

MgO THERMOCOUPLE ELEMENTS

This Section Contains

MgO Thermocouple Style Selection Pages

Hardware

Terminations

Cutable Couples

Accessories

MgO Thermocouple Reference Data

Please CALL for a Quote!

If you can't find what you need

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From Illinois 618-465-7623

From St. Louis 314-231-0752

Fax 618-465-7679

info@ipscustom.com

Thermocouple Elements

1. Construction

M = MgO G = General

2-3 Style

- 10 = Stripped and sealed
- 80 = With 1/2" x 1/2" Stainless fitting
- 90 = With self gripping spring
- 91 = With 1/2" x 1/2" spring load fitting
- 92 = With 1/2" x 1/2" spring load fitting and oil seal

4. Calibration

J,K,T,E

5. Limits of Error

0 = Standard S = Special

6. Number of Thermocouple Elements

1 = Single 2 = Dual

7. Sheath Alloy

- 4 = 304 Stainless Steel
- 6 = 316 Stainless Steel
- I = Inconel

8. Sheath Diameter

- 1 = 1/16" 3 = 3/16"
- 2 = 1/8" 4 = 1/4" (other sizes available)

9. Junction Type

- G = Grounded E = Exposed
- U = Ungrounded D = Ungrounded Isolated
- F = Ungrounded Common

10-11 Sheath Length in Inches

12. Sheath Length Fraction

- A = 1/8" D = 1/2" G = 7/8"
- B = 1/4" E = 5/8" 0 = None
- C = 3/8" F = 3/4"

13. Stripped Lead Length

1 = 1" 2 = 2" 3 = 3"

14. Fitting

See page 5

15-16 Immersion Depth

No length required with adjustable compression fittings

17. Immersion Depth Fraction

- A = 1/8" D = 1/2" G = 7/8"
- B = 1/4" E = 5/8" 0 = None
- C = 3/8" F = 3/4"

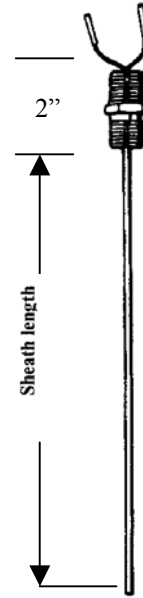
18-19 Termination (See page 6)

20. Special Features

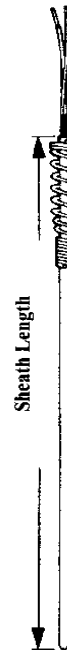
- S = Special (List special features)
- 0 = None



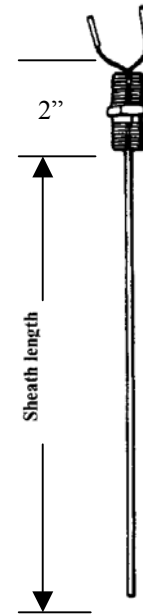
STYLE 10



STYLE 80



STYLE 90



STYLE 91 & 92

Part No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

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Standard Plugs and Jacks

1. Construction

M = MgO G = General

2-3 Style

20 = Plug with crimping insert
 21 = Plug with tube adapter
 22 = Jack with crimping insert
 23 = Jack with tube adapter

4. Calibration

J, K, E, T

5. Limits of error

0 = Standard
 S = Special

6. Number of Thermocouple Elements

1 = Single
 = Dual

7. Sheath Alloy

4 = 304 Stainless Steel
 6 = 316 Stainless Steel
 I = Inconel 600

8. Sheath Diameter

1 = 1/16" 3 = 3/16"
 2 = 1/8" 4 = 1/4"

9. Junction Type

G = Grounded E = Exposed
 U = Ungrounded D = Ungrounded isolated
 F = Ungrounded common

10-11 Sheath Length in Inches

12. Sheath Length Fraction

A = 1/8" D = 1/2" G = 7/8"
 B = 1/4" E = 5/8" 0 = None
 C = 3/8" F = 3/4"

13. Fitting

See Page 5

14-15 Immersion Length in Inches

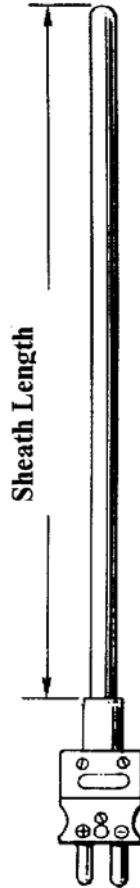
No length required with adjustable compression fittings.

