Mineral Insulated (MI)

Watlow's mineral insulated (MI) thermocouples are fast-responding, durable and capable of handling high temperatures.

Manufactured with best-in-class XACTPAK®, Watlow's trademark for metal sheathed, mineral insulated (MI) thermocouple material, XACTPAK responds fast because the protective metal outer sheath allows use of smaller diameter thermocouple conductors. The rock hard compacted MgO insulation further enhances the sensor's ability to "read" temperature by transferring heat quickly to the measuring junction.

The XACTPAK protecting sheath and compacted insulation outperform bare wire thermocouples in most applications.

Performance Capabilities

- Easily handles temperatures up to 2200°F (1200°C)
- Meets or exceeds initial calibration tolerances per ASTM E 230

Features and Benefits

Special mineral insulation

- Protects thermocouple from moisture and thermal shock
- Permits operation in high temperature, high pressure environments

Diameters as small as 0.020 in. (0.50 mm)

- Ideal when physical space or extremely fast response are critical

Flexibility of the XACTPAK material

- Allows forming and bending of the thermocouple, without risk of cracking, to meet design requirements

Outer sheath

- Protects wires from oxidation and hostile environments

Wide range of sheath materials, diameters and calibrations

- Meet specific requirements

In-house manufacturing of XACTPAK material

- Rigid quality control procedures
- Ensures high standards are met
- Single source reliability

Custom capabilities

- Include options such as special lead lengths, lead wires and terminations

Typical Applications

- Heat treating
- Furnaces/kilns
- Turbines
- Bearing temperature
- Power stations
- Steam generators
- Diesel engines
- Nuclear reactors
- Atomic research
- Jet engines and test cells
- Rocket engines
- Semiconductor manufacturing
- Refineries/oil processing
- Catalytic reformers
- Food processing

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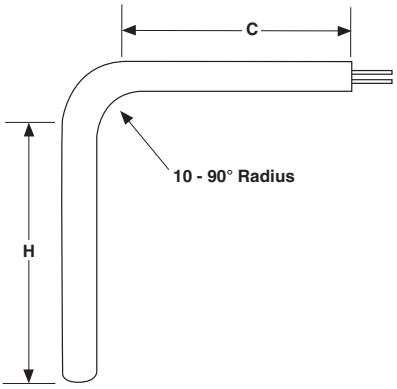
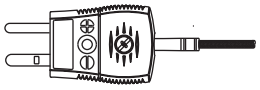
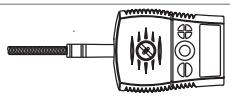
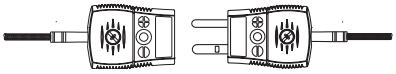
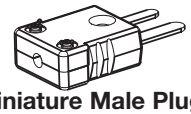
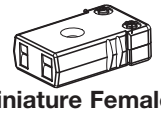
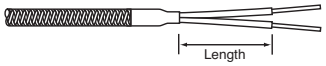
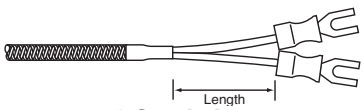
Bends

Diameter in.	Standard Bend Radius in.	Minimum "H" Dimension in.	Minimum "C" Dimension in.
0.063	3/16	1/2	1 1/2
0.090	1/4	3/4	1 1/2
0.125	3/8	1	2
0.188	1/2	1	2
0.250	3/4	2	2
0.313	1 1/4	2	2
0.375	1 1/2	3	2
0.500	2	4	2



Lead Terminations

Termination	Code	Length
 Standard Male Plug	A	—
 Standard Female Jack	B	—
 Standard Male Plug with Mating Connector	C	—
 Miniature Male Plug	F	—
 Miniature Female Jack	G	—
 Miniature Male Plug with Mating Connector	H	—
 Split Leads	T	1 1/2
 #8 Spade Lugs	U	1 1/2

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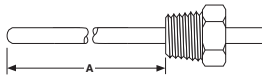
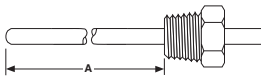
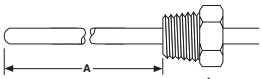
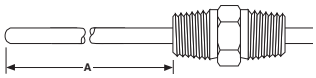
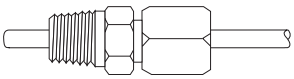
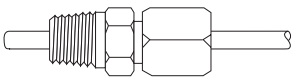
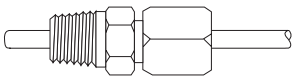
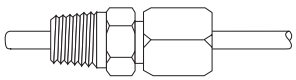
Fitting Options
Fixed Fittings

Fitting Type	Material	Sheath Size in.	NPT Thread Size in.	Hex Size in.	Length in.	Code
 **Fixed Single Thread ⅛ NPT** Customer Specified	303 SS	0.063 to 0.250	1/8	7/16	11/16	A
 **Fixed Single Thread ¼ NPT** Customer Specified	303 SS	0.125 to 0.250	1/4	9/16	7/8	B
 **Fixed Single Thread ½ NPT** Customer Specified	303 SS	0.125 to 0.250	1/2	7/8	1	D
 **Fixed Double Thread ½ NPT** Customer Specified	303 SS	0.125 to 0.250	1/2	7/8	1 3/4	F

