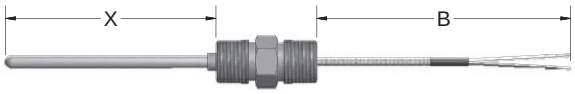
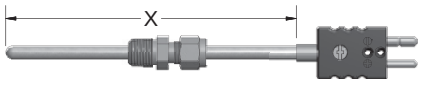
MgO

Configuration Code Mg01
MgO Insulated Thermocouples with Extension Leadwire
Configuration Code Mg02
MgO Insulated Thermocouples with Sheath Terminations

A Pyromation MgO thermocouple assembly consists of a thermocouple element swaged in hard-packed, standard-purity (96%) Magnesium Oxide mineral insulation and encased in a metal sheath. Thermocouple sheaths have been fully annealed; they can be formed into many configurations, and can be bent into a radius of twice the size of its outer sheath. The tables found on this page and the following pages allow customer selection of standard thermocouple types, sheath diameters, mounting fittings and terminations. Custom built products are available upon request.





ORDER CODES

Example Order Number:

1-1	1-2	1-3	1-4	1-4 A		1-5		
K	4	8	G	M	-	012	-	For Optional Sheath Mounting Fittings See Page MgO-2

1-1 Thermocouple Types

CODE	
SINGLE	***DUPLEX***
E	EE
J	JJ
K	KK
T	TT
N	NN

1-2 Sheath Diameters

CODE	DIAMETER (inches)
1	1/16 [1]
2	1/8
3	3/16
4	1/4
6	3/8
[1] 1/16" will be coiled unless otherwise specified for 36" and longer lengths.	

1-3 Sheath Materials

CODE	MATERIAL	STANDARD AVAILABLE TYPES
3	Alloy 600	K, N
4	310 Stainless steel	K
5	446 Stainless steel	K[1]
8	316 Stainless steel	E, J, K, T
[1] All sensors with 446SS sheaths must have an ungrounded measuring junction.		

1-5 "X" Dimension

Insert three digit sheath length ("X" Dimension) in inches
Sheath lengths over 72" will be shipped in a coiled configuration unless otherwise specified.

1-4 A Special Options

CODE	DESCRIPTION
M	Special limits of error
H	High-Purity MgO Insulation (99.4% Pure)
Use this table only if options are desired.	

1-4 Measuring Junctions

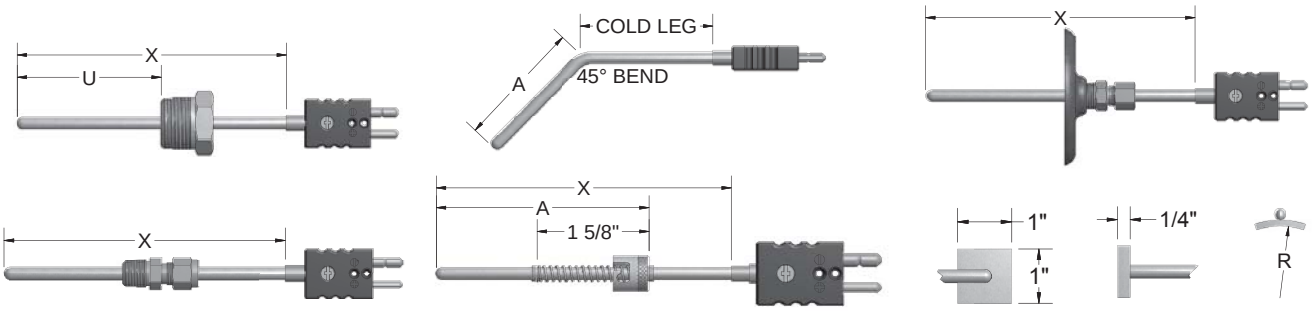
CODE	DESCRIPTION
G	Grounded junction
U	Ungrounded junction
E[1]	Exposed junction
S	Exposed shielded junction
[1] Not available with 1/16" O.D..	

