TIGER FAMILY

- 5-digit, 7-segment 0.56” (14.2 mm) LED Display
- 1/8 DIN Case
- 3-button Front Panel Operation

LVDT-100

Single LVDT Controllers Positioning & Displacement

The easiest solution to single input LVDT display and control applications

Introduction

The LVDT-100 series are LVDT (Linear Variable Differential Transformer) indicators that deliver precise measurement and indication for applications using a single LVDT input.

The 5-digit, 7-segment LED display provides configuration setup prompts for LVDT parameters using intuitive, easy to follow text menus.

Setup

- Select 50 or 60 Hz supply frequency.
- Select excitation frequencies:

  50 Hz: 1.2, 1.6, 2.4, 3.2, 4.8, 6.4, 8.0, 9.6 kHz excitation.

  60 Hz: 1.44, 1.92, 2.88, 3.84, 5.76, 7.68, 9.60, 11.52 kHz excitation.
- Select LVDT output rate: 4, 10, 20, or 40 readings per second.
- Select decimal point position setting with resolution to 0.0001 of any engineering unit.

Calibration

- Locate the sensor NULL position.
- **Input Signal Calibration:** Perform 2-point zero and span input signal calibration setting.
- **Analog Output Signal Calibration:** Calibrate analog output milliamp or voltage output low and high settings.

Analog Output Scaling

Set the analog output low (zero) and high (full scale) range settings.

Setpoints

Four independent setpoints with individually configured setpoint actuation values, preprogrammed for above or below activation:

- Lo 1, Lo 2 activates below value.
- hi 1, hi 2 activates above value.

Options

- **Relays:** Up to four 5 amp relays.
- **Analog Output**

  Standard: Fully scalable from 0/4 to 20 mA (or reverse).

  Options: Single 0 to 10 V DC (or reverse).
- **Display Zero**

  Preprogrammed function requires customer supplied switch to operate.
- **Reset Display Value**

  Preprogrammed function requires customer supplied switch to operate.

Table of Contents

Specifications

General

Digital Display: 7-segment, 0.56” (14.2 mm) LEDs.

Display Color: Red

Display Range: -19999 to 99999.

Display Update Rate: 10 times per second.

Display Dimming: 8 brightness levels. Front panel selectable.

Polarity: Assumed positive. Displays – negative.

Annunciators: 6 red LEDs on front panel.

Overrange Indication: oUEr

Underrange Indication: undEr

Front Panel Controls: PROGRAM, UP, and DOWN buttons.

Power Supplies

Standard high voltage AC / DC power supply 85-265 V AC / 95-370 V DC.

Optional low voltage AC / DC power supply 18-48 V AC / 10-72 V DC.

Environmental

Operating Temperature: 0 °C to 50 °C (32 °F to 122 °F).

Storage Temperature: -20 °C to 70 °C (-4 °F to 158 °F).

Relative Humidity: 95% (non-condensing) at 40 °C (104 °F).

Mechanical

Case Dimensions: 1/8 DIN, 96x48 mm (3.78” x 1.89”).

Case Depth: 137 mm maximum (5.39”).

Case Material: 94V-0 UL rated self-extinguishing polycarbonate.

Weight: 11.5 oz (0.79 lbs), 14 oz (0.96 lbs) when packed.

Approvals

UL: E469078

LVDT Input

Excitation Voltage: 3 V RMS sine wave, zero DC component THD <2% (1.2 kHz).

Excitation Frequency: x 16 selectable frequencies available (1.2 kHz to 11.5 kHz). Crystal locked, software driven.

Temperature Coefficient: ± 50 ppm/ ° C of full scale (typical).

LVDT Input: 30 kΩ input impedence. Synchronous demodulation of excitation carrier. >130 db rejection of excitation carrier.

Frequency Response: 500 Hz (–3 db) low-pass filter.

Analog to Digital: Single channel ΣΔ A/D convertor approaching 19-bit resolution. Ratiometric operation relative to excitation voltage magnitude.

Output Rate: 10 Hz averaged response output.

Line Frequency Rejection: 50 / 60 Hz noise rejection.

Relays

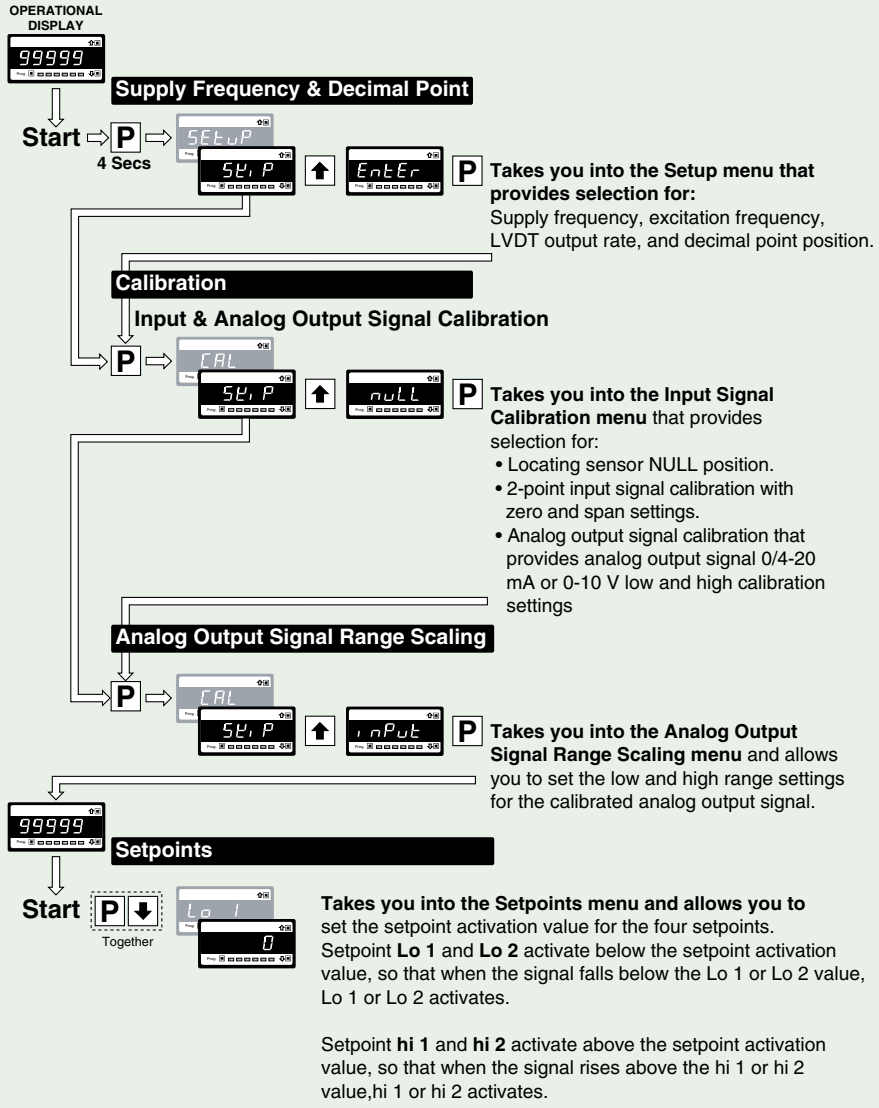
Plugs into carrier board from rear:

