

MODEL DM SIGNAL CONDITIONER- INDICATOR



SENSOTEC

Sensotec, Inc.

**Model DM Signal Conditioner-Indicator
Instruction Manual**

Sensotec Part Number: 008 - 0189 - 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.

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MODEL DM

1.0 Description

The model DM is a complete 4-1/2 digit signal conditioner/indicator for LVDTs or VRTs. The unit is housed in a 1/8 DIN case and utilizes screwdriver-type power and I/O connectors. It also provides adjustments for zero, gain, phase, and scaling. The DM features a +/-5 volt output along with a wide input range. The options are Dual Limits, Peak Detector, or Track-and-Hold.

2.0 Specifications

GENERAL

#Channels	1
Case Material	Noryl Plastic
Temperature, Storage	-20° F to 200° F
Temperature, Operating	0° F to 130° F

TRANSDUCER INTERFACE

Transducer Excitation	5KHz
Type of inputs accepted	LVDT, VRT
Transducer Current Drive	100 mA
Input Gain Range	<1 to 300
Calibration Method	Manual Displacement
Zero Balance	+/-15% F.S. Min.
Noise & Ripple	<300 microvolts
Transducer Min. Imp.	7 ohms

AMPLIFIER CHARACTERISTICS

Full-Scale Output	+/- 5 Volts
Output Impedance	<2 ohms
Accuracy	+/-0.2%
Frequency Response	300 Hz.
Common Mode Rejection	60 db.
Fine Span Adjust	>+/-15%
Coarse Span Adjust	>80%
Fine Zero Adjust	>+/-15%
Coarse Zero Adjust	>+/-20%
Short Circuited Protected	Yes

DIGITAL DISPLAY

# Char. Displayed	4-1/2
Conversions per sec.	3
Scaling	+/-19999
Scaling Method	Potentiometer
Polarity Indication	"-" For Negative
Decimal Pt. Selection	Jumper (non-solder)
Display Size	0.56"
Overrange Indication	Flashing Display
Resolution	1/20000
Type	LED

PHYSICAL

Input/Output Connector	Screwdriver Terminals
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CHARACTERISTICS

Weight	2 lbs.
Mounting	Bench, Panel, or Rack
Size	1/8 DIN

POWER SUPPLY

Power Requirements	115VAC/220VAC (factory set/field changeable)
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3.0 Installation and Wiring

The model DM is shipped in a single container, Prior to energizing it, inspect the unit for damage by gently shaking and listening for loose components. Report shipping damage to the carrier; it is their responsibility to safely transport the unit to the customer. If there is transportation damage and you have difficulty getting proper adjustment, contact SENSOTEC at (614)-486-7723. We will attempt to assist in resolving the situation.

3.1 Mounting the Unit

For panel mounting, cut a rectangular horizontal hole 3.58" in width by 1.73" in height. Remove the panel mounting brackets by unsnapping them from the sides of the Model DM through the panel cutout and reattach the brackets. Using a small screwdriver, tighten the bracket adjusting screws until the case is pulled tightly to the panel. Figure 1 depicts the Model DM's dimensions.

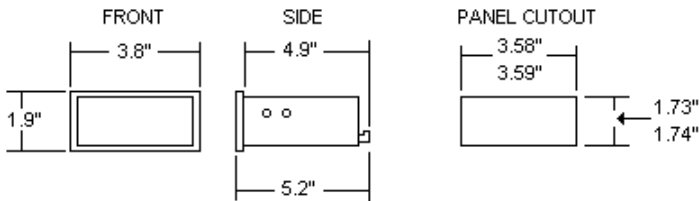


Figure 1 - Model DM Mounting Dimensions

3.2 Wiring

All connections to the Model DM are made through the rear-panel 15-pin connector. Terminal 1 is AC HI; terminal 15 is +EXC. This connector may be separated from the DM for wiring by gently pulling it loose. Figure 2 shows the rear-panel connector along with its pin configuration.

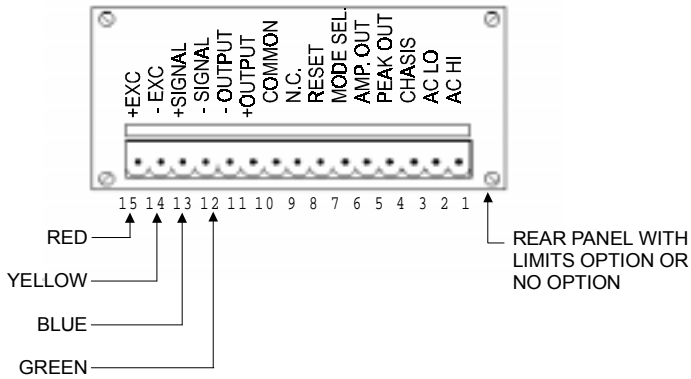


Figure 2 - Model DM control locations

3.2.1 Power

Connect 110V, 60 HZ AC power to pins 1 (HI), 2 (LO), and 3 (CHASSIS). Optional 220V, 50Hz AC power may also be connected to the DM. Contact SENSOTEC for instructions on this modification.

