



Model 482C05

Four-channel, ICP® 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
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Web: www.pcb.com**





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

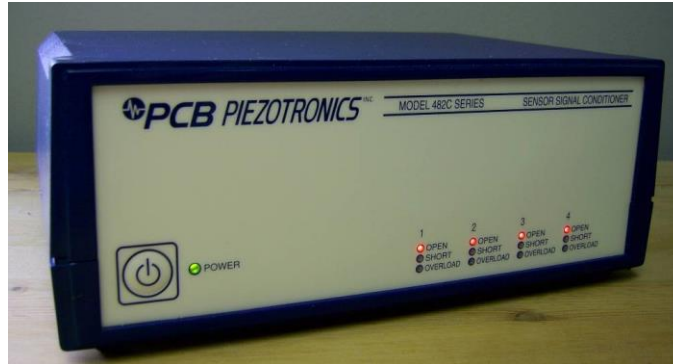
X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

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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ECN: 45605



SIGNAL CONDITIONER

Models 482C05 & 482C15

GENERAL OPERATION MANUAL

For powering ICP[®] sensors and in-line charge converters, this signal conditioner provides a cost effective method for powering small numbers of sensor channels.

The 482C Series is available with many different options from PCB. This manual describes the functions of the most economical signal conditioner with unity gain (482C05) and x1, x10, x100 jumper selectable gain (482C15), of that series.



MANUAL #: 38410
MANUAL REV: A
ECO: 43785

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1-1. Introduction

Model 482C05 is a basic ICP signal conditioner that provides an adjustable current source to drive ICP sensors. Additionally it has open, short and overload input fault condition indicators.

Model 482C15 is an ICP[®] signal conditioner that has all the features of the 482C05 plus jumper selectable (x1, x10, and x100) gain options and an overload range selection. An easy to open cover, allows access to the jumper selections.

The following sections describe these devices in more detail.

1-2. Safety Considerations

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 that the test fixture, Model 482C15, must be connected to earth ground via the power cord.

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.

WARNING 1: *The power supply/signal conditioner should not be opened by anyone other than qualified service personnel.* This product is intended for service 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 (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.
- Contact to 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 that is typically present in normal situations.

1-3. Equipment Rating

For complete specifications, please refer to the enclosed specification sheet. This equipment operates optimally at +32 to +120°F (0 to +50°C), in an environment having < 85% relative humidity. Its line power frequency range is 47 - 63 Hz.

The 482C05 and 482C15 devices require 32 - 38 VDC with approximately 200 mA to operate. In turn, they supply 26 VDC @ 2 - 20 mA excitation voltage to connected ICP® sensors or in-line charge converters. The units get power via PCB model 488B04 AC power adaptor (supplied with model), PCB model 488A11 car adapter or a 36 VDC battery pack. All of these plug into a 5-socket DIN female connector on the rear panel. External power pin out information is provided in section 1-8.3.

1-4. Model 482C15 System Description

Model 482C15 is a four channel signal conditioning unit designed to interface measurement signals to readout or recording devices.

The following are features that come standard on 482C15 units:

- Input fault and overload LED's with jumper selectable overload level of +/-5V or +/-10V
- Variable ICP® source current, 0 to 20 mA
- Jumper selectable Voltage input mode
- Jumper selectable gain of x1, x10, x100 (482C15 Only)
- Lighted power indicator on the front panel
- Rear panel BNC input/output connectors
- Optional low pass plug in filters (477A series type) various 2-pole frequencies available (consult factory)

1-4.1. Model 482C15 ICP® Input/Output Mode

Model 482C15 contains a regulated 26 VDC power supply that provides constant current for up to 4 individual channels. Both the output and input connections utilize BNC connectors and are brought out through the rear panel. The unit is AC coupled only. The 482C series offers optional DC Coupling. Consult factory

1-4.2. Adjusting the Current Source

The current adjustment is located on the rear of the unit. Use a standard small flat screwdriver to adjust the "I ADJ" potentiometer located on the rear panel between channel 2 and 3 inputs/outputs. Turning the adjustment slot clockwise will increase the current, while counterclockwise will decrease the current. Do this adjustment only while a DC mA meter or DMM set to mA is connected to any "ICP" BNC. One adjustment controls all channels. The unit is factory set to 4 mA and can be adjusted between 0 - 20 mA.