1-2 A Reduced-Tip MgO Thermocouples

CODE	NORMAL SHEATH DIA. O.D. (inches)	TIP DIA. (inches)	TIP LENGTH (inches)	MATERIAL
88R48	1/2	1/4	1 (1/4)	316 SS
68R38	3/8	3/16	1 (1/4)	316 SS
48R28	1/4	1/8	1 (1/4)	316 SS

Table 1-2 A lists thermocouple elements with reduced-tip sheaths. To order, use order code numbers from Tbl. 1-2 A in place of straight sheath order code numbers from Tbl. 1-2 and 1-3. EXAMPLE: J88R48

Select Sheath Mounting or Bend Options as desired from tables below.



ORDER CODES

Example Order Number: K48GM - 012 - 01A,306 [2] - Page MgO-3 - Page MgO-4 - Page MgO-5

2-1 No Fitting or Bend Options

CODE	00

2-2 One-Time Adjustable Compression Fittings

CODE	TYPE	NPT SIZE (inches)	PRESSURE RATED	AVAILABLE SHEATH DIAMETERS (inches)
01A	303 Stainless steel	1/8	NO	1/16, 1/8, 3/16, 1/4
05A	316 Stainless steel	1/8	YES	1/16, 1/8, 3/16, 1/4
05B	316 Stainless steel	1/4	YES	1/8, 3/16, 1/4, 3/8
05C	316 Stainless steel	1/2	YES	1/8, 1/4, 3/8
15A	Brass	1/8	NO	1/8, 3/16, 1/4
15B	Brass	1/4	NO	3/16, 1/4, 3/8
15C	Brass	1/2	NO	1/4, 3/8

2-3 Re-Adjustable Compression Fittings

CODE	TYPE	NPT SIZE (inches)	AVAILABLE SHEATH DIAMETERS (inches)
10A	303 Stainless steel	1/8	1/16, 1/8, 3/16
10B	303 Stainless steel	1/4	1/4, 3/8
10C	303 Stainless steel	1/2	1/4, 3/8
12A	316 Stainless steel	1/8	1/16, 1/8, 3/16, 1/4
12B	316 Stainless steel	1/4	1/8, 3/16, 1/4, 3/8
12C	316 Stainless steel	1/2	1/8, 1/4, 3/8
11A	Brass	1/8	1/16, 1/8, 3/16, 1/4
11B	Brass	1/4	1/8, 3/16, 1/4, 3/8
11C	Brass	1/2	1/4, 3/8
19C	Spring-loaded SS well fitting	1/2	3/16, 1/4

FEP gland standard 204 ºC [400 ºF] max. For lava gland 649 ºC [1200 ºF] max. opt. 10A and 10B only use letter suffix "L" after compression fitting order code. EXAMPLE: 10AL for lava gland.

2-4 Fixed Bushings

CODE *316 SS*	MOUNTING THREAD NPT (inches)	AVAILABLE SHEATH DIAMETERS (inches)
8A _ _ [1]	1/8	1/16, 1/8, 3/16, 1/4
8B _ _ [1]	1/4	1/16, 1/8, 3/16, 1/4, 3/8
8C _ _ [1]	1/2	1/8, 3/16, 1/4, 3/8
8D _ _ [1]	3/4	1/8, 3/16, 1/4, 3/8

[1] When ordering fixed bushings, specify order code above plus insert length "U", as measured from hot tip to bottom of threaded bushing. EXAMPLE: order code 8A06 is 1/8" NPT, 316 SS bushing located 6" from hot tip.

2-5 Sheath Bends

CODE	DESCRIPTION
2 _ _	Sheath bent 45º
3 _ _	Sheath bent 90º

When ordering bend options, specify hot leg dim. "A". EX: order code 206 is a 45º bend with 6" hot leg. Total sheath length in Table 1, referred to as "X" length = hot leg plus cold leg.

