Vibrating Wire Temperature Sensor

Applications

The measurement of temperature in concrete, soil and rock including:

- Monitoring of temperature rise during the cure of concrete.
- Soil and rock temperatures adjacent to ground freezing operations and liquid gas storage tanks.
- Interpretation of temperature effects on other installed instruments.
- Measurement of water temperatures in reservoirs and in boreholes.
- Air temperature measurements on structure surfaces.
- Interpretation of temperature related stress and volume changes in dams.

Operating Principle

The Vibrating Wire Temperature Sensor comprises a stainless steel body which houses a vibrating wire sensing unit. The sensing unit incorporates a stainless steel mounting body for the carbon steel vibrating wire and coil assembly.

The vibrating wire tension changes with temperature due to the difference in coefficients of expansion of the two materials. The mode of operation is by plucking or swept oscillation of the vibrating wire. The wire, vibrating at its resonant frequency, which is relative to the tension in the wire, induces an alternating current in a coil which is detected by the readout unit. In this way the period of oscillation is accurately measured. Readings are made by measuring the elapsed time for 100 cycles. The readout then displays the information in engineering units. Frequency throughout the temperature range is approximately from 2000 Hz to 3000 Hz.

Advantages and Limitations

- Accurate, robust, high resolution and good long term stability.
- Readings unaffected by cable length.
- Capable of withstanding thermal shocks without impairing performance.
- Outer body manufactured from 316 stainless steel.
- Overvoltage surge arrestors fitted to protect against electrical damage.
- Connecting cable is strong, screened and flexible and can be used in lengths in excess of 1000m.
- Suitable for remote reading, scanning and data logging.
- Thermal mass requires approximately 10 minutes to achieve steady state reading.
- Upper temperature limit determined by cable, lower limit by internal potting.

Performance

- Measuring range: -20 to +80°C.
- Accuracy: ±0.4% F.S.
- Sensitivity: 0.03°C.
- Operating Frequency: 2000 Hz to 3000 Hz.
- Cable: 4 core screened.

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DATA SHEET T3

Specification

T3-1 Vibrating Wire Temperature Sensor

T3-1.1 Vibrating Wire Temperature Sensor comprising a stainless steel housing containing a stainless steel mounting body for the vibrating wire element, electromagnetic pulsing and sensing unit with overvoltage surge arrestor. Cable lengths fitted to suit customers requirements. The temperature range of the complete assembly is -20°C to +80°C with an accuracy of ±0.4% F.S. Dimensions 19mm diameter, length 130mm.

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