Thermocouple Sensor Probes

1. **Lead Wire Termination** is how the sensor will connect and terminate to the instrument or electrical interface.

2. **Lead Wire Insulation Type** and length are selected to suit each application. The temperature rating varies depending on the material of lead wire used.

3. **Transition** is where the sensing probe is transitioned to lead wires. This piece is crimped or brazed onto the probe and potted with an epoxy rated to 150°C. For high temperature, and low moisture applications, a ceramic cement potting material is available on special request.

4. **Fitting** options are available to fasten the sensor into the process or optional thermowell.

5. **Sensor** length, outer diameter, and material are very important variables when designing a thermocouple sensor probe. The sheath is commonly constructed from mineral insulated cable (MI cable). Various alloys are available to suit applications. Material compatibility is always the end users responsibility.

6. **Thermocouple Junction** is located in the tip of the sensor. This is where the temperature sensing takes place.

**Temperature Limiting Factors** of thermocouple sensor probes will depend on the material temperature rating of each component used in the sensors construction, in addition to the thermocouple type. Continuous temperature ratings of the components are listed in the model number selection. Generally, the sensor probe sheath will have a higher temperature rating than the transition and lead wires.

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**Overview**

The TC series Thermocouple sensor probes come in various styles unique to different applications. Each style consists of a thermocouple sensing junction protected by a sheath with a termination option.

**Features:**

- Styles are customizable to almost any application.
- Manufactured from high quality raw materials that meet industry recognized standards.
- Fast lead time on styles that utilize standard Aircom materials.

**Application:**

Thermocouple sensor probes are used widely across almost any and every commercial and industrial temperature process control application.

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**Configuration Considerations**

When configuring the TC series thermocouple sensor probe models to suit your application it is important to consider the following:

- Hazardous location approval rating
- Thermocouple type
- Number of junctions
- Sheath OD
- Sheath material
- Sensor probe length
- Lead wire length
- Lead wire type
- Lead wire termination
- Process fitting options
- Process fitting size
- Minimum and maximum temperature of the process
- Process conditions and effect on the sensor probe
- Maximum pressure (if any)
## TC4 Thermocouple Sensor Probe Model Code

**TC4** Thermocouple Sensor Probe

### T1 Thermocouple Type
- **K** Type K
- **J** Type J
- **T** Type T
- **E** Type E
- **N** Type N
- Other: Consult factory

### T2 Thermocouple Junction
- **G** Grounded
- **U** Ungrounded
- **2G** Dual grounded
- **2U** Dual ungrounded
  - (Qty up to 4) grounded
  - (Qty up to 4) ungrounded
- **E** Exposed

### T3 Sensor Probe Diameter
- **04** 0.040” (1/25”)
- **16** 0.063” (1/16”)
- **18** 0.125” (1/8”)
- **36** 0.188” (3/16”)
- **14** 0.250” (1/4”)
- **38** 0.375” (3/8”)

### T4 Sensor Sheath Material
- **304** 304/304L stainless steel
- **316** 316/316L stainless steel
- **310** 310 stainless steel
- **446** 446 stainless steel
- **600** Inconel 600
- Other: Consult factory

### T5 Sensor Probe “L” Length (inches)
- Specify length in inches for straight probe length
- **N’** inches Specify “N” and length in inches for 90° bend

### T6 Lead Wire “A” Length (inches)
- Specify length in inches

### T7 Lead Wire Type
- **FB** Fiberglass (482°C)
- **SF** Fiberglass with SS over braid (482°C)
- **AF** Flex armor over fiberglass (482°C)
- **TE** Teflon (260°C)
- **ST** Teflon with SS over braid (260°C)
- **AT** Flex armor over Teflon (260°C)
- **PT** Poly jacketed flex armor over Teflon (102°C)
- **PV** Polynvinylchloride (PVC) (102°C)
- **BC** 2” Stripped bare conductor
- Other: Consult factory

### T8 Lead Wire Termination
- **BE** Bare ended lead wire
- **SC** Standard male connector (205°C)
- **MC** Miniature male connector (205°C)
- **HC** High temp standard male connector (425°C)
- **MH** High temp miniature male connector (425°C)
- **SL** Spade lugs (thermocouple alloy if available)
- **CG** 1/2” NPT cord grip electrical fitting
- Other: Consult factory