Compression Fittings

Fitting Type	Material	Sheath Size in.	NPT Thread Size in.	Hex Size in.	Length in.	Code
 **Non-Adjustable Compression Brass**	Brass	0.125	1/8	1/2	1	J
		0.188	1/8	1/2	1 1/8	J
		0.250	1/8	1/2	1 3/16	J
 **Non-Adjustable Compression SS**	303 SS	0.063	1/8	1/2	1 1/4	L
		0.125	1/8	1/2	1 1/4	L
		0.188	1/8	1/2	1 5/16	L
		0.250	1/8	1/2	1 5/16	L
 **Adjustable Compression TFE Gland**	303 SS	0.063	1/8	1/2	1 1/4	G
		0.125	1/8	1/2	1 1/4	G
		0.188	1/8	1/2	1 1/4	G
		0.250	1/4	7/8	2 7/16	X
 **Adjustable Compression Lava Gland**	303 SS	0.063	1/8	1/2	1 1/4	Q
		0.125	1/8	1/2	1 1/4	Q
		0.188	1/8	1/2	1 1/4	Q
		0.250	1/4	7/8	2 7/16	V

Compression Fittings: Compression fittings are shipped finger-tight on the sheath allowing field installation. Once non-adjustable fittings are deformed, they cannot be relocated. Adjustable fittings come with tetrafluorethylene (TFE) sealant or lava sealant glands.

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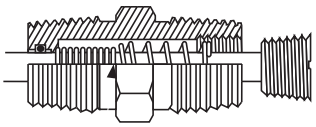
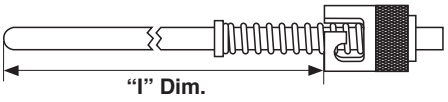
Fitting Options (Continued)

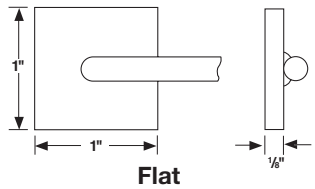
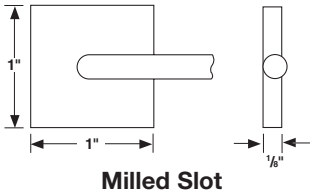
Adjustable Spring Loaded

Fitting Type	Material	Sheath Size in.	NPT Thread Size in.	Hex Size in.	Length in.	Code
	316 SS	0.250	1/2	7/8	2	H

Bayonet Lockcap and Spring

Fitting Type	Material	Sheath Size in.	Length in.	Code
	Plated Steel	0.125	1 5/8	W
	Plated Steel	0.188	1 5/8	W
	Plated Steel	0.063	1 5/8	W

Weld Pads

Weld Pad Type	Material	Code
 Flat	304 SS*	2
 Milled Slot	304 SS	5

*Alloy 600 available on special order and recommended for use with alloy 600 sheath.

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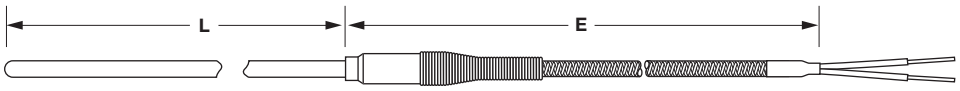
Metal Transitions with Spring Strain Relief Style AF



Ordering Information

Part Number

①	②	③	④	⑤	⑥	⑦	⑧ ⑨	⑩	⑪	⑫	⑬ ⑭	⑮
	Style	Sheath O.D.	Lead Wire Const.	Fittings, Weld Pads	Lead Wire Term.	Sheath Material	Sheath Length "L" (whole in.)	Sheath Length "L" (fract. in.)	Junction	Calibration	Lead Wire Length "E" (whole ft)	Special Rqmts.
A	F											

② Style	
F =	Metal transition with strain relief and 300°F (149°C)

③ Sheath O.D. (in.)	
B =	0.020
C =	0.032
D =	0.040
E =	0.063
G =	0.125
H =	0.188
J =	0.250

④ Lead Wire Construction				
		Standard	Overbraid	Flex Armor
Fiberglass	Solid	A	J	R
FEP	Solid	C	L	T
Fiberglass	Stranded*	B	K	S
FEP	Stranded*	D	M	U

*Stranded lead wire available only for sheath O.D. 0.063 in. and larger.

⑤ Fittings, Weld Pads	
0 =	None

Notes: If required, enter code from pages ??. If none, enter "0."
Weld pads available for 0.063 in. and larger.

⑥ Lead Wire Termination	
A =	Standard male plug
B =	Standard female jack
C =	Standard plug with mating connector
F =	Miniature male plug
G =	Miniature female jack
H =	Miniature plug with mating connector
T =	Standard, 1 1/2 in. split leads
U =	1 1/2 in. split leads with #8 spade lugs

⑦ Sheath Material	
A =	304/304L SS
F =	316/316L SS
C =	PFA coated over 304/304L SS (available on G, H and J diameter)
E =	316/316L SS with Teflon® encapsulation
Q =	Alloy 600 (Type K)

⑧ ⑨ Sheath Length "L" (whole in.)
Available lengths: 01 to 99, for lengths over 99 inches contact factory. Maximum length for PFA coating is 48 in.

⑩ Sheath Length "L" (fractional in.)	
0 =	0
4 =	1/2

⑪ Junction			
	Grounded	Ungrounded	Exposed
Single	G	U	E
Dual*	H	W (isolated)	D (isolated)

*Only available for 0.063 in. diameter and larger.

⑫ Calibration				
	E	J	K	T
Standard limits	E	J	K	T
Special limits	2	3	4	8

⑬ ⑭ Lead Wire Length "E" (whole feet)
Available lengths: 01 to 30, for lengths over 30 contact factory

⑮ Special Requirements	
0 =	Standard 300°F (149°C)
H =	High temperature 1000°F (538°C) potting
M =	500°F (260°C)