Instruction Manual
Line Power Operated LVDT Signal Conditioner
Model LPC-2100

MACRO SENSORS™
Division Of Howard A. Schaevitz Technologies, Inc.

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DESCRIPTION

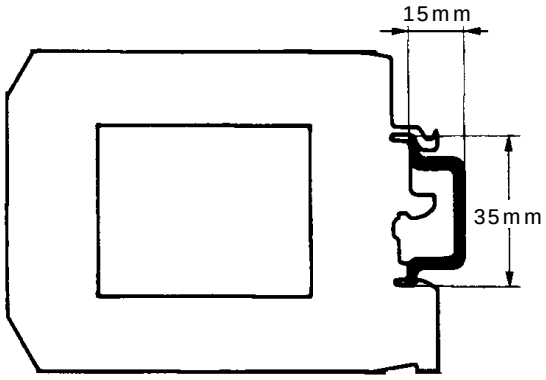
The LPC-2100 is a compact, single channel AC-operated signal conditioner capable of operating most LVDTs and RVDTs. Operating from 115V or 220V AC,50-60 Hz, an LPC-2100 provides all necessary circuitry required to operate an LVDT position sensor and provide a high level, low noise analog DC output suitable for feeding analog or digital indicators, PLCs and other system indicating and control instrumentation or a 4-20 mA 3-wire current loop output.The LPC-2100 features user-selectable excitation frequency and gain to permit use with sensors having widely varying sensitivities. Connections are made via recessed screw terminals at the top and bottom of the case which mounts on DIN 1 or DIN 3 type rail.

SPECIFICATIONS

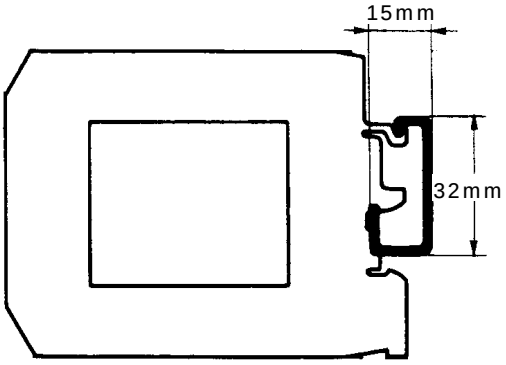
Power Input Voltage.....115 or 220 V AC, 50-60Hz, 2.5VA
LVDT Excitation Voltage.....3V rms (Nom.)
LVDT Excitation Freq.....3kHz, 5kHz or 10kHz
LVDT Input Impedance.....200 Ohms (min.)
Output, Voltage Mode.....±10V DC @ 5mA
Output,Current Mode.....4-20 mA sourcing, 500 Ohms max
Frequency Response.....-3db at 250Hz
Output Ripple.....<10mV 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.....7 ounces (200 grams)

MOUNTING

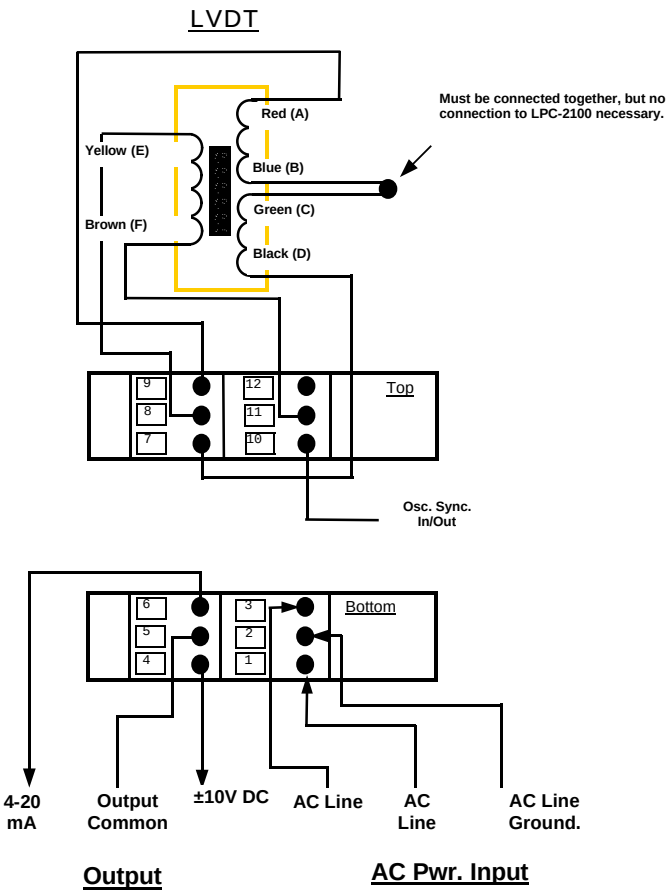
The LPC-2100 is designed to mount on the DIN rail mounting system, including DIN 1, 32mm X 15mm asymetrical or DIN 3, 35mm X 7.5mm or 15mm, symmetrical rails as illustrated below.



