Model 484B06

Line Powered Signal Conditioner for ICP® Sensors

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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PCB PIEZOTRONICS INC.
A PCB GROUP COMPANY

Warranty, Service, Repair, and Return Policies and Instructions

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 traceablility 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. 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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DOCUMENT NUMBER: 21354
DOCUMENT REVISION: B
ECN: 17900

OPERATING GUIDE

MODEL 484B DUAL MODE
ICP® POWER UNIT

1.0 INTRODUCTION

The Model 484B Power Unit features an AC signal decoupling mode for standard operation with ICP systems as well as a DC mode for calibration or ultra low frequency operation.

The output amplifier in the 484B is a unity gain buffer amplifier, providing low output impedance (50 ohms) and up to 10mA of output current, independent of transducer drive current.

Model 484B can supply from 2mA to 20mA constant current to ICP transducers or amplifiers.

See Guide G0001 "General Guide to ICP Instrumentation" for a complete coverage of the low impedance concept.

2.0 DESCRIPTION

The Model 484B contains a regulated DC power supply (+24V) and a settable constant current source to supply power to a single transducer (or ICP amp).

In the "AC" mode, the signal information is AC (capacitor) coupled from the +9V to +12V DC transducer bias level and fed thru a unity gain buffer amplifier. The coupling time constant in the "AC" mode is 10 seconds and is independent of output load.

In the "DC" mode, the signal is direct coupled from the transducer signal/power lead and fed to a level shifting circuit, then to the unity gain buffer amplifier.

In this mode the transducer discharge time constant is not compromised and full advantage can be taken of long time constant transducers for calibration purposes or for special situations where extra long duration events must be measured. The latter can usually only be accomplished in thermally stable environments.

A zero control knob is provided to adjust the DC zero at the output jack when the unit is in the "DC" mode.

A fault monitor meter is located on the front panel to give a continuous circuit continuity and operation check.

The rear panel contains the coupling mode switch, the "XDCR jack, the output ("Scope") jack, AC line cord and the bias selector switch.

The bias selector switch allows the use of the Model 484B with the class of low impedance transducers with a nominal +6volt DC bias as well as with the more conventional +11 volt nominal bias transducer.

3.0 INSTALLATION

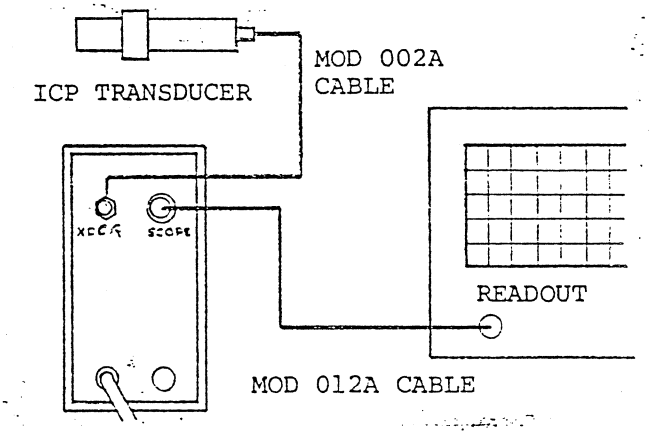


FIGURE 1
TYPICAL CIRCUIT CONNECTIONS

Connect the transducer (or amplifier) to the "XDCR jack of the Model 484B using the Model 002A cable as shown in Figure 1.

> NOTE: Since the ICP Transducers operate at a low impedance level, it is not necessary to use low noise or other shielded cable. In some cases, it is desirable to use twisted pair and other types of 2-wire cable.

Connect the readout to the "Scope" jack using a Model 012A cable (or equivalent BNC to BNC cable).

Many types of connector adaptors are available at PCB to simplify difficult installation problems. Consult the factory for details.

4.0 OPERATION

Plug the 3-wire line cord into a 120V 60Hz receptacle, switch power on and allow unit

to warm up for 10 or 15 minutes with transducer connected to thermally stabilize system components.

Check the specification sheet of your transducer (or amplifier) to determine the bias voltage. Most standard ICP transducers operate with a +9.5V to +13V bias. Keep the bias mode switch in the "11V" position for this type of instrument.

Several types of ICP instruments operate with a bias range of 4.5V to 6.2V. Place the bias mode switch in the "6V" position for this type of transducer.

Observe the fault monitor voltmeter at the front panel. This meter will indicate approximately mid-scale (see Figure 2) for normal transducer operation.

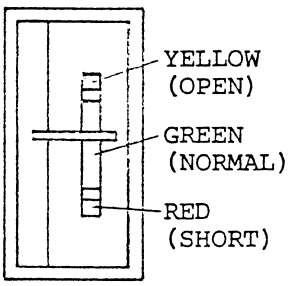


FIGURE 2
FAULT MONITOR METER

If the transducer cable is open or the ICP amplifier is faulty (open) the meter will indicate in the yellow (full scale) area.

