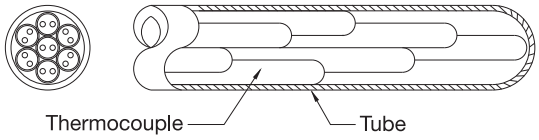
Made in USA

## Series TCM Multipoint Thermocouple Assemblies

Multipoint Thermocouples are used in a broad range of processes and installations to monitor the temperature in multiple positions or elevations. These sensors are used in a variety of applications such as Petroleum, Chemical Processing, Furnaces, Storage Tanks and Air Flow Ducts.

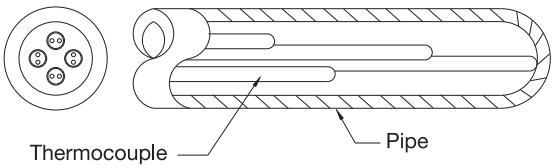
These sensors are made-to-order to meet the requirements of the specific application. The styles depicted below are the most common constructions. Consult Tempco for other sizes and construction methods. To order, simply fill out the specification sheet on page 14-31.


### Style 1 – Standard Miniature Style Assembly

This Multipoint Assembly uses numerous individual mineral insulated thermocouple elements contained in a tube. Individual thermocouples are made with the largest possible Mineral Insulated Cable in order to maximize contact with Protection Tube.

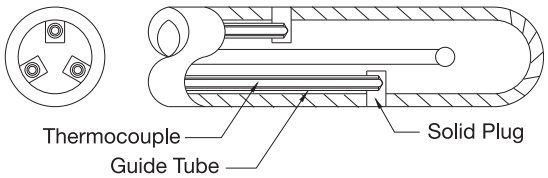
| Tube OD | Maximum Number of Points |
|---|---|
| .125" | 13 |
| .188" | 20 |
| .250" | 20 |
| .312" | 20 |
| .375" | 20 |
| .500" | 20 |




### Style 2 – Free-Hanging Assembly In A Pipe

This Heavy Duty Multipoint Assembly uses several individual Mineral Insulated Thermocouple Elements contained in a Standard Protection Pipe. Thermocouple bundles are replaceable.

| Pipe Size | Maximum Number of Points |
|---|---|
| 1/2" NPT SCH. 40 | 12 |
| 3/4" NPT SCH. 40 | 20 |
| 1" NPT SCH. 40 | 20 |



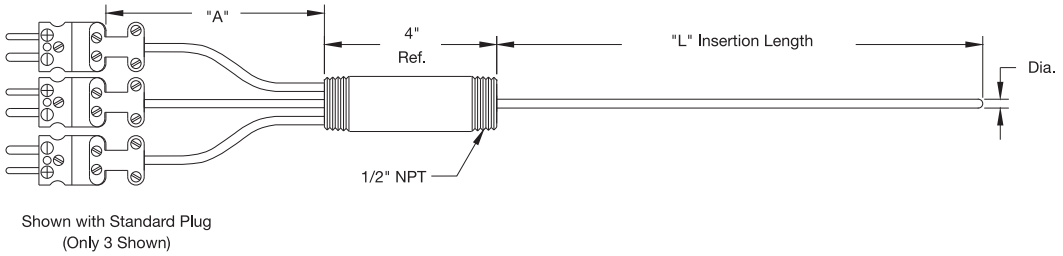

### Style 3 – Protection Pipe With Guide Tubes

This Multipoint Assembly is mostly used in the Petrochemical Industry. Guide Tubes are positioned at specific locations and enable the replacement of individual sensors in the field. This Multipoint Style is ideal in high temperature and pressure applications and provides a quick thermal response.

| Pipe Size | Maximum Number of Points |
|---|---|
| 1/2" NPT SCH. 40 | 10 |
| 3/4" NPT SCH. 40 | 20 |
| 1" NPT SCH. 40 | 20 |

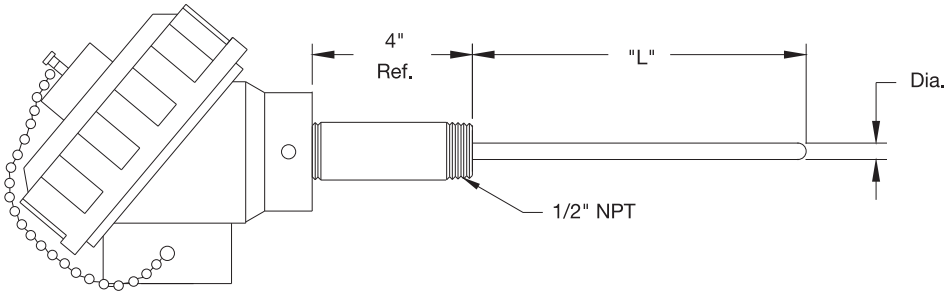
## Multipoint Assemblies with Protection Tube

