



**Model 482A23**

**Signal Conditioner, Line (or DC) Powered**

**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 and Specifications

A specification sheet and outline drawing are located in the rear of this manual.

### 1.1 Introduction: Safety Considerations

**WARNING 1:** *The power supply/signal conditioner should not be opened by anyone other than qualified service personnel.* This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid injury.

**WARNING 2:** This equipment is designed with user safety in mind; however, the protection provided by the equipment may be impaired if the equipment is used in a manner not specified by PCB Piezotronics, Inc.

**Caution 1:** *Cables can kill your equipment.* High voltage electrostatic discharge can damage electrical devices. Similar to a capacitor, a cable can hold a charge caused by triboelectric transfer, such as that which occurs in the following:

- Laying on and moving across a rug.
- Any movement through air.
- The action of rolling out a cable.
- Contact with a non-grounded person.

The solution for product safety: 1) Connect the cables only with the AC power off. 2) Temporarily “short” the end of the cable before attaching it to any signal input or output.

**Caution 2:** *ESD considerations should be made prior to performing any internal adjustments on the equipment.* Any piece of electronic equipment is vulnerable to ESD when opened for adjustments. Internal adjustments should therefore be done **ONLY** at an ESD-safe work area. Many products have ESD protection, but the level of protection may be exceeded by extremely high voltage.

### WARNING SYMBOLS AND TERMS

The following symbols and terms may be found on the equipment described in this manual.



This symbol on the unit indicates that the user should refer to the operating instructions located in the 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 indicates safety, earth ground.

The **WARNING** heading used in this manual explains dangers that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **Caution** heading used in this manual explains hazards that could damage the instrument.

**1.2 Introduction**

Model 482A21 is a single-channel, line-operated signal conditioner for ICP<sup>®</sup> transducer systems. This unit provides constant current excitation to the built-in transducer amplifier and decouples the signal from the DC bias voltage.

The unit also contains provision for fault monitoring the channel, as well as provision for externally varying the constant current output over a 2 to 20 mA range. This model is factory set at 4 mA.

**2.0 Description**

Model 482A21 is powered externally by universal power supply model 488B04. The rear panel contains a BNC jack for transducer signal INPUT and a BNC jack for signal OUTPUT connections.

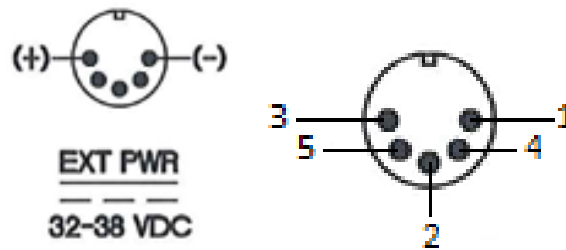
The AC signal information is decoupled from the sensor bias by a coupling capacitor and brought out to the OUTPUT jack.

The bias monitor located on the front panel consists of a color-coded panel meter that permanently monitors the sensor bias level. See sensor specification for correct sensor bias level.

**3.0 Installation**

See the included outline drawing for dimensions, as well as jack and control locations. Plug the five-pin DIN output connector on 488B04 into the DC INPUT located on the rear panel of 482A21.

Plug the three-wire line cord of the 488B04 into a source of 85 to 264 VAC, 47 to 440 Hz power and switch the power on for 482A21.



Pins 3 and 5 are (+)  
 Pins 1, 2 and 4 are (-)  
 Outside shell is earth/chassis ground

**Figure 1:** External Power Connector and Pin Numbers

Note: For battery operation use model 488B07 in place of model 488B04.

With no transducer connected to the INPUT connector, the front panel bias indicator meter indicates full scale (yellow), which corresponds to open circuit power supply voltage. See Figure 2.

Meter Reading	Yellow	Green	Red
Condition	Open	Ok	Short

**Figure 2:** Fault Monitor Table

When an ICP<sup>®</sup> transducer (or in-line amplifier) is connected to the INPUT jack, the front monitor meter indicates approximately midscale (green) if the transducer or amplifier is functioning properly. It does not read midscale if the transducer bias is 3 to 5 volts.

