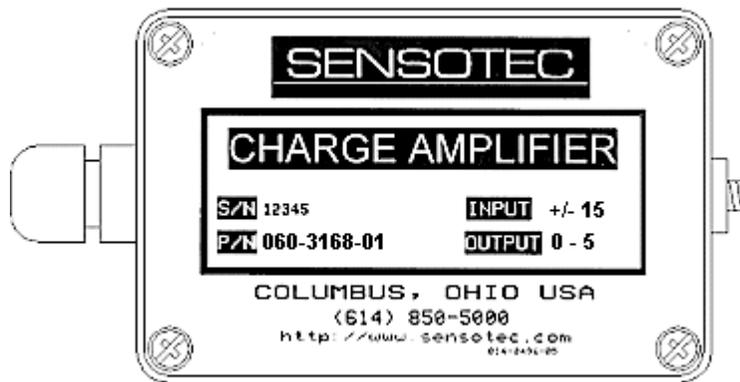




INLINE CHARGE AMPLIFIER

MODEL CA2



2080 ARLINGATE LANE, COLUMBUS OHIO 43228 (614) 850-5000



Inline Charge Amplifier
Model CA2 User's Guide
Sensotec Part Number: 008-0508-00
Rev. 0: August, 1997

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TABLE OF CONTENTS

	Page Number
CHAPTER 1: INTRODUCTION	
1.1 Overview.....	1-1
1.2 Specifications.....	1-1
1.3 Layout.....	1-2
CHAPTER 2: INSTALLATION / SET UP	
2.1 Wiring.....	2-1
2.2 Sensitivity Switch Setup.....	2-2
2.3 Panel Mounting Information.....	2-3
CHAPTER 3: CALIBRATION	
3.1 Calibration.....	3-1
3.2 Long Time Constant Option.....	3-3
CHAPTER 4: WARRANTY / REPAIR POLICY	
4.1 Limited Warranty on Products.....	4-1
4.2 Obtaining Service Under Warranty....	4-1
4.3 Obtaining Non-Warranty Service.....	4-2
4.4 Repair Warranty.....	4-2
APPENDIX A.....	A-1







Chapter 1
INTRODUCTION

1.1 OVERVIEW

Charge mode piezoelectric transducers require charge amplifiers to convert their output to useful voltage levels. The Sensotec model 3168 Inline Charge Amplifier is a versatile convenient solution to the use of charge mode piezoelectric transducers. The inline is housed in a small metal package which is connected between the transducers and the instrumentation. The amplifier features multiple sensitivity settings creating a flexible measuring system.

1.2 SPECIFICATION

Power Requirements	+ / - 15 volts DC, or 24 - 32 volts DC (with -Output voltage = 1/2 of supply)
Amplifier Characteristics Sensitivity	Programmable (.05 mV/pC to 6.4 mV/pC)
Input Range	780pC to 100,000pC
Output	+ / - 5V RMS max
Frequency Response	Standard- 3HZ to 30kHz Long TC--DC to 30kHz
Time Constant	Standard- 50 milliseconds Long TC- 2,000 seconds
Short Circuit Protected	+ Output to - Output



