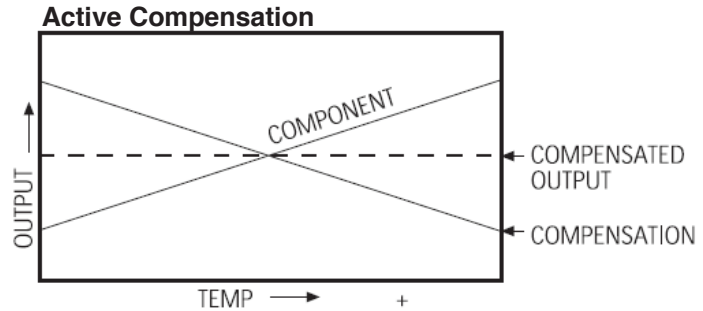




# Principles of Temperature Compensation Using PTC Thermistors

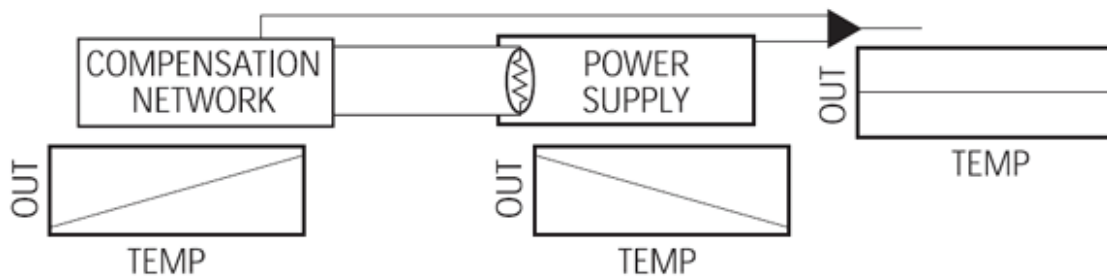
Most electronic components and assemblies are temperature sensitive to some extent, and circuit precision often necessitates some sort of temperature compensation. Oscillators, coils, and amplifiers are examples of circuits that are commonly in need of temperature compensation. Thermistors are easily utilized for general temperature compensation.



Circuits and components can use either active or passive compensation. Active compensation utilizes the thermistor as a sensing element which drives an active compensation circuit, whereas passive compensation uses a thermistor in a configuration to offset an element's characteristic R-T response. Active compensation is more suitable to applications where the temperature of an entire assembly is in question, where passive compensation focuses on a critical component.

The first step in electronic temperature compensation is to determine the R-T characteristic of the circuit or component which is to be compensated. The appropriate thermistor compensation network is then determined to inversely match this response as closely as possible.

The circuit below is an example of a thermistor used to compensate a power supply. Assume that as temperature of the power supply board increases, the output voltage of the supply drifts in a negative direction. The thermistor is placed on the power supply in a location where the thermistor resistance accurately reflects the temperature of the supply circuit. As the supply heats up, the compensation amplifier voltage increases. The output of the power supply and the compensation amplifier are then fed through a summing amplifier, stabilizing the final output.



## Passive Compensation

Assume the following component has the given R-T transfer characteristics. By incorporating the thermistor into the component biasing circuit, the effects of component temperature rise can be negated.