Four 5 A Form A Relays.

Form A Relay Specifications: 5 A 240 VAC. Isolation 3000 V. UL and CSA listed.

Configuration Menu

The Configuration Menu shown opposite is a flow diagram of the LVDT-100 Series configuration menus and describes the settings and parameters that can be applied in each menu.



Supply Frequency & Decimal Point

The **supply frequency and decimal point** menu allows you to configure:

- The power supply frequency.
- The excitation frequency.
- The LVDT output rate.
- The position of the decimal point.

Calibration

The **LVDT input signal calibration** menu allows you to set the null position of the sensor, if required, and also allows you to perform a 2-point zero and span calibration of the input signal.

The **analog output signal calibration** menu allows you to calibrate the analog output's milliamp or voltage output to suit your application.

Calibrating the analog output requires setting the milliamp or voltage output low [CAL_L] and high [CAL_h] parameters using a multimeter connected to the analog output signal (See Figure 1 for a LVDT-100 Series to multimeter connection diagram). The calibrated low and high outputs can be set anywhere between –0.3 to +21 mA for current or –0.3 V to +10.5 V for voltage.

Once the milliamp or voltage output is calibrated, the analog output range can be easily rescaled [An Lo] [An hi] using the analog output scaling mode without having to recalibrate the milliamp or voltage output. The calibrated low and high milliamp or voltage output signal values follow the new span range.

See **Analog Output Procedures** for an analog milliamp or voltage output calibration procedure.

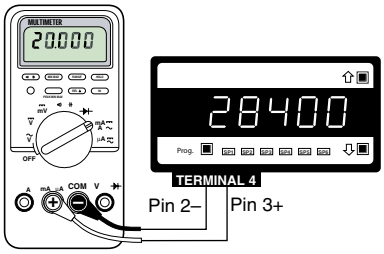


Figure 1 – Multimeter Connections

Analog Output Signal Range Scaling

The analog output module is a standard single channel, programmable, isolated, 16-bit analog output that can be scaled to any desired span between –19999 to 99999 display counts using the **analog output signal range scaling** menu.

Optional single channel 0-10 V DC analog output module is also available.

See **Analog Output Procedures** for an analog output selection header position.

-Display Zero and Reset Display Value

The LVDT-100 Series indicators are programmed with a **display zero** and **reset display value** function. The **display zero** function is used to zero the display when the sensor is in any position.

Display zero is initiated from a remote switch (not supplied) connected across the **common** and **hold** pins at the rear of the controller (Terminal 2: Pin 4 Common, Pin 2 Hold).

