



HITEC PRODUCTS, INC.

P.O. Box 790 • Ayer, MA 01432 USA
Tel: 978-772-6963 • Fax: 978-772-6966
www.hitecprod.com

HIGH TEMPERATURE FULL BRIDGE STRAIN GAGE

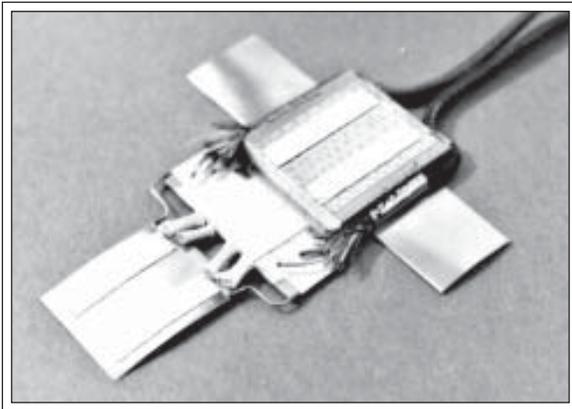


FIGURE 1: FULL BRIDGE
WELDABLE STRAIN GAGE

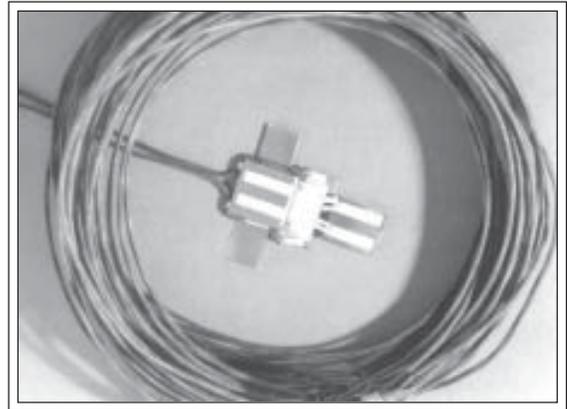


FIGURE 2: STRAIN GAGE WITH 50' OF
HIGH TEMPERATURE CABLE

FEATURES:

- Useful temperature range 50°F to 800°F *
- Full bridge circuit eliminates apparent strain errors and lead wire error - permits use of long cables
- Resistive strain gage bridge circuit utilizes common strain gage data acquisition instrumentation
- High output - gage factor \cong 4.0 NOMINAL
- Ceramic installations provide high stability, very low drift and creep

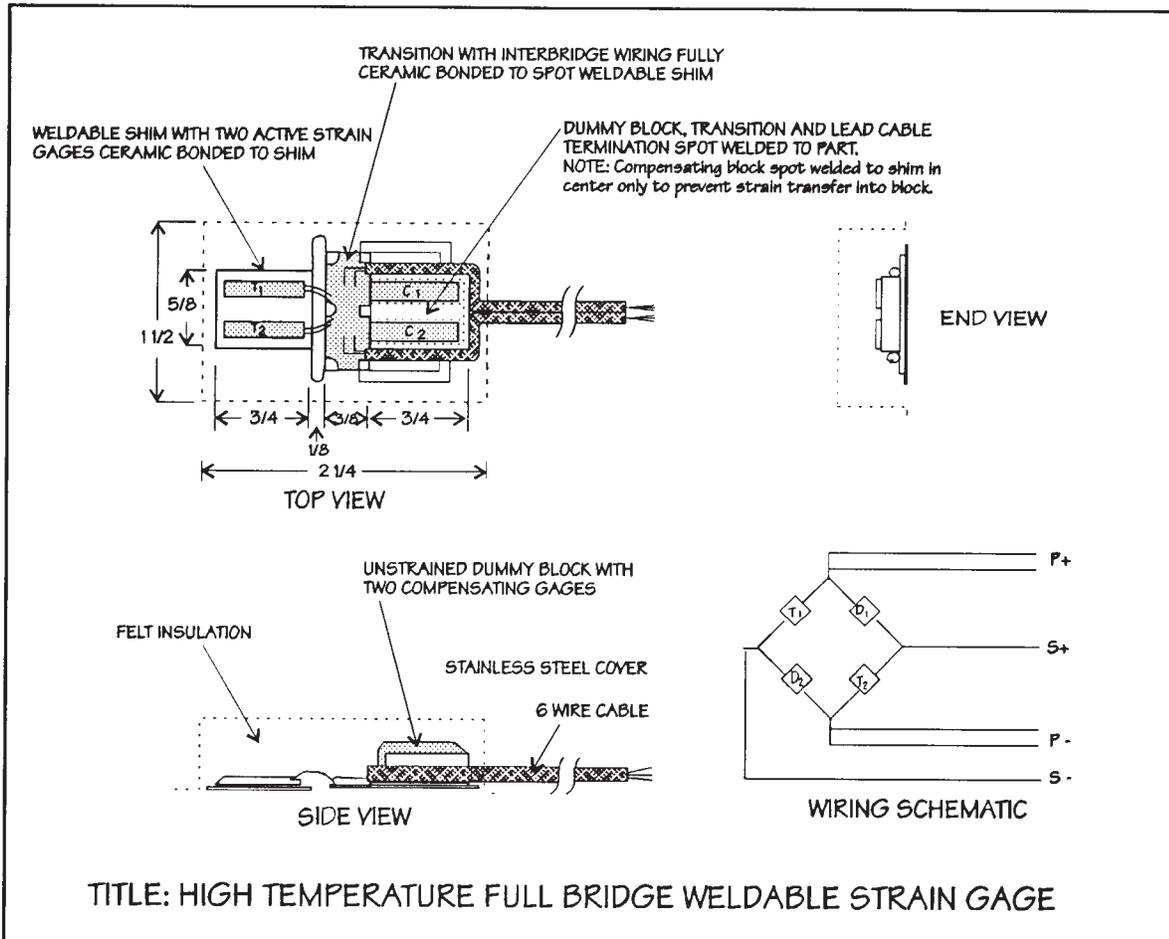
**For higher temperature requirements,
please consult HPI*

