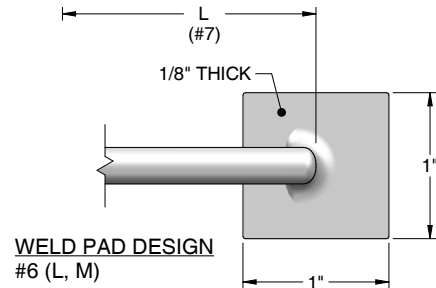


# INDUSTRIAL AND MINIATURE THERMOCOUPLES

#1	DESCRIPTION [6, 7]
1	Thermocouple
#2	TYPE [8,9,10]
	J,T,K,E,N,X (Other, Specify)
#3	LIMITS OF ERROR/ELEMENT CONSTRUCTION
1	Standard Single 6 Standard Triple
2	Standard Dual X Other, specify
3	Special Single
4	Special Dual



WELD PAD DESIGN #6 (L, M)

Many more options available at [JMS-SE.com](http://JMS-SE.com)

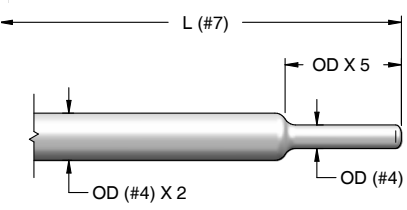
**Note:** For hollow tube sensors or sensors requiring a factory bend, see pages 2-1 and 2-2.

[ ] Brackets indicate page numbers where additional helpful information can be found in technical catalog. Now available online at [www.JMS-SE.com/TechnicalCatalog](http://www.JMS-SE.com/TechnicalCatalog)

#4	OUTSIDE DIAMETER [1-11]			CONDUCTOR SIZE (FOR BASE METALS ONLY)							
	OD	Single	Dual	OD	Single	Dual	OD	Single	Dual		
P	1/2"	10	12	R	6mm	16	18	F	1/25"	32	34
A	3/8"	13	16	C	3/16"	19	20	X*	Other, specify		
Y	5/16"	14	16	D	1/8"	22	24	*JMS now offers sheath as small as 0.010" diameter			
B	1/4"	16	18	E	1/16"	28	30				

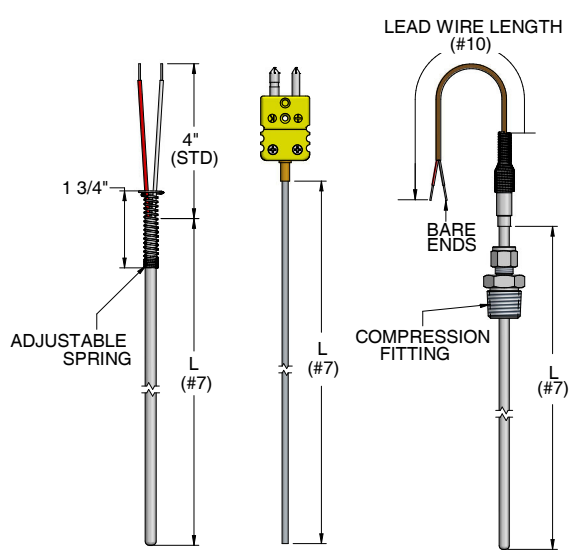
#5	SHEATH MATERIAL [11]	MAX °F [2-8, 4-17]	MAX °F
H	304 stainless steel	1650	C Teflon coated stainless steel 400
J	310 stainless steel	2100	S Titanium 400
V	STABALOY	2220	Q Hastelloy C-276 800
K	316 stainless steel	1650	P Pyrosil 2300
M	Inconel 600	2100	X Other, specify

## REDUCED TIP DESIGN #6 (P,Y)



#6	MEASURING JUNCTION [1-12, 13, 14, 15]		
G	Grounded	P Reduced tip, grounded	
U	Ungrounded	Y Reduced tip, ungrounded	
E	Exposed (isolated on dual/triple)	R Gas/air, exposed	
I	Isolated	S Gas/air, grounded	
J	Pointed tip, grounded 45°	T Gas/air, ungrounded	
K	Pointed tip, ungrounded 45°	V* Enlarged tip, grounded	
L	Weld pad, grounded (Flat)	W* Enlarged tip, ungrounded	
M	Weld pad, ungrounded (Flat)	X Other, specify	
N	Weld pad, removable grounded	*Provide length and enlarged diameter description when selecting these options.	
O	Weld pad, removable ungrounded	<b>Note:</b> For options N, NF, O, & OF Fastrax (aka removable weld pad) designs, refer to 4-11.	
NF	Removable, "foot" only, grounded		
OF	Removable, "foot" only, ungrounded		

