Model 102A14

Cryogenic ICP® pressure sensor, 5000 psi, 1 mV/psi, 3/8-24 mtg thd,

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

PCB PIEZOTRONICS INC.
A PCB GROUP COMPANY

Warranty, Service, Repair, and Return Policies and Instructions

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 traceablility 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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Depew, NY 14043 USA
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DOCUMENT NUMBER: 21354
DOCUMENT REVISION: B
ECN: 17900

OPERATING GUIDE
DYNAMIC (CRYOGENIC)
ICP® PRESSURE SENSORS
MODELS 102A10, A11, A13, A14

1.0 DESCRIPTION

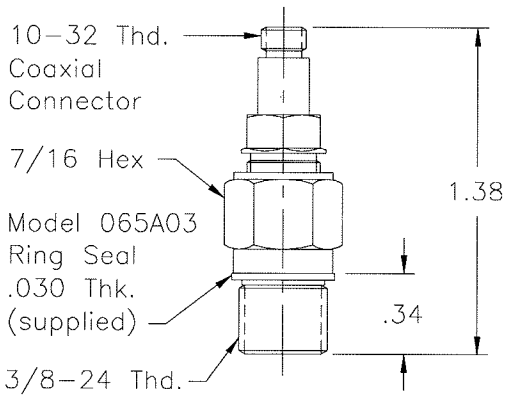
This sensor series consists of a Model 112A quartz pressure element coupled to a special MOSFET amplifier circuit to permit operation at cryogenic temperatures.

Cryogenic sensors use special electronics that have some characteristics differing from standard designs.

Polarity of the output signal is positive-going for increasing pressure.

2.0 INSTALLATION

Refer to installation drawing for mounting hole preparation. The outer housing of the thread adaptor is ground isolated from the sensing element.



Series 102A10: Cryogenic Pressure Sensor

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 prevent 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. It is recommended to replace the seals every time the sensor is re-installed.

Although these low-impedance sensors are not affected by moisture, in extreme environments such as cryogenic, it is advisable to protect cable connections with shrink tubing. Low-noise cable

(003A) is not necessary. Model 070A09 solder connector adaptor permits the use of ordinary two-wire cable.

3.0 OPERATION

These sensors are operated like standard ICP® sensors.

For general laboratory-type use, either Model 480C02 battery-powered signal conditioner or Model 482A06 line-powered signal conditioner is recommended for use with Cryogenic Sensors. Both Models provide 2 mA constant current to power the sensor electronics.

Other standard signal conditioners Series 481A, 482A, and 483A may also be used, provided the current is adjusted to 2 mA. All above Models include a bias de-coupling capacitor in series with the output connector.

For telemetry applications, Model 495A signal conditioner provides band pass filtering, adjustable gain, bias and limiting.

4.0 CALIBRATION

Because of the relatively short time constants of these sensors (see specification sheet at the front of this manual), only dynamic calibration methods can be used.

5.0 MAINTENANCE

Because of the miniature size and built-in electronics of these units, field maintenance is not recommended.

Drawing Number: 21077
Revision: A
ECN Number: 25700

6.0 CAUTION

The FET amplifier used in these sensors is a special low-noise device with gate breakdown voltage of 125 volts.

This voltage rating can be exceeded by either imposing a high-pressure step or a fast-rising pressure ramp to the diaphragm in excess of the rating for the sensor.

Slowly applied or released static pressure levels, within the mechanical capability of the sensor, are not dangerous since the charge generated by the quartz element has time to leak off through the FET bias resistor.

It is important to note that the following two pressure ratings are involved:

1. Maximum total pressure (mechanical consideration).

2. Maximum step pressure (electrical consideration).

NOTE: To avoid damage to the sensor, limit pressure application to maximum values on specification sheet at the front of this manual.

The maximum step pressure may be exceeded up to the maximum total pressure level provided the total pressure (rise or fall) takes place.