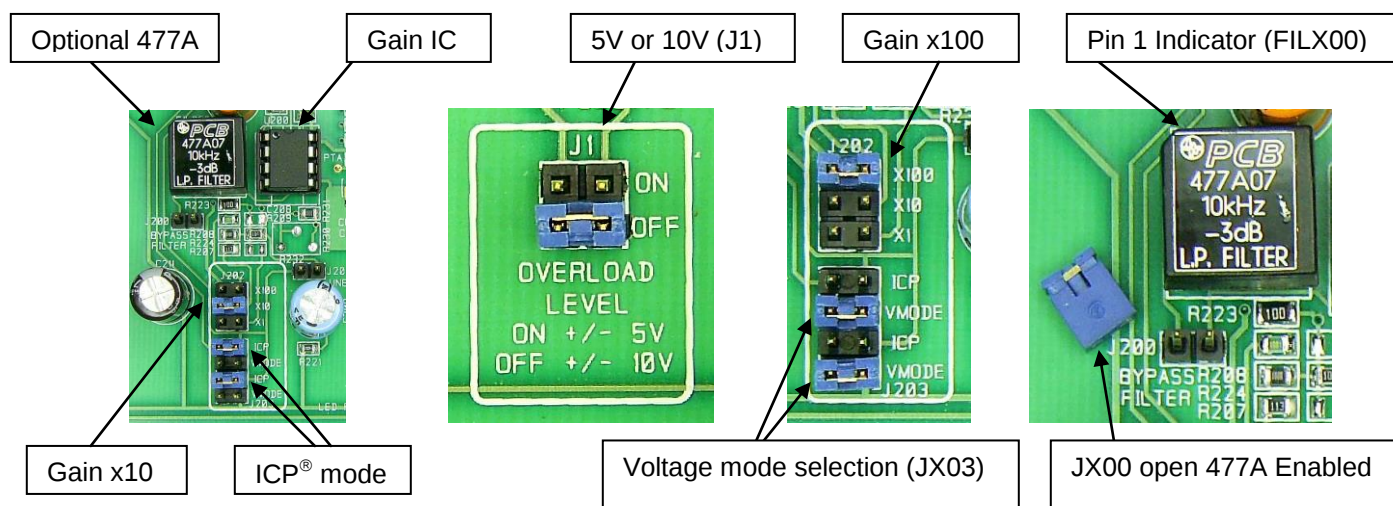
Current adjust

1-4.3. Fault Indications

The three red LED's on the front panel are all indicators of some type of problem. The normal operation state is when all fault lights are off. The "OPEN" light indicates that the bias voltage is over that of most sensors and is close to an open circuit voltage of 26 VDC. The photo on the cover is shown with the unit on, and no sensors attached, so the "OPEN" LED is on. The "SHORT" light indicates a very low bias voltage close to 0 VDC. The "OVERLOAD" light indicates a signal level of ± 10 V peak has been detected and the signal may be in danger of clipping. These fault lights are active for all channels at the same time.

1-4.4. Gain selection / Jumper definition

The 482C15 has internal jumpers that are accessed by opening the top cover. On each side of the unit are small slots, which can be accessed with a medium size flat screwdriver. Press the blade into the slot gently, and the locking device will be released, allowing the cover to be opened. The various jumpers are all labeled on the PC board. Each channel can be set to your selected gain and other options. The selection of all these features with jumpers allows the 482C15 to have the functionality of many other higher priced units at an economical cost. See the table that explains the function and number of each jumper. "X" represents channel number.



Gain 1 10 100.....	JX02...	1 jumper per channel
Overload 5V/10V.....	J1.....	Controls all channels
Voltage Mode.....	JX03.....	2 jumpers per channel
Bypass Filter.....	JX00.....	Remove to install filter module
477A Filter.....	FILX00...	Install filter here per channel

1-5. Model 482C05 System Description

Model 482C05 is a basic four channel signal conditioning unit designed to interface measurement signals to readout or recording devices.

