Chapter 1 - Introduction

1.1 General

The Cooper DCM 495 is a universal in-line amplifier that can be used in applications where a direct high level output from a transducer is not possible due to a harsh environment or because of the small size of the transducer (e.g. miniatures). The user-programmable DCM 495 is contained in a rigid NEMA-4 plastic box. It supplies a highly regulated bridge excitation voltage to the transducer and converts it into a +/- 10VDC output signal. The DCM 495 has three selectable excitation voltages, a programmable gain setting and a wide adjustment on zero. Quick calibration is available through a buffered solid state shunt calibration feature. Typical advantages like increased signal-to-noise ratio, elimination of voltage drop effects on excitation and signals into low-impedance data systems are ensured by the careful design of the DCM 495.

1.2 Specifications

Supply Voltage:	18 - 32 VDC
Excitation Voltage to Sensor:	2.5, 5 or 10 VDC (User selectable)
Output Voltage Range:	+/-10 volts @ 2 mA
Frequency Response (1-3db):	DC – 5000 Hz
Signal to Noise Ratio:	65 dB
Zero Adjustment Range:	+/- 25% course, +/- 10% fine
Span Adjustment Range:	Switch Selectable (1 to 32 mV/V), +/- 25% fine adjustment
Short Circuit Protected:	(+) Output to (–) Output/Common
Environment Protection:	IP-66 or NEMA 4
Shunt Calibration:	Solid State Relay
Linearity:	+/- 0.02% of Full Scale

1.3 Layout

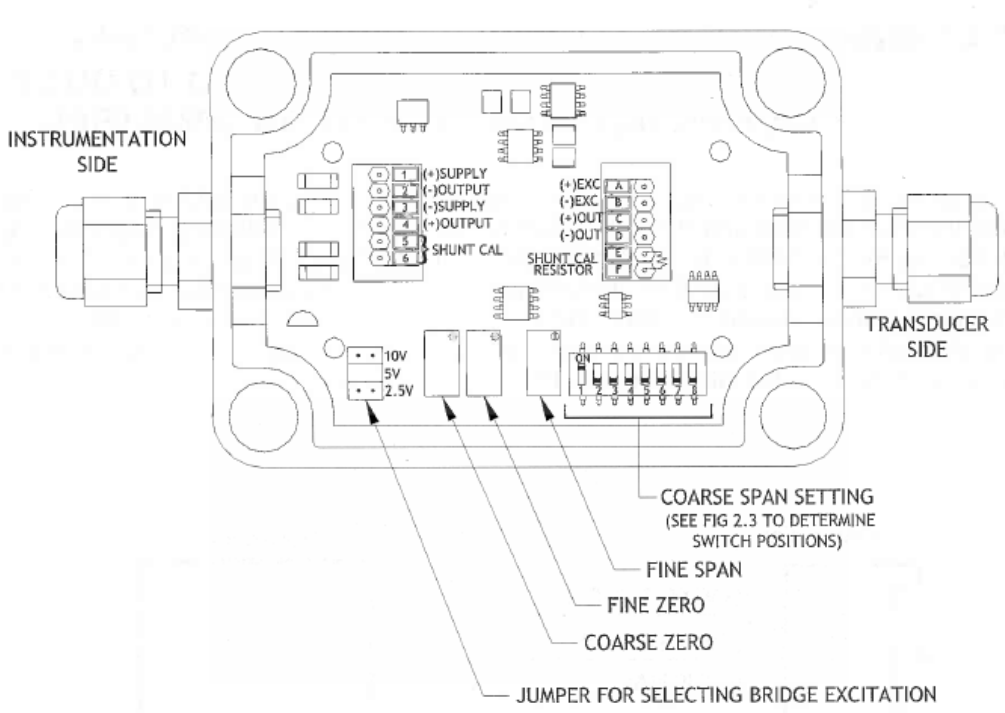


Figure 1-1

Chapter 2 - Installation/Setup

2.1 Wiring

⚠ WARNING: CONNECT ALL WIRES PRIOR TO APPLYING POWER TO THE AMPLIFIER. FAILING TO DO SO CAN RESULT IN DAMAGE TO THE AMPLIFIER!