DIN 3 Mounting



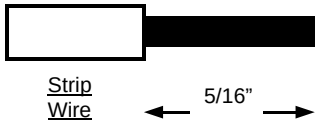
DIN 1 Mounting

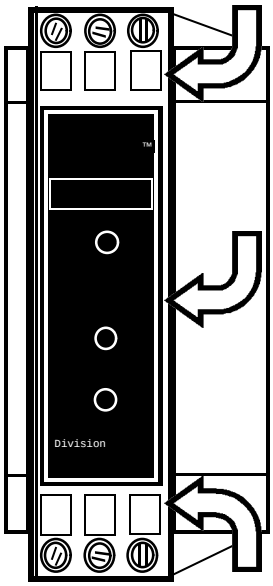


Wiring Note: The wire colors and/or letters shown in the connection diagram apply only to Macro Sensors' standard AC LVDTs with 6 lead wires or 6-pin connectors. For LVDTs with other terminations such as BB series gaging probes or SQ series heavy duty LVDTs, or for extension cables used with LVDTs, consult 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.

CONNECTIONS

All wire connections to the LPC-2100 are through industry standard recessed screw clamp terminals that will accept wire sizes from #28AWG to #12 AWG, either solid or stranded. Wires should be stripped 5/16" which will provide the proper length of conductor without exposing any bare wire. Line power input wiring should utilize a minimum size of #18AWG. **Be sure to de-energize line power prior to making power connections.**





INTERNAL ACCESS

It may be necessary to gain access to the inside of the LPC-2100 to adjust excitation frequency and/or gain jumpers. **De-energize line power.** Using a knife blade, small screwdriver or similar tool, gently pry off the cover at points indicated in adjoining figure.

WARNING !

Dangerous voltages are present inside energized unit ! Be sure to de-energize unit prior to removal of cover !

EXCITATION FREQUENCY SELECTION

The LPC-2100 has three user-selectable LVDT excitation frequencies. The desired 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 to provide 3k Hz LVDT excitation frequency which is common to many LVDTs. Frequency is changed by jumpers (shorting bars) on S1, S2 and S3. (see Figure 1). As supplied, a jumper is positioned across S1 as shown in Figure 1. To obtain 5k Hz, move the jumper from S1 to S2. To obtain 10k Hz, move the jumper from S1 to S3. **WARNING! Unit must be de-energized when cover is removed. Dangerous voltages are present inside energized unit !**

OUTPUT GAIN SELECTION

The LPC-2100 can operate with LVDTs having a wide range of sensitivities. Coarse gain selection 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 the following calculation:

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: 0.0065V/.001" X 3V rms X 50 (1/2 range in .001") = 0.975V AC, rms Full Scale LVDT Output

Example 2: ±1.000" Stroke LVDT
Sensitivity: 0.00065V/.001" X 3V rms X 1000 (1/2 range in .001") = 1.95V AC, rms Full Scale LVDT Output

Gain may be adjusted by placing jumpers (shorting bars) in positions shown in the table below. Adjustments are made to S4, S5, S6 and S7.

