

THERMOCOUPLE CODES/CONDUCTOR COMBINATIONS & CHARACTERISTICS

Approximate generated EMF change per degree Fahrenheit change with reference junction at 0°F.

Approximate working temperature range of measuring junction..

National standards for output of thermocouple conductors.

Those standards noted in this column all conform with each other and are based upon IPTS 1968 & IEC 584.1:1977.

National color coding for insulation of thermocouple and extension cable (and compensating cable where noted as such).

AMERICAN TO ANSI/MC96.1	ENGLISH TO BS 1843	GERMAN TO DIN 43714	JAPANESE TO JIS C 1610-1981	FRENCH TO NR C 42-323



NOTES

CODE	CONDUCTOR COMBINATIONS		μV/°F at			°F		National standards for output of thermocouple conductors.	National color coding for insulation of thermocouple and extension cable (and compensating cable where noted as such).					NOTES	
	+leg	-leg	212°F	932°F	1832°F	Continuous	Short Term		AMERICAN TO ANSI/MC96.1	ENGLISH TO BS 1843	GERMAN TO DIN 43714	JAPANESE TO JIS C 1610-1981	FRENCH TO NR C 42-323		
K	NICKEL-CHROMIUM Also known as: *Chromel, Ni-Cr, *T1.	NICKEL-ALUMINUM (magnetic) Also known as: Ni-Al, *Alumel, KN, *T2.	23.33	23.89	21.67	32 to +2012	-292 to +2462	ANSI/MC96.1 Type "K" BS4937 part 4 DIN 43710 JIS C 1602 NF C 42-321.						Wide range and most commonly used. ANSI/MC96.1 Type "K" replaced circular 561	
V	COPPER	COPPER-NICKEL Also known as: Constantan, Nickel	Used for interconnecting Type "K" thermocouples and instrumentation as an alternative to Type "K" material. Only used where the interconnection temperature is in the range of 32°F to +176°F.											Color coded for use as a compensating cable for Type "K" thermocouples. In fact, Type "T" conductors are incorporated and therefore excepting that the color coding will be incorrect this compensating cable can also be used for extending Type "T" thermocouples.	
T	COPPER	COPPER-NICKEL Also known as: Nickel, *Cupron, Constantan	25.55	—	—	-301 to -572	-482 to +752	ANSI/MC96.1 Type "T" BS4937 part 5 JIS C 1602 NF C 42-321.						Many low temperature and cryogenic applications. Suitable for use in a mildly oxidizing or reducing atmosphere as an unprotected thermocouple sensor. ANSI/MC96.1 Type "T" replaced circular 561.	
J	IRON (magnetic) Also known as Fe	COPPER-NICKEL Also known as: Constantan, *Cupron	25.55	31.11	32.78	+68 to +1292	-292 to +1382	ANSI/MC96.1 Type "J" BS4937 part 3 JIS C 1602 NF C 42-321.						Commonly used in the plastics molding industry. Used in reducing atmospheres as an unprotected thermocouple sensor. NB Iron rusts at low and oxidizes at high temperatures. ANSI/MC96.1 Type "J" replaced circular 561.	
E	NICKEL-CHROMIUM Also known as: *Chromel, Chromium Nickel	COPPER-NICKEL Also known as: Nickel, Copper, Constantan	37.78	45	—	32 to +1472	—	ANSI/MC96.1 Type "E" BS4937 part 6 DIN 43710 JIS C 1602 NF C 42-321.						Highest thermal EMF output change/°F. Suitable for use in a vacuum or mildly oxidizing or reducing atmosphere as an unprotected sensor. ANSI/MC96.1 Type "E" replaced circular 561.	
N	NICKEL-CHROMIUM-SILICON Also known as Nicrosil	NICKEL-SILICON-MAGNESIUM Also known as Nisil	16.67	21.11	21.67	32 to +2012	-454 to +2372							This combination show good promise as an alternative to Type "K". Appears to be more stable and longer lived.	
R	PLATINUM-13% RHODIUM	PLATINUM	4.45	5.56	7.23	32 to +1600	-58 to +3092	ANSI/MC96.1 Type "R" BS4937 part 2 DIN 43710 JIS C 1602 NF C 42-321.						Used for high temperature applications. Has high resistance to oxidation and corrosion. Easily contaminated and normally requires protection. ANSI/MC96.1 Type "R" replaced circular 561.	
S	PLATINUM-10% RHODIUM	PLATINUM	4.45	5.00	6.11	32 to +2822	-58 to +3092	ANSI/MC96.1 Type "S" BS4937 part 1 DIN 43710 JIS C 1602 NF C 42-321.						See Type "R" above. ANSI/MC96.1 Type "S" replaced circular 561.	
B	PLATINUM-30% RHODIUM	PLATINUM-6% RHODIUM	.56	2.78	5.00	+212 to +2912	+122 to +3182	ANSI/MC96.1 Type "B" BS4937 part 7 DIN IEC B8 JIS C 1602 NF C 42-321.						See Type "R" above. Commonly used in glass industry. Copper vs copper compensating cable can be used for normal ambient interconnection temperatures up to 100°C. ANSI/MC96.1 Type "B" replaced circular 561.	
U	COPPER	COPPER-LOW VALUE NICKEL Also known as Nickel	Used for interconnecting Type "R" and "S" thermocouples and instrumentation. Only used where the interconnection temperature is in the range of 32°F to +122°F.												This is a compensating cable only and is used with Types "R" and "S" measuring thermocouple sensors.
W	TUNGSTEN	TUNGSTEN-26% RHENIUM	2.78	8.89	11.67	+68 to +4172	32 to +4712							Tungsten Rhenium alloy combinations offer reasonable high and relatively linear EMF outputs for high temperature measurement up to 4712°F and good chemical stability at high temperatures in hydrogen, inert gas and vacuum atmospheres. They are not really practicable for use below 752°F. Not recommended for use in oxidizing conditions. Suggested compensating cables follow.	
W₅	TUNGSTEN-5% RHENIUM	TUNGSTEN-26% RHENIUM	8.34	10	10	+68 to +4172	32 to +4712								
W₃	TUNGSTEN-3% RHENIUM	TUNGSTEN-25% RHENIUM	7.23	11.11	11.11	+68 to +3632	32 to +3812								

Thermocouple Combination	Compensating Cable Combination	
	+LEG	-LEG
W	ALLOY 200*	ALLOY 226*
W5	ALLOY 405*	ALLOY 426*
W3	ALLOY 203*	ALLOY 225*

‡These codes have not been adopted Nationally or Internationally.

#Trade Name

‡With reference to ANSI/MC96.1 color coding, it is noted that a brown overall sheath color, replacing that shown, denotes the incorporation of thermocouple grade conductors where relevant. However, cables available from us incorporate thermocouple grade conductors as standard within the color coding illustrated where relevant.

* These color codes normally relate only to the compensating cable for use with the appropriate thermocouple conductor combination type code.