

## Data Sheet



CE

# VIBRATING WIRE TEMPERATURE METER

**MODEL ETT-10V**

## INTRODUCTION

The Encardio-rite model ETT-10V vibrating wire temperature meter is used for the measurement of internal temperature in concrete structures or water. It has a resolution of better than 0.1°C. The vibrating wire temperature meter is designed on the principle that dissimilar metals have different linear coefficient of expansion with temperature variation.

## FEATURES

- Rugged, waterproof and of stainless steel construction for high reliability.
- Excellent linearity and hysteresis.
- Vibrating wire technology assures long term stability, quick and easy readout.
- Sensor hermetically sealed by electron beam welding with a vacuum of around 1/1000 Torr inside it

## APPLICATION

- For verifying design assumptions that will promote safer and economical design and construction.
- Temperature rise during process of curing concrete.
- Rock temperatures near liquid gas storage tanks and ground freezing operations.
- Water temperatures in reservoirs and bore holes.
- Interpretation of temperature related stress and volume changes in dams.



- Weather proof enclosure conforming to IP 68.
- Low cost, extremely reliable sensor
- Suitable for remote reading, scanning and data logging.

- Study of temperature effect on other installed instruments.

## OVERVIEW

Excepting for the procedure adopted during construction, the greatest single factor in causing stress in mass concrete is due to the temperature change. For analyzing the development of thermal stress and for control of artificial cooling, it is therefore necessary to monitor the temperature variation of concrete during construction.

For this, the temperature should be accurately measured at many points in the structure, in the water and in the air. Sufficient number of temperature sensors should be embedded to get a correct picture of temperature distribution at various points in the structure.

## DESCRIPTION

The vibrating wire temperature meter basically consists of a magnetic, high tensile strength stretched wire, the two ends of which are fixed to any dissimilar metal in a manner that any change in temperature directly affects the tension in the wire and thus its natural frequency of vibration. The dissimilar metal, in the case of the Encardio-rite temperature meter, is aluminium. As the temperature signal is converted into frequency, the same read-out unit as is used for other vibrating wire sensors can be used for monitoring temperature also. The data can also be automatically collected at desired frequency, stored and transmitted to remote server by a suitable datalogger.

## OPERATING PRINCIPLE

The change in temperature is sensed by the specially built Encardio-rite vibrating wire sensor and is converted to an electrical signal which is transmitted as a frequency to the read-out unit. The frequency, which is proportional to the temperature and in turn to the tension 'σ' in the wire, can be determined as follows:

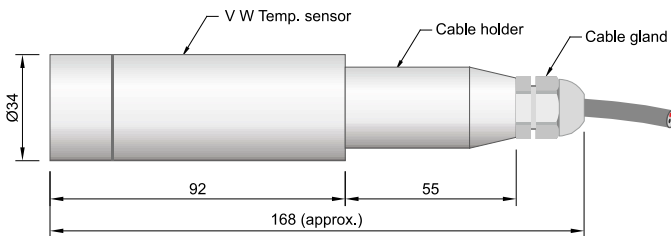
$$f = [\sigma g / \rho]^{1/2} / 2l \text{ Hz}$$

where:

- σ = tension of wire
- g = acceleration due to gravity
- ρ = density of wire
- l = length of wire

## SPECIFICATIONS

|                                    |   |
|------------------------------------|---|
| Transducer type                    | Vibrating wire  |
| Model                              | ETT-10V   |
| Service                            | Embedment in concr  |
| Accuracy                           | ± 0.5 % fs normal<br>± 0.1 % fs optional                                |
| Range                              | -20°C to + 80°C   |
| Coil resistance                    | 120-150 Ohm   |
| Insulation resistance              | > 500 M Ohm at 12   |
| Humidity                           | 0-100 % RH  |
| Vibration limit                    | 2 g, 50 - 500 Hz  |
| Read out                           | Portable readout uni  |
| Enclosure                          | Stainless steel. Hermetically sealed by electron beam welding to IP-68. |
| Over voltage/ lightning protection | Provided with bipolar plasma surge arrester to protect against over-    |



\*All specifications are subject to change without prior notice

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TUNNELS



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