

## K Series BASO® Thermocouples

*The K Series Thermocouples are designed for use in standing pilot ignition systems. They are used primarily with BASO brand automatic pilot controls and pilot burners; however, many models are interchangeable with thermocouples made by other manufacturers.*

*Johnson Controls thermocouples are built to provide reliable performance and designed to simplify installation. Various constructions and lengths are available.*



**Figure 1: K Series Thermocouples**

| Features and Benefits                                                             |                                                                            |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <input type="checkbox"/> <b>Heavy-Duty Construction</b>                           | Promotes long life                                                         |
| <input type="checkbox"/> <b>High-Performance Inner and Outer Element Material</b> | Provides maximum output capacity                                           |
| <input type="checkbox"/> <b>Built-in Junction Block (Optional)</b>                | Allows for the addition of a high limit switch in the thermocouple circuit |
| <input type="checkbox"/> <b>Nickel Plating (Optional)</b>                         | Provides high ambient and corrosive atmosphere protection                  |

## Description

A thermocouple is constructed of two dissimilar metals; one is a solid element, and that is surrounded by a second, tubular-shaped piece. These metal elements touch only at a single welded endpoint. This endpoint, commonly known as the “hot” junction, is the tip of the thermocouple heated by the pilot flame.

The outer element is brazed to a brass connector sleeve attached to a copper tube, or is welded directly to a copper tube. Inside the copper tube is an insulated copper wire that is welded to the inner element of the thermocouple. This welded joint, together with the brazed joint between the copper tube or brass connector and the outer thermocouple element, forms the “cold” junction of the thermocouple. See Figures 2 and 3.

When there is a large temperature differential between the hot and cold junctions, an electrical current is generated. In its operating range, the electrical energy created is directly proportional to the temperature differential between the hot and cold junctions. The electrical output of a thermocouple is small (measured in millivolts) and the response time is slow (normally 30 to 45 seconds).

Care must be taken when applying a thermocouple to an appliance. Only a large temperature differential between the hot and cold junctions will create a useful millivolt output. The thermocouple should be positioned with 12.7 mm (0.5 in.) of its tip in the pilot flame. The cold junction should not be subjected to any large amounts of ambient heat. The lead should be routed away from the heat of the pilot and main burners. Electrical resistance increases with lead length, and will create a noticeable power drop.

## Junction Block Thermocouples

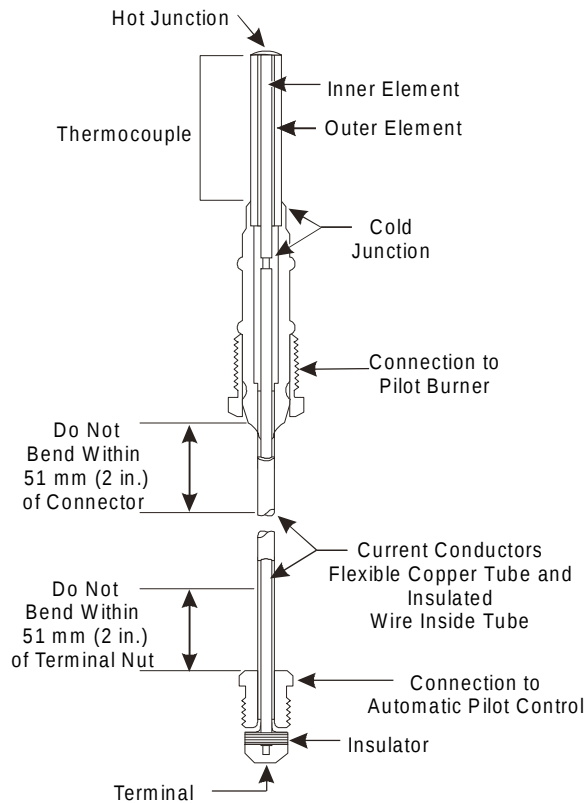
K16F and K16J junction block thermocouples have a built-in junction block, which allows for the connection of a high limit switch. This type of application places the power unit of the pilot control in series with the limit switch and thermocouple so that all gas to the appliance will be shut off if pilot flame failure occurs or the high limit switch opens.

