EMBEDDED VIBRATING WIRE STRAIN GAUGE

Model C-110

APPLICATIONS

The C-110 strain gauge is designed for embedment in fine aggregate concrete to measure strain caused by variations in stress. If the modulus of elasticity of the material is known, the magnitude of the strain (other than that induced by loading) can be evaluated. In the case of concrete, the effects of temperature, creep, and the autogenous reaction must be known. Typical examples of concrete structures where vibrating wire strain gauges are used include:

• Dams

• Nuclear power stations

• Bridges and viaducts

• Large buildings

• Tunnel linings

• Piles and caissons

DESCRIPTION

The C-110 strain gauge consists of a thin-wall steel tube with two steel heads soldered to its extremities using solder with a low modulus of deformation. The distance between flanges of the heads determines the gauge length. A small rectangular housing at the gauge mid-section encloses the electro-magnetic excitation and pick-up coils.

The electrical resistance of one of the electromagnetic coils provides temperature data, in which case the gauges are delivered with a 5-conductor cable. A 4-conductor cable is used when temperature measurements are not required.

Unless specified, gauges are factory-set at mid-range, allowing one half of the range for measurement of tensile strain, and the other half for compressive strain.

FEATURES

• **Long-term reliability**

• **High resolution and accuracy**

• **Rugged: housing resistant to impact and corrosion**

• **Easy to install and use**

• **No maintenance needed**

• **Frequency signal output easy to process and transmit over long distances**

• **Integrated temperature gauge**

• **Watertight to 1500 kPa standard**

• **Frequency measured in sustained or dampened mode**

ROCTEST TELEMAC

READINGS AND INTERPRETATION

Readings on this and all Roctest Telemac vibrating wire transducers may be taken with a Telemac PC series readout or SENSLOG automated data acquisition system.

As with all vibrating wire instruments, the readings may be recorded in the sustained or dampened excitation mode using either one or both of the coils. The dual-coil circuit ensures the maximum longevity of the instrument.

Deformations in the concrete between the flanges induce variations in the length and vibration frequency of the gauge wire. The relationship between frequency and wire length, a characteristic of each gauge, allows for strain calculation using the gauge factor K and the following formula:

$$\frac{\Delta L}{L} = K \times 625 \times 10^{-5} \times (N^2 - N_0^2) \qquad \text{where:} \quad \frac{\Delta L}{L} = \text{strain}$$

K = gauge factor

N_0 = initial frequency

N = current frequency

SPECIFICATIONS

MODEL	C-110
Range	2900 $\mu\varepsilon$
Average resolution using PC readout	0.35 $\mu\varepsilon$
K strain gauge coefficient	0.3
Resistance of each coil	90Ω

Signal specifications
    Input signal
    Output signal
	
	Sinusoidal, 150 to 170 mV rms
	Sinusoidal, 10 to 30 mV rms

Total length	144 mm
Gauge length	110 mm
Tube diameter	6 mm
Flange diameter	20 mm
Weight (without cable)	85 g

ORDERING INFORMATION

Please specify:

• Cable length

• Setting, if other than standard