Use an 18-32 V single voltage supply to power the DCM 495. Strip the cables back 2-3 inches with the wires stripped and tinned ½". Connect as shown in the following diagrams: Figure 2-1 shows the connection between the transducer and the DCM 495 and Figure 2-2 shows the power supply connection to the inline amplifier and the signal connection to a data system readout. Observe the wiring code of the transducer to ensure proper connection. Connect the stripped and tinned wires to the terminal block inside the DCM 495 by pressing the orange levers and inserting the wire inside the hole next to the lever.

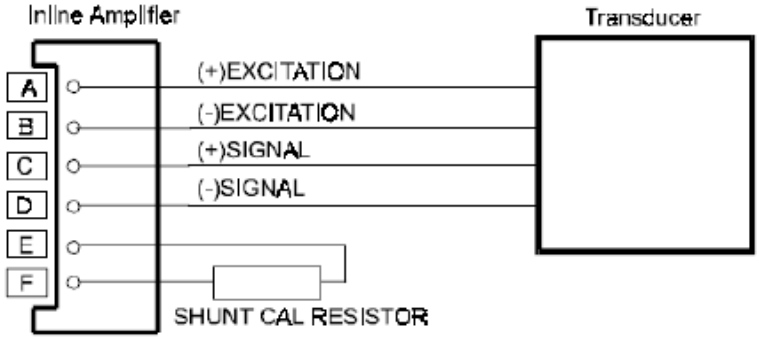


Figure 2-1: Transducer to In-line Wiring

NOTE: Up to 20AWG may be connected to the terminals.

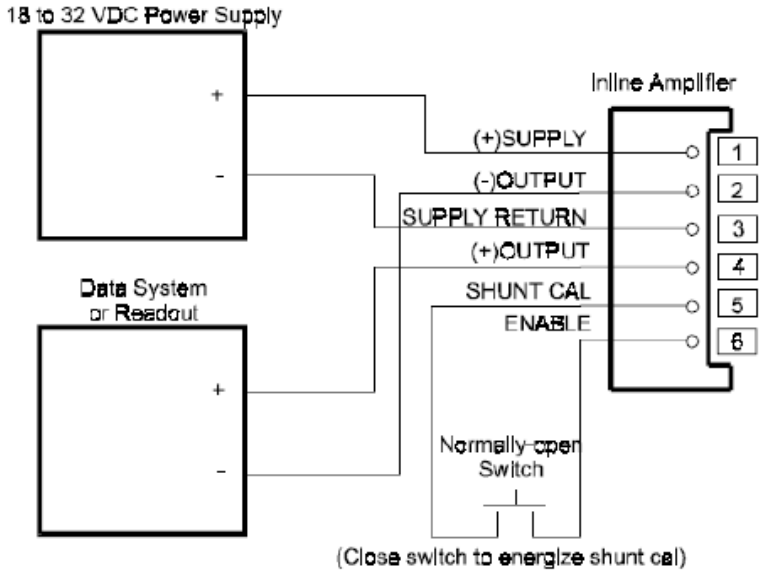


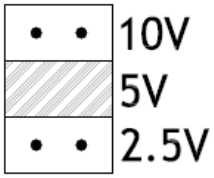
Figure 2-2: 18 to 32 Single Voltage Supply to DCM 495 In-line Wiring

NOTE: (-) OUTPUT and SUPPLY RETURN are connected together internally.

2.2 Setup

Step 1 Determine the excitation voltage for the transducer being used from the calibration certificate or from the label on the transducer.

Step 2 Insert the excitation jumper in the location corresponding to the voltage determined from step 1. See Figure 1-1 for location of the jumper on the amplifier.