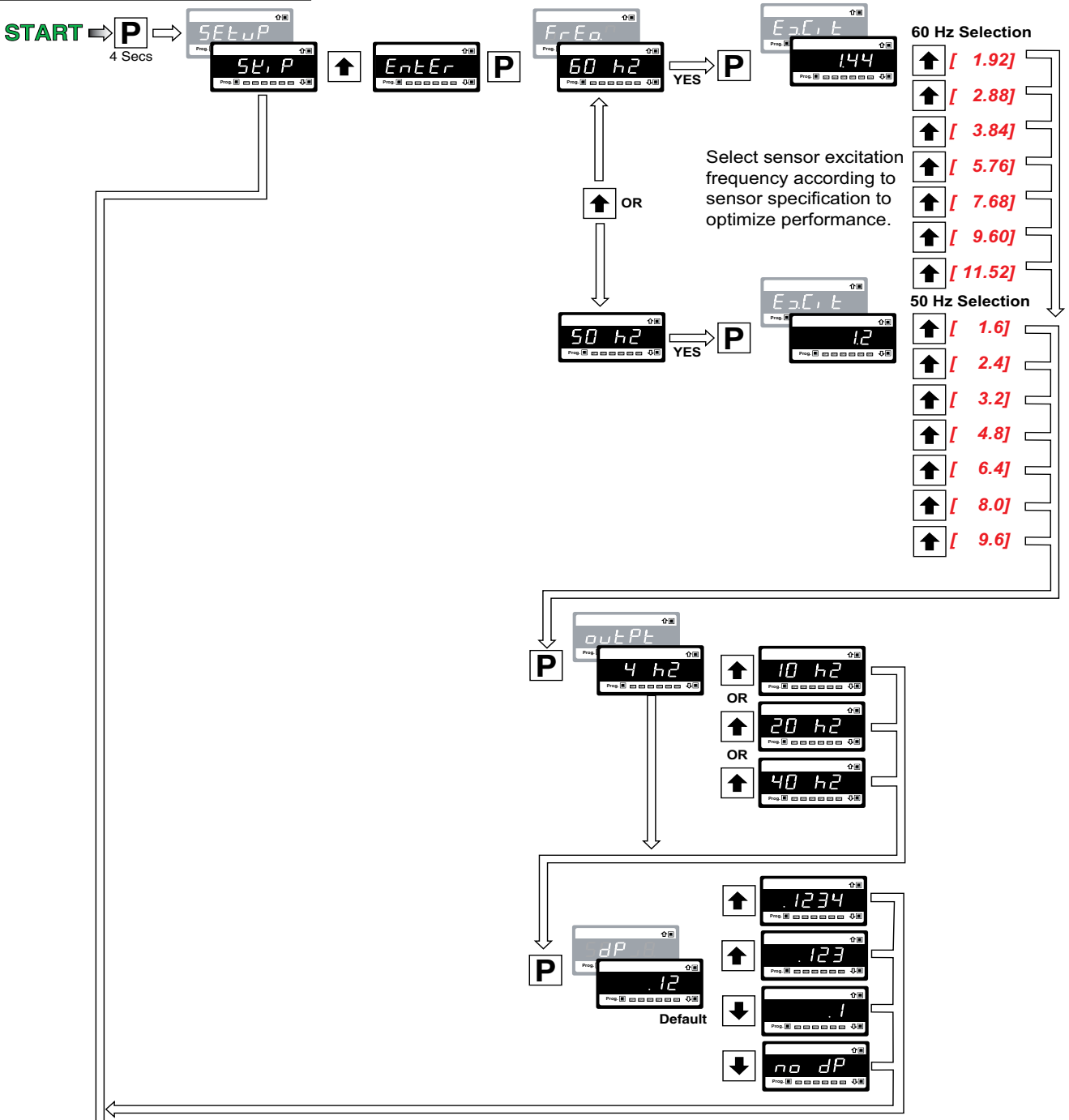
The **reset display value** function is used to restore the true calibrated value on the display.

Reset display value is initiated from a remote switch (not supplied) connected across the **common** and **lock** pins at the rear of the controller (Terminal 2: Pin 4 Common, Pin 1 Lock).

The display zero value and reset display value are not retained during a power outage. The display zero and reset display value functions are often used for cut, measure, and trim applications.

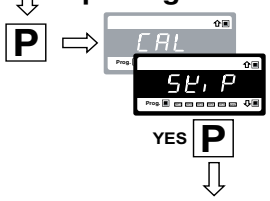
Setup Configuration Menu

Input Setup



Calibration

Input Signal Calibration



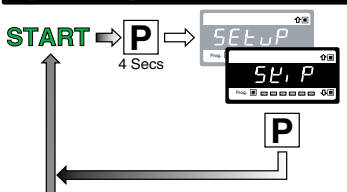
Press the ⇧ button to enter the **Calibration Mode**

See Page 4 for further details

Or press the P button 2 times to EXIT (bypassing the analog setup) and return to the Operational Display

Setup Configuration Menu

Input Setup



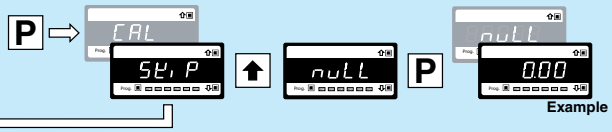
Press the ↑ button to enter the **Input Mode**

See Page 3 for further details

Calibration

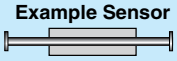
CAUTION: Do not enter the Calibration menu unless you are sure you want to change the calibration parameters.

Input Signal Calibration



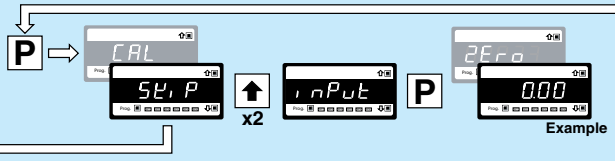
Adjust the sensor to locate the NULL position.

Example Sensor



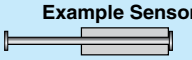
NULL POSITION

LVDT Sensor NULL position must be located before calibration to ensure correct operation.



Adjust the sensor to the required zero position. Adjust the display value using the ↑↓ buttons. Press the P button to accept the sensor's new zero value.

Example Sensor



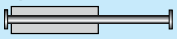
ZERO POSITION

↑ **Max counts 99999**

↓ **Min counts –19999**

Adjust the sensor to the required span position. Adjust the display value using the ↑↓ buttons. Press the P button to accept the sensor's new span value.

Example Sensor



SPAN POSITION

↑ **Max counts 99999**

↓ **Min counts –19999**

Analog Output Signal Calibration

DMI-A1 Connected to Multimeter

Ensure the correct **low** analog output signal reading [CAL_L] is shown on the **multimeter**.

If not correct, press the ↑ OR ↓ button on the DMI-A1 until the reading on the multimeter display is correct.

↑ **Max counts 99999**

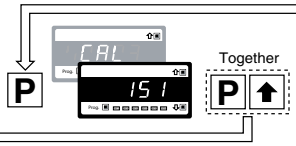
↓ **Min counts –19999**

Ensure the correct **high** analog output signal reading [CAL_h] is shown the **multimeter**.

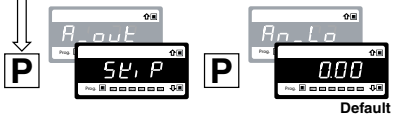
If not correct, press the ↑ OR ↓ button on the DMI-A1 until the reading on the multimeter display is correct.

↑ **Max counts 99999**

↓ **Min counts –19999**



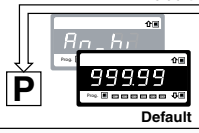
Analog Output Range Scaling



Set the counts required to be displayed for the calibrated **low** analog output value using the ↑↓ buttons. Press the P button to accept the new high value.

