



## 10 Important Questions and Answers about Temperature Sensing using Thermocouple Sensors

### 1. Why use welding to create a thermocouple sensor?

Welding produces a mechanical and electrical connection that creates a solid sensor starting point of zero electrical potential difference and zero temperature difference between the two thermocouple sensor wires.

### 2. How is the temperature difference measured via a thermocouple sensor?

A temperature gradient along the wire will produce a voltage gradient proportional to the temperature difference between the hot and cold ends of the wires.



### 3. How is the temperature difference related to the voltage difference measured at the open end of a thermocouple sensor?

At the open end of a thermocouple wire pair, the voltage difference present between open ends will be proportional to the temperature difference between the shorted ends and the open ends of the sensor pair and the particular alloys in the thermocouple wires.



**4. Why is a small welded bead used to connect the thermocouple wires ?**

If the welded bead is sized so that it is isothermal (no temperature gradient), there is no voltage contribution by the beaded junction, and its chemical make-up is irrelevant to the thermocouple voltage generated. Thin wires and small welded beads also produce a quick response.

**5. How is temperature range calculated using a thermocouple sensor?**

The nonlinear relationship of sensor volts produced per degree temperature shift along the sensor wire pair is temperature range dependent, so tables or algorithms are used to produce accurate results for corresponding temperature range differences for each wire pair type.

**6. What factors are considered when choosing the materials for a thermocouple sensor?**

Standard pair alloy wire and insulating materials are chosen to match the measured temperature range, maximum temperature and environmental conditions expected. Time response and durability affect the choice of wire size. Some materials will melt at high temperatures and some insulating materials are not waterproof. Tables and algorithms are available for calculating temperature differences for standard alloy pairs.

**7. What are the benefits of having my own thermocouple welding capability?**

Having your own thermocouple welding capability saves time, costs, offers convenient sensor availability, and significantly enhances the users scheduling and testing flexibility.

**8. What are the chief advantages of using capacitive welders for creating thermocouple junctions?**

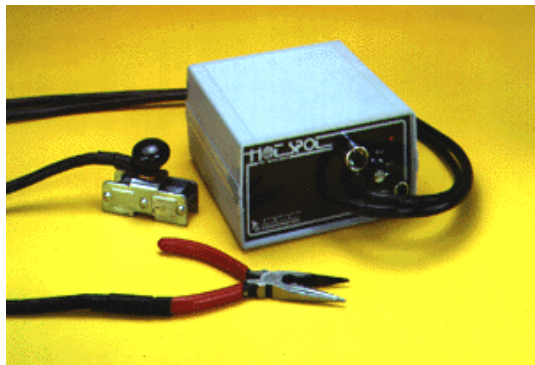
The small size, minimal power requirements, low cost, ease of operation and low maintenance of capacitive discharge thermocouple sensor welder units free the user from the delays, inflexibility and costs associated with other methods for procuring thermocouples sensors.

**9. How long does it take to create a thermocouple weld?**

A thermocouple weld can be made in just a few seconds. The DCC thermocouple welders can be recharged in less than 10 seconds, and are then ready to create the next weld.

**10. Why are capacitive discharge welders popular?**

Capacitive discharge welders offer time saving and portability advantages, and minimal operator training requirements, compared to other welder types.



For more information about DCC's Hot Spot and Hot Spot 2 capacitive discharge welders, visit our website at [www.dcccorporation.com/hotspot.html](http://www.dcccorporation.com/hotspot.html) or call our office at 856-662-7272.