

### Flexible Heater Built-In Temperature Sensors

#### Temperature Sensors

Flexible surface heaters can be manufactured with temperature sensors of various types including thermocouples, RTDs, and thermistors. Thermal fuses can also be incorporated into the design to prevent dangerous temperatures in the event of a control device failure (see page 9-17).

The sensors can be mounted on the heater to sense the temperature of the part being heated or the heater surface temperature itself. For silicone rubber heaters, temperature sensors are mounted to the surface of the heater under a vulcanized patch. For Kapton® heaters the sensor is affixed to the surface with epoxy. The leads are run on the exterior of the heater to avoid heat and mechanical interference with the resistance element inside.

#### Tempco offers three types of sensor mounting:

**Heater Sensing:** The sensor is located over heater wiring to sense the temperature of the heater surface (standard).

**Indirect Load Sensing:** A cold section is designed into the resistance element layout for where the sensor is to be located.

**Direct Load Sensing (silicone rubber only):** A hole/window is cut into the bottom layer of the heater so that the sensor is mounted in the “window” under a vulcanized patch, allowing it to be in contact with the load. (Note: higher cost and subject to potential mechanical damage.)

#### Lead Wire Connectors

Tempco has the tooling to attach many different types of “quick connectors” that are used with sensors. Consult Tempco with your requirements.

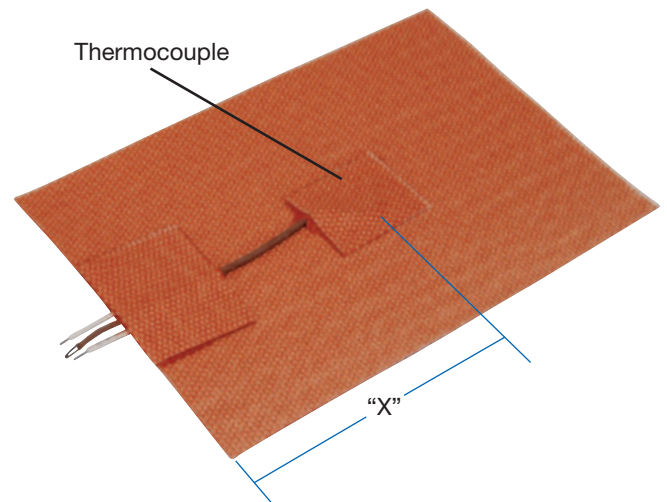
### Sensor Types

#### Thermocouples

Tempco can incorporate common Type J or K thermocouples almost anywhere on the heater surface. Other thermocouple types can also be used. Standard thermocouple temperature ranges apply. Specify when ordering. See page 14-90 for optional plugs.



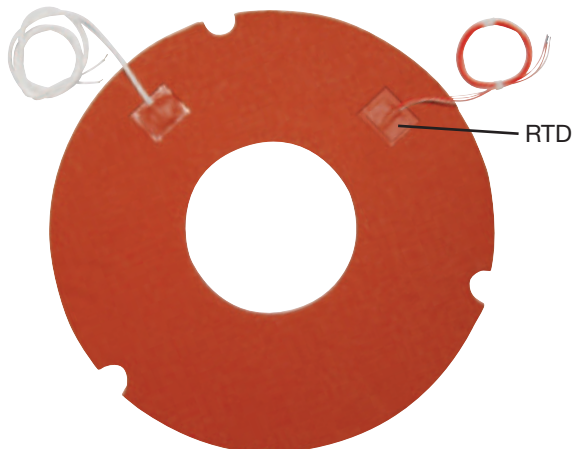
**Note:** Standard length is 10". Specify sensor lead wire length and the distance from where the sensor leads exit the heater to the heater edge (Dimension X) when ordering.



#### RTDs (2- or 3-wire)

The RTDs used are platinum thin film 100 ohm @ 100°C. The standard curve is 0.00385 TCR / DIN432760. Other common RTDs such as 1000 ohm can also be used. Specify when ordering.

The RTD's resistance increases with a rise in temperature and is considered the most accurate and stable sensor.



#### Thermistors

Thermistors are also a resistive-based temperature sensor. They do not generally respond in a linear style and are used in a limited temperature range or at a specific single temperature.

Small bead style thermistors can be mounted directly on the heater.

The thermistor's response is generally designed directly into the customer's electronic control system. Therefore if a thermistor is required, specify manufacturer, specific model number, type and specifications when requesting a quote. Consult Tempco for more information.

