PCB PIEZOTRONICS
AN AMPHENOL COMPANY

Model 102M81A

Cryogenic ICP pressure sensor, 500 psi, 10 mV/psi, 7/16-20 UNF - 2A mtg thd, for K-type seal mounting

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

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

1.0 DESCRIPTION

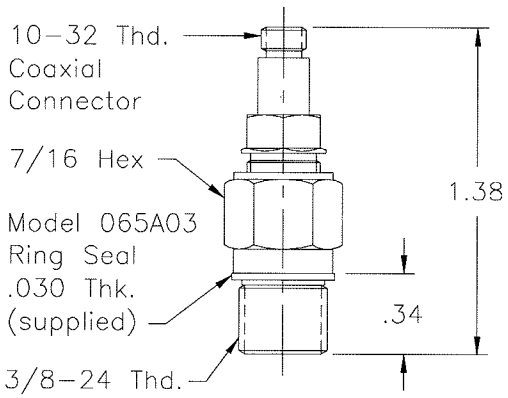
This sensor series consists of a Model 112A quartz pressure element coupled to a special MOSFET amplifier circuit to permit operation at cryogenic temperatures.

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 102M81A	ICP® PRESSURE SENSOR	Revision: C ECN #: 55146

Performance	ENGLISH	SI	
Measurement Range(for ±5V output)	500 psi	3,447 kPa	[1]
Useful Overrange(for ± 10V output)	1,000 psi	6,895 kPa	[2]
Sensitivity(± 15 %)	10 mV/psi	1.45 mV/kPa	
Maximum Pressure(step)	5,000 psi	34,500 kPa	
Maximum Pressure(Total)	7.5 kpsi	51,711 kPa	[3]
Resolution	10 mpsi	0.0689 kPa	[4]
Resonant Frequency	≥ 250 kHz	≥ 250 kHz	
Rise Time(Reflected)	≤ 2.0 µ sec	≤ 2.0 µ sec	
Non-Linearity	≤ 1.0 % FS	≤ 1.0 % FS	[5]
Environmental			
Acceleration Sensitivity	0.002 psi/g	0.0014 kPa/(m/s²)	[4]
Temperature Range(Operating)	-400 to +212 °F	-240 to +100 °C	
Temperature Coefficient of Sensitivity	≤ 0.06 %/°F	≤ 0.108 %/°C	
Maximum Flash Temperature	3,000 °F	1648.89 °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)	≥ 1.0 sec	≥ 1.0 sec	
Excitation Voltage	15 to 30 VDC	15 to 30 VDC	
Constant Current Excitation	2 to 20 mA	2 to 20 mA	
Output Impedance	≤ 500 Ohm	≤ 500 Ohm	
Output Bias Voltage	3 to 8 VDC	3 to 8 VDC	
Physical			
Housing Material	304L/316L Stainless Steel	304L/316L Stainless Steel	
Thread Adaptor Material	Vascomax C-300	Vascomax C-300	
Diaphragm	316L Stainless Steel	316L Stainless Steel	
Sealing	Welded Hermetic	Welded Hermetic	
Electrical Connector	10-32 Coaxial Jack	10-32 Coaxial Jack	
Weight	0.9 oz	25 gm	

CE

UK CA [6]

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.

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.

NOTES:

[1]-5V output may be limited by the output bias.
[2]For +10 volt output, minimum 24 VDC supply voltage required. Negative 10 volt output may be limited by output bias.
[3]Due to high sensitivity, the static pressure should be applied and removed very slowly. Rate should prevent more than 10 Volt change in output until Output Bias Voltage returns to normal (approximately 15 times discharge time constant).
[4]Typical.
[5]Zero-based, least-squares, straight line method.
[6]See PCB Declaration of Conformance PS023 for details.

SUPPLIED ACCESSORIES:

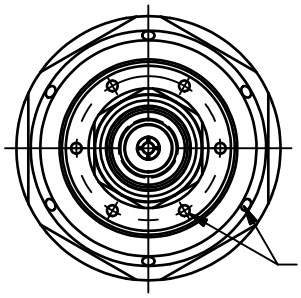
Model PCS-10AA Single point sensitivity coefficient at sensor minimum operating temperature (-320°F / -196°C limit)
Model PCS-1AZ Sensitivity calibration at 100% and 10% of sensor range