Should the cable or ICP amplifier be shorted, the meter will indicate in the red (zero volts) area.

NOTE: Normal reading of the fault monitor meter is approx. 1/3 F.S. for the 6V nominal bias transducers.

4.1 COUPLING MODE SWITCH

For most normal measurements, the coupling mode switch should be placed in the "AC" position. In this position, the system is AC coupled internally with a 10 sec. coupling time constant.

This gives a low-frequency response as follows:

1% dn @ .11 Hz (Table 1)
5% dn @ .05 Hz
30% (-3db) @ .016 Hz

NOTE: Table 1 applies to a transduction system where the discharge time constant of the transducer is greater than 100 sec. Shorter TC transducers will shorten the overall system TC accordingly.

The AC mode is desirable for standard operation since long term thermal drifting of long TC transducers is nullified by the internal AC coupling.

In the AC mode, the DC offset at the output will be, at the maximum, 50mV positive. The front panel zero control has no effect on output zero with the mode switch in "AC".

The DC mode is provided for system calibration purposes and for situations where it is necessary to measure long duration events with long TC transducers. In this mode, the low frequency response is determined by the transducer only since the 484B direct couples the signal to the output.

4.2 ZERO CONTROL

The front panel zero control knob functions with the coupling mode switch in the "DC" position.

After the system has adequately warmed up, adjust the "zero" control to zero the output voltage. Clockwise rotation shifts the voltage positive and counterclockwise moves it negative.

After longer periods of operation, it may be necessary to re-check and reset the zero slightly. This is normal.

4.3 GAIN AND POLARITY

The Model 484B is a unity gain, non-inverting amplifier. The overall system gain is not affected by use of this amplifier in place of other PCB supplies such as models 480A, 482A, & 483A also power conditioners, model 485B, etc.

4.4 SETTING THE CONSTANT CURRENT

The series 484B Power Units are normally supplied with the constant current output to the transducer set at 4mA nominal.

This is adequate for most laboratory and field applications. Special situations such as driving extra-long cables (beyond 1000 ft.) with high frequency or fast rise

4.4 SETTING THE CONSTANT CURRENT (CON'D)

time pulses, may require increasing the transducer drive current above 4mA.

It has been found that often, when driving fast rise time pulses over long lines, system performance can 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 experimenting with your particular test set-up. A good rule of thumb is to use the lowest current consistent with satisfactory results to minimize transducer self-heating and lower noise.

To set the constant current, remove the protective outer case by removing the 4 rubber feet at the bottom surface. Locate the current adjust potentiometer. (Refer to Figure 3)

Connect a 0-30mA DC meter (or multimeter) to the "XDCR" jack center conductor as shown, returning the negative probe to chassis ground.

The constant current value is read directly on the milliameter when connected as shown.

Vary the setting of the current adjust pot to set current to a new level.

CAUTION: It may be possible to exceed 20mA slightly. Do not do so as to operate an ICP transducer or amplifier above 20mA may be harmful.

Use care to avoid shorting components with metal screwdriver blades.

4.5 ZERO CLAMP

When making repetitive measurements which produce asymmetrical waveforms, it is sometimes necessary to clamp the output voltage to a zero baseline to avoid the averaging effect typical of all piezoelectric and other AC coupled systems. This behavior is characterized by a slow drift of the signal to the point where the included area under the waveform above ground is equal to the included area below ground.