3.2.2 Transducer

The Model DM will accept 4-wire LVDT or 3-wire VRT transducers. Connect either sensor type to the Model DM by use of pins 15 (+EXC), 14 (-EXC), 13 (+SIGNAL), and 12 (-SIGNAL). For VRT transducers connect a proper load resistance (see the transducer manual) between pins 13 and 12, and connect a jumper between pins 12 (-signal) and 11 (-output).

3.2.3 Output

A 0-5V output may be obtained from pins 10 (+OUTPUT) and 11 (-OUTPUT).

4.0 Initial Adjustments / Setup

The Model DM may be setup for operation by adjusting the zero, span, phase, and scaling potentiometers. Figure 3 illustrates the Model DM's control locations.

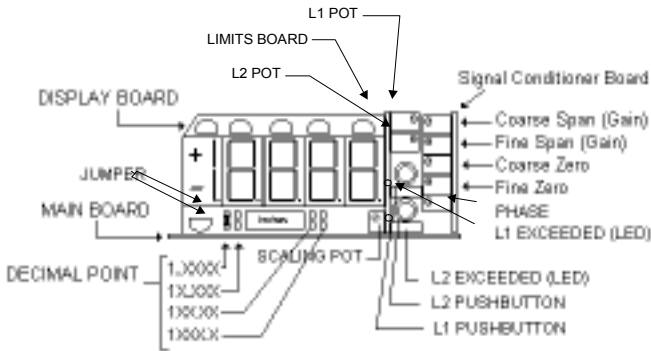


Figure 3- Model DM control locations

4.1 Calibrating the Model DM for Operation

For all the described adjustments, the attached transducer should not have an applied stimulus unless noted otherwise. For an LVDT, this means that the armature should be close to its center position.

4.1.1 Zero Adjustment

1. Remove the bezel and front panel with a small screwdriver.
2. Apply power to the unit. Ten minutes warmup is suggested.
3. Apply a zero signal to the input. This can be done by installing a temporary jumper between the +SIGNAL (13) and -SIGNAL (12) terminals and one between the -SIGNAL (12) and -OUTPUT (11) terminals.
4. Adjust the COARSE and FINE ZERO potentiometers to give an output voltage on terminals 10 (+OUTPUT) and 11 (-OUTPUT) of zero volts.
5. Remove the jumpers and adjust the sensor to obtain a minimum voltage reading. This step locates the mechanical null of the transducer.
6. Adjust the FINE ZERO potentiometer for an output of zero. The display should also read zero.

4.1.2 Gain and Phase Adjustment

Gain adjustment requires displacing the transducer a known amount. Use this known amount to calculate the expected voltage output of the Model DM as follows:

$$\text{EXP. OUTPUT} = \frac{\text{Known Displacement}}{\text{Full-Scale Displacement}} \times 5\text{V}$$

1. Displace the transducer the known amount.
2. Use a voltmeter to monitor the output on pins 11 (-OUTPUT) and 10 (+OUTPUT). Adjust the phase potentiometer until a peak output is seen. If the polarity of the signal is not correct, it can be changed by moving a jumper on the signal conditioner board. Refer to section 4.2 for this procedure.
3. Vary the COARSE and FINE SPAN potentiometers to give the expected voltage output, as calculated above.
4. Adjust the scaling potentiometer to give the proper meter reading while the transducer is displaced the known amount.

4.1.3 Operative Adjustments

Transducers usually have some small amount of zero drift, usually the result of temperature change at the transducer itself. It may be necessary during normal operation to readjust the zero. This can be done by using the front panel FINE ZERO potentiometer.

4.2 Changing the Signal Polarity

1. Unplug AC power and remove the bezel and front panel.
2. Carefully remove the unit from its housing and unplug the signal conditioner card.
3. Locate and change the POLARITY jumper. Refer to Figure 4.
4. Plug in the signal conditioner card and reassemble the unit.

