



Temperature
Sensing Solutions
Catalogue



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Pyrotek® is a global engineering leader and innovator of performance-improving technical solutions, integrated systems design and consulting services for customers in the aluminium industry. We have global resources and dependable local support in more than 35 countries with over 60 locations. Our products and solutions are in use around the world in automotive, aerospace, rail transportation and high-tech manufacturing. Privately-owned since 1956, our deep-rooted values of integrity and collaborative problem-solving uphold our mission to improve customer performance.

Temperature Sensing Solutions – From the Smelter to the Foundry

Pyrotek provides comprehensive temperature sensing solutions for aluminium manufacturing and industrial applications, from primary aluminium smelting and casting to aluminium foundry and die casting processes. This includes a complete line of thermocouple elements, protective tubes and assemblies for a broad range of molten metal applications. Pyrotek offers a wide variety of thermocouple protection tube material options for almost every high temperature application: cast iron (plain or enameled), reinforced fibreglass material (RFM®) and high-performance ceramics and standard refractory types.

Our global manufacturing locations are available to readily supply our customers and provide local service and support. Our global sales engineers are trained to assist in selecting the correct temperature measuring solutions for your typical and custom or specific application.

Refer to the Thermocouple Protection Tubes section of this catalog for material options and properties and to the following table for information regarding primary aluminium and foundry process applications.

Pyrotek is committed to:

- Customer Satisfaction
- Integrity
- Reliability, Quality and Service
- Environmental Awareness
- Profitable Growth
- Employee Development
- Partnerships with Customers and Suppliers

PRIMARY ALUMINIUM THERMOCOUPLES



ANODE BAKE

LOCATION	PYROTEK MODEL	TC TYPE	TCPT TYPE	† AVERAGE LIFE	QUANTITY USED
Firing frame—flue	I2 series	N	Inconel 601	2–3 months	1 per flue opening
	I2 series	S	Re-SiC	12 months	1 per flue opening
Firing frame—pit	I2 series	N	310SS or 253 MA	1–2 months	1–4 per pit section
	I2 series	N	Inconel 601	2–3 months	1–4 per pit section
Temperature pressure ramp exhaust	M2 series	K	Not specified. Can use Inconel 601 to extend life	2–4 months	1 per flue section
	I2 series				
Exhaust manifold	M2 series	K	Not required	2–4 months	Minimum 1 per manifold
Isotherm	I9 series	K	Cast iron	Single use	Minimum 2 per section

ELECTROLYSIS POTS

Cryolite	I2 series	K	Not required	Multiple dips	One per operator
Molten electrolyte bath	Quick tips	K	Not necessary	Multiple dips	One per operator

CASTHOUSE (REMELT)

Immersion	I9 series T2 series	K	Cast Iron Plain Cast Iron Enamel	1–2 weeks	1–2 per furnace
	I5 series I6 series T1 series	K	Pinnacle	1–2 months	1–2 per furnace
	I5 series I6 Series T1 series	K	RFM	3–6 months	1–2 per furnace
Atmospheric	I2 series I3 series IP series	K	Inconel 601	7–9 months	1–2 per roof
	I4 series	K	Alumina	12 months	1–2 per roof
	I4 series	K	Mullite	12 months	1–2 per roof
Sampling	Quick tips	K	Not necessary	Multiple dips	One per operator

†Typical average operation life with proper maintenance practice.

*Not recommended in high solid impact environment.



I2 Series



I9 Series



Quick Tips



M2 Series

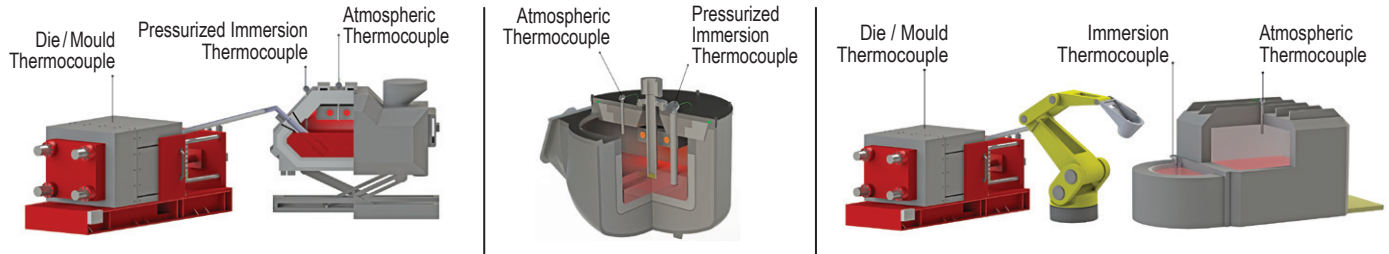


M3 Series



P4 Series

FOUNDRY THERMOCOUPLES



MOLTEN METAL IMMERSION

PYROTEK MODEL	TC TYPE	TCPT TYPE	RATED TEMPERATURE	†AVERAGE LIFE
I5 or I6 series	K	RFM	800°C (1472°F)	3–6 months
I7 or I8 series	K	Sialon, B100/SiN	1100°C (2012°F)	10–13 months
I7 or I8 series	K	O'-Sialon	1100°C (2012°F)	2–4 months
I5 or I6 series	K	Pinnacle	1100°C (2012°F)	3–6 months

ATMOSPHERIC

I2 series	K	Inconel 601	1260°C (2300°F)	7–9 months
I4 series	K	Alumina	1600°C (2912°F)	12 months
I4 series	K	Mullite	1400°C (2552°F)	12 months

†Typical average operation life with proper maintenance practice.
 **Not recommended for pressurized immersion.



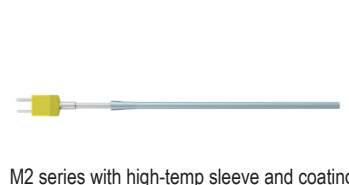
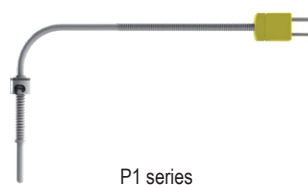
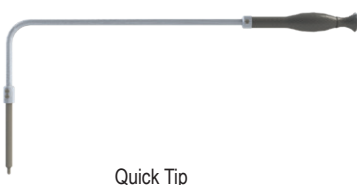
DIE AND MOULD

PYROTEK MODEL	TC TYPE	DESCRIPTION	RATED TEMPERATURE	†AVERAGE LIFE
P1 series	K	90° with compression fitting or bayonet adapter	870°C (1600°F)	Replace during maintenance
P2 series	K	Spring adjustable with bayonet adapter	870°C (1600°F)	Replace during maintenance
P3 series	K	Armor adjustable with bayonet adapter	870°C (1600°F)	Replace during maintenance
M4 series	K	MgO with extension wire	1260°C (2300°F)	Replace during maintenance

SAMPLING

Quick tip	K	Specially coated heat resistance steel TC with lance	1260°C (2300°F)	Multiple dips
M2 series	K	MI element with plug /jack	1260°C (2300°F)	Multiple dips
M4 series	K	MI element with extension and plug /jack	1260°C (2300°F)	Multiple dips
M2 series	K	Sleeved and coated MI element with plug /jack	1260°C (2300°F)	Multiple dips

†Typical average operation life with proper maintenance practice.

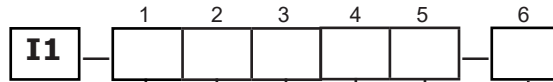
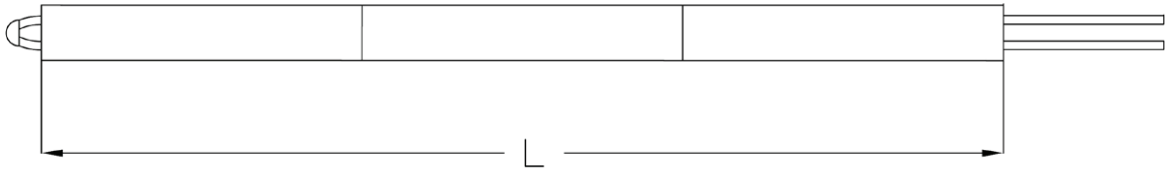


I1 SERIES – BASE METAL AND NOBLE METAL TC ELEMENTS

Pyrotek's straight base metal (K and J) and noble metal (R, S, and B) thermocouple elements are for the typical protection tube assemblies utilized in industrial applications. Special construction styles may be available upon request.



Base Metal Element



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)

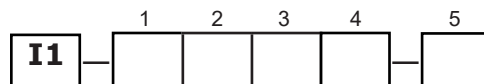
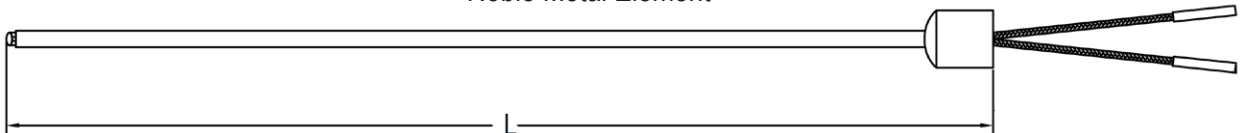
3. THERMOCOUPLE CALIBRATION	
J	Type J
K	Type K
N	Type N
JJ	Dual Type J
KK	Dual Type K
NN	Dual Type N
Other calibrations are available on request.	

6. ELEMENT LENGTH – "L" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

5. WELD JUNCTION STYLE	
S	Butt Weld
T	Twist and Weld (Standard)

4. INSULATOR TYPE	
R	Round Insulators
N	No Insulators; Bare Element Only
V	Oval Insulators

Noble Metal Element



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

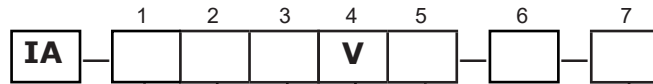
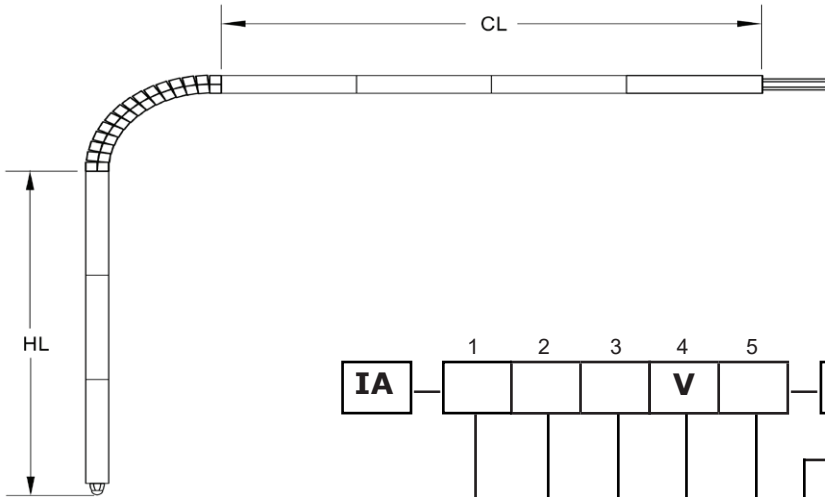
2. WIRE SIZE – MM (AWG)	
24	0.51 (24)
26	0.41 (26)
28	0.32 (28)

3. THERMOCOUPLE CALIBRATION	
R	Type R
S	Type S
B	Type B

5. ELEMENT LENGTH – "L" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

4. INSULATOR TYPE	
N	No Insulators; Bare Element Only
R	Round Solid Insulator

Pyrotek's angle base metal thermocouples are elements for the typical angle assemblies utilized in industrial applications. Special construction styles may be available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)

3. THERMOCOUPLE CALIBRATION	
J	Type J
K	Type K
N	Type N
JJ	Dual Type J
KK	Dual Type K
NN	Dual Type N
Other calibrations are available on request.	

4. INSULATOR TYPE	
V	Oval Insulators

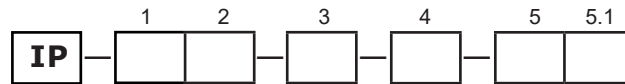
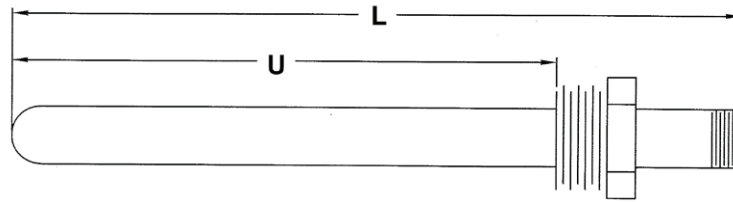
7. COLD LEG LENGTH – "CL" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

6. HOT LEG LENGTH – "HL" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

5. WELD JUNCTION STYLE	
S	Butt Weld
T	Twist and Weld (Standard)

IP SERIES – METAL ALLOY PROTECTION TUBES

Metal alloy protection tubes are replacement tubes for thermocouple assemblies. These tubes are for general purpose industrial applications. Special materials and sizes available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. PIPE SIZE – MM (IN NPT)	
C	15 (1/2) Sch40
D	20 (3/4) Sch40
Other sizes are available on request.	

3. PROTECTION TUBE MATERIAL	
34	304SS
36	316SS
30	310SS
61	INCONEL 601

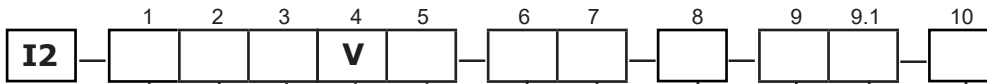
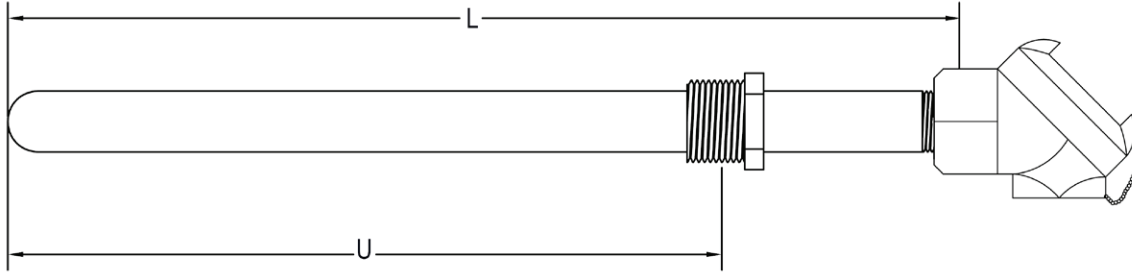
5.1 INSERTION LENGTH – “U” DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

5. OPTIONAL MOUNTING CHOICES	
00	No Optional Fitting
FX	Adjustable Flange with Set Screw
FD	Welded SS Bushing 20 mm (3/4 in NPT)
FE	Welded SS Bushing 25 mm (1 in NPT)
GD	Welded Steel Bushing 20 mm (3/4 in NPT)
GE	Welded Steel Bushing 25 mm (1 in NPT)

4. TUBE LENGTH – “L” DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

I2 SERIES – BASE THERMOCOUPLE ELEMENT WITH STEEL THERMOCOUPLE PROTECTION TUBE

Pyrotek's metal protection tube style assemblies are most commonly utilized in medium to high temperature industrial applications. Special protection tube materials and construction styles are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
JJ	Dual Type J
KK	Dual Type K
NN	Dual Type N
Other calibrations are available on request.	

4. INSULATOR TYPE	
V	Oval Insulators
If using option MI from Box 2, skip this option.	

5. WELD JUNCTION STYLE	
S	Butt Weld
T	Twist and Weld (Standard)
If using option MI from Box 2, skip this option.	

6. PIPE SIZE – MM (IN NPT)	
C	15 (1/2) Sch40
D	20 (3/4) Sch40
Other sizes are available on request.	

10. SCREW COVER HEAD STYLE	
00	No Head and Block
41	Cast Aluminium Screw Cover Head
42	Cast Iron Screw Cover Head

9.1. INSERTION LENGTH - "U" DIMENSION	
XX	Enter two-digit length for millimetres or inches. Example: 09, 20

9. OPTIONAL MOUNTING CHOICES	
00	No optional fitting
FX	Adjustable Flange with Set Screw
FD	Welded SS Bushing 20 mm (3/4 in NPT)
FE	Welded SS Bushing 25 mm (1 in NPT)
GD	Welded Steel Bushing 20 mm (3/4 in NPT)
GE	Welded Steel Bushing 25 mm (1 in NPT)

8. TUBE LENGTH – "L" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-1/2 inches

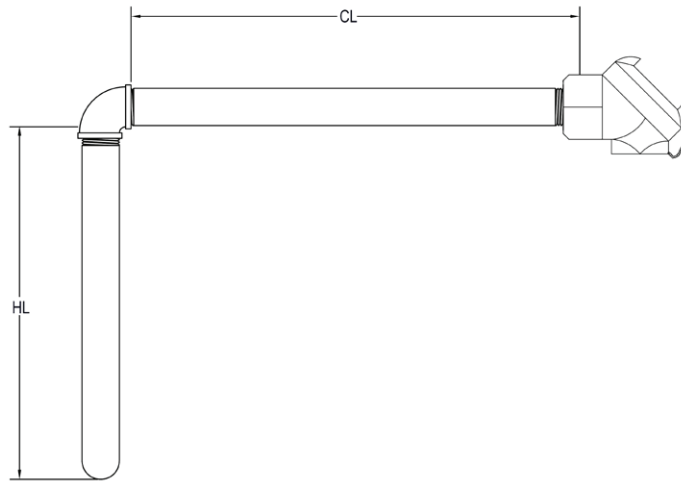
7. PROTECTION TUBE MATERIAL	
34	304SS
30	310SS
32	312SS
36	316SS
60	INCONEL 600
61	INCONEL 601
MON	MONEL

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I3 SERIES – ANGLE STEEL THERMOCOUPLE PROTECTION TUBE WITH BASE THERMOCOUPLE ELEMENT



Pyrotek's angle metal protection tube style assemblies are most commonly utilized in medium to high temperature industrial applications. Special protection tube materials and construction styles are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
JJ	Dual Type J
KK	Dual Type K
NN	Dual Type N
Other calibrations are available upon request.	

4. INSULATOR TYPE	
V	Oval Insulators
If using option MI from Box 2, skip this option.	

5. WELD JUNCTION STYLE	
S	Butt Weld
T	Twist and Weld (Standard)
If using option MI from Box 2, skip this option.	

10. SCREW COVER HEAD STYLE	
00	No Head and Block
41	Cast Aluminium Screw Cover Head
42	Cast Iron Screw Cover Head

9. COLD LENGTH (STEEL PIPE EXTENSION) – “CL” DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

8. HOT LEG LENGTH – “HL” DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

7. PROTECTION TUBE MATERIAL	
34	304SS
36	316SS
30	310SS
61	INCONEL 601

6. PIPE SIZE – MM (IN NPT)	
C	15 (1/2) Sch40
D	20 (3/4) Sch40

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I4 SERIES – MGO, BASE METAL TC METAL TC ELEMENTS

Pyrotek's ceramic protection tube assemblies are typically utilized in temperatures exceeding 1204°C (2200°F). The noble metal elements offer the advantages of handling higher temperatures and providing greater accuracy than base metal elements.

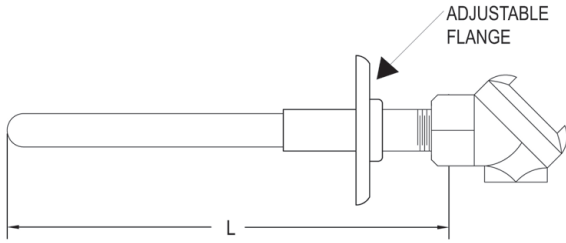


FIGURE A

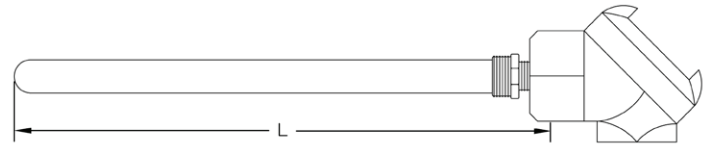
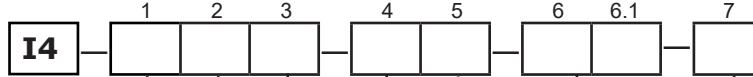


FIGURE B



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. WIRE SIZE – MM (AWG)

8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
24	0.51 (24)
26	0.41 (26)
28	0.32 (28)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION

K	Type K
N	Type N
R	Type R
S	Type S
KK	Dual Type K
NN	Dual Type N
RR	Dual Type R
SS	Dual Type S

Other calibrations are available on request.

