



**Model 478B05**  
**3 Channel DC Sensor Signal Conditioner**  
**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)**



**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 traceability 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.

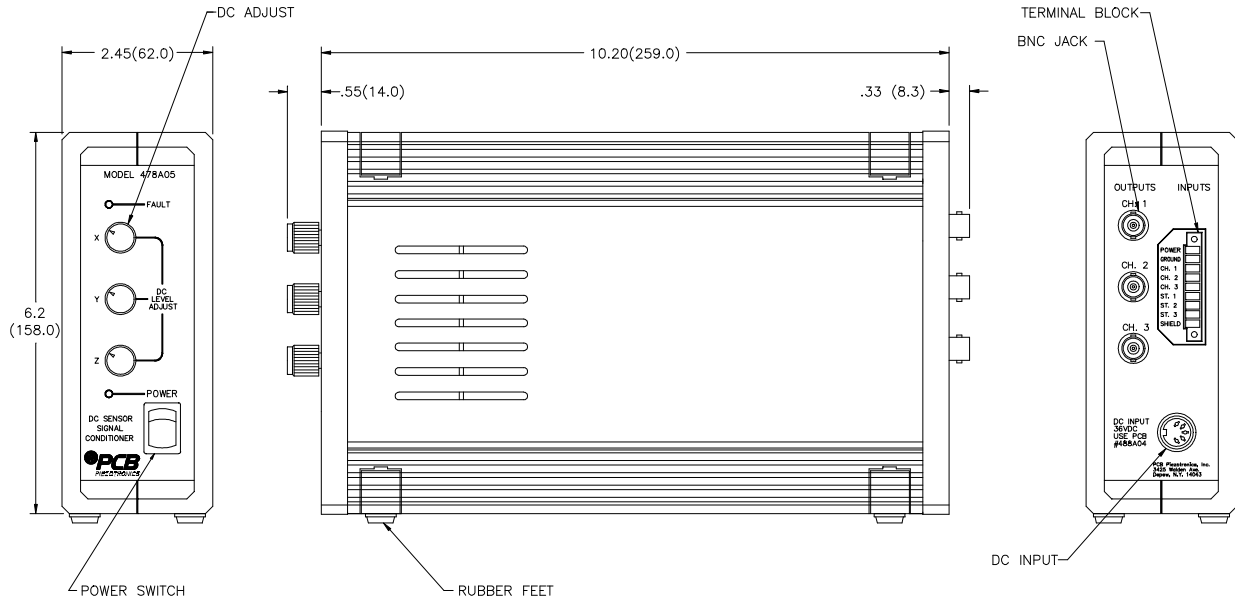
**Warranty** – All equipment and repair services provided by PCB Piezotronics, Inc. are covered by a limited warranty against defective material and workmanship for a period of one year from date of original purchase. Contact

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](http://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](http://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:

PCB Piezotronics, Inc.  
3425 Walden Ave.  
Depew, NY 14043 USA  
Toll-free: (800) 828-8840  
24-hour SensorLine<sup>SM</sup>: (716) 684-0001  
Website: [www.pcb.com](http://www.pcb.com)  
E-mail: [info@pcb.com](mailto:info@pcb.com)

**The Model 478A05 Capacitive Accelerometer Power Supply**



**Operating Guide with Enclosed Warranty Information**

3425 Walden Avenue, Depew, New York 14043-2495

DCS Toll Free 888-684-0014

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E-mail [dc@PCB.com](mailto:dc@PCB.com)

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### ***introduction***

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Congratulations on the purchase of a quality PCB Signal Conditioner. In order to ensure the highest level of performance for this product, please familiarize yourself with the safety and operation procedures before attempting to operate this device. If you have any additional questions concerning this unit or its application, feel free to call a factory application engineer at (716) 684-0001. A product specification sheet is included in this manual.

### ***description***

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The Model 478A05 is a three channel, signal conditioner and power supply for PCB Series 370 Capacitive Sensors. It is primarily intended for the 3703 Series Triaxial Accelerometer, but will function for three single axis 3701 Series sensors as well. The unit is powered by an external 36V DC supply. It comes standard with the PCB Model 488A04 Power Supply, but will also work with the PCB Model 488B07 Battery Pack. (See Figure 1.)