Placing jumpers as instructed below will yield a ±10V DC full scale output.

GAIN SELECTION TABLE

LVDT Full Scale Output AC Volts	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

See next page for jumper locations.

Indicates Jumper positions as shipped from factory

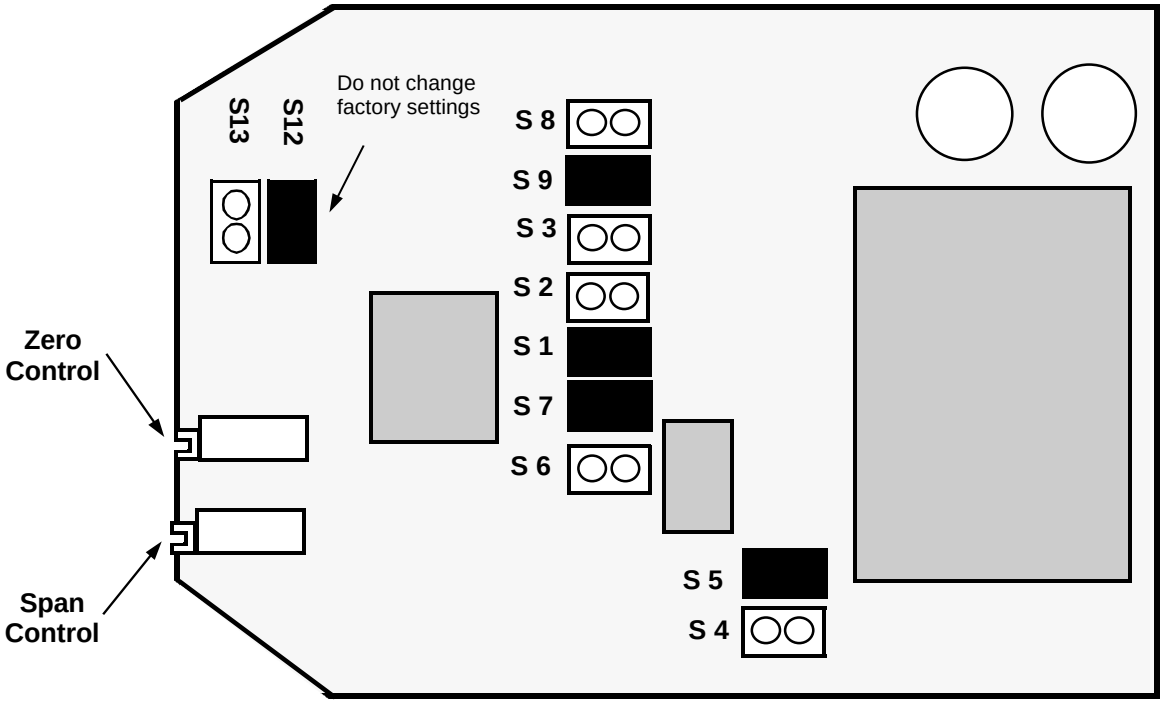
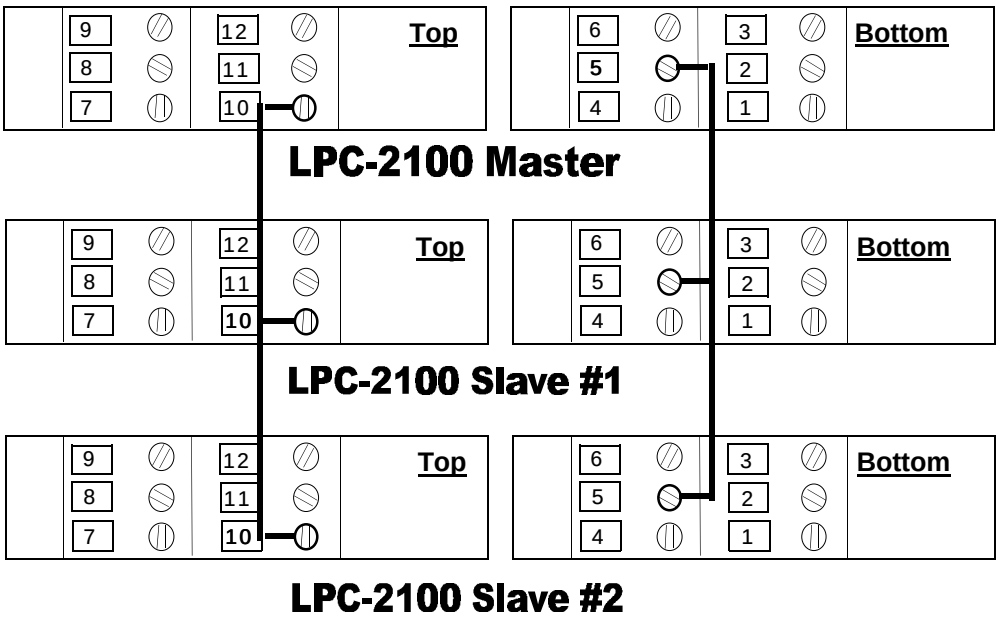