16. Immersion Length Fraction

A = 1/8" D = 1/2" G = 7/8"
 B = 1/4" E = 5/8" 0 = None
 C = 3/8" F = 3/4"

17. Special Features

S = Special (List special features)
 0 = No



Style 20



Style 22

Part No. T 1 23 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Thermocouple With Extension

1. Construction

M = MgO G = General

2-3 Style

30 = With extension
 31 = With extension and strain relief spring
 32 = With extension, No transition fitting

4. Calibration

J, K, E, T

5. Limits of error

0 = Standard
 S = Special

6. Number of Thermocouple Elements

1 = Single
 2 = Dual

7. Sheath Material

4 = 304 Stainless Steel
 6 = 316 Stainless Steel
 I = Inconel 600

8. Sheath Diameter

1 = 1/16" 3 = 3/16" (Other sizes available)
 2 = 1/8" 4 = 1/4"

9. Junction Type

G = Grounded E = Exposed
 U = Ungrounded D = Ungrounded isolated
 F = Ungrounded common

10-11 Sheath Length in Inches

12. Sheath Length Fraction

A = 1/8" D = 1/2" G = 7/8"
 B = 1/4" E = 5/8" 0 = None
 C = 3/8" F = 3/4"

13-15 Extension Length

16. Extension Insulation

	Standard	SS Overbraid	Flex Armor
Teflon	A	B	C
Fiberglass	D	E	F

17. Fitting

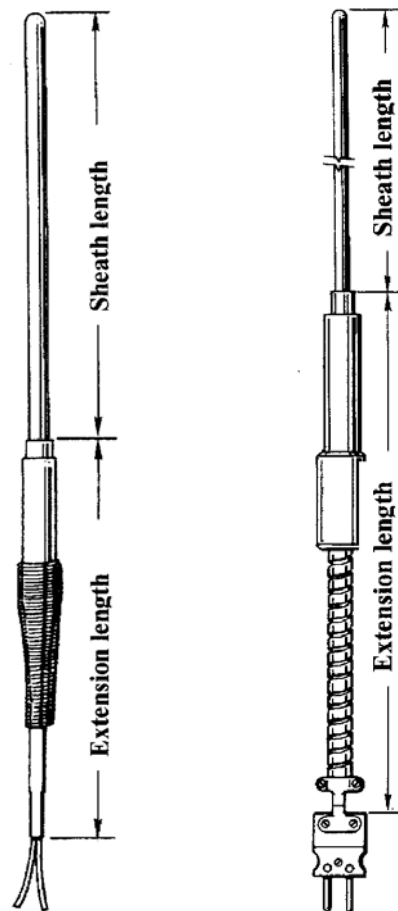
See Page 5

18. Termination

A = Standard Plug	B = Standard Jack	C = Standard Plug and Jack
D = Mini Plug	E = Mini Jack	F = Mini Plug and Jack
G = Spade lugs	H = Stripped 1/2"	J = None

19. Special Features

S = Special (List special features)
 0 = No



Style 31

Style 30

Part No. T 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

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Thermocouple With Heads

1. Construction

M = MgO G = General

2-3 Style

70 = Head with fixed fitting
 71 = head with compression fitting
 72 = Head with nipple-union-nipple

73 = Head with nipple union
 74 = Head with nipple
 75 = Head only

76 = Head with 1/2" x 1/2" Hex Fitting

4. Calibration

J,K,T,E

5. Limits of Error

0 = Standard
 S = Special

6. Number of Elements

1 = Single
 2 = Dual

7. Sheath Alloy

4 = 304 Stainless steel
 6 = 316 Stainless steel
 I = Inconel

8. Sheath Diameter

1 = 1/16" 3 = 3/16" (Other sizes available)
 2 = 1/8" 4 = 1/4"

9. Junction Type

G = Grounded E = Exposed
 U = Ungrounded D = Ungrounded Common
 F = Ungrounded Isolated

10-11 Sheath Length

12. Sheath Length Fraction

A = 1/8" D = 1/2" G = 7/8"
 B = 1/4" E = 5/8" 0 = None
 C = 3/8" F = 3/4"

13. Head

A = IPS Alum. Head E = Large Cast Iron Head
 B = Stand. Alum. Head F = Mini aluminum head
 C = Cast Iron G = Explosion Proof head
 D = Alum. Snap Lever head

14. Head Size

1 = 1/2" x 1/2" 4 = 1/2" x 3/4"
 2 = 3/4" x 1/2" 5 = 3/4" x 3/4"
 3 = 1" x 1/2" 6 = 1" x 3/4"
 (Process connection first digit – conduit size second digit)

