



Model 102M205

**Pressure Sensor ICP® pressure sensor, 100 psi, 50 mV/psi, 3/8-24 mtg thd, accel. comp.,
ground isolated**

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
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E-mail: info@pcb.com
Web: www.pcb.com**



OPERATION MANUAL FOR ICP® PRESSURE SENSORS Models 102A02, A05, A07, A09 Models 112A21, A22, A23

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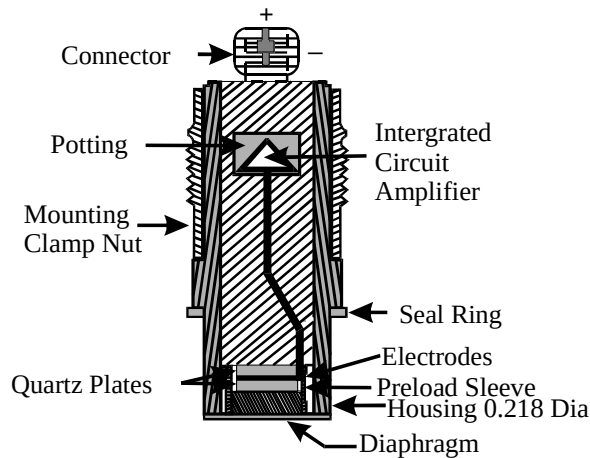
1.0 INTRODUCTION

The series of miniature pressure sensors described by this operating guide is designed for low pressure, high resolution applications and features acceleration compensation.

Uses include monitoring of low pressure hydraulic and pneumatic phenomena in the presence of shock and vibration such as on jet engines, compressors, turbines and other operating machinery, high intensity sound and turbulence measurements, and many other industrial R & D applications.

2.0 DESCRIPTION

This series is comprised of six sensor models having high sensitivities, but differing in mechanical configuration.

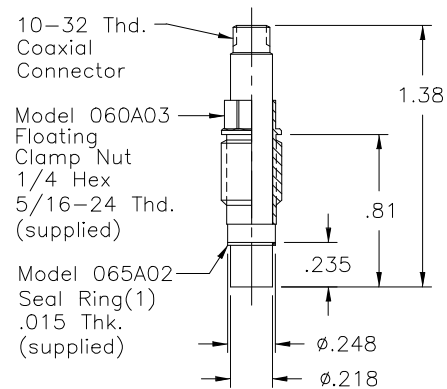


Typical ICP® Probe Style Sensor

Each model utilizes the basic ICP® pressure probe as shown in above figure. The pressure probe consists of the Model 112A high sensitivity acceleration-compensated quartz element and an IC source follower amplifier joined together as an inseparable assembly.

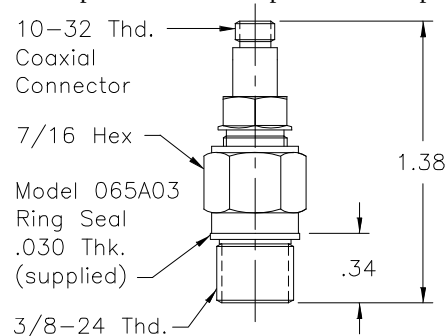
Refer to "General Guide to ICP® Instrumentation" G-0001B for a complete treatment of the ICP® concept.

Models 112A21, 112A22 and 112A23 are in the basic probe configuration as shown in Figure 1, and are installed with a hollow clamp nut with 5/16-24 external threads. The housings of these models are at electrical ground potential.



Series 111: Probe Style Sensor

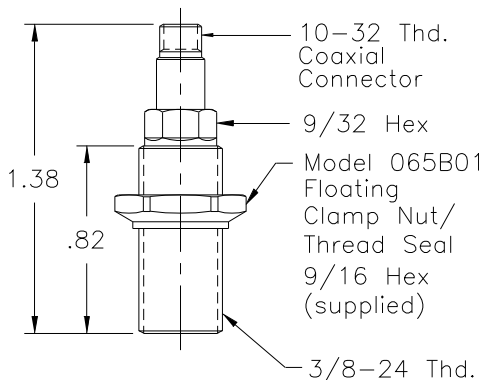
The Model 102A05 utilizes the same basic pressure probe, mounted in a 3/8-24 threaded mounting adaptor with shoulder seal. The probe is assembled into the adaptor at the factory in an "off ground" configuration, i.e., the probe body is electrically insulated from the external mounting adaptor body. Do not attempt to disassemble probe and adaptor.



