**Overview**

Multipoint temperature sensors and assemblies are constructed using either thermocouple or RTD temperature sensing elements. The temperature sensor points are sheathed for protection from the process or built into a larger assembly.

Multipoint temperature sensors and assemblies are used in industrial process environments where multiple temperature readings are required in a single temperature sensor connection point. They are commonly found in process reactors, catalytic crackers, fractionization towers, vessels and storage tanks. Multipoint’s optimize the process by providing temperature profiles across a specific areas of the chemical reaction or process media.

**Design Considerations**

When designing a multipoint to suit your application it is important to consider the following:

- Process media, temperature and pressure compatibility
- Connection to process
- Multipoint sensor housing or assembly style
- Sensor type (Thermocouple or RTD)
- Number of points and point location
- Insertion length
- Diameter of sensor housing
- Material and compatibility with process
- Transition to lead wire and lead wire type
- Electrical termination

---

Aircom can integrate an electrical enclosure or junction box with terminal blocks. User defined conduit entries will provide access to end user for termination to the control system. Or in some cases an electrical enclosure is not required and the multipoint is supplied with flying lead wires for further end user termination.

![Multipoint Temperature Sensors & Assemblies](image)

**Connection to process is commonly flanged or threaded**

The sensor sheathing into the process is commonly constructed from an alloy that extends into the process. It can either flexible or rigid. In some designs sensor points are contained inside an overall sheath similar to a thermowell while other designs integrate the sensor elements into the sheathing wall itself.
MP1 Multipoint Thermocouple Probe

Multiple MI (mineral insulated) thermocouple sensor probes are combined and embedded inside an overall probe sheath. Excess space inside the sheath is filled using redundant MI filler material. The MP1 design is a very robust design that is capable of experiencing very high temperature and pressures. The limiting temperature and pressure factors will be the thermocouple type, and sheath material used.

Common Sheath Materials

<table>
<thead>
<tr>
<th>Sheath Material</th>
<th>304/L stainless steel</th>
<th>321 stainless steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>316/L stainless</td>
<td>Inconel 600</td>
<td></td>
</tr>
<tr>
<td>steel</td>
<td>Hastelloy C-276</td>
<td></td>
</tr>
</tbody>
</table>

Thermocouple Types

Type K, J, T, N & B

Thermocouple Junction

Grounded or ungrounded

Thermocouple Tolerance

Special / standard limits of error

### Transition Size

<table>
<thead>
<tr>
<th># Points</th>
<th>OD</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>0.5&quot;</td>
<td>4.0&quot;</td>
</tr>
<tr>
<td>4-5</td>
<td>0.75&quot;</td>
<td>4.0&quot;</td>
</tr>
<tr>
<td>6-7</td>
<td>1.0&quot;</td>
<td>4.0&quot;</td>
</tr>
<tr>
<td>8-12</td>
<td>1.0&quot;</td>
<td>6.0&quot;</td>
</tr>
<tr>
<td>13-16</td>
<td>1.5&quot;</td>
<td>6.0&quot;</td>
</tr>
<tr>
<td>17-20</td>
<td>2.0&quot;</td>
<td>6.0&quot;</td>
</tr>
<tr>
<td>21-25</td>
<td>2.375&quot;</td>
<td>6.0&quot;</td>
</tr>
<tr>
<td>26-30</td>
<td>2.375&quot;</td>
<td>8.0&quot;</td>
</tr>
</tbody>
</table>

### Sheath Outside Diameter

<table>
<thead>
<tr>
<th># Points</th>
<th>OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.062&quot;</td>
</tr>
<tr>
<td>5-7</td>
<td>0.092&quot;</td>
</tr>
<tr>
<td>8-12</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>13-24</td>
<td>0.188&quot;</td>
</tr>
<tr>
<td>25-30</td>
<td>0.250&quot;</td>
</tr>
<tr>
<td>25-30</td>
<td>0.313&quot;</td>
</tr>
</tbody>
</table>