↑ **Max counts 99999**

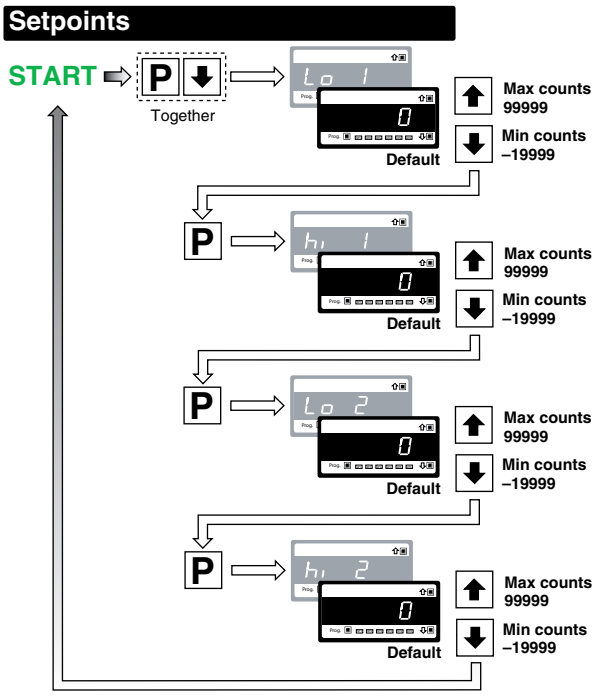
↓ **Min counts –19999**



Set the counts required to be displayed for the calibrated **high** analog output value using the ↑↓ buttons. Press the P button to accept the new low value.

↑ **Max counts 99999**

↓ **Min counts –19999**



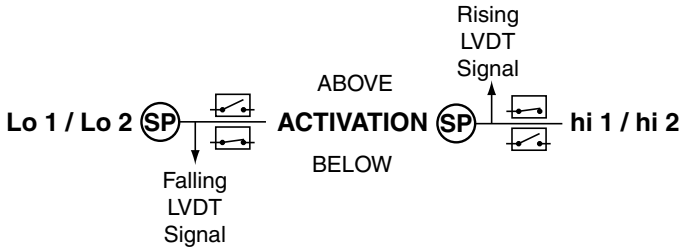
Setpoint Activation

The four setpoints are grouped together in two pairs:

- Setpoint Lo 1 (SP1) and hi 1 (SP2).
- Setpoint Lo 2 (SP3) and hi 2 (SP4).

Low setpoints Lo 1 and Lo 2 are programmed to activate on a **falling signal below** the setpoint activation setting.

High setpoints hi 1 and hi 2 are programmed to activate on a **rising signal above** the setpoint activation setting.



Input Signal Setup Procedures

Technical Description

See Figure 2. ISL1 is a smart input module designed to drive and condition the signal from an LVDT transducer. The module contains two high-speed microcontrollers and a synchronous demodulator 16-bit dual channel A/D convertor. It communicates with LVDT-100-100 via the I²C data bus. One of the microcontrollers generates the sine wave for the LVDT excitation frequency. The frequency is produced as multiples of the line frequency (either 50 Hz or 60 Hz). The output to the primary coil of the LVDT is a 3 V RMS sine wave. The received LVDT signal is synchronously demodulated and filtered to remove the carrier frequency. The Σ Δ 16-bit A/D convertor has over 130 dB noise rejection at the excitation frequency.

