

DCM 490 UNIVERSAL INLINE TRANSDUCER AMPLIFIER USER'S GUIDE

1.0 INTRODUCTION

1.1 Overview

The Cooper Universal Inline Amplifier is housed in a small plastic package, which is connected between the transducer and a readout instrument. The amplifier supplies a highly regulated bridge excitation voltage for the transducer and converts the millivolt signal of the transducer to a + / -5 volts DC. The inline features include three selectable excitation voltages, programmable gain settings, a wide adjustment range on the zero and a buffered solid state shunt cal relay for quick calibration.

1.2 Specification

Power Requirements	24-32 volts DC (with -Output voltage = ½ of supply), or ± 15 volts DC
Bridge Excitation	10, 5, or 3 volts DC @ 70ma (user selectable)
Output voltage range	± 5 volts @ 2.5ma. (with ±15 volts DC power applied)
Frequency response	DC - 5000 Hz
Zero Balance range	±50% coarse, ± 15%, fine adjustment range
Gain Adjustment Range	Switch selectable (0.5 to 5mV/V), ± 25% fine adjust
Short circuit protected	(+) Output to (-) Output
Environment Protection	IP-66 or NEMA 4
Shunt calibration	Solid State Relay
Long Term Zero Drift	.1% of Full Scale per 6 months
Zero Temperature Drift	0.005% per °C @ 2 mV/V
Span Temperature Drift	0.005% per °C @ 2 mV/V
Operating Temperature Range	-10 to 70 °C

1.3 Layout

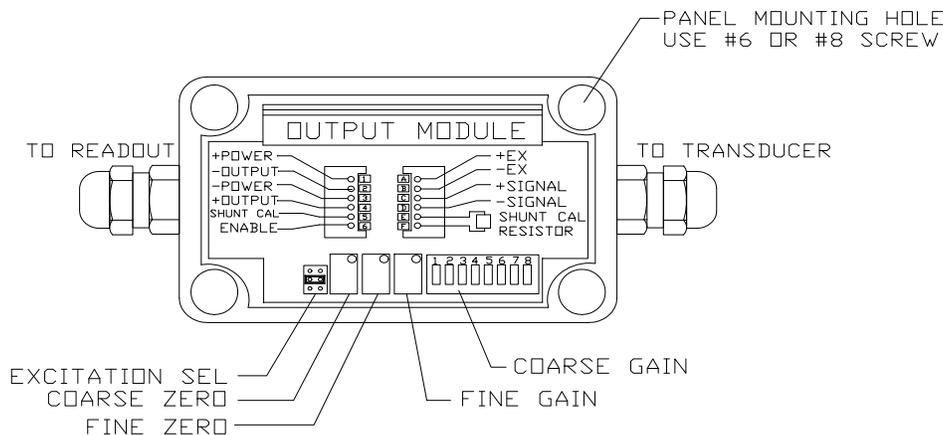


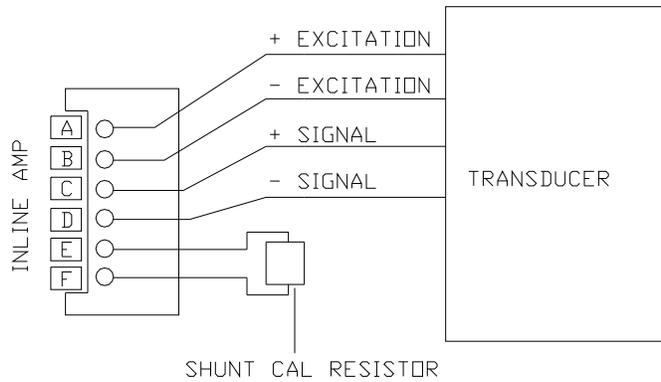
Fig. 1-1. Layout of Inline Amplifier

2.0 INSTALLATION / SET UP

2.1 Wiring

The BIPOLAR INLINE amplifier can be powered from a +/-15 DC or a 24 to 32 volt single voltage supply. The following diagrams show the wiring to the supply and readout.

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 hole next to the levers. The terminal block will accept wire up to AWG 20.



NOTE: Install shunt cal resistor value specified on the transducer data sheet.