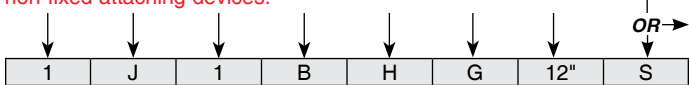
#7	LENGTH (See illustrations on page 1-1 through 1-3 for lengths)
"	Length in Inches (Lengths greater than 90" may be coiled for shipment)



**Note:** L is the overall length of the sensor to the transition, wire, plug, head, or fixed attaching device. L excludes non-fixed attaching devices.

**NEW** Skip to page 1-3 to complete selection #8 if your sensor requires a nipple and/or union extension.

#8	STANDARD INDUSTRIAL ATTACHING DEVICE [1-3, 6-13]	
X	Other, specify	
Z	N/A	No attaching device
G	Single thread (process)	Welded design
F	Single thread (reversed)	
W	Double threaded	
H*	SS w/ SS ferrule	Compression design
I*	SS w/ Teflon ferrule	
J*	SS w/ Lava ferrule	
K*	SS w/ Nylon ferrule	
L*	Brass w/ Brass ferrule	
D	Single threaded (process)	Spring-loaded design
C	Double threaded w/ oil seal	
A	Double w/ threaded retainer	
E	Adjustable spring	
S	Double threaded (most common)	
B	Double threaded Bayonet	
BS*	Double threaded Bayonet w/ oil seal	
BD	Single threaded Bayonet	
BDS*	Single threaded Bayonet w/ oil seal	



SEE PAGE 1-3

# INDUSTRIAL AND MINIATURE THERMOCOUPLES

#9	PROCESS CONNECTION SIZE & TYPE [1-3]				<b>Note:</b> Threaded bushing may be used for sizes larger than 1/2" NPT	
L	1/8" NPT	O	3/4" NPT	X	Other, specify	
M	1/4" NPT	J	1" NPT	Z	N/A	
A	3/8" NPT	T	1 1/4" NPT			
P	1/2" NPT (Standard) w/ symbols W,S,C, & N from selection #8	Y	1 1/2" NPT			

#10	LEAD WIRE TYPE & LENGTH IN INCHES [SEE SECTION 7]			
Z	No lead wires	7"	Bare wire (AWG per #4)	
1"	Fiberglass braid	8"	PVC coil cord (Relaxed length)	
2"	PVC		(4" standard length for in head bayonet sensors)	
3"	Teflon	S9"	Teflon ultra premium Type T, stranded 22 AWG	
4"	Hi-temp fiberglass braid	X"	Other, specify	
5"	Kapton			

**Note:** Add an S prefix to your selection to designate stranded wire. Preferred for high vibration applications with lead wires > 6". Example: S312= 12" stranded Teflon lead wire. 24 AWG or smaller may be used to accommodate some smaller diameters and flex armor extensions.

#11	ARMOR OR HEAT SHRINK [7-7,16]		A special armor adapter is used when flex armor is longer than 60".	
A	SS flex armor	J	Aluminum mylar shielded and jacketed to match primary insulation	
B	SS flex armor teflon coated white	Z	N/A	
C	SS flex armor teflon coated black	K	SS overbraid, drain, & yellow Teflon jacket overall, 20 AWG stranded (Type K only)	
D	Small 1/8" ID SS flex armor	X	Other, specify	
F	SS overbraid			
G	Heat shrink/sleeving			
H	Jacket to match primary insulation			

#12	TYPE OF TRANSITION [1-16]	
H	Heat shrink	<b>Note:</b> For high humidity/moisture environments (< 500°F), put a 2 after your selection. For example, R2.
S	Size on size	
T	3/8" OD (Standard)	<b>Note:</b> For high temperatures at the transition area (500°F - 1200°F), put a 3 after your selection. For example, T3.
R	1/4" OD	
X	Other, specify	
Z	No transition	