### T9 Fitting Options
- **X** No fitting required
- **CF** Compression fitting - SS ferrule
- **CT** Compression fitting - Teflon ferrule
- **FX** Fixed hex instrument plug 1/2” NPT
- **FS** Fixed bushing 1/2”x1/2” NPT
- **TX** Spring loaded bushing 1/2”x1/2” NPT
- **OS** Oil seal spring loaded 1/2”x1/2” NPT
- **SG** Self gripping spring
- Other: Consult factory

### T10 Fitting Size
- **X** No fitting
- **18** 1/8” NPT
- **14** 1/4” NPT
- **38** 3/8” NPT
- **12** 1/2” NPT
- Other: Consult factory

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**NOTES:**
1. Part number example: TC4-K-U-14-316-12-36-TE-BE-X-X or TC4-J-2U-14-316-N6-24-AT-SC-CF-12
2. Consult factory for more than 2 thermocouple junctions with probe OD (T3) values less than option 36 (0.188”) and part number examples.
3. Reference page B-6 for part outline and B-7 for part dimensions
4. Temperature values given are for maximum continuous rating for the specific component of the configuration
5. CG fitting option (T8) only for lead wire options AT, AF & PT
6. Consult factory for FX fixed hex plug option (T9) for probe OD options smaller than option 36 (0.188”)
7. Bold text indicates most common part selections

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### TC4 Thermocouple Sensor Probe Outline

<table>
<thead>
<tr>
<th>Termination</th>
<th>Lead Wire Type</th>
<th>Transition</th>
<th>Fittings</th>
<th>Sensor Sheath (OD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE</td>
<td>FB</td>
<td>Transition</td>
<td>CF</td>
<td>04 (0.040&quot;)</td>
</tr>
<tr>
<td>SC</td>
<td>SF</td>
<td>with Spring</td>
<td>CT</td>
<td>16 (0.0625&quot;)</td>
</tr>
<tr>
<td>MC</td>
<td>AF</td>
<td>Standard</td>
<td>FX</td>
<td>18 (0.125&quot;)</td>
</tr>
<tr>
<td>HC</td>
<td>TE</td>
<td>Transition</td>
<td>FS</td>
<td>36 (0.188&quot;)</td>
</tr>
<tr>
<td>MH</td>
<td>ST</td>
<td>Small</td>
<td>TX</td>
<td>14 (0.250&quot;)</td>
</tr>
<tr>
<td>SL</td>
<td>AT</td>
<td>Transition</td>
<td>OS</td>
<td>38 (0.375&quot;)</td>
</tr>
<tr>
<td>CG</td>
<td>PT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PV</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>BC</td>
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</tr>
</tbody>
</table>

**Termination**
- BE
- SC
- MC
- HC
- MH
- SL
- CG

**Lead Wire Type**
- FB
- SF
- AF
- TE
- ST
- AT
- PT
- PV
- BC

**Transition**
- Transition with Spring
- Standard Transition
- Small Transition

**Fittings**
- CF
- CT
- FX
- FS
- TX
- OS

**Sensor Sheath (OD)**
- 04 (0.040")
- 16 (0.0625")
- 18 (0.125")
- 36 (0.188")
- 14 (0.250")
- 38 (0.375")

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**Lead Wire**

- **3” (Typ.)**
  - FB, TE, PV

- **3” (Typ.)**
  - SF, ST

- **6” (Typ.)**
  - AT, AF, AP

- **6” (Typ.)**
  - PT

**Transition**

- Strain relief transition is used with lead wire options: SF, ST, FB, TE, PV when "A" length is greater than 12”

- Standard 1.875” transition is used with lead wire options: AF, AT, PT.

- Small 0.625” transition is used only with lead wire options FB, TE, PV when "A" length is less than 12”

- No transition is used with fitting options FX, FS unless lead wire options are armored (AT, AF, PT)

**Sensor Probe**

- Standard Sensor Probe
  - L
  - OD

- Fitting option CF, CT (supplied loose)
  - L
  - OD

- Fitting option FX
  - OD

- Fitting option FS
  - 2”
  - OD

- Fitting option TX, OS
  - 2.375”
  - OD

- Option for length below 90° specified: “N” length

- Standard distance to transition will be minimum allowable length (Typ. 1.5”)

- Bend radius is a function of tube (MI cable) OD