

Thermo-Amp

'K' Type Thermocouple Amplifier



Specifications –

Applicable sensor:

'K' type with standard 'miniature' style connector

Linear voltage output:

10mV/deg Celsius or 3.3mV/deg Celsius (selectable)

Range:

0°C to 1250°C

Dimensions:

Case- 60mm x 35mm x 20mm (2.4" x 1.4" x 0.8")

Wiring:

Red +ve power (5V to 18V) Supply voltage must be greater than max. required output voltage

Black -ve ground

Green Output voltage



Wiring DTEC's 'Thermo-Amp' thermocouple amplifier –

Thermocouples only produce tiny voltages so these are greatly amplified before use. This means they are very sensitive to electrical noise also being amplified. Thermo-Amp takes measures to prevent this, but care is still needed to get quality data. Avoid running near ignition system wiring and it is greatly preferable to use 'isolated' sensors, these do not contact the earth (ground) of the vehicle and therefore connect only to Thermo-Amp directly. Particularly when using 'spark plug washer' type sensor probes interference may occur if they are grounded and not isolated type.

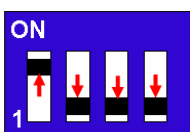
Powering of 'Thermo-Amp' for high temperatures –

For Thermo-Amp to read to 1200°C the sensor supply will need to be 12V or greater as the output is 10mV per °C (even if set to 3.3mV per °C this rule applies). For measuring temperatures < 500 °C then a 5V power supply is fine.

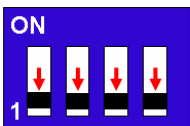
Setting the operating mode of 'Thermo-Amp' –

Removing the 2 screws from the cover will reveal a small 'DIP' switch. This can be used to set the output characteristics to suit any application.

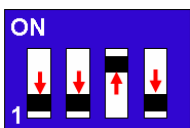
Note: Factory setting is Mode 1



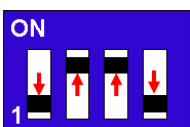
Mode 1) 10mV per °C output, Hi current (low impedance)



Mode 2) 10mV per °C output, with electrical noise filtering



Mode 3) 3.33mV per °C output



Mode 4) 3.33mV per °C output, with electrical noise filtering

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Interfacing to equipment with poor (low) input impedance –

If you are connecting to equipment with very low input impedance (meaning it 'loads down' inputs) then it may result in the output of Thermo-amp being 'pulled down', resulting in a slightly lower temperature reading than expected.

To prevent this, Mode1 provides a Hi current source (low impedance) to drive this equipment for improved accuracy.

Mode 1 is recommended to use whenever possible and is the default Mode.

Voltage output ranges (3.3mV or 10mV per °C) –

The higher choice of 10mV/ °C will generally allow better accuracy (resolution will be greater) when reading the output voltage, just ensure your measuring equipment can handle the peak voltage expected at your max temperature.

However, if you wish to interface to equipment (e.g. many data loggers) that only accept 5V Max inputs then you will be limited to measuring < 500 °C, unless the output voltage is 'scaled down' to suit.

By choosing a 3.33mV/ °C output option you are effectively dividing the output by 1/3, therefore a temperature of 1500°C would = 5V (as oppose to 15V)

Filtering of electrical noise –

Thermo-Amp is designed to be as universal in use as possible; therefore it requires exceptional internal filtering to suppress interference and help improve measurement quality. Electrical noise can come from many sources, particularly vehicle ignition systems.

If your output is varying wildly you may need to select a mode with 'noise' filtering such as Mode 2 or Mode 4, this is often necessary when taking measurements near ignition systems, particularly of the CDI type found on many small engines.

A side effect of selecting this noise filtering is that in extremely rare cases it is possible that the output may be seen to repeatedly and slowly read high and low (slowly oscillating), this effect depends on the input design of the measuring equipment you have connected, if observed then simply select an unfiltered mode.

Use in harsh environments –

Thermo-Amp has fully sealed (potted) electronics; however, it is not designed to be exposed directly to water. We suggest for improved life expectancy in harsh environments that the cover is removed and sealed with a 'neutral cure' Silastic sealant after the correct operating mode is selected. The aim being to encircle the Mode selection switch and prevent moisture ingress to this component.

Field calibration –

For an easy field calibration/test immerse the sensor probe in boiling water (100 °C) and later in a crushed ice bath (0 °C) to measure the error and apply an offset to your collected data if required.