4. CERAMIC PROTECTION TUBE TYPE

M	Mullite
A	Alumina

7. SCREW COVER HEAD

00	No Head and Block
41	Cast Aluminium Screw Cover Head
42	Cast Iron Screw Cover Head

6.1. OPTIONS – FIGURE A

FX	Adjustable Flange with Set Screw
----	----------------------------------

6. TUBE LENGTH – "L" DIMENSION

XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches
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5. CERAMIC PROTECTION TUBE DIAMETER AND FITTINGS

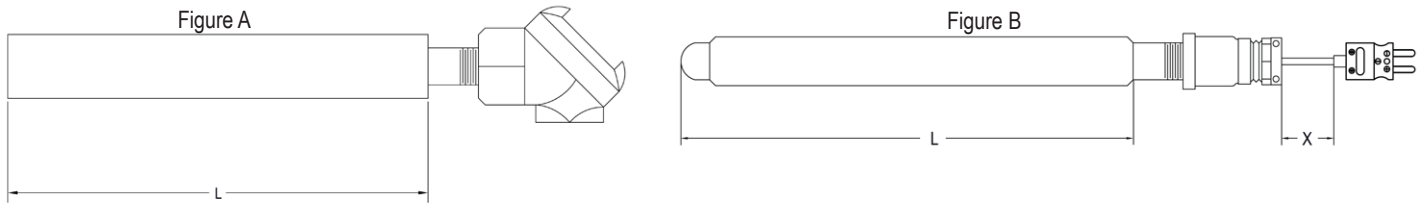
Code	Description and Order Instructions	Inner Diameter – mm (in)	Outer Diameter – mm (in)	Process Thread – mm (in NPT)	Termination Thread – mm (in NPT)
LC	Steel Close Nipple	8 (1/4)	10 (3/8)	15 (1/2)	15 (1/2)
L(X)	Steel Pipe Nipple (Specify "X" Dimension)	8 (1/4)	10 (3/8)	15 (1/2)	15 (1/2)
LH	Steel Hex Nipple	8 (1/4)	10 (3/8)	15 (1/2)	15 (1/2)
NC	Steel Close Nipple	11 (7/16)	19 (11/16)	20 (3/4)	20 (3/4)
N(X)	Steel Pipe Nipple (Specify "X" Dimension)	11 (7/16)	19 (11/16)	20 (3/4)	20 (3/4)
NH	Steel Hex Nipple	11 (7/16)	19 (11/16)	20 (3/4)	15 (1/2)
PC	Steel Close Nipple	15 (1/2)	20 (3/4)	20 (3/4)	20 (3/4)
P(X)	Steel Pipe Nipple (Specify "X" Dimension)	15 (1/2)	20 (3/4)	20 (3/4)	20 (3/4)
PH	Steel Hex Nipple	15 (1/2)	20 (3/4)	20 (3/4)	15 (1/2)
QC	Steel Close Nipple	18 (5/8)	22 (7/8)	25 (1)	25 (1)
Q(X)	Steel Pipe Nipple (Specify "X" Dimension)	18 (5/8)	22 (7/8)	25 (1)	25 (1)
QH	Steel Hex Nipple	18 (5/8)	22 (7/8)	25 (1)	20 (3/4)

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I5 SERIES – STRAIGHT MGO, BASE METAL TC ASSEMBLIES: REFRACTORY/PIPE REINFORCED ASSEMBLIES



They provide non-wetting attributes, a steel inner tube that provides support for strength and assembly mounting options and extended life.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
K	Type K
KK	Dual Type K
Other calibrations are available on request.	

4. THERMOCOUPLE PROTECTION TUBE MATERIAL		
Code	Description	Standard Stocked Lengths–mm (in)
RFM	Reinforced Fibreglass Material TC Protection Tube	305, 457, 610, 762, 914, 1219 (12, 18, 24, 30, 36, 48) Special lengths are available.
PIN	Pinnacle Cast O'-Sialon/Silicon Carbide Protection Tube	152, 305, 457, 610, 762, 914, 1219 (6, 12, 18, 24, 30, 36, 48) Special lengths are available.
RSC	SiC-Graphite Protection Tube	305, 457, 610, 762, 914, 1219 (12, 18, 24, 30, 36, 48)

5. TUBE LENGTH – "L" DIMENSION	
XX	For the length order code, insert the whole millimetres (inches) dimension from Box 4. Example: 120 for 120 millimetres tube length

8.1. SHEATH TERMINATION OPTIONS	
H	High Temperature Connectors 427°C (800°F)
C	Compression Tube Adaptor Holding Plug to Sheath
Only add the option designation letter if those options are desired.	

8. SHEATH TERMINATION	
21	Standard Male Plug
22	Standard Female Jack
23	Standard Plug/Jack
24	Standard Solid Pin Plug
The temperature rating for all standard temperature plugs is 425°F (218°C).	

7. EXTENSION LENGTH – "X" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

6. SCREW COVER HEAD OR EXTENSION		
41	Cast Aluminium	Figure A
42	Cast Iron	
00	MI Cable Extension Beyond Thermocouple Protection Tube*	Figure B
*For MI Cable Extension Option (Figure B), continue building part number using boxes 7, 8 and 8.1.		

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I6 SERIES – ANGLED MGO, BASE METAL TC ASSEMBLIES: REFRACTORY/PIPE REINFORCED ASSEMBLIES

They provide non-wetting attributes, a steel inner tube that provides support for strength and assembly mounting options and extended life.

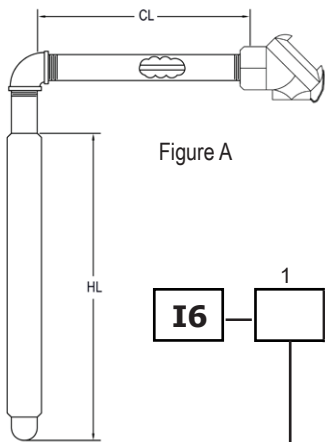


Figure A

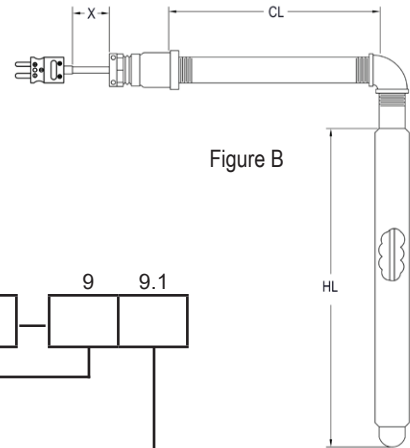
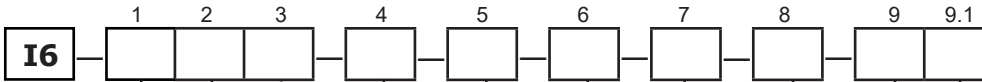


Figure B



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. WIRE SIZE – MM (AWG)

8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION

K	Type K
KK	Dual Type K

Other calibrations are available upon request.

4. THERMOCOUPLE PROTECTION TUBE MATERIAL

Code	Description	Standard Stocked Lengths – mm (in)
RFM	Reinforced Fibreglass Material TC Protection Tube	305, 457, 610, 762, 914, 1219 (12, 18, 24, 30, 36, 48) Special lengths are available.
PIN	Pinnacle Cast O'-Sialon/Silicon Carbide Protection Tube	152, 305, 457, 610, 762, 914, 1219 (6, 12, 18, 24, 30, 36, 48) Special lengths are available.
RSC	SiC Protection Tube	305, 457, 610, 762, 914, 1219 (12, 18, 24, 30, 36, 48)

5. HOT LENGTH – "HL" DIMENSION

XX	For the length order code, insert the whole millimetres (inches) dimension from Box 4. Example: 120 for 120 millimetres tube length
----	---

6. COLD LENGTH – "CL" DIMENSION (STEEL PIPE EXTENSION)

XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches
----	--

9.1. SHEATH TERMINATION OPTIONS

H	High Temperature Connectors 427°C (800°F)
C	Compression Tube Adaptor Holding Plug to Sheath

Only add the option designation letter if those options are desired.

9. SHEATH TERMINATION

21	Standard Male Plug
22	Standard Female Jack
23	Standard Plug/Jack
24	Standard Solid Pin Plug

The temperature rating for all standard temperature plugs is 218°C (425°F).

8. EXTENSION LENGTH – "X" DIMENSION

XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches
----	--

7. SCREW COVER HEAD OR EXTENSION

41	Cast Aluminium	Figure A
42	Cast Iron	
00	MI Cable Extension Beyond Thermocouple Protection Tube*	Figure B

*For MI Cable Extension Option (Figure B), continue building part number using boxes 7, 8, 9, and 9.1.

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I7 SERIES – STRAIGHT MGO, BASE METAL TC ASSEMBLIES: REFRACTORY TUBE ASSEMBLIES



These assemblies provide non-wetting attributes, as well as higher life expectancy in applications with a limited impact from solids.

Figure A

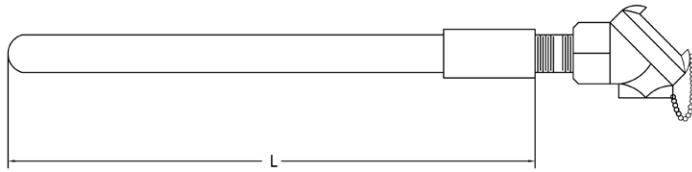
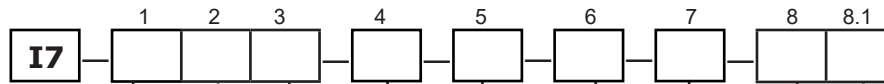
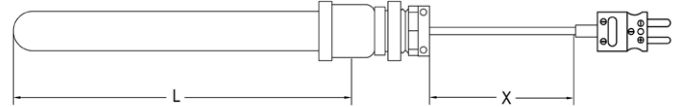


Figure B



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
K	Type K
KK	Dual Type K
Other calibrations are available upon request.	

4. THERMOCOUPLE PROTECTION TUBE MATERIAL		
Code	Description	Standard Stocked Lengths – mm (in)
OSI	O'-Sialon/Silicon Carbide Protection Tube, 28 x 16 mm (1.1 x 0.63 in) OD x ID	300, 400, 500, 600, 700, 800, 900, 1000, 1200 (12, 16, 20, 24, 28, 32, 35, 39, 47)
B100	Sialon B100 Ceramic Protection Tube, 28 x 16 mm (1.1 x 0.63 in) OD x ID	200, 300, 400, 460, 500, 600, 650, 700, 750, 800, 850, 900, 1000 (8, 12, 16, 18, 20, 24, 26, 28, 30, 32, 34, 35, 39)
SIA	Silicon Nitride Thermocouple Protection Tube, 28 x 16 mm (1.1 x 0.63 in) OD x ID	400, 500, 600, 700, 800, 900, 1000 (16, 20, 24, 28, 32, 35, 39, 47)

5. TUBE LENGTH – "L" DIMENSION – MM (IN)	
30	300 (12)
40	400 (16)
50	500 (20)
60	600 (24)
70	700 (28)
80	800 (32)
90	900 (35)
10	1000 (40)
11	1100 (43)
12	1200 (47)

8.1. SHEATH TERMINATION OPTIONS	
H	High Temperature Connectors 427°C (800°F)
C	Compression Tube Adaptor Holding Plug to Sheath
Only add the option designation letter if those options are desired.	

8. SHEATH TERMINATION	
21	Standard Male Plug
22	Standard Female Jack
23	Standard Plug/Jack
24	Standard Solid Pin Plug
The temperature rating for all standard temperature plugs is 218°C (425°F).	

7. EXTENSION LENGTH – "X" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

6. SCREW COVER HEAD OR EXTENSION		
41	Cast Aluminium	Figure A
42	Cast Iron	Figure A
00	MI Cable Extension Beyond Thermocouple Protection Tube*	Figure B
*For MI Cable Extension Option (Figure B), continue building part number using boxes 7, 8 and 8.1.		

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I8 SERIES – ANGLED MGO, BASE METAL TC ASSEMBLIES: REFRACTORY TUBE ASSEMBLIES

These assemblies provide non-wetting attributes, as well as higher life expectancy in applications where limited impact from solids occurs.

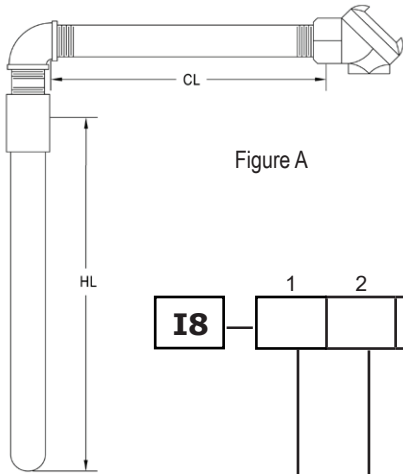


Figure A

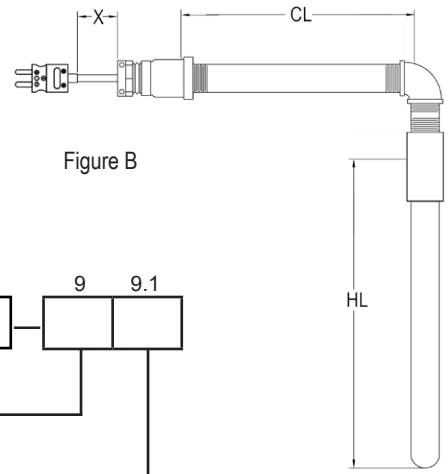
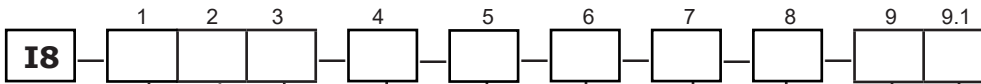


Figure B



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
K	Type K
KK	Dual Type K
Other calibrations are available on request.	

4. THERMOCOUPLE PROTECTION TUBE MATERIAL		
Code	Description	Standard Stocked Lengths – mm (in)
OSI	O'-Sialon/Silicon Carbide Protection Tube, 28 x 16 mm (1.1 x 0.63 in) OD x ID	300, 400, 500, 600, 700, 800, 900, 1000, 1200 (12, 16, 20, 24, 28, 32, 35, 39, 47)
B100	Sialon B100 Ceramic Protection Tube, 28 x 16 mm (1.1 x 0.63 in) OD x ID	200, 300, 400, 460, 500, 600, 650, 700, 750, 800, 850, 900, 1000 (8, 12, 16, 18, 20, 24, 26, 28, 30, 32, 34, 35, 39)
SIA	Silicon Nitride Thermocouple Protection Tube, 28 x 16 mm (1.1 x 0.63 in) OD x ID	400, 500, 600, 700, 800, 900, 1000 (16, 20, 24, 28, 32, 35, 39, 47)

9.1. SHEATH TERMINATION OPTIONS	
H	High Temperature Connectors 427°C (800°F)
C	Compression Tube Adaptor Holding Plug to Sheath
Only add the option designation letter if those options are desired.	

9. SHEATH TERMINATION	
21	Standard Male Plug
22	Standard Female Jack
23	Standard Plug/Jack
24	Standard Solid Pin Plug
The temperature rating for all standard temperature plugs is 218°C (425°F).	

8. EXTENSION LENGTH IN WHOLE INCHES – "X" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

7. SCREW COVER HEAD OR EXTENSION		
41	Cast Aluminium	Figure A
42	Cast Iron	
00	MI Cable Extension Beyond Thermocouple Protection Tube*	Figure B
*For MI Cable Extension Option (Figure B), continue building part number using boxes 7, 8, 9, and 9.1.		

6. COLD LEG LENGTH – "CL" DIMENSION (STEEL PIPE EXTENSION)	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

5. TUBE HOT LEG LENGTH – "HL" DIMENSION	
30	300 (12)
40	400 (16)
50	500 (20)
60	600 (24)
70	700 (28)
80	800 (32)
90	900 (35)
10	1000 (40)
11	1100 (43)
12	1200 (47)

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

I9 SERIES – STRAIGHT MGO, BASE METAL TC ASSEMBLIES: CAST IRON AND ENAMELED CAST IRON



Pyrotek's cast iron thermocouples are designed to be utilized where a high degree of impact from solids is expected.

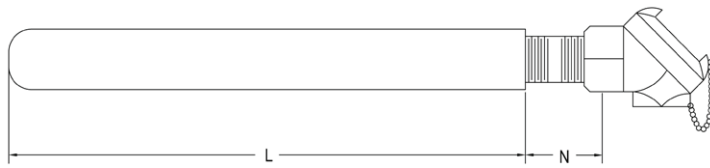


Figure A

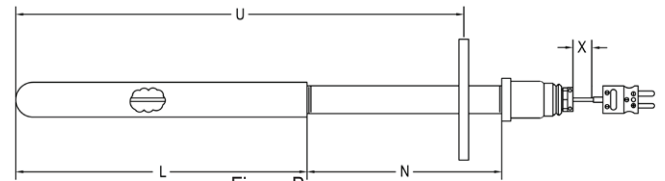
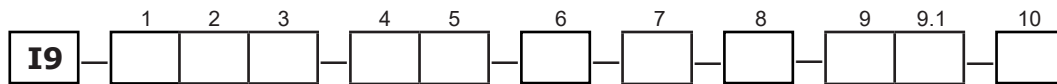


Figure B



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
K	Type K
KK	Dual Type K
KKK	Triple Type K
Other calibrations are available on request.	

4. THERMOCOUPLE PROTECTION TUBE MATERIAL		
Code	Description	Standard Stocked Lengths – mm (in)
CIP	Uncoated Cast Iron Thermocouple Protection Tube	305, 457, 610, 762, 914, 1219, 1372, 1524, 1676, 1829, 2438, 2743 (12, 18, 24, 30, 36, 48, 54, 60, 66, 72, 96, 108)
CIR	Red Enamel Coated Cast Iron Thermocouple Protection Tube	305, 457, 610, 762, 914, 1219, 1372, 1524, 1676, 1829, 2235, 2438 (12, 18, 24, 30, 36, 48, 54, 60, 66, 72, 88, 96)

5. TUBE LENGTH – “L” DIMENSION	
XX	For the length order code, insert the whole millimetres (inches) dimension from Box 4. Example: 120 for 120 millimetres tube length

6. PIPE NIPPLE EXTENSION LENGTH – “N” DIMENSION	
XX	Insert the length of the pipe nipple extension required – 25 mm (1 in) minimum Example: 25 Standards: 25, 152, 305, 457 mm (1, 6, 12, 18 in)

10. HARDWARE OPTION – “U” DIMENSION	
T(XX)	13 mm (1/2 in) Diameter x 152 mm (6 in) Steel Bar Welded to Pipe Extension
XX=Insert “U” Dimension.	

9.1. TERMINATION OPTIONS	
C	Cable Clamp for Plug/Jack
H	High Temp Plug/Jack (Standard Size Only; 427°C/800°F)
The temperature rating for all standard plugs and jacks is 218°C (425°F). Leave the box blank if no options are needed.	

9. LEAD WIRE TERMINATION STYLE	
31	51 mm (2 in) Split Leads
32	51 mm (2 in) Leads with Spade Lugs
21	*Standard Plug
22	*Standard Jack
23	*Standard Plug/Jack
11	Miniature Plug
12	Miniature Female Jack
13	Miniature Plug/Jack
*The temperature rating for all standard plugs and jacks is 218°C (425°F).	

8. LEAD WIRE LENGTH – “X” DIMENSION	
XXX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

7. SCREW COVER HEAD OR EXTENSION	
41	Cast Aluminium Screw Cover Head
42	Cast Iron Screw Cover Head
For the following selections, continue building the part number using boxes 8–10.	
00	MI Cable Extension Beyond Thermocouple Protection Tube
E	Hi-Temp Fibreglass Solid Wire 722°C (1300°F)
F	Hi-Temp Fibreglass Solid Wire With Stainless Overbraid 722°C (1300°F)
G	Hi-Temp Fibreglass Solid Wire With Flex Armor 722°C (1300°F)

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

Pyrotek's cast iron thermocouples are designed to be utilized where a high degree of impact from solids is expected.

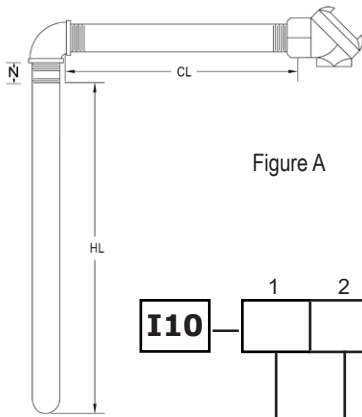


Figure A

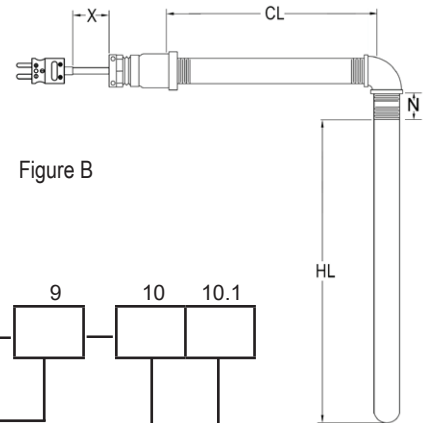
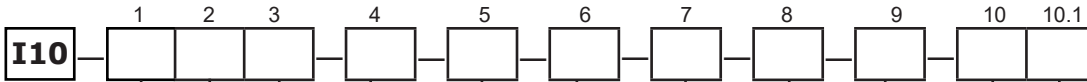


Figure B



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. WIRE SIZE – MM (AWG)	
8	3.25 (8)
11	2.31 (11)
14	1.63 (14)
MI	Ungrounded MI Cable

3. THERMOCOUPLE CALIBRATION	
K	Type K
KK	Dual Type K
KKK	Triple Type K
Other calibrations are available on request.	

4. THERMOCOUPLE PROTECTION TUBE MATERIAL		
Code	Description	Standard Stocked Lengths – mm (in)
CIP	Uncoated Cast Iron Thermocouple Protection Tube	305, 457, 610, 762, 914, 1219, 1372, 1524, 1676, 1829, 2438, 2743 (12, 18, 24, 30, 36, 48, 54, 60, 66, 72, 96, 108)
CIR	Red Enamel Coated Cast Iron Thermocouple Protection Tube	305, 457, 610, 762, 914, 1219, 1372, 1524, 1676, 1829, 2438, 2743, 2235, 2438 (12, 18, 24, 30, 36, 48, 54, 60, 66, 72, 88, 96)

5. HOT LENGTH – “HL” DIMENSION	
XX	For the length order code, insert the whole millimetres (inches) dimension from Box 4. Example: 120 for 120 millimetres tube length

6. PIPE NIPPLE EXTENSION LENGTH – “N” DIMENSION	
XX	Insert the length of the pipe nipple extension required – 25 mm (1 in) minimum Example: 25 Standards: 25, 152, 305, 457 mm (1, 6, 12, 18 in)

10.1. SHEATH TERMINATION OPTIONS	
H	High Temperature Connectors 427°C (800°F)
C	Compression Tube Adaptor Holding Plug to Sheath
Only add the option designation letter if those options are desired.	