The correct length of the wire for connecting the limit switch to the junction block is determined by several factors: the size of the wire, the wire temperature, the thermocouple lead length, the power unit type, and the distance between the limit switch and the junction block. The junction block is 90 mm (3.546 in.) from the terminal end of the thermocouple for the K16F model, and 60 mm (2.343 in.) for the K16J model.

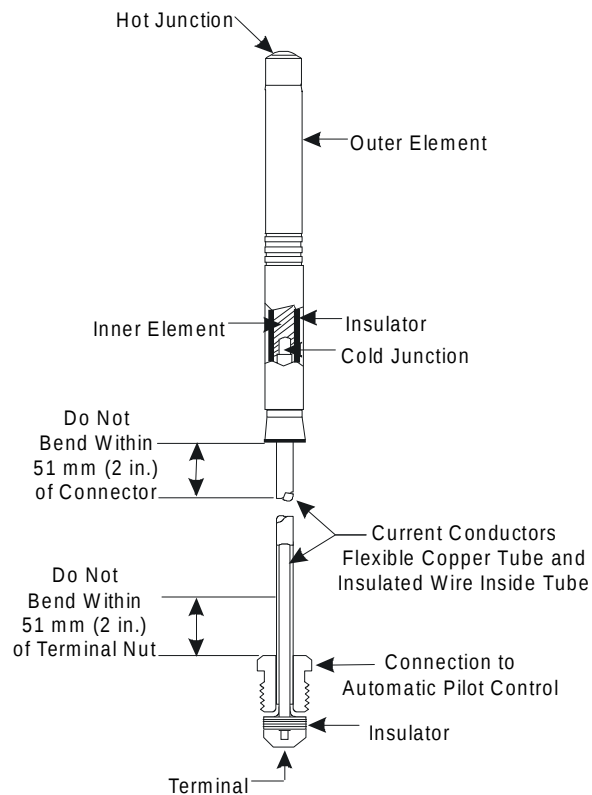
## Thermocouple Output

**Table 1: Thermocouple Output**

| Thermocouple Type            | Open Circuit mV Range | Maximum Tip Temperature |
|------------------------------|-----------------------|-------------------------|
| K15D, K15F                   | 20-28 mV              | 816°C (1500°F)          |
| K16B, K16F, K16J, K16C, K16R | 25-35 mV              | 816°C (1500°F)          |
| K19                          | 25-35 mV              | 704°C (1300°F)          |