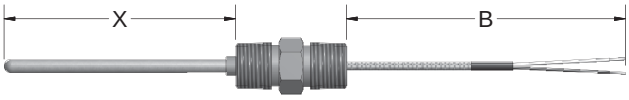
2-6 Weld Pads

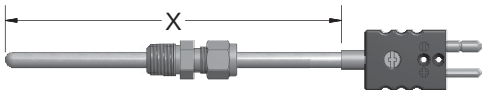
CODE	DESCRIPTION
17	316 SS weld pad 1" x 1" x 1/4" thick perpendicular mount
18	316 SS weld pad 1" x 1" x 1/4" thick horizontal mount
17R	316 SS weld pad 1" x 1" x 1/8" thick perpendicular mount with radius bend (specify radius)
18R	316 SS weld pad 1" x 1" x 1/8" thick horizontal mount with radius bend (specify radius)

2-7 Miscellaneous Options

CODE	DESCRIPTION	AVAILABLE SHEATH DIAMETERS (inches)
13A _ _ [1]	Spring-loaded bayonet fitting	1/8, 3/16
14	Adjustable flange with brass compression fitting	1/8, 3/16, 1/4, 3/8
16A	Compression fitting with bayonet cap and spring	1/8 (2 5/8" min. "A" dim.)

[1] When ordering fixed bayonet fitting, specify hot leg dimension "A". EXAMPLE: order code 13A06 for a fixed bayonet adapter with 6" hot leg. Total sheath length is Table 1 "X" length = hot leg plus cold leg.





MgO2 ORDER CODES MgO1

Example Order Number: K48GM - 012 - 15C - [3-1: 4, MC] or K48GM - 012 - 00 - [3-2: 16] - [Page MgO-4] - [Page MgO-5]

3-1 Plug and Jack Sheath Terminations

CODE	DESCRIPTION
4[1]	Standard plug
5[1]	Standard jack
6[2]	Miniature plug
7[2]	Miniature jack
	Options
MC	Mating connector
HT	High temp connector 350 ºC [660 ºF]
SP[3]	Solid pin plug
CL[4]	Compression L bracket to hold plug to sheath

[1] If used with a 3/8" O.D. sheath, an option CL must be specified.
[2] Not available with 1/4 or 3/8" O.D. sheath.
[3] Standard with 385 °C [725 °F]
[4] Not available with miniature connector

3-1 Sheath Terminations

CODE	DESCRIPTION
10	2" stripped leads (insert two digit strip length for other lengths - ex. 10(03")
14[1]	Ceramic wafer block
22	Leadwire transition with 3" individual leads and terminal pins

[1] Only available on 1/8, 3/16, 1/4" O.D. sheath.

3-2 Leadwire Transitions
(Requires Table 4 and 5 selections)

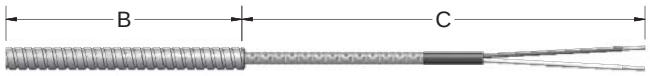
CODE	DESCRIPTION
15	Extension leadwire transition with relief spring 204 ºC [400 °F]
16	Extension leadwire transition with heat-shrink tubing 104 ºC [220 °F]
13[1]	Same size transition with heat-shrink tubing 104 ºC [220 °F]
18[1]	Same size transition without heat-shrink tubing 204 ºC [400 °F]
19	Extension leadwire transition w/o spring or heat-shrink tubing 204 ºC [400 °F]
	Options
HT[2]	High-temperature potting 538 ºC [1000 ºF]

[1] Not available with Flex Armor
[2] Not available with option 13 or 16. When specifying high temp potting with Flex Armor, Option 19 must be selected.

3-2 Threaded Fittings with Extension Leadwire
(Requires Table 4 and 5 selections)

CODE	DESCRIPTION
6HN23	1/2" x 1/2" NPT steel hex nipple
8HN23	1/2" x 1/2" NPT stainless steel hex nipple
9HP23	1/2" NPT stainless steel bushing (no process threads)
8RNDC23	3/4" process x 1/2" NPT stainless steel hex nipple

Select desired leadwire type by order code number, followed by desired length in inches



