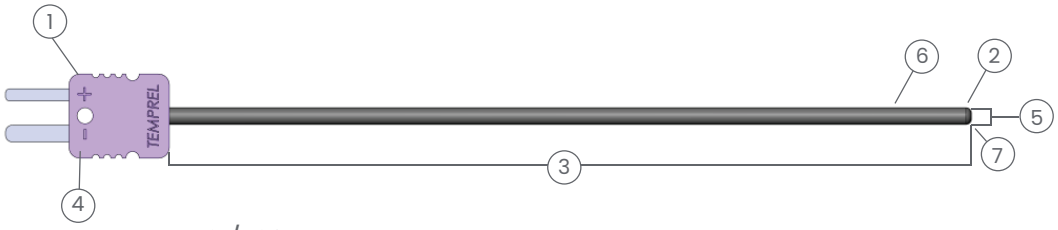
T21/T23 THERMOCOUPLES
PROBES WITH ATTACHED CONNECTORS



T21/T23 _ _ _ _ _ _ _ _
1 2 3 4 5 6 7 8
T23 only

(Prefix T21/T23 Changes to D21/D23 for Dual Element)

Sample shown:
T21-MU-6E-CS10

1. Connectors

MP	Put On Mini Plug	Male - Flat Blade
P	Put on Standard Plug	Male - Round Pin
M	Molded on Mini-Plug	Male - Flat Blade
S	Molded on Standard Plug	Male - Round Pin
J	Put On Standard Jack	Female - Round Pin
MJ	Put On Mini Jack	Female - Flat Blade

2. Junction Type (see pages 39 for more info)

E	Exposed	
FSE	Fully Shielded Exposed	
G	Grounded	
S	Semi-Shielded	
U	Ungrounded	
U2	Ungrounded Separate for Dual Element	

3. Probe Length

-----	inches

Note: Probe length is measured from the tip of the connector to the first fixed attachment. Probe lengths may vary Probe lengths may vary +/- .125" unless otherwise specified.

4. Calibration

E	Purple
K	Yellow
T	Blue
J	Black

5. Probe Diameter (inches)

AAAA	.020"	38 AWG wire*
AAA	.032"	34 AWG wire*
AA	.040"	32 AWG wire*
A	.062" (1/16")	28 AWG wire*
B	.090"	25 AWG wire*
C	.125" (1/8")	22 AWG wire*
D	.188" (3/16")	19 AWG wire*
E	.250" (1/4")	16 AWG wire*

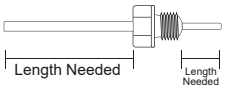
**Note: Approximate internal wire diameter.*

6. Probe Material

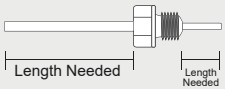
S	304 Stainless Steel	1652°F	900°C
S10	310 Stainless Steel	2102°F	1150°C
S16	316 Stainless Steel	1652°F	900°C
I	Inconel	2147°F	1175°C
H	Hastelloy X	2201°F	1205°C

Note: Material is subject to availability and is dependent on calibration.

7. Available Options

			Available On:
Leave Blank	Standard Probe Tip Most common	Most common	T21, T23
HPT	Hypodermic Point	Sharpened to need point	T21
RT	Reduced Tip	0.125" to 0.062" diameter	T21
FEP	FEP Coated Probe	.040", 062", .125", .188, .250 diameter	T21
PFA	PFA Coated Probe	0.125" to 0.062" diameter	T21
18PP	1/8" Pipe Plug		T23
14PP	1/4" Pipe Plug		T23
38PP	3/8" Pipe Plug		T23
W	Washer (Choose one: 8mm/10mm/12mm/ 14mm/18mm)	0.062" or 1/16th" diameter	T21
WP	Weld Pad	0.062" or 1/16th" diameter probe	T21

8A. Probe Exposure Length (inches) Past Threads (T23 - 18PP, 14PP, 38PP Only)

-----	inches	

Note: If Pipe Plug (PP) was chosen in #7, please specify length of probe past the pipe plug. Custom threads and fittings are available, call Temprel for more info.

REFERENCE GUIDE

USEFUL OPERATING RANGE

	Operating Range	Special Limits of Error	Each Conductor	ANSI Color Coding
E	0 - 900°C (32 - 1650°F) -200 - 0°C (-325 - 32°F)	± 1.0°C or ± .4% of Reading ± 1.7°C or ± .1% of Reading	Pos. Purple Neg. Red	Purple
J	0 - 750°C (32 - 1380°F)	± 1.1°C or ± .4% of Reading	Pos. White Neg. Red	Black
K	0 - 1250°C (32 - 2280°F) -200 - 0°C (-325 - 32°F)	± 1.1°C or ± .4% of Reading ± 2.2°C or ± .2% of Reading	Pos. Yellow Neg. Red	Yellow
T	0 - 350°C (32 - 660°F) -200 - 0°C (-325 - 32°F)	± .5°C or ± .4% of Reading ± 1.0°C or ± 1.5% of Reading	Pos. Blue Neg. Red	Blue

PROBE TEMPERATURES

Standard Probe Diameters	Suggested Upper Temperature Limits
.032" + .001 - .0005"	1290°F (700°C)
.040" + .001 - .0005"	1290°F (700°C)
.063" ± .001"	1690°F (920°C)
.090" ± .001"	1830°F (1000°C)
.125" + .002 - .001"	1960°F (1070°C)
.188" + .002 - .001"	2100°F (1150°C)
.250" + .003 - .001"	2100°F (1150°C)

All MgO compacted thermocouples can be bent on a radius of twice the probe diameter.

APPROXIMATE RESPONSE TIME IN SECONDS

Outside Diameter	Approximate Wire Gauge	Approximate Wire Gauge	Grounded Junction	Ungrounded Junction
.020	38	.003	.02	.03
.032	34	.004	.02	.07
.040	32	.006	.04	.13
.062	28	.009	.22	.40
.090	25	.012	.33	.68
.125	22	.017	.50	1.10
.188	19	.025	1.00	2.30
.250	16	.033	2.20	4.10
20 AWG bare wire junction				.45

Values are for 2/3 of total temperature change from 0 to 100% as measured in water.

20-AWG bare wire junction measured in gas.

MGO PROBE MATERIAL OPTIONS

All Temprel MgO insulated thermocouples are made using the highest purity MgO for temperatures up to 2300°F (1260°C). The thermo-elements are all ANSI special limits of error to give your measurements the best possible results. The various sheath materials are dependent on the application and the following will help you make the best selection.

304 SS	Maximum temperature of 1650°F (900°C) and is the most widely used low temperature sheath material. It offers good corrosion resistance but is subject to carbide precipitation in the 900°F to 1600°F range.
310 SS	Maximum temperature of 2100°F (1150°C) and offers good mechanical and corrosion resistance similar to 304 SS. Very good heat resistance. Not as ductile as 304 SS.
316 SS	Maximum temperature of 1650°F (900°C) and has the best corrosion resistance of the austenitic stainless steels. Subject to carbide precipitation in the 900°F to 1600°F range.
Inconel®	Maximum temperature 2150°F (1175°C) and is the most widely used thermocouple sheath material. Good high temperature strength, corrosion resistance and is resistant to chloride-ion stress corrosion, cracking and oxidation. Do not use in sulfur bearing environments.
Hastelloy X®	Maximum temperature 2200°F (1205°C) widely used in aerospace applications. Resistant to oxidizing, reducing and neutral atmospheric conditions. Excellent high temperature strength.

Inconel® is the registered trademark of INCO Alloys International.
Hastelloy X® is the registered trademark of Haynes International.

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