

T2-T3-T4 TEMPERATURE SENSORS

Datasheet T2-T3-T4



**Description**

Temperature sensors are used to monitor temperature in concrete, rock and soil.

They are ideal for monitoring temperature during concrete curing, for evaluating seasonal variations within ground and structures and to interpret temperature related stress and volume changes in dams.

Soil Instruments produce three kinds of temperature sensors:

- **Vibrating Wire** – comprises a Stainless Steel body which houses a Vibrating Wire sensor unit/transducer. As the body expands or contracts due to temperature, this changes the tension in the Vibrating Wire. The resulting frequency is converted to output temperature.
- **Thermocouple** – comprises of two dissimilar conductors joined at one end to form a hot junction which produces a voltage. As the junction is heated or cooled the voltage changes and is converted to return the temperature.
- **PT100 Resistance** – measures the resistance of a platinum element. The resistance is then converted to temperature.

**Features**

- **Accurate and robust with good long-term stability**
- **Suitable for manual or remote reading and datalogging**
- **Strong, screened and flexible cable**

**Benefits**

- **Choice of temperature sensors to suit project and site requirements**
- **Low cost option**
- **Cable lengths can be up to 100m or 1000m, dependent on choice of sensor**



Comprehensive information about this product and our full range is available at [www.soilinstruments.com](http://www.soilinstruments.com)  
If you would like to speak with someone directly please call +44 (0)1825 765044 or email [sales@soilinstruments.com](mailto:sales@soilinstruments.com)

## VIBRATING WIRE PRINCIPLE



A high carbon steel wire is held in tension between a fixed point and a movable point within the sensor.

The physical changes measured by the sensor result in small changes to the position of the movable point which results in a change to the tension of the wire.

The wire may be excited by either plucking or sweeping via a coil adjacent to the wire. The resulting resonant frequency (which is relative to the tension of the wire) is then recorded by the same coil. The reading can be displayed by instrument readout or recorded by data logging equipment.

### Operation

**Vibrating Wire Sensor:** The sensor is inserted into the medium to be monitored. As the sensor expands or contracts due to temperature, the tension in the VW wire changes. The resulting frequency change is converted by a readout or data acquisition system into temperature.

**Thermocouple Sensor:** The sensor is sealed against corrosion and placed in the medium. The thermocouple voltage is generated from two dissimilar conductors being joined to form a hot junction. This hot junction creates a voltage and, as the junction is heated or cooled, the voltage will change. The result will be proportional to the temperature at the installed location – a readout or data acquisition system can be used to read the voltage and convert it to temperature.

**Resistance Sensor:** The sensor is placed in the medium to be monitored. A platinum element changes resistance with temperature and the resulting resistance change is converted to temperature using a handheld readout or data acquisition system.



### Applications

Temperature sensors are used for measuring temperature in concrete, soil and rock including:

- Monitoring temperature during concrete curing
- Soil and rock temperatures adjacent to ground freezing operations and liquid gas storage tanks
- Measurements of water temperatures in reservoirs and boreholes
- Monitoring seasonal variations within the ground and structures
- Interpretation of temperature-related stress and volume changes in mass concrete structures including dams
- Air temperature measurements on structure surfaces
- Determination of critical moment for injecting joints within mass concrete structures
- Interpretation of temperature effects on other installed instruments

### Associated products

For details on:	Catalogue code:
Terminal and Junction Boxes	RO-TB/JB/TJ
Dataloggers	D1
VWnote	RO-1-VW-NOTE
Thermocouple Readout	T4-1.2
PT100 (Resistance) Readout	T2-4.10

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### THE TECHNICAL RATING FOR THIS PRODUCT:

As the correct installation of any monitoring sensor or system is vital to maximise performance and accuracy, Soil Instruments makes the following recommendations, for the skill level of the installation contractor.

#### ADDITIONAL SUPPORT

We offer installation and monitoring services to support this system. For more information please email : [sales@soilinstruments.com](mailto:sales@soilinstruments.com) or call : **+44 (0) 1825 765044**

**BASIC** 

**ADVANCED** 

**INTERMEDIATE** 

**BASIC** 

The installer is trained and experienced in the installation of this type of instrument or systems, and is ideally a specialist Instrumentation and Monitoring contractor.

The installer already has previous experience and/or training in the installation of this instrument or system.

As a minimum the installer has read and fully comprehends the manual, and if possible has observed these instruments or systems being installed by others.

## Specifications

### Sensor

Type	Vibrating Wire	Thermocouple	Resistance
Range	-20 to +80°C	-10 to +150°C	-20 to +100°C
Accuracy	±0.5% full scale	±1°C	±0.2°C
Resolution <sup>1</sup>	0.03°C	0.1°C	0.01°C
Housing material	Stainless Steel	PVC bonded sheath	Stainless Steel
Dimensions	130mm x Ø19mm	30mm x Ø5mm	80mm x Ø15.8mm
Cable	4 core, screened, 7/0.20	2 core, 13/0.20	4 core, screened, 7/0.20
Readings	Manual or remote	Manual or remote	Manual or remote

### Readout Units

Type	Thermocouple Readout	PT100 (Resistance) Readout
Compensation	Automatic	n/a
Accuracy	±0.5% of reading, +0.7°C	±0.2% of reading, ±0.1°C
Range	-90 to +400°C	-150 to +800°C
Resolution	0.1°C	0.1°C (up to 199.9°C), 1°C (200°C to 800°C)
Display	Digital, LCD .35 digits, 15mm	Magnified backlit digital display
Battery voltage	9V, dry cell	2 x AA, 1.5V
Battery life	150 - 200hrs	500hrs
Temperature operation	0 to +50°C	-10 to +50°C
Dimensions	150mm x 70mm x 30mm	155mm x 67mm x 40mm
Weight	230g	365g
Ingress protection	IP66	IP67

<sup>1</sup> Dependent on readout

For VVnote Readout specifications, please see Soil datasheet R0-1-VW-NOTE

## Ordering Information

### Resistance Temperature Sensor

Range: -20 to +100°C

T2-1.10	Resistance temperature sensor
T2-4.10	Readout unit for resistive temperature sensor

### Vibrating Wire Temperature Sensor

Range: -20 to +80°C

T3-1.1	Vibrating wire thermometer; customer-specified length of 4 core screened cable CA-2.3-4-SC
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### Connecting Cable and Fittings

CA-2.3-4-SC	4 core multicore cable, 16/0.20; screened, PVC jacket, priced per metre - for instruments with thermistors
CA-4.1	Joint sealing kit
CA-4.2	Coloured adhesive tapes; set of 10No.
CA-4.3	Crimping tool
CA-4.4	Crimping sleeves; set of 100No.
W6-6.1	Nylon ties; 150mm x 3.5mm, pack of 100No.
ST1-3.5	Nylon ties; 370mm x 4.7mm, pack of 100No.

### Thermocouples

Range: -10 to +150°C

T4-1.1-5	Thermocouple; 5metres
T4-1.1-10	Thermocouple; 10metres
T4-1.1-20	Thermocouple; 20metres
T4-1.1-50	Thermocouple; 50metres
T4-1.1-100	Thermocouple; 100metres
T4-1.1-150	Thermocouple; 150metres

### Thermocouple Accessories

T4-1.2	Thermocouple readout
T4-1.1	Thermocouple cable, 2 core, 13/0.2; 13/C - Type T, PVC jacket and sheath, priced per metre
T4-2.2	Spare thermocouple cable plug type T

### Manual

MAN-184	Vibrating Wire Temperature Sensor
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