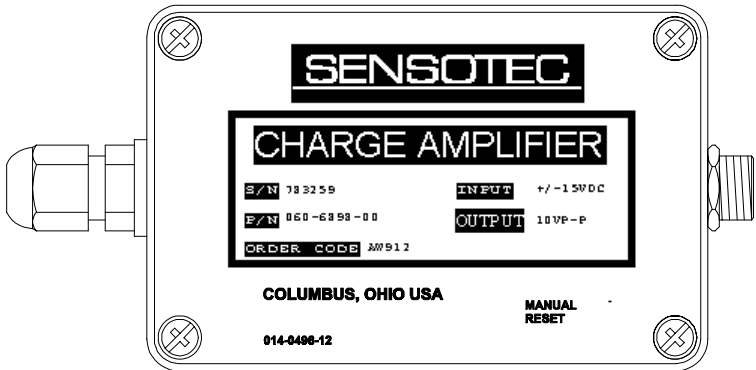


Model WCA Inline Charge Amplifier



SENSOTEC

Weld Sensor Group

2080 Arlingate Lane, Columbus, Ohio 43228 USA • (614)850-1140

Sensotec, Inc.

Weld Sensor Group

2080 Arlingate Lane

Columbus, Ohio 43228 USA

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Telephone: (614)850-1140

FAX: (614)850-1141

Toll Free: 1-800-848-6564

E-mail: service@sensotec.com

WWW: <http://www.weldsensor.com>

Model WCA Inline Charge Amplifier

Sensotec Part Number: 008-0612-00

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IMPORTANT! IT IS RECOMMENDED THAT YOU READ THIS DOCUMENT THOROUGHLY BEFORE APPLYING POWER TO THIS UNIT. THIS DOCUMENT CONTAINS INFORMATION ON WIRING, CALIBRATION, AND USE OF FEATURES.

Sensotec continually improves its products, and thus the information herein is subject to change without notice.

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Chapter 1

INTRODUCTION

1.1 Overview

Charge-mode piezoelectric transducers require charge amplifiers to convert their output to useful voltage levels. The Sensotec Model WCA Inline Charge Amplifier (Sensotec order code AW912) is a versatile, convenient solution to the use of charge mode piezoelectric transducers. The amplifier 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.

The Model WCA can be used with the following transducers:

- Model WDL Dynamic-Load Washer (order code AW717)
- Model WEL Weld-Through Load Washer (order codes AW713, AW714)

1.2 Specifications

Sensotec continually improves its products, and thus these specifications are subject to change without notice.

Power Requirements: +/- 15 VDC,
or 24 to 32 VDC (this will
force the (-)Output pin to be
1/2 of the power supply)

Sensitivity: 0.05 mv/pC to 6.4 mV/pC
(field selectable)

Input Range: 780 pC to 100,000 pC

Output: +/- 5 VRMS max.