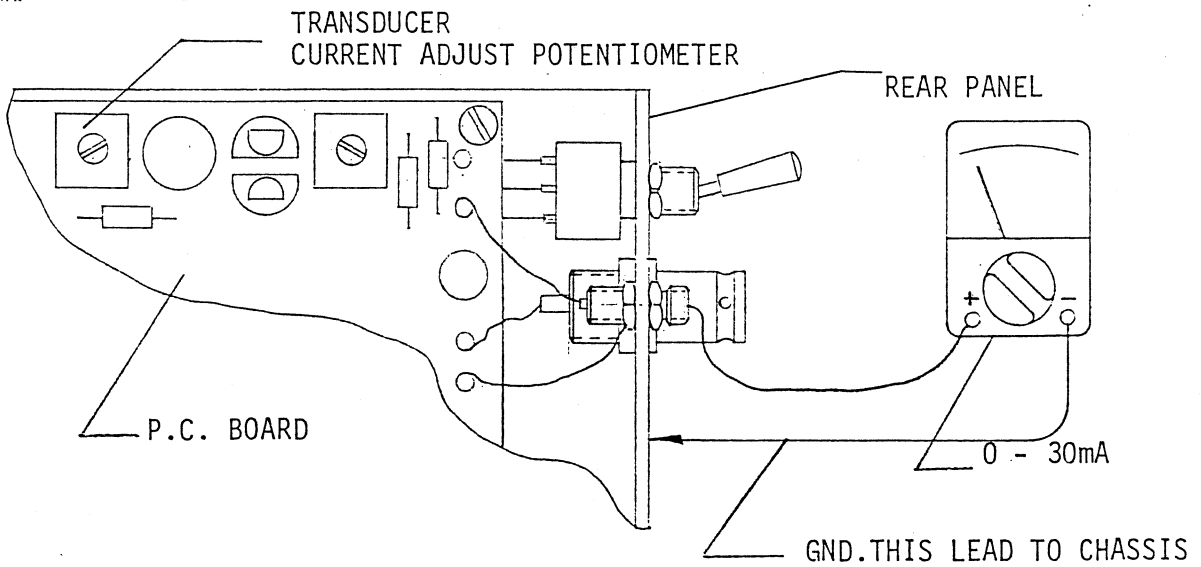


FIGURE 3
CURRENT ADJUST POT LOCATION

4.5 ZERO CLAMP (Con'd)

It is especially important to zero clamp when the output is used with peak indicating meters, comparitors, level detectors and other readouts which are referenced to a fixed voltage.

Consult the factory about the zero clamp options available for your particular application.

5.0 MAINTENANCE AND REPAIR

Aside from the transducer current adjustment as described in Section 4.4, there are no other adjustments to perform on the Model 484B.

No maintenance is required for these units and it is suggested that should trouble occur, you contact the factory for assistance.

If it is determined that the unit must be returned, please include a brief note describing the problem.

MANUAL NUMBER: 19852
MANUAL REVISION: NR

Model Number		Revision: E
484B06	**LINE POWERED ICP® SENSOR SIGNAL CONDITIONER**	ECN #: 23604

ELECTRICAL

Supply Voltage Regulated			VDC	+24 ±1.0	
ICP® Sensor Excitation Current (Constant Current Source)			mA	2-20	[1]
Time Constant			sec	10 (-0, +50%)	
Transducer Bias Voltage Accommodation Range:	11V nominal		VDC	7.5 to 14.5	
	6V nominal		VDC	3.0 to 8.0	
Low Frequency Response (-5%) AC, DC			Hz	0.05, 0	
High Frequency Response (±5V, -5%)			kHz	50	[4]
DC Offset			mV	<30	[3]
Noise Broadband, RMS (1 Hz-10 kHz)			µV [dB]	85 [-81,0]	
Typical Spectral Noise:	at 1 Hz		µV/√Hz [dB]	7.0 [-103]	
	at 10 Hz		µV/√Hz [dB]	2.5 [-112]	
	at 100 Hz		µV/√Hz [dB]	1.5 [-116]	
	at 1 kHz		µV/√Hz [dB]	1.0 [-120]	
	at 10 kHz		µV/√Hz [dB]	1.0 [-120]	
Gain				1 ±1%	
Maximum Voltage Output			volts (pk)	±10	
Output Impedance			ohms	<50	
Fault Monitor Meter (1 mA movement)			V/FS	24 ±1.0	
Power (50 to 400 Hz)			V/A	115 ±10%/0.12 (maximum)	[2]

PHYSICAL

Connectors:	Input (transducer)	type	BNC Jack
	Output (scope)	type	BNC Jack
	AC (power) Input	type	IEC 320
Size (H x W x D):		in	4.25 x 1.62 x 6.25
		[mm]	[108 x 41 x 159]
Weight		lb [gm]	2 [907,2]

NOTES:
[1] Unit supplied with current set at 4 ±0.6 mA.
[2] Unit set to 230 VAC when ordered as "F484B06."
[3] In AC mode.
[4] Serial Number 1261 and greater

