

APPLICATIONS

- Temperature correction of capacitance soil moisture sensors
- Monitoring Soil Column temperatures in lab experiments
- Monitoring Concrete curing times
- Monitoring Landfill temperatures
- Plant Science research
- Determining individual tree canopy temperatures
- Crop canopy thermodynamics

FEATURES

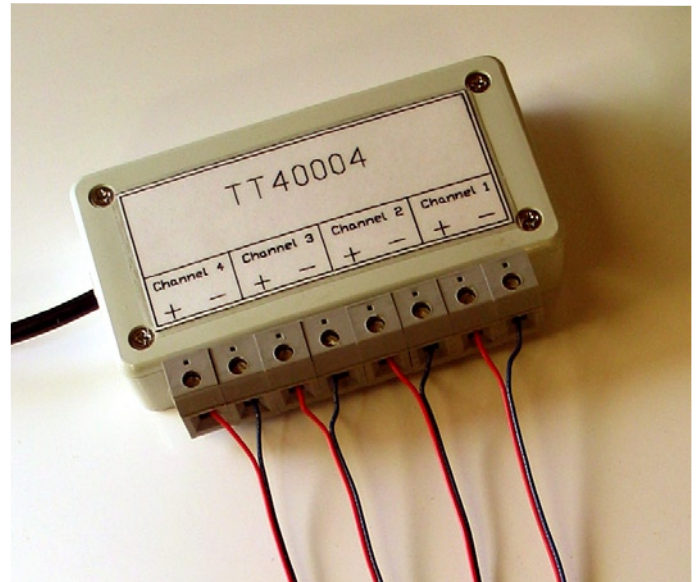
- Plug & Play Operation
- Microprocessor controlled
- Digital/serial data output
- Factory calibrated
- 4 channel capacity
- Re-useable Smart Interface
- User made thermocouples
- Variable length sensors
- Compatible with E, J, K and T type Thermocouples
- Thermocouple specific setup options
- HyperTerminal Access to configuration information

TT4 Multi-sensor Thermocouple

The TT4 is a digital interface to allow connection of thermocouple temperature sensors to the SL5 SmartLogger. It provides a means of connecting up to four thermocouples of the same material type to the system, and will interface to most types of common thermocouple.

What is a thermocouple?

A thermocouple is a temperature sensor formed by connecting wires of two dissimilar metals together. A temperature gradient between the ends of the wires generates a small DC voltage which is directly proportional to temperature. The sensitivity available depends on the materials used to make the thermocouple. The TT4 is factory calibrated to use any of the common material types, and is software selectable via a straightforward menu. The compatible thermocouple types, indicated by a standard letter code, are listed below



Type	materials	wire colours	output	temp range
Type E	Chromel/ Constantan		68 μ V/°C	-270 - 1100°C
Type J	Iron/ Constantan	red/white	52 μ V/°C	-40 - 750°C
Type K	Chromel/ Alumel	yellow/red	41 μ V/°C	-200 - 1200°C
Type T	Copper/ Constantan	blue/red	43 μ V/°C	-200 - 350°C

The TT4 provides calibrations for the chosen thermocouple type, giving a direct output in engineering units of °C when connected to the Smart Logger. Each type has different properties and optimal temperature ranges, and should be selected for the application. In general, the type-T will be the most commonly used, being highly accurate within a temperature range of 0 to 125°C for general purpose applications.

Flexibility & Ease of Use

The simplicity and very low cost of thermocouple sensors allows them to be effectively disposable, which means they are ideal for applications where the probe is not recoverable such as embedded in a material like concrete or at great depths below the ground surface. Users can make their own thermocouples of any type and length, reusing the TT4 Smart Interface time and again for ever-changing applications.

Digital Output

The TT4 is microprocessor-controlled so the conversion from analogue to digital signals and processing of raw voltages to engineering units is handled at the point of measurement using the specific calibration for the appropriate thermocouple type being used. The digital serial output is compatible with the Smart Logger's 3-wire Databus protocol and this allows the data to be transferred up to 4km without any loss in signal or degradation of data quality. The Smart Loggers software interface provides the user with a simple to use menu via HyperTerminal where all the settings for each thermocouple type can be manually adjusted.

Applications

The TT4 is an excellent multi-sensor device for any temperature measurement application. It is highly accurate, low cost and easy to use. The screw terminal connection of the TT4 Smart Interface allows easy and convenient access to swap or change thermocouple sensors.

The user can customize the length of the Thermocouples to suit specific applications as each thermocouple can be of varying lengths. Individual Thermocouple wires can be up to 10m from the Smart Interface where the analogue signal is then converted to a digital value in °C. Once converted the temperature value can be transmitted via the Databus back to the Smart Logger up to 4km from the point of measurement.

The TT4 is ideally suited to monitoring the curing process of concrete. Concrete setting is an exothermal process, giving off heat as it cures or dries. By measuring the temperature over time, the curing process can be monitored and earliest safe strength can be determined. This can reduce down-time and improve safe working conditions.

Soil temperature gradients exist from the soil surface extending down the soil profile to depth. The actual soil temperature and the change in temperature down the profile are very important in soil science research and commercial agriculture. The TT4 provides a low cost and customizable means of monitoring these temperatures

Plant science research and commercial horticulture industries commonly need to monitor plant canopy temperatures. Thermal gradient occur vertically and horizontally within the canopies of both individual forest or fruit trees and within plant community canopies. As each tree or canopy has very different architecture the flexibility to have four thermocouples of varying lengths nested within the measurement area allows for accurate monitoring and analysis of canopy thermodynamics.



SPECIFICATIONS

Temperature Range:

Measurement Units: °C

Accuracy: +/- 0.5°C

Resolution: 0.5°C

Humidity Range: 0-100%

Output: Serial data ASCII format plus either voltage 0-1 or 0-2.5V or frequency +5V pulse (2-10Hz)

Options: 4-20mA

Power requirements:

Power Supply: 5-28V DC unregulated

Current Drain: < 1.5mA

Cable:

Standard cable length is 5m
Maximum cable length 4km using Databus communications protocol

Interface dimensions:

Length: 120mm

Width: 70mm

Height: 40mm

Related products:

EnviroStation™ automatic weather station
FieldStation Unlimited channel logging system
SL5 Smart Logger
SS1 Mini Single Sensor Radiation Shelter
TA1 Air Temperature Sensor
TS1 Soil Temperature Sensor
TL1 Leaf Temperature sensor



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