10. SHEATH TERMINATION	
21	Standard Male Plug
22	Standard Female Jack
23	Standard Plug/Jack
24	Standard Solid Pin Plug
The temperature rating for all standard temperature plugs is 218°C (425°F).	

9. EXTENSION LENGTH – “X” DIMENSION	
XX	Insert length in whole inches. For fractional lengths, specify as follows. Example: 12(1/2) for 12-½ Inches

8. SCREW COVER HEAD OR EXTENSION		
41	Cast Aluminium	Figure A
42	Cast Iron	Figure A
00	MI Cable Extension Beyond Thermocouple Protection Tube*	Figure B
*For MI Cable Extension Option (Figure B), continue building the part number using boxes 8, 9, 10 and 10.1.		

7. COLD LENGTH – “CL” DIMENSION (STEEL PIPE EXTENSION)	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

QUICK TIPS

Quick response sampling thermocouples are used to measure the temperature of nonferrous molten metals. Proprietary coating on each thermocouple tip protects the surface sheath without diminishing its rapid response time.



GLOBAL PART NUMBER	DESCRIPTION	DESIGN
P009-BN008-QT-A	Quick Tips, Type K, 203 mm (8 in) Tip, Grounded, Coated, No Lance or Lead Wire, with Standard Plug	See Figure A
P009-BN008-QT-AA	Quick Tips, Type K, 203 mm (8 in) Tip, Grounded, Coated 1829 mm (72 in) Lead Wire with Round Ceramic Insulators, with CF (Crimp Fork)	See Figure H
P009-BN008-QT-K	Quick Tips, Type K, 203 mm (8 in) Tip, Grounded, Coated, 737 mm (31 in) Lead Wire, with Standard Plug	See Figure B
P009-BN008-QT-L	Quick Tips, Type K, 203 mm (8 in) Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-BN008-QT-M	Quick Tips, Type K, 203 mm (8 in) Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, with Standard Plug	See Figure B
P009-BN008-QT-N	Quick Tips, Type K, 203 mm (8 in) Tip, Grounded, Coated, Mounting Plate, with Standard Plug	See Figure D
P009-BN008-QT-U	Quick Tips, Type K, 203 mm (8 in) Flat Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, with Standard Plug	See Figure E
P009-BN010-QT-A	Quick Tips, Type K, 254 mm (10 in) Round Tip, Grounded, Coated, 1524 mm (60 in) lead wire with Armored Conduit, Mounting Plate, with Standard Plug	See Figure K
P009-BN012-QT-B	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, No Lance or Lead Wire, with Standard Plug	See Figure A
P009-BN012-QT-C	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, 305 mm (12 in) Lead Wire, with Standard Plug	See Figure B
P009-BN012-QT-D	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, with Standard Plug	See Figure B
P009-BN012-QT-E	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, 1346 mm (55 in) Lead Wire, with Standard Plug	See Figure B
P009-BN012-QT-N	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, Mounting Plate, with Standard Plug	See Figure D
P009-BN012-QT-Q	Quick Tips, Type K, 305 mm (12 in) Round Tip, Ungrounded, Coated, 305 mm (12 in) Lead Wire, with Standard Plug	See Figure F
P009-BN012-QT-R	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, 1092 mm (43 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-BN012-QT-S	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, 381 mm (15 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-BN012-QT-SA	Quick Tips, Type K, 305 mm (12 in) Tip, Grounded, Coated, 2100 mm (83 in) Lead Wire, CF (Crimp Fork)	See Figure H
P009-BN012-J-QT-B	Quick Tips, Type J, 305 mm (12 in) Tip, Grounded, Coated, No Lance or Lead Wire, with Standard Plug	See Figure A
P009-BN015-QT-F	Quick Tips, Type K, 381 mm (15 in) Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-BN015-QT-G	Quick Tips, Type K, 381 mm (15 in) Tip, Grounded, Coated, 3048 mm (120 in) Lead Wire, with Standard Plug	See Figure B
P009-BN015-QT-GA	Quick Tips, Type K, 381 mm (15 in) Tip, Grounded, Coated, 305 mm (12 in) Bead Lead Wire, with Standard Plug	See Figure H
P009-BN015-QT-T	Quick Tips, Type K, 381 mm (15 in) Tip, Grounded, Coated, 1397 mm (55 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-BN015-QT-Y	Quick Tips, Type K, 381 mm (15 in) Tip, Grounded, Coated, 1143 mm (45 in) Lead Wire, with No Connector	See Figure G
P009-BN015-QT-Z	Quick Tips, Type K, 381 mm (15 in) Tip, Grounded, Coated, 1829 mm (72 in) Lead Wire, CF (Crimp Fork)	See Figure H
P009-BN018-QT-H	Quick Tips, Type K, 457 mm (18 in) Tip, Grounded, Coated, No Lance or Lead Wire, with Standard Plug	See Figure A
P009-BN018-QT-V	Quick Tips, Type K, 457 mm (18 in) Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-BN018-QT-P	Quick Tips, Type K, 457 mm (18 in) Tip, Grounded, Coated, Mounting Plate, with Standard Plug	See Figure D
P009-BN030-QT-J	Quick Tips, Type K, 762 mm (30 in) Tip, Grounded, Coated, 1041 mm (43 in) Lead Wire, CF (Crimp Fork)	See Figure C
P009-L043-QT-A	Lance with Handle, Cable and Connector to Suit for a 1041 mm (43 in) Lead Wire	See Figure J

NOTE: NOT ALL DESIGNS AND CONFIGURATIONS ARE LISTED.
PLEASE CONTACT PYROTEK FOR CUSTOM CONFIGURATIONS

FIGURE A

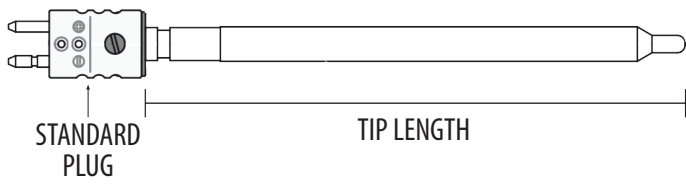


FIGURE B

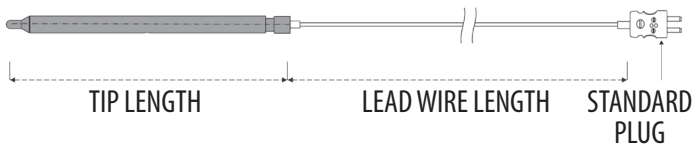


FIGURE C

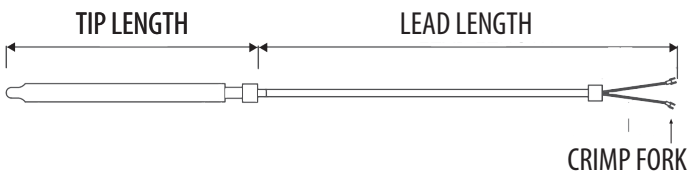


FIGURE D

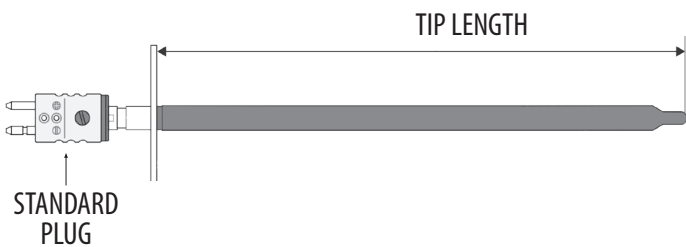


FIGURE E

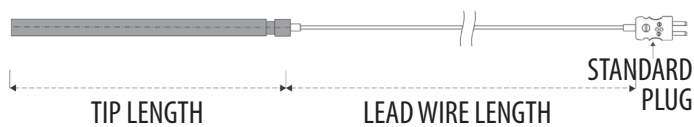


FIGURE F

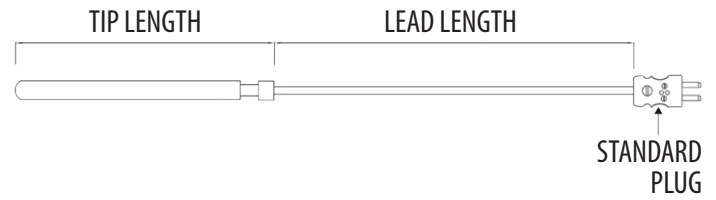


FIGURE G

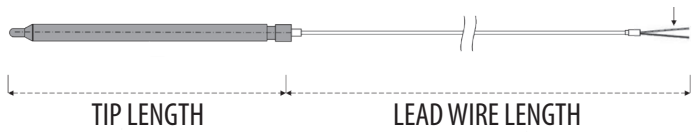


FIGURE H

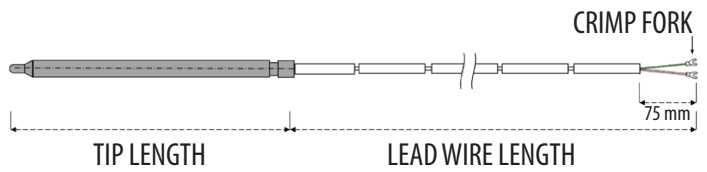
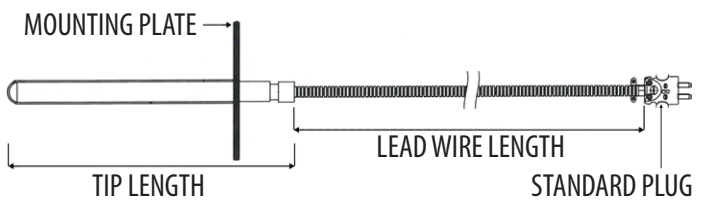


FIGURE J



FIGURE K

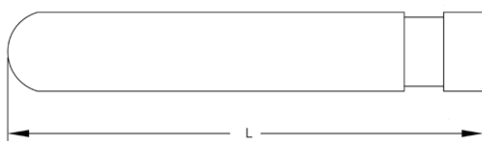


T1 SERIES – THERMOCOUPLE PROTECTION TUBES (O'-SIALON, SIALON, PINNACLE, RFM AND SIC)



Pyrotek offers a wide variety of thermocouple protection tubes for direct immersion into molten non-ferrous metals. Pyrotek offers several styles in an effort to satisfy all customers' combination of life expectancy and value. Special sizes and construction methods are available upon request.

O'-SIALON TC TUBE ONLY



O'-SIALON TC TUBE WITH FITTING



SIALON B100 CERAMIC OR SIN TC TUBE ONLY

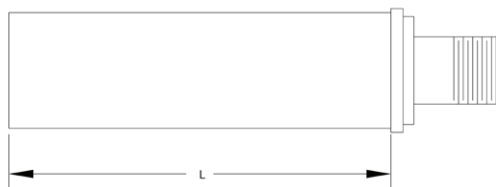


SIN TUBE WITH FITTING



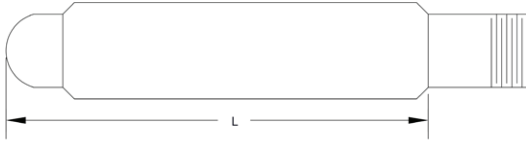
O'-SIALON TC PROTECTION TUBE		
Tube Only Part Number	Tube Outside Diameter x Inside Diameter x Length – mm (in)	Tube with Fitting Part Number
001528	28 x 16 x 300 (1.1 x 0.6 x 11.8)	011397
006608	28 x 16 x 400 (1.1 x 0.6 x 15.8)	007370
005886	28 x 16 x 500 (1.1 x 0.6 x 19.7)	007371
000795	28 x 16 x 600 (1.1 x 0.6 x 23.6)	007372
006607	28 x 16 x 700 (1.1 x 0.6 x 27.6)	001130
006606	28 x 16 x 800 (1.1 x 0.6 x 31.5)	019453
006724	28 x 16 x 900 (1.1 x 0.6 x 35.4)	001339
006725	28 x 16 x 1000 (1.1 x 0.6 x 39.3)	007374
007122	28 x 16 x 1200 (1.1 x 0.6 x 47.2)	007375

SIN TC PROTECTION TUBE		
Tube Only Part Number	Tube Outside Diameter x Inside Diameter x Length – mm (in)	Tube with Fitting Part Number
005897	28 x 16 x 400 (1.1 x 0.6 x 15.8)	N/A
005898	28 x 16 x 500 (1.1 x 0.6 x 19.7)	N/A
005899	28 x 16 x 600 (1.1 x 0.6 x 23.6)	010265
005900	28 x 16 x 700 (1.1 x 0.6 x 27.6)	N/A
005901	28 x 16 x 800 (1.1 x 0.6 x 31.5)	N/A
005902	28 x 16 x 900 (1.1 x 0.6 x 35.4)	010263
009079	28 x 16 x 1000 (1.1 x 0.6 x 39.3)	005062



PINNACLE PROTECTION TUBE 19 MM (3/4" NPT) PIPE FITTING		
Part Number	Outside Diameter – mm (in)	Tube Length – mm (in)
011250	51 (2)	152 (6)
001431	51 (2)	305 (12)
001450	51 (2)	457 (18)
001415	51 (2)	610 (24)
001517	51 (2)	762 (30)
001414	51 (2)	914 (36)
003352	51 (2)	1067 (42)

SIALON B100 TC PROTECTION TUBE	
Tube Only Part Number	Tube Outside Diameter x Inside Diameter x Length – mm (in)
P009-FDS020	28 x 16 x 200 (1.1 x 0.6 x 7.9)
P009-FDS021	28 x 16 x 300 (1.1 x 0.6 x 11.8)
P009-FDS022	28 x 16 x 400 (1.1 x 0.6 x 15.8)
P009-FDS023	28 x 16 x 460 (1.1 x 0.6 x 18.1)
P009-FDS024	28 x 16 x 500 (1.1 x 0.6 x 19.7)
P009-FDS025	28 x 16 x 600 (1.1 x 0.6 x 23.6)
P009-FDS025-1	28 x 16 x 650 (1.1 x 0.6 x 25.6)
P009-FDS026	28 x 16 x 700 (1.1 x 0.6 x 27.6)
P009-FDS026-1	28 x 16 x 750 (1.1 x 0.6 x 29.5)
P009-FDS027	28 x 16 x 800 (1.1 x 0.6 x 31.5)
P009-FDS028	28 x 16 x 850 (1.1 x 0.6 x 33.5)
P009-FDS029	28 x 16 x 900 (1.1 x 0.6 x 35.4)
P009-FDS030	28 x 16 x 1000 (1.1 x 0.6 x 39.3)



RFM PROTECTION TUBE 19 MM (3/4" NPT) PIPE FITTING

Part Number	Outside Diameter – mm (in)	Tube Length – mm (in)
006757	38 (1 1/2)	305 (12)
006756	38 (1 1/2)	457 (18)
001578	38 (1 1/2)	610 (24)
006754	38 (1 1/2)	762 (30)
006753	38 (1 1/2)	914 (36)
009702	38 (1 1/2)	1067 (42)
009701	38 (1 1/2)	1219 (48)



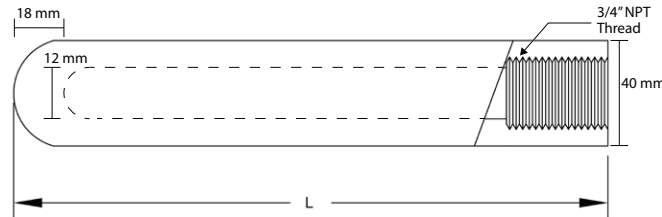
CARBON BONDED SIC-GRAPHITE TUBE 19 MM (3/4" NPT) PIPE FITTING

Part Number	Outside Diameter – mm (in)	Tube Length – mm (in)
006925	44 (1 3/4)	305 (12)
005920	44 (1 3/4)	457 (18)
000292	44 (1 3/4)	610 (24)
000262	44 (1 3/4)	762 (30)
000926	44 (1 3/4)	914 (36)

T2 SERIES – THERMOCOUPLE PROTECTION TUBES (PLAIN AND RED ENAMEL CAST IRON)



Pyrotek's cast iron protection tubes have been designed to provide long life when they are subjected to the demanding process of melting non-ferrous alloys. Pyrotek offers both plain and enameled tubes in multiple sizes that are available globally.

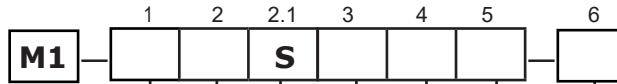
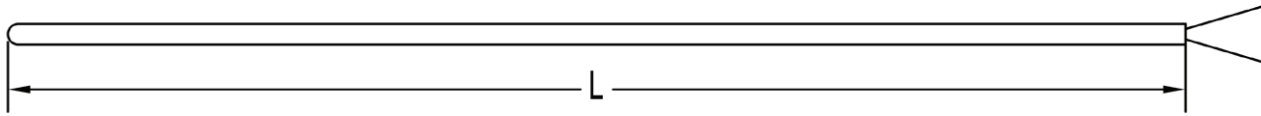


CAST IRON THERMOCOUPLE PROTECTION TUBE (PLAIN TUBE) – MM (IN)	
Part Number	Tube Length
P009-P012NPT-012X40	Plain Cast Iron Protection Tube, 305 (12)
P009-P018NPT-012X40	Plain Cast Iron Protection Tube, 457 (18)
P009-P024NPT-012X40	Plain Cast Iron Protection Tube, 610 (24)
P009-P030NPT-012X40	Plain Cast Iron Protection Tube, 762 (30)
P009-P036NPT-012X40	Plain Cast Iron Protection Tube, 914 (36)
P009-P042NPT-012X40	Plain Cast Iron Protection Tube, 1067 (42)
P009-P048NPT-012X40	Plain Cast Iron Protection Tube, 1219 (48)
P009-P054NPT-012X40	Plain Cast Iron Protection Tube, 1372 (54)
P009-P060NPT-012X40	Plain Cast Iron Protection Tube, 1524 (60)
P009-P066NPT-012X40	Plain Cast Iron Protection Tube, 1676 (66)
P009-P072NPT-012X40	Plain Cast Iron Protection Tube, 1829 (72)
P009-P096NPT-012X40	Plain Cast Iron Protection Tube, 2438 (96)
P009-P108NPT-012X40	Plain Cast Iron Protection Tube, 2743 (108)

CAST IRON THERMOCOUPLE PROTECTION TUBE (RED ENAMELED TUBE) – MM (IN)	
Part Number	Tube Length
P009-R012NPT-012X40	Red Cast Iron Protection Tube, 305 (12)
P009-R018NPT-012X40	Red Cast Iron Protection Tube, 457 (18)
P009-R024NPT-012X40	Red Cast Iron Protection Tube, 610 (24)
P009-R030NPT-012X40	Red Cast Iron Protection Tube, 762 (30)
P009-R036NPT-012X40	Red Cast Iron Protection Tube, 914 (36)
P009-R042NPT-012X40	Red Cast Iron Protection Tube, 1067 (42)
P009-R048NPT-012X40	Red Cast Iron Protection Tube, 1219 (48)
P009-R054NPT-012X40	Red Cast Iron Protection Tube, 1372 (54)
P009-R060NPT-012X40	Red Cast Iron Protection Tube, 1524 (60)
P009-R066NPT-012X40	Red Cast Iron Protection Tube, 1676 (66)
P009-R072NPT-012X40	Red Cast Iron Protection Tube, 1829 (72)
P009-R088NPT-012X40	Red Cast Iron Protection Tube, 2235 (88)
P009-R096NPT-012X40	Red Cast Iron Protection Tube, 2438 (96)

M1 SERIES – MINERAL INSULATED THERMOCOUPLE ELEMENTS

Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures up to 1260°C (2300°F). Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
R	Type R
S	Type S
JJ	Dual Type J
KK	Dual Type K
NN	Dual Type N

2.1. T/C CALIBRATION TOLERANCE	
S	Special Limits of Error

3. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

6. ELEMENT LENGTH – "L" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

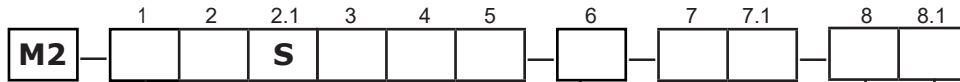
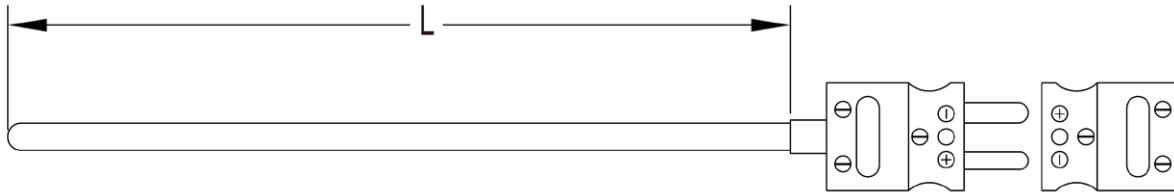
5. THERMOCOUPLE JUNCTION	
U	Ungrounded
G	Grounded
E	Exposed

4. SHEATH MATERIAL	
34	304SS
30	310SS
32	321SS
36	316SS
50	Pyrocable
60	INCONEL 601
MON	MONEL

M2 SERIES – MINERAL INSULATED ELEMENTS PLUG AND JACK STYLE



Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures of up to 1260°C (2300°F). Plug and jack assemblies utilize either miniature or standard size plugs and jacks to ensure the sensors are interchangeable. These probes are available in several diameters, a variety of sheath materials and customer specific lengths. Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
S	Type S
R	Type R
JJ	Dual Type J
KK	Dual Type K

2.1. T/C CALIBRATION TOLERANCE	
S	Special Limits of Error

3. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

4. SHEATH MATERIAL	
34	304 SS
30	310 SS
32	321 SS
36	316 SS
50	Pyrocable
60	INCONEL 601
MON	MONEL

5. THERMOCOUPLE JUNCTION	
U	Ungrounded
G	Grounded
E	Exposed

8.1. SHEATH TERMINATION OPTIONS	
H	High Temperature Connectors (427°C/800°F)
L	Compression Tube Adaptor Holding Plug to Sheath
Only add the option designation letter if those options are needed.	