Figure 1

MULTI-CHANNEL APPLICATIONS

A requirement may exist where multiple LPC-2100s are to be used and where units or wiring will be located in close proximity to each other. The LPC-2100 can synchronize the oscillators of multiple units to prevent crosstalk, beating and intermodulation between units. To synchronize the oscillators, connect together terminal 5 on all units and connect together terminal 10 on all units. These connections are <u>in addition to</u> the connections shown on page 4. 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". On "Master" unit, move jumper from S8 to S9. 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.



<u>Additional Connections For LPC-2100 Multi-channel "Master/Slave" Configuration</u>

CALIBRATION PROCEDURE(Voltage Output)

To calibrate, remove LVDT secondary wire, usually Red or (A) from terminal 9. Insert temporary jumper between terminals 7 and 9 (this jumper will be removed after Zero adjustment). Apply AC power to unit and allow a 3-5 minute warm-up. Adjust the Zero control until an output of 0V DC is obtained between terminal 4 and 5. De-energize unit and remove temporary jumper from between terminals 7 and 9. Re-connect secondary wire Red or (A) to terminal 9. Apply power to unit and move core or LVDT body until an output of 0V DC is obtained. This position is the true null of the sensor and the reference point from which subsequent measurements are made.

NOTE: If mechanical adjustment of the core or LVDT body is difficult or impossible, make this adjustment as close as possible and then adjust the Zero control to obtain 0V DC output. It is important that the LVDT be within 5% of its true null position to insure that full displacement is within the LVDTs rated linear range. Offsets of more than 5% may result in non-linear results at or near full scale displacement.

Move the LVDT core to its full scale displacement and adjust the Span control to obtain a reading of 10V DC. Outputs of less than 10V DC may be obtained by adjustment of the Span control (**e.g.** 5V DC). If desired full scale output cannot be obtained by Span control adjustment, reset gain jumpers (shorting bars) to next higher or lower setting as shown in "GAIN SELECTION" table on page 7 and then re-adjust Span control to obtain desired output. **If it is necessary to reset gain jumpers, be sure to de-energize unit prior to removing cover.**

Unit is now ready for normal operation.

CALIBRATION FOR 100% ZERO OFFSET (Voltage Output)

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

Follow the instructions as described in the "CALIBRATION PROCEDURE" section for full scale use, but adjust the Span control for half the desired full scale output (e.g. 5V DC). Move the LVDT core to "minus" full scale displacement and adjust the Zero control to obtain zero output. Move the LVDT core to "plus" full scale displacement and adjust the Span control for desired full scale output. Repeat this procedure to insure proper calibration.

Unit is now ready for unipolar operation.