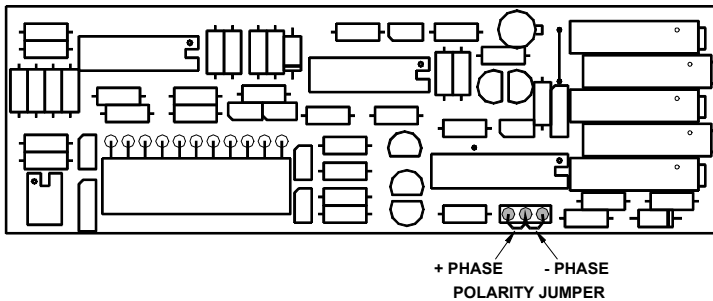


Figure 4 - Model DM Signal Conditioner Card

5.0 Options

High/Low Limits, Peak Detection, or Track-and-Hold options are available as factory or field installable cards. Due to the small size of the Model DM, only one of these cards can be installed in the unit.

5.1 Option Card Installation

1. Unplug AC power and remove the bezel and front panel.
2. Carefully remove the unit from its housing.
3. Remove the plug-in jumper from the otherwise empty socket parallel to the vertical Signal Conditioner Board. Keep the jumper! It must be reinstalled on pins 6 and 7 (counting from the front) if the unit is to be used again without an option card.
4. Plug the option card into the empty socket.
5. Reassemble the unit. Be sure to use the new front panel.

5.2 High/Low Limits Option

The Model DM Limits Option continuously compares the transducer signal to two adjustable set points called "limits". L1 is the high limit and L2 is the low limit. This option energizes relays when the signal level exceeds the limit setting as illustrated in Figure 5. The relays are rated at 24V 1A, or 48V 0.5A. The relay's contact closures are shown in Figure 6. LED indicators, located below the limit push buttons, also light when a signal exceeds a limit.

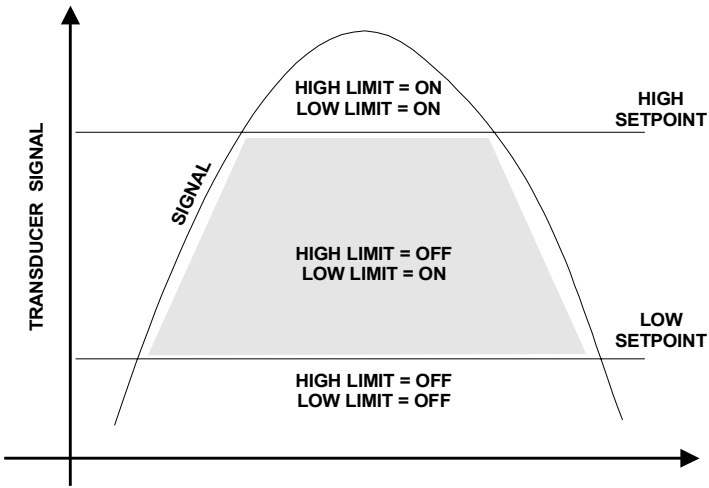


Figure 5 - Limit Operation

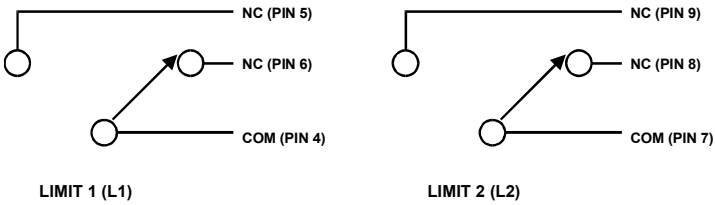


Figure 6 - Limit closures

5.2.1 Setting the Limits

1. Unplug AC power and remove the bezel and front panel.
2. Power the unit and depress the desired limits push button (L1 or L2).
3. Adjust the proper (L1 or L2) potentiometer to give the desired value.
4. Reassemble the unit.

5.2.2. Changing the Hysteresis

1. Unplug the AC power and remove the bezel and front panel.
2. Remove the main board and unplug the limit card.
3. Locate and change the hysteresis jumper. Refer to Figure 7 for location and correct settings.
4. Reassemble the unit.

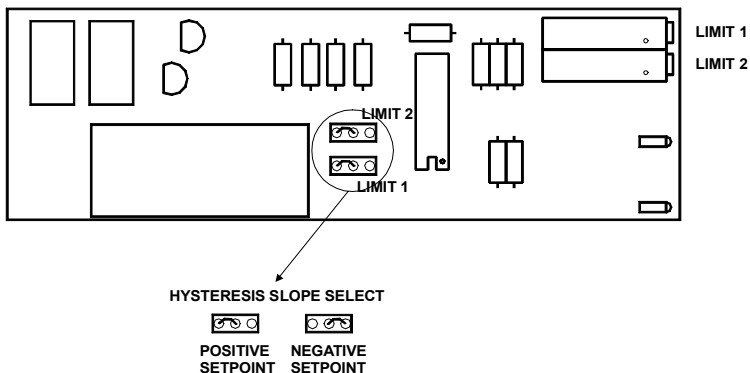


Figure 7 - Hysteresis Jumper Locations

5.3 Peak Detector Option

The Model DM Peak Detector Option detects the highest positive signal value attained since the peak detector was last reset. Reset can be accomplished by either pressing the front panel RST button or momentarily interconnecting the RESET (7) and COMMON (9) terminals on the rear connector. Further, the PEAK OUT (4) will constantly monitor the peak detector output signal, and the AMP OUT (6) and display will normally monitor the amplifier output, but will shift to monitor the peak detector output when one of two conditions occurs:

1. The front panel PK button is pressed.
2. The MODE SEL (6) and COMMON (9) rear panel terminals are interconnected.

Shown in Figure 8 are the rear panel pin locations for the peak detector option.

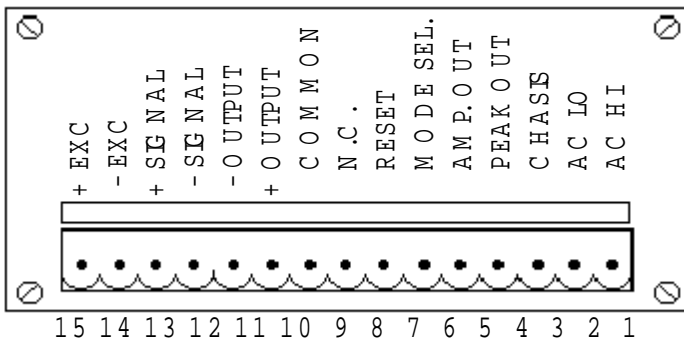


Figure 8 - Peak Detector Pin Locations

5.4 Track-and-Hold Option

The Model DM Track-and-Hold option permits the DM to stop tracking an input signal upon command. This command is initiated by the front panel HOLD button; the first push activates the feature and the next one deactivates it. When the Track-and-Hold feature is in the "hold" mode, the front HOLD light is illuminated. The "hold" feature can also be activated through the rear panel by interconnecting the COMMON (9) and HOLD (6) terminals. The OUTPUT (10 and 11) terminals track the input signal until the "hold" mode is activated and then lock onto the last value prior to this condition. The AMP OUT (5) terminal monitors the amplified input signal regardless of the hold function condition. Figure 9 shows the rear panel pin connections for the Track-and-Hold option.

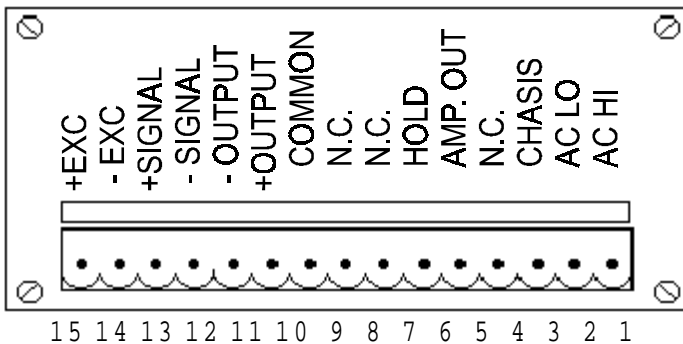


Figure 9 - Track-and-Hold Pin Locations

6.0 Trouble Shooting Guide

Symptom/Problem Action/Solution

Erratic Display	Check electrical connections for continuity and wiring code for pin layout. Refer to Section 3.2
No Display No Voltage Out.	Check power connections. Refer to Section 3.2.1
Blinking Display	Indicates a signal level greater than full scale; check wire connections and transducer range.
Incorrect Readout Value	Check transducer range on label. Verify that system was set-up correctly. See Section 4.0. Refer to transducer trouble shooting guide and verify transducer operation.
Limit 1 or 2 fails to trip relay at setpoint	Check installation of Limit Card. Section 5.1 Check wiring. See Section 5.2, Figure 6.
Peak detector won't reset	Check installation of Peak Detector Card. See Section 5.1
Track-and-Hold unit will not hold signal when front panel switch is pushed	Check installation of Track-and-Hold card. See Section 5.1 Check wiring. See Section 5.4, Figure 8. Verify that HOLD light is coming on in the hold mode.

7.0 Drawings

Customers desiring to repair failed boards themselves can request appropriate drawings from SENSOTEC, at a nominal charge. Note that any attempt to repair the unit by anyone other than SENSOTEC's Customer Service Department voids the product warranty.

APPENDIX

A.1.1 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.

A.1.2 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.

A.1.3 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 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.

A.1.4 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.