Frequency Response: ~DC to 30 kHz

Time Constant: 200 seconds

Short Circuit Protection: (+)Output to (-)Output

Operating Temperature: 30 to 160 °F

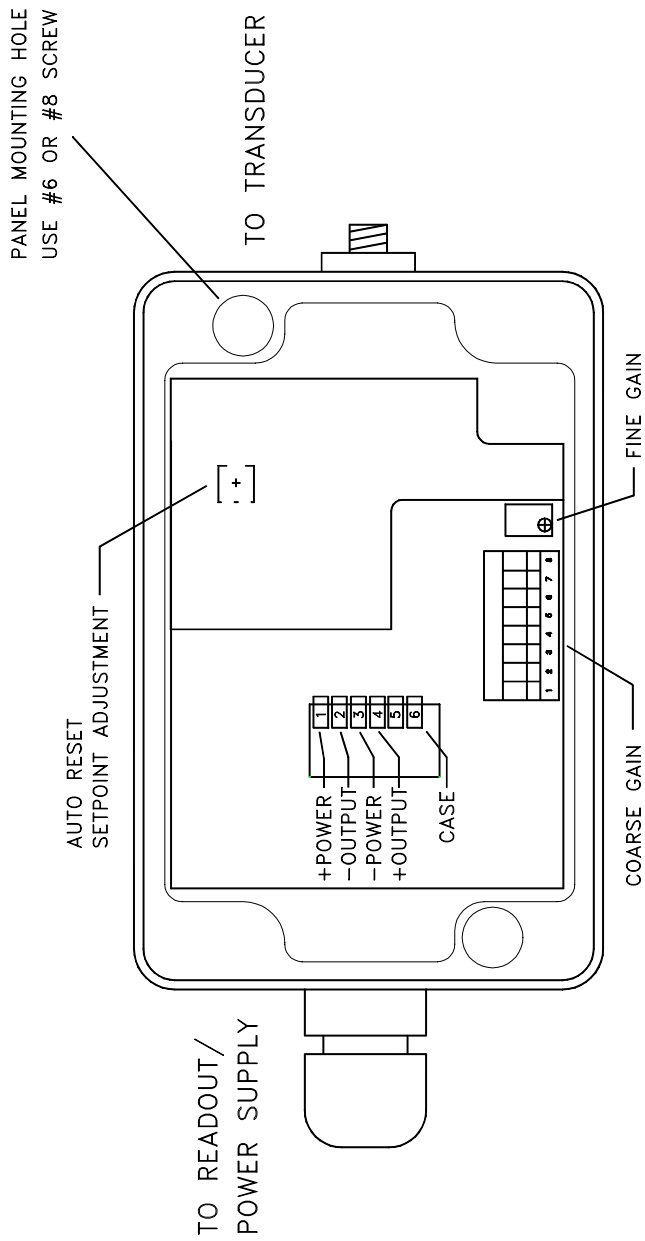


Figure 1-1: Layout of Inline Amplifier

Chapter 2

INSTALLATION

2.1 Wiring

The amplifier can be powered from a +/-15 VDC bi-polar power supply or a 24 - 32 VDC 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 blocks will accept wires up to AWG 20.

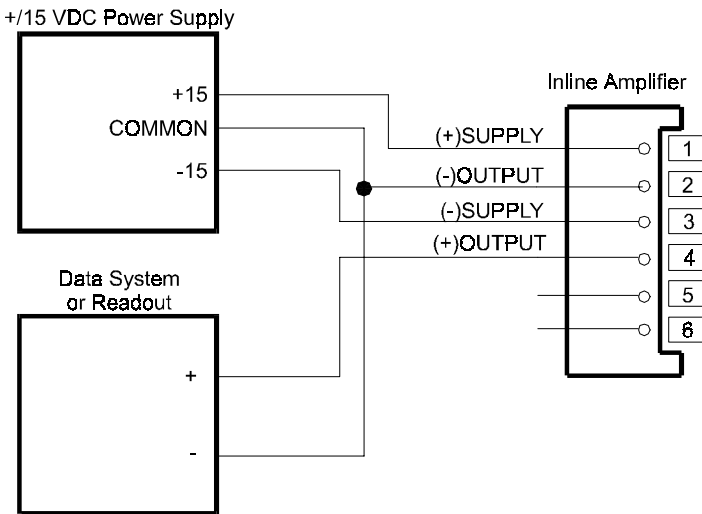


Figure 2-1: Bipolar Power Supply to Amplifier Wiring

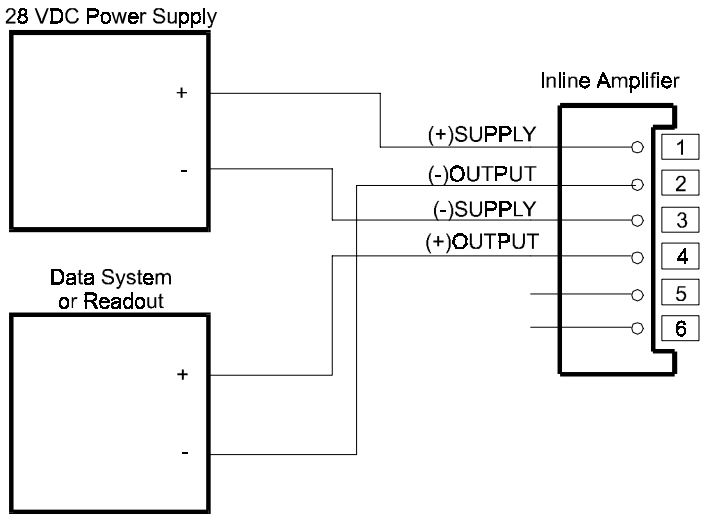


Figure 2-2: Single Voltage Supply Wiring

The connection to the transducer is through a 4-pin, female connector. **The special low-noise cable that was shipped with your sensor must be used to achieve the best performance.**

