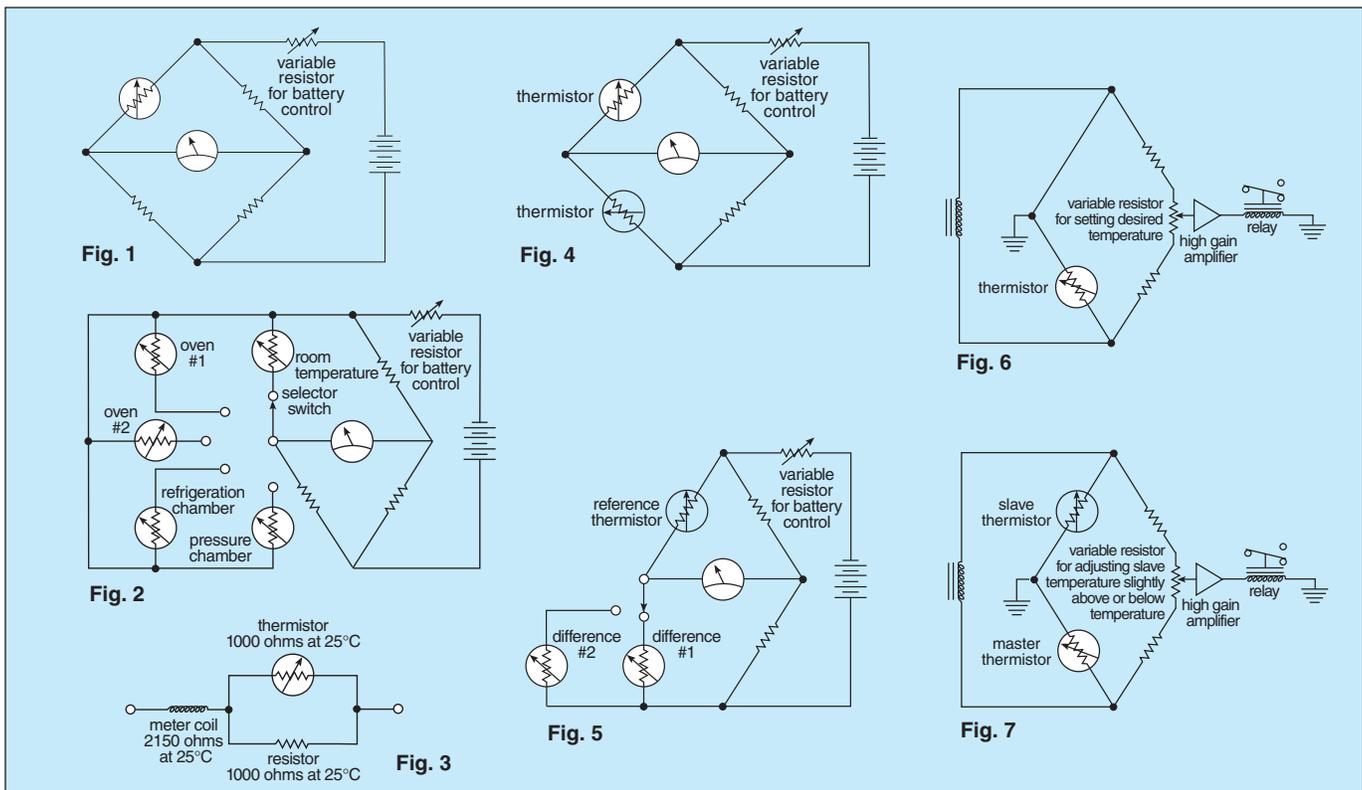


# OMEGA® Interchangeable Thermistor Applications



Thermistors can be used in a variety of ways. Here are a few typical applications. If you have questions concerning these or other thermistor uses, we will be happy to discuss them.

## TEMPERATURE MEASUREMENT—

A thermistor in one leg of a Wheatstone bridge circuit will provide precise temperature information. Accuracy is limited in most applications only by the readout device. See Figure 1. Since lead length between thermistor and bridge is not normally a limiting factor, this basic system can be expanded to measure temperature at several locations from a central point. Thermistor interchangeability and large resistance change eliminate any significant error from switches or lead length. See Figure 2.

**METER COMPENSATION—**The coil resistance of a meter movement changes with temperature, making the meter temperature-dependent. Using the thermistor's property of a high negative temperature coefficient, the coil can be compensated so total resistance due to temperature rise is essentially constant, allowing the meter to be used over a wide temperature range with minimal error. See Figure 3.

**DIFFERENTIAL THERMOMETERS—**For accurate indication of temperature differential, two thermistors can be used in a Wheatstone bridge circuit. Thermistor interchangeability simplifies circuit design and reduces the number of components. See Figure 4. To measure heat loss in a piping network, thermistors can be placed at various points and the difference between these temperatures and the original

temperature monitored at a convenient location. Measuring air temperatures at different elevations with reference to ground temperature is useful for temperature inversion data and geological studies. See Figure 5.

**TEMPERATURE CONTROL—**A system can be designed using a thermistor with a known temperature/resistance curve to form one leg of an AC bridge and a variable resistor calibrated in temperature to form another leg. When the resistor is set to a desired temperature, bridge unbalance occurs. This unbalance is fed into an amplifier which actuates a relay to provide a source of heat or cold. When the thermistor senses the desired temperature, the bridge is balanced, opening the relay and turning off the heat or cold. See Figure 6.

**MASTER-SLAVE CONTROL—**Occasionally there is a need to control one temperature with respect to another, such as a product going through a series of baths. The first bath acts as a master and uses a thermistor to sense temperature. Succeeding baths, also using thermistors, are slaves. When these thermistors are placed in the controller bridge, the slave baths can be kept at a temperature relative to the master bath. The master bath can be controlled with the system described earlier. The master-slave controller can be used for as many baths as necessary. See Figure 7.



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