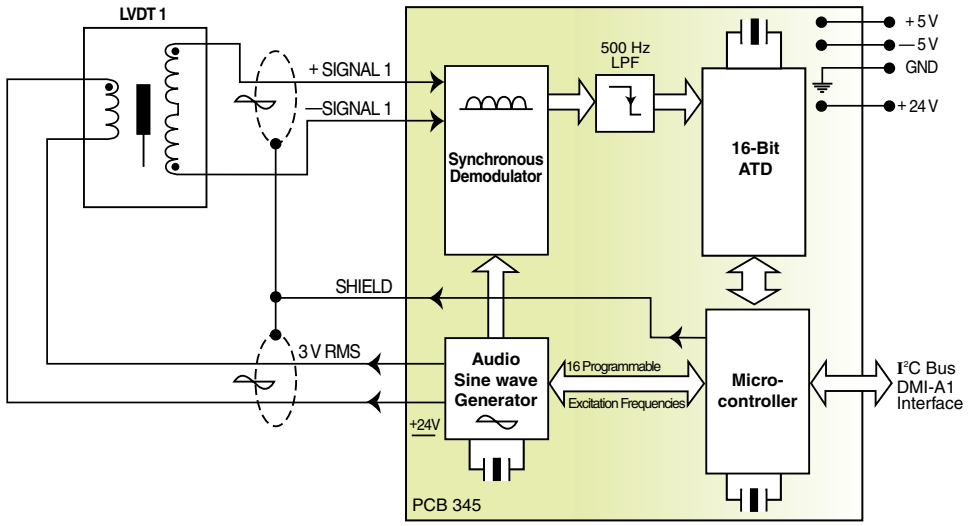


Figure 2 – Input Module ISL1 LVDT Functional Schematic

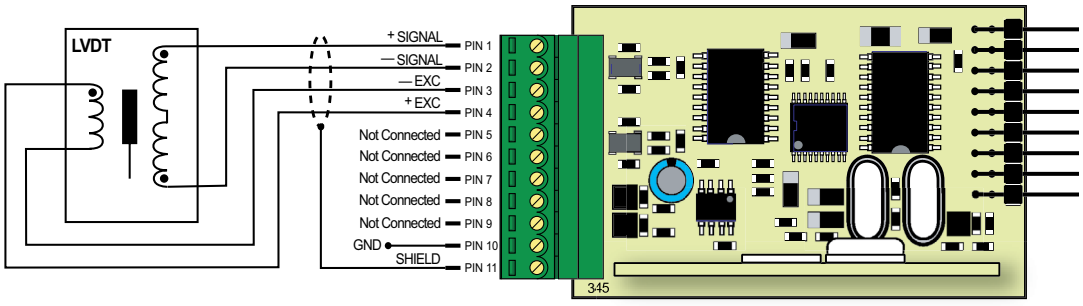


Figure 3 – Example LVDT Input Connection to ISL1

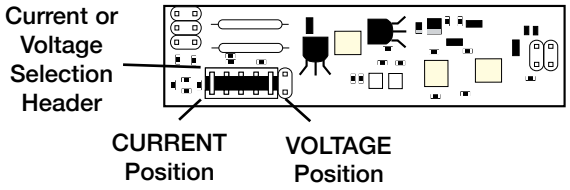
1) Connect a multimeter to the analog output connector at the rear of the meter (Terminal 4: Pin 3 positive, Pin 2 negative).
2) Make sure the multimeter is set to read the appropriate signal type: volts or milliamps.
3) Carry out the analog output scaling procedure to set zero and full scale settings.
4) If required, carry out the analog output calibration procedure to calibrate the millamp (or voltage) output low and high settings.

Analog Output Calibration Mode Procedure

In the example on the following page (analog output signal calibration procedure) with the analog output already scaled over a range of 50 to 3000 counts for 0 to 10 V DC, calibrate the **low** V DC output [CAL_L] to 0.00 V DC and the **high** V DC output [CAL_h] to 10.00 V DC.

Selecting the Analog Output Signal to be Voltage or Current output

Analog Output Module PCB



Available in Single (0~4-20mA or 0-10V) or Dual (0-10V & 0-10V)

To change the analog output from voltage to current output, remove the PCB from the case.
Identify the Analog Output module which is soldered on to the top carrier board.
Move the V/I selection header on the analog output module from the voltage position (default) to the current position .

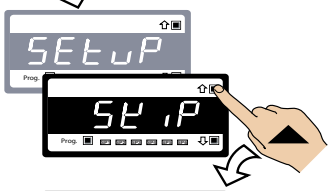
Calibrate Analog Voltage Output Signal

START HERE

Operational Display

Step 1
Press the P button for **4** secs

Press for 4 secs



Step 2
Select **Enter**

Step 3
Enter the Supply Frequency menu

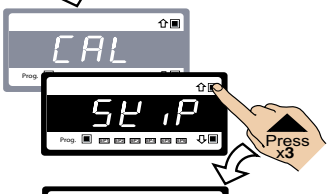
Press 1

Step 4
Pass thru the Supply Frequency menu

Press 1

Step 5
Pass thru the Decimal Point menu

Press 1

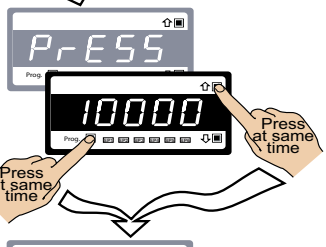


Step 6
Press the ⇧ button **3** times to jump to the **Output** menu

Press x3

Step 7
Enter the Analog Output menu

Press 1



Step 8
Display scrolls **[PrESS P and uP]**
Press P and ⇧ buttons at the same time

Press at same time

Press at same time

Step 9
Press P to enter the Calibration menu

Press 1

To Step 10

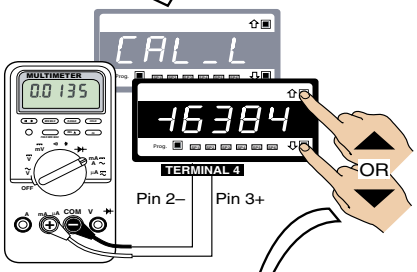
From Step 9

Step 10
With the DMI-A1 connected to a multimeter, the DMI-A1 displays [CAL] [151]. This is the setting for **analog output 1**.

Press P to start the calibration procedure

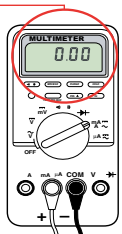
Press 1

DO NOT CHANGE THIS SETTING.

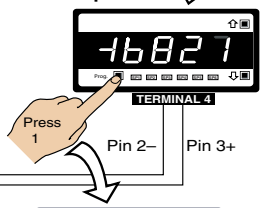


Step 11
Ensure the **low** analog output signal reading [CAL L] on the multimeter display is 0.00 V DC.

If not correct, press the ⇧ OR ⇩ button on the DMI-A1 until the reading on the multimeter display is correct.

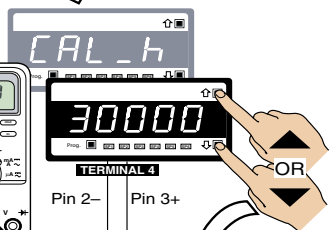


Example



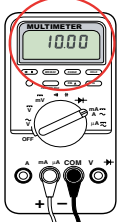
Press 1

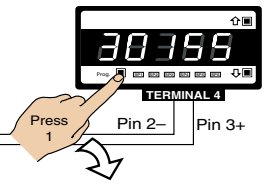
Step 12
Save the **low** analog output signal setting. Enter analog output **high** signal calibration



Step 13
Ensure the **high** analog output signal reading [CAL_h] on the multimeter display is 10.00 V DC.

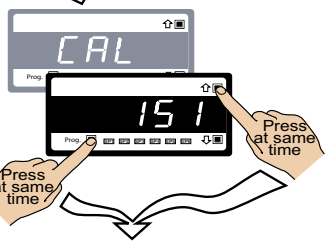
If not 10.00 V DC, press the ⇧ OR ⇩ button on the DMI-A1 until the reading on the multimeter display is correct.