#13	COLD END TERMINATION Choose as many as applicable (Additional options see Pg. 1-7) (Visit our online catalog for additional terminations, <a href="http://www.JMS-SE.com/ends">www.JMS-SE.com/ends</a> )				
Connectors		Heads [6-1] visit <a href="http://www.JMS-SE.com/headspecs">www.JMS-SE.com/headspecs</a>			
B	Miniature plug	Exp. Proof	I	Aluminum, NEMA 4X, FM, CSA, IP68 (6IA)	
C	Standard plug		J	316 SS, NEMA 4X, FM, CSA, IP68 (6ISS)	
F	High temperature plug (< 800°F)		P	Aluminum, NEMA 4X, FM, CSA, ATEX, IECEx, IP68 (6IAIEC)	
WM	Microphone style plug (6DA)		SI	Cast Iron, NEMA 4, UL, CSA (6I)	
D	Miniature jack				
E	Standard jack				
G	High temperature jack (<800°F)				
WF	Microphone style jack (6DA)				
Transmitters			Gen. Purpose	L	Aluminum w/ hinged cover (6L)
8H	Isolated transmitter			M	Aluminum w/ screw cover & chain (6M)
8N	Non-isolated transmitter	R		Aluminum w/ hinged high dome cover (6R)	
8I	Hart protocol	N		Cast Iron w/ screw cover (6N)	
8E	Intrinsically safe	Q		Black plastic (6Q)	
8D	Hart/intrinsically safe	SS		316 SS w/ screw cover & chain (6SS)	
8PS	Indicating with SS Exp. housing	Other			
8PA	Indicating with Alum Exp. housing	A		Bare ends	
		K	Spade lugs (6SL)		
		O	Open terminal block (6B4)		
		X	Other, specify		

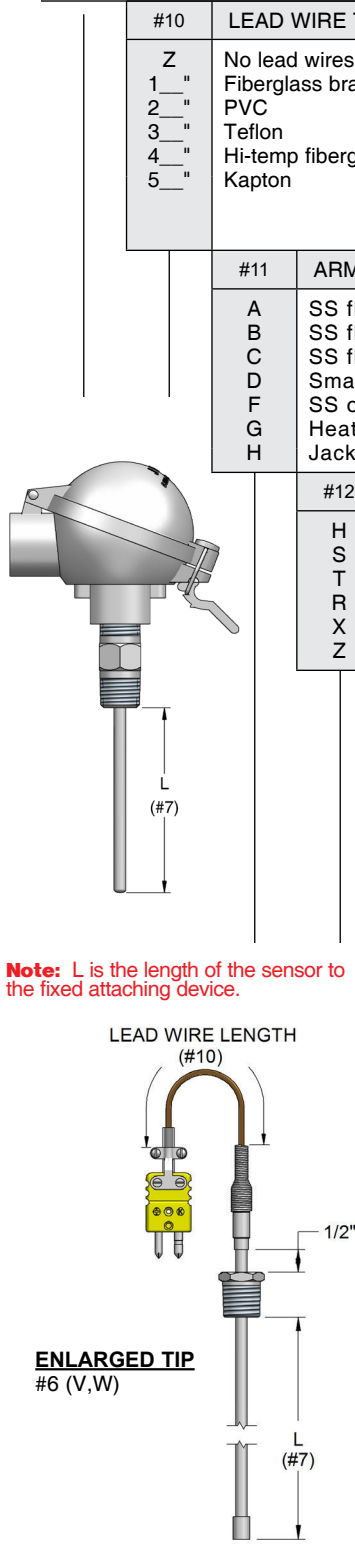
**Note:** Add span range after transmitter selection. Example: 8H(0-200C). Transmitter output=4-20mA. (See section 8 for other options).