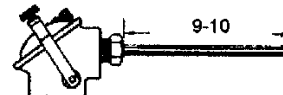
15. Spring Load

0 = No
 1 = Self gripping spring
 2 = Adjustable 1/2" x 1/2" Spring loaded fitting (If selected it replaces the first nipple and reduces nom length by 1")

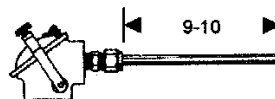
16. Special Features

S = Special
 0 = None

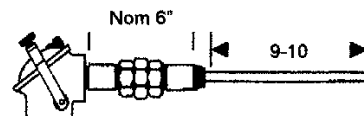
Style 70



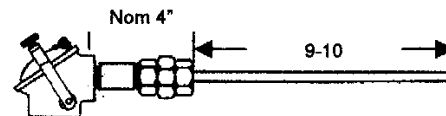
Style 71



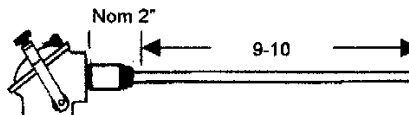
Style 72



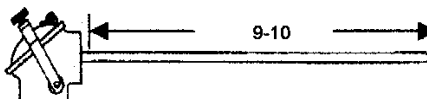
Style 73



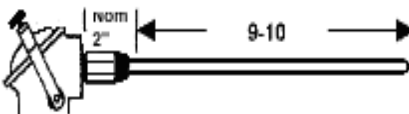
Style 74



Style 75



Style 76

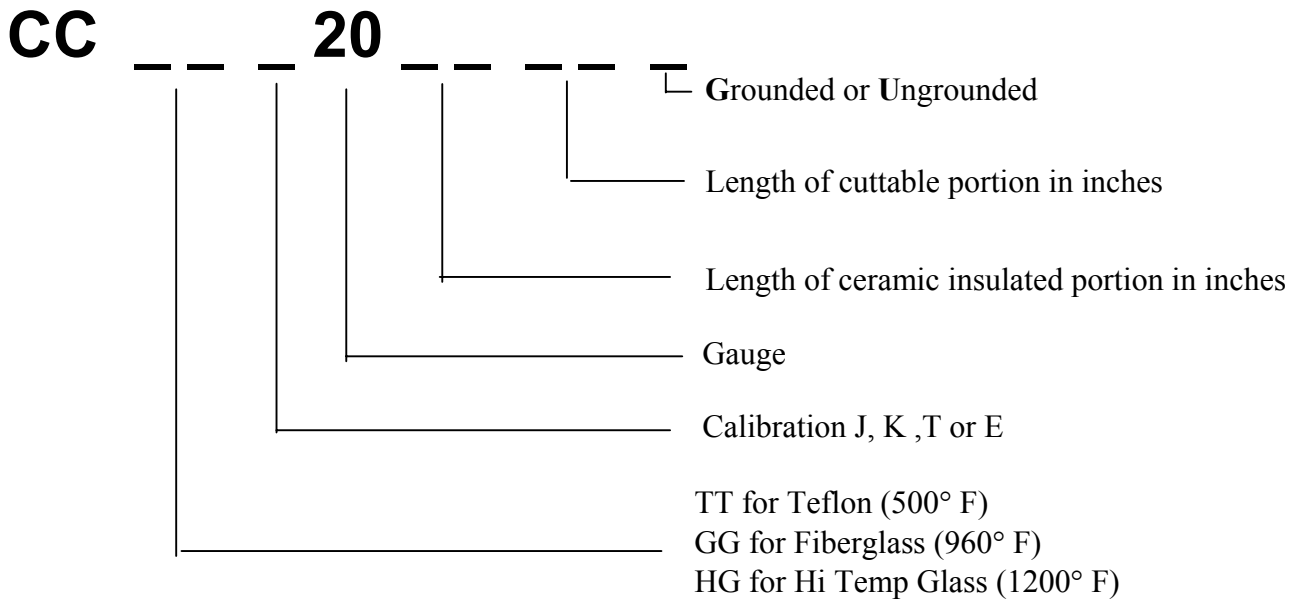
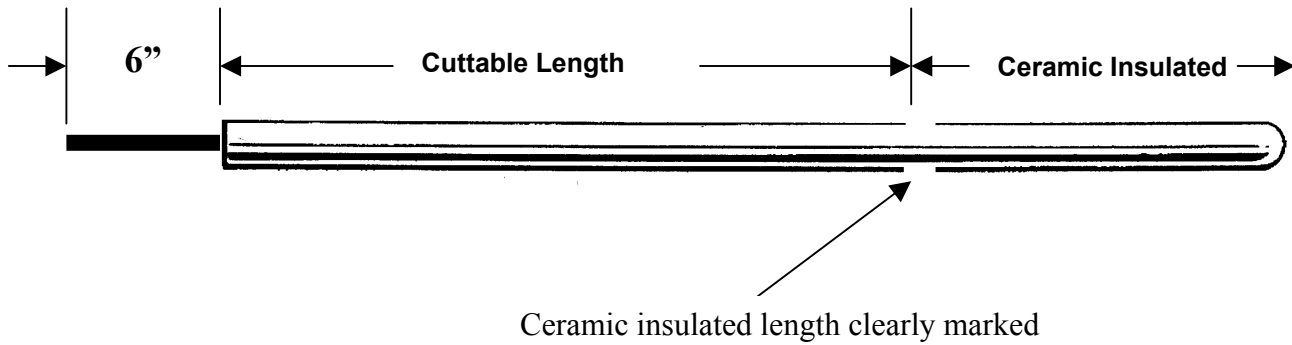