### Style 1 Shown with Lead Wire Extension

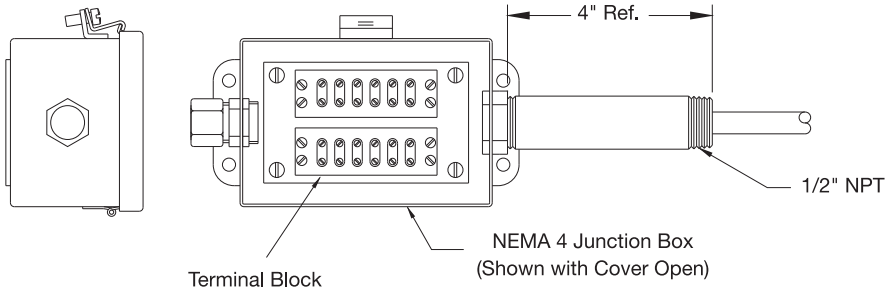



### Style 1 Shown with Standard Die Cast T/C Head

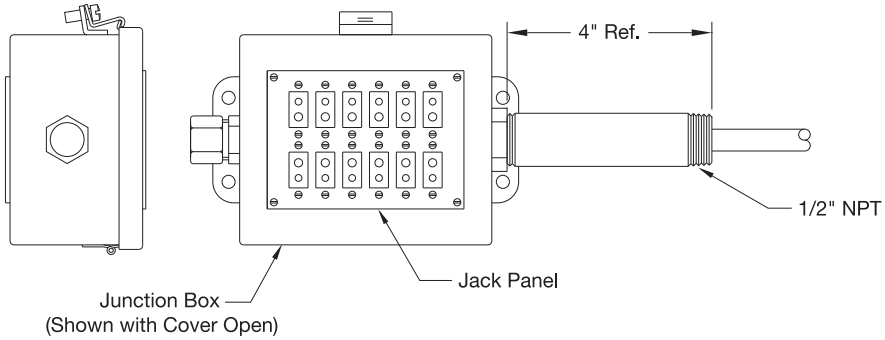
(3 Points Maximum)