Figure 2-1. Transducer to Inline Wiring

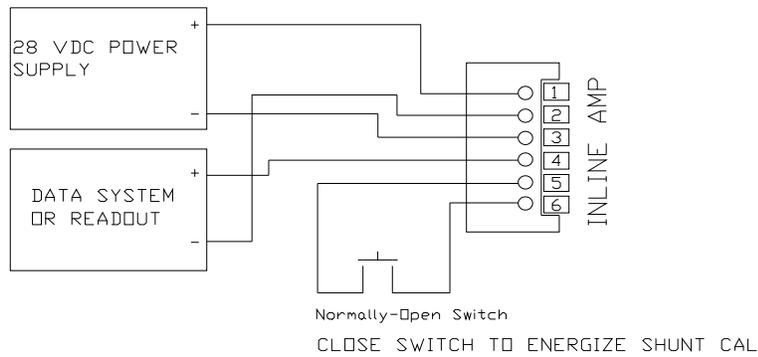


Figure 2-2. 24 to 32 Volt Power Supply to Inline Wiring

NOTE: For the single voltage supply, (-) OUTPUT is biased approximately 1/2 of the supply voltage. The output will swing ± 5 VDC around the (-) OUTPUT reference voltage.

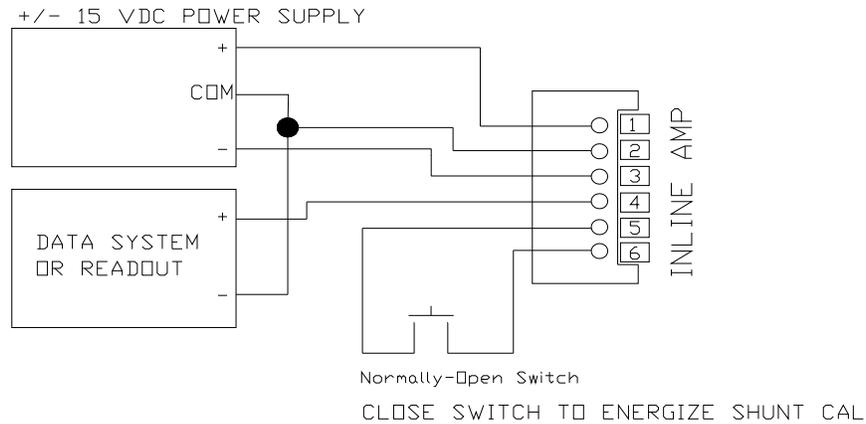
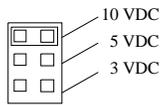


Figure 2-3. ± 15 Volt Power Supply to Inline Wiring

2.2 Setup

Use the following procedure for setting up the excitation and the coarse gain:

1. Determine the EXCITATION VOLTAGE required by the transducer being used.
2. Set the EXCITATION SELECT JUMPER as shown below: (See Fig. 1-1 for location of jumper).



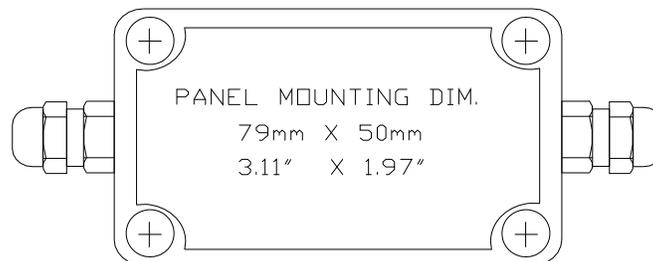
3. Determine the sensitivity of the transducer in mV/V from the transducer calibration sheet.
4. Set the COARSE GAIN SWITCH (See Fig. 1-1 for location of switch) to the nearest mV/V setting in the corresponding excitation column in Table 1.