#14	OPTIONS Use only if applicable [INTRODUCTION]				
Marking / Tagging		Calibration Options	Certifications		
1	Stainless steel tag	5	Calibrate at specified point(s). Corrections data provided for each point.	8***	Guide 17025 calibration certification
2	Plastic tag	5L*	Standard lot calibration	M	MTR (sheath / tubing / measuring junction components)
3	Paper tag	5M	Material calibration report.	Other Options	
4	Laser etch on probe	6**	Premium calibration report. Corrections data will be provided for temperatures within the range.	B	Head mounting bracket
7	CE marking [page XV]	6L	Premium lot calibration report. Corrections data will be provided for temperatures within the range.	S	Ship straight (Do not coil)
T	Calibration Tag			X	Other, specify

\* AMS 2750D/E/F compliant  
 \*\* Must specify increments & range (Example: 0 to 300°F, 10° increments)  
 \*\*\* Must choose calibration option other than 5M

### COMPLETE PART NUMBER EXAMPLES

- With nipple-union-spring-loaded extension assembly: **1J1BHG12"S[UN6H1]PZZZL1**
- Without extension assembly: **1J1BHG12"SPZZZL1**



P	Z	Z	Z	L	1
---	---	---	---	---	---

# CUSTOM NIPPLE/UNION EXTENSION CONFIGURATOR

An extension assembly provides extra length extending the sensor head past insulation and away from heat. Standard unions are 1/2" FNPT on both ends. The union joins two nipples in an extension assembly and has a standard pressure rating of 150 PSIG.

When a nipple-union-nipple assembly is selected and spring-loading of the thermocouple element is required, there are two different methods of spring-loading the sensor. JMS's standard, recommended method is to use the machined 1/2" x 1/2" NPT spring-loaded stainless steel fitting as one of the nipples. With this design, the probe is secured within the fitting and mounted to the head in a rigid manner instead of spring-loading against a terminal block, as is the case with a standard nipple-union-nipple. Due to stress exerted by spring, selection #8, option N "nipple" should never be used with an in-head transmitter. Any of the other options within option #8 are compatible with in-head transmitters.

**Notes:**

- The standard JMS spring designed specifically for a 1/4" OD sensor is made of high nickel proprietary spring wire which allows users to successfully maintain 1/2" of spring-loading even up to 1000°F.
- Spring-loaded extension assemblies should not be used with ceramic protection tubes.

		#8	COLD SIDE STANDARD INDUSTRIAL ATTACHING DEVICE [1-3, 6-13]		
		X	Other, specify		<p>STANDARD ATTACHING DEVICE (ALREADY SELECTED IN #8)</p>
		Welded design	G	Single Thread (Process)	
			W	Double Threaded	<p>MOST COMMON</p> <p>** L is the overall length of the sensor to the fixed attaching device. Page 1-1, selection #7 for T/Cs or 3-1, selection #6 for RTDs.</p>
		Compression design	H2	SS w/ SS ferrule	
			I2	SS w/ Teflon ferrule	
			J2	SS w/ Lava ferrule	
			K2	SS w/ Nylon ferrule	
			L2	Brass w/ Brass ferrule	
		Spring-loaded design	D	Single threaded	
			C	Double threaded w/ oil seal	
			A	Double w/ threaded retainer	
			N	Nipple (spring-loaded against terminal block)	
			S	Double threaded	
			B	Double threaded Bayonet	
			BS	Double threaded Bayonet w/ oil seal	
			BD	Single threaded Bayonet	
			BDS	Single threaded Bayonet w/ oil seal	
		#8.1	UNION		<p>UNION (#8.1)</p>
		U	Union		
		O	Coupling		
		X	Other, specify		
		<p><b>Note:</b> Thread adapters may be used when symbol #9 is not 1/2" NPT.</p>			
		#8.2	PROCESS FITTING (MALE)		<p>PROCESS FITTING (#8.2)</p>
		N	Nipple		
		X	Other, specify		
		Z	N/A (female thread)		
		<p><b>Note:</b> Thread adapters may be used when symbol #9 is not 1/2" NPT.</p>			
		#8.3	N LENGTH		<p>N (#8.3)</p>
		"	Specify (Inches)*		
		Z	N/A (female thread)		
		<p>* ONLY for configurations with nipples (option N for selection #8 or #8.2) ALL other configurations have fixed lengths and this selection is not applicable.</p>			
		#8.4	UNION and/or NIPPLE MATERIAL		<p>H 304 stainless steel <input checked="" type="checkbox"/> X Other, specify</p> <p>K 316 stainless steel</p> <p>C Black steel</p> <p>G Galvanized steel</p>
		H	304 stainless steel		
		K	316 stainless steel		
		C	Black steel		
		G	Galvanized steel		
		#8.5	UNION PRESSURE RATING		<p>1 #150 - A351 spec (Standard) } ASTM</p> <p>2 #3000 - A182 spec</p> <p>3 #6000 - A182 spec</p> <p>X Other, specify</p>
		1	#150 - A351 spec (Standard)		
		2	#3000 - A182 spec		
		3	#6000 - A182 spec		
		X	Other, specify		