8. SHEATH TERMINATION	
21	*Standard Male Plug
22	*Standard Female Jack
23	*Standard Plug/Jack
24	*Standard Solid Pin Plug
11	Miniature Male Plug
12	Miniature Female Jack
13	Miniature Plug/Jack
*The temperature rating for all standard plugs and jacks is 218°C (425°F).	

7.1. BEND MOUNTING OPTIONS	
9XX	90° Bend (XX = Hot Leg Length in Inches)
4XX	45° Bend (XX = Hot Leg Length in Inches)
When ordering an angled assembly, the sum of the Hot Leg and Cold Leg will equal the total L dimension. Leave the box blank if no options are needed.	

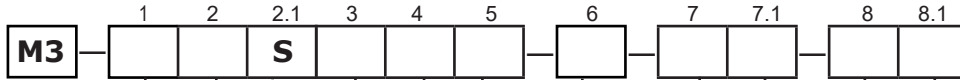
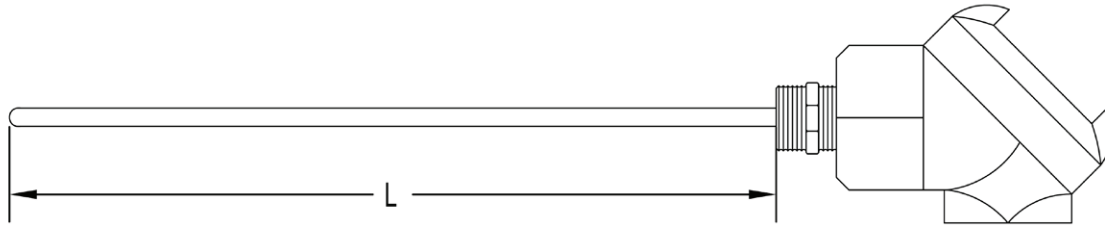
7. SHEATH MOUNTING OPTIONS – MM (IN NPT)	
00	No Mounting Options
BA	Brass Compression Fitting 3 (1/8)
SA	Stainless Compression Fitting 3 (1/8)
BB	Brass Compression Fitting 6 (1/4)
SB	Stainless Compression Fitting 6 (1/4)
BC	Brass Compression Fitting 13 (1/2)
SC	Stainless Compression Fitting 13 (1/2)
RA	Readjustable SS Compression Fitting 3 (1/8)
FC	Fixed SS Bushing 13 (1/2) (Insert L Dimension)
HY	Compression Bayonet Fitting (3 mm, 1/8 in Sheath Only)
ZZ	Special Option-Consult Factory

6. ELEMENT LENGTH – "L" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-1/2 inches

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

M3 SERIES – MINERAL INSULATED ELEMENTS HEAD AND BLOCK

Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures up to 1260°C (2300°F). Assemblies are available with many attachment fittings, including cast iron or cast aluminium screw cover heads for ease of installation. Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
K	Type K
J	Type J
N	Type N
KK	Dual Type K
JJ	Dual Type J

2.1. T/C CALIBRATION TOLERANCE	
S	Special Limits of Error

3. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

4. SHEATH MATERIAL	
34	304SS
36	316SS
30	310SS
32	321SS
50	Pyrocable
60	INCONEL 601

5. THERMOCOUPLE JUNCTION	
U	Ungrounded
G	Grounded
E	Exposed

8.1. SCREW COVER HEAD STYLE	
00	No Head; Threaded Fitting Only; 2 inch Stripped Leads Beyond Fitting Standard
41	Cast Aluminium Screw Cover Head
42	Cast Iron Screw Cover Head

8. HEAD TERMINATION OPTIONS – MM (IN NPT)	
75C	13 x 13 (1/2 x 1/2) SS Hex Nipple
65C	13 x 13 (1/2 x 1/2) Steel Hex Nipple
55B	6 (1/4) Brass Compression Fitting
85C	13 (1/2) Steel Hex Plug
85D	19 (3/4) Steel Hex Plug

7.1. SHEATH BEND OPTIONS	
9XX	90° Bend (XX = Hot Leg Length in Inches)
4XX	45° Bend (XX = Hot Leg Length in Inches)

When ordering an angled assembly, the sum of the Hot Leg and the Cold Leg will equal the total "L" dimension. Leave the box blank if no options are needed.

7. SHEATH MOUNTING OPTIONS – MM (IN NPT)	
00	No Mounting Options
BA	Brass Compression Fitting 3 (1/8)
SA	Stainless Compression Fitting 3 (1/8)
BB	Brass Compression Fitting 6 (1/4)
SB	Stainless Compression Fitting 6 (1/4)
BC	Brass Compression Fitting 13 (1/2)
SC	Stainless Compression Fitting 13 (1/2)
FC	Fixed SS Bushing 13 (1/2) (Insert L Dimension)
HY	Compression Bayonet Fitting (3 mm, 1/8 in Sheath Only)
ZZ	Special Option-Consult Factory

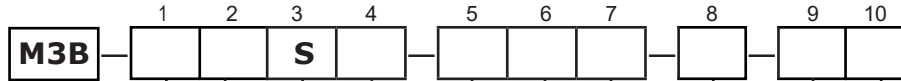
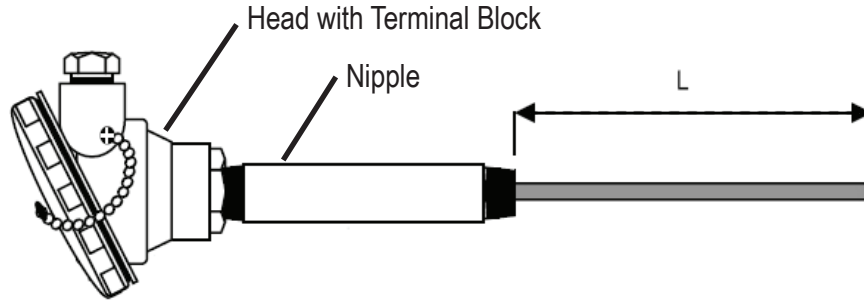
6. ELEMENT LENGTH – "L" DIMENSION	
XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-1/2 inches

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

M3B SERIES – THERMOCOUPLE SENSOR ASSEMBLY WITH HEAD AND NIPPLE



Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures up to 1260°C (2300°F). Assemblies are available with many attachment fittings, including cast iron or cast aluminium screw cover heads for ease of installation. Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
R	Type R
S	Type S

3. T/C CALIBRATION TOLERANCE	
S	Special Limits of Error

4. JUNCTION	
G	Grounded
U	Ungrounded
E	Exposed

5. SHEATH MATERIAL	
36	316 SS
32	321 SS
30	310 SS
60	Inconel 601
MON	Monel

6. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

10. FITTINGS – NIPPLE	
N	Nipple: NPT Connection Type
B	Nipple: BSP Connection Type

9. HEAD TERMINATION OPTIONS	
W	Cast Aluminium Weatherproof
E	Cast Aluminium Explosion proof
N	Class 1, Div 1, Group B, C
E1	Cast Aluminium Flame proof
E2	CENELEC: Eexd, IIC, ATEX, 2G
H	High Lid
42	Cast Iron Head

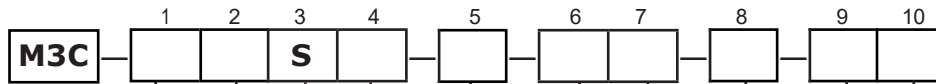
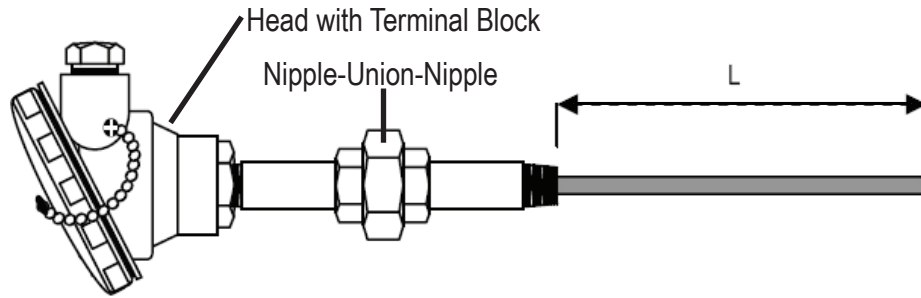
8. ELEMENT LENGTH – “L” DIMENSION	
Enter the length in millimetres or inches.	
For fractional lengths, enter 2(1/2) for 2-½ inches	

7. NIPPLE THREAD SIZE – MM (IN)	
1	15 (1/2)
2	20 (3/4)

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

M3C SERIES – THERMOCOUPLE SENSOR ASSEMBLY WITH HEAD AND NIPPLE-UNION-NIPPLE

Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures up to 1260°C (2300°F). Assemblies are available with many attachment fittings, including cast iron or cast aluminium screw cover heads for ease of installation. Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. THERMOCOUPLE CALIBRATION

E	Type E
J	Type J
K	Type K
N	Type N
R	Type R
S	Type S

3. T/C CALIBRATION TOLERANCE

S	Special Limits of Error
---	-------------------------

4. JUNCTION

G	Grounded
U	Ungrounded
E	Exposed

5. SHEATH MATERIAL

36	316 SS
32	321 SS
30	310 SS
60	Inconel 601
MON	Monel

10. FITTINGS – NIPPLE

N	Nipple: NPT Connection Type
B	Nipple: BSP Connection Type

9. HEAD TERMINATION OPTIONS

W	Cast Aluminium Weatherproof
E	Cast Aluminium Explosion proof Class 1, Div 1, Group B, C
N	Cast Aluminium Flame proof
E1	CENELEC: Eexd, IIC, ATEX, 2G
E2	CENELEC: Eexd, IIC, ATEX, 2G
H	High Lid
42	Cast Iron Head

8. SENSOR LENGTH – "L" DIMENSION

Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

7. NIPPLE THREAD SIZE – MM (IN)

1	15 (1/2)
2	20 (3/4)

6. SHEATH DIAMETER

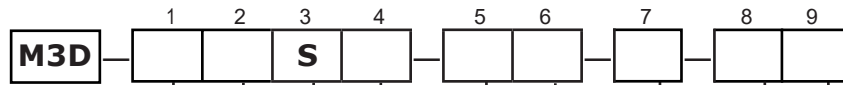
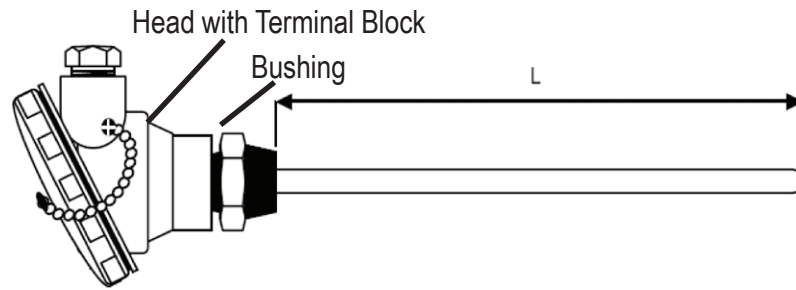
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

M3D SERIES – THERMOCOUPLE SENSOR ASSEMBLY WITH HEAD AND BUSHING



Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures up to 1260°C (2300°F). Assemblies are available with many attachment fittings, including cast iron or cast aluminium screw cover heads for ease of installation. Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
R	Type R
S	Type S

3. T/C CALIBRATION TOLERANCE	
S	Special Limits of Error

4. JUNCTION	
G	Grounded
U	Ungrounded
E	Exposed

5. SHEATH MATERIAL	
36	316 SS
32	321 SS
30	310 SS
60	Inconel 601
MON	Monel

9. FITTINGS – NIPPLE	
N	Nipple: NPT Connection Type
B	Nipple: BSP Connection Type

8. HEAD TERMINATION OPTIONS	
W	Cast Aluminium Weatherproof
E	Cast Aluminium Explosion proof
N	Class 1, Div 1, Group B, C
E1	Cast Aluminium Flame proof
E2	CENELEC: Eexd, IIC, ATEX, 2G
H	High Lid
42	Cast Iron Head

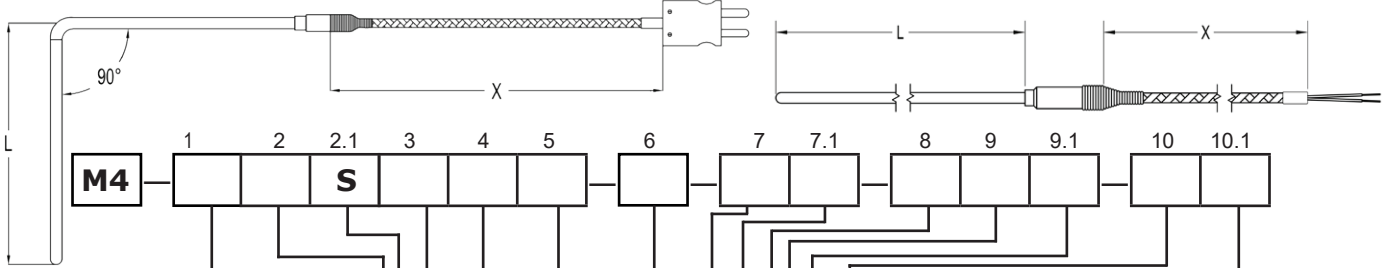
7. SENSOR LENGTH – "L" DIMENSION	
Enter the length in millimetres or inches.	
For fractional lengths, enter 2(1/2) for 2-½ inches	

6. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

M4 SERIES – MINERAL INSULATED THERMOCOUPLES WITH LEAD WIRE

Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures of up to 1260°C (2300°F). Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. THERMOCOUPLE CALIBRATION

K	Type K
J	Type J
N	Type N
KK	Dual Type K
JJ	Dual Type J

2.1. T/C CALIBRATION TOLERANCE

S	Special Limits of Error
---	-------------------------

3. SHEATH DIAMETER

D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
P	1.5 mm
Q	2 mm
R	3 mm
S	4.5 mm
T	6 mm
V	8 mm
Y	10.8 mm
W	12.7 mm

4. SHEATH MATERIAL

34	304 SS
36	316 SS
30	310 SS
32	321 SS
50	Pyrocable
60	INCONEL 601

5. THERMOCOUPLE JUNCTION

U	Ungrounded
G	Grounded
E	Exposed

6. ELEMENT LENGTH – "L" DIMENSION

XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches
----	---

10.1. TERMINATION OPTIONS

C	Cable Clamp for Plug/Jack
H	High Temp Plug/Jack (Standard Size Only; 427°C/800°F)

The temperature rating for all standard plugs and jacks is 218°C (425°F). Leave box blank if no options needed.

10. LEAD WIRE TERMINATION STYLE

31	51 mm (2 in) Split Leads
32	51 mm (2 in) Leads with Spade Lugs
21	Standard Plug
22	Standard Jack
23	Standard Plug and Jack
11	Miniature Plug
12	Miniature Female Jack
13	Miniature Plug and Jack
BL	Boot Lace Connectors

The temperature rating for all standard plugs and jacks is 218°C (425°F).

9.1. LEAD WIRE LENGTH – "X" DIMENSION

XXX	Insert the length in whole inches. Example: 060 for 60 inches
-----	---

9. LEAD WIRE TYPES (SOME CONFIGURATIONS ARE NOT AVAILABLE)

E	Hi-Temp Fibreglass Solid 704°C (1300°F)
F	Hi-Temp Fibreglass Solid w/ SSOB 704°C (1300°F)
G	Hi-Temp Fibreglass Solid w/ Flex Armor 704°C (1300°F)
H	Hi-Temp Fibreglass Stranded w/ SSOB 704°C (1300°F)
T	FEP Teflon Solid 260°C (500°F) (1/8 inch Probes Only)

Other types available upon request.

8. WIRE TRANSITION OPTIONS

7	HT Transition with Spring 538°C (1000°F) (Standard)
6	Transition with Spring 204°C (400°F)
8	Transition with Heat Shrink 104°C (220°F)

7.1. SHEATH BEND OPTIONS

9XX	90° Bend (XX = Hot Leg Length in Inches)
4XX	45° Bend (XX = Hot Leg Length in Inches)

When ordering an angled assembly, the sum of the Hot Leg and Cold Leg will equal the total "L" dimension. Leave the box blank if no options are needed.

7. SHEATH MOUNTING OPTIONS – MM (IN NPT)

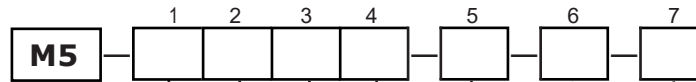
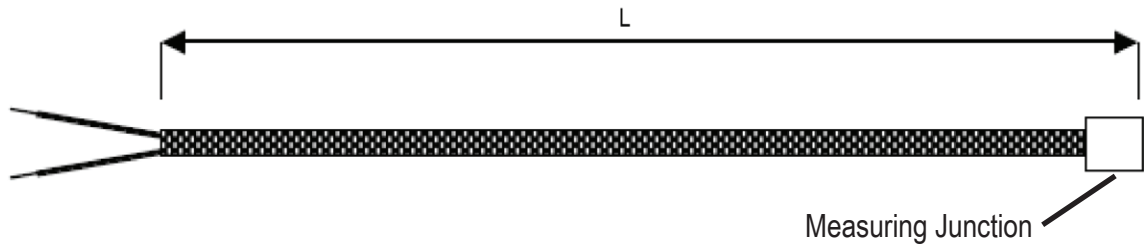
00	No Mounting Options
BA	Brass Compression Fitting 3 (1/8)
SA	Stainless Compression Fitting 3 (1/8)
BB	Brass Compression Fitting 6 (1/4)
SB	Stainless Compression Fitting 6 (1/4)
BC	Brass Compression Fitting 13 (1/2)
SC	Stainless Compression Fitting 13 (1/2)
RA	Adjustable SS Compression Fitting 3 (1/8)
FC	Fixed SS Bushing 13 (1/2) (Insert L Dimension)
HY	Compression Bayonet Fitting (3 mm, 1/8 in Sheath Only)
ZZ	Special Option-Consult Factory

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

M5 SERIES – MINIATURE SENSORS FOR BEARING TEMPERATURE



Pyrotek's mineral insulated (MgO) elements are fast responding, durable and capable of handling temperatures up to 1482°C (2700°F).



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
E	Type E
J	Type J
K	Type K
N	Type N
S	Type S
R	Type R

3. T/C CALIBRATION TOLERANCE	
1	Standard Limits of Error
2	Special Limits of Error

4. JUNCTION	
G	Grounded
U	Ungrounded
E	Exposed

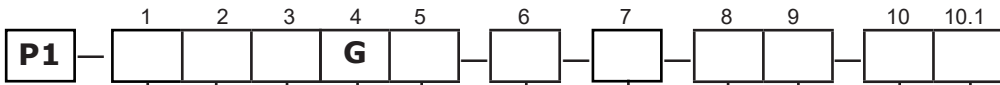
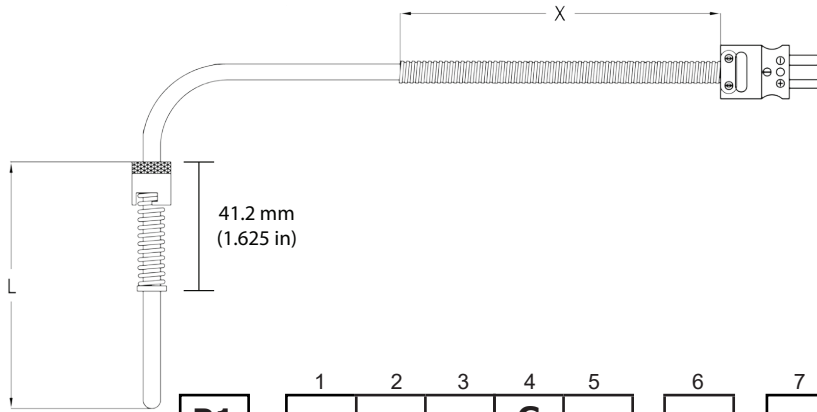
7. OVERBRAID	
S	Stainless Steel Overbraided
X	No Overbraided

6. SENSOR LENGTH – "L" DIMENSION	
Enter the length in millimetres or inches.	
For fractional lengths, enter 2(1/2) for 2-½ inches	

5. SHEATH MATERIAL	
36	316 SS
32	321 SS
30	310 SS
32	321 SS
60	Inconel
MON	Monel

P1 SERIES – GENERAL APPLICATION DIE THERMOCOUPLES

Pyrotek's fibreglass insulated elements with tubular sheaths are capable of handling temperatures up to 870°C (1600°F). Compression fitting or bayonet adapter connections are typical for direct and quick attachment to your tooling and dies. Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. THERMOCOUPLE CALIBRATION

E	Type E
J	Type J
K	Type K
N	Type N
R	Type R
S	Type S
JJ	Dual Type J
KK	Dual Type K

3. TUBING DIAMETER 304SS – MM (IN)

E	3 (1/8)
F	5 (3/16)

4. THERMOCOUPLE JUNCTION

G	Grounded (Ungrounded Available by Request Only)
---	--

5. BEND ANGLE

S	Straight
F	45° Bend
N	90° Bend

6. ELEMENT LENGTH – "L" DIMENSION

XX	Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches
----	---

7. SHEATH MOUNTING OPTIONS – MM (IN NPT)

00	No Mounting Options
BA	Brass Compression Fitting 3 (1/8)
SA	Stainless Compression Fitting 3 (1/8)
BB	Brass Compression Fitting 6 (1/4)
SB	Stainless Compression Fitting 6 (1/4)
HY	Compression Bayonet Fitting (3 mm, 1/8 in Sheath Only)
FB	Fixed Bayonet Fitting

10.1. TERMINATION OPTIONS

C	Cable Clamp
H	High Temp Plug/Jack (Standard Size Only; 427°C/800°F)

Only add the option designation letter if those options are desired.

