**MI Cable Thermocouple Assemblies**

**Style MTA3 — Open Disc Termination**

**Design Features**
- Economical termination with nickel plated brass inserts.
- Available in sheath diameters ranging from 0.063" to 0.250", single and duplex construction.

**Optional Installation Compression Fitting**
See Box 10

**Ordering Information**
Thermocouples are offered with the options listed in the worksheet below. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements, and a part number will be assigned.

**Ordering Code:** MTA3

**Calibration Code**

- Special Tolerances: 3, 4, 5, 6, 7

**Number of Conductors**

- 2 = Single (Standard)
- 4 = Duplex

**Insulation**

- M = 96% min. MgO (Standard)
- H = 99.4% min. MgO

**Sheath Material**

- A = Alloy 600
- B = 304 SS
- C = 316 SS

**Sheath O.D.**

- D = .063" ±.001
- E = .092" ±.001
- F = .125" ±.002
- G = .188" ±.002
- H = .250" ±.003/- .002
- P = 2.0 mm ±.03
- Q = 3.0 mm ±.03
- R = 4.5 mm ±.05
- S = 6.0 mm ±.07/- .05

**Sheath Length “L”**

- Whole inches
- 01 to 99
- For lengths over 99 in. consult TEMPCO.

**Junction**

- Single: Grounded G, Ungrounded U, Exposed E
- Dual, common: 4, 5, 6
- Dual, isolated: — 7, 8

**Termination**

- 1 = Silicone/glass cloth to 350°F (177°C) 1" O.D. with Brass mounting plate
- 2 = Ceramic to 1000°F (538°C) 1-1/8" O.D. Single and Dual element with SS mounting plate
- * Single element only

**Optional Compression Fitting**

- 1 = 1/8" NPT SS
- 2 = 1/4" NPT SS
- 3 = 1/2" NPT SS
- 4 = 1/8" NPT Brass
- 5 = 1/4" NPT Brass
- 6 = 1/2" NPT Brass
- 0 = None Required

**Special Requirements**

- X = Specify
- 0 = None

**View Product Inventory @ www.tempco.com**

**WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov.
Temperature Sensing

MI Cable Thermocouple Assemblies

**Mineral Insulated Metal-Sheathed Cable**

Thermocouple Assemblies are made from TEMPCO’s high quality Tempco-Pak and will incorporate all the same outstanding features.

**Important Features:**

* Accurate
* High Temperature Rating
* Fast Response
* Moisture Proof
* Thermal Shock Resistant
* Can Be Formed
* Weldable
* High Pressure Rated
* Compact
* Durable

**Typical Applications:**

› Bearing Temperature
› Diesel Engines
› Food Processing
› Furnaces
› Glass Manufacturing
› Heat Treating
› Kilns
› Metal Processing
› Oil Processing
› Ovens
› Petrochemicals
› Power Stations
› Refineries
› Research Laboratories
› Steam Generators
› Turbines

**Hot Junctions**

(Hot or Measuring Junctions available on single or dual element cable)

Choose the measuring junction that best suits your particular needs:

**Exposed Junction (E)**

Thermocouple wires are butt-welded. Insulation is sealed against liquid or gas penetration prior to use. This junction style provides the fastest possible response time but leaves the thermocouple wires unprotected against corrosive or mechanical damage.

**Grounded Junction (G)**

The sheath and thermocouple wires are welded together, forming a completely sealed integral junction. Recommended in presence of liquids, moisture, gas or high pressure. The wire is protected from corrosive or erosive conditions. In the Grounded Junction, response time approaches that of the Exposed Junction.

**Ungrounded Junction (U)**

Thermocouple junction is fully insulated from welded sheath end. Excellent for applications where stray emf’s would affect the reading and for frequent or rapid temperature cycling. With the Ungrounded Junction, response time is slightly longer than for the Grounded Junction.
Temperature Sensing
MI Cable Thermocouple Assemblies

Selecting the Correct Tempco-Pak Thermocouple Assembly

Thermocouples must be selected to meet the conditions of each particular application. The environment, operating temperature and atmosphere, response time and length of service must be considered when selecting the sheath, insulation, calibration, junction and termination of the thermocouple assembly.

