

Signal Generator Calibrates Strain Gauge Electronics

The strain gauge has been in use many years and is the fundamental sensing element for many types of sensors, including pressure sensors, load cells, torque sensors, and position sensors. The majority of strain gauges are metallic foil types, available in a wide choice of shapes and sizes to suit a variety of applications.

Foil type strain gauges feature a pattern or circuit of resistive foil bonded to a backing material such as epoxy resin. The Wheatstone bridge, for example, is a common circuit. When the backing material is strained, the metallic foil is stressed, altering the foil's electrical resistance in a defined way. Changes in foil resistance correspond to the strain applied.

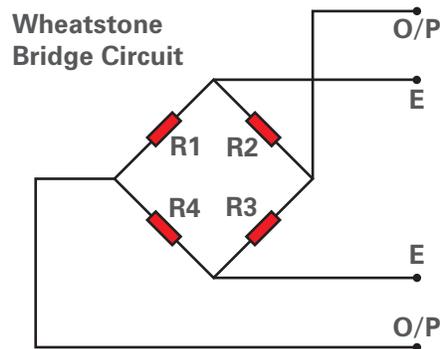
Problem

To correctly monitor the strain gauge, it is important to calibrate the signal conditioner electronics connected to the strain gauge. Setting the span and offset ensures the meter is properly matched to the strain gauge sensitivity factor. Potential sources for error include electrical noise, thermal or magnetic induced voltages, and temperature effects on gauge resistance.

Solution

MTI's 1510A portable signal generator can be used to calibrate strain gauge conditioning electronics. Unlike competing products, the 1510A can accurately generate precision low voltages without drifting. These low-level DC voltages, in turn, simulate those produced by bridge-type strain gauges. In addition, the 1510A self monitors its output using feedback to adjust the output voltage and hold it at the correct value.

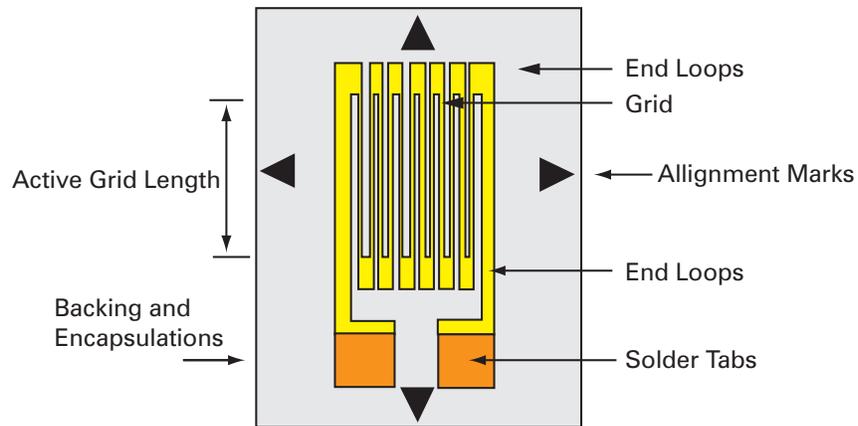
The following example illustrates how users can achieve high-accuracy calibration with low-level signals.



Assume E is the excitation supply input (DC) and O/P is the strain gauge's differential output. The O/P outputs pass to a strain gauge meter similar to a precision low-voltage DC voltmeter (Volts are calibrated to micro strain). The 1510A simulates this output voltage with up to 0.1 μV resolution. In this manner, users can check the strain gauge meter and adjust its span.

Benefits

Foil type strain gauges are small, low mass, and low in cost. They offer good sensitivity to strain and are relatively unaffected by temperature changes. MTI's 1510A portable signal generator offers a simple method for monitoring the accuracy of these strain gauge meters.



Small and low in cost, foil type strain gauges are the fundamental sensing element for many sensor types.



The MTI 1510A portable signal generator can be programmed to simulate the low-level DC voltages produced by bridge type sensors such as load cells and strain gauges.

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