



**Model 478A01**  
**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)**





<b>Warranty, Service, Repair, and Return Policies and Instructions</b>
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**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 SI through 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 **Warranty, Service, Repair, and Return Policies and Instructions** 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, NY14043 USA  
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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	○	○	○	○	○	○
PCB板	X	○	○	○	○	○
电气连接器	○	○	○	○	○	○
压电晶体	X	○	○	○	○	○
环氧	○	○	○	○	○	○
铁氟龙	○	○	○	○	○	○
电子	○	○	○	○	○	○
厚膜基板	○	○	X	○	○	○
电线	○	○	○	○	○	○
电缆	X	○	○	○	○	○
塑料	○	○	○	○	○	○
焊接	X	○	○	○	○	○
铜合金/黄铜	X	○	○	○	○	○
本表格依据 SJ/T 11364 的规定编制。						
○：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.

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DOCUMENT REVISION: C

ECN: 45605

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## 1.0 Introduction and Specifications

Congratulations on the purchase of a quality PCB Power Supply. 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 Specification Sheet is located in the rear of this manual.

### 1.1 Safety Considerations

**WARNING 1:** This product is intended for use by qualified personnel who recognizes 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 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 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.

## 2.0 Description

The Model 478A01 is a single-channel, battery operated power supply for PCB Series 370 Capacitive Sensors. The signal conditioner is powered by three nine-volt alkaline batteries, or a 27V DC power supply capable of supplying at least 1.5 watts. (See Figure 1.)

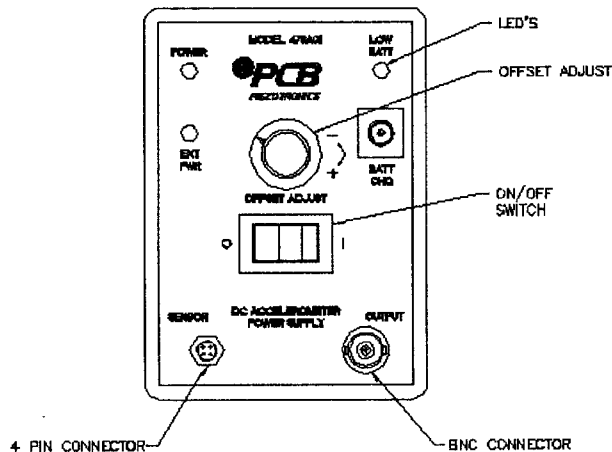
To turn on the Model 478A01, press the black switch on the front panel, and a green power indicator light illuminates. A LOW BATT indicator light turns red when battery power is low. (See Section 4.0 Changing the Batteries.)

## 3.0 Operation

The capacitive sensor is connected to the four-pin input connector via PCB Model 010 Cable. Output is routed to the readout device from the BNC connector through a PCB Model 012 Output Cable.

To compensate for the nominal DC offset and/or the offset due to the effect of gravity on the 3701 series sensor, the Model 478A01 is equipped with an offset adjust feature. Turn the offset adjust potentiometer on the power supply clockwise to adjust out a negative offset, and counterclockwise to adjust out a positive offset. In addition, to provide better resolution at the different sensor g ranges, the 478A01 has selectable offset ranges. To select the

offset range, open the unit as described in section 4.0. On the lower right hand corner of the circuit board there is a three-position switch to set the range. The upper position sets a range of  $\pm 1.2V$ . The unit is shipped in this default DC Adjustment range. The middle position sets a range of  $\pm 0.15V$ . The lower position sets a range of  $\pm 0.05V$ .



**Figure 1.** Model 478A01 Capacitive Accelerometer Power Supply

#### 4.0 Changing the Batteries

Remember to check the LOW BATT indicator frequently. If the power supply batteries drop below the necessary 15.5 volts, the accelerometer still operates but its sensitivity shifts. Should the batteries require changing, as indicated by the LOW BATT indicator light, proceed as follows:

1. Remove the single screw at the rear panel of the unit and remove the unit from its plastic case.
2. Unsnap the batteries from connectors and remove them.
3. Secure new nine-volt batteries in place.
4. Making sure that the insulator between the PC board and the batteries is in place, replace the rear cover and secure the cover with the screw.