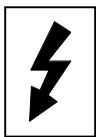
### ***warning symbols & terms***

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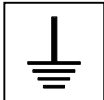
The following symbols and terms may be found on the equipment described in this manual.



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



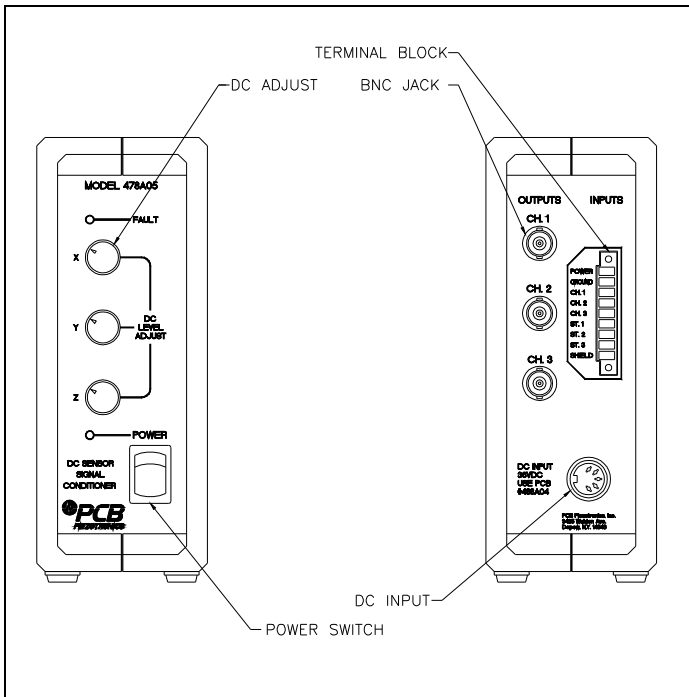
***This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.***



***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.

figure 1 - model 478A05 capacitive accelerometer power supply



**operation**

To turn on the Model 478A05, connect the 488A04 Power Supply to the DIN connector on the back of the unit and press the black switch on the front panel to the 1 position. A green power indicator light will illuminate. A red fault light is provided on the front panel to indicate a problem with the power supply to the sensor. The light illuminates whenever the sensor supply voltage drops below 15.5V DC. Such an occurrence could be the result of the sensor being connected improperly, low batteries, in the case when the unit is used with the 488B07, or the unlikely event of a sensor malfunction.

The capacitive sensor is connected to the input connector via one PCB Model 037Pxx Cable or three PCB Model 010Pxx Cables (pigtail terminations). The input connector features a two piece terminal strip connector for ease of switching in and out sensors without having to make each individual connection each time. Output is routed to the readout device from the three BNC connectors through a PCB Model 012 Output Cable.

*operation continued . . .*

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Input connection to the unit is made as follows:

For the 3703 Triaxial Accelerometer and 037Pxx Cable, with a typical configuration of the X, Y, and Z axis corresponding to Ch. 1, Ch.2 and Ch. 3 respectively:

<b><u>478A05 Input</u></b>	<b>→</b>	<b><u>037Pxx Cable</u></b>
<i>Power.....</i>		<i>Red – Power</i>
<i>Ground.....</i>		<i>Black – Ground</i>
<i>CH 1.....</i>		<i>Orange – X Signal</i>
<i>CH 2.....</i>		<i>Green – Y Signal</i>
<i>CH 3.....</i>		<i>White – Z Signal</i>
<i>ST 1.....</i>		<i>Blue – X Self Test</i>
<i>ST 2.....</i>		<i>Yellow – Y Self Test</i>
<i>ST 3.....</i>		<i>Gray – Z Self Test</i>
<i>Shield.....</i>		<i>Cable Shield</i>

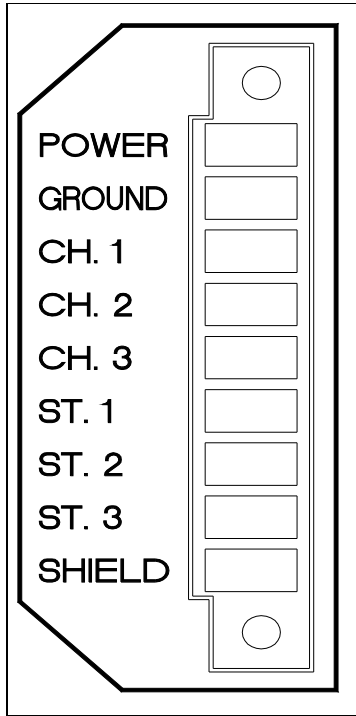
For the 3701 Single-Axis Accelerometer and 010Pxx Cable:

<b><u>478A05 Input</u></b>	<b>→</b>	<b><u>010Pxx Cable</u></b>
<i>Power.....</i>		<i>Red – Power</i>
<i>Ground.....</i>		<i>Black – Ground</i>
<i>CH 1.....</i>		<i>Yellow – Signal</i>
<i>ST 1.....</i>		<i>White – Self Test</i>

*Note: Multiple single-axis accelerometers share the same Power connection on the Signal Conditioner.*



figure 2 - model 478A05 sensor input terminal strip



**operation continued . . .**

All Self Test connections are internally connected to ground to avoid offset drift in the sensor. The SHIELD connection is internally capacitively coupled to signal ground. This is an optional connection used to correct possible noise issues.

The PCB Series 370 Capacitive Accelerometers can have up to 40 mV of DC offset at zero g's. The Model 478A05 is equipped with an offset adjust feature on each channel to zero the DC offset and/or the effect of gravity prior to making measurements. The full DC adjustment range is  $\pm 2.25$  volts over a span of ten turns on the adjustment control.

**warning 1 – ESD sensitivity**

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**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 – ESD sensitivity**

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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 – ESD sensitivity**

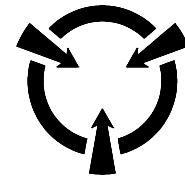
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**Cables can kill your equipment.** High voltage electrostatic discharge (ESD) can damage electrical devices. Similar to a capacitor, a cable can hold a charge caused by triboelectric transfer, such as that which occurs in the following:

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

**The PCB solution for product safety:**

- Connect the cables only with the AC power off.
- Temporarily “short” the end of the cable before attaching it to any signal input or output.



**CAUTION**  
ELECTROSTATIC  
DISCHARGE SENSITIVE

**caution 2 – ESD sensitivity**

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**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.

**warranty**

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PCB offers an unconditional guarantee for customer satisfaction. PCB strives to provide superior, unmatched customer service. Should you at any time find yourself dissatisfied with any PCB product for any reason, consult a PCB application engineer to discuss repair, refund, or exchange procedures. PCB instrumentation is warranted against defective material and workmanship for one year unless otherwise expressly specified. Damage to instruments caused by incorrect power or misapplication is not covered by warranty. If there are any questions regarding power, intended application, or general usage, please contact a PCB application engineer (or your local sales contact). Batteries and other expendable hardware items are not covered by warranty.

**maintenance & repair**

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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 strongly suggested that the user confer with a factory application engineer (or local sales contact) concerning the difficulty, to ascertain if an on-site procedure may rectify 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.

Please provide a detailed written description of the malfunction encountered with the returned item, together with your information and setup procedures. Customers outside the U. S. should consult their local PCB sales contact for information on returning equipment. For exceptions, please contact the International Sales department at PCB to request shipping instructions and an RMA. For assistance, please call (716) 684-0001, or fax us at (716) 684-0987. You may also receive assistance via e-mail at [sales@pcb.com](mailto:sales@pcb.com) or our web site at [www.pcb.com](http://www.pcb.com).



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*ICP® is a registered trademark of PCB Piezotronics, Incorporated,  
which uniquely identifies PCB sensors that incorporate built-in microelectronics.*