1.3 LAYOUT

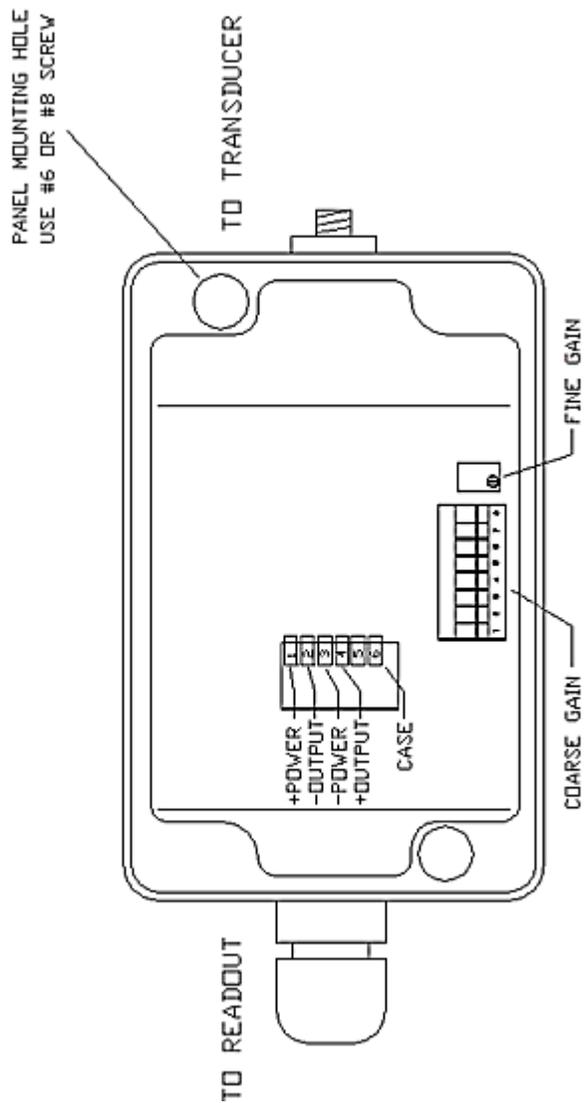


Figure 1-1. Layout of Inline Amplifier



INSTALLATION / SET UP

2.1 WIRING

The Inline Charge amplifier can be powered from a +/- 15 volts DC or a 24 to 32 volt single voltage supply. The following diagrams show the wiring to each type of supply.

Cables should be stripped back 3 inches with the wires stripped and tinned 1/2 inch. Connections to the terminal block are made by pressing the orange levers and inserting the wires into the holes next to the levers. The terminal block will accept wire up to AWG 20.

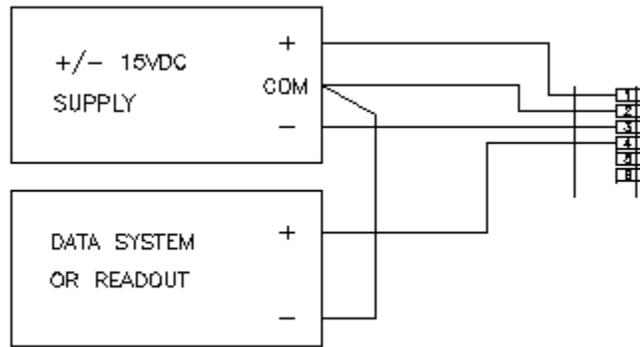


Figure 2-1. +/- 15 Volt Power Supply to Inline Wiring

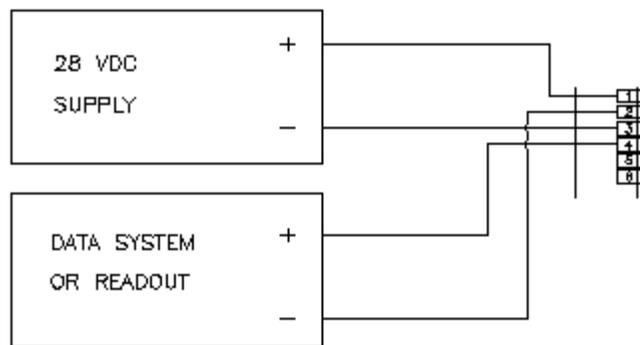


Figure 2-2. 24 - 32 Single Voltage Supply To Inline



The connection to the sensor is thru a low noise miniature coaxial cable. Cable length should be as short as possible to minimize noise.