With normal use, the life expectancy of the batteries is in excess of 26 hours. Turn the unit off when not in use

to conserve battery life. The unit does not have an automatic shutoff feature.

**NOTE:** The Model 478A01 Power Supply uses standard nine-volt alkaline batteries.

#### 5.0 Warranty

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.

#### 6.0 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 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).

MANUAL NUMBER: 19180  
MANUAL REVISION: NR

Model Number  
**478A01**

**BATTERY POWERED SIGNAL CONDITIONING FOR CAPACITIVE SENSOR**

Revision: F  
ECN #: 28806

Supply Voltage		+V	>16	[1]
Current Limited		mA	60 ±10%	[6]
		mA	14-20	[7]
Battery Life		hours	20	[2] [3]
Battery (3 supplied)		V	9	[2]
Power Requirements for External DC Supply:		V	27	
		W	1.5	
DC Offset Adjustment Range:		V	±1.2 ±5%	[4,6]
		V	±0.15	[4,6]
		V	±0.05	[4,6]
		V	±1.6 ±5%	[7]
Voltage Gain			1 : 1	
Frequency Response (±5% voltage gain)		Hz/kHz	DC/>2	
Spectral Noise:	100 mHz	μV/√Hz [dB]	18 [-95]	[5]
	1 Hz	μV/√Hz [dB]	1.4 [-117]	[5]
	10 Hz	μV/√Hz [dB]	0.2 [-134]	[5]
	100 Hz	μV/√Hz [dB]	0.1 [-140]	[5]
	1 kHz	μV/√Hz [dB]	0.1 [-140]	[5]
	10 kHz	μV/√Hz [dB]	0.1 [-140]	[5]
Broadband Noise (100 mHz - 10 kHz)		μV [dB]	8 [-102]	[5]
Connectors:	Input (transducer)	type	4-Pin Jack	
	Output (scope)	type	BNC Jack	
	External Power, Input	type	3.5 mm Jack	
	Charge Connector	type	#722 Switchcraft Jack	
Size: H x W x D		in	4.0 x 2.9 x 2.4	
		[mm]	[101,6 x 73,7 x 61,0]	
Weight (including batteries)		oz [gm]	11.0 [312]	

**NOTES:**

- [1] Low battery indication at 15.5V.
- [2] Alkaline batteries (typical or compatible).
- [3] Continuous operation.
- [4] Internally selectable.
- [5] Typical value.
- [6] Specifications pertain only to units after serial number 564.
- [7] Specifications pertain only to units prior to serial number ≤563.
- [8] See PCB Declaration of Conformance PS024 for details.

**SUPPLIED ACCESSORIES:**

None



[8]

*In the interest of constant product improvement, we reserve the right to change specifications without notice.*