Model Number	ICP® PRESSURE SENSOR	Revision: F
102A14		ECN #: 29109

Performance	ENGLISH	SI	
Measurement Range(for ±5V output)	5 kpsi	34,475 kPa	
Useful Overrange(for ± 10V output)	10 kpsi	68,950 kPa	[1]
Sensitivity(± 15 %)	1.0 mV/psi	0.145 mV/kPa	
Maximum Pressure	15 kpsi	103,425 kPa	
Resolution	100 mpsi	0.690 kPa	[2]
Resonant Frequency	≥ 250 kHz	≥ 250 kHz	
Rise Time	≤ 2.0 µ sec	≤ 2.0 µ sec	
Low Frequency Response(-5 %)	0.25 Hz	0.25 Hz	
Non-Linearity	≤ 1.0 % FS	≤ 1.0 % FS	[3]
Environmental			
Acceleration Sensitivity	≤ 0.002 psi/g	≤ 0.0014 kPa/(m/s²)	
Temperature Range(Operating)	-320 to +212 °F	-196 to +100 °C	
Temperature Coefficient of Sensitivity	≤ 0.06 %/°F	≤ 0.108 %/°C	
Maximum Flash Temperature	3000 °F	1649 °C	
Maximum Shock	20,000 g pk	196,140 m/s² pk	
Electrical			
Output Polarity(Positive Pressure)	Positive	Positive	
Discharge Time Constant(at room temp)	≥ 2 sec	≥ 2 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	9 to 13 VDC	9 to 13 VDC	
Physical			
Sensing Element	Quartz	Quartz	
Housing Material	Stainless Steel	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	0.388 oz	11.00 gm	

CE [4]

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.

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.

M - Metric Mount
Supplied Accessory : Model 065A34 Seal ring 0.435" OD x 0.397" ID x 0.030" Cu (3) replaces Model 622A01

NOTES:

[1] Excitation voltage ≥28 volts required.
[2] Typical.
[3] Zero-based, least-squares, straight line method.
[4] 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)

Entered: BLS	Engineer: RF	Sales: RWM	Approved: BM	Spec Number:
Date: 7/16/08	Date: 7/16/08	Date: 7/16/08	Date: 7/16/08	6855

PCB PIEZOTRONICS
PRESSURE DIVISION
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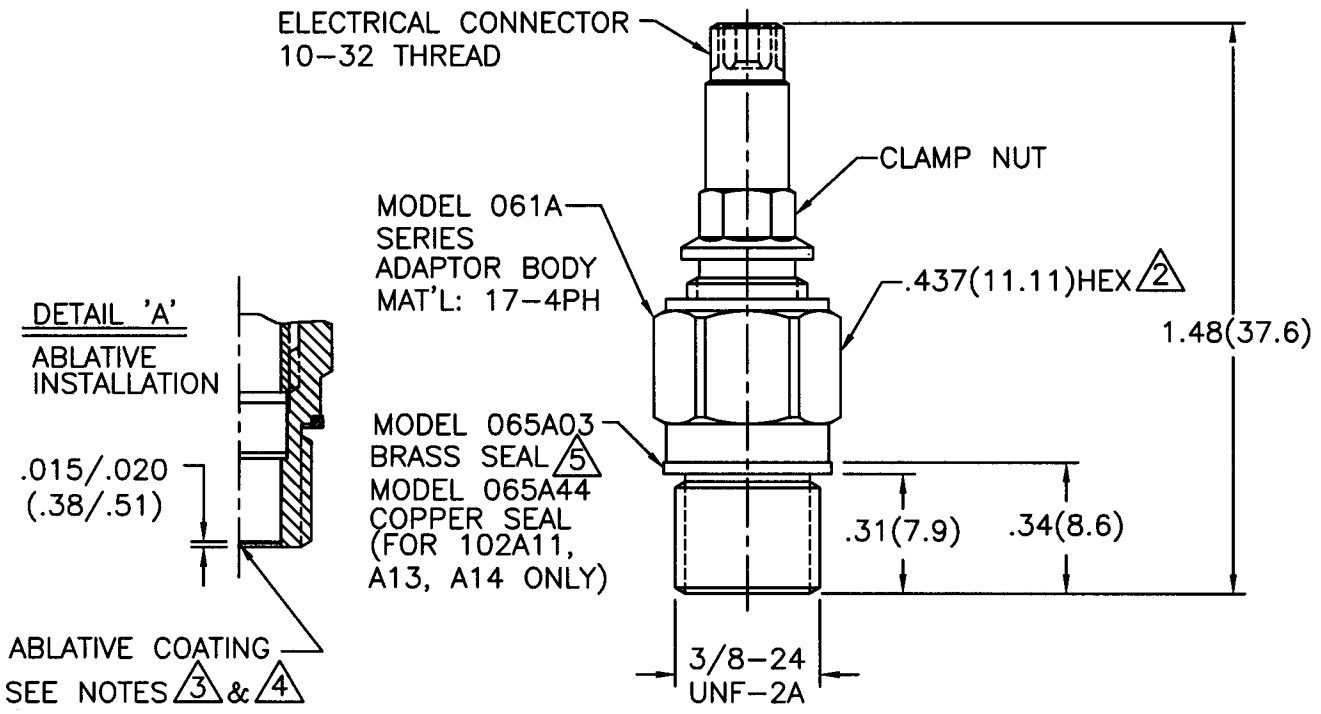
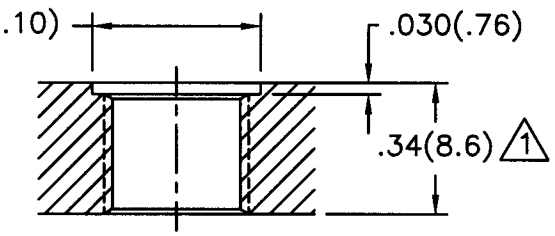
101-1020-90