The following are features that come standard on every 482C05:

- Unity gain
- Input fault and overload LED's
- Variable ICP® source current, 0 to 20 mA
- Lighted power indicator on the front panel
- Rear panel BNC input/output connectors

1-5.1. Model 482C05 ICP® Input/Output Mode

Model 482C05 contains a regulated 26 VDC power supply that provides constant current for up to 4 individual channels. Both the output and input connections utilize BNC connectors and are brought out through the rear panel. The unit is AC coupled only. The 482C series offers optional DC Coupling. Consult factory.

1-5.2. Adjusting the Current Source

The current adjustment is located on the rear of the unit. Use a standard small flat screwdriver to adjust the "I ADJ" potentiometer located on the rear panel between channel 2 and 3 inputs/outputs (see section 1-4.2 for photo of current adjust location). Turning the adjustment slot clockwise will increase the current, while counterclockwise will decrease the current. Do this adjustment only while a DC mA meter or DMM set to mA is connected to any "ICP" BNC. One adjustment controls all channels. The unit is factory set to 4 mA and can be adjusted between 0 - 20 mA.

1-5.3. Fault Indications

The three red LED's on the front panel are all indicators of some type of problem. The normal operation state is when all fault lights are off. The "OPEN" light indicates that the bias voltage is over that of most sensors and is close to an open circuit voltage of 26 VDC. The photo on the cover is shown with the unit on, and no sensors attached, so the "OPEN" LED is on. The "SHORT" light indicates a very low bias voltage close to 0 VDC. The "OVERLOAD" light indicates a signal level of +/- 10 V peak has been detected and the signal may be in danger of clipping. These fault lights are active for all channels at the same time.

1-6. Installation

Both 482C15 and 482C05 come packaged in a standard box and require very little in terms of installation. The box should be located in such a way as to allow convenient access to the power outlet for disconnect purposes. Since these units have low power consumption, they can be located in confined environments.

1-7. Grounding Techniques

Integrating either of these models into an application that links the outputs to other test equipment powered by line voltages may lead to errors or loss of signal-to-noise ratio due to ground loops. The evidence of ground loops is easily seen whenever the fundamental frequency (50 or 60 Hz) or a multiple of the fundamental frequency is present in the system when the sensors are "at rest." In order to maintain the operating specification of noise and reduce the effects of line interference, proper grounding techniques should be used. The following procedure may be helpful:

1. Make sure the signal ground lines of all equipment are tied together. The signal grounds of the channels are typically tied together via the case of the input and output BNC connectors. The individual channels of the Model 482C15 and 482C05 have their signal ground line tied together internally at the power supply.
2. Insure that the sensor does not pick up line noise from the body under test. The case of the sensor should be isolated from the body under (ground) using an isolation pad. The isolation pad breaks the loop formed by the signal path of the sensor to the unit and the return (ground) from the unit back to the sensor.
3. Make sure that all equipment signal grounds of the test system are tied to the Earth ground at a single point and the connections linking the equipment ground are made using a wire that can provide a very low impedance connection.

1-8. Unit Power

1-8.1. Power: Standard AC Line adapter Model 488B04 (supplied with unit)

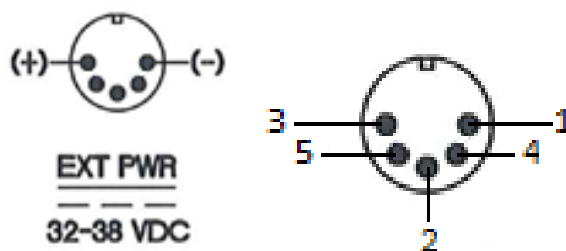
Plug the adapter into any 100 - 240 VAC 47 - 63 Hz power source, attach the supplied ferrite clamp on the AC cord to ensure CE conformance, and press the "ON/OFF" button.

1-8.2. Power: Optional auto adapter Model 488A11

Plug the adapter into a 12 VDC power source, or automobile cigar lighter socket and press the "ON/OFF" button.

1-8.3. Power: Using other 36 VDC power sources, or batteries (not supplied with unit)

When using any 36 VDC power source for power, make sure to observe the correct pin out, as indicated on the rear panel of the unit. Both models use a standard 5-socket DIN female connector. Pin information is provided below.