ORDER CODES

Example Order Number: K48GM - 012 - 01A,306 - 15 - F1048 - Page MgO-5

4 5

4

	CODE	DESCRIPTION	AVAILABLE CALIBRATIONS					TEMP. RATING
Fiberglass	F1	Fiberglass insulation - solid conductor	J	K	T	E	N	482 ºC [900 ºF]
	F1A	Fiberglass insulation - solid conductor - flexible armor	J	K	T	E	N	482 ºC [900 ºF]
	F1B	Fiberglass insulation - solid conductor - stainless steel overbraid	J	K	T	E		482 ºC [900 ºF]
	F3	Fiberglass insulation - stranded conductor	J	K	T			482 ºC [900 ºF]
	F3A	Fiberglass insulation - stranded conductor - flexible armor	J	K	T			482 ºC [900 ºF]
	F3B	Fiberglass insulation - stranded conductor - stainless steel overbraid	J	K	T			482 ºC [900 ºF]
	H1	Hi-temp fiberglass insulation - solid conductor	J	K				704 ºC [1300 ºF]
	H1A	Hi-temp fiberglass insulation - solid conductor - flexible armor	J	K				704 ºC [1300 ºF]
	H1B	Hi-temp fiberglass insulation - solid conductor - stainless steel overbraid	J	K				704 ºC [1300 ºF]
Fluoropolymer	T3J	Individual stranded fluoropolymer leads - 12 inch limit	J	K		E		204 ºC [400 ºF]
	T1	Fluoropolymer insulation - solid conductor	J	K	T			204 ºC [400 ºF]
	T1A	Fluoropolymer insulation - solid conductor - flexible armor	J	K	T			204 ºC [400 ºF]
	T1B	Flouropolymer insulation - solid conductor - stainless steel overbraid	J	K				204 ºC [400 ºF]
	T1M	Fluoropolymer insulation - solid conductor - polyester shield	J	K				204 ºC [400 ºF]
	T3	Fluoropolymer insulation - stranded conductor	J	K	T			204 ºC [400 ºF]
	T3A	Fluoropolymer insulation - stranded conductor - flexible armor	J	K	T			204 ºC [400 ºF]
	T3B	Fluoropolymer insulation - stranded conductor - stainless steel overbraid	J	K				204 ºC [400 ºF]
PVC	P5	PVC insulation - solid conductor	J	K	T	E	N	105 ºC [221 ºF]
	P7	PVC insulation - stranded conductor	J	K	T			105 ºC [221 ºF]
	P5M	PVC insulation - solid conductor - polyester shield	J	K	T			105 ºC [221 ºF]
	P7M	PVC insulation - stranded conductor - polyester shield	J	K				105 ºC [221 ºF]
	C3060	PVC insulated coil cord - stranded; 60" extended	J	K	T	E		105 ºC [221 ºF]
	C3120	PVC insulated coil cord - stranded; 120" extended	J	K	T			105 ºC [221 ºF]
Polyimide	K1	Polyimide insulation - solid conductor	J	K				316 ºC [600 ºF]
	K1A	Polyimide insulation - solid conductor - flexible armor	J	K				316 ºC [600 ºF]
	K3	Polyimide insulation - stranded conductor	J	K				316 ºC [600 ºF]
	K3A	Polyimide insulation - stranded conductor - flexible armor	J	K				316 ºC [600 ºF]

Insert wire code number and 3 digit "B" length code. **Example: F1036 = 36" "B" length.**

For assemblies requiring leadwire beyond the flexible armor, illustrated as "C" in drawing, insert 3 digit "C" length after armor length. **Example: T1A036-012 = 36" "B" length with additional 12" "C" length leads beyond armor.**

Insulated leadwires in flexible armor are available with either extruded PVC or FEP covering over the flexible armor. Substitute suffix codes T (FEP) or P (PVC) for the suffix "A" code above. **Example: T3T is FEP covered armor.**

Duplex elements supplied with individual leads.

Select desired leadwire termination and options (if desired) by order code numbers below

OPTIONS 4 OR 4,MC

OPTIONS 6 OR 6,MC

OPTION 3

OPTION 8

ORDER CODES

Example Order Number: K48GM - 012 - 01A,306 - 15 - F1048 - 4, CC

(5-1 = 4, 5-2 = CC)

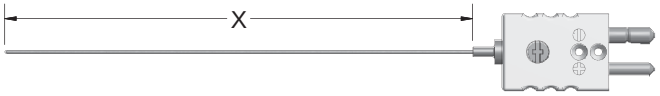
5-1 Terminations

CODE	DESCRIPTION
0	Leads not stripped
2	2" split leads, 1/4" stripped
3	2" split leads with spade lugs
4	Standard plug
5	Standard jack
6	Miniature plug
7	Miniature jack
8	2" split leads with 1/4" quick disconnect female terminal lugs

