

## Weldable Strain Gauges

Weldable strain gauges measure strain in steel. Special end-blocks can adapt these gauges for concrete or rock surfaces. Applications include:

- Monitoring changes in load on structural elements during and after construction.
- Monitoring the performance of wall anchors and other post-tensioned support systems.
- Measuring strain in tunnel linings.

## Embedment Strain Gauges

Embedment strain gauges measure strain in concrete. Applications include:

- Measuring strains in mass concrete.
- Measuring curing strains.

## Operation

The vibrating wire strain gauge operates on the principle that a tensioned wire, when plucked, vibrates at a frequency that is proportional to the strain in the wire.

The gauge is constructed so that a wire is held in tension between two end flanges. Loading of the monitored element changes the distance between the two flanges and results in a change in the tension of the wire and its output signal.

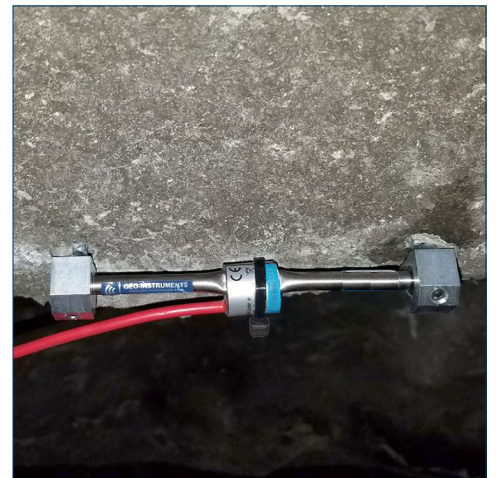
An electromagnet is used to excite the wire and measure the resulting frequency of vibration. Strain is then calculated by squaring the frequency value and applying constant.



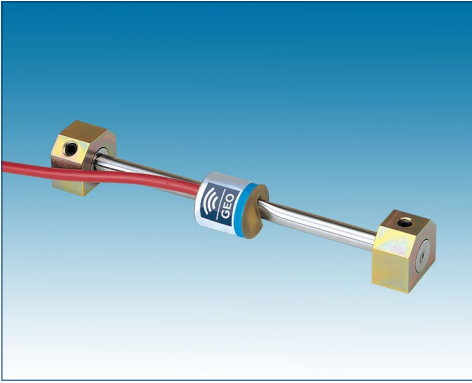
Struts instrumented with arc-weldable strain gauges



Careful positioning of the strain gauges on these lattice girders along with protective metal-foil wraps yielded a 100% survival rate during shotcreting.



Special end-blocks allow surface installation of strain gauges on concrete structural elements

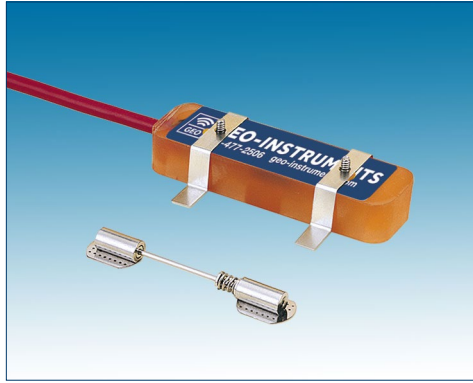


### Arc-Weldable Gauges

Arc-weldable strain gauges are suitable for most applications and are quickly installed using an arc welder. They can be adapted for concrete by the use of grouted concrete mounting blocks.

#### Specifications

Sensor Type: Vibrating Wire  
 Gauge Length: 6 inches ( 150 mm)  
 Range: 3,000  $\mu\text{m}$   
 Resolution: 1.0  $\mu\text{m}$   
 Accuracy:  $\pm 0.5\%$  FS  
 Non-Linearity:  $< 0.5\%$  FS  
 Temp Range:  $-20^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$

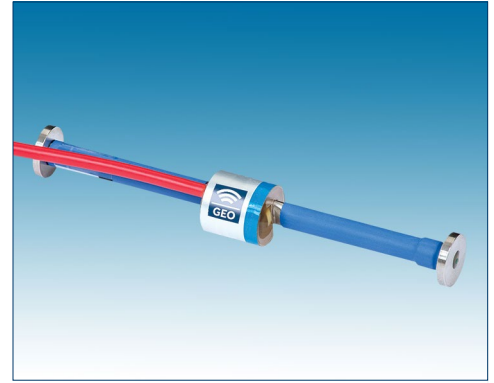


### Spot-Weldable Gauges

Spot-weldable strain gauges are compact gauges used when space is limited or when low-heat, shallow welds are required. For short-term applications, the gauge can be installed with epoxy adhesive.

#### Specifications

Sensor Type: Vibrating Wire  
 Gauge Length: 2 inches ( 51 mm)  
 Range: 3,000  $\mu\text{m}$   
 Resolution: 0.4  $\mu\text{m}$   
 Accuracy:  $\pm 0.5\%$  FS  
 Non-Linearity:  $< 0.5\%$  FS  
 Temp Range:  $-20^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$



### Embedment Gauges

Embedment strain gauges are designed for direct embedment in concrete. In reinforced or pre-stressed concrete applications, the embedment strain gauge is tied to the reinforcing cage. In mass concrete applications, the gauge is installed either before or immediately after placement of the concrete.

#### Specifications

Sensor Type: Vibrating Wire  
 Gauge Length: 6 inch ( 153 mm)  
 Range: 3,000  $\mu\text{m}$   
 Resolution: 1.0  $\mu\text{m}$   
 Accuracy:  $\pm 0.5\%$  FS  
 Non-Linearity:  $< 0.5\%$  FS  
 Temp Range:  $-20^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$