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

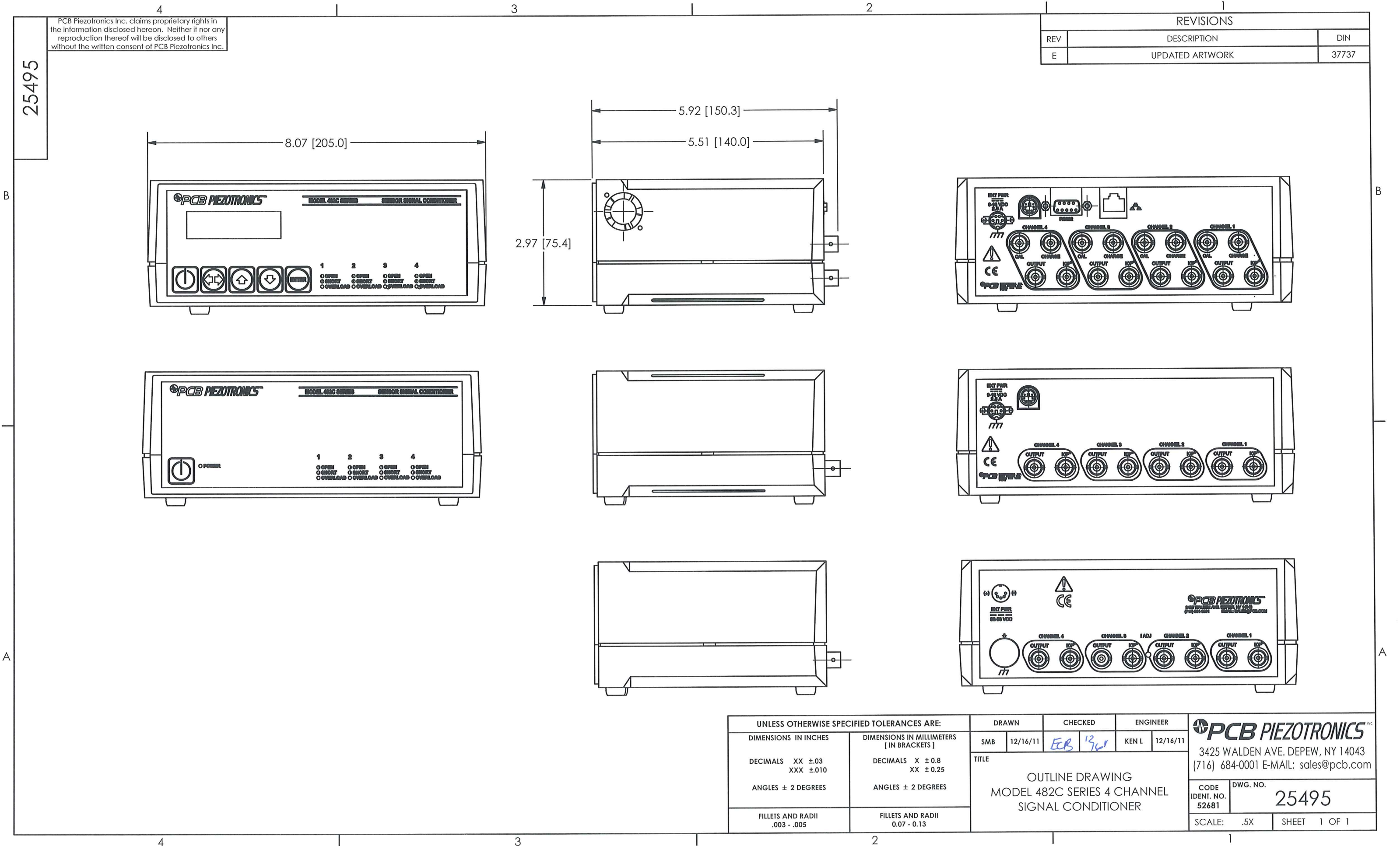
CAUTION 3: Refer to the rear panel for proper input voltage. Only PCB supplied power sources will ensure noise specifications and CE ratings.

1-9. Maintenance and Repair

It is not recommended that the customer attempt repairs on 482C15 or 482C05. Should trouble occur, contact the factory for assistance.