Nipple-union-nipple supplied with 3" nipples and malleable union.
 Nipple-union supplied with 3" nipple and malleable union.
 Nipple supplied with 3" nipple.
 All fittings galvanized unless specified differently.
 Other sizes available upon request

Part No. T 1 23 4 5 6 7 8 9 10 11 12 13 14 15 16

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CUTTABLE COUPLES



Supplied in 1/4" 316 Stainless with 20 gauge wire.

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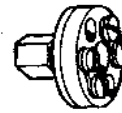
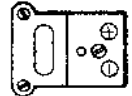
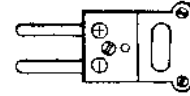
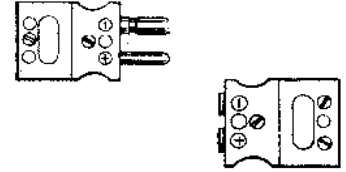
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Hardware and Accessories

SP>(*T)	Standard Plug
SJ>(*T)	Standard Jack
MP>(*T)	Miniature Plug
MJ>(*T)	Miniature Jack
SWH>(*T)-(*d)	Single Element Wafer Head
DWH>(*T)-(*d)	Dual Element Wafer Head
SMAH	Single Element Miniature Aluminum Head
DMAH	Dual Element Miniature Aluminum Head
TA(*d)	Tube Adapter
SCC	Standard Cable Clamp
MCC	Miniature Cable Clamp



Not shown



*T = Thermocouple calibration J, K, T, E, R or S

*d = sheath diameter as decimal.

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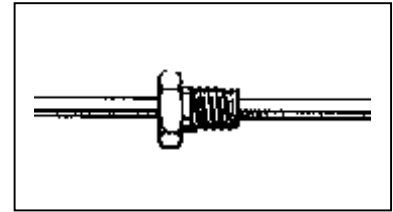
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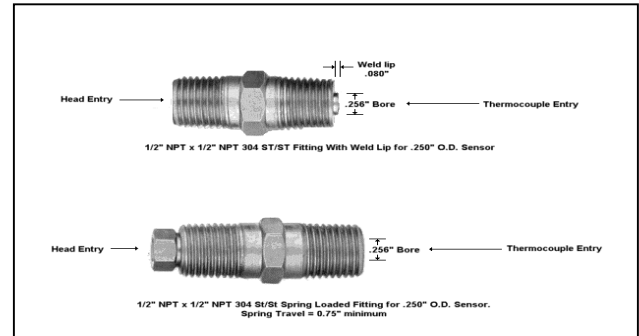
Hardware and Accessories continued

Single Ended Fixed Fittings		
Carbon Steel	Male NPT	Stainless
K	1/8"	T
L	1/4"	U
M	3/8"	V
N	1/2"	W
O	3/4"	X
Q	1"	Y
R	1-1/2"	Z
S	2"	1

Fixed fittings brazed or silver soldered.