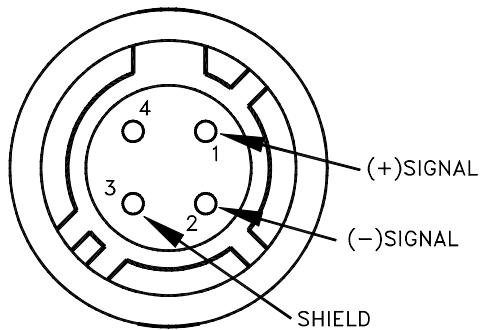


Figure 2-3: Sensor Connector on the Amplifier

2.2 Sensitivity Select

Table 1: Coarse Gain Setup

Switch Position "ON"	Sensitivity (mV/pC)
1	NOT USED
2	3.2 mV/pC
3	1.6 mV/pC
4	0.8 mV/pC
5	0.4 mV/pC
6	0.2 mV/pC
7	0.1 mV/pC
8	0.05 mV/pC

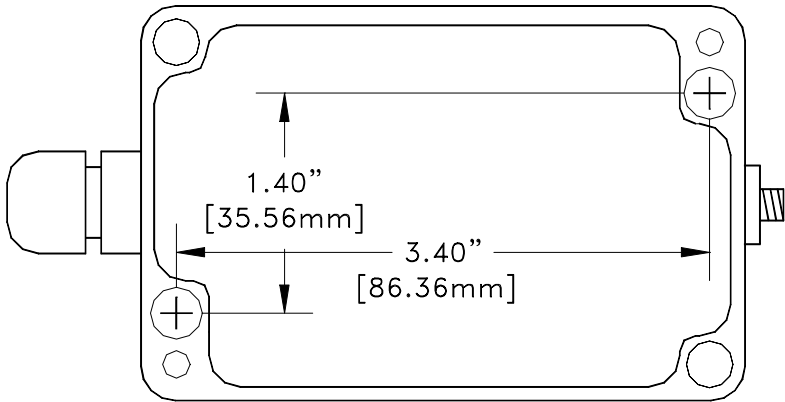
Multiple switch combinations can be activated to attain additional sensitivities. For example, if 1 mV/pC is desired then switches 4 and 6 should be "on" ($0.8 \text{ mV/pC} + 0.2 \text{ mV/pC} = 1.0 \text{ mV/pC}$).

The factory default setting is 1 mV/pC. **DO NOT** use the fine gain potentiometer unless you are re-calibrating the amplifier or if you are scaling the output to a known input. **Adjusting the fine gain potentiometer changes the sensitivities listed in Table 1 on page 11.**

If the customer requests Sensotec to set-up the sensor and the amplifier for a single sensitivity, the coarse and fine gain adjustments should not be altered. In this event, the customer loses the flexibility of sensitivity adjustment and Table 1 on page 11 no longer applies.

2.3 Panel Mounting

The amplifier can be 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 the enclosure to the panel.



BOX DIMENSIONS
3.85 X 2.51 X 1.33"
[97.8 x 65.3 x 33.8mm]

Figure 2-4: Panel Mounting Layout

2.4 Auto-Reset Circuit

The auto-reset circuit is used to reset the integrator each time the signal reaches the set point. This is used to bleed off any accumulated charge that the integrator is holding before the next cycle begins. The auto-reset is active for 250 to 325 ms. The next cycle must not begin during this time period.

The auto-reset set point adjustment potentiometer has a range of -150 to -350 mV. Turning the adjustment clockwise moves the set point towards -350 mV, counter-clockwise towards -150 mV. See “Layout of Inline Amplifier” on page 7 for the location of the set point adjustment.

The reset can be manually triggered with the front panel push button switch.

