Vibrating Wire Temperature Sensor

Applications

The Model 4700 is 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 gage.

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 gages are waterproof and contain internal protection against lightning damage.

Each gage 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.

Special high and low temperature versions are available for temperatures varying from –80ºC to +230ºC.

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

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● *The Model 4700 incorporated into the Model 4500 Vibrating Wire Piezometer (Model 4500-4700).*

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

Standard Range	100°C (−20°C to +80°C)
Optional Range	200°C (−200°C to 0°C or 0°C to +200°C)
Resolution	0.034°C
Accuracy[1]	±0.5°C
Response Time[2]	2.5 minutes
Thermal Equilibrium[3]	15 minutes
Cable	4-conductor shielded 22 AWG
Weight	115 g
Length × Diameter	130 × 19 mm

[1]*Established under laboratory conditions.*
[2]*Time required to reach 63.2% of an instantaneous temperature change.*
[3]*Maximum time required to reach thermal equilibrium.*