Press 1

Step 14
Press P button to leave the CAL menu



Press at same time

Press at same time

Operational Display

Step 15
Press P and ⇧ buttons at the same time to return to the operational display

Note:

*In **Steps 11** and **13** the 0-10 V DC settings can be replaced by other ranges such as 0-20 mA or 4-20 mA, or settings within these ranges.*

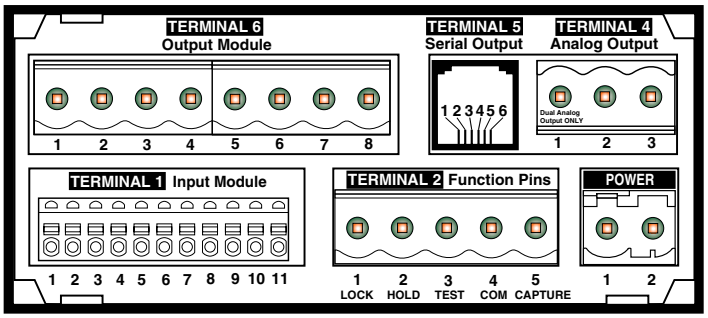
See the drawing on page 6 on how to change the analog output from voltage (default) to current output.

Connector Pinouts

All external connections to the LVDT-100 is via the following six connector terminal blocks located at the rear of the controller:

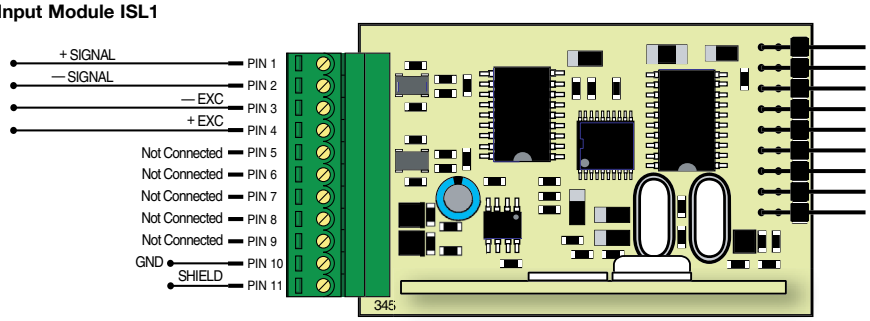
- Terminal 1: LVDT Input Signals.
- Terminal 2: Function Pins.
- Power: AC / DC Power Supply.
- Terminal 4: Analog Output (optional).
- Terminal 5: Serial Output (optional).
- Terminal 6: Relay Output Module.

LVDT-100 indicators use plug-in type screw terminal connectors for most input and output connections, an RJ-11 phone connector for the optional RS-232 or RS-485 serial outputs, and an RJ-45 phone connector for the optional Ethernet output.



WARNING: **AC and DC input signals and power supply voltages can be hazardous. Do not connect live wires to screw terminal plugs, and do not insert, remove, or handle screw terminal plugs with live wires connected.**

Figure 4 – Rear Panel Pinout Diagram

Connector	Pin	Name	Description
TERMINAL 1 **Input Signals** Pins 1 up to 11	1 2 3 4 5 6 7 8 9 10 11	+ Signal – Signal –Excitation +Excitation Not Connected Not Connected Not Connected Not Connected Not Connected Ground Shield	**Input Module ISL1** 
TERMINAL 2 **Function Pins** Pins 1 to 5	1 2 3 4 5	Reset Display Value (Lock) Display Zero (Hold) Display Test and Reset Common -	By connecting Pin 1 (**lock**) to Pin 4 (**common**) with a remote spring-return switch restores the display to the true calibrated value. By connecting Pin 2 (**hold**) to Pin 4 (**common**) with a remote spring-return switch zeroes the display. Pin 3 (**display test** and **reset** pin) provides a test of the controller's display and resets the microprocessor when Pin 3 is connected to Pin 4. To activate the **hold, test and reset,** or **lock** pins from the rear of the controller, the respective pins have to be connected to the **common** pin. - **For further details on the function pins, contact Texmate Inc..**
POWER **Auto Sensing AC / DC Power Supply** Pins 1 and 2	1 2	AC Neutral / DC – AC Line / DC +	The **power** connector supplies AC / DC power to the controller via a standard high voltage or optional low voltage auto-sensing power supply mounted on the main board. **PS1:** Standard High Voltage option. 85-265 V AC / 95-370 V DC. **PS2:** Optional Low Voltage option. 14-48 V AC / 10-72 V DC.

Connector	Pin	Name	Description
TERMINAL 4 **Analog Outputs** Pins 1 to 3	TERMINAL 4 connects the analog output module to external devices. A single 0~4 to 20 mA (standard) or (optional) 0 to 10 V DC is supported on the standard, Ethernet, or DeviceNET carrier board.		
	1	-	-
	2	Negative (–)	Negative for Analog Output.
	3	Positive (+)	Positive for Analog Output .

TERMINAL 5

Serial Outputs

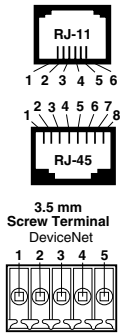
Pins 1 up to 8

TERMINAL 5 connects an optional serial output module to external devices.

The **standard** carrier board supports a single or dual RS-232 or RS-485 ASCII or Modbus serial card connected thru an RJ-11 socket.

The **Ethernet** carrier board uses an RJ-45 socket at 10/100 Base-T.

The **DeviceNET** carrier board uses a 3.5 mm screw connector.