### Sheath OD & Maximum Length

<table>
<thead>
<tr>
<th>OD</th>
<th>Maximum Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.062&quot;</td>
<td>240&quot; (20ft)</td>
</tr>
<tr>
<td>0.092&quot;</td>
<td>240&quot; (20ft)</td>
</tr>
<tr>
<td>0.125&quot;</td>
<td>1320&quot; (110ft)</td>
</tr>
<tr>
<td>0.188&quot; - 0.375&quot;</td>
<td>1320&quot; (110ft)</td>
</tr>
</tbody>
</table>

### Lead Wire

<table>
<thead>
<tr>
<th>Lead Wire</th>
<th>Teflon (260°C)</th>
<th>Fiberglass (482°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teflon /w SS braid</td>
<td>Fiberglass /w SS braid</td>
<td></td>
</tr>
<tr>
<td>Flex armour over Teflon</td>
<td>Flex armour over Fiberglass</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

1. Drawing for approval provided after receipt of order
2. Temperature rating reflective of sheath material and thermocouple type
3. Transition filled with epoxy resin 175°C maximum temperature
4. Pressure rating will be reflective of sheath tubing specifications
5. Minimum bend radius is 10x sheath OD
6. Sensors longer than 6 feet will be shipped in a coil roughly 24" - 36" OD
MP2 OMP Multipoint Thermocouple Probe

Optimized multipoint thermocouple (OMP) probes are made from a specialized MI cable. The MI cable will have multiple negative thermocouple conductors surrounding one larger positive conductor in the middle. Common ungrounded thermocouple junctions are created along the sensor sheath by accessing the conductors through the sheath wall and then re-sealing the sheath wall. Multiple points can be arranged along the length of the sheath with great accuracy.

Common Sheath Materials

- 316/L stainless steel
- Inconel 600
- 310 stainless steel
- Consult factory for other

Thermocouple Types

Type K & N standard

Thermocouple Junction

Ungrounded

Thermocouple Tolerance

Special / standard limits of error

Sheath OD & Maximum Points Lengths

<table>
<thead>
<tr>
<th>OD</th>
<th>Tolerance</th>
<th>Max Pts.</th>
<th>Max Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.125&quot;</td>
<td>+/- 0.002&quot;</td>
<td>7</td>
<td>1600 feet</td>
</tr>
<tr>
<td>0.188&quot;</td>
<td>+/- 0.002&quot;</td>
<td>10</td>
<td>700 feet</td>
</tr>
<tr>
<td>0.250&quot;</td>
<td>+/- 0.002&quot;</td>
<td>16</td>
<td>400 feet</td>
</tr>
<tr>
<td>0.313&quot;</td>
<td>+/- 0.003&quot;</td>
<td>16</td>
<td>250 feet</td>
</tr>
</tbody>
</table>

Dimensional Information

<table>
<thead>
<tr>
<th>Number of Points</th>
<th>Wall Thickness % of Diameter</th>
<th>Outer Wire Size % of Diameter</th>
<th>Inner Wire Size % of Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4</td>
<td>11.8%</td>
<td>11.0%</td>
<td>15.5%</td>
</tr>
<tr>
<td>5-7</td>
<td>11.8%</td>
<td>8.5%</td>
<td>11.7%</td>
</tr>
<tr>
<td>8-10</td>
<td>11.8%</td>
<td>8.0%</td>
<td>10.3%</td>
</tr>
<tr>
<td>11-13</td>
<td>11.8%</td>
<td>7.6%</td>
<td>11.4%</td>
</tr>
<tr>
<td>14-16</td>
<td>11.8%</td>
<td>7.2%</td>
<td>12.1%</td>
</tr>
</tbody>
</table>

Transition Size

<table>
<thead>
<tr>
<th># Points</th>
<th>OD x Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4</td>
<td>0.5” x 1.5”</td>
</tr>
<tr>
<td>5-7</td>
<td>0.75” x 3.0”</td>
</tr>
<tr>
<td>8-10</td>
<td>0.75” x 3.0”</td>
</tr>
<tr>
<td>11-13</td>
<td>0.75” x 3.0”</td>
</tr>
<tr>
<td>14-16</td>
<td>1.0” x 3.0”</td>
</tr>
</tbody>
</table>