Manual Number: 38410
Manual Revision:
ECO Number:

Model Number 482C05	FOUR-CHANNEL, ICP® SENSOR SIGNAL CONDITIONER			Revision: J ECN #: 43617
Performance	ENGLISH	SI	OPTIONAL VERSIONS	
Channels	4	4	Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.	
Sensor Input Type(s)	ICP®	ICP®		
Output Range(Maximum)	± 10 V	± 10 V		
Low Frequency Response(-5 %)	<0.1 Hz	<0.1 Hz		
High Frequency Response(-5 %)	>1000 kHz	>1000 kHz		
Phase Response(at 1 kHz)	± 1 °	± 1 °	[2][3]	
Cross Talk(maximum)	-72 dB	-72 dB		
Fault/Bias Monitor/Meter(LED)	Open/Short/Overload	Open/Short/Overload		
Environmental				
Temperature Range(Operating)	+32 to +120 °F	0 to +50 °C		
Electrical				
Power Required(for supplied AC power adaptor)	AC Power	AC Power	NOTES: [1]User adjustable, factory set at 4 mA (± 0.5 mA). One control adjusts all channels. [2]With ≥ 1M ohm input impedance of readout device. [3]Un-buffered output, read out device input impedance affects discharge time constant and low frequency response of unit. [4]Typical. [5]See PCB Declaration of Conformance PS024 for details.	
Power Required(direct input to unit)	DC power	DC power		
AC Power(47 to 63 Hz)	100 to 240 VAC	100 to 240 VAC		
AC Power	≤ 0.7 Amps	≤ 0.7 Amps		
Excitation Voltage(± 1 VDC)(To Sensor)	+26 VDC	+26 VDC		
DC Offset	<20 mV	<20 mV		
DC Power	+32 to 38 VDC	+32 to 38 VDC		
DC Power	<0.25 Amps	<0.25 Amps		
Constant Current Excitation(To Sensor)	2 to 20 mA	2 to 20 mA		
Overload Threshold(± 1.0 Vpk)	± 10 Vpk	± 10 Vpk		
Discharge Time Constant(0 to 50 %)	>5 sec	>5 sec	[2][3]	
Broadband Electrical Noise(1 to 10,000 Hz)	3.5 µV rms	3.5 µV rms		
Spectral Noise(1 Hz)	1.30 µV/√Hz	1.30 µV/√Hz	[4]	
Spectral Noise(10 Hz)	0.10 µV/√Hz	0.10 µV/√Hz	[4]	
Spectral Noise(100 Hz)	0.08 µV/√Hz	0.08 µV/√Hz	[4]	
Spectral Noise(1 kHz)	0.07 µV/√Hz	0.07 µV/√Hz	[4]	
Spectral Noise(10 kHz)	0.07 µV/√Hz	0.07 µV/√Hz	[4]	
Physical				
Electrical Connector(ICP® Sensor Input)	BNC Jack	BNC Jack	SUPPLIED ACCESSORIES: Model 017AXX Power Cord Model 488B04/NC Power Converter	
Electrical Connector(Output)	BNC Jack	BNC Jack		
Electrical Connector(DC Power Input)	5-socket DIN (female)	5-socket DIN (female)		
Size (Height x Width x Depth)	3.2 in x 8.0 in x 5.9 in	8.1 cm x 20 cm x 15 cm		
Weight	1.25 lb	567 gm		
 [5]			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 35061	
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.			 3425 Walden Avenue, Depew, NY 14043	
			Phone: 716-684-0001 Fax: 716-684-0987 E-Mail: info@pcb.com	



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REVISIONS		
REV	DESCRIPTION	DIN
E	UPDATED ARTWORK	37737

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER		 PCB PIEZOTRONICS INC.	
DIMENSIONS IN INCHES		DIMENSIONS IN MILLIMETERS [IN BRACKETS]		SMB	12/16/11	ECB	12/16/11	KEN L	12/16/11
DECIMALS XX ±.03 XXX ±.010		DECIMALS X ± 0.8 XX ± 0.25		TITLE OUTLINE DRAWING MODEL 482C SERIES 4 CHANNEL SIGNAL CONDITIONER					
ANGLES ± 2 DEGREES		ANGLES ± 2 DEGREES							
FILLETS AND RADII .003 - .005		FILLETS AND RADII 0.07 - 0.13		CODE IDENT. NO. 52681					
				DWG. NO. 25495					
				SCALE: .5X					
				SHEET 1 OF 1					