Instruction Manual
DC-Operated
LVDT
Signal Conditioner
Model DCM-1000

Macro Sensors™

Division Of

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DESCRIPTION

The DCM-1000 is a compact single channel DC-operated signal conditioner capable of providing conditioning of most LVDTs and RVDTs. Operating from ±15 V DC, the DCM-1000 provides all circuitry required to operate an LVDT position sensor and provide a high level, low noise analog DC output suitable for feeding analog or digital indicators, PLCs, and other system indicating and control instrumentation. The DCM-1000 features user-selectable excitation frequency and gain to permit use with sensors having widely varying sensitivities. Connections can be made either through a PC board edge connector (mating connector optional) or to solder terminals located on the PC board. Board-mounted standoffs, threaded 6-32, are provided to facilitate mounting.

SPECIFICATIONS

Power Input Voltage & Current...............±15 V DC, 50 mA max.
LVDT Excitation Voltage.......…………..................3 V rms (Nom)
LVDT Excitation Freq...........…...............3 kHz, 5 kHz or 10 kHz
LVDT Primary Impedance................................200 Ohms (min.)
Output Voltage........................…...................................±10 V DC
Output Current........................…......................................5 mA
Frequency Response....................…....................-3 db at 250 Hz
Output Ripple.............................…........................<10 mV rms
Output Impedance..........……......................................<10 Ohms
Nonlinearity........................……...............................±0.01% FSO
Operating Temp. Range...……......0°F to +160°F(-18°C to +70°C)
Temp. Coeff. of Sens..........……..0.01% FSO/°F (0.018% FSO/°C)
Controls.............................……….......................Zero and Span
Weight..................................……........0.8 ounces (24 grams)
Mating Connector (Optional)..………..Cinch #50-10A-20 or equiv.

CONNECTIONS

Connections to the DCM-1000 must be made in accordance with Figure 1 shown below. The DCM-1000 may be plugged into a PC board edge connector(optional) or connections may be made to the solder pin terminals located adjacent to the edge connector fingers. Be sure that power supply common and output low are connected as shown to ensure proper operation

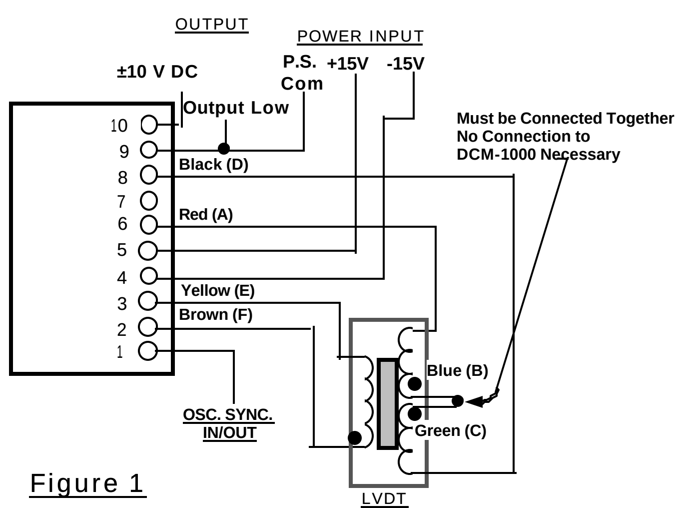

Figure 1

Connection Diagram

Wiring Note: The wire colors and/or letters shown in the connection diagram apply only to Macro Sensors' standard AC LVDTs with 6 lead wires or 6-pin connectors. For LVDTs with other terminations such as BB series gaging probes or SQ series heavy duty LVDTs, or for extension cables used with LVDTs, consult the data sheet accompanying the LVDT or cable for the correct color codes or terminal connections. Connect the LVDT's primary and secondaries to the signal conditioner according to the wiring diagram, observing the magnetic polarity dots on the LVDT winding schematic.

EXCITATION FREQUENCY SELECTION

The DCM-1000 has three user-selectable LVDT excitation frequencies. The frequency is normally set to match the specifications and/or recommended operating frequency of the LVDT being used. As shipped from the factory, the unit is set for 3 kHz frequency, which is common to many LVDTs. Frequency is changed by positioning jumpers(shorting bars) on S1, S2 or S3. (see Figure 2). As supplied, a jumper is positioned across S1 as shown in Figure 2. To obtain 5 kHz move the jumper from S1 to S2. To obtain 10 kHz, move the jumper from S1 to S3.

OUTPUT GAIN SELECTION

The DCM-1000 can operate with LVDTs having a wide range of sensitivities. Coarse gain selection adjustment is provided to permit operation with most LVDTs. To set coarse gain, the AC full scale output of the LVDT being used must be determined by performing a calculation as follows:

Sensitivity in Volts/.001" X Excitation Voltage X Full Stroke in thousandths of an inch = Full Scale Output (V AC rms)

Example 1:±0.050" Stroke LVDT
Sensitivity: 0.0065 V/.001" X 3 V rms X 50 (stroke in .001") = 0.975 V rms full scale output

Example 2:±1.000" Stroke LVDT
Sensitivity: 0.00065 V/.001" X 3 V rms X 1000 (stroke in .001") = 1.95 V rms full scale output.