**Note:** High nickel proprietary spring material is rated to 1000°F. (For 1/4" Ø sensors)

S { U N 6" H 1 }

Continue on to the "PROCESS NPT" selection to finish creating your sensor part number. Selection #9 on page 1-2 (thermocouples) and 3-2 (RTDs).

# ADDITIONAL TERMINATIONS

**COLD END TERMINATION** [SEE SECTION 6] Choose as many as applicable (JMS part number prefixes are shown in parenthesis)

**Connectors**

<b>Plugs</b>		<b>Jacks</b>	
B	Miniature plug (6A1B)	D	Miniature jack (6A1D)
BH	Miniature high temperature plug (6A2B) <800°F	DH	Miniature high temperature jack (6A2D) <800°F
C	Standard plug (6A1C)	E	Standard jack (6A1E)
F	Standard high temperature plug (6A2C) <800°F	G	Standard high temperature jack (6A2E) <800°F
WM	Microphone style plug (6DA)	WF	Microphone style jack (6DA)
WA	Solid pin plug, heavy duty (6A3C)	WB	Solid pin jack, heavy duty (6A3E)
WC	Jab in plug (6A4C)	WD	Jab in jack (6A4E)
WE	Ultra high temperature plug, glazed (6A5C) <1200°F	WG	Ultra high temperature jack, glazed (6A5E) <1200°F
WH	Ultra high temperature plug, unglazed (6A7C) <1200°F	WI	Ultra high temperature jack, unglazed (6A7E) <1200°F
WJ	Low noise plug (6A6C) <425°F	WK	Low noise jack (6A6E) <425°F
WL	DIN-IEC microphone plug (6DB)	WN	DIN-IEC microphone style jack (6DB)
V	Molded/water resistant plug (6DC)	VF	Molded/water resistant jack (6DC)
Y	M12 Male connector (6DY)	YF	M12 Female connector (6DY)
WQ	Miniature locking plug (6A8B2)	WR	Miniature locking jack (6A1DL2)
WS	Standard plug, locking (6A8C2)	WT	Standard jack, locking (6A8E2)

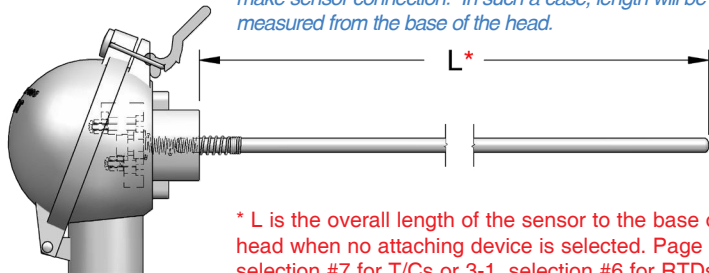
**Heads** [6-1] Visit [www.JMS-SE.com/headspecs](http://www.JMS-SE.com/headspecs)

<b>Explosion Proof</b>	
I	Aluminum, NEMA 4X, FM, CSA, IP68 (6IA)
J	316 stainless steel, NEMA 4X, FM, CSA, IP68 (6ISS)
P	Aluminum, NEMA 4X, FM, CSA, ATEX, IECEx, IP68 (6IAIEC)
U	316 stainless steel, NEMA 4X, ATEX, IP68 (6ISSATEX)
SI	Cast Iron, NEMA 3, 4, UL, CSA (6I)
GA	Aluminum, screw cover w/ indicating window, NEMA 4X, ATEX, IECEx, FM, CSA, IP68 (688A1)
GS	316SS, screw cover w/ indicating window, NEMA 4X, ATEX, IECEx, FM, CSA, IP68 (688S1)