10. LEAD WIRE TERMINATION STYLE

31	51 mm (2 in) Split Leads
32	51 mm (2 in) Leads with Spade Lugs
21	*Standard Plug
22	*Standard Jack
23	*Standard Plug/Jack
11	Miniature Plug
12	Miniature Female Jack
13	Miniature Plug/Jack

*The temperature rating for all standard plugs and jacks is 425°F (218°C).

9. LEAD WIRE LENGTH – "X" DIMENSION

XXX	Enter the length in whole millimetres or inches. Example: 060 for 60 inches
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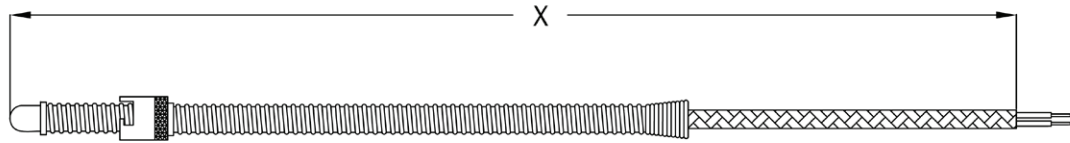
8. LEAD WIRE TYPES (SOME CONFIGURATIONS MAY NOT BE AVAILABLE)

E	Hi-Temp Fibreglass Solid 704°C (1300°F)
F	Hi-Temp Fibreglass Solid w/ SSOB 704°C (1300°F)
G	Hi-Temp Fibreglass Solid w/ Flex Armor 704°C (1300°F)
H	Hi-Temp Fibreglass Stranded w/ SSOB 704°C (1300°F)
T	FEP Teflon Solid 260°C (500°F) (1/8 in Probes Only)

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

P2 SERIES – SPRING ADJUSTABLE BAYONET STYLE

Pyrotek's spring adjustable style allows for a varying depth adjustment of up to 178 millimetres (7 inches) maximum. Utilized with a bayonet adapter, this assembly allows for quick installation. The assembly is capable of handling temperature limits up to 870°C (1600°F). Special construction styles and materials are available upon request.

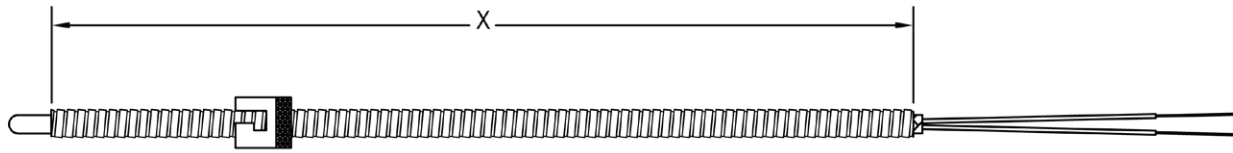


P2		1	2	3	4	5	6	7	7.1
1. MODEL UNIT SYSTEM		2. THERMOCOUPLE CALIBRATION		3. SHEATH DIAMETER – MM (IN)		4. THERMOCOUPLE JUNCTION		7.1. TERMINATION OPTIONS	
E	Imperial	J	Type J	E	3 (1/8)	G	Grounded	C	Cable Clamp for Plug/Jack
M	Metric	K	Type K	F	5 (3/16) (Standard)		(Ungrounded Available by Request Only)	H	High Temp Plug/Jack
Specify the required unit system and use it to determine all the item's measurements.		JJ	Dual Type J					(Standard Size Only; 427°C/800°F)	
		KK	Dual Type K					Leave box blank if no options needed.	
								7. LEAD WIRE TERMINATION STYLE	
								31	51 mm (2 in) Split Leads
								32	51 mm (2 in) Leads with Spade Lugs
								21	*Standard Plug
								22	*Standard Jack
								23	*Standard Plug/Jack
								11	Miniature Plug
								12	Miniature Female Jack
								13	Miniature Plug/Jack
								*The temperature rating for all standard plugs and jacks is 218°C (425°F).	
								6. LEAD WIRE LENGTH – "X" DIMENSION	
								XXX	Enter the length in whole millimetres or inches.
								Example: 060 for 60 inches	
5. LEAD WIRE TYPES									
P	Fibreglass Solid with SSOB 870°C (1600°F)								
S	Fibreglass Stranded with SSOB 870°C (1600°F)								
Only available in 5 mm (3/16 in) OD tube size.									
E	Hi-Temp Fibreglass Solid 704°C (1300°F)								
N	Fibreglass Stranded 704°C (1300°F)								

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

P3 SERIES – ARMOR ADJUSTABLE BAYONET STYLE

Pyrotek's armour adjustable style allows the entire length of the flexible armour jacketing on the wire to be immersed. Utilized with a bayonet adapter, this assembly allows for quick installation. The assembly is capable of handling temperature limits of up to 870°C (1600°F). Special construction styles and materials are available upon request.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
J	Type J
K	Type K
JJ	Dual Type J
KK	Dual Type K

3. SHEATH DIAMETER – MM (IN)	
E	3 (1/8) (Not available in dual elements)
F	5 (3/16) (Standard)

4. THERMOCOUPLE JUNCTION	
G	Grounded (Ungrounded Available by Request Only)

5. LEAD WIRE TYPES	
G	Fibreglass Solid with Armour 870°C (1600°F)
R	Fibreglass Stranded with Armour 482°C (900°F)
Only available in 5 mm (3/16 in) OD tube size.	
E	Hi-Temp Fibreglass Solid 704°C (1300°F)
N	Fibreglass Stranded 704°C (1300°F)

7.1. TERMINATION OPTIONS	
C	Cable Clamp for Plug/Jack
H	High Temp Plug/Jack (Standard Size Only; 427°C/800°F)
Leave box blank if no options needed.	

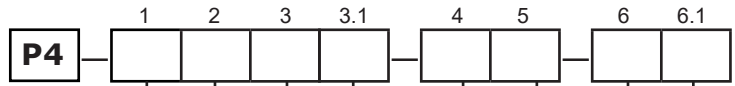
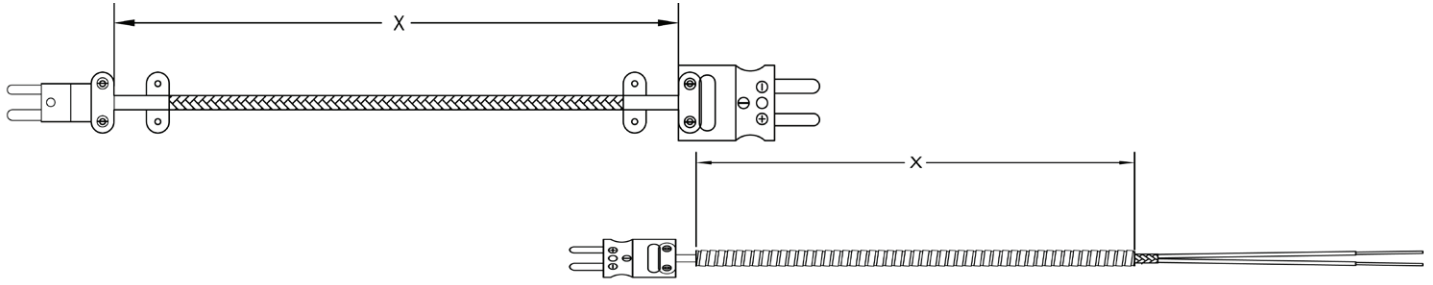
7. LEAD WIRE TERMINATION STYLE	
31	51 mm (2 in) Split Leads
32	51 mm (2 in) Leads with Spade Lugs
21	*Standard Plug
22	*Standard Jack
23	*Standard Plug/Jack
11	Miniature Plug
12	Miniature Female Jack
13	Miniature Plug/Jack
*The temperature rating for all standard plugs and jacks is 218°C (425°F).	

6. LEAD WIRE LENGTH IN INCHES – "X" DIMENSION	
XXX	Enter the length in whole millimetres or inches. Example: 060 for 60 inches

NOTE: THERMOCOUPLE EXTENSIONS, ACCESSORIES AND WIRES ARE AVAILABLE ON THE P4 AND A1 SERIES PAGES.

P4 SERIES – THERMOCOUPLE EXTENSIONS

Pyrotek's thermocouple extensions provide a suitable connection from the thermocouple to the instrumentation panel. Often, extensions will be utilized to extend the length of the thermocouple to reduce waste and the replacement of sensor lead wire. Thermocouple wire and terminations in a wide variety of lengths are available, along with special construction styles.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. THERMOCOUPLE CALIBRATION	
K	Type K
J	Type J
N	Dual Type N
KK	Dual Type K
JJ	Dual Type J

3. LEAD WIRE TERMINATION STYLE	
31	51 mm (2 in) Split Leads
32	51 mm (2 in) Leads with Spade Lugs
21	*Standard Plug
22	*Standard Jack
23	*Standard Plug/Jack
11	Miniature Plug
12	Miniature Female Jack
13	Miniature Plug/Jack
*The temperature rating for all standard plugs and jacks is 218°C (425°F).	

3.1. TERMINATION OPTIONS	
C	Cable Clamp for Plug/Jack
H	High Temp Plug/Jack (Standard Size Only; 427°C/800°F)
Leave the box blank if no options are needed.	

6.1. TERMINATION OPTIONS	
C	Cable Clamp for Plug/Jack
H	High Temp Plug/Jack (Standard Size Only; 427°C/800°F)
Leave the box blank if no options are needed.	

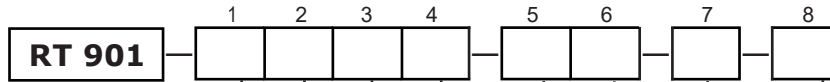
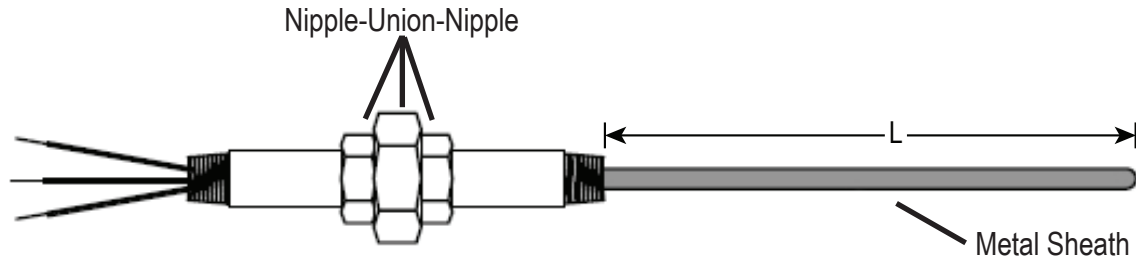
6. LEAD WIRE TERMINATION STYLE	
31	51 mm (2 in) Split Leads
32	51 mm (2 in) Leads with Lugs
21	*Standard Plug
22	*Standard Jack
23	*Standard Plug/Jack
11	Miniature Plug
12	Miniature Female Jack
13	Miniature Plug/Jack
*The temperature rating for all standard plugs and jacks is 218°C (425°F).	

5. LEAD WIRE LENGTH – "X" DIMENSION	
XXX	Enter the length in whole millimetres or inches. Example: 060 for 60 inches

4. LEAD WIRE TYPES (SOME CONFIGURATIONS MAY NOT BE AVAILABLE)	
E	Hi-Temp Fibreglass Solid 704°C (1300°F)
F	Hi-Temp Fibreglass Solid w/ SSOB 704°C (1300°F)
G	Hi-Temp Fibreglass Solid w/ Flex Armor 704°C (1300°F)
H	Hi-Temp Fibreglass Stranded w/ SSOB 704°C (1300°F)
T	FEP Teflon Solid 260°C (500°F) (3 mm, 1/8 in Probes Only)
C	PVC/PVC Coil Cord Extension (Must use whole ("060") millimetres or inches as the extended X dimension in Box 5; other sizes available upon request)

RT 901 SERIES – RESISTANCE TEMPERATURE DETECTORS (RTDS) SENSOR WITH NIPPLE-UNION-NIPPLE

Pyrotek's RT 901 Series are ceramic encapsulated resistance temperature detectors that offer Class A and Class B accurate temperature measurements from -200 to 800°C (-328 to 1472°F) through the use of wire wound and thin sensors. The sensors are calibrated to the following standards: ASTM E585/E585-M 01a, BS EN 60584-1, IEC 584, IEC 1515, ANSI/MC 96.1



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. ELEMENT TYPE	
PO	PT 100
POO	PT 1000
C	Cu 10

3. SENSORS	
S	Simplex
D	Duplex

4. WIRE CONFIGURATION	
B	2 Wire
T	3 Wire
P	4 Wire

8. FITTINGS	
B	BSP (M) Comp. Fitting
N	NPT (M) Comp. Fitting

7. SENSOR LENGTH – "L" DIMENSION	
XX	Enter the length in whole millimetres or inches. Example: 060 for 60 inches

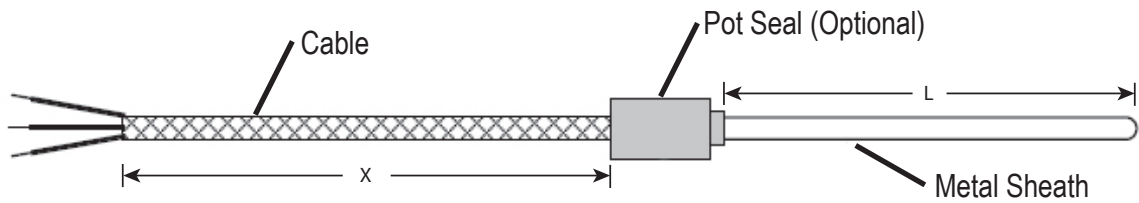
6. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
Q	3 mm
R	6 mm
S	8 mm
T	12.7 mm

5. SHEATH MATERIAL	
36	316 SS
30	310 SS
32	321 SS
60	Inconel 601
MON	Monel

RT 902 SERIES – RESISTANCE TEMPERATURE DETECTORS (RTDS) SENSOR WITH EXTENSION CABLE



Pyrotek's RT 902 Series are ceramic encapsulated resistance temperature detectors that offer Class A and Class B accurate temperature measurements from -200 to 800°C (-328 to 1472°F) through the use of wire wound and thin sensors. The sensors are calibrated to the following standards: ASTM E585/E585-M 01a, BS EN 60584-1, IEC 584, IEC 1515, ANSI/MC 96.1



RT 902	1	2	3	4	5	6	7	8	9	10
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1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. ELEMENT TYPE	
P1	PT 100
P2	PT 1000
C	Cu 10

3. SENSORS	
S	Simplex
D	Duplex

4. WIRE CONFIGURATION	
B	2 Wire
T	3 Wire
P	4 Wire

5. SHEATH MATERIAL	
36	316 SS
30	310 SS
32	321 SS
60	Inconel 601
MON	Monel

6. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
Q	3 mm
R	6 mm
S	8 mm
T	12.7 mm

7. SENSOR LENGTH – "L" DIMENSION	
Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches	

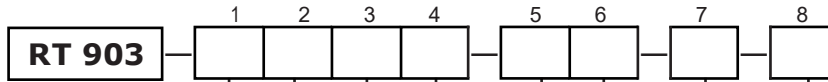
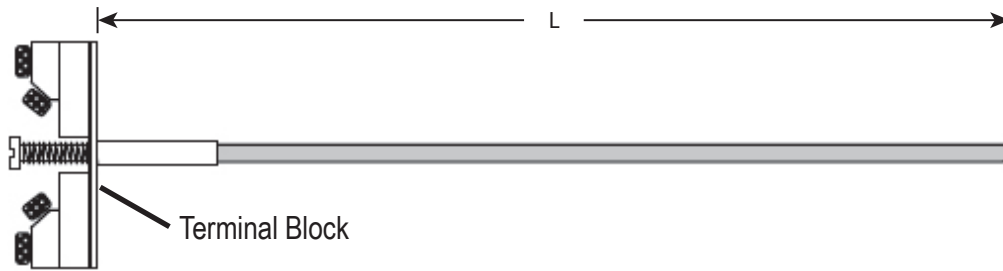
8. CABLE	
T	Teflon/Teflon
F	Fibreglass/Fibreglass

9. CABLE LENGTH – "X" DIMENSION	
Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches	

10. POT SEAL SLEEVE	
Y	Yes
N	No

RT 903 SERIES – RESISTANCE TEMPERATURE DETECTORS (RTDS) REPLACEMENT SENSOR

Pyrotek's RT 903 Series are ceramic encapsulated resistance temperature detectors that offer Class A and Class B accurate temperature measurements from -200 to 800°C (-328 to 1472°F) through the use of wire wound and thin sensors. The sensors are calibrated to the following standards: ASTM E585/E585-M 01a, BS EN 60584-1, IEC 584, IEC 1515, ANSI/MC 96.1



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. ELEMENT TYPE

P1	PT 100
P2	PT 1000
C	Cu 10

3. SENSORS

S	Simplex
D	Duplex

4. WIRE CONFIGURATION

B	2 Wire
T	3 Wire
P	4 Wire

8. TERMINAL BLOCK

L	Spring-loaded
N	Non-spring-loaded

7. SENSOR LENGTH – "L" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. SHEATH DIAMETER

D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
Q	3 mm
R	6 mm
S	8 mm
T	12.7 mm

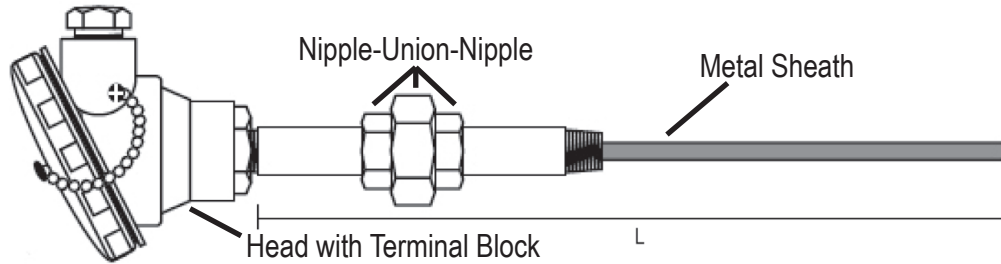
5. SHEATH MATERIAL

36	316 SS
30	310 SS
32	321 SS
60	Inconel 601
MON	Monel

RT 904 SERIES – RESISTANCE TEMPERATURE DETECTORS (RTDs) SENSOR ASSEMBLY WITH HEAD AND NIPPLE-UNION-NIPPLE



Pyrotek's RT 904 Series are ceramic encapsulated resistance temperature detectors that offer Class A and Class B accurate temperature measurements from -200 to 800°C (-328 to 1472°F) through the use of wire wound and thin sensors. The sensors are calibrated to the following standards: ASTM E585/E585-M 01a, BS EN 60584-1, IEC 584, IEC 1515, ANSI/MC 96.1.



