MI Cable Thermocouple Assemblies

Thermocouples with Transmitter and Connection Head

Design Features
- 4-20mA Programmable Linear Output Transmitter
- Available with Spring-Loaded Sheath
- For field programming of the temperature transmitter see Part Number EMT90006 on page 12-45
- Transmitter Accuracy of +/-0.2% of temperature span
- 1/2" NPT Process Connection

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:

TTM - 1 2 3 4 5 6 7 8 9 10 11

Calibration Code box 1
ANSI Standard
J K E T
Tolerances
Special
3 4 5 6

Insulation box 2
M = 96% min. MgO (Standard)
H = 99.4% min. MgO

Sheath Material box 3
A = Alloy 600
B = 304 SS
C = 316 SS

Sheath O.D. box 4
F = .125"
G = .188"
H = .250"

Sheath Length “L” box 5
Whole inches
01 to 99
For lengths over 99 in. consult TEMPCO.

Sheath Length “L” box 6
Fractional inches
0 = 0"
1 = 1/8"
2 = 1/4"
3 = 3/8"
4 = 1/2"
5 = 5/8"
6 = 3/4"
7 = 7/8"
1/2" – 14 NPT SS Hex Nipple

Junction Type box 7
Grounded
Exposed
Ungrounded

Transmitter Type box 8 (Enter Code Below)
Temperature low range
Temperature high range
Unit °F
°C

Connection Head box 9
A = Standard Aluminum
B = Medium Size Aluminum
C = Stainless Steel
D = Standard Cast Iron
E = Aluminum Head with LCD Indicator
F = Polypropylene Head (FDA Approved)
G = Heavy Duty Aluminum Head with LCD Indicator (EMT20001)

Note: Conduit connection for A, H & S is 1/2" NPT, for B is 3/8" NPT, for P is 3/4" NPT. For overall dimensions see pages 14-98 through 14-100.

Spring-Loaded box 10
Y = Spring-Loaded
0 = Not Required

Special Requirements box 11
X = Specify
0 = None

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

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

Rev 1 (8-18)
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.

View Product Inventory @ www.tempco.com
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>

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

Refer to the Mineral Insulated Thermocouples and Cable section regarding sheath, insulation and calibration (pages 14-114 through 14-118).

**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.

Assembly Tolerances:
Sheath Length Dimensions

<table>
<thead>
<tr>
<th>Sheath O.D.</th>
<th>“L” Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to .038”</td>
<td>±½”</td>
</tr>
<tr>
<td>.038” to .065”</td>
<td>±⅛”</td>
</tr>
<tr>
<td>Larger than .065”</td>
<td>±¼”</td>
</tr>
</tbody>
</table>