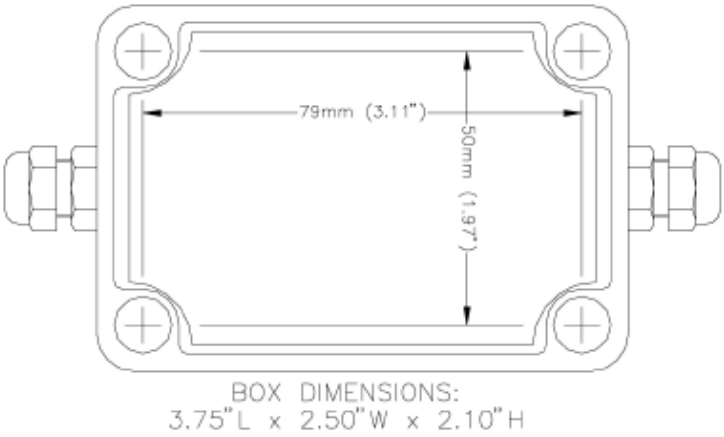
Step 3 Locate the full scale output in mV/V for the transducer on the calibration certificate.

Step 4 From the Coarse Gain Table (Figure 2-3) below, find the nearest sensitivity to that of the transducer and put the corresponding switch or switches to the ON position.

This is the initial setup that will allow you to fully calibrate the DCM 495 with the transducer. The calibration procedure is explained in Chapter 3.

2.3 Panel Mounting Instructions

The DCM 495 In-Line Amplifier can be easily mounted to a panel by using the measurements below. The cover must be removed to have access to the mounting holes. #6 or #8 screws should be used for mounting the box to a panel.



Coarse Gain Setup

Switch Position	Excitation (VDC)		
ON	2.5	5	10
1	4 mV/V	2 mV/V	1 mV/V
2 & 7	6 mV/V	3 mV/V	1.5 mV/V
2	8 mV/V	4 mV/V	2 mV/V
4 & 7	10 mV/V	5 mV/V	2.5 mV/V
3	12 mV/V	6 mV/V	3 mV/V
6 & 8	14 mV/V	7mV/V	3.5 mV/V
4	16 mV/V	8 mV/V	4 mV/V
5	20 mV/V	10 mV/V	5 mV/V
6	24 mV/V	12 mV/V	6 mV/V
7	28 mV/V	14 mV/V	7 mV/V
8	32 mV/V	16 mV/V	8 mV/V

Figure 2-3

Chapter 3 - Calibration

3.1 Calibration

The following calibration process is used to fully calibrate the DCM 495 with the transducer being used.

Connect the DCM 495 to the transducer observing the wiring codes as explained in Chapter 2. Apply power and allow the unit to stabilize for 10-15 minutes before starting the calibration process.

ZERO ADJUSTMENT: With no load or pressure on the transducer and using the ZERO potentiometers, adjust the output on the readout instrument to Zero.

SPAN ADJUSTMENT: Load the transducer to its full scale and using the SPAN potentiometer, adjust the span to indicate the full scale reading on the readout instrument.

Repeat this process to ensure that calibration is completed.

3.2 Using Shunt Calibration

The Cooper DCM 495 features shunt calibration. This calibration method simulates an output from the transducer as if a load or pressure is being applied to it. This is accomplished by placing a known resistance across one leg of the Wheatstone bridge. When performing shunt calibration, the transducer should be at ZERO pressure or load (in other words, no physical load or pressure is to be applied to the transducer). 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 =	_____	Ohms
Shunt Cal Output =	_____	mV/V

The following formulas are used to calculate output voltage and display units:

FORMULA TO CALCULATE OUTPUT VOLTAGE

$$\frac{\text{Shunt Cal Output}}{\text{Full Scale Output}} \times \text{Full Scale Voltage} = \text{Output Voltage}$$

_____ x _____ = _____

FORMULA TO CALCULATE DISPLAY UNITS

$$\frac{\text{Shunt Cal Output}}{\text{Full Scale Output}} \times \text{Full Scale Units} = \text{Display Units}$$

_____ x _____ = _____

3.3 Procedure to Adjust Scaling for Engineering Units

Step 1 Apply power and allow the amplifier to warm up for 10-15 minutes.

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

Step 3 Connect a jumper across PINS 5 & 6 of the power terminals (See Figure 1-1) or wire in a switch as shown in the wiring section. Adjust the SPAN potentiometer to the calculated voltage 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.

Warranty

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 $150 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.