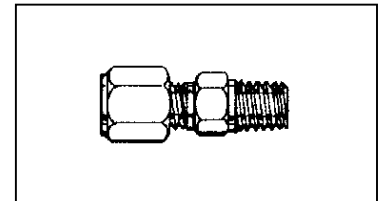


Double Ended Fixed Fitting	
2	1/2" x 1/2" SS fixed fitting
3	1/2" x 1/2" SS Springload fitting

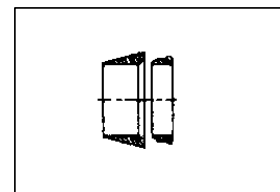


One Time Adjustable Compression Fittings		
Brass	Male NPT	Stainless
A	1/8"	F
B	1/4"	G
C	3/8"	H
D	1/2"	I
E	3/4"	J

All SS fittings supplied with SS Ferrules.
For re-adjustable or oil tight compression fittings order Teflon ferrules.

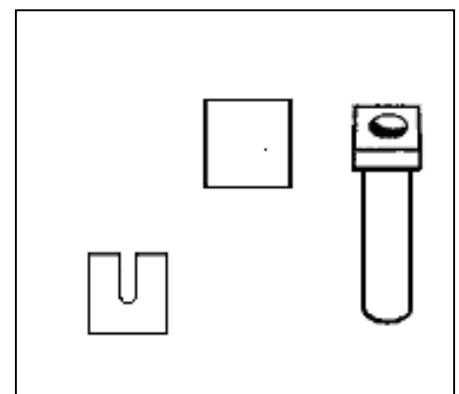


Ferrule Sets			
Tube O.D.	Brass	Stainless	Teflon
3/16"	FS3B	FS 3 SS	FS 3 T
1/4"	FS4B	FS 4 SS	FS 4 T



Part No.	Description
CI(*d)	Crimping Insert
PWP	Plain Weld Pad
SWP(*d)	Slotted Weld Pad

*d = SHEATH DIAMETER AS DECIMAL



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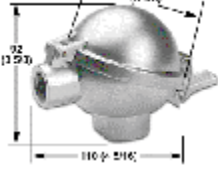




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THERMOCOUPLE HEADS

Table 8

Head No.	Head Description	Part No.	Available Terminal Block Description
H-7-X ¹	IPS cast aluminum Head. Stainless Steel cover. Thumb screw for easy cover removal.	 <p style="text-align: center; font-size: small;">Covering the Head with 1/2" Terminal Block</p>	<ul style="list-style-type: none"> ◆ Single element with lift out bail
H-7-A-X ¹	Standard cast aluminum head with screw cover		<ul style="list-style-type: none"> ◆ Single element block ◆ Single element 8 AWG
H-7-CI-X ¹	Standard cast iron head with screw cover		<ul style="list-style-type: none"> ◆ Dual Element ◆ 6-way terminal block
H-KNPL-X ¹	Cast Aluminum Head with hinged snap lever cap		<ul style="list-style-type: none"> ◆ 2 pole elliptical ◆ Round single element 8 AWG ◆ Round dual Element ◆ Round 6-way
H-LCI-X ¹	Large Cast Iron Head		<ul style="list-style-type: none"> ◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block
H-SMAH	.250 MgO Head Mini Aluminum Head Single Termination		<ul style="list-style-type: none"> ◆ Single Termination
H-DMAH	.250 MgO Head Mini Aluminum Head Dual Termination		<ul style="list-style-type: none"> ◆ Dual termination
H-EX-X ¹	Explosion Proof Head		<ul style="list-style-type: none"> ◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block

¹ Note: The last X in the Head P/N designates the Process x Conduit sizes. See Table 8A, next page.

Thermocouple Head Size Selection

Use table 8A to select the head size for the thermocouple heads in Table 8.

Example: If you want an IPS Thermocouple head with, a cast aluminum body and a stainless steel cover, select an H-7 head.

And you want 1/2" X 1/2" connections, select Head Size 1 from Table 8A. Use the 1 to replace the "X" in the head P/N above.

The full part number of the thermocouple head is H-7-1

TABLE 8A

Head Sizes			
Head Size	Process x Conduit	Head Size	Process x Conduit
1	1/2" x 1/2"	4	1/2" x 3/4"
2	3/4" x 1/2"	5	3/4" x 3/4"
3	1" x 1/2"	6	1" x 3/4"