Model Number  
478B05

# 3 CHANNEL DC SENSOR SIGNAL CONDITIONER

Revision: C  
ECN #: 37737

Performance	ENGLISH	SI	
Channels	3	3	
Frequency Response(± 5 %) (± 5 %)	DC Hz ≥ 2 kHz	DC Hz ≥ 2 kHz	
Voltage Gain(± 1 %)	1:1	1:1	
<b>Electrical</b>			
Excitation Voltage(± 10 %)(To Sensor)	17.3 V	17.3 V	
DC Offset	± 2.25 mV	± 2.25 mV	
Spectral Noise(1 Hz)	0.47 μV/√Hz	-12 dB	[1]
(10 Hz)	0.12 μV/√Hz	-139 dB	[1]
(100 Hz)	0.075 μV/√Hz	-142 dB	[1]
(1 kHz)	0.075 μV/√Hz	-142 dB	[1]
(10 kHz)	0.075 μV/√Hz	-142 dB	[1]
Broadband Electrical Noise(1 to 10,000 Hz)(Gain x1)	5.0 μV	-106 dB	[1]
Power Required	DC power	DC power	
DC Power	+32 to 38 VDC	+32 to 38 VDC	[2]
Current Consumption	0.12 amps	0.12 amps	
<b>Physical</b>			
Electrical Connector(Input, sensor)	4-Pin Jack	4-Pin Jack	
(Output, scope)	BNC Jack	BNC Jack	
(DC Power Input)	DIN Jack	DIN Jack	
Size (Depth x Height x Width)	11 in x 6.3 in x 2.4 in	28 cm x 16 cm x 6.1 cm	
Weight(Including Batteries)	1.67 oz	756 gm	

**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] Typical.  
[2] Provided by supplied external DC power supply.  
[3] See PCB Declaration of Conformance PS024 for details.

**SUPPLIED ACCESSORIES:**  
Model 017AXX Power Cord  
Model 488B04/NC Power Converter

**OPTIONAL ACCESSORIES:**  
Model 488B07 External battery pack

Entered: <i>JH</i>	Engineer: <i>CPH</i>	Sales: <i>JJM</i>	Approved: <i>BAM</i>	Spec Number:
Date: <i>12-7-11</i>	Date: <i>11-23-11</i>	Date: <i>11-25-11</i>	Date: <i>12-7-11</i>	28813



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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**PCB PIEZOTRONICS™**  
ELECTRONICS DIVISION  
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Fax: 716-684-0987  
E-Mail: [electronics@pcb.com](mailto:electronics@pcb.com)

Model Number  
478B05

# 3 CHANNEL DC SENSOR SIGNAL CONDITIONER

Revision: C  
ECN #: 37737

Performance	ENGLISH	SI	
Channels	3	3	
Frequency Response(± 5 %) (± 5 %)	DC Hz ≥ 2 kHz	DC Hz ≥ 2 kHz	
Voltage Gain(± 1 %)	1:1	1:1	
<b>Electrical</b>			
Excitation Voltage(± 10 %)(To Sensor)	17.3 V	17.3 V	
DC Offset	± 2.25 mV	± 2.25 mV	
Spectral Noise(1 Hz)	0.47 μV/√Hz	-12 dB	[1]
(10 Hz)	0.12 μV/√Hz	-139 dB	[1]
(100 Hz)	0.075 μV/√Hz	-142 dB	[1]
(1 kHz)	0.075 μV/√Hz	-142 dB	[1]
(10 kHz)	0.075 μV/√Hz	-142 dB	[1]
Broadband Electrical Noise(1 to 10,000 Hz)(Gain x1)	5.0 μV	-106 dB	[1]
Power Required	DC power	DC power	
DC Power	+32 to 38 VDC	+32 to 38 VDC	[2]
Current Consumption	0.12 amps	0.12 amps	
<b>Physical</b>			
Electrical Connector(Input, sensor)	4-Pin Jack	4-Pin Jack	
(Output, scope)	BNC Jack	BNC Jack	
(DC Power Input)	DIN Jack	DIN Jack	
Size (Depth x Height x Width)	11 in x 6.3 in x 2.4 in	28 cm x 16 cm x 6.1 cm	
Weight(Including Batteries)	1.67 oz	756 gm	

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**SUPPLIED ACCESSORIES:**  
Model 017AXX Power Cord  
Model 488B04/NC Power Converter

**OPTIONAL ACCESSORIES:**  
Model 488B07 External battery pack

Entered: <i>JH</i>	Engineer: <i>CPH</i>	Sales: <i>JJM</i>	Approved: <i>BAM</i>	Spec Number:
Date: <i>12-7-11</i>	Date: <i>11-23-11</i>	Date: <i>11-25-11</i>	Date: <i>12-7-11</i>	28813



[3]