Gain may be adjusted by placing jumpers (shorting bars) S4, S5, S6 and S7 as shown in table below. Placing jumpers as instructed below will yield a ±10V DC output at full scale displacement of the LVDT.

GAIN SELECTION TABLE

LVDT Full Scale Output	S4	S5	S6	S7
0 - 0.3V	Open	Open	Open	Open
0.31V - 0.6V	Open	Jumper	Open	Open
0.61V - 2.5V	Open	Jumper	Open	Jumper
2.51V - 5.5V	Jumper	Open	Jumper	Open

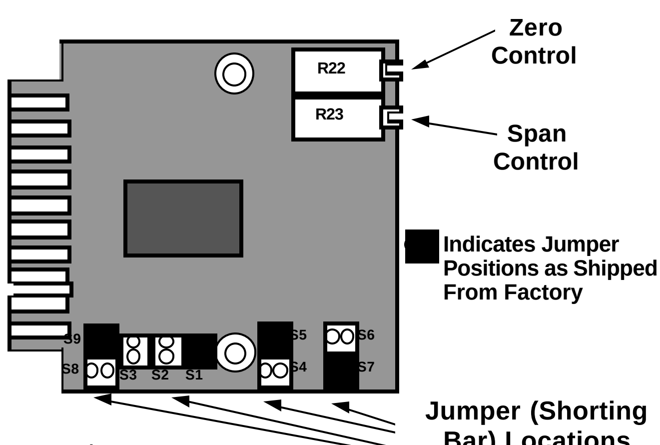

Figure 2

MULTI-CHANNEL APPLICATIONS

A requirement may exist where multiple DCM-1000s are to be used and where units or wiring will be located in close proximity to each other. The DCM-1000 can synchronize the oscillators of multiple units to prevent crosstalk, beating, and intermodulation between units. To synchronize the oscillators, Pin 1 should be connected together on all units, and pin 9 of all units should be connected together. One unit should be designated as the Master and the balance of the units designated as Slaves. The Master unit's excitation frequency must be set in accordance with the instructions given in the paragraph entitled "EXCITATION FREQUENCY SELECTION". The Slave units must have a jumper (shorting bar) on S8. On Slave units only, all jumpers (shorting bars) must be removed from S1, S2, S3 and S9. On the Master unit, the jumper must be on S9 instead of S8.

CALIBRATION PROCEDURE

To calibrate, remove LVDT secondary wire, usually Black or (D) from pin 8. Insert a temporary jumper between pins 6 and 8 (this jumper will be removed after null adjustment). Apply DC power to unit and allow a 3-5 minute warm-up. Adjust the Zero control until a reading of 0 V DC is obtained. Turn off power to unit and remove temporary jumper from pins 6 and 8. Re-connect secondary wire Black or (D) to pin 8. Apply power to unit. Adjust the core or body of the LVDT until 0 V DC output is obtained. This position is the null point of the sensor, the reference point from which subsequent position measurements are made.

NOTE: If mechanical adjustment of the core or LVDT body is difficult, try to get as close to null as possible and adjust the Zero control to obtain 0 V DC output. It is best that the LVDT be within 5% of its true null position to ensure that full displacement is within the LVDTs rated linear range. Offsets of more than 5% can cause non-linear results near full scale displacement..

Move the LVDT core to its full scale displacement and adjust the Span control to obtain a reading of 10 V DC. Outputs of less than 10V DC may be obtained by adjusting the Span control (i.e. 5 V DC). If desired full scale output c annot be obtained by Span adjustment, reset gain jumpers (shorting bars) to next higher or lower setting as shown in "GAIN SELECTION TABLE" and re-adjust Span control to obtain desired output.

Unit is now ready for normal operation.

CALIBRATION FOR 100% ZERO OFFSET

100% zero offset allows the user to obtain a unipolar output over the total range of the LVDT.

Follow the above instructions for full scale use, but adjust Span control at 'plus' full scale displacement for half the desired full scale output. Move the LVDT core to 'minus' full scale displacement and adjust the Zero control to obtain 0 V DC output. Move the LVDT core to 'plus' full scale displacement and adjust the Span control for desired full scale output. Repeat the above procedure to ensure proper calibration.

Unit is now ready for operation with unipolar output.

DIRECTIONAL SENSE

If the slope of the analog output voltage is the reverse of the desired slope, i.e., if the output voltage increases or decreases opposite to the desired direction of core motion, reverse the LVDT connections to terminals 6 and 8