If a cable is faulty (open), or the sensor's built-in amplifier is open, the meter indicates a yellow (full scale) reading. When a cable or transducer is shorted, the meter indicates zero volts (red).

Immediately after connecting a readout instrument (oscilloscope, meter, or recorder) to the OUTPUT jack, the coupling capacitor begins charging through the input resistance of the readout instrument. This charging causes an apparent "drifting" of the output signal until the capacitor is fully charged. The normal amount of leakage through the coupling capacitor usually results in a <20 mV maximum DC offset.

#### 4.0 Coupling Time Constant, AC Coupled

The coupling time constant (TC) is the product of the coupling capacitor (47  $\mu$ F) and the input resistance of the readout instrument, in parallel with the 274 kilohm shunt resistor. Typically, this is ten seconds, assuming the input resistance of the readout measurement is one megohm.

In most cases, it is desirable to keep the coupling TC long, with respect to the transducer discharge TC, to minimize the effect of the coupling TC on low frequency response.

#### 4.1 Driving Long Cables

When driving long cables, it may be necessary to increase the constant current drive to the transducers. 482A21 is normally supplied with the constant current output to the transducer set at 4 mA nominal. This is adequate for most laboratory and field applications. Special situations, such as driving long cables (beyond 100 ft) with high frequency or fast rise time pulses, may require increasing the transducer drive current up to 20 mA.

When driving fast rise time pulses over long lines, system performance may be optimized by "tuning" the drive current to the line; i.e., by finding the best current setting for the particular set of physical parameters established by the transducer, line length, line termination, pulse rise time, etc.

The optimum current setting is best determined by experimentation with your particular test setup. A good rule of thumb is to use the lowest current consistent with satisfactory results to minimize transducer self-heating and noise.

Another technique requires the use of impedance matching resistor model 073A connected immediately after the transducer. This variable resistor is then used to "tune" the current to the line.

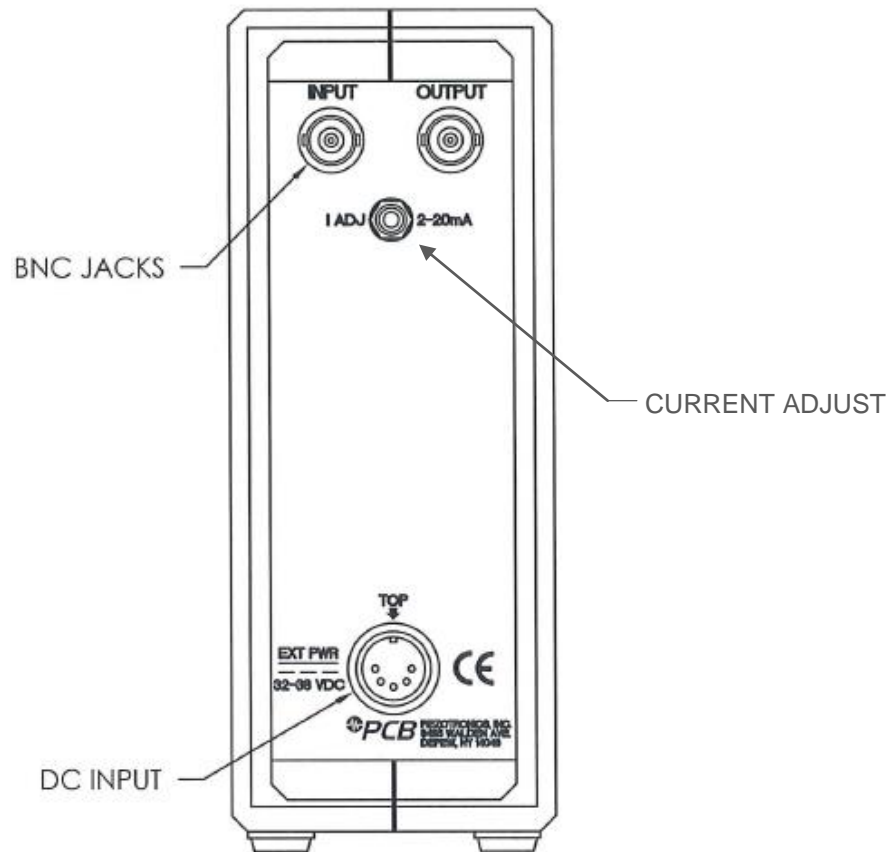
One of the best approaches is to test the long line with a signal generator set at a frequency of interest.