5-2 Options

CODE	DESCRIPTION
BX	1/2" NPT BX connector with Opt. 0, 2, 3, or 8
CC	Plug or jack secured to leads with cable clamp
RB	Rubber boot
SP[1]	Solid pin plug
CG	Cord grip (1/2" NPT weatherproof PVC connector)
MC	Mating connector
HT	High temp. connector 350 °C [660 °F]
[1] Standard with 350 °C [660 °F]	

Miniature thermocouple assemblies have very small swaged sheath diameters containing standard-purity MgO (96%) insulated thermocouple elements. The small sheath size provides accurate and fast response time temperature measurement in a variety of laboratory, process, and special applications. These units are only offered with ungrounded junctions to prolong their useful life. Illustrated below are the most commonly used assemblies, however, other sensor configurations are available upon request.



ORDER CODES

Example Order Number:

1-1	1-2	1-3	1-4		2			3		4		5
J	040	8	U	-	012	-	00	-	16	-	PAGE MGO-7	-	PAGE MGO-7

1-1 Thermocouple Types

CODE
J
K

1-2 Sheath Diameter

CODE	DIAMETER (INCHES)
032	0.032
040	0.040

1-3 Sheath Material

CODE	MATERIAL
3	Alloy 600
8	316 Stainless steel

1-4 Measuring Junction

CODE	MATERIAL
U	Ungrounded junction
M	Special limits (consult factory)

2 "X" Dimension

Insert three digit sheath length ("X" Dimension) in inches

3 Sheath Terminations

CODE	DESCRIPTION
4	Standard plug
5	Standard jack
6	Miniature plug
7	Miniature jack
Options	
MC	Mating connector
Leadwire Transitions	
15	Extension leadwire transition fitting with relief spring 204 ºC [400 °F]
16	Extension leadwire transition fitting with heat-shrink tubing 104 ºC [220 °F]
19	Extension leadwire transition ftg. w/o relief spring or heat-shrink tubing 204 ºC [400 °F]
Options	
HT[1]	High Temperature Potting 538 ºC [1000 °F]
[1] Not available with option 16. When specifying flex armor, Option 19 must be selected.	

Select desired extension leadwire type (in inches) and leadwire termination and options (if desired) by order code number from the tables below.

OPTIONS 4 OR 4,MC

OPTIONS 6 OR 6,MC

OPTION 3

OPTION 8

ORDER CODES

Example Order Number: J0408UM - 012 - 00 - 16 - F1048 (4) - 6 (5)

4 Extension Leadwire

	CODE	DESCRIPTION	AVAILABLE CALIBRATIONS		TEMP. RATING
Fiberglass	F1	Fiberglass insulation - solid conductor	J	K	482 ºC [900 ºF]
	F1A	Fiberglass insulation - solid conductor - flexible armor	J	K	482 ºC [900 ºF]
	F1B	Fiberglass insulation - solid conductor - stainless steel overbraid	J	K	482 ºC [900 ºF]
	F3	Fiberglass insulation - stranded conductor	J	K	482 ºC [900 ºF]
	F3B	Fiberglass insulation - stranded conductor - stainless steel overbraid	J	K	482 ºC [900 ºF]
Fluoropoly-mer	T1	Fluoropolymer insulation - solid conductor	J	K	204 ºC [400 ºF]
	T1A	Fluoropolymer insulation - solid conductor - flexible armor	J	K	204 ºC [400 ºF]
	T3	Fluoropolymer insulation - stranded conductor	J	K	204 ºC [400 ºF]
PVC	P5	PVC insulation - solid conductor	J	K	105 ºC [221 ºF]
Insert wire code number and 3 digit "B" length code. Example: F1036 = 36" "B" Length					

5 Terminations

CODE	DESCRIPTION
0	Leads not stripped
2	2" split leads, 1/4" stripped
3	2" split leads with spade lugs
4	Standard plug
5	Standard jack
6	Miniature plug
7	Miniature jack
Options	
MC	Mating connector
CC	Plug or jack secured to leads with cable clamp