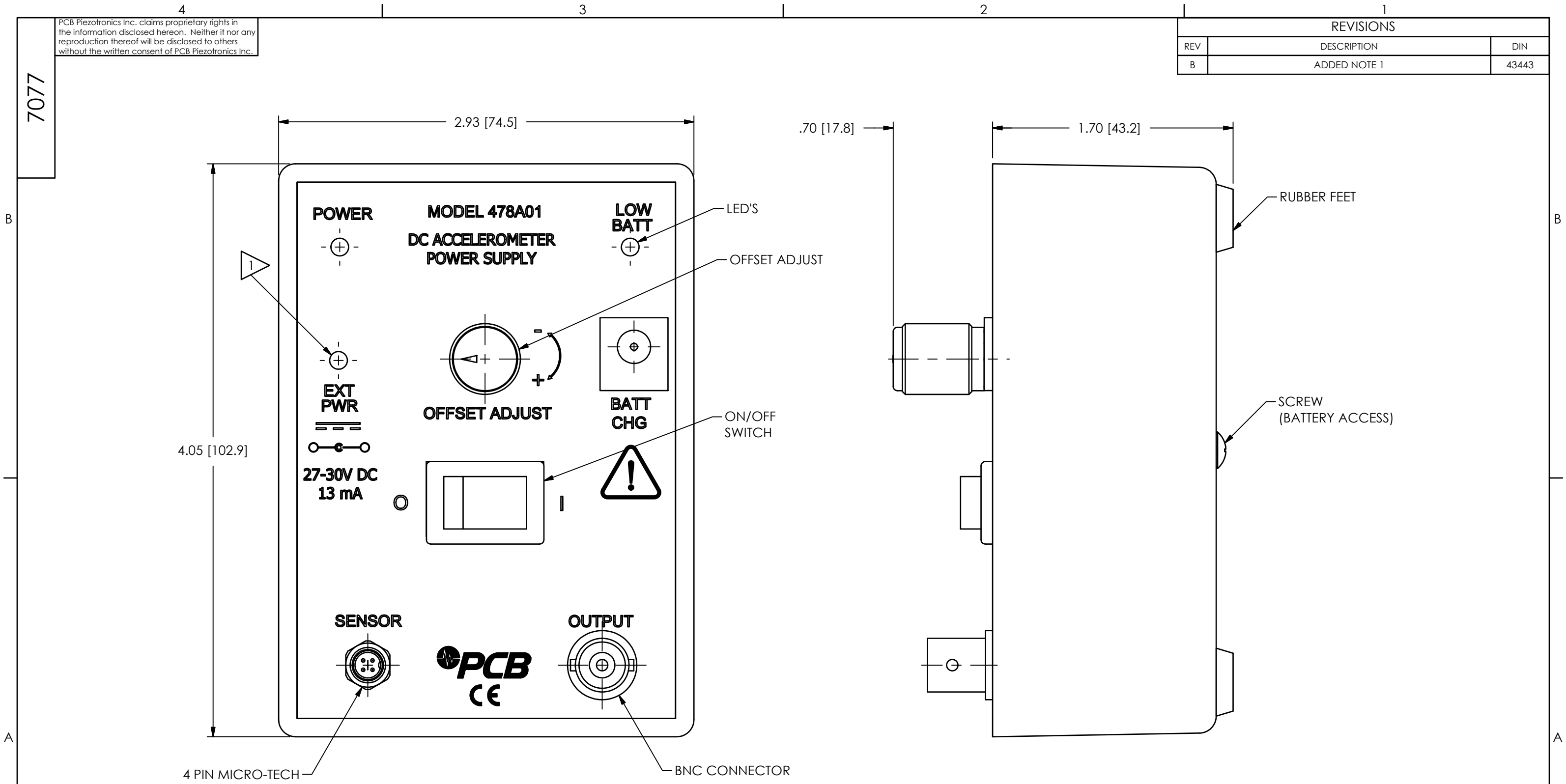
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Drawn	LH	05/16/08	Spec No. <b>7594</b>
Engineer	CPH	05/12/08J	
Sales	JJM	05/12/08	
Approved	APB	05/13/08	Sheet 1 of 1

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REVISIONS		
REV	DESCRIPTION	DIN
B	ADDED NOTE 1	43443



1 FOR USE WITH 488A03 AC POWER SUPPLY.

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER	
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [ IN BRACKETS ]	BB	3/6/15	ECB	3/6/15	CPH	3/6/15
DECIMALS XX ±.03 XXX ±.010	DECIMALS X ±0.8 XX ±0.25	TITLE OUTLINE DRAWING MODEL 478A01 DC ACCEL POWER SUPPLY					
ANGLES ± 2 DEGREES	ANGLES ± 2 DEGREES						
FILLETS AND RADII .003 - .005	FILLETS AND RADII 0.07 - 0.13	CODE IDENT. NO. 52681		DWG. NO. 7077		SCALE: 1.25X SHEET 1 OF 1	

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