APPLICATION		
NEXT ASS'Y	USED ON	VAR

REVISIONS				
REV	DESCRIPTION	ECN	DATE	APP'D
P	REVISED PER ECR	18315	9/9/03	



MOUNTING HOLE PREPARATION:
ø.332(ø8.43)
THRU
⌴ ø.437(ø11.10)
X .030(.76) ↧
TAP 3/8-24 UNF-2B
THRU



MOUNTING HOLE DETAIL

5 MODEL 065M29 ST STL SEAL AVAILABLE.

4 BLACK VINYL ELECTRICIANS TAPE HAS BEEN FOUND TO BE AN EFFECTIVE ABLATIVE MATERIAL AS IS DC-4 SILICONE GREASE.

3 ☐ IF CHECKED, RTV ABLATIVE COATING HAS BEEN APPLIED TO THE DIAPHRAGM FOR FLASH TEMPERATURE PROTECTION. REPLACE WITH: GE SILICONE RTV 106

2 MOUNTING TORQUE ON 7/16 HEX - 5 TO 8 FT LBS(6.78-10.85 NM)

1 ABOVE INSTALLATION SHOWN FOR WALL THICKNESS OF .34(8.6) THICK. ⌴ THICKER WALLS ø.75(ø19.0) TO CLEAR .497(11.11) HEX AND ALLOW FOR SOCKET WRENCH.

UNLESS SPECIFIED TOLERANCES	
DIMENSIONS IN INCHES DECIMALS XX ±.01 XXX ±.005 ANGLES ±2 DEGREES	DIMENSIONS IN MILLIMETERS [IN BRACKETS] DECIMALS X ±0.3 XX ±0.13 ANGLES ±2 DEGREES
FILLETS AND RADII .003 - .005	FILLETS AND RADII [0.07 - 0.13]
DD011 REV. C 01/21/03	

DRAWN	EGB	9/9/03	MFG		9/9/03
CHK'D	DM	9/10/03	ENGR		9/9/03
APP'D		9/11/03	SALES		9/11/03

TITLE: INSTALLATION DRAWING
MODELS 101A02, A03, A04, A06
102A, A03, A04, A06, A11, A13, A14

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CODE IDENT. NO.	DWG. NO.
52681	101-1020-90

SCALE: 2X | SHEET 1 OF 1