

Vibrating Wire Temperature Sensors

Applications

The Model 4700 and 4500HT are used to measure the temperatures in and around...

- Dams
- Concrete structures
- Geothermal wells
- Landfills



• Model 4700 Vibrating Wire Temperature Sensor.

Operating principle

A tensioned steel wire is clamped axially inside a cylindrically shaped, stainless steel body and is made to vibrate at its fundamental frequency by means of electrical pulses fed from a readout, through a cable, to an electronic coil and permanent magnet assembly mounted close to the wire. Temperature changes cause the stainless steel body to expand and contract at a different rate than the vibrating wire. This causes a corresponding change in the wire tension and in its vibrational frequency. Vibration of the wire in the permanent magnetic field induces an alternating current in the electronic coil with the same frequency. The readout used to pluck the wire is now used to measure this frequency, which can then be related to the temperature by means of a calibration factor supplied with each gauge.

Advantages and Limitations

The Model 4700 enjoys all the advantages of vibrating wire sensors: excellent long term stability, maximum resistance to the effects of water and a frequency output suitable for transmission over very long cables.

All components are made from stainless steel for corrosion protection. The gauges are waterproof and contain internal protection against lightning damage.

Each gauge also incorporates a thermistor for use as a back-up or as an independent check on the temperature reading.

The Model 4700 is of particular value where cables are very long, (lengths of up to 3 km are possible), and where other types of vibrating wire sensors are in use. In addition, it can be incorporated into the Model 4500 Piezometer and Model 4800 Pressure Cell.

The thermal response of the Model 4700 is quite slow so it is not suitable for the measurement of rapidly changing temperatures.

The Model 4700HT High Temperature version is designed for temperatures up to +250 °C. Other temperature ranges are available on request.



• The Model 4700HT High Temperature Vibrating Wire Temperature Sensor.

System Components

The basic transducer is packaged inside a sealed stainless steel tube for protection against mechanical damage and water intrusion. An internal thermistor and gas-discharge tube, (for lightning protection), are also included. The Model 4700 is supplied with a 4-conductor cable attached.

Accessories

The Model 4700 can be read using either the Model GK-404 or GK-405 Readouts or the Model 8600 Series, Model 8002 LC-2 Series, or Model 8800 Series Dataloggers. Terminal Boxes and Junction Boxes are also available for multiple temperature sensor installations. Mounting brackets for installations on various structures are available as well.

Technical Specifications

	4700	4700HT*
Standard Range	-20 °C to +80 °C	-40 °C to +200 °C; -40 °C to +250 °C
Resolution	0.034 °C (approximate)	0.034 °C (approximate)
Accuracy ¹	±0.5 °C	±0.5 °C
Response Time ²	2.5 minutes	2.5 minutes
Thermal Equilibrium ³	15 minutes	15 minutes
Cable	4-conductor, shielded, 22 AWG	4-conductor, shielded, 22 AWG Teflon® jacketed (+200 °C max rating); 4-conductor, shielded, 22 AWG 316SS encapsulated (+250 °C max rating)
Weight	115 g	115 g
Length × Diameter	130 × 19 mm	157 × 19 mm

*Maximum temperature is cable dependent.

¹Established under laboratory conditions.

²Time required to reach 63.2% of an instantaneous temperature change.

³Maximum time required to reach thermal equilibrium.

*PLEASE NOTE: THE MODEL 4700HT HIGH TEMPERATURE VIBRATING WIRE TEMPERATURE SENSOR IS NOT CE APPROVED.