CALIBRATION FOR 4-20mA CURRENT LOOP OUTPUT

To calibrate unit for current output, make sure that output connections are made between Terminals 5 and 6. Remove LVDT secondary wire, usually Red (A) from Terminal 9. Insert temporary jumper between terminals 7 and 9 (this jumper will be removed after zero adjustment). Apply AC power to unit and allow a 3-5 minute warm-up. Adjust Zero control until a reading of 12mA is obtained. De-energize unit and remove jumper from between Terminals 7 and 9. Re-connect secondary wire Red (A) to Terminal 9. Apply power to unit. Move LVDT core or body until 12 mA output is obtained. This position is the true null position of the sensor and the point from which subsequent measurements are made.

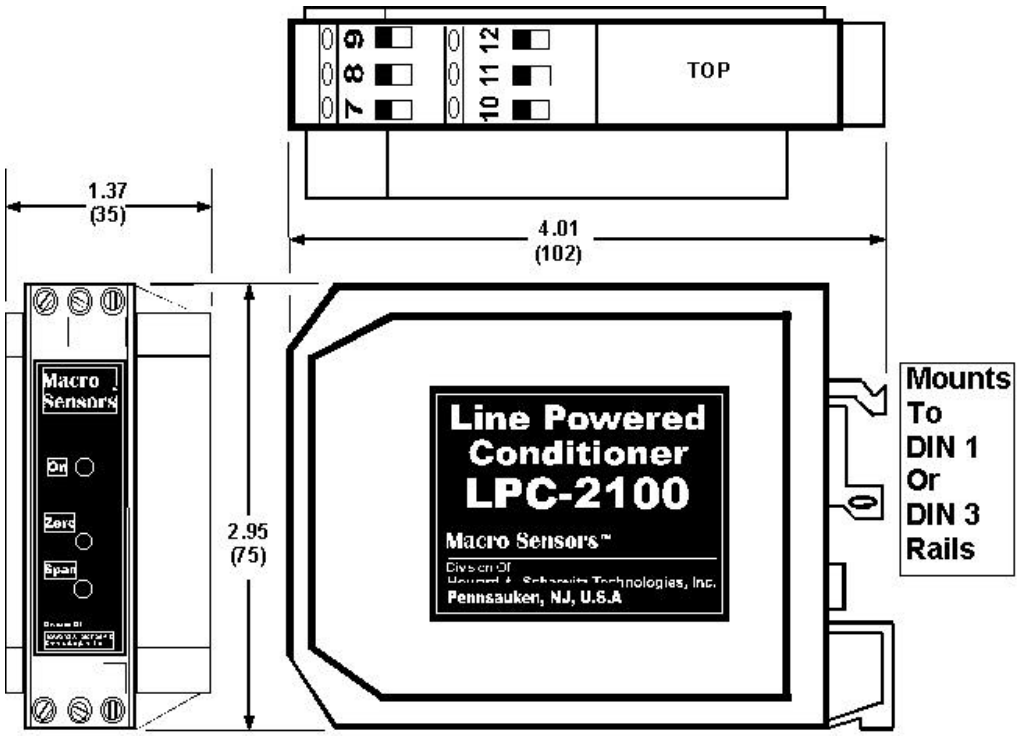
NOTE: If mechanical adjustment of the core or LVDT body is difficult or impossible, make this adjustment as close as possible and then adjust the Zero control to obtain 12mA output. It is important that the LVDT be within 5% of its true null position to insure that full displacement is within the LVDTs rated linear range. Offsets of more than 5% may result in non-linear results at or near the full scale displacement.

Move the LVDT core to its "plus" full scale displacement and adjust the Span control to obtain a reading of 20 mA. Return the core to "minus" full scale position and adjust the Zero control to obtain a reading of 4 mA. Move the core to the "plus" full scale popsition and adjust the Span control to obtain a 20 mA reading. Repeat the above procedure to obtain proper output at both extremes of the core travel.

Unit is now ready for current output operation.

Directional Sense

If the slope of the analog output voltage or current is the reverse of the desired slope, i.e., if the output voltage or current increases or decreases opposite to the desired direction of core movement, reverse the LVDT connections to terminal 7 and 9.



OUTLINE