     </div> <div data-bbox="1659 795 1911 876" style="text-align: right;">       Phone: 716-684-0001        Fax: 716-684-0987        E-Mail: info@pcb.com     </div>	Entered: JM	Engineer: MJK	Sales: RWM	Approved: APB	Spec Number:	Date: 10/6/2015	Date: 10/6/2015	Date: 10/6/2015	Date: 10/6/2015	1911
Entered: JM	Engineer: MJK	Sales: RWM	Approved: APB	Spec Number:										
Date: 10/6/2015	Date: 10/6/2015	Date: 10/6/2015	Date: 10/6/2015	1911										

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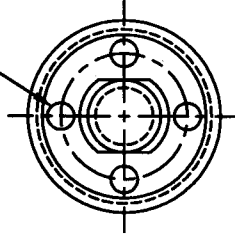
APPLICATION

NEXT ASS'Y	USED ON	VAR

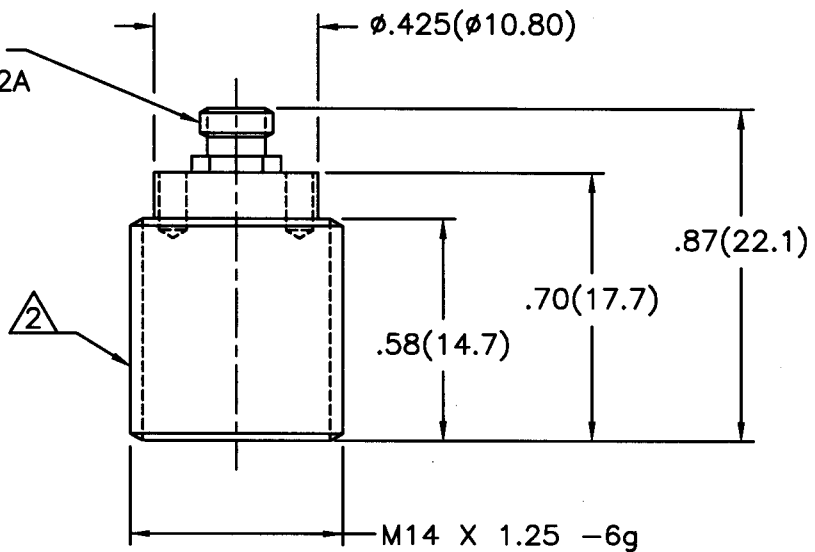
REVISIONS

REV	DESCRIPTION	ECN	DATE	APP'D
A	REVISED PER ECR	20361	8/5/04	DM/aj

SPANNER WRENCH HOLES

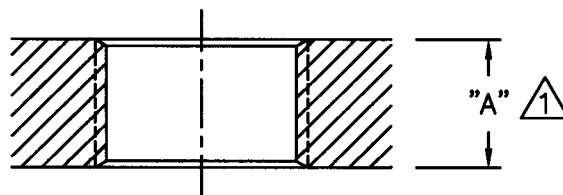


ELECTRICAL CONNECTOR  
CO-AXIAL 10-32 UNF-2A



MOUNTING HOLE PREPARATION

DRILL  $\phi$ .492( $\phi$ 12.50)  
THRU  
M14 X 1.25-6h  
THRU



② USE OF TEFLON TAPE IS RECOMMENDED WHEN MOUNTING ADAPTOR.

① "A" DIMENSION TO SUIT USER REQUIREMENTS.

UNLESS SPECIFIED TOLERANCES

DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]
DECIMALS XX $\pm$ .01	DECIMALS X $\pm$ 0.3
XXX $\pm$ .005	XX $\pm$ 0.13
ANGLES $\pm$ 2 DEGREES	ANGLES $\pm$ 2 DEGREES
FILLETS AND RADII .003 - .005	FILLETS AND RADII [0.07 - 0.13]

DRAWN	ECB	8/6/04	MFG	KLG	8/10/04
CHK'D	DM	8/11/04	ENGR	MEM	8/12/04
APP'D	RF	8/19/04	SALES	DPC	8/12/04

**PCB PIEZOTRONICS**  
3425 WALDEN AVE. DEPEW, NY 14043  
(716) 684-0001 EMAIL: SALES@PCB.COM

TITLE  
INSTALLATION DRAWING  
MODEL M132A36  
DYNAMIC PRESSURE SENSOR

CODE IDENT. NO. 52681  
DWG. NO. 26735

DD011 REV. C 01/21/03

SCALE: 2X SHEET 1 OF 1