Terminal Block Part Numbers

Table 8B

Head No.	Head Description	Terminal Block Part No.	Terminal Block Description
H-7	IPS Cast Aluminum Head. Stainless Steel cover. Thumb screw for easy cover removal.	HTB-7A	◆ Single element with lift out bail
H-7A	Standard Cast Aluminum Head with screw cover	HTB-M-100 HTB-M-108 HTB-M-200 HTB-M-300	◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block
H-CI	Standard Cast Iron Head with screw cover		
H-KNPL	Cast Aluminum Head with hinged snap lever cap	HTB-TC-E-2PC HTB-TC-N2PC HTB-TC-N4PC HTB-TC-N6PC	◆ 2 pole elliptical ◆ Round single element 8 AWG ◆ Round dual Element ◆ Round 6-way
H-LCI	Large Cast Iron Head	HTB-M-100 HTB-M-108 HTB-M-200 HTB-M-300	◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block
H-EX	Explosion Proof Head	HTB-M-100 HTB-M-108 HTB-M-200 HTB-M-300	◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block

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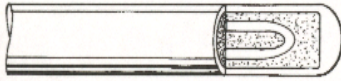
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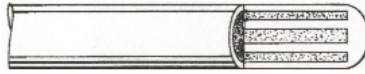
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MgO Technical Data



Ungrounded Junction

This thermocouple junction is electrically and mechanically insulated from the sheath for long life characteristics under maximum corrosion, thermal shock and vibration conditions. Response time is slower than both the grounded and exposed junctions.



Grounded Junction

This thermocouple is welded directly to the sheath. This provides a faster response than the ungrounded and better protection against corrosion and mechanical damage than the exposed junction.



Exposed Junction

The bare thermocouple wires are butt-welded and insulation is initially sealed. The exposed tip extends beyond the sheath for a distance equal to the sheath diameter. The exposed junction provides the fastest response time and the shortest life span.

Time constants

The time required for a thermocouple to indicate 63.2% of a step in temperature in a surrounding media, is the *time constant*. Several factors influence the measured time constant, such as the the degree of insulation compaction, sheath wall thickness and distance of the junction from the welded cap on the ungrounded style. These factors, as well as the velocity of the liquid or mass past the thermocouple probe affect the *time constant*.

Sheath Diameter in inches	Time Constants /Seconds		
	Grounded Junction	Ungrounded Junction	Exposed Junction
0.040	0.2	0.7	0.1
0.063	0.3	0.8	0.2
0.125	0.5	1.3	0.3
0.188	1.0	2.5	0.5
0.250	2.3	4.3	0.6

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MgO Technical Data continued

Temperature Limits ° F Continuous Duty							
Sheath Diameter Inches	Nominal Tube Wall Thickness Inches	Wire Gauge AWG	ANSI Thermocouple Type				
		Single TC Element	Dual TC Element	J	T	K	E
.032	.004	34		700	400	1600	800
.040	.006	33		700	400	1600	800
1/16	.009	28	30	700	400	1600	800
1/8	.017	22	24	700	400	1600	800
3/16	.025	20	21	900	500	2000	1000
1/4	.033	16	18	1000	600	2000	1100
5/16	.041	16		1000	600	2000	1100
3/8	.052	15		1100	700	2000	1200
1/2	.070	10					

Sheath Alloys
<p>304 Stainless Steel (18% Chromium-8% Nickel) is a general purpose, economical, readily available sheath material that has good corrosion and oxidation resistance. Max. operating temp. is 1650°F.</p>
<p>316 Stainless Steel (16% Chromium-10% Nickel) is a material that has superior corrosion resistance as compared to 304 stainless steel with improved oxidation resistance and a higher hot strength than 304. Maximum operating temp. is 1700°F.</p>
<p>Inconel 600™ (72% Nickel-17% Chromium) is a material that is readily available and has an outstanding resistance to oxidation, corrosion and scaling. Should not be used in the presence of sulphur above 1600°F. Maximum operating temp is 2100°F.</p>

Calibration Type
<p>Type J is used protected or unprotected in vacuum, oxidizing, inert or reducing atmospheres. The iron element oxidizes rapidly at temperatures exceeding 1000°F, therefore heavier gauge wire is recommended for longer life at these temperatures.</p>
<p>Type K is used protected or exposed to oxidizing, inert or dry reducing atmospheres. Exposures to vacuum limited to short time periods. Must be protected from sulphurous and marginally oxidizing atmospheres. Reliable at high temperatures.</p>
<p>Type E may be used protected or unprotected in oxidizing, inert or reducing atmospheres, or for a short periods of time under vacuum. Must be protected from sulphurous and marginally oxidizing atmospheres. Produces the highest EMF per degree of any standardized metallic thermocouple.</p>
<p>Type T is used for service in oxidizing, inert or reducing atmospheres or in a vacuum. It is highly resistant to corrosion from atmospheric moisture and condensation and exhibits high stability at low temperatures; it is the only type with limits of error guaranteed for cryogenic temperatures.</p>

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