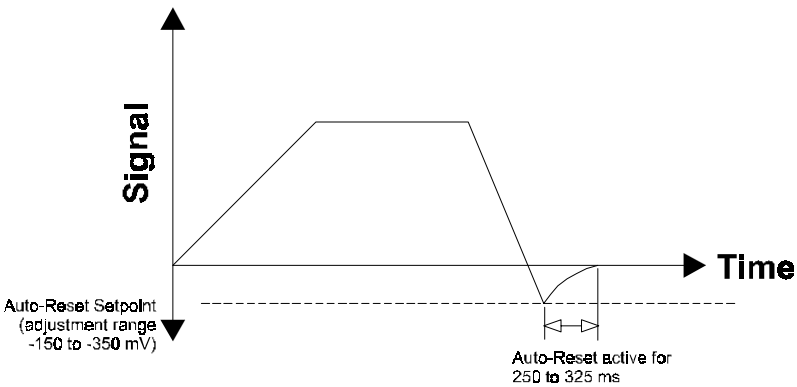


Figure 2-5: Auto-Reset circuit Timing

Chapter 3

SETUP

3.1 Procedure

Step 1. Remove the cover of the amplifier.

Step 2. Apply power to the amplifier and allow it to warm-up for 10 minutes.

Step 3. Calculate the sensitivity switch setting based on the desired mV/lbs output. First use the following formula:

$$\text{Sensitivity (mV/pC)} = \frac{\text{Desired mV/lbs}}{\text{Load Cell Sensitivity (pC/lbs)}}$$

then use the information in Table 1 on page 11 to set the sensitivity switches.

3.2 Examples

3.2.1 Example 1

Sensitivity of sensor = 10 pC/lb

Desired mV/lb = 20

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

3.2.2 Example 2

Sensitivity of sensor = 10 pC/lb

Full-scale lbs = 500

Full-scale output at 500 lbs = 5V

$$\begin{aligned} \frac{5 \text{ V}}{500 \text{ lbs}} &= 10 \text{ mV/lb} \\ \text{Sensitivity (mV/pC)} &= \frac{10 \text{ mV/lb}}{10 \text{ pC/lb}} \\ &= 1 \text{ mV/pC} \\ &= \text{switches 4 and 6} \end{aligned}$$

3.2.3 Example 3, quasi-static

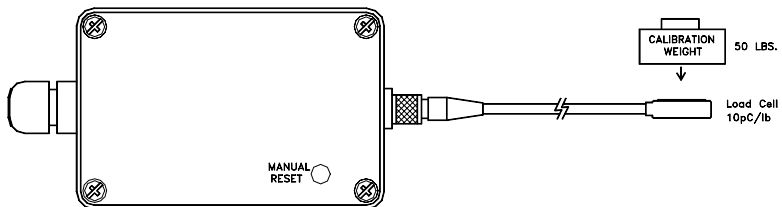


Figure 3-1: Quasi-static setup example

Sensitivity switches are based on a full-scale of 5V@ 50 lbs.

Step 1. Calculate mV/lb.

$$\frac{5 V}{50 lbs} = 100 mV/lb$$

Step 2. Calculate sensitivity switch settings.

$$\begin{aligned} \text{Sensitivity (mV/pC)} &= \frac{100 mV/lb}{10 pC/lb} \\ &= 10 mV/pC \\ &= \text{switches 2, 3 and 6} \end{aligned}$$

Step 3. Press the manual reset push-button switch.

Step 4. Apply a known weight to the load cell. The type of load cell used will determine if the known weight should be applied in tension or compression. The load cell output voltage must move in the positive direction or the auto-reset circuit will be activated.

Step 5. Note the output voltage. The output signal amplitude will decay somewhat rapidly so an instrument that can detect the peak amplitude (such as an oscilloscope) is very useful.

Step 6. Remove the weight. Repeat procedure if desired.

To insure accuracy the calibration must be performed as quickly as possible. The decay of the first 10% of the time constant is linear. With a time constant of 200 seconds, the following calibration accuracies can be determined:

2 seconds = 1% accuracy

4 seconds = 2% accuracy

6 seconds = 3% accuracy

Chapter 4

WARRANTY / REPAIR POLICY

4.1 Limited Warranty on Products

Any of our products which, under normal operating conditions, proves defective in material in 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 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 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 Ringlet 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.

SENSOTEC

WeldSensor Group

(800)848-6564

2080 Arlingate Lane
Columbus, Ohio 43228

Tel: (614)850-1140

Fax: (614)850-1141

E-mail: service@sensotec.com

<http://www.weldsensor.com>