#### 4.2 Setting the Constant Current

To set the constant current, locate the current adjust potentiometer on the rear panel. Connect a 0 to 30 mA DC ammeter (or multimeter) to the INPUT jack (as shown in Figure 3). The constant current value is read directly on the ammeter. Using a small regular screwdriver, vary the setting of the current adjust pot to set the current at a new level.

**CAUTION:** It may be possible to exceed 20 mA slightly. Do not do so; to operate an ICP<sup>®</sup> transducer or amplifier above 20 mA may damage the equipment.





**Figure 3:** Constant Current Adjust

## 5.0 Maintenance and Repair

Because of the sophisticated nature of PCB instrumentation, field repair of the equipment is not recommended. Most PCB signal conditioners are of modular construction and are factory repairable. A repair or replacement quotation is available at no charge. Before returning equipment for repair, it is advisable that the user confers with a factory application engineer (or international representative) concerning the difficulty to ascertain if an on-site procedure rectifies the problem.

If repair is indicated, contact PCB to request a Return Materials Authorization (RMA) number from the factory. An advanced authorization to proceed with the repair, permitting charges of up to 50% of a new item, greatly expedites repair.

For the most efficient service, please provide a detailed, written description of the malfunction encountered with the equipment you are returning, together with your specific application and setup procedures. International customers should return PCB equipment to their representative. For exceptions, please contact the International Sales department at PCB to request shipping instructions and an RMA.



## 482A21 and 482A22 Troubleshooting Guide



<b>Problem</b>	<b>Test/Solution</b>
Unit does not appear to be powered up/ No meter movement.	<ul style="list-style-type: none"> <li>- Power switch in the on position.</li> <li>- Test 'sensor' excitation current. Measure the current on the 'sensor' input BNC from the center conductor to the shell. Adjust 'Iadj' (rear panel) with screwdriver turning both clockwise and counterclockwise. Reference section 'Setting the Constant Current.'</li> <li>- Make sure the bias monitor channel select matches the channel of interest.</li> </ul>
Output signal seems to drift.	<ul style="list-style-type: none"> <li>- Make sure the input impedance of the readout device, scope or data acquisition system is approximately 1 M<math>\Omega</math>.</li> </ul>
Low frequency response not meeting specification or amplitude is attenuated.	<ul style="list-style-type: none"> <li>- The input impedance of the readout device may be too low. May need to use a buffered signal conditioner, for example 482C16.</li> </ul>
Meter does not seem to show sensor bias voltage.	<ul style="list-style-type: none"> <li>- Match the channel select with channel of interest.</li> <li>- Measure the sensor bias while the sensor is attached to the unit. This requires a 'T' connector to allow both the sensor and the measuring device to be attached. If problem persists, return for repair.</li> </ul>

MANUAL NUMBER: 19179

MANUAL REVISION:

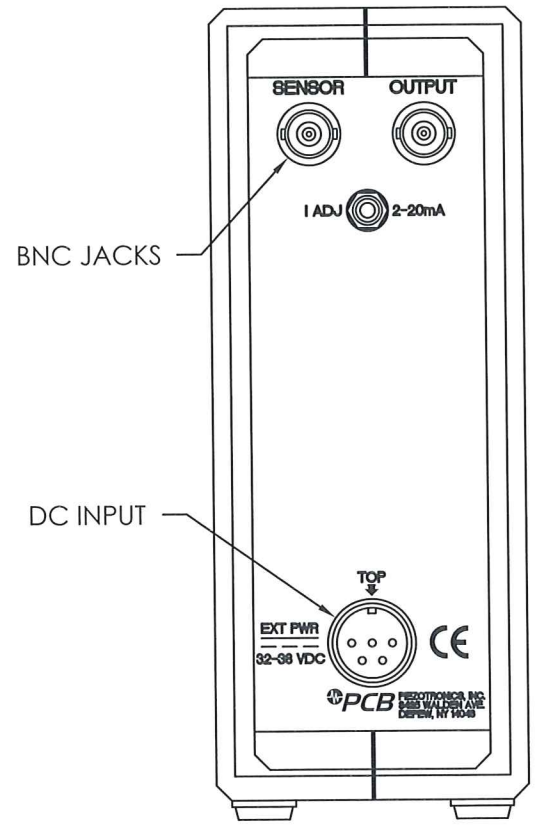
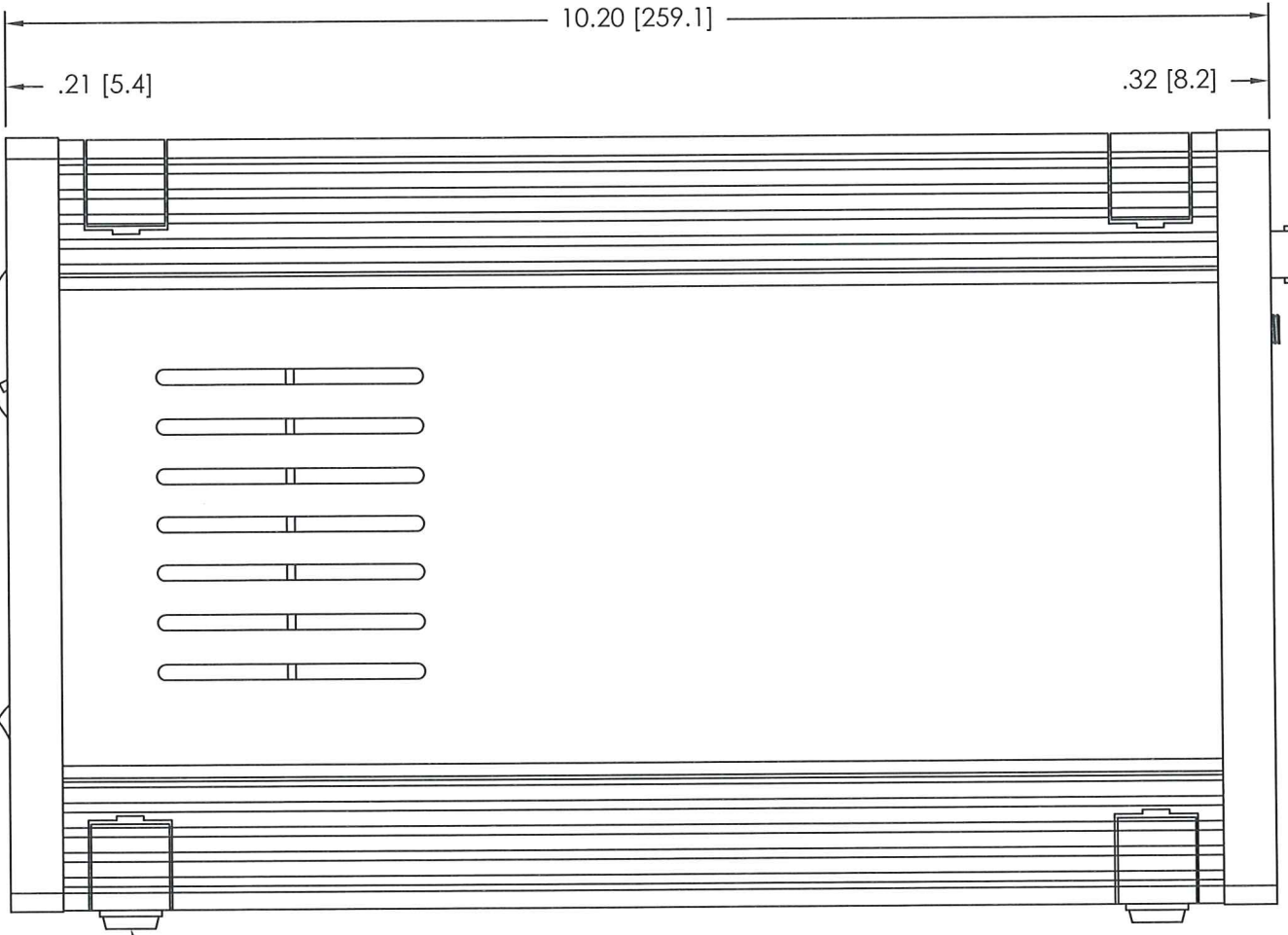