	STANDARD CARRIER BOARD				ETHERNET CARRIER BOARD		DEVICENET CARRIER BOARD
Pin No.	RS-232 (ASCII or Modbus) RJ-11 Socket		RS-485 (ASCII or Modbus) RJ-11 Socket		RJ-45 Socket (10/100 Base-T)		3.5 mm Pitch Screw Terminal
	Single Output	Dual Output	Single Output	Dual Output			
1	Reserved for future use	RXD1	Reserved for future use	B1	White/Orange	TXD+	Negative (–) 24 V
2	Isolated Ground	0 V	Isolated Ground	0 V	Orange	TXD–	Can – (negative)
3	+5 VDC to power external converters	0 V1	+5 VDC to power external converters	0 V1	White/Green	RXD+	N/C
4	TXD. Transmitted Serial	TXD	A (High)	A	Blue	–	Can + (positive)
5	RXD. Received Serial	RXD	B (Low)	B	White/Blue	–	Positive (+) 24 V
6	Reserved for future use	TXD1	Reserved for future use	A1	Green	RXD–	Not applicable
7	Not applicable	Not applicable	Not applicable	Not applicable	White/Brown	–	Not applicable
8	Not applicable	Not applicable	Not applicable	Not applicable	Brown	–	Not applicable

TERMINAL 6

Relay Outputs

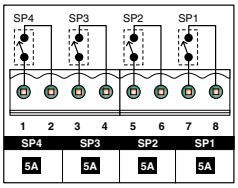
Pins 1 up to 8

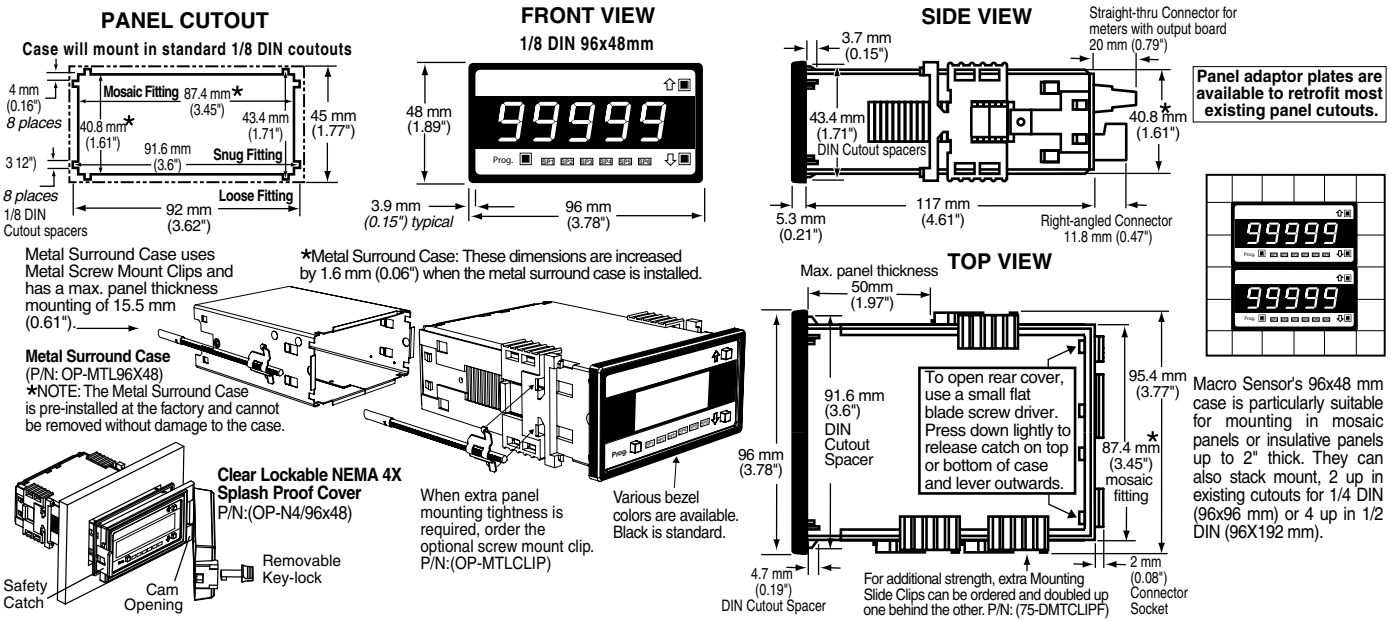
TERMINAL 6 connects electromechanical relays to external applications.

With 4 relays installed, an 8-pin connector block is used.

1	Normally Open SP4
2	Common SP4
3	Normally Open SP3
4	Common SP3
5	Normally Open SP2
6	Common SP2
7	Normally Open SP1
8	Common SP1

Relay Modules with
Four 5 A Form A Relays





Installation Procedure

WARNING

AC and DC power supply voltages are hazardous. Make sure the power supply is isolated before connecting to the meter.

STEP A Prepare the Panel

1) Cut a hole in the panel to suit the panel cutout. See panel cutout sizes above.

STEP B Install the Meter

1) Remove both mounting clips from the meter. ①
2) Push the meter into the panel cutout from the front of the panel. ②
3) Attach both mounting clips to the meter from the rear of the panel and push them towards the front of the panel until the meter is firmly held. ③

STEP C Connect the Cables

1) Connect all input and output signal cables to the connector pins (See *Connector Pinouts* for details).
2) Connect the power cables to the connector pins (See *Connector Pinouts* for details).

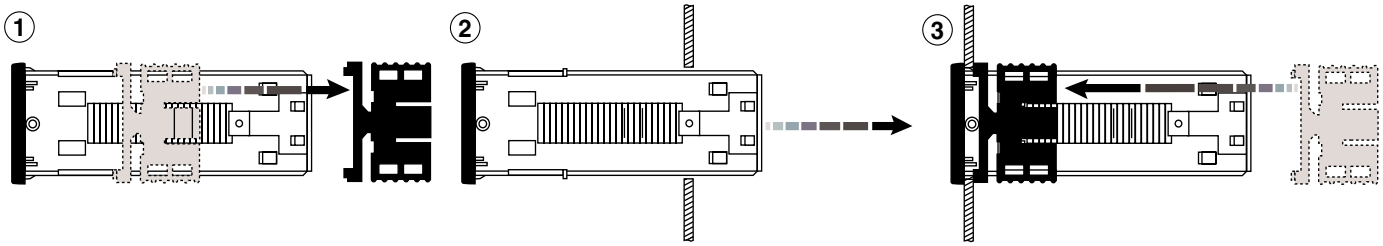


Figure 5 – LVDT-100 Installation Sequence

Differential measurements are now available with Texmate's dual input LVDT controller