### Style 1 Shown with Nema 4 Junction Box



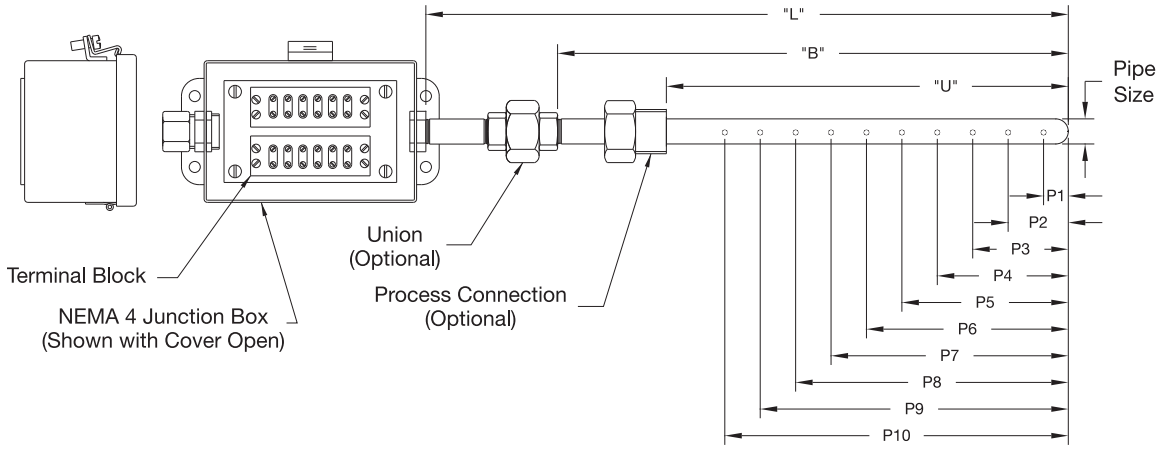

### Style 1 Shown with Jack Panel Junction Box



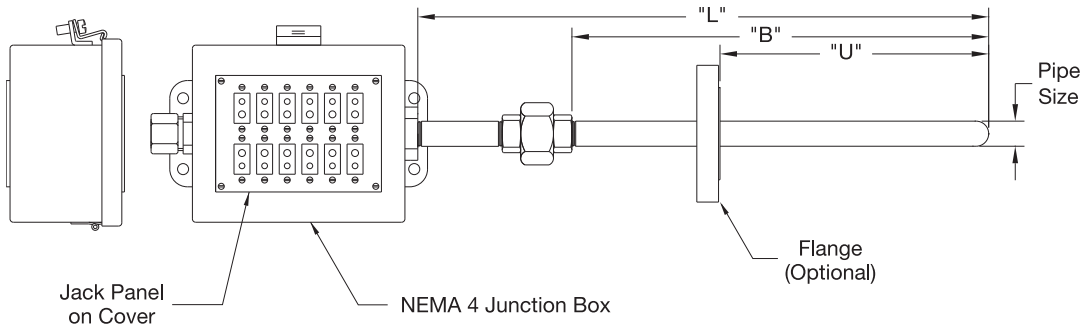

CONTINUED

## Heavy Duty Multipoint Assemblies with Pipe as Protection Tube

### Style 2 Shown with Union, Threaded Process Connection and Nema 4 Junction Box




### Style 2 Shown with Union, Flange and Jack Panel Junction Box



## Ordering Information for Multipoint Assemblies

**Please supply the following information by filling in the boxes as required.**

**Calibration** = _____
J, K, E, T, N
Other (Specify)

**Junction** = _____
Grounded Or Ungrounded

**Protection Tube Dia.**= _____
Tube Sizes: .125", .188", .25", .312", .375", .500"
PIPE Sizes (SCH. 40): 1/2" NPT, 3/4" NPT ,1" NPT
Other (specify)
Are Guide Tubes Required?_____ (Style 3) See Page 14-28

**Protection Tube Length** = _____
"L" Dimension (in inches)

**Protection Tube Material** = _____
Tube Materials: 304SS, 316SS, Inconel 600
Pipe Materials: 304/304L SS, 316/316L SS, 446SS, Inconel 600
Other (specify)

**Point Locations (in inches)** See Page 14-30
List As Many As Needed

| | |
|---|---|
| P1=____ | P11=____ |
| P2=____ | P12=____ |
| P3=____ | P13=____ |
| P4=____ | P14=____ |
| P5=____ | P15=____ |
| P6=____ | P16=____ |
| P7=____ | P17=____ |
| P8=____ | P18=____ |
| P9=____ | P19=____ |
| P10=___ | P20=____ |

**Union** (option)
If Required, Specify "B" Dim. = _____
"B" Dim. is the length below the union
(Enter 0 if not required)
Material: _____
Rating: _____
(150 lbs. Galvanized Steel is standard)

**Flange or Threaded Process Connection** (option)
If Required, Specify "U" Dim. = _____
"U" Dim. is the length below flange or thread
Flange or Process Thread: _____
(Enter 0 if not required)
Size: _____
Material: _____
Rating: _____
Face Type (Flange): _____

**Termination** = _____
NEMA 4 Junction Box With Terminal Block
Jack Panel Junction Box
Std. Aluminum T/C Head (3 Points Max.)
Other (specify)

**Lead Wire Extension** (if Required)
Length ("A" Dim.) = _____ (in Inches)
(Enter 0 If Not Required)
Insulation = _____
Fiberglass
Fiberglass w/ SS Overbraid
Teflon® (400°F Max.)
Termination = _____
Standard Plug or Jack
Mini Plug or Jack
Spade Lugs or with BX Connector
2-1/2" Stripped Ends
Other (specify)

**Describe any Pertinent Information or Special Requirements:**

_____

_____

_____

Made in USA

# 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.

## 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.

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.***

### Sheath Materials

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

| Sheath Material | Max. Operating Temperature |
|---|---|
| Alloy 600 | 2150°F (1177°C) |
| 304 Stainless Steel | 1650°F (899°C) |
| 316 Stainless Steel | 1650°F (899°C) |
| 310 Stainless Steel | 2100°F (1150°C) |

***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:

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

### 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

| Sheath O.D. | "L" Tolerance Up to 24" | "L" Tolerance Over 24" |
|---|---|---|
| Up to .038" | ±½" | ±2% |
| .038" to .065" | ±⅜" | ±1½% |
| Larger than .065" | ±¼" | ±1% |

### Flexible Lead Dimensions

| Lead Length (ft.) | Tolerance |
|---|---|
| Up to 5 | +6", –1" |
| 5 to 10 | +6", –2" |
| over 10 | +5%, –2% |