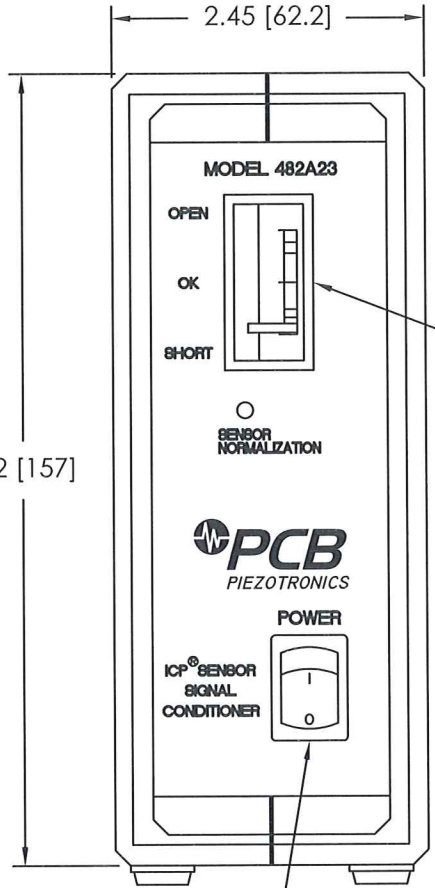
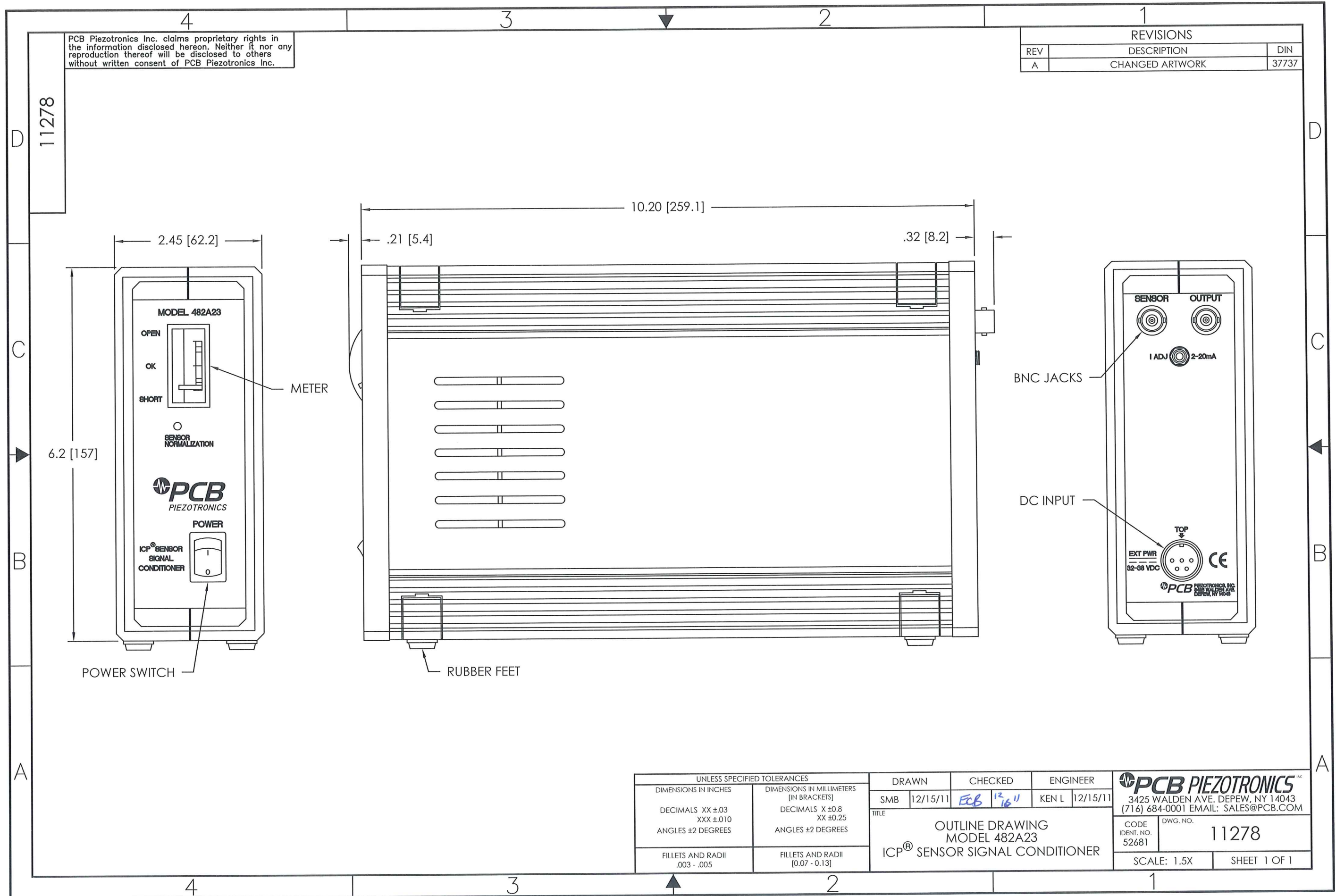
ECO NUMBER:

Model Number <b>488B04</b>	<b>POWER SUPPLY</b>				Revision: A ECN #: 32528
<b>Environmental</b>	<b>ENGLISH</b>	<b>SI</b>	<b>OPTIONAL VERSIONS</b>		
Temperature Range(Operating)	32 to 104 °F	0 to 40 °C	Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.		
Humidity Range(Non-Condensing)	0 to 95 %	0 to 95 %	<b>488B04/NC</b> - Does not include a 017AXX Power Cord		
<b>Electrical</b>			<b>NOTES:</b>		
Output Voltage	32 - 38 VDC	32 - 38 VDC	[1] See PCB Declaration of Conformance PS024 for details.		
Output Current	0.54 amps	0.54 amps	<b>SUPPLIED ACCESSORIES:</b>		
AC Power(50 to 60 Hz)	100 to 240 VAC	100 to 240 VAC	Model 017AXX Power Cord (1)		
(50 to 60 Hz)	0.6 amps	0.6 amps	Entered: <i>JH</i> Engineer: <i>PH</i> Sales: <i>gjm</i> Approved: <i>EB</i> Spec Number:		
AC Ripple(Peak to Peak)	<350 mV	<350 mV	Date: <i>3-15-10</i> Date: <i>3-3-10</i> Date: <i>2-26-10</i> Date: <i>3-9-10</i> <b>45177</b>		
<b>Physical</b>			 <b>PCB PIEZOTRONICS</b> <b>ELECTRONICS DIVISION</b> Phone: 716-684-0001 Fax: 716-684-0987 E-Mail: electronics@pcb.com 3425 Walden Avenue, Depew, NY 14043		
Electrical Connector(AC Power Input)	IEC 320	IEC 320			
(Output DC)	DIN 5 Pin (Male)	DIN 5 Pin (Male)			
Size (Height x Width x Depth)	1.3 in x 2.13 in x 3.76 in	33 mm x 54.1 mm x 95.5 mm			
Weight	1.25 lb	0.57 kg			
 [1]					
<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.</i>					
ICP® is a registered trademark of PCB Group, Inc.					