**Figure 2: Cutaway View of a K15/K16 Thermocouple**

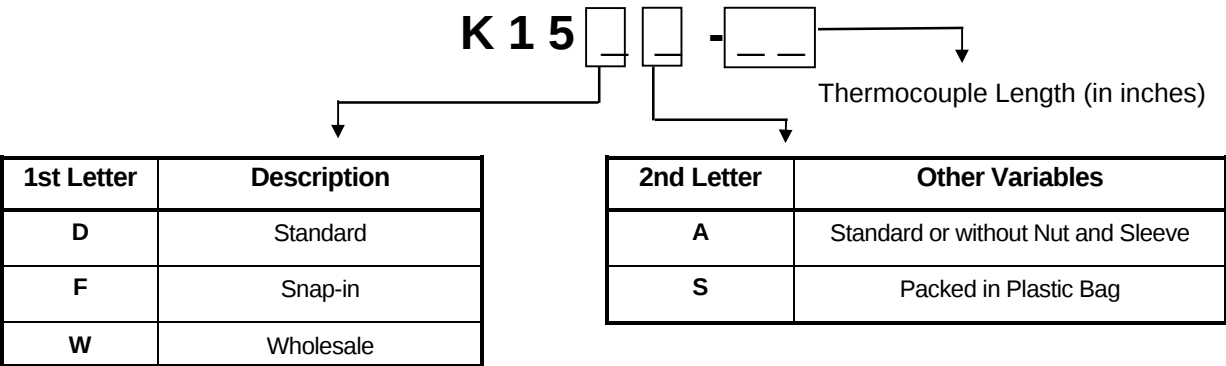


**Figure 3: Cutaway View of a K19 Thermocouple**

# Ordering Information



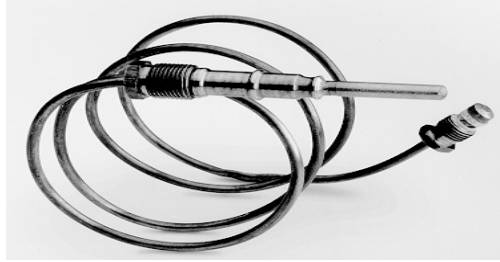
Figure 4: K15 Series Thermocouple



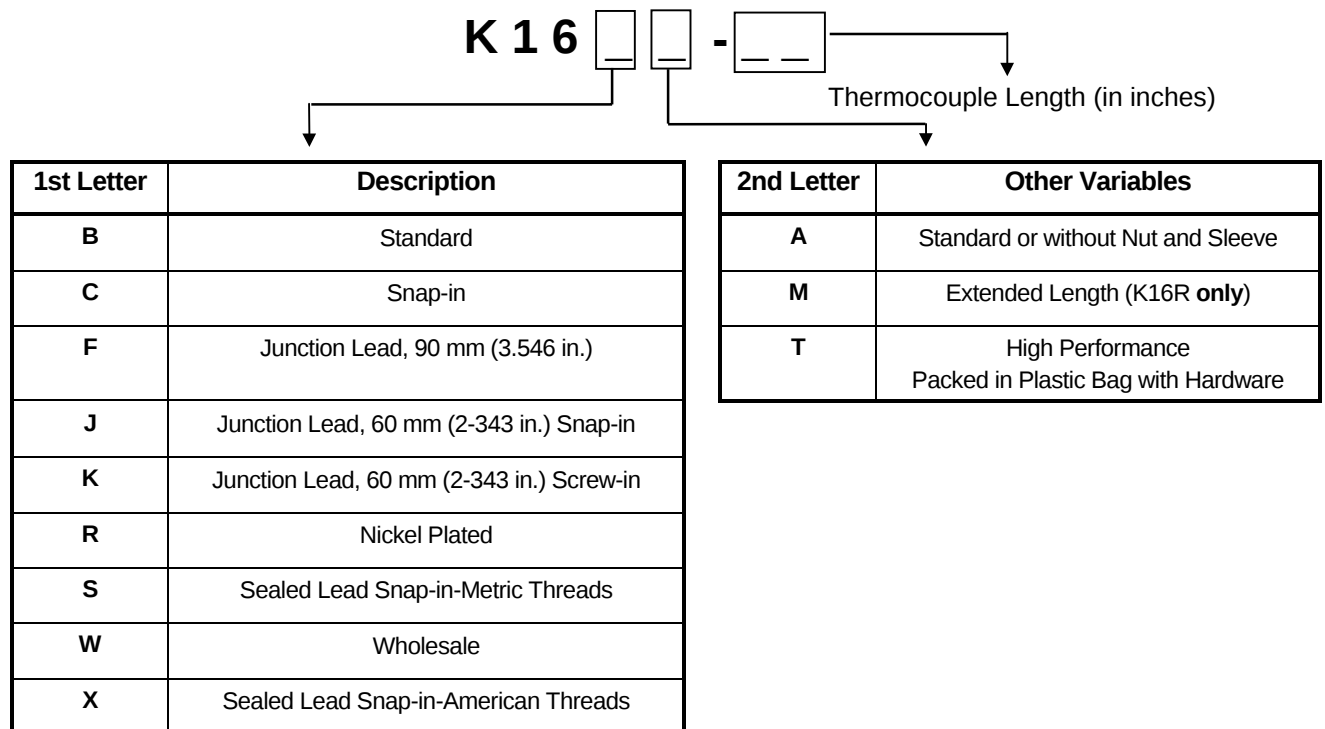
Many lengths (normally in 152 mm [6 in.] increments) are available up to 305 to 1,220 mm (12 to 48 in.), but the length should be kept to a minimum.