RT 904 [1] [2] [3] [4] [5] [6] [7] [8] [8.1]

1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. ELEMENT TYPE

P1	PT 100
P2	PT 1000
C	Cu 10

3. SENSORS

S	Simplex
D	Duplex

4. WIRE CONFIGURATION

B	2 Wire
T	3 Wire
P	4 Wire

5. SHEATH MATERIAL

36	316 SS
30	310 SS
32	321 SS
60	Inconel 601
MON	Monel

8.1 FITTINGS

N	Nipple Union Nipple: NPT Connector
B	Nipple Union Nipple: BSP Connector

8. HEADS

W	Cast Aluminium Weatherproof
E	Cast Aluminium Explosion Proof
N	Class 1, Div 1, Group B, C
E1	Cast Aluminium Flame Proof
E2	CENELEC: Eexd, IIC, ATEX, 2G
H	High Lid

7. SENSOR LENGTH – "L" DIMENSION

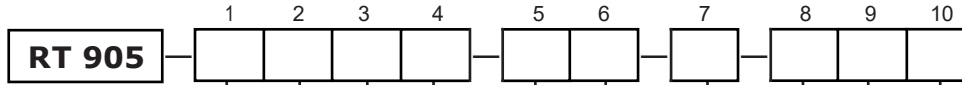
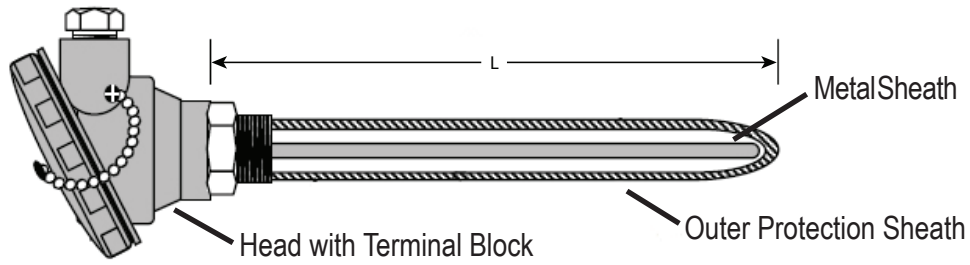
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. SHEATH DIAMETER

D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
Q	3 mm
R	6 mm
S	8 mm
T	12.7 mm

RT 905 SERIES – RESISTANCE TEMPERATURE DETECTORS (RTDS) SENSOR ASSEMBLY WITH HEAD AND NIPPLE-UNION-NIPPLE

Pyrotek's RT 905 Series are ceramic encapsulated resistance temperature detectors that offer Class A and Class B accurate temperature measurements from -200 to 800°C (-328 to 1472°F) through the use of wire wound and thin sensors. The sensors are calibrated to the following standards: ASTM E585/E585-M 01a, BS EN 60584-1, IEC 584, IEC 1515, ANSI/MC 96.1.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. ELEMENT TYPE	
P1	PT 100
P2	PT 1000
C	Cu 10

3. SENSORS	
S	Simplex
D	Duplex

4. WIRE CONFIGURATION	
B	2 Wire
T	3 Wire
P	4 Wire

5. SHEATH MATERIAL	
36	316 SS
30	310 SS
32	321 SS
60	Inconel 601
MON	Monel

10. OUTER PROTECTION SHEATH MATERIAL	
36	316 SS
32	312 SS
30	310 SS
44	446 SS
60	Inconel 601
Specify the sheath length and diameter.	

9. FITTINGS	
N	Nipple Union Nipple: NPT Conn.
B	Nipple Union Nipple: BSP Conn.
Specify the thread size for the fitting.	

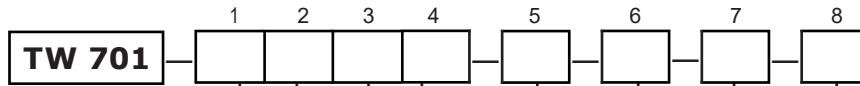
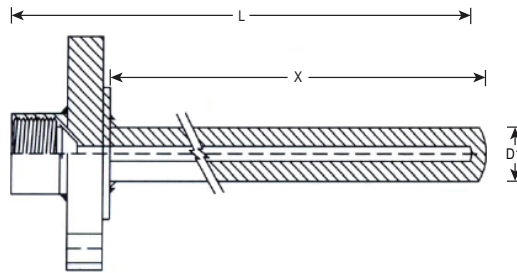
8. HEADS	
W	Cast Aluminium Weatherproof
E	Cast Aluminium Explosion Proof
N	Class 1, Div 1, Group B, C
E1	Cast Aluminium Flame Proof
E2	CENELEC: Eexd, IIC, ATEX, 2G
H	High Lid

7. SENSOR LENGTH - "L" DIMENSION	
Enter the length in millimetres or inches.	
For fractional lengths, enter 2(1/2) for 2-1/2 inches	

6. SHEATH DIAMETER	
D	1/16 in
E	1/8 in
F	3/16 in
I	1/4 in
L	3/8 in
Q	3 mm
R	6 mm
S	8 mm
T	12.7 mm

TW 701 SERIES – THERMOWELLS: FLANGED STRAIGHT

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



1. MODEL UNIT SYSTEM	
E	Imperial
M	Metric
Specify the required unit system and use it to determine all the item's measurements.	

2. BORE – MM (IN)	
A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. FLANGE SIZE – MM (IN)		PRESSURE RATING – KPA (LB/IN ²)
32	25 (1)	1034 (150)
33	38 (1 1/2)	1034 (150)
34	51 (2)	1034 (150)
42	25 (1)	2068 (300)
43	38 (1 1/2)	2068 (300)
44	51 (2)	2068 (300)
52	25 (1)	4137 (600)
53	38 (1 1/2)	4137 (600)
54	51 (2)	4137 (600)

Other flange sizes and pressure ratings are available.

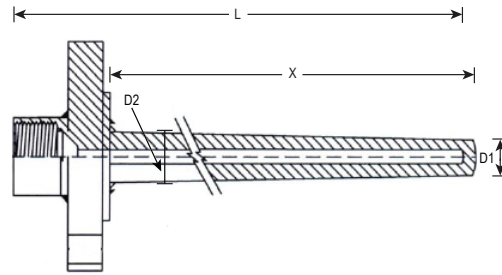
4. STEM MATERIAL	
36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

8. OUTER SHEATH DIAMETER – "D1" DIMENSION
Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

7. INSERTION LENGTH – "X" DIMENSION
Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

6. STEM LENGTH – "L" DIMENSION
Enter the length in millimetres or inches. For fractional lengths, enter 2(1/2) for 2-½ inches

5. FLANGE MATERIAL	
36	316 SS
32	321 SS
30	310 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite



TW 702 1 2 3 4 5 6 7 8 8.1

1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. FLANGE SIZE – MM (IN)		PRESSURE RATING – KPA (LB/IN ²)
32	25 (1)	1034 (150)
33	38 (1 1/2)	1034 (150)
34	51 (2)	1034 (150)
42	25 (1)	2068 (300)
43	38 (1 1/2)	2068 (300)
44	51 (2)	2068 (300)
52	25 (1)	4137 (600)
53	38 (1 1/2)	4137 (600)
54	51 (2)	4137 (600)

Other flange sizes and pressure ratings are available.

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

8.1 COLLAR DIAMETER – “D2” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

8. TAPER DIAMETER – “D1” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

7. INSERTION LENGTH – “X” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. STEM LENGTH – “L” DIMENSION

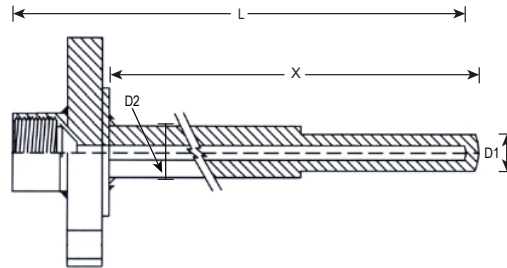
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

5. FLANGE MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

TW 703 SERIES – THERMOWELLS: FLANGED STEPPED

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



TW 703 [1] [2] [3] [4] [5] [6] [7] [8] [9]

1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. FLANGE SIZE – MM (IN) | PRESSURE RATING – KPA (LB/IN²)

32	25 (1)	1034 (150)
33	38 (1 1/2)	1034 (150)
34	51 (2)	1034 (150)
42	25 (1)	2068 (300)
43	38 (1 1/2)	2068 (300)
44	51 (2)	2068 (300)
52	25 (1)	4137 (600)
53	38 (1 1/2)	4137 (600)
54	51 (2)	4137 (600)

Other flange sizes and pressure ratings are available.

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

9. COLLAR DIAMETER – "D2" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

8. STEPPED DIAMETER – "D1" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

7. INSERTION LENGTH – "X" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. STEM LENGTH – "L" DIMENSION

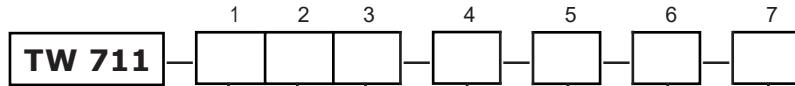
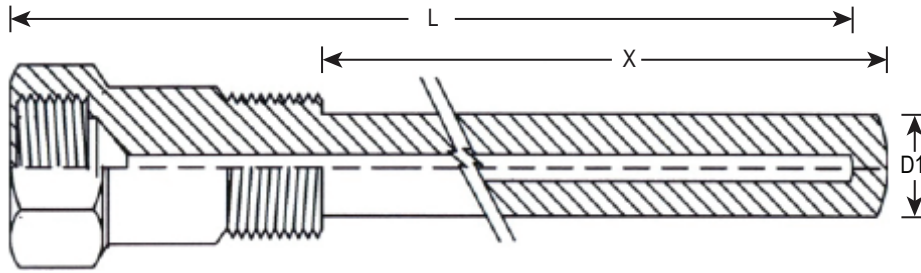
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

5. FLANGE MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

TW 711 SERIES – THERMOWELLS: THREADED STRAIGHT

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. PROCESS SIZE – MM (IN NPT)

A	13 (1/2)
B	19 (3/4)
C	25 (1)
D	32 (1 1/4)
E	38 (1 1/2)

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

7. STEPPED DIAMETER – “D1” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. INSERTION LENGTH – “X” DIMENSION

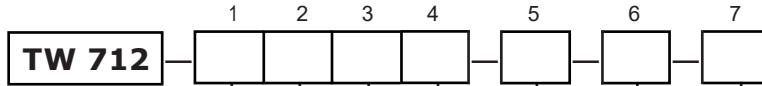
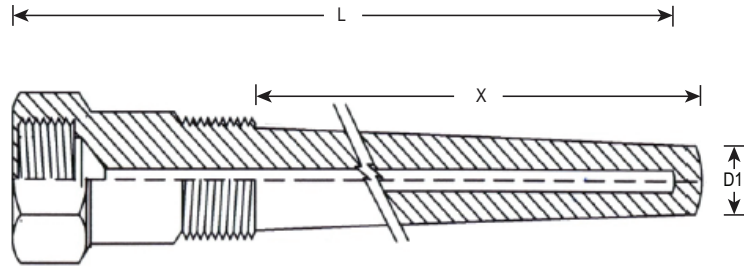
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

5. STEM LENGTH – “L” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

TW 712 SERIES – THERMOWELLS: THREADED TAPERED

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. PROCESS SIZE – MM (IN NPT)

A	13 (1/2)
B	19 (3/4)
C	25 (1)
D	32 (1 1/4)
E	38 (1 1/2)

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

7. TAPER DIAMETER – "D1" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. INSERTION LENGTH – "X" DIMENSION

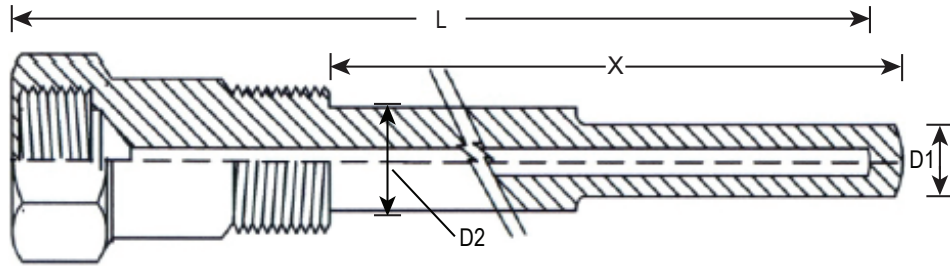
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

5. STEM LENGTH – "L" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

TW 713 SERIES – THERMOWELLS: THREADED STEPPED

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



TW 713 [1] [2] [3] [4] [5] [6] [7] [8]

1. MODEL UNIT SYSTEM

E	English
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. PROCESS SIZE – MM (IN NPT)

A	13 (1/2)
B	19 (3/4)
C	25 (1)
D	32 (1 1/4)
E	38 (1 1/2)

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

8. COLLAR DIAMETER – “D2” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

7. STEPPED DIAMETER – “D1” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. INSERTION LENGTH – “X” DIMENSION

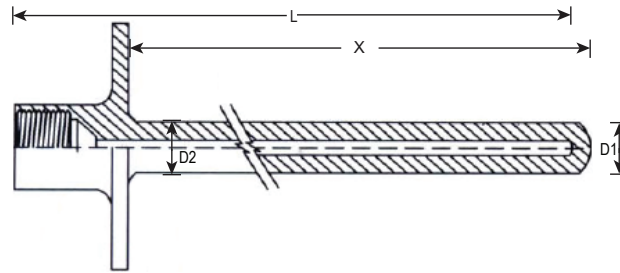
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

5. STEM LENGTH – “L” DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

TW 721 SERIES – THERMOWELLS: VANSTONE STRAIGHT

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



TW 721 [1] [2] [3] [4] [5] [6] [7] [8] [9]

1. MODEL UNIT SYSTEM

E	English
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. FLANGE SIZE – MM (IN)		PRESSURE RATING – KPA (LB/IN ²)
32	25 (1)	1034 (150)
33	38 (1 1/2)	1034 (150)
34	51 (2)	1034 (150)
42	25 (1)	2068 (300)
43	38 (1 1/2)	2068 (300)
44	51 (2)	2068 (300)
52	25 (1)	4137 (600)
53	38 (1 1/2)	4137 (600)
54	51 (2)	4137 (600)

Other flange sizes and pressure ratings are available.

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

5. FLANGE MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

9. COLLAR DIAMETER – "D2" DIMENSION
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

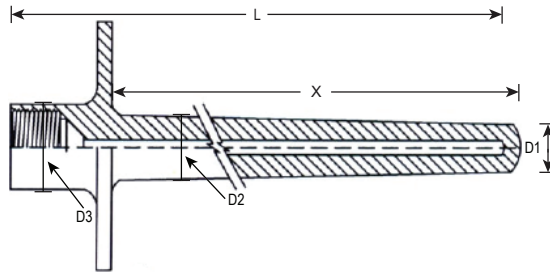
8. STEM DIAMETER – "D1" DIMENSION
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

7. INSERTION LENGTH – "X" DIMENSION
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. STEM LENGTH – "L" DIMENSION
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

TW 722 SERIES – THERMOWELLS: VANSTONE TAPERED

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



TW 722 [] [] [] [] [] [] [] [] [] []

1. MODEL UNIT SYSTEM

E	English
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. FLANGE SIZE – MM (IN)		PRESSURE RATING – KPA (LB/IN ²)
32	25 (1)	1034 (150)
33	38 (1 1/2)	1034 (150)
34	51 (2)	1034 (150)
42	25 (1)	2068 (300)
43	38 (1 1/2)	2068 (300)
44	51 (2)	2068 (300)
52	25 (1)	4137 (600)
53	38 (1 1/2)	4137 (600)
54	51 (2)	4137 (600)

Other flange sizes and pressure ratings are available.

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

5. FLANGE MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

10. COLLAR DIAMETER – "D3" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

9. TAPER DIAMETER – "D2" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

8. TAPER DIAMETER – "D1" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

7. INSERTION LENGTH – "X" DIMENSION

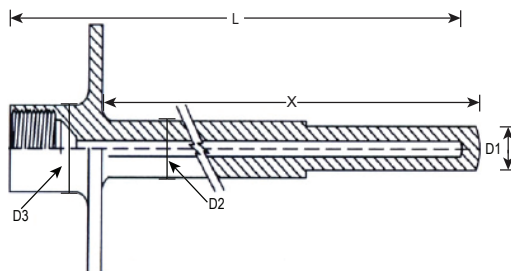
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. STEM LENGTH – "L" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

TW 723 SERIES – THERMOWELLS: VANSTONE STEPPED

Pyrotek's standard and custom thermowells are available in a wide range of materials and sizes. Pyrotek also provides Wake frequency calculations in accordance with ASME PTC 19.3.



TW 723 — [1] [2] [3] [4] [5] [6] [7] [8] [9] [10]

1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. FLANGE SIZE – MM (IN)		3. PRESSURE RATING – KPA (LB/IN ²)
32	25 (1)	1034 (150)
33	38 (1 1/2)	1034 (150)
34	51 (2)	1034 (150)
42	25 (1)	2068 (300)
43	38 (1 1/2)	2068 (300)
44	51 (2)	2068 (300)
52	25 (1)	4137 (600)
53	38 (1 1/2)	4137 (600)
54	51 (2)	4137 (600)

Other flange sizes and pressure ratings are available.

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

5. FLANGE MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

10. COLLAR DIAMETER – "D3" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

9. STEPPED DIAMETER – "D2" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

8. STEPPED DIAMETER – "D1" DIMENSION

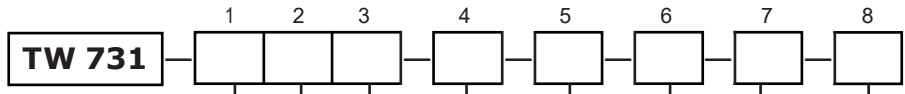
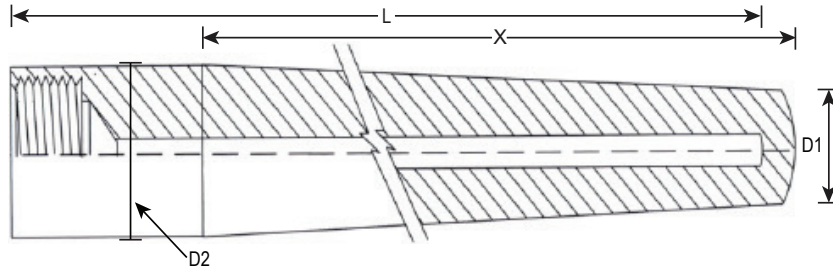
Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

7. INSERTION LENGTH – "X" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches

6. STEM LENGTH – "L" DIMENSION

Enter the length in millimetres or inches.
For fractional lengths, enter 2(1/2) for 2-½ inches



1. MODEL UNIT SYSTEM

E	Imperial
M	Metric

Specify the required unit system and use it to determine all the item's measurements.

2. BORE – MM (IN)

A	6.6 (0.260)
B	9.78 (0.385)
C	Other measurement (specify)

3. PROCESS SIZE – MM (IN NPT)

A	13 (1/2)
B	19 (3/4)
C	25 (1)
D	32 (1 1/4)
E	38 (1 1/2)

4. STEM MATERIAL

36	316 SS
30	310 SS
32	321 SS
46	446 SS
60	Inconel
MON	Monel
STE	Stellite

8. STEM DIAMETER – "D2" DIMENSION
 Enter the length in millimetres or inches.
 For fractional lengths, enter 2(1/2) for 2-½ inches

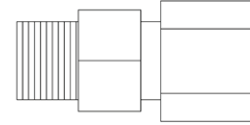
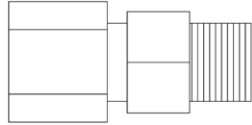
7. STEM DIAMETER – "D1" DIMENSION
 Enter the length in millimetres or inches.
 For fractional lengths, enter 2(1/2) for 2-½ inches

6. INSERTION LENGTH – "X" DIMENSION
 Enter the length in millimetres or inches.
 For fractional lengths, enter 2(1/2) for 2-½ inches

5. STEM LENGTH – "L" DIMENSION
 Enter the length in millimetres or inches.
 For fractional lengths, enter 2(1/2) for 2-½ inches

A1 SERIES – THERMOCOUPLE ACCESSORIES AND WIRES

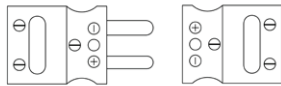
Pyrotek offers a variety of thermocouple accessories including plugs, jacks, compression fittings, replacement screw cover heads and insulated thermocouple wires. These replacement parts are available and many other options can be requested.