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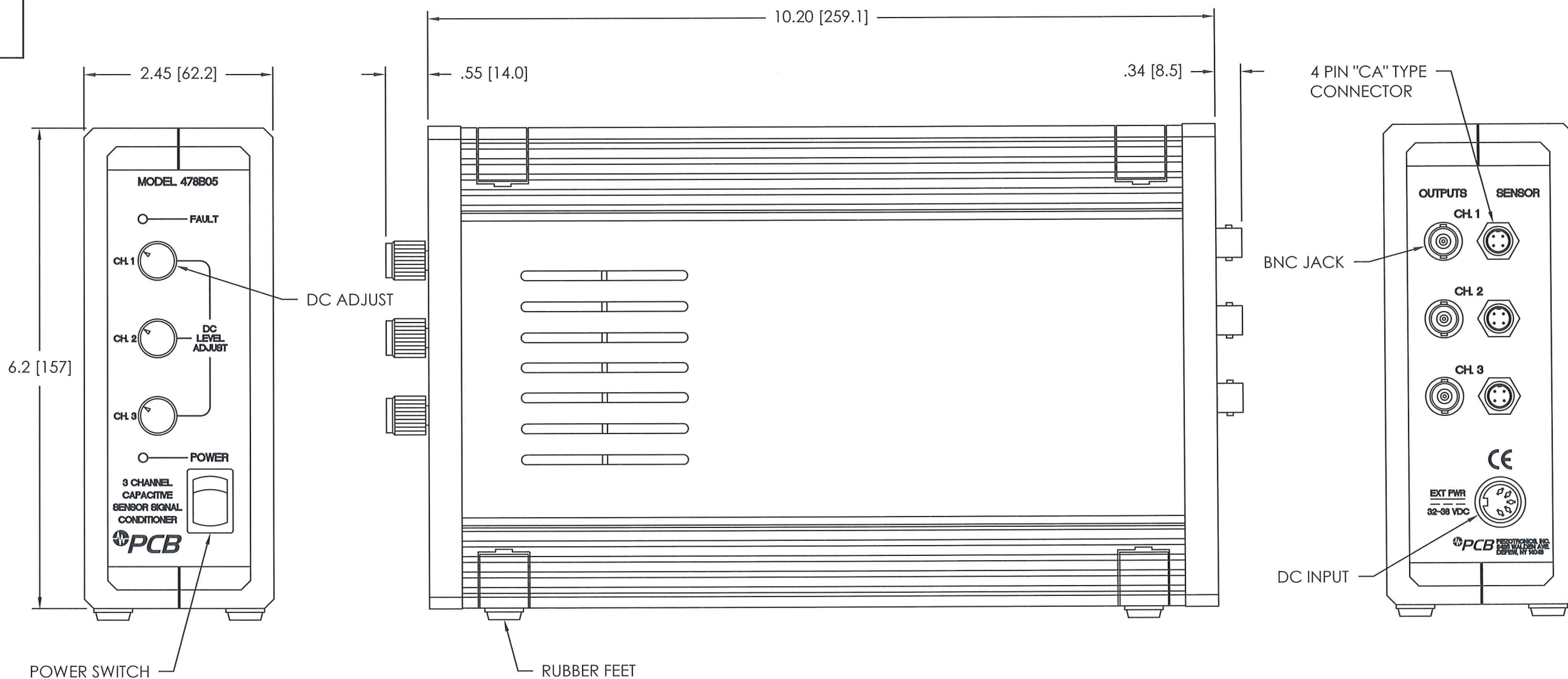
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E-Mail: electronics@pcb.com

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REVISIONS		
REV	DESCRIPTION	DIN
B	CHANGED ARTWORK	37737

28812



UNLESS SPECIFIED TOLERANCES		DRAWN	CHECKED	ENGINEER	 <b>PCB PIEZOTRONICS</b> <sup>INC.</sup> 3425 WALDEN AVE. DEPEW, NY 14043 (716) 684-0001 EMAIL: SALES@PCB.COM
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	SMB	12/16/11	KEN L	
DECIMALS XX ±.03 XXX ±.010	DECIMALS X ±0.8 XX ±0.25	TITLE			CODE IDENT. NO.
ANGLES ±2 DEGREES	ANGLES ±2 DEGREES	OUTLINE DRAWING MODEL 478B05 DC SENSOR SIGNAL CONDITIONER			52681
FILLET AND RADII .003 - .005	FILLET AND RADII [0.07 - 0.13]				DWG. NO. 28812
					SCALE: 1.5X
					SHEET 1 OF 1