The presence of a particular construction in this information does not guarantee its availability. Consult Johnson Controls for available constructions.

Figure 5: K15 Ordering Matrix



**Figure 6: K16 Husky Thermocouple**



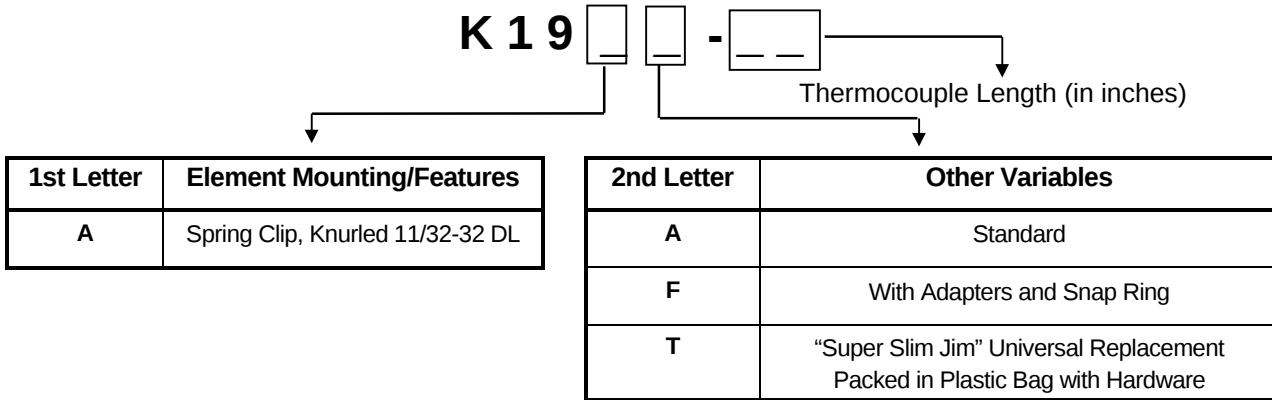
Many lengths (normally in 152 mm [6 in.] increments) are available up to 305 to 4,572 mm (12 to 180 in.), but the length should be kept to a minimum.

The presence of a particular construction in this information does not guarantee its availability. Consult Johnson Controls for available constructions.

**Figure 7: K16 Ordering Matrix**



**Figure 8: K19 Thermocouple**



Many lengths (normally in 152 mm [6 in.] increments) are available up to 457 to 1,830 mm (18 to 72 in.), but the length should be kept to a minimum.

The presence of a particular construction in this information does not guarantee its availability. Consult Johnson Controls for available constructions.

**Figure 9: K19 Ordering Matrix**

---

## Notes

# Specifications

|                                |                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------|
| <b>Product</b>                 | K Series Thermocouples                                                            |
| <b>Types of Gas</b>            | Natural, Liquefied Petroleum (LP), manufactured, mixed, or LP gas-air mixture     |
| <b>Packaging</b>               | Bulk pack supplied to original equipment manufacturer, (individual pack optional) |
| <b>Bulk Pack Quantity</b>      | 100                                                                               |
| <b>Bulk Pack Weight</b>        | Varies due to the different lengths of leads                                      |
| <b>Agency Listings</b>         | AGA Certificate Number 20-35C-TC                                                  |
| <b>Specification Standards</b> | ANSI Standard Z21-20-1995                                                         |

*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*

Refer to the K Series Technical Bulletin (LIT-121321) for necessary information on the installation, use, and servicing of this product.



**Controls Group**  
507 E. Michigan Street  
P.O. Box 423  
Milwaukee, WI 53201

**www.johnsoncontrols.com**  
**FAN 435.0**  
Heating Line Product Guide  
Printed in U.S.A.