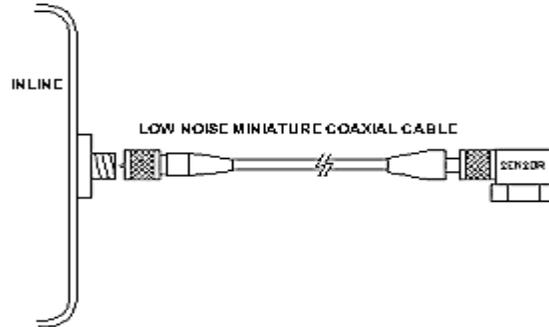


Figure 2-2. Sensor to Inline Wiring

2.2 SENSITIVITY SELECT

SWITCH POSITION ON	SENSITIVITY MV/PC
1	NOT USED
2	3.2mV/pC
3	1.6mV/pC
4	.8mV/pC
5	.4mV/pC
6	.2mV/pC
7	.1mV/pC
8	.05mV/pC

Table 2-1. Coarse Gain Setup

Multiple switch combinations can be activated to attain additional sensitivities. For example, if 1mV/pC is desired then switches 4 and 6 would be on. (.8V/pC+.2mV/pC=1mV/pC).

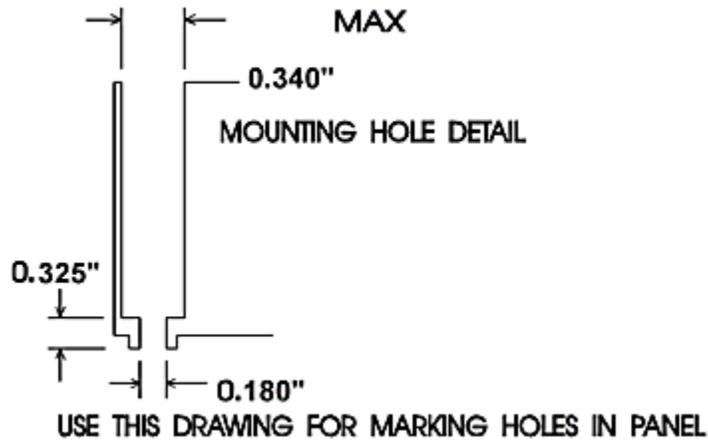
The factory default setting is 1mV/pC. DO NOT use the fine gain adjustment potentiometer unless you are re-calibrating the charge amplifier or if you are scaling the output to a known input. Adjusting the fine gain potentiometer changes the sensitivities listed in table 2-1.

If the customer requests Sensotec to set-up the transducer and CA2 for a single sensitivity, the coarse and fine gain adjustment should not be altered. In this event the customer loses the flexibility of sensitivity adjustment. Table 2-1 no longer applies.

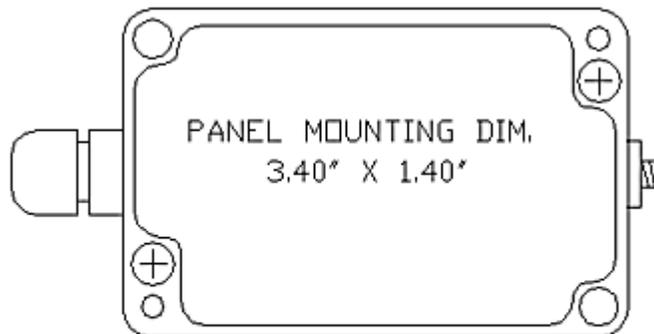


2.3 PANEL MOUNTING INFORMATION

The inline can be easily mounted to a panel by using the template in Appendix A for marking the holes in the panel. The cover must be removed to get access to the mounting holes. Use # 6 or # 8 screws for mounting box to panel.



Actual size not shown. See Appendix A for Template.



BOX DIMENSIONS
3.85' X 2.51' X 1.33'

Figure 2-3. Panel Mounting Layout





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**3.1 CALIBRATION**

Step 1. Apply power and allow unit to stabilize for 10 minutes.