Lead Wire

- Teflon (260°C)
- Teflon /w SS braid
- Flex armour over Teflon
- Fiberglass (482°C)
- Fiberglass /w SS braid
- Flex armour over Fiberglass

NOTES:
1. Drawing for approval provided after receipt of order
2. Temperature rating reflective of sheath material and thermocouple type
3. Transition filled with epoxy resin 175°C maximum temperature
4. Pressure rated to 1000 psi
5. Minimum bend radius is 10x sheath OD
6. Sensors longer than 6 feet will be shipped in a coil roughly 24”- 36” OD

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Section: Multipoint Temperature Sensors
File: Multipoint-Thermocouple-OMP-MP2-F3-0
**Specifications**

**MP3 Pocket Junction Multipoint Thermocouple**

Pocket Junction Multipoint thermocouple probes are very similar to MP2 OMP MultiPoint's. They utilize a specialized MI cable that contains multiple thermocouple wire pairs. Ungrounded uncommon thermocouple junctions are created along the sensor sheath by accessing the conductors through the sheath wall and then re-sealing the sheath wall. Multiple points can be arranged along the length of the sheath with great accuracy.

**Common Sheath Materials**
- 316/L stainless steel
- Inconel 600
- 310 stainless steel
- Consult factory for other

**Thermocouple Types**
- Type K & N standard

**Thermocouple Junction**
- Ungrounded

**Thermocouple Tolerance**
- Special / standard limits of error

### Sheath OD & Maximum Points Lengths

<table>
<thead>
<tr>
<th>OD</th>
<th>Tolerance</th>
<th>Max Pts.</th>
<th>Max Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.125&quot;</td>
<td>+/- 0.002&quot;</td>
<td>7</td>
<td>1600 feet</td>
</tr>
<tr>
<td>0.188&quot;</td>
<td>+/- 0.002&quot;</td>
<td>8</td>
<td>700 feet</td>
</tr>
<tr>
<td>0.250&quot;</td>
<td>+/- 0.002&quot;</td>
<td>8</td>
<td>400 feet</td>
</tr>
<tr>
<td>0.313&quot;</td>
<td>+/- 0.003&quot;</td>
<td>8</td>
<td>250 feet</td>
</tr>
</tbody>
</table>

### Dimensional Information

<table>
<thead>
<tr>
<th>Number of points</th>
<th>Wall Thickness % of Diameter</th>
<th>Outer Wire Size % of Diameter</th>
<th>Inner Wire Size % of Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4</td>
<td>11.8%</td>
<td>11.0%</td>
<td>15.5%</td>
</tr>
<tr>
<td>5-7</td>
<td>11.8%</td>
<td>8.5%</td>
<td>11.7%</td>
</tr>
<tr>
<td>8</td>
<td>11.8%</td>
<td>8.0%</td>
<td>10.3%</td>
</tr>
</tbody>
</table>

### Transition Size

<table>
<thead>
<tr>
<th># Points</th>
<th>OD x Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4</td>
<td>0.5&quot; x 1.5&quot;</td>
</tr>
<tr>
<td>5-7</td>
<td>0.75&quot; x 3.0&quot;</td>
</tr>
<tr>
<td>8</td>
<td>0.75&quot; x 3.0&quot;</td>
</tr>
</tbody>
</table>

**Lead Wire**
- Teflon (260°C)
- Teflon /w SS braid
- Flex armour over Teflon
- Fiberglass (482°C)
- Fiberglass /w SS braid
- Flex armour over Fiberglass

**NOTES:**
1. Drawing for approval provided after receipt of order
2. Temperature rating reflective of sheath material and thermocouple type
3. Transition filled with epoxy resin 175°C maximum temperature
4. Pressure rated to 1000 psi
5. Minimum bend radius is 10x sheath OD
6. Sensors longer than 6 feet will be shipped in a coil roughly 24" - 36" OD