Table 1. Coarse Gain Setup Table

SWITCH POSITION ON	EXCITATION (VDC)		
	10	5	3
1	.5 mV/V	1 mV/V	1.6 mV/V
2 & 3 & 5	.6 mV/V	1.2 mV/V	2 mV/V
2 & 4	.75 mV/V	1.5 mV/V	2.5 mV/V
2	1 mV/V	2 mV/V	3.3 mV/V
3 & 6	1.25 mV/V	2.5 mV/V	4.16 mV/V
3	1.5 mV/V	3 mV/V	5 mV/V
4 & 7	1.75 mV/V	3.5 mV/V	5.8 mV/V
4	2 mV/V	4 mV/V	6.6 mV/V
5 & 8	2.25 mV/V	4.5 mV/V	7.5 mV/V
5	2.5 mV/V	5 mV/V	8.3 mV/V
6	3 mV/V	6 mV/V	10 mV/V
7	3.5 mV/V	7 mV/V	11.6 mV/V
8	4 mV/V	8 mV/V	13.3 mV/V

2.3 Panel Mounting Information

The inline can be easily mounted to a panel. The cover must be removed to get access to the mounting holes. Use #6 or #8 screws for mounting box to panel.



BOX DIMENSIONS
3.75" X 2.50" X 2.10"

Figure 2-4. Panel Mounting Layout

3.0 CALIBRATION

3.1 Calibration

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

Step 2. With zero load or pressure on the transducer adjust the ZERO potentiometers to indicate zero on the readout instrument.

- Step 3. Apply full scale pressure or load to the transducer and adjust the SPAN potentiometer to indicate full scale on the readout instrument.
- Step 4. Recheck zero and full scale (repeat steps 2 & 3)

3.2 Using Shunt Calibration

Cooper transducers feature a calibration technique called shunt calibration. This method applies a known resistance across one leg of the transducer, which simulates an output, as if a load or pressure was applied to the transducer. When performing shunt calibration the transducer should be at ZERO pressure or load. The full scale output and shunt cal output is found on the TRANSDUCER CALIBRATION SHEET. This information can be used to calibrate the amplifier's output voltage and the readout's display with the following equations.

Transducer Calibration Data

Full Scale Output = _____ mV/V

Shunt Resistor Value of _____ Ohms

Shunt Cal Output = _____ mV/V

The following equations are used to calculate output current and display units:

3.3 Formula To Calculate Output Current

$$\frac{\text{SHUNT CAL OUTPUT}}{\text{FULL SCALE OUTPUT}} \times \text{FULL SCALE VOLTAGE} = \text{OUTPUT VOLTAGE}$$

$$\text{_____} \times \text{_____} = \text{_____}$$

3.4 Formula To Calculate Display Units

$$\frac{\text{SHUNT CAL OUTPUT}}{\text{FULL SCALE OUTPUT}} \times \text{FULL SCALE UNITS} = \text{DISPLAY UNITS}$$

$$\text{_____} \times \text{_____} = \text{_____}$$

- Step 1. Apply power and allow the amplifier to warm up.
- Step 2. With zero load or pressure on the transducer adjust the ZERO potentiometer to indicate zero on the readout instrument.
- Step 3. Connect a jumper across PINS 5 & 6 of the power terminals (See Fig. 1-1) or wire in a switch as shown in wiring section. Adjust the span potentiometer to the calculated current or calculated units on the readout instrument.
- Step 4. Disconnect the shunt cal jumper or release the shunt cal switch and repeat steps 2 & 3 if needed.

4.0 WARRANTY REPAIR POLICY

Limited Warranty on Products

Any Cooper Instruments product which, under normal operating conditions, proves defective in material or in workmanship within one year of the date of shipment by Cooper will be repaired or replaced free of charge provided that a return material authorization is obtained from Cooper and the defective product is sent, transportation charges prepaid, with notice of the defect, and it is established that the product has been properly installed, maintained, and operated within the limits of rated and normal usage. Replacement or repaired product will be shipped F.O.B. from 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 Cooper whether based on contract, negligence, or otherwise. Cooper is not responsible for any incidental or consequential loss or damage which might result from a failure 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.

Obtaining Service under Warranty

Advance authorization is *required* prior to the return to Cooper Instruments. Before returning the item, contact the Repair Department c/o Cooper Instruments at (540) 349-4746 for a Return Material Authorization number. Shipment to Cooper shall be at buyer's expense and repaired or replacement items will be shipped F.O.B. from our plant in Warrenton, Virginia. Non-verified problems or defects may be subject to a \$100 evaluation charge. Please return the original calibration data with the unit.

Repair Warranty

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

* Technical description of the defect: In order to properly repair a product, it is *absolutely necessary* for Cooper 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 are needed.