COMPRESSION FITTINGS

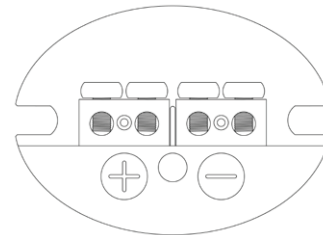
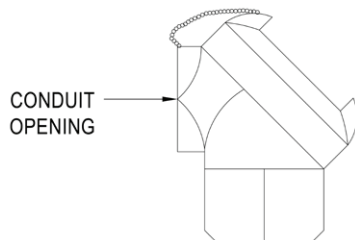
Part Number	*Description	Part Number	*Description
007252	SS Adjustable 3 mm (1/8 in) Tube x 3 mm (1/8 in) NPT	007130	Brass Adjustable 3 mm (1/8 in) Tube x 3 mm (1/8 in) NPT
007114	SS Adjustable 5 mm (3/16 in) Tube x 3 mm (1/8 in) NPT	008396	Brass Adjustable 5 mm (3/16 in) Tube x 3 mm (1/8 in) NPT
006141	SS Adjustable 6 mm (1/4 in) Tube x 3 mm (1/8 in) NPT	006140	Brass Adjustable 6 mm (1/4 in) Tube x 3 mm (1/8 in) NPT
007033	SS Adjustable 10 mm (3/8 in) Tube x 6 mm (1/4 in) NPT	006589	Brass Adjustable 6 mm (1/4 in) Tube x 6 mm (1/4 in) NPT
007399	SS Adjustable 6 mm (1/4 in) Tube x 6 mm (1/4 in) NPT	007207	Brass Adjustable 5 mm (3/16 in) Tube x 6 mm (1/4 in) NPT
013454	SS Adjustable 5 mm (3/16 in) Tube x 6 mm (1/4 in) NPT	007792	Brass Adjustable 3 mm (1/8 in) Tube x 6 mm (1/4 in) NPT
001342	SS Adjustable 10 mm (3/8 in) Tube x 13 mm (1/2 in) NPT	007156	Brass Adjustable 10 mm (3/8 in) Tube x 13 mm (1/2 in) NPT
007321	SS Readjustable 3 mm (1/8 in) x 3 mm (1/8 in) NPT	008405	Brass Adjustable 6 mm (1/4 in) Tube x 13 mm (1/2 in) NPT

* Adjustable = one time adjustable compression fitting



PLUGS AND JACKS

Part Number	Description	Part Number	Description
015412	Standard Plug-K 218°C (425°F)	015413	Standard Jack-K 218°C (425°F)
010178	Standard Plug-K High Temp 427°C (800°F)	010179	Standard Jack-K High Temp 427°C (800°F)
007031	Standard Plug-N 218°C (425°F)	008099	Standard Jack-N 218°C (425°F)
007711	Standard Plug-J 218°C (425°F)	009469	Standard Jack-J 218°C (425°F)
007016	Cable Clamp Standard Temp	007000	Mini Jack-K 218°C (425°F)
007599	Cable Clamp High Temp Plug/Jack	007906	Mini Jack-J 218°C (425°F)
005831	Mini Plug-K 218°C (425°F)	007769	Cable Clamp for use with Mini Plug
007905	Mini Plug-J 218°C (425°F)		



SCREW COVER HEADS AND BLOCKS

Part Number	Description	Part Number	Description
011664	Cast Iron 13 mm (1/2 in) NPT Process Opening	005938	Cast Aluminium 13 mm (1/2 in) NPT Process Opening
005826	Cast Iron 19 mm (3/4 in) NPT Process Opening	005481	Cast Aluminium 19 mm (3/4 in) NPT Process Opening
005827	Cast Iron 25 mm (1 in) NPT Process Opening	013558	Cast Aluminium 25 mm (1 in) NPT Process Opening
000651	Single Thermocouple Block 2 Terminals	005825	Dual Thermocouple Block 4 Terminals

THERMOCOUPLE WIRE							
Part Number	TC Calibration	AWG	Conductor	Outer Jacket Insulation	Conductor Insulation	*Limits of Error	Temp Rating
006135	K	16	Solid	Heavy Fibreglass Braid	Serv-Tex Braid	STD	288°C (550°F)
000982	K	20	Solid	High Temp Glass Braid	High Temp Glass Braid	SLOE	704°C (1300°F)
007716	K	20	Solid	FEP with Shield & Drain Wire	FEP Teflon	SLOE	204°C (400°F)
006804	K	20	Solid	High Temp Glass Braid	High Temp Glass Braid	SLOE	704°C (1300°F)
007158	K	20	Solid	Ceramic Fibre	Ceramic Fibre	STD	1204°C (2200°F)
008100	**KX	20	Solid	PVC	PVC	EXT	105°C (221°F)
008245	K	20	Solid	Fibreglass Braid	Fibreglass Braid	STD	482°C (900°F)
007574	K	20	Solid	High Temp Glass Braid	None	SLOE	704°C (1300°F)
007112	K	20	Stranded	High Temp Glass Braid	High Temp Glass Braid	SLOE	704°C (1300°F)
007352	K	20	Stranded	FEP Teflon	FEP Teflon	STD	204°C (400°F)
005906	K	20	Stranded	Double Fibreglass Braid	Fibreglass Braid	STD	482°C (900°F)
007093	K	24	Solid	TFE	TFE	STD	260°C (500°F)
006850	J	20	Solid	Double Fibreglass Braid	Fibreglass Wrap	STD	482°C (900°F)
007949	J	20	Solid	Fibreglass Braid	Fibreglass Braid	SLOE	482°C (900°F)
007669	J	20	Solid	FEP Teflon	FEP Teflon	STD	204°C (400°F)
006809	J	20	Stranded	Double Fibreglass Braid	Fibreglass Braid	STD	482°C (900°F)
007907	J	20	Stranded	Double Fibreglass Braid	Fibreglass Braid	STD	482°C (900°F)
000809	**SX	20	Solid	Fibreglass Braid	Fibreglass Braid	STD	482°C (900°F)

* STD = standard. SLOE = special limit of error. EXT = extended.
 ** KX and SX = extension grade.
 Stainless Steel overbraid options are available for thermocouple wire. Contact your Pyrotek Sales Representative for more information.



Plain Cast Iron

Plain cast iron tubes are designed to provide excellent physical strength for the charging of scrap and ingot, for demanding environments including aluminium and zinc melting furnaces, and other applications. The tube's design creates a robust and durable option for temperature measurement.

Applications

- Melting and holding furnaces
- Degassing crucibles
- Transfer equipment
- Reverberatory melting furnaces

Advantages

- Robust and durable
- Increased thickness and uniform wall
- 100 percent ultrasonic tested
- Ideally suited when the tube length required is longer than 1200 millimetres (48 inches)



Enamel Cast Iron

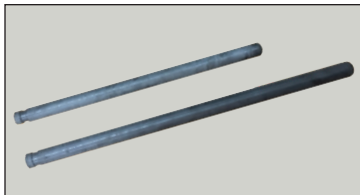
Enamel cast iron tubes are designed to provide excellent physical strength for the charging of scrap and ingot, for demanding environments including aluminium and zinc melting furnaces and other applications. The ceramic-based enamel coating provides for longer life and less routine maintenance than uncoated tubes.

Applications

- Melting and holding furnaces
- Degassing crucibles
- Transfer equipment
- Reverberatory melting furnaces

Advantages

- High quality coating provides oxidation resistance
- Robust and durable
- Increased thickness and uniform wall
- 100 percent ultrasonic tested
- Ideally suited when the tube length required is longer than 1200 millimetres (48 inches)



Sialon B100 Ceramic

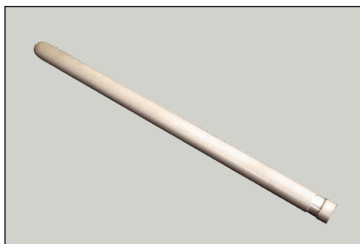
Pyrotek Sialon B100 ceramic protection tubes provide high strength at room and operating temperatures, have high corrosion and abrasion resistance and effective thermal shock resistance. These tubes are also non-wetting to molten aluminium and its alloys.

Applications

- Low-pressure holding furnaces
- Crucible furnaces
- Degassing crucibles
- Holding furnaces
- Melting furnaces
- Transfer equipment
- Troughs

Advantages

- High performance ceramic
- High thermal conductivity
- Excellent thermal shock resistance
- Corrosion resistance
- Non-wetting to aluminium and its alloys
- Less dross buildup at the metal line



SiN/Sialon

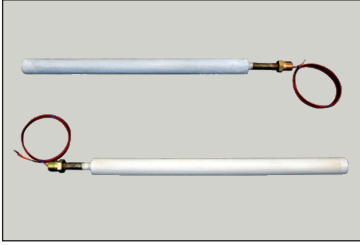
SiN/Sialon is a high strength, high density ceramic that provides thermocouple users with an excellent protection tube choice. These tubes offer excellent chemical stability, prevent molten aluminium contamination, provide long life, reduced maintenance costs, and require no surface treatment.

Applications

- Low-pressure holding furnaces
- Melting furnaces
- Transfer equipment
- Troughs

Advantages

- High performance ceramic
- High thermal conductivity
- Excellent thermal shock
- Corrosion resistance



Pyrocast C-3

Pyrocast C-3 protection tubes are constructed of a phosphate bonded refractory material developed for use in molten non-ferrous metals, specifically molten aluminium and zinc. This tube has excellent non-wetting properties, which allows for easy slag removal. The tube's smaller diameter provides a fast thermal response to process temperature changes. Pyrocast C-3 tubes also provide good resistance to thermal shock and mechanical breakage.

Applications

- Melting furnaces
- Degassing crucible
- Holding furnaces
- Transfer equipment

Advantages

- Cost effective
- Excellent non-wetting properties
- Resistance to thermal shock
- Single unit design, ready to use



SiC-Graphite

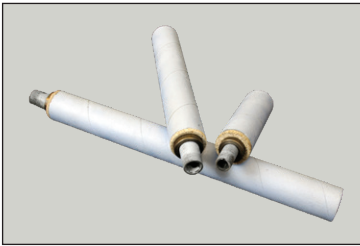
SiC-Graphite tubes are non-wetting and also have good thermal shock properties, high abrasion resistance and good response time. These tubes also exhibit good oxidation resistance due to their microstructure and can be used in many applications.

Applications

- Melting furnaces
- Degassing crucibles
- Holding furnaces
- Transfer equipment

Advantages

- High thermal conductivity
- Good life in metal



Pinnacle

Pyrotek's Pinnacle thermocouple protection tubes are made from O'-Sialon, a long-life, non-wetting, temperature sensitive (bonded silicon carbide) material. The Pinnacle tube's properties make it an excellent alternative to other tubes in temperature measurement. This tube also provides excellent thermal shock resistance, less dross buildup at the metal line, and can provide longer life.

Applications

- Crucible furnaces
- Melting furnaces
- Degassing crucibles
- Holding furnaces
- Troughs

Advantages

- Non-wetting to aluminium and its alloys
- Less dross buildup at the metal line
- Excellent thermal shock resistance



RFM®

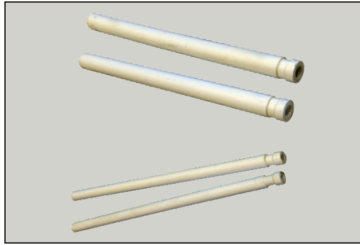
Pyrotek's reinforced fibreglass material (RFM®) thermocouple protection tubes are specifically designed to provide a robust non-wetting product that will result in longer life. The RFM composite is a fibreglass reinforced material with extremely high thermal shock resistance, and the ability to withstand mechanical abuse. The tube's SiC tip has excellent thermal conductivity which results in fast response time to temperature fluctuations.

Applications

- Crucible furnaces
- Degassing crucibles
- Holding furnaces
- Melting furnaces
- Troughs
- Casting areas

Advantages

- Non-wetting to aluminium and its alloys
- Less dross buildup at the metal line
- Superior response time
- Narrow temperature control band for energy conservation
- Excellent thermal shock resistance



O'-Sialon

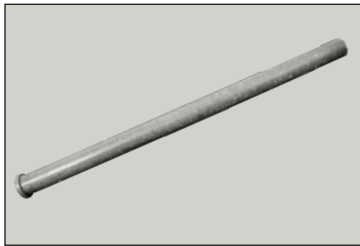
O'-Sialon tubes are a composite of SiC and O'-Sialon materials. They are ideally suited for use in molten aluminium applications. The tubes are non-wetted by aluminium, have a high level of oxidation resistance, high resistance to chemical corrosion, high abrasion resistance and excellent thermal response properties.

Applications

- Low pressure holding furnaces
- Melting furnaces
- Transfer equipment
- Troughs

Advantages

- Excellent oxidation resistance
- Non-wetting to aluminium and its alloys
- Excellent thermal shock resistance



Clay Bonded SiC

Pyrotek's Clay Bonded SiC tube has good non-wetting and thermal shock properties, high abrasion resistance and good response time. The tube is also capable of withstanding direct flame impingement.

Applications

- Melting and holding furnaces
- Degassing crucibles
- Crucible furnaces
- Transfer equipment

Advantages

- Cost effective
- Good thermal response
- Non-wetting to aluminium and its alloys



Alumina

Alumina thermocouple tubes are designed for a roof furnace at free air application in heat treat, glass and ferrous metal industries. They are not intended for direct immersion into molten metal.

Applications

- Roof thermocouples
- Heat treat furnace thermocouples
- Kiln thermocouples
- Vacuum furnace application

Advantages

- High temperature capabilities. Maximum rating of 1870°C (3400°F)
- Moderate cost
- Fair resistance to thermal shock
- Impervious to gases at high temperatures



Mullite

Mullite thermocouple tubes are another option for a roof furnace at free air application, with a lower temperature rating than alumina.

Applications

- Roof thermocouples
- Heat treat furnace thermocouples
- Kiln thermocouples

Advantages

- High temperature capabilities. Maximum rating of 1510°C (2750°F)
- Low cost
- Good thermal shock resistance
- Impervious to gases at high temperatures



MC-1

MC-1 thermocouple tubes are specially designed for immersion in molten copper, brass, zinc and lead. They are a unique blend of metal and ceramic. These tubes are also known as LT-1.

Applications

- Molten copper based alloy immersion
- Surfer burner and blast furnaces
- Chemical process reactors

Advantages

- Can be used in oxidizing applications
- High temperature capabilities. Maximum rating of 1370°C (2500°F)

THERMOCOUPLE PROTECTION TUBE MATRIX

*Always consult with a Pyrotek sales engineer to properly define the TCPT solution that's right for your application.



*Thermocouple Protection Tube Type	Typical Applications	Initial Investment (\$\$\$ is most expensive)	Relative Mechanical Strength	Relative Typical Life	Maximum Working Temperature	Relative Response Time (1=fastest)	Available Models and Configurations
FOR DIRECT IMMERSION TO MOLTEN ALUMINIUM							
Reinforced Fibreglass Material (RFM). RFM thermocouple tubes are engineered to provide robust, non-wetting qualities to aluminium and its alloys. This fibreglass reinforced material coupled with an internal steel tube has the ability to withstand mechanical abuse. RFM tubes are also an excellent option for use in the zinc industry.	<ul style="list-style-type: none"> Crucible Furnaces Degassing Crucibles Holding Furnaces Troughs 	\$\$\$	Refractory with steel pipe reinforced	3-6 months	800°C (1472°F)	3	Refer to the I5 and I6 series. For TCPT only refer to the T1 series.
Pinnacle. The unique properties of Pinnacle thermocouple tubes provide long-life and non-wetting qualities, and they are ideal for foundry and other temperature-sensitive applications.	<ul style="list-style-type: none"> Melting Furnaces Degassing Crucibles Holding Furnaces Transfer Equipment Reverb Melting Furnaces 	\$\$\$	Refractory with steel pipe reinforced	3-6 months	1100°C (2012°F)	3	Refer to the I5 and I6 series. For TCPT only refer to the T1 series.
O-Sialon. O-Sialon thermocouple tubes are ideally suited for use in the aluminium industry. They are non-wetting, have a high level of oxidation resistance, have high resistance to chemical corrosion, high abrasion resistance and provide excellent thermal response.	<ul style="list-style-type: none"> Low Pressure Holding Furnaces Melting Furnaces Transfer Equipment Troughs 	\$\$\$	Strong without pipe fitting	2-4 months	1100°C (2012°F)	2	Refer to the I7 and I8 series. For TCPT only refer to the T1 series.
Cast Iron Plain/Cast Iron Enamel. Both plain and enamel coated cast iron thermocouple tubes can withstand the rigors of a furnace environment. Their physical strength is ideal for casthouse handling. Ceramic coated tubes provide a 25-50% longer life than plain cast iron tubes.	<ul style="list-style-type: none"> Melting Furnaces Degassing Crucibles Holding Furnaces Transfer Equipment Reverb Melting Furnaces 	\$-\$	Cast Iron Strong	1-2 weeks	800°C (1472°F)	4	Refer to the I9 series. For TCPT only refer to the T2 series.
Recrystallized SiC. SiC-Graphite tubes are non-wetting and also have good thermal shock properties, high abrasion resistance and good response time. These tubes also exhibit good oxidation resistance due to their microstructure and can be used in many applications.	<ul style="list-style-type: none"> Melting Furnaces Degassing Crucibles Holding Furnaces Transfer Equipment Reverb Melting Furnaces 	\$\$\$	Refractory with steel pipe reinforced	1-3 months	1500°C (2732°F)	3	Refer to the I5 and I6 series. For TCPT only refer to the T1 series.
Sialon B100 / SIN. Silicon nitride thermocouple tubes are Pyrotek's highest performing ceramic technology. Their superior strength, high thermal conductivity, excellent thermal shock and corrosion resistance contribute to the longest service life in molten applications.	<ul style="list-style-type: none"> Low Pressure Holding Furnaces Melting Furnaces Transfer Equipment Troughs 	\$\$\$\$	Strongest without pipe fitting	10-13 months	1100°C (2012°F)	1	Refer to the I7 and I8 series. For TCPT only refer to the T1 series.
NOT INTENDED FOR DIRECT IMMERSION INTO MOLTEN ALUMINIUM							
INCONEL 601. Well known and standard material with great resistance to heat and corrosion. This thermocouple tube is not intended for direct immersion to molten metal.	<ul style="list-style-type: none"> Open Carbon Bake Furnace: Preheat Section and Pit/Flue firing chambers Roof Furnace Heat Treat 	\$-\$-\$	Stainless Steel Strong	7-9 months	1260°C (2300°F)	1	Refer to the IP and I4 series
Alumina. Alumina thermocouple tubes are designed for roof furnace at free air in heat treat, glass, and ferrous metal industries. They are not intended for direct immersion to molten metal.	<ul style="list-style-type: none"> Roof Furnace Heat Treat 	\$\$\$	Alumina Ceramic	3-5 months	1600°C (2912°F)	5	Refer to the I4 series
Mullite. Mullite thermocouple tubes are another option for a roof furnace at free air application, with a lower temperature rating than alumina.	<ul style="list-style-type: none"> Roof Furnace Heat Treat 	\$\$\$	Mullite Ceramic	3-5 months	1400°C (2552°F)	5	Refer to the I4 series

Thermocouples are classified by calibration type because they have differing electromotive force (EMF) versus temperature curves. Some thermocouples generate considerably more voltage at lower temperatures, while others do not begin to develop a significant voltage until they are subjected to high temperatures. Calibration types are designed to deliver as close to a straight line voltage curve inside their temperature application range as possible. This makes it easier for an instrument or temperature controller to correctly correlate the received voltage to a particular temperature.

BASE METAL TYPES

Type K

Type K is used extensively at temperatures up to 1260°C (2300°F). Type K works in most applications since it is nickel-based and has good corrosion resistance. It is the most common sensor calibration type, and provides the widest operating temperature range.

Type N

This nickel based thermocouple alloy is used primarily at temperatures up to 1260°C (2300°F). While it is not a direct replacement for Type K, Type N provides better resistance to oxidation at high temperatures and longer life in applications where sulfur is present.

Type J

Type J may be used, exposed or unexposed, where there is a deficiency of free oxygen. For cleanliness and longer life, a protection tube is recommended for use with Type J. Since JP (iron) wire will oxidize rapidly at temperatures over 540°C (1000°F), it is recommended that larger gauge wires be used to compensate for the loss. The maximum recommended operating temperature for Type J is 760°C (1400°F). Type J is the second most common calibration of thermocouple and is a good choice for general purpose applications where moisture is not present.

NOBLE METAL TYPES

Types S, R, B

The maximum recommended operating temperature for Type S or R is 1450°C (2640°F). Type B is recommended for use at temperatures as high as 1700°C (3100°F). These thermocouples are easily contaminated. Noble metal thermocouples should always be protected with a gas-tight ceramic tube, a secondary porcelain tube, and a silicon carbide or metal outer tube as conditions require.

TABLE 1 – TOLERANCES ON INITIAL VALUES OF EMF VS. TEMPERATURE FOR THERMOCOUPLES

NOTE 1: Tolerances in this table apply to new, essentially homogeneous 0.25 to 3 millimeter diameter (No. 30 to No. 8 AWG) thermocouple wire used at temperatures not exceeding the recommended limits of Table 2. If the wire is used at higher temperatures these tolerances may not apply.

NOTE 2: For temperatures expressed in Celsius, the tolerance expressed in Fahrenheit is 1.8 times larger. Note that wherever applicable, percentage-based tolerances must be computed from temperatures that are expressed in Celsius.

NOTE 3: **CAUTION**—Users should be aware that certain characteristics of thermocouple materials, including the EMF versus temperature relationship may change in time with use. Consequently, test results and performance obtained at time of manufacture may not necessarily apply throughout an extended period of use. Tolerances given in this table apply only to new wire as delivered to the user and *does not allow for changes in characteristics with use*. The magnitude of such changes depends on factors such as wire size, temperature, time of exposure and environment. It should also be noted that due to possible changes in homogeneity, attempting to recalibrate used thermocouples is likely to yield irrelevant results, and is not recommended. However, it may be appropriate to compare used thermocouples in-situ with new or known good thermocouples to ascertain their suitability for further service under the conditions of the comparison.

THERMOCOUPLE TYPE	TEMPERATURE RANGE		TOLERANCES-REFERENCE JUNCTION 0°C (32°F)			
	°C	°F	Standard Tolerances		Special Tolerances	
			°C (whichever is greater)	°F	°C (whichever is greater)	°C
T	0–370	32–700	±1 or ±0.75%	Note 2	±0.5 or 0.4%	Note 2
J	0–760	32–1400	±2.2 or ±0.75%			
E	0–870	32–1600	±1.7 or ±0.5%			
K or N	0–1260	32–2300	±2.2 or ±0.75%			
R or S	0–1480	32–2700	±1.5 or ±0.25%			
B	870–1700	1600–3100	±0.5%			
C	0–2315	32–4200	±4.4 or 1%	Note 2		
T ^A	-200–0	-328–32	±1 or ±1.5%			B
E ^A	-200–0	-328–32	±1.7 or ±1%			B
K ^A	-200–0	-328–32	±2.2 or ±2%			B

^AThermocouples and thermocouple materials are normally supplied to meet the tolerances specified in the table for temperatures above 0°C (°F). The same materials, however, may not fall within the tolerances given for Celsius temperatures in the second section of the table. If materials are required to meet the tolerances stated for temperatures below 0°C the purchase order must so state. Selection of materials usually will be required.

^BSpecial tolerances for temperatures below 0°C (°F) are difficult to justify due to limited information available. However, the following values for Types E and T thermocouples are suggested as a guide for discussion between purchaser and supplier.

- Type E: -200 to 0°C ± 1°C or ± 0.5% (whichever is greater)
- Type T: -200 to 0°C ± 0.5°C or ± 0.8% (whichever is greater)

Initial values of tolerance for Type J thermocouples at temperatures below 0°C (°F) and special tolerances for Type K thermocouples below 0°C (°F) are not given due to the characteristics of the materials.