DESCRIPTION:

The full bridge weldable strain gage is a prepackaged assembly consisting of two sensing strain gages mounted on a shim and two compensating gages mounted on an unstrained compensating block. (See Figure 1). A pre-wired transition provides interbridge wiring between the two active and the two compensating gages and the lead cable assembly. The gage is designed for monitoring strains on large structures such as power plant or refinery machinery or piping, in situations where resistive strain instrumentation is preferred.

The use of two active gages provides double the output of a single or half bridge arrangement. The Hoskins 875 sensors, with a gage factor = 2.4 produce an equivalent sensor gage factor = 4.8. The Hoskins 875 sensors are drift free at 800°F and the ceramic installations are creep free over the entire temperature range. These factors and the use of a highly fatigue resistant lead assembly provide a durable and highly reliable sensor. The use of a pre-wired bridge completion circuit pre-bonded to a transition shim produces sensors with virtually identical temperature response. The greatest feature of the full bridge arrangement is the complete elimination of lead wire errors common in quarter bridge or half bridge arrangements. Any temperature effects on lead cables after the bridge completion point (which is at the sensor transition) do not effect the measurement. Therefore, long cable lengths can be used with this sensor. The six-wire circuit is standard which allows power supplies with lead sensing circuits to be used.

The full bridge arrangement also cancels out the apparent strain of each sensor. In the event of very rapid heating, an output may be generated due to the compensating block temperature lagging or leading the sensors. This can easily be corrected for by measuring the temperature difference between the active and compensating gages using a differential thermocouple. If rapid transients are to be expected, a differential thermocouple assembly should be ordered with the gages and a thermocouple readout be made part of the instrumentation.



HIGH TEMPERATURE FULL BRIDGE

Specifications: for HBWF-12-250-6-10FG and HBWF-12-250-6-10MG

Compensated Temperature Range: 50 to 800°F*
Nominal Gage Factor = 4.0
Axial Strain Range $\pm .5\%$ ($\pm 5000\mu''$)
Zero Balance: $\pm 4000 \mu''$
Excitation Voltage: 5VDC
Temperature Effect on Gage Factor = $-1.5\% / 100^\circ\text{F}$
Apparent Strain: $\pm 1\mu'' / ^\circ\text{F}$
Bridge Resistance: 120 ± 2.0 ohms
Insulation Resistance: >1 Megohm at 800°F
Non-Linearity: 0.5%
Hysteresis: 0.4%
Shim material: Hastalloy X
Strain Sensors: Hoskins 875 Alloy
Gage Type: HFH-12-250-ZHW
Lead Wire, Interbridge Wiring: Nichrome 5
Bonding Matrix: Ceramic
Compensating Block: 1018 Steel (to 600°F, Inconel to 800°F)
Thermal Expansion Coefficient of Compensating Block: 6.7ppm/°F

Compensating blocks:	.6" x .75" can be supplied by customer for special orders.
Pre-curving:	Pre-curved shims are recommended for diameters less than 12 inches. Gages can be supplied precurved circumferentially, longitudinally or at 45° to longitudinal for a nominal fee.
Thermal Insulation:	Ceramic felt is recommended over gage and compensating block assembly. A pre-cut felt pad is available.
Protection Cover:	A Stainless steel cover which fits over the ceramic felt pad is available and is recommended to provide protection for gage installation.
Moisture Proofing:	Dow Corning 736 RTV silicone is recommended. The sealer should be applied to all protective cover joints and the joint between cover and structure. The sealer will provide protection during wet insulation application or other wet processes. The RTV should be cured at least 24 hours prior to use. The RTV is useable to 500°F continuous and 600°F intermittent.
Cable Attachment:	The gage cables must be firmly secured to avoid movement or abrasion due to vibration during operation. The cable should either be threaded through thin wall tubing or be strap welded in place using 3 to 5 mil stainless steel shim stock. On structures where very little vibration is encountered, the cables may be taped in place.
Strain Indicator Hookup:	The sensor is hooked up as a full bridge transducer to any strain indicator or strain gage based transducer indicator. See wiring schematic. The six wires permit voltage sensing at the transducer and should be used with long cables. The sensing leads may be ignored with short cable lengths.