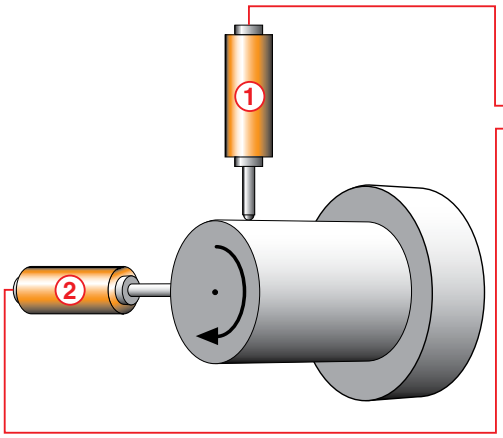
LVDT sensors can be applied in almost all engineering applications covering civil, mechanical, petrochemical, power generation, production, aerospace, defense, and much more.

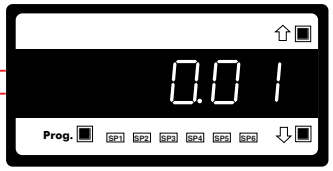
They can be used on production lines to automatically gauge products for quality control and product sorting.

In the power generation and petrochemical industries they can be used, for example, as servo position feedback on actuated equipment such as valves and dampers, or for measuring turbine casing expansion.

Submersible units can be used in marine and offshore mining applications. Sensors that meet military environmental standards have been applied to defense and aerospace applications.

Following are applications that show the power and versatility of Texmate's LVDT-200 dual input differential measurement controller.





Operational Display (CH1)

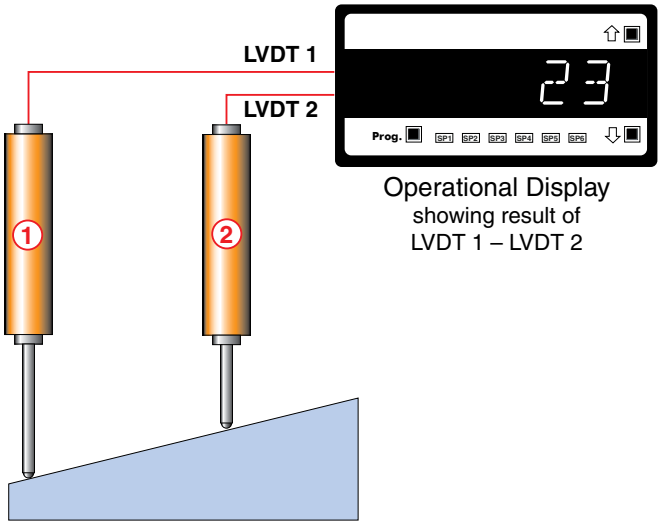
CH2 View Mode

ALIGNMENT TOOL

Measured using two LVDT sensors at 90°

LVDT 1 to CH1 = Shown on Display

LVDT 2 to CH2 = Use View Mode to view CH2

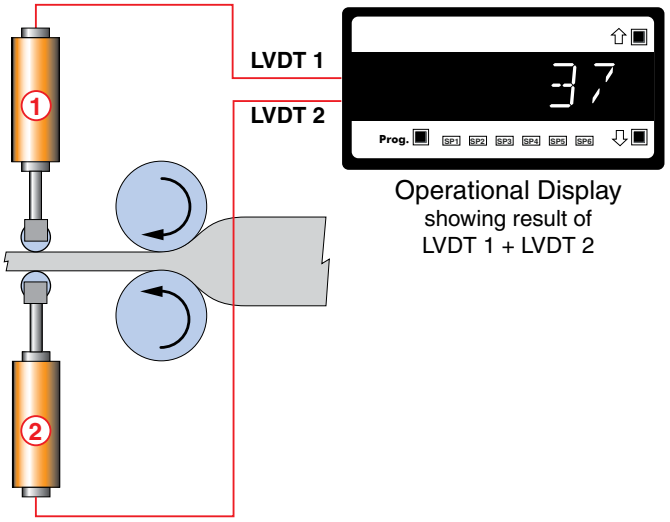


Operational Display
showing result of
LVDT 1 – LVDT 2

SLOPE INDEXING

Measured using two parallel LVDT sensors (1 – 2)

LVDT 1 minus LVDT 2 = Displayed Result



Operational Display
showing result of
LVDT 1 + LVDT 2

THICKNESS MONITORING

Measured using two opposed LVDT sensors (1 + 2)

LVDT 1 plus LVDT 2 = Displayed Result

For further information on Texmate's LVDT-200 Series dual input differential measurement controller, contact Texmate and request:

Flyer: Dual Inputs LVDT Controller Flyer

User Manual: Dual LVDT Controller

Or go to www.texmate.com and download a pdf of either document from our free downloadable literature.

Notes

Frequency Range: 

Excitation Frequency in kHz: 

LVDT Output Rate: 

Decimal Point Position: 

Input Signal:

Calibration: 

Analog Output Signal:

Calibration: 

Scale Range: 

Setpoint Activation Values: 

WARRANTY

Texmate warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment. Texmate's obligations under this warranty are limited to replacement or repair, at its option, at its factory, of any of the products which shall, within the applicable period after shipment, be returned to Texmate's facility, transportation charges pre-paid, and which are, after examination, disclosed to the satisfaction of Texmate to be thus defective. The warranty shall not apply to any equipment which shall have been repaired or altered, except by Texmate, or which shall have been subjected to misuse, negligence, or accident. In no case shall Texmate's liability exceed the original purchase price. The aforementioned provisions do not extend the original warranty period of any product which has been either repaired or replaced by Texmate.

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