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The MP4 Multipoint RTD & Thermocouple Probe is an effective lower cost solution for milder process conditions. Multiple RTD and thermocouple sensors are combined together into an overall sensor sheath. The individual sensors inside are constructed from either Teflon or fiberglass insulated wires. They will provide the same accuracy as MI built sensors, however the limiting temperature rating factor will be the wire insulation. Excess space in the sensor assembly will be take up with aluminum oxide powder.

**Common Sheath Materials**

<table>
<thead>
<tr>
<th>Material</th>
<th>Sheath Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>316/L stainless steel</td>
<td>Inconel 600</td>
</tr>
<tr>
<td>Hastelloy C</td>
<td>Consult factory for other</td>
</tr>
</tbody>
</table>

**Temperature Sensor Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>100Ω Pt. 385 class A (3-wire &amp; 4-wire)</td>
<td></td>
</tr>
<tr>
<td>Type K thermocouple</td>
<td></td>
</tr>
<tr>
<td>Type J thermocouple</td>
<td></td>
</tr>
<tr>
<td>Type T thermocouple</td>
<td></td>
</tr>
<tr>
<td>Type N thermocouple</td>
<td></td>
</tr>
</tbody>
</table>

**Sensor Construction**

- **Low temperature (-50 to 260°C)**
- **High temperature (485°C)**

**Sheath OD, Maximum Points & Transition Size**

<table>
<thead>
<tr>
<th>Sheath OD</th>
<th>Max. Points</th>
<th>Transition OD x L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.250”</td>
<td>3</td>
<td>0.313” OD x 2”</td>
</tr>
<tr>
<td>0.375”</td>
<td>10</td>
<td>0.500” OD x 4”</td>
</tr>
<tr>
<td>0.500”</td>
<td>20</td>
<td>0.625” OD x 4”</td>
</tr>
</tbody>
</table>

**Lead Wire**

- Teflon (260°C)
- Teflon /w SS braid
- Flex armour over Teflon
- Fiberglass (482°C)
- Fiberglass /w SS braid
- Flex armour over Fiberglass

**NOTES:**

1. Drawing for approval provided after receipt of order
2. Transition filled with epoxy resin 175°C maximum temperature
3. Pressure rated to sensor sheath (tubing) specifications
4. Minimum bend radius is 10x sheath OD
5. Sensors longer than 6 feet will be shipped in a coil roughly 24” - 36” OD
MP5 Flanged Free Hanging Multipoint Assembly

The MP5 threaded free hanging assembly is constructed by banding together thermocouple or RTD probes to form a multipoint assembly. The sensor array is fastened to a flanged process connection. An optional electrical enclosure can be provided for wire termination and access.

Electrical Enclosure (Junction Box) - Optional
Optional electrical enclosure customized to application
Material: Cast aluminum or fiberglass
Hazardous location rating available
Dimensions: L x W x H (inches)
Conduit entries NPT size: 1/2", 3/4" and 1" NPT
Specify other characteristics to factory

Flanged Process Connection (Per B16.5)
Specify flange: NPS, class, gasketing surface and material

Number of Sensor Points
Consult factory as the process connection fitting and desired sensor probe OD will be a factor in the amount of sensor points

Common Sheath Materials
316/L stainless steel
Inconel 600
Hastelloy C
Consult factory for other

Temperature Sensor Type
100Ω Pt. 385 class A (3-wire & 4-wire)
Type K thermocouple
Type J thermocouple
Type T thermocouple
Type N thermocouple

Sensor Construction
Low temperature (-50 to 260°C)
High temperature (485°C)

Sheath OD
0.125" (1/8")
0.188" (3/16")
0.250" (1/4")

Lead Wire
Teflon (260°C)
Consult factory for other lead wire options

NOTES:
1. Drawing for approval provided after receipt of order
2. Minimum bend radius is 10x sheath OD
3. Sensors longer than 6 feet will be shipped in a coil roughly 24"-36" OD

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The MP6 threaded free hanging assembly is constructed by banding together thermocouple or RTD probes to form a multipoint assembly. The sensor array is fastened to a threaded fitting. An optional electrical enclosure can be provided for wire termination and access.