Model 102A05 Thread Mount Design, Ground-Isolated Sensor

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Models 102A02, 102A07, and 102A09 utilize the same inner probe design but in a 3/8-24 threaded adaptor with floating clamp nut to allow adjustment of diaphragm depth where it is necessary to adapt to various wall thicknesses. These models are supplied only in low pressure (100 and 50 psi) versions and are also "off ground".



**102A's: Thread Mount with Floating Clamp Nut,
Ground-Isolated Sensor**

3.0 INSTALLATION

This manual contains outline and installation information for your specific model in this series. Prepare mounting ports in accordance with the installation drawing for the specific model, paying particular attention to sealing surfaces. These surfaces must be smooth and free from chatter marks, nicks and other irregularities which could preclude a pressure-tight seal.

Seals are provided with each sensor and should always be used. Extra seals for all standard models are in stock at the factory. Replace seals when they become unserviceable.

In some cases, e.g., where flash temperatures such as those generated by combustion processes are present, it may be necessary to thermally insulate the diaphragm to minimize spurious signals generated by these effects.

Common black vinyl electrical tape has been found to be an effective insulating material in many cases. One or more layers may be used across the end of the diaphragm without affecting response or sensitivity.

A silicone rubber coating approximately .010" thick has also been proven effective in many applications. General Electric RTV type 106 silicone rubber is recommended. Apply the rubber coating and allow to cure in accordance with the manufacturer's instructions.

Although ICP® sensors have low output impedance and in general are not affected by moisture, in extreme environments it is good practice to protect cable connections with shrink tubing.

It is not necessary to use low-noise coaxial cable with this sensor series. In fact, a Model 070A09 solder connector adaptor that allows the use of ordinary two-wire cable is desired.

4.0 OPERATION

It is only necessary to supply the sensor with a 2 to 20 mA constant current at +20 to +30 VDC through a current-regulating diode or equivalent circuit. (See Guide G-0001B for powering and signal utilization information pertaining to all ICP® instrumentation).

Most of the signal conditioners manufactured by PCB have an adjustable current feature allowing a choice of input currents from 2 to 20 mA. In general, for lowest noise (best resolution) choose the low current ranges and for driving long cables (to several thousand feet) use the higher current, up to 20 mA maximum.

To operate system using a PCB signal conditioner:

1. Switch power on.
2. Wait several minutes for the IC amplifier to turn on and stabilize.
3. Proceed with measurements.

4.1 OPERATING CONSIDERATION FOR MODEL 112A23

The Model 112A23 features a low-noise amplifier which, based on a peak-to-peak broadband noise factor of 50 μ V, results in a resolution of .001 psi.

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Defined for practical purposes as the minimum readout signal, the resolution is based on the sensitivity of 50 mV/psi and a low noise amplifier of 50 μ V peak noise.

Thus, $50 \mu\text{V}/50\text{mV} = .001$ psi resolution

The output bias voltage of the Model 112A23 is 5.0 volts, half the bias voltage of most PCB pressure sensors. This will cause the bias monitor meter on PCB power supplies to read at the low end of the green band.

5.0 POLARITY

This sensor series produces a positive-going output voltage for increasing pressure input.

6.0 LOW FREQUENCY RESPONSE

The low frequency response of an ICP® system is determined by:

1. The discharge time constant of the sensor, and,
2. If AC-coupled at power unit, the coupling time constant.

Consult Section 7.0 in Guide G-0001B for detailed explanation of low frequency characteristics of ICP® instruments.

7.0 CALIBRATION

Piezoelectric sensors are dynamic devices, but static calibration methods may be employed if discharge time constants are sufficiently long. Generally, static methods are not employed below several hundred seconds discharge time constant.