Step 2. Calculate sensitivity switch based on desired mV/g or mV/lb output. Use the following formulas:

$$\begin{aligned} \text{Sensitivity} &= \frac{\text{Desired mV/g}}{\text{Accelerometer Sensitivity pC/g}} \\ \text{mV/pC} & \\ &= \frac{\text{Desired mV/lb}}{\text{Load Cell Sensitivity pC/lb}} \end{aligned}$$

EXAMPLES

Example # 1:

Sensitivity of the accelerometer = 100pC/g
Desired mV/g = 10

$$\begin{aligned} \text{Sensitivity} &= \frac{10 \text{ mV/g}}{100 \text{ pC/g}} \\ \text{mV/pC} & \\ &= .1 \text{ mV/pC (switch 7)} \end{aligned}$$

Example # 2:

Sensitivity of load cell = 10pC/lb
Desired mV/lb = 20

$$\begin{aligned} \text{Sensitivity} &= \frac{20 \text{ mV/lb}}{10 \text{ pC/lb}} \\ \text{mV/pC} & \\ &= 2 \text{ mV/pC (switches 3 and 5)} \end{aligned}$$



Example # 3:

Sensitivity of accelerometer = 100 pC/g

Full scale g's = 50

Full scale output at 50g's = 5V

a.) $\frac{5V}{50g} = .1V/g = 100 \text{ mV/g}$

b.) Sensitivity = $\frac{100\text{mV/g}}{100 \text{ pC/g}} = 1\text{mV/pC}$ (switches 4 and 6)

Example # 4:

Sensitivity of load cell = 10 pC/lb

Full scale lb's = 500

Full scale output at 500 lb's = 5V

a.) $\frac{5V}{500 \text{ lb}} = 10\text{mV/lb}$

b.) Sensitivity = $\frac{10 \text{ mV/lb}}{10 \text{ pClb}} = 1\text{mV/pC}$

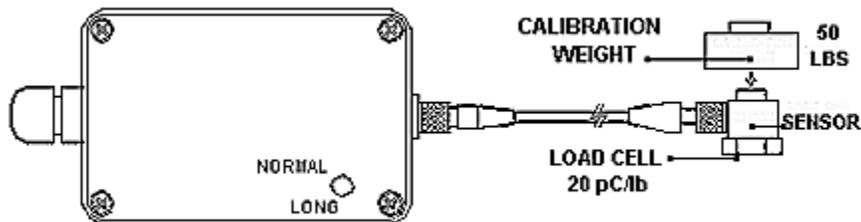




3.2 LONG TIME CONSTANT OPTION

If the long TC option was purchased there will be a front panel toggle switch labeled LONG or NORMAL. Normal TC indicates the standard time constant of 50 milliseconds. Long TC indicates a time constant of 2000 seconds. The long TC option is used to measure quasistatic (near static) events and or to calibrate the sensor under static conditions. During dynamic measurements reset the long TC toggle switch to normal.

Quasistatic set-up examples:



Set sensitivity switches based on full-scale = 5V @ 50 lbs

1) Calculate mV/lb:

$$\frac{5V}{50 \text{ lb}} = .1V/lb = 100 \text{ mV/lb}$$

2) Calculate switch settings:

$$\text{Sensitivity} = \frac{100 \text{ mV/lb}}{20 \text{ pC/lb}} = 5 \text{ mV/pC} \quad (\text{switches 2, 3, 6})$$

- 3) Switch in normal mode.
- 4) Apply weight to load cell.
- 5) Toggle switch to long TC.
- 6) Quickly remove weight from load cell and note output voltage.

To insure accuracy the test must be performed as quickly as possible. The decay of the first 10% of the TC is linear. With a TC of 2000 seconds, we can conclude:

- 20 seconds = 1% accuracy
- 40 seconds = 2% accuracy
- 60 seconds = 3% accuracy



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WARRANTY / REPAIR POLICY

4.1 LIMITED WARRANTY ON PRODUCTS

Any of our products which, under normal operating conditions, proves defective in material or workmanship within one year from the date of shipment by SENSOTEC, will be repaired or replaced free of charge provided that you obtain a return material authorization from SENSOTEC and send the defective product, transportation charges prepaid with notice of the defect, and establish that the product has been properly installed, maintained, and operated within the limits of rated and normal usage. Replacement product will be shipped F.O.B. our plant. The terms of this warranty do not extend to any product or part thereof which, under normal usage, has an inherently shorter useful life than one year. The replacement warranty detailed here is the buyer's exclusive remedy, and will satisfy all obligations of SENSOTEC whether based on contract, negligence, or otherwise. SENSOTEC is not responsible for any incidental or consequential loss or damage which might result from a failure of any SENSOTEC product. This express warranty is made in lieu of any and all other warranties, express or implied, including implied warranty of merchantability or fitness for particular purpose. Any unauthorized disassembly or attempt to repair voids this warranty.