<b>General Purpose</b>	
L	Aluminum w/ hinged cover (6L)
M	Aluminum w/ screw cover & chain (6M)
R	Aluminum w/ hinged high dome cover (6R)
N	Cast Iron w/ screw cover (6N)
Q	Black plastic (6Q)
SS	316 stainless steel w/ screw cover & chain (6SS)
WP	White plastic, screw cover, Sanitary (6WP)
SB	Nickel plated, cylinder style, 1/4" NPT (6S250)
SD	Nickel plated, cylinder style, 1/8" NPT (6S125)
SC	Stainless steel, socket cap style
ST	Molded plastic, mini head, 1/4" NPT, < 350F (6T)
SU	Molded plastic, mini head, 1/4" NPT, < 800F (6U)

*Some applications may have pre-existing threaded pipes or protection tubes where no attaching device is needed to make sensor connection. In such a case, length will be measured from the base of the head.*



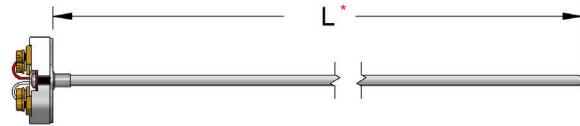
\* L is the overall length of the sensor to the base of the head when no attaching device is selected. Page 1-1, selection #7 for T/Cs or 3-1, selection #6 for RTDs.

**Transmitters** [ 8-1 to 8-3 ] **Notes:** - Add span range after transmitter selection. Example: 8H(0-200C).  
- Transmitter output = 4 - 20 mA. (See section 8 for other options).

8H	Isolated transmitter	8PA	Explosion proof, IP66/IP68, NEMA 4X, ATEX/IECEx, FM/CSA, Aluminum, threaded cap with glass viewing window, touch programmable [ 8-2 ]
8N	Non-isolated transmitter		
8I	Hart Protocol	8PS	Explosion proof, IP66/IP68, NEMA 4X, ATEX/IECEx, FM/CSA, 316 SS, threaded cap with glass viewing window, touch programmable [ 8-2 ]
8E	Intrinsically safe		
8D	Hart/Intrinsically safe		
8M	Integral transmitter (see page 3-5)		<b>RTDs ONLY</b>

**Other**

A	Bare ends		
K	Spade lugs (6SL)		
RL	Ring lugs (6RL)		
O	Open ceramic terminal block, brass screw terminal (6B)		
OA	Open Bakelite terminal block, nickel plated screw terminal (6BB)		
OB	Open ceramic terminal block for sensors with bayonet style connection, brass screw terminal (6B or 6C)		
OG	Ceramic terminal block, brass screw terminal (6G)		
OP	Pluggable polyimide terminal block, nickel plated screw terminal (6PT)		
OS	Open ceramic terminal block, nickel plated solder terminal (6C)		
CG	Cord connector/grip, aluminum 1/2" NPT (6CC)		
TB	Conduit bushing, 3/4" NPT male X 1/2" NPT female, plated steel (6IRB)		
X	Other, specify		



\* L is the overall length of the sensor to the base of the terminal block mounting plate when open terminal block cold end termination is selected without a fixed attaching device. Page 1-1, selection #7 for T/Cs or 3-1, selection #6 for RTDs.

# CERAMIC PROTECTION TUBES

Alumina, Mullite and Hexoloy SE protection tubes are used at high temperatures that have a small slope of temperature change. Any thermocouple type can be used in these ceramic tubes; however, Platinum-Rhodium and Chromel-Alumel are used most often due to their high operating temperature range. "Alumina" is an Aluminum Oxide ceramic (99.7% Al<sub>2</sub>O<sub>3</sub>). "Mullite" is a compound of Alumina and Silica (Silicon Carbide). "Hexoloy" is a sintered alpha Silicon Carbide. Alumina tubes can be used at 3400°F (1870°C), Mullite tubes can be used at 3100°F (1700°C) and Hexoloy will not slump at 3000°F (1648°C) even under load. Alumina and Mullite tubes are somewhat gas tight, sensitive to thermal shock, and can crack if one end of the tube is heated at a different rate than the other. If the tubes are exposed to a significant sharp decline or rise in temperature, they may crack. Hexoloy has excellent thermal shock resistance, universal corrosion resistance and exceptional wear with high strength and extreme hardness for severe environment applications. It is not gas tight.