Sheath Materials
The most commonly used sheath materials and their maximum continuous operating temperatures in an oxidizing atmosphere are as follows:

<table>
<thead>
<tr>
<th>Sheath Material</th>
<th>Max. Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alloy 600</td>
<td>2150°F (1177°C)</td>
</tr>
<tr>
<td>304 Stainless Steel</td>
<td>1650°F (899°C)</td>
</tr>
<tr>
<td>316 Stainless Steel</td>
<td>1650°F (899°C)</td>
</tr>
<tr>
<td>310 Stainless Steel</td>
<td>2100°F (1150°C)</td>
</tr>
</tbody>
</table>

\textbf{Note:} For temperatures exceeding 2200°F (1204°C), Noble or Refractory metal sheaths are normally used.

Calibrations
The table shows the standard temperature ranges for the various ANSI thermocouple calibrations:

<table>
<thead>
<tr>
<th>ANSI Letter</th>
<th>Thermocouple Type</th>
<th>Temperature Range °F (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Iron-Constantan</td>
<td>32-1400 (0-760)</td>
</tr>
<tr>
<td>K</td>
<td>CHROMEL P®-ALUMEL®</td>
<td>32-2300 (0-1260)</td>
</tr>
<tr>
<td>N</td>
<td>Nicrosil-Nisil</td>
<td>32-2300 (0-1260)</td>
</tr>
<tr>
<td>T</td>
<td>Copper-Constantan</td>
<td>32-660 (0-350)</td>
</tr>
<tr>
<td>E</td>
<td>CHROMEL P®-Constantan</td>
<td>32-1600 (0-871)</td>
</tr>
<tr>
<td>R</td>
<td>Pt 13% Rhodium-Platinum</td>
<td>32-2700 (0-1482)</td>
</tr>
<tr>
<td>S</td>
<td>Pt 10% Rhodium-Platinum</td>
<td>32-2700 (0-1482)</td>
</tr>
<tr>
<td>B</td>
<td>Pt 30% Rh-Pt 6% Rh</td>
<td>1600-3100 (871-1704)</td>
</tr>
</tbody>
</table>

Assembly Tolerances: Sheath Length Dimensions

<table>
<thead>
<tr>
<th>Sheath O.D.</th>
<th>“L” Tolerance Up to 24&quot;</th>
<th>“L” Tolerance Over 24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to .038&quot;</td>
<td>±1/2&quot;</td>
<td>±2%</td>
</tr>
<tr>
<td>.038&quot; to .065&quot;</td>
<td>±1/8&quot;</td>
<td>±1 1/2%</td>
</tr>
<tr>
<td>Larger than .065&quot;</td>
<td>±1/4&quot;</td>
<td>±1%</td>
</tr>
</tbody>
</table>

Flexible Lead Dimensions

<table>
<thead>
<tr>
<th>Lead Length (ft.)</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5</td>
<td>+6&quot;, −1&quot;</td>
</tr>
<tr>
<td>5 to 10</td>
<td>+6&quot;, −2&quot;</td>
</tr>
<tr>
<td>over 10</td>
<td>+5%, −2%</td>
</tr>
</tbody>
</table>

(800) 323-6859 • Email: sales@tempco.com

TEMPCO’s engineering staff will be happy to assist you with the design and selection of your thermocouple requirements.

Formability
Because Tempco-Pak is fully annealed it can normally be formed around a mandrel 4 times the sheath diameter. Consult TEMPCO if special forming is required.

Weldability
The thermocouple sheath can be brazed, soldered or welded. Welding the thermocouple sheath in the field is not recommended on diameters less than .093 in. All welding should be done in an inert atmosphere.