Model Number <b>482A23</b>	<b>SIGNAL CONDITIONER, LINE (OR DC) POWERED</b>			Revision: E ECN #: 43617										
<b>Performance</b> Channels Voltage Gain(± 1 %) Low Frequency Response(-5 %) High Frequency Response(-5 %) Fault/Bias Monitor/Meter	<u>ENGLISH</u> 1 0.9 to 1.1 <0.1 Hz >1000 kHz 26 V FS	<u>SI</u> 1 0.9 to 1.1 <0.1 Hz >1000 kHz 26 V FS	     	<p align="center"><b>OPTIONAL VERSIONS</b></p> <p>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>										
<b>Environmental</b> Temperature Range	32 to 120 °F	0 to 50 °C		<p><b>NOTES:</b></p> <p>[1] Provided by supplied external DC power supply.  [2] User adjustable, factory set at 4 mA (± 0.5 mA). One control adjusts all channels.  [3] With ≥ 1M ohm input impedance of readout device.  [4] Un-buffered output, read out device input impedance affects discharge time constant and low frequency response of unit.  [5] Typical.  [6] Factory set at 1:1, except when part of a calibration system, the gain is set with specific sensor to normalize system sensitivity.  [7] See PCB Declaration of Conformance PS024 for details.</p>										
<b>Electrical</b> Power Required(Standard) Excitation Voltage(To Sensor) DC Offset(Maximum) DC Power DC Power Constant Current Excitation(To Sensor) Discharge Time Constant(0 to +50%) Broadband Electrical Noise(1 to 10,000 Hz) Spectral Noise(1 Hz) Spectral Noise(10 Hz) Spectral Noise(100 Hz) Spectral Noise(1 kHz) Spectral Noise(10 kHz)	DC power 25 to 27 VDC <20 mV +32 to 38 VDC 0.12 Amps 2 to 20 mA 10 sec 17.8 µV 3.7 µV/√Hz 0.10 µV/√Hz 0.05 µV/√Hz 0.08 µV/√Hz 0.03 µV/√Hz	DC power 25 to 27 VDC <20 mV +32 to 38 VDC 0.12 Amps 2 to 20 mA 10 sec -95 dB -109 dB -137 dB -146 dB -142 dB -150 dB	           	<p><b>SUPPLIED ACCESSORIES:</b></p> <p>Model 017AXX Power Cord  Model 488B04/NC Power Converter</p>										
<b>Physical</b> Electrical Connector(Input, sensor) Electrical Connector(Output) Electrical Connector(DC Power Input) Size (Height x Width x Length) Weight	BNC Jack BNC Jack DIN Jack 6.3 in x 2.4 in x 11 in 1.51 lb	BNC Jack BNC Jack DIN Jack 16 cm x 6.1 cm x 28 cm 685 gm		<table border="1"> <tr> <td>Entered: AP</td> <td>Engineer: CPH</td> <td>Sales: ML</td> <td>Approved: JWH</td> <td>Spec Number:</td> </tr> <tr> <td>Date: 1/28/2015</td> <td>Date: 1/28/2015</td> <td>Date: 1/28/2015</td> <td>Date: 1/28/2015</td> <td><b>11146</b></td> </tr> </table>	Entered: AP	Engineer: CPH	Sales: ML	Approved: JWH	Spec Number:	Date: 1/28/2015	Date: 1/28/2015	Date: 1/28/2015	Date: 1/28/2015	<b>11146</b>
Entered: AP	Engineer: CPH	Sales: ML	Approved: JWH	Spec Number:										
Date: 1/28/2015	Date: 1/28/2015	Date: 1/28/2015	Date: 1/28/2015	<b>11146</b>										
 <p><small>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.</small></p>	 <p><b>Phone: 716-684-0001</b>  <b>Fax: 716-684-0987</b>  <b>E-Mail: info@pcb.com</b></p> <p>3425 Walden Avenue, Depew, NY 14043</p>													

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REVISIONS		
REV	DESCRIPTION	DIN
A	CHANGED ARTWORK	37737



UNLESS SPECIFIED TOLERANCES		DRAWN	CHECKED	ENGINEER	 3425 WALDEN AVE. DEPEW, NY 14043 (716) 684-0001 EMAIL: SALES@PCB.COM		
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	SMB	12/15/11	ECB 12/16"		KEN L	12/15/11
DECIMALS XX ±.03 XXX ±.010	DECIMALS X ±0.8 XX ±0.25	TITLE				CODE IDENT. NO.	DWG. NO.
ANGLES ±2 DEGREES	ANGLES ±2 DEGREES	OUTLINE DRAWING MODEL 482A23 ICP® SENSOR SIGNAL CONDITIONER				52681	11278
FILLETS AND RADII .003 - .005	FILLETS AND RADII [0.07 - 0.13]					SCALE: 1.5X	SHEET 1 OF 1