Platinum-Rhodium thermocouples should always be protected in ceramic protection tubes. Alumina should be used rather than Mullite for all atmospheres, except oxidizing, where Mullite can be used. The Silicon from the Mullite can contaminate the Platinum-Rhodium thermocouple.

We recommend that the user preheat the entire tube to ≈ 900°F before installing it into a hot process environment.

#1	DESCRIPTION					
5D	Ceramic protection tubes - Add a W here for a brass cap and stainless steel chain attached to threaded protection tubes only (Example: 5DW)					
	#2	MATERIAL				
	A	Alumina	G	Alumina/Mullite 60/40		
	M	Mullite	X	Other, specify		
	H	Hexoloy SE Silicon Carbide				
	#3	ATTACHING DEVICE (See illustrations to the right and below)				
	O	No fitting				
	P	Open both ends, no fitting				
	C	Collar (See collar OD dimensions below in option #4)				
	B*	Hex bushing (Std for option #4 selections: 14, 38, 76 & 12)				
	S*	Carbon steel sleeve (Std for option #4 selections: 34 & 10)				
	X*	Other, specify				
	#4	TUBE SIZE				
		Tube ID x OD		NPT*		Collar OD
		Alumina Mullite	Hexoloy	Hex Bushing	CS Sleeve	Alumina Mullite Hexoloy
	14**	1/4" x 3/8"	1/4" x 3/8"	3/4"	1/2"	5/8" 5/8"
	38**	3/8" x 1/2"	3/8" x 5/8"	3/4"	1/2"	3/4" 1"
	76	7/16" x 11/16"	N/A	3/4"	3/4"	1" N/A
	12	1/2" x 3/4"	1/2" x 3/4"	3/4"	3/4"	1-1/8" 1-1/8"
	34***	3/4" x 1"	3/4" x 1-1/4"	1"	1"	1-3/8" 1-3/4"
	10***	1" x 1-1/4"	1" x 1-1/2"	1-1/4"	1-1/4"	1-3/4" 2"
	X	Other, Specify				
	#5	OVERALL LENGTH (L)				
	A	6"				
	B	12" (Standard)				
	C	18"				
	D	24" (Standard)				
	E	30"				
	F	36"				
	L_ "	Other, specify				
	#6	TAGGING OPTIONS				
	1	Tag # is indelibly marked on well or attaching device (Standard)				
	X	Other				
	M	MTR				

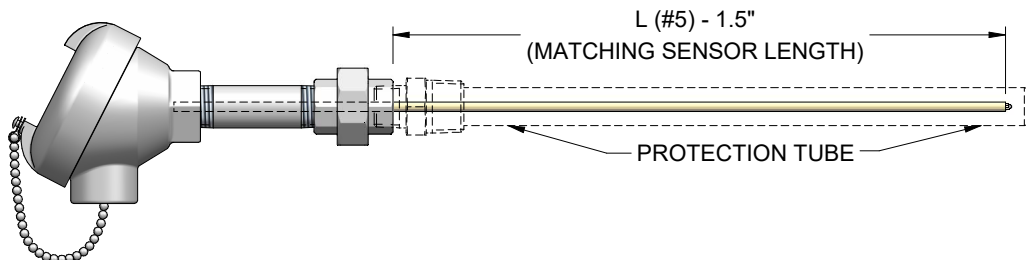
\* NPT process connection thread sizes are shown in option #4 and can be used to attach to process equipment, flanges, and/or threaded bushings. (Use X in symbol number 3 and describe flanges and nonstandard bushings).

\*\* Standard Attaching Device selection in #3 is Hex Bushing (B).

\*\*\* Standard Attaching Device selection in #3 is Carbon Steel Sleeve (S).

## MATCHING SENSOR LENGTHS

### ATTACHING DEVICE B



**Note:** Do NOT use spring-loaded sensors in ceramic protection tubes.

5D	A	B	12	B	1
----	---	---	----	---	---