To employ static methods, directly couple the sensor to the DVM readout using a T-connector from the XD4R jack or use the Model 484B in the "calibrate" mode. Apply pressure with dead weight tester and take readings quickly. Release pressure after each calibration point.

For the shorter discharge time constant series, a rapid pressure step must be generated by a pneumatic pressure pulse calibrator or dead weight tester and readout is by recorder or storage oscilloscope.

PCB offers a complete recalibration service. Consult factory for details.

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8.0 MAINTENANCE

The miniature size sealed construction precludes field maintenance. Should service be required, return unit to factory with note describing problem.

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Model Number 102M205		ICP® PRESSURE SENSOR		Revision: F ECN #: 54975	
Performance		ENGLISH	SI	OPTIONAL VERSIONS	
Measurement Range(for ±5V output)		100 psi	689.5 kPa	Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used. M - Metric Mount Supplied Accessory: Model 065A40 Seal ring 0.435" OD x 0.397" ID x 0.030" thk brass (3) W - Water Resistant Cable	
Useful Overrange(for ± 10V output)		200 psi	1,379 kPa		
Sensitivity(± 10 mV/psi)		50 mV/psi	7.25 mV/kPa		
Maximum Pressure		500 psi	3 448 kPa		
Resolution		0.4 psi	0.0028 kPa		
Resonant Frequency		≥ 250 kHz	≥ 250 kHz		
Rise Time		≤ 2 μ sec	≤ 2 μ sec		
Low Frequency Response(- 5 %)		0.50 Hz	0.50 Hz		
Non-Linearity		≤ 1 % FS	≤ 1 % FS		
Environmental					
Acceleration Sensitivity		0.002 psi/g	0 0014 kPa/(m/s²)		
Temperature Range(Operating)		-100 to +275 °F	-73 to +135 °C		
Temperature Coefficient of Sensitivity		≤ 0.03 %/°F	≤ .054 %/°C		
Maximum Flash Temperature		3,000 °F	1 649 °C		
Maximum Vibration		2,000 g pk	19,600 m/s² pk		
Maximum Shock		20,000 g pk	196,000 m/s² pk		
Electrical					
Output Polarity(Positive Pressure)		Positive	Positive		
Discharge Time Constant(at room temp)		≥ 1 sec	≥ 1 sec		
Excitation Voltage		20 to 30 VDC	20 to 30 VDC		
Constant Current Excitation		2 to 20 mA	2 to 20 mA		
Output Bias Voltage		8 to 14 VDC	8 to 14 VDC		
Physical					
Sensing Element		Quartz	Quartz		
Housing Material		17-4 Stainless Steel	17-4 Stainless Steel		
Diaphragm		316L Stainless Steel	316L Stainless Steel		
Sealing		Welded Hermetic	Welded Hermetic		
Electrical Connector		10-32 Coaxial Jack	10-32 Coaxial Jack		
Weight		0.4 oz	11 gm		
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]Diaphragm with ablative coating. [5]See PCB Declaration of Conformance PS023 for details.					
SUPPLIED ACCESSORIES: Model 065A44 Seal ring 0.435" OD x 0.377" ID x 0.030" thk Cu (3) Model PCS-1AZ Sensitivity calibration at 100% and 10% of sensor range					
Entered: ND		Engineer: AJA		Sales: RWM	
Date: 07/15/2024		Date: 07/15/2024		Date: 07/15/2024	
				Approved: RPF	
				Spec Number:	
				3931	
CE UK CA [5] Phone: 716-684-0001 Fax: 716-684-0987 E-Mail: info@pcb.com PCB PIEZOTRONICS AN AMPHENOL COMPANY 3425 Walden Avenue, Depew, NY 14043					

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.
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REV	DESCRIPTION
G	UPDATED NOTES



- A

 PCB PIEZOTRONICS AN AMPHENOL COMPANY		
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CODE IDENT. NO. 52681	SHEET B	DWG. NO. 6450
SCALE: 3X	SHEET 1 OF 1	