TABLE 2 – SUGGESTED UPPER TEMPERATURE LIMITS FOR PROTECTED THERMOCOUPLES



NOTE 1: This table gives the recommended upper temperature limits for the various thermocouples and wire sizes. These limits apply to protected thermocouples or thermocouples with conventional closed-end protecting tubes. The limits do not apply to sheathed thermocouples with compacted mineral oxide insulation.

NOTE 2: The temperature limits listed here are intended only as a guide to the user and should not be taken as absolute values nor as guarantees of satisfactory life or performance. These types and sizes are sometimes used at temperatures above the given limits, but usually at the expense of stability, or life, or both. In other instances it may be necessary to reduce the limits in order to achieve adequate service. ASTM MNL-12^A and other literature sources should be consulted for additional application information.

UPPER TEMPERATURE LIMIT FOR VARIOUS WIRE SIZES (AWG), °C (°F)						
THERMOCOUPLE TYPE	NO. 8 GAUGE 3.25 mm (0.128 in)	NO. 14 GAUGE 1.63 mm (0.064 in)	NO. 20 GAUGE 0.81 mm (0.032 in)	NO. 24 GAUGE 0.51 mm (0.020 in)	NO. 28 GAUGE 0.33 mm (0.013 in)	NO. 30 GAUGE 0.25 mm (0.010 in)
T		370 (700)	260 (500)	200 (400)	200 (400)	150 (300)
J	760 (1400)	590 (1100)	480 (900)	370 (700)	370 (700)	320 (600)
E	870 (1600)	650 (1200)	540 (1000)	430 (800)	430 (800)	370 (700)
K and N	1260 (2300)	1090 (2000)	980 (1800)	870 (1600)	870 (1600)	760 (1400)
R and S				1480 (2700)		
B				1700 (3100)		
C ^B				2315 (4200) ^C		

^A Manual on the Use of Thermocouples in Temperature Measurement, ASTM MNL-12, 1993.

^B Type C thermoelements cannot operate in presence of oxygen; therefore, protection for these thermocouples must provide an inert or non-oxidizing environment.

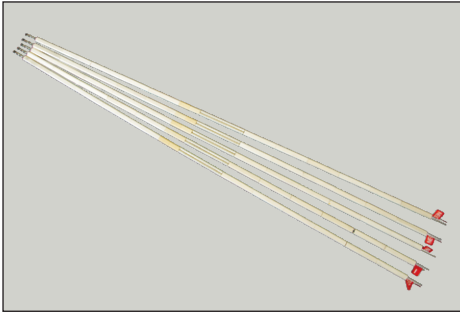
^C No. 24 Gauge thermoelements are common for this thermocouple type, but other sizes are possible and with adequate protection are generally useable over the same temperature range.

THERMOCOUPLE CALIBRATION REQUIREMENTS

Pyrotek offers lot and individual certification of thermocouples in compliance with one or more applicable industry standards including ASTM E-207, E-200, E-230, ITS 90 and AMS2750D. Temperature test points are determined by individual customer requirements and specifications. All results are traceable to NIST Standards as required in the applicable standards. Please consult the factory to determine availability and costs for your testing requirements.

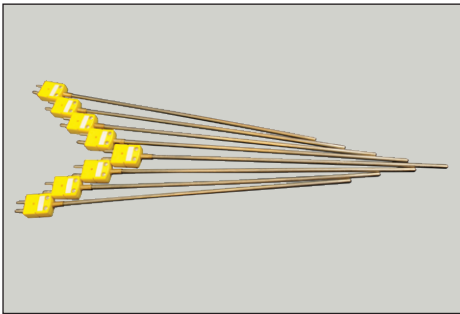
THERMOCOUPLE ELEMENTS

Base Metal (Industrial) Element



- Easily fabricated
- Ceramic bead insulation
- Unprotected hot junction
- Susceptible to green rot
- Commonly used in low cost TCPT

Mineral Insulated Metal-Sheathed Cable (MgO or MI)



- Formable and have the ability to withstand corrosive environment
- Metal sheath enclosing a highly compacted powder material, typically magnesium oxide (MgO)
- Temperature range from -200 to +1250°C (-328 to 2282°F)
- Diameter range from 0.25 to 13 millimetres (0.010 to 0.5 inches)

JUNCTIONS

All junctions are welded by the inert gas method to ensure performance and to prevent contamination from the sheath/insulation.



EXPOSED



GROUNDING



UNGROUNDING

- **Exposed junction** wires are welded to form a junction that extends beyond the sheath for a distance equal to the sheath diameter. These are used where a fast response is required and contamination is not a factor
- **Grounded junction** is welded directly to the sheath. These provide good thermocouple protection against pressure, moisture and mechanical damage, yet retain good response characteristics
- **Ungrounded junction** is electrically and mechanically insulated from the sheath for long life characteristics under maximum corrosion, thermal shock, and vibration conditions

SHEATH MATERIAL

304 SS (Stainless Steel)

- Maximum temperature of 900°C (1650°F)
- Most widely used low temperature sheath material
- Extensively used in food, beverage, chemical and other industries where corrosion resistance is required

316 SS (Stainless Steel)

- Maximum temperature of 900°C (1650°F)
- Best corrosion resistance of the austenitic stainless steel grades
- Widely used in the food and chemical industry
- Subject to damaging carbide precipitation in the 482–870°C (900–1600°F) range

310 SS (Stainless Steel)

- Maximum temperature of 1150°C (2100°F)
- Mechanical and corrosion resistance, similar to but better than the 304 SS
- Very good-heat resistance
- This alloy contains 25% chromium and 20% nickel
- Not as ductile as 304 SS

446 SS (Stainless Steel)

- Maximum temperature of 1150°C (2100°F)
- Made of stainless steel which has good resistance to sulfurous atmospheres at high temperatures
- Good corrosion resistance to nitric acid, sulfuric acid and most alkalis
- The 27% chromium content gives this alloy the highest heat resistance of any stainless steel

Alloy 600

- Maximum temperature of 1175°C (2150°F)
- Most widely used thermocouple sheath material
- High temperature strength
- Corrosion resistant
- Resistant to chloride ion corrosion
- Oxidation resistance to high temperature
- Do not use in sulfur bearing environments
- Good in nitrating environments

Pyrocable

- Maximum temperature of 1150°C (2102°F)
- Similar to Alloy 600 with the addition of aluminium for outstanding oxidation resistance
- Designed for high temperature corrosion resistance
- This material is good in carburizing environments, and has good creep rupture strength

TABLE 3 – UNITED STATES COLOR CODES FOR SINGLE AND DUPLEX INSULATED THERMOCOUPLE WIRE

NOTE 1: Data in this table represents customary practices in the United States of America. Different colour code conventions may be found in use in other countries.

NOTE 2: For some types of insulations colours may appear as a stripe or trace strand. High temperature braided insulation is not normally colour coded.

THERMOCOUPLE TYPE	THERMOELEMENT DESIGNATION	INDIVIDUAL CONDUCTOR COLOR	OVERALL JACKET COLOR
T	TP (+) TN (-)	Blue Red	Brown
J	JP (+) JN (-)	White Red	Brown
E	EP (+) EN (-)	Purple Red	Brown
K	KP (+) KN (-)	Yellow Red	Brown
N	NP (+) NN (-)	Orange Red	Brown

TABLE 4 – IEC COLOR CODES FOR INSULATED THERMOCOUPLE WIRE AND EXTENSION MATERIALS



NOTE 1: Data in this table are taken from IEC Standard 584-3. These colours are not compatible with the traditional colours widely used in the United States.

NOTE 2: For some types of insulations colours may appear as a stripe or trace strand. High temperature braided insulation is not normally colour coded.

NOTE 3: The noble metal thermocouples are not normally supplied with coloured insulations, however, if they were furnished, the colour codes would be those provided in the following table.

NOTE 4: The IEC colour coding system does not distinguish by color among thermocouple, extension, and compensating cables. Instead, a system of code letters are used to designate such cables. A single letter without a suffix denotes a thermocouple cable, an additional suffix “X” indicates an extension cable, and a suffix “C” is used to represent a compensating cable. Although the following table includes all three cable designations for each type, this should not be taken to mean that all three classes of cable are necessarily available for every type.

THERMOCOUPLE CABLE TYPE	THERMOELEMENT POLARITY	INDIVIDUAL CONDUCTOR COLOR	OVERALL JACKET COLOR
T, TX, TC	(+) (-)	Brown White	Brown
J, JX, JC	(+) (-)	Black White	Black
E, EX, EC	(+) (-)	Purple White	Purple
K, KX, KC	(+) (-)	Green White	Green
N, NX, NC	(+) (-)	Pink White	Pink
B, BX, BC ^A	(+) (-)	Gray White	Grey
R, RX, RC ^B	(+) (-)	Orange White	Orange
S, SX, SC ^B	(+) (-)	Orange White	Orange

^AColour code is applicable to constructions incorporating proprietary Type B compensating alloy wires. When uncompensated (copper/copper) extension materials are used with Type B thermocouples (at low temperatures and over limited temperature spans) the extension wire insulation is not normally color coded.

^BType R and S thermocouples utilize the same compensating cable.

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-273	-459.4	-10.6	13	22.8	73	216	420	560	1040
-268	-450	-10.0	14	23.3	74	221	430	571	1060
-262	-440	-9.4	15	23.9	75	227	440	582	1080
-257	-430	-8.9	16	24.4	76	232	450	593	1100
-251	-420	-8.3	17	25.0	77	238	460	604	1120
-246	-410	-7.8	18	25.6	78	243	470	616	1140
-240	-400	-7.2	19	26.1	79	249	480	627	1160
-234	-390	-6.7	20	26.7	80	254	490	638	1180
-229	-380	-6.1	21	27.2	81	260	500	649	1200
-223	-370	-5.6	22	27.8	82	266	510	660	1220
-218	-360	-5.0	23	28.3	83	271	520	671	1240
-212	-350	-4.4	24	28.9	84	277	530	682	1260
-207	-340	-3.9	25	29.4	85	282	540	693	1280
-201	-330	-3.3	26	30.0	86	288	550	704	1300
-196	-320	-2.8	27	30.6	87	293	560	732	1350
-190	-310	-2.2	28	31.1	88	299	570	760	1400
-184	-300	-1.7	29	31.7	89	304	580	788	1450
-179	-290	-1.1	30	32.2	90	310	590	816	1500
-173	-280	-0.6	31	32.8	91	316	600	843	1550
-169	-273	0	32	33.3	92	321	610	871	1600
-168	-270	.6	33	33.9	93	327	620	899	1650
-162	-260	1.1	34	34.4	94	332	630	927	1700
-157	-250	1.7	35	35.0	95	338	640	954	1750
-151	-240	2.2	36	35.6	96	343	650	982	1800
-146	-230	2.8	37	36.1	97	349	660	1010	1850
-140	-220	3.3	38	36.7	98	354	670	1038	1900
-134	-210	3.9	39	37.2	99	360	680	1066	1950
-129	-200	4.4	40	37.8	100	366	690	1093	2000
-123	-190	5.0	41	43	110	371	700	1121	2050
-118	-180	5.6	42	49	120	377	710	1149	2100
-112	-170	6.1	43	54	130	382	720	1177	2150
-107	-160	6.7	44	60	140	388	730	1204	2200
-101	-150	7.2	45	66	150	393	740	1232	2250
-96	-140	7.8	46	71	160	399	750	1260	2300
-90	-130	8.3	47	77	170	404	760	1288	2350
-84	-120	8.9	48	82	180	410	770	1316	2400
-79	-110	9.4	49	88	190	416	780	1343	2450
-73	-100	10.0	50	93	200	421	790	1371	2500
-68	-90	10.6	51	99	210	427	800	1399	2550
-62	-80	11.1	52	100	212	432	810	1427	2600
-57	-70	11.7	53	104	220	438	820	1454	2650
-51	-60	12.2	54	110	230	443	830	1482	2700
-46	-50	12.8	55	116	240	449	840	1510	2750
-40	-40	13.3	56	121	250	454	850	1538	2800
-34	-30	13.9	57	127	260	460	860	1566	2850
-29	-20	14.4	58	132	270	466	870	1593	2900
-23	-10	15.0	59	138	280	471	880	1621	2950
-17.8	0	15.6	60	143	290	477	890	1649	3000
-17.2	1	16.1	61	149	300	482	900		
-16.7	2	16.7	62	154	310	488	910		
-16.1	3	17.2	63	160	320	493	920		
-15.6	4	17.8	64	166	330	499	930		
-15.0	5	18.3	65	171	340	504	940		
-14.4	6	18.9	66	177	350	510	950		
-13.9	7	19.4	67	182	360	516	960		
-13.3	8	20.0	68	188	370	521	970		
-12.8	9	20.6	69	193	380	527	980		
-12.2	10	21.1	70	199	390	532	990		
-11.7	11	21.7	71	204	400	538	1000		
-11.1	12	22.2	72	210	410	549	1020		

INCH TO MILLIMETRE CONVERSION TABLE

1 inch equals 25.4 millimetres



Fraction	Decimal	Millimetre	Fraction	Decimal	Millimetre
1/64	.0156	.3962	33/64	.5156	13.0962
1/32	.0313	.7950	17/32	.5313	13.4950
3/64	.0469	1.1913	35/64	.5469	13.8913
1/16	.0625	1.5875	9/16	.5625	14.2875
5/64	.0781	1.9837	37/64	.5781	14.6837
3/32	.0938	2.3825	19/32	.5938	15.0825
7/64	.1094	2.7788	39/64	.6094	15.4788
1/8	.1250	3.1750	5/8	.6250	15.8750
9/64	.1406	3.5712	41/64	.6406	16.2712
5/32	.1563	3.9700	21/32	.6563	16.6700
11/64	.1719	4.3663	43/64	.6719	17.0663
3/16	.1875	4.7625	11/16	.6875	17.4625
13/64	.2031	5.1587	45/64	.7031	17.8587
7/32	.2188	5.5575	23/32	.7188	18.2575
15/64	.2344	5.9538	47/64	.7344	18.6538
1/4	.2500	6.3500	3/4	.7500	19.0500
17/64	.2656	6.7462	49/64	.7656	19.4462
9/32	.2813	7.1450	25/32	.7813	19.8450
19/64	.2969	7.5413	51/64	.7969	20.2413
5/16	.3125	7.9375	13/16	.8125	20.6375
21/64	.3281	8.3337	53/64	.8281	21.0337
11/32	.3438	8.7325	27/32	.8438	21.4325
23/64	.3594	9.1288	55/64	.8594	21.8288
3/8	.3750	9.5250	7/8	.8750	22.2250
25/64	.3906	9.9212	57/64	.8906	22.6212
13/32	.4063	10.3200	29/32	.9063	23.0200
27/64	.4219	10.7163	59/64	.9219	23.4163
7/16	.4375	11.1125	15/16	.9375	23.8125
29/64	.4531	11.5087	61/64	.9531	24.2087
15/32	.4688	11.9075	31/32	.9688	24.6075
31/64	.4844	12.3038	63/64	.9844	25.0038
1/2	.5000	12.7000	1	1.0000	25.4000

Tables 1, 2 and 3 were extracted from ASTM E230-03 "Standard Specifications and Temperature-Electromotive Force (EMF) Tables for Standardized Thermocouples."

Ambient Temperature: The average or mean temperature of the surrounding environment in contact with the sensor or equipment concerned.

Annealing: Heat treatment of materials to relieve internal stresses and dislocations.

ASTM: A nonprofit organization that develops and publishes technical standards used worldwide. ASTM also serves as the administrator for the U.S. Technical Advisory Group (TAG) to an enormous amount of ISO technical committees and their subcommittees.

Base Metals: Metals that oxidize, tarnish or corrode relatively easily when exposed to air or moisture—aluminium, copper, lead, nickel, tin and zinc.

Bonded Hot Junction: Refers to a type of mineral insulated thermocouple where the measuring junction is integral to the tip of the sheath, and thus electrically grounded to it.

Calibration: The process of determining or adjusting values of an instrument by independent measurements of the relevant phenomenon.

Celsius: A temperature scale where 0°C is the ice point and 100°C is the boiling point of water.

Ceramic Insulation: High temperature compositions of metal oxides insulating thermocouple wires—most commonly alumina, beryllia and magnesium oxide; available as single and multi-hole tubes and as beads.

Cold Junction: Original name for the reference junction of a thermocouple—now implying a floating temperature.

Colour Codes: The IEC standard color identification and tolerance codes for thermocouple extension and compensating cables and connectors.

Compensating Cable: Cable for extending thermocouple circuits more cheaply. It has conductors that, in combination, match the thermocouple characteristics over a limited temperature range.

Compensator: An externally powered electrical network containing a temperature sensitive element connected to a thermocouple to provide an equivalent 0°C reference voltage.

Connection Head: A cover or enclosure fitted over a thermocouple protection tube at the end furthest from the sensor. It contains electrical terminals that allow convenient connection of the sensor to the rest of the circuit.

Drift: Shift of a signal or reading over a long period due to factors like ambient temperature change, hysteresis of the sensor and other physical, chemical and electromagnetic effects.

Duplex: A name commonly given when two thermocouples are housed in the same probe.

EMF: Abbreviation for electromotive force—the electrical potential difference developed by sources of energy in electrical circuits.

EMI: Electromagnetic interference.

Emissivity: The ratio of emitted energy from a surface compared with a black body at the same temperature.

Exposed Junction: A form of faster response thermocouple probe constructed such that the measuring junction protrudes beyond the sheath, and is thus fully exposed to the medium being measured.

Extension Cable: A method of extending thermocouple circuits with lower cost or more suitable types of wiring cable—contains similar materials to those of the thermocouple itself.

Fahrenheit Scale: A temperature scale where 32°F is the ice point; and 212°F is the boiling point of water.

Ground: The reference point for an electrical system.

Grounded Junction: Construction of a thermocouple probe where the measuring junction is in electrical contact with the sheath so that sheath and thermocouple are at the same potential.

Heat Transfer: Thermal energy flow from one body having higher energy to a body of lower energy—by conduction, convection and radiation.

Hot Junction: Original and commonly used name for the measuring junction of the thermocouple. See measuring junction.

Impedance: Total resistance to electrical current flow (resistive plus reactive).

Insulated Hot Junction: A form of construction adopted primarily for mineral insulated thermocouple units where the measuring junction is separated and electrically insulated from the cable sheath.

Junction: The point in a thermocouple where the two dissimilar metals are joined. See measuring junction.

Kelvin: 1 Kelvin is equal to 1°Celsius.

Linearity: The deviation of an instrument's response from a straight line.

Maximum Operating Temperature: The maximum ambient, continuous temperature at which an instrument or sensor can be safely operated.

Mean Temperature: The average of the maximum and minimum temperatures of a process in equilibrium.

Measuring Junction: The electrical connection that comprises one end of the conductors in a thermocouple, and is used as the temperature sensor. See hot junction.

Melting Point: The temperature at which a substance transforms state from the solid phase to the liquid phase.

MI (Mineral Insulated) Thermocouple: Common name for a thermocouple unit manufactured from metal sheathed, mineral insulated thermocouple cable.

Noble Metals: Metals which tend towards a positive electrochemical potential, are inert and have a high resistance to corrosion and oxidation—gold, silver and platinum.

Noise: An unwanted electrical interference on the signal wires.

Platinum Metals: Platinum, osmium, iridium, palladium, rhodium and ruthenium. Platinum has a melting point of 1700°C (3100°F), and is used for resistance thermometry. Together with iridium and rhodium alloys, it is also used in thermocouple thermometry. See Noble metals.

Polarity: The sign (positive or negative) of an electrical conductor.

Protection Head: A cover or enclosure fitted over a thermocouple protection tube at the end furthest from the sensor. It contains electrical terminals to allow convenient connection of the sensor to the rest of the circuit. See “Connection Head”.

Protection Tube: A closed end, cylindrical sleeve fitted over a sensor to provide mechanical and environmental protection. Can be made from metal, plastic, ceramic or refractory material.

Resistance: The restriction to electrical current flow through a material, measured in Ohms. For a conductor wire, resistance is a function of diameter, length and resistivity (resistance per unit length—a physical material property).

Response Time: The time interval between the application of a sudden change of temperature to a sensor and the attainment of a given output. The change is frequently defined as 63.2% of the final value.

Sensitivity: The output response, measured in time or magnitude, developed by a thermocouple for a given temperature change.

Sheathed MI Cable: A cable comprising one or more conductors embedded in a powdered insulant and surrounded by a metal sheath. The final diameter is produced by drawing or swaging.

Signal: General term for an electrical current or voltage representing a quantity or event.

Thermal Conductivity: The rate at which heat flows through a material for a given temperature difference applied to it, with no gain or loss of heat by the material.

Thermal Expansion: The increase in material size resulting from an increase in temperature—thermal coefficient is normally expressed as the length change per degree Centigrade.

Thermocouple: An electrical circuit comprising two dissimilar materials. A voltage is generated that is dependent on the temperatures at the junctions forming the limits of the dissimilar materials. The reference junction at one end of the conductors is usually maintained at 0°C to allow the measuring junction to be used as a temperature sensor.

Transducer: A device that converts a physical quantity into a related electrical signal. For example, a resistance thermometer, thermocouple or strain gauge.

Transmitter: A device incorporating an electrical circuit that converts a signal from a transducer into a standard transmittable form—typically, a two wire DC current output ranging from 4–20 mA.

Ungrounded Junction: A thermocouple probe constructed so the measuring junction is fully enclosed by, and insulated from, the sheath material.

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