General MgO Specifications

The information contained in the following pages is intended as a guideline only for general sensor usage. The specific application and the enviornmental conditions may require that other sensor sheath materials, diameters, or construction styles be used to provide optimum temperature measurement results. The dimensions, temperature ratings, and response times indicated are nominal, and they may vary in actual practice.

Thermocouple Types and Sizes

SHEATH DIAMETER (inches) - AWG WIRE SIZE									
TYPE	MATERIAL	0.020 O.D.	0.032 O.D.	0.040 O.D.	1/16 O.D.	1/8 O.D.	3/16 O.D.	1/4 O.D.	3/8 O.D.
E	Chromel-Constantan	38	35	32	30	24	21	19	15
J	Iron-Constantan	38	35	32	30	24	21	19	15
K	Chromel-Alumel	38	35	32	30	24	21	19	15
T	Copper-Constantan	38	35	32	30	24	21	19	15
N	Nicrosil-Nisil	38	35	34	-	29	21	19	15

Recommended Upper Temperature Limits For Protected Thermocouples
Upper Temperature Limits (F) For Various Sheath & Diameter Combinations

TYPE	SHEATH MATERIAL	SHEATH DIAMETER (inches)					
		0.020, 0.032, 0.040	1/16	1/8	3/16	1/4	3/8
		TEMPERATURE RANGE					
J	*316 S.S.*	(0 to 260) °C [32 to 500] °F	(0 to 441) °C [32 to 825] °F	(0 to 521) °C [32 to 970] °F	(0 to 621) °C [32 to 1150] °F	(0 to 721) °C [32 to 1330] °F	(0 to 721) °C [32 to 1330] °F
K or N		(0 to 700) °C [0 to 1290] °F	(-200 to 921) °C [-328 to 1690] °F	(-200 to 927) °C [-328 to 1700] °F	(-200 to 927) °C [-328 to 1700] °F	(-200 to 927) °C [-328 to 1700] °F	(-200 to 927) °C [-328 to 1700] °F
E		(-200 to 260) °C [-328 to 570] °F	(-200 to 510) °C [-328 to 950] °F	(-200 to 649) °C [-328 to 1200] °F	(-200 to 732) °C [-328 to 1350] °F	(-200 to 821) °C [-328 to 1510] °F	(-200 to 821) °C [-328 to 1510] °F
T		(-200 to 260) °C [-324 to 500] °F	(-200 to 260) °C [-328 to 500] °F	(-200 to 371) °C [-328 to 700] °F	(-200 to 371) °C [-328 to 700] °F	(-200 to 371) °C [-328 to 700] °F	(-200 to 371) °C [-328 to 700] °F
K or N	*ALLOY 600*	(0 to 700) °C [0 to 1290] °F	(-200 to 921) °C [-328 to 1690] °F	(-200 to 1071) °C [-328 to 1960] °F	(-200 to 1149) °C [-328 to 2100] °F	(-200 to 1149) °C [-328 to 2100] °F	(-200 to 1149) °C [-328 to 2100] °F
E		(-200 to 300) °C [-328 to 570] °F	(-200 to 510) °C [-328 to 950] °F	(-200 to 649) °C [-328 to 1200] °F	(-200 to 732) °C [-328 to 1350] °F	(-200 to 821) °C [-328 to 1510] °F	(-200 to 821) °C [-328 to 1510] °F

This table gives the suggested upper temperature limits for various thermocouples in several common sheath sizes. It does not address compatibility considerations between the thermoelement materials and the sheath containing them. The temperature limits given here are intended only as a guide to the purchaser 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, life or both. In other instances, it may be necessary to reduce the given limits in order to achieve adequate service.

HOT or MEASURING JUNCTIONS and RESPONSE TIMES

UNGROUNDED JUNCTION (U)
The welded thermocouple junction is fully isolated from the welded closure of the sheath. This junction provides electrical isolation to reduce problems associated with electrical interference. Ungrounded junctions are also recommended for use in extreme positive or negative temperatures, rapid thermal cycling and for ultimate corrosion resistance of the sheath alloy. Ungrounded junctions exceed 1000 MΩ resistance @ 500 V dc at ambient room temperatures for diameters 1/16 inch and larger.

SHIELDED JUNCTION (S)
The thermocouple wires are welded and recessed inside the sheath with the tip of the sheath open. Insulation is not sealed against process conditions.

GROUNDED JUNCTION (G)
The thermocouple junction is welded securely into the closure end of the sheath, becoming an integral part of the weld. This is a good general purpose, low cost junction providing faster response times than an un-grounded junction of similar sheath diameter. Grounded junctions should not be used with Type T thermocouples, due to the copper wire.

EXPOSED JUNCTION (E)
The thermocouple wires are welded and exposed. The insulation is not sealed against liquid or gas penetration. Recommended where fast response is desired, and corrosive conditions are nonexistent. The exposed hot junction length for 1/8-inch diameter sheaths and above is typically 3/16" past sheath. The exposed junctions for sheath diameters less than 1/8-inch diameter are supplied as shielded junctions.

Typical Junction Response Times (63.2% of a (25 to 100) °C Step Change)

SHEATH O.D. (inches)	"E" JUNCTION (seconds)	"G" JUNCTION (seconds)	"U" JUNCTION (seconds)
0.020	0.02 s	0.03 s	0.24 s
0.032	0.03 s	0.05 s	0.26 s
0.040	0.03 s	0.06 s	0.28 s
1/16	0.01 s	0.3 s	0.4 s
1/8	0.1 s	0.6 s	1.6 s
3/16	0.2 s	0.9 s	2.4 s
1/4	0.3 s	1.3 s	2.9 s
3/8	0.4 s	3.5 s	7.2 s