### Electrical Enclosure (Junction Box) - Optional
Optional electrical enclosure customized to application
- Material: Cast aluminum or fiberglass
- Hazardous location rating available
- Dimensions: L x W x H (inches)
- Conduit entries NPT size: 1/2", 3/4" and 1" NPT
- Consult factory for other characteristics

### Process Connection Thread & Maximum Number of Points
<table>
<thead>
<tr>
<th>Thread Size</th>
<th>Maximum Number of Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; NPT</td>
<td>6</td>
</tr>
<tr>
<td>3/4&quot; NPT</td>
<td>7</td>
</tr>
<tr>
<td>1&quot; NPT</td>
<td>8</td>
</tr>
</tbody>
</table>

### Number of Sensor Points
Consult factory as the process connection fitting and desired sensor probe OD will be a factor in the amount of sensor points.

### Common Sheath Materials
- 316/L stainless steel
- Inconel 600
- Hastelloy C
- Consult factory for other

### Temperature Sensor Type
- 100Ω Pt. 385 class A (3-wire & 4-wire)
- Type K thermocouple
- Type J thermocouple
- Type T thermocouple
- Type N thermocouple

### Sensor Construction
- Low temperature (-50 to 260°C)
- High temperature (485°C)

### Sheath OD
- 0.125" (1/8")
- 0.188" (3/16")
- 0.250" (1/4")

### Lead Wire
- Teflon (260°C)
- Consult factory for other lead wire options

### NOTES:
1. Drawing for approval provided after receipt of order
2. Minimum bend radius is 10x sheath OD
3. Sensors longer than 6 feet will be shipped in a coil roughly 24"-36" OD
**MP7 Button Block Multipoint Assembly**

The Button block multipoint assembly consists of multiple metal sheathed RTD or Thermocouple sensor probes secured into a flanged protection tube assembly. Sensing elements are in positive contact with landing blocks that are integral to the protection tube wall. Sensor probes are replaceable. The overall protection tube provides resistance to harsh process conditions, while providing accurate temperature point measurements.

<table>
<thead>
<tr>
<th>Sensor Probe Sheath Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>316/L stainless steel</td>
</tr>
<tr>
<td>Inconel 600</td>
</tr>
</tbody>
</table>

**Electrical Enclosure (Junction Box)**

The electrical enclosure style can be customized to application

- Material: Cast aluminum or fiberglass
- Hazardous location rating available
- Dimensions: L x W x H (inches)
- Conduit entries NPT size: 1/2", 3/4" and 1" NPT
- Specify other characteristics to factory

<table>
<thead>
<tr>
<th>Pipe Size &amp; Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPS Pipe Size</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>1&quot; SCH 80</td>
</tr>
<tr>
<td>1.25&quot; SCH 80</td>
</tr>
<tr>
<td>1.5&quot; SCH 80</td>
</tr>
</tbody>
</table>

**Flange & (Pipe) Material**

- 316/L (316/L) stainless steel
- A350 LF2 C1 (SA-333 GR6)
- Consult factory for other

**Temperature Sensor Type**

- 100Ω Pt. 385 class A (3-wire & 4-wire)
- Type K thermocouple
- Type J thermocouple
- Type T thermocouple
- Type N thermocouple

**Sensor Construction**

- Low temperature (-50 to 260°C)
- High temperature (485°C)

**Outline & Dimensions**

- Extension Length
- Points are measured from fitting bottom
- Minimum distance between points is 6.0"

NOTES:
1. Drawing for approval provided after receipt of order
2. Consult with factory for pressure and temperature rating details
3. CRN available for specific configurations

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