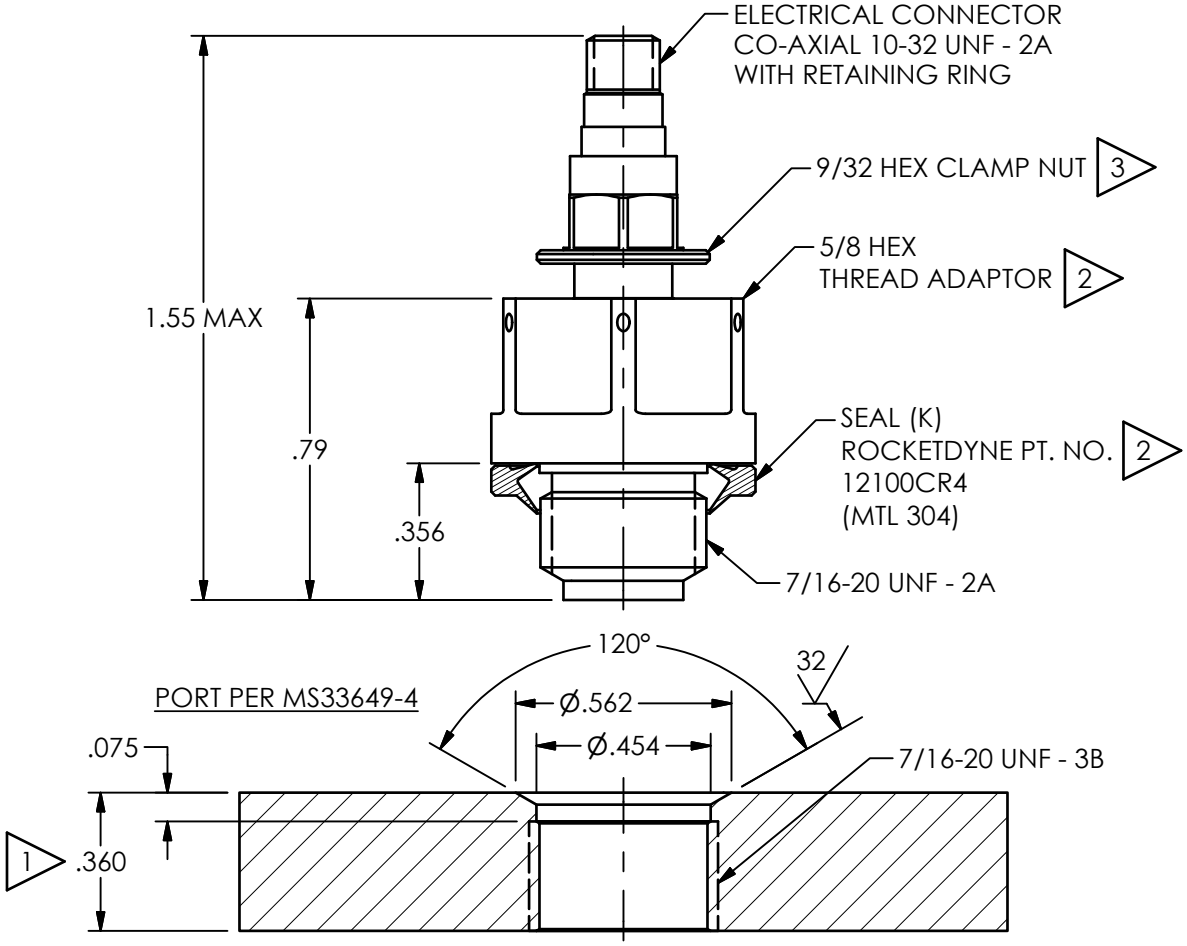
Entered: ND	Engineer: RPF	Sales: RWM	Approved: RPF	Spec Number:
Date: 08/23/2024	Date: 08/23/2024	Date: 08/23/2024	Date: 08/23/2024	65696

PCB PIEZOTRONICS
AN AMPHENOL COMPANY
Phone: 716-684-0001
Fax: 716-684-0987
E-Mail: info@pcb.com
3425 Walden Avenue, Depew, NY 14043

67826

REVISIONS		
REV	DESCRIPTION	DIN
NR	RELEASED TO DRAFTING	47140





4.) THE ABOVE UNIT IS A SEALED ASSEMBLY AND SHOULD BE RETURNED TO THE FACTORY SHOULD SERVICE BE REQUIRED

3 RECOMMENDED TORQUE ON A 9/32 HEX: 75-85 IN-LBS

2 MOUNTING TORQUE ON A 5/8 HEX: 120-130 IN-LBS

1 DIMENSIONS SHOWN ARE FOR .36 WALL THICKNESS, COUNTERBORE FOR THICKER WALLS

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER	
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	JDM	9/20/17	JDM	9/20/17	DRK	9/20/17
FILLETS AND RADII .003 - .005	FILLETS AND RADII 0.07 - 0.13						

TITLE

INSTALLATION DRAWING
CRYOGENIC PRESSURE TRANSDUCER

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

CODE IDENT. NO.	DWG. NO.	
52681	67826	
SCALE: 2X	SHEET 1 OF 1	