

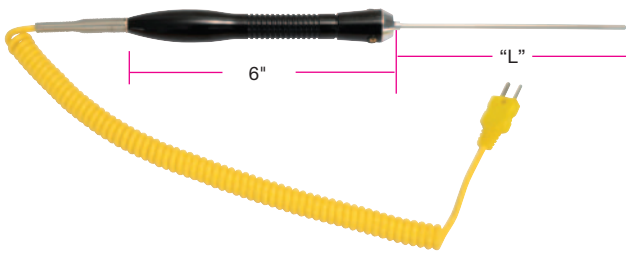
# Temperature Sensing

## MI Cable Thermocouple Assemblies

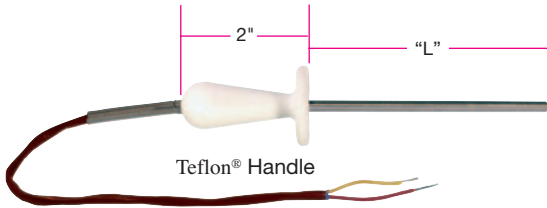


### Style MTA9 Handheld Probe

Bakelite Handle

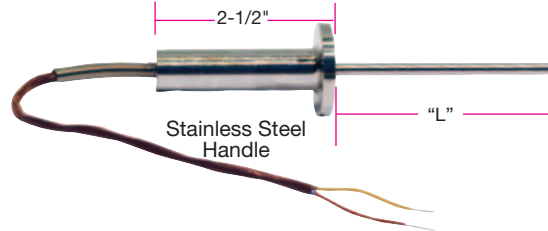


Teflon® Handle



#### Design Features

- \* Coil cord lengths are available only in 1 ft. (5 ft. extended) and 2 ft. (10 ft. extended).
- \* Coil cord construction is good to 221°F (105°C).
- \* Fiberglass lead construction is good to 900°F (482°C).
- \* Teflon® insulated lead construction is good to 392°F (200°C).



#### 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:

MTA9 -

#### Calibration Code BOX 1

ANSI Standard Tolerances	J	K	E	T	N
Special Tolerances	3	4	5	6	7

#### Sheath Length "L" BOX 6

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

#### Sheath Length "L" BOX 7

Fractional inches		
0 = 0"	3 = 3/8"	6 = 3/4"
1 = 1/8"	4 = 1/2"	7 = 7/8"
2 = 1/4"	5 = 5/8"	

#### Lead Wire Construction BOX 11

		Overbraided	Flex Armor
Coil Cord	C	-	-
Fiberglass	S	B	A
Teflon®	T	D	F

Note: Coil cord insulation is PVC/Polyurethane with a temperature rating of 221°F (105°C).

#### Number of Conductors BOX 2

- 2 = Single
- 4 = Duplex

#### Insulation BOX 3

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

#### Sheath Material BOX 4

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

#### Sheath O.D. BOX 5

- F = .125" ±.002
- G = .188" ±.002
- H = .250" +.003/- .002

#### Junction BOX 8

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

#### Tip BOX 9

- R = Round Tip
- D = Drill Point
- F = Flat Tip
- O = Exposed Junction

#### Lead Wire Length BOX 10

In inches 012 to 999  
For Coil Cords Enter 060 or 120

#### Lead Wire Termination BOX 12

- P = Standard Male Plug
- J = Standard Female Jack
- K = Std. Plug with Mating Jack
- D = Mini Male Plug
- E = Mini Female Jack
- F = Mini Plug with Mating Jack
- B = Std.— 2-1/2" Split Leads
- S = Leads with Spade Lugs
- C = 2-1/2" Split with BX connector and Spade Lugs

#### Handle Type BOX 13

- 1 = Stainless Steel
- 2 = Teflon® 500°F (260°C)
- 3 = Bakelite 400°F (204°C)

#### Special Requirements BOX 14

- X = Specify
- 0 = None

**⚠ WARNING:** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

### 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.

#### 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.

#### 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)

#### 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"	±¾"	±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%