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Model 1601 LVDT Adapter

Linear Variable Differential Transformer (LVDT) outputs can now be measured/displayed/recorded with standard strain gauge instrumentation. The Model 1601 LVDT Adapter is an interface module designed expressly for operating LVDT's from dc-excited strain gauge instruments.

In use, the LVDT is connected to one side of the 1601 and the strain gauge instrument to the other side. The 1601 then functions to convert the dc bridge voltage from the instrument to a stable 2.5 kHz excitation supply for the primary winding of the LVDT. It also conditions and filters the output of the LVDT secondary and attenuates the signal to a level compatible with normal instrument input. The net effect is that the strain gauge instrument "sees" an external full-bridge circuit, as if it were connected to a typical strain gauge transducer - except that the instrument now indicates the LVDT's output instead of strain.

The adapter features both low and high ranges, as well as continuously variable span control. As a result, the 1601 output is easily adjusted for scaling the strain gauge instrument to read directly in engineering units according to the particular type of LVDT being used.

Model 1611 Thermocouple Adapter

The Model 1611 Thermocouple Adapter adds a new dimension to strain gauge instrumentation by allowing thermocouple outputs to be monitored with standard strain-measuring instruments. The adapter is powered from the strain measuring instrument's dc bridge excitation supply and the output of the adapter is fed to the strain gauge amplifier at a compatible signal level. The result is *accurate indication or recording of temperature, directly in °F or °C.*

Electronic circuitry in the 1611 accepts the millivolt-level thermocouple output voltage, amplifies it and performs linearizing and scaling operations. Adapter circuits include an internal precision calibration voltage source and automatic reference-junction compensation. Thermocouple linearization is in accordance with NBS Monograph 135, based upon IPTS-68.

Separate versions of the 1611 are available for three common thermocouple types as shown in the table below. Output scaling is available in Fahrenheit and Celsius, although this can be selected in the field by activating a small switch inside the unit.

Adapter Type	Range	NBS Conformity
Iron/Constantan, Type J Model 1611-J	-58° to +1022°F (-50° to +550°C)	±1.44°F (±0.80°C)
Chromel/Alumel, TypeK Model 1611-K	-40° to +1292°F (-40° to +700°C)	±1.08°F (±0.60°C)
Copper/Constantan, Type T Model 1611-T	-292° to +212°F (-180° to +100°C)	±1.62°F (±0.90°C)

Specifications - Model 1601 LVDT Adapter

Input:	3-, 4-, 5- or 6-wire LVDT (secondary centertap not required).	Sensitivity:	0.1V rms change on LVDT secondary will produce a 1.5 mV output shift at maximum setting in HI range and 0.25 mV in the LO range.
LVDT Excitation:	2.8V rms at 2.5 kHz with 15 Vdc input to Adapter.	Input Supply Voltage:	10 to 15 Vdc recommended. 4 to 20 Vdc operational.
LVDT Loading:	300,000 Ω , min.	Input Supply Current:	15 to 30 mA.
Phase Adjustment:	$\pm 80^\circ$.	Environment:	Temperature: 0° to +122°F (-18° to +50°C). Humidity: up to 95% RH, non-condensing.
Zero Control:	Utilizes the bridge balance control of the strain indicator. Range is a function of bridge balance circuit; typically $\pm 40\%$ to $\pm 200\%$ of LVDT full range.	Size:	2.40 W x 4.38 L x 1.83 H in (61 x 111 x 46 mm)
Linearity:	Better than $\pm 0.1\%$ of full working range.	Weight:	0.75 lb (0.34 kg)
Linear Output Range with 15 Vdc Input:	High range: 0 to ± 5 mV, S+ to S- HI LO range: 0 to ± 0.8 mV, S+ to S- LO	Compatibility:	
Frequency Response:	100 Hz (-3 dB); 2-pole Butterworth filter.	Signal Conditioners:	BAM-1, 2100 System, 2200 System, 2300 System
Output Noise:	Less than 50 μ V rms.	Strain Indicating Systems:	3800, System 4000
Output Impedance:	60 Ω , max.		

Specifications - Model 1601 LVDT Adapter

Input Impedance:	40 M Ω .	Temperature Coefficient of Span:	22 ppm/°F (40 ppm/°C).
Common-Mode Rejection:	>85 dB at dc >85 dB at 48-62 Hz	Span Adjustment:	$\pm 70\%$ of nominal span.
Normal-Mode Rejection:	>40 dB at 48 Hz and above	Output:	1 mV/°F or 1 mV/°C (optional - see Instruction Manual).
Source-Resistance Tolerance:	No measurable error with up to 250 Ω source resistance.	Power Requirements:	12 Vdc, 35 mA (operating voltage range: 10.8 to 13.0 Vdc).
Reference-Junction Compensation:	Automatic, with sensor thermally integrated with junction at barrier strip: $\pm 0.03^\circ/\text{deg}$ for types J and K and $\pm 0.05^\circ/\text{deg}$ for type T - over the range from +50° to +104°F (+10° to +40°C). Sensor offset externally accessible.	Size:	2.4 W x 4.4 L x 1.8 H in (60 x 110 x 45 mm)
Linearization:	Analog, using multiple straightline segments (NBS conformity).	Weight:	0.75 lb (0.34 kg)
Temperature Coefficient of Zero:	1.1 μ V/°F, RTI (2 μ V/°C, RTI).	Compatibility:	
		Signal Conditioners:	BAM-1, 2100 System (Model 1611-A25 accessory DC/DC Converter required), 2200 System, 2300 System.
		Strain Indicating Systems:	3800.

All specifications are nominal or typical at +23°C unless noted.



NOTE: The Model 1601 LVDT Adapter and the Model 1611 Thermocouple Adapter were designed specifically for use with strain gauge instrumentation manufactured by the Instruments Division of Measurement Group, Inc. (see Specifications for model numbers). Neither the compatibility of the adapters for their performance can be assured with other manufacturers' instruments.