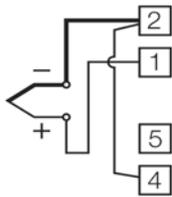


## Thermocouples

### Internal Cold Junction Compensation on the V624—How and Why?



Thermocouple with  
Internal  
cold junction  
compensation

Figure 1

Cold junction compensation allows accurate temperature measurement when using a thermocouple. A thermocouple produces a potential difference between the two dissimilar metals that varies with temperature. It is repeatable and is created when wires made from two different types of metal are connected together, (such as Iron and Copper-Nickel). Thermocouples generate a small Voltage (millivolts), which increases when the thermocouple junction gets hotter. When the thermocouple wires are connected to an instrument, two more thermocouple junctions are created, because the terminals are made of a different material than the thermocouple wires. These "extra" junctions, (called cold junctions), create their own Voltage, which alters the Voltage generated by the actual thermocouple. Cold junction compensation negates the voltage created by these cold junctions, allowing only the Voltage created by the thermocouple to be sensed by the instrument. When you desire to use the internal cold junction compensation (CJC) circuit on the V624 you must do the following: 1) When programming the unit insure that the measuring method selected is "internal compensated Thermocouple" and 2) you must add a standard copper jumper from pins 2 to 4 to energize the internal circuitry (See Figure 1). The unit will go into upscale burnout (110% of full scale output) if you do not add the jumper or the thermocouple opens.

### TEMPERATURE CONVERSION

$$\text{DEGREES F} = (\text{DEGREES C} \times 9/5) + 32$$

$$\text{DEGREES C} = (\text{DEGREES F} - 32) \times 5/9$$

#### Common Thermocouples

Type	Polarity & Material	Wire ID Properties	Wire Color	Practical Temp Range
J	+ Iron	Very magnetic	White	32 to 1336°F
	- Constantan		Red	0 to 724°C
K	+ Chromel	Slightly magnetic	Yellow	32 to 2282°F
	- Alumel		Red	0 to 1250°C
N	+ NICROSIL	Greater stiffness	Orange	32 to 2282°F
	- NISIL		Red	0 to 1250°C
T	+ Copper	Copper color	Blue	-299 to 700°F
	- Constantan		Red	-184 to 371°C
E	+ Chromel	Greater stiffness	Purple	32 to 1652°F
	- Constantan		Red	0 to 900°C
R	+ Pt 13%Rh	Greater stiffness	Black	32 to 2700°F
	- Platinum		Red	0 to 1482°C
S	+ Pt 10%Rh	Greater stiffness	Black	32 to 2700°F
	- Platinum		Red	0 to 1482°C