SUPPLIED ACCESSORIES:
Model 017 AC Line Cord

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

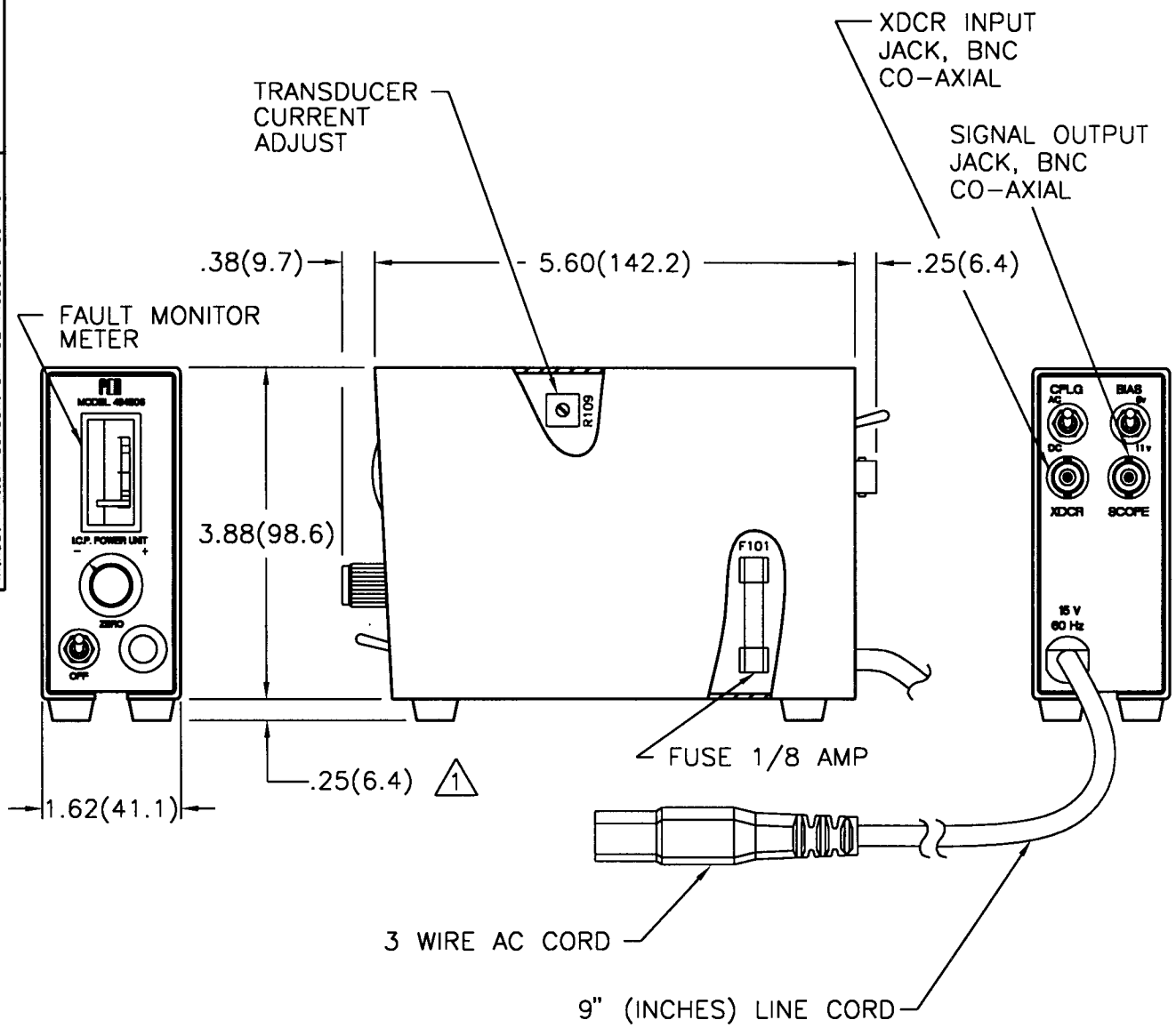
PCB PIEZOTRONICS INC.

Drawn	[signature]	2-6-06	Spec No. **484-2060-80**
Engineer	[signature]	2-7-06	
Sales	[signature]	2/7/6	
Approved	[signature]	2/13/06	Sheet 1 of 1

APPLICATION		
NEXT ASS'Y	USED ON	VAR

REVISIONS				
REV	DESCRIPTION	ECN	DATE	APP'D

10387



1 EXTERNAL COVER MAY BE REMOVED BY REMOVING SCREWS IN RUBBER FEET.

UNLESS SPECIFIED TOLERANCES	
DIMENSIONS IN INCHES DECIMALS XX ±.01 XXX ±.005 ANGLES ±2 DEGREES	DIMENSIONS IN MILLIMETERS (IN PARENTHESIS) DECIMALS XX ±0.3 XXX ±0.13 ANGLES ±2 DEGREES
FILLETS AND RADII .003 - .005	FILLETS AND RADII (0.07 - 0.13)
DD011 REV. B 03/13/98	

DRAWN	[illegible]	2/4/99	MFG	[illegible]	2/4/99
CHK'D	[illegible]	2/4/99	ENGR	[illegible]	2/4/99
APP'D	[illegible]	2/4/99		ESR	2/4/99

TITLE: OUTLINE DRAWING
MODEL 484B06
ICP POWER SUPPLY

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(716) 684-0001 EMAIL: SALES@PCB.COM

CODE IDENT. NO.	DWG. NO.
52681	10387

SCALE: 1=2 | SHEET 1 OF 1