4.2 OBTAINING SERVICE UNDER WARRANTY

Advanced authorization is required prior to the return to SENSOTEC. Before returning the items, either write to the Customer Service Department c/o SENSOTEC, Inc., 2080 Arlingate Lane, Columbus, Ohio 43228, or call (800) 848-6564 with: 1) a part number; 2) a serial number for the defective product; 3) a technical description* of the defect; 4) a no-charge purchase order number (so products can be returned to you correctly); and 5) ship and bill addresses. Shipment to SENSOTEC shall be at Buyer's expense and repaired or replacement items will be shipped F.O.B. our plant in Columbus, Ohio. Non-verified problems or defects may be subject to an evaluation charge. Please return the original calibration data with the unit.





4.3 OBTAINING NON-WARRANTY SERVICE

Advance authorization is required prior to the return to SENSOTEC. Before returning the item, either write to the Customer Service Department c/o SENSOTEC, Inc., 2080 Arlingate Lane, Columbus, Ohio 43228, or call (800) 848-6564 with: 1) a model number; 2) a serial number for the defective product; 3) a technical description* of the malfunction; 4) a purchase order number to cover SENSOTEC's repair cost; and 5) ship and bill addresses. After the product is evaluated by SENSOTEC, we will contact you to provide the estimated repair costs before proceeding. Shipment to SENSOTEC shall be at Buyer's expense and repaired items will be shipped to you F.O.B., our plant in Columbus, Ohio. Please return the original calibration data with the unit.

4.4 REPAIR WARRANTY

All repairs of SENSOTEC products are warranted for a period of 90 days from date of shipment. This warranty applies only to those items which were found defective and repaired, it does not apply to products in which no defect was found and returned as is or merely recalibrated. Out of warranty products may not be capable of being returned to the exact original specifications or dimensions.

* Technical description of the defect: In order to properly repair a product, it is necessary for SENSOTEC to receive information specifying the reason the product is being returned. Specific test data, written observations on the failure and the specific corrective action you require, is needed.





APPENDIX A

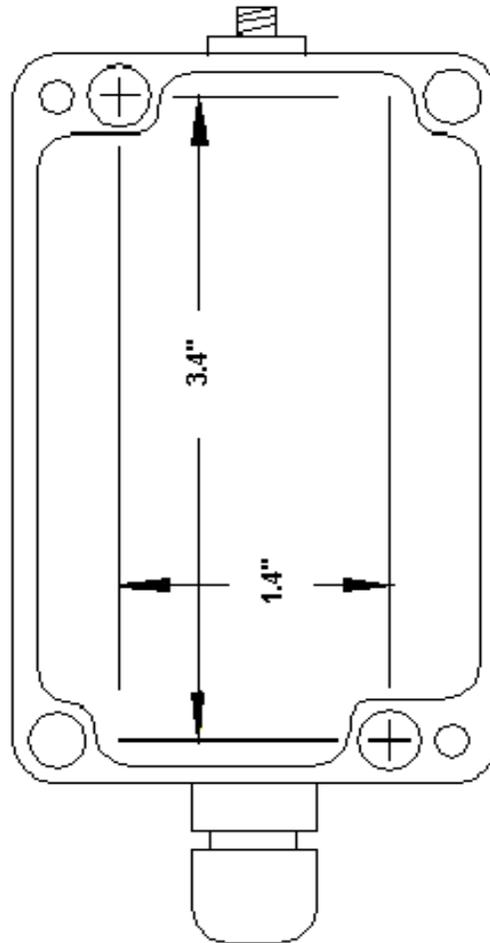


Figure A-1. Panel Mounting Template