



Aavad Thermocouple Color Codes

THERMO- COUPLE TYPE	ALLOY COMBINATION	U.S. & CANADIAN (ANSI/MC96.1, ANSI/ASTM E230)		PLUG & JACK	International	International	Czech British	Netherlands German	Japanese	French
		THERMOCOUPLE GRADE	EXTENSION GRADE		IEC 584-3	IEC 584-3 Inherently Safe	BS 1843	DIN 43710	JIS C 1510	NFC 42-324
T	Copper Constantan (Copper-Nickel)	Brown Blue Red	Blue Blue Red	Blue	Brown Brown White	Blue Brown White	Blue White Blue	Brown Red Brown	Brown Red White	Blue Yellow Blue
J	Iron (imprecise) Constantan (Copper-Nickel)	Brown White Red	White Black Red	Black	Black Black White	Blue Black White	Black Yellow Blue	Blue Red Blue	Yellow Red White	Black Yellow Black
E	Nickel - Chromium Constantan (Copper-Nickel)	Brown Purple Red	Purple Purple Red	Purple	Purple Purple White	Blue Purple White	Brown Brown Blue	Black Red Black	Purple Red White	Purple Yellow Purple
K	Nickel - Chromium Nickel - Aluminum (magnetic)	Brown Yellow Red	Yellow Yellow Red	Yellow	Green Green White	Blue Green White	Red Brown Blue	Green Red Green	Blue Red White	Yellow Yellow Purple
N	Nicrosil (Nickel-Chromium-Silicon) Nisil (Nickel-Silicon-Magnesium)	Brown Orange Red	Orange Orange Red	Orange	Pink Pink White	Blue Pink White	Orange Orange Blue	No Standard (Use American Color Codes)	No Standard (Use American Color Codes)	No Standard (Use American Color Codes)
S	Platinum Rhodium - 10% Platinum	None Established	Black Green Red	Green	Orange Orange White	Blue Orange White	Green White Blue	White Red White	Black Red White	Green Yellow Green
R	Platinum Rhodium - 13% Platinum	None Established	Black Green Red	Green	Orange Orange White	Blue Orange White	Green White Blue	White Red White	Black Red White	Green Yellow Green
B	Platinum Rhodium - 30% Platinum Rhodium - 6%	None Established	Gray Gray Red (Compensated Cable)	White (Uncompensated)	Gray Gray White (Compensated Cable)		No Standard (Use Copper Wire)	Gray Red Gray (Compensated Cable)	Gray Red Gray (Compensated Cable)	No Standard (Use American Color Codes)
C	Tungsten Rhenium - 5% Tungsten Rhenium - 26%	None Established	Green Red Red	Red				No Standard (Use American Color Codes)	No Standard (Use American Color Codes)	No Standard (Use American Color Codes)

Aavad Thermocouple Temperature Capacity

ANSI LETTER	LEG*	METALLIC COMPOSITION	MELTING POINT		USABLE TEMPERATURE RANGE (LONG TERM)	TOLERANCES (THE GREATER OF BASE OR % OF READING)	
			°F	°C		**STANDARD	PREMIUM
B	P N	PLATINUM +30% RHODIUM PLATINUM +6% RHODIUM	3320	1825	400 TO 3050°F 200 TO 1680°C	±0.5%	NOT SET
C***	P N	(TUNGSTEN +5% RHENIUM) (TUNGSTEN +26% RHENIUM)	4500	2480	30 TO 4200°F 0 TO 2300°C	NOT ESTABLISHED SEE IPTS-90	N.A.
E	P N	CHROMEL® CONSTANTAN	2230	1220	-300 TO 850°F -200 TO +450°C	±1.7°C or ±0.5%	+ 1.0° C or ±0.4%
J	P N	IRON CONSTANTAN	2230	1220	30 TO 700° F 0 TO 400°C	±2.2°C or ±0.75%	+ 1.1° C or ±0.4%
K	P N	CHROMEL, ALUMEL,	2550	1400	-300 TO 1800°F -200 TO 1000°C	±2.2°C or ±0.75%	+ 1.1° C or + ±0.4%
N	P N	NICROSIL NISIL	2440	1340	30 TO 1800°F 0 TO 1000°C	±2.2°C or ±0.75%	+ 1.1° C or ±0.4%
R	P N	PLATINUM +13% RHODIUM PURE PLATINUM	3215	1770	400 TO 2700°F 200 TO 1500°C	±1.5°C or ±0.25%	±0.6° C or ±0.1%
S	P N	PLATINUM +10% RHODIUM PURE PLATINUM	3215	1770	400 TO 2700°F 200 TO 1500°C	±1.5°C or ±0.25%	±0.6° C or ±0.1%
T	P N	COPPER CONSTANTAN,	1980	1080	-450 TO 660°F -270 TO 350°C	±1.0° or ±0.75%	± 0.5°C or ±0.4%

PT-100 Accuracy Classes & Tolerances In Defined by IEC 60751

Temperature (°C)	Resistance Value (Ω)	1/3B		A		B		2B	
		°C	Ω	°C	Ω	°C	Ω	°C	Ω
-40	84.27	-	-	-	-	±0.5	±0.25	±1.0	±0.4
0	100.00	±0.10	±0.04	±0.15	±0.06	±0.3	±0.12	±0.6	±0.24
100	138.51	±0.27	±0.10	±0.35	±0.14	±0.8	±0.30	±1.6	±0.61
200	175.86	±0.44	±0.16	±0.55	±0.20	±1.3	±0.48	±2.6	±0.96
300	212.05	-	-	±0.75	±0.27	±1.8	±0.64	±3.6	±1.28
400	247.09	-	-	±0.95	±0.33	±2.3	±0.79	±4.6	±1.59
500	280.98	-	-	-	-	±2.8	±0.93	±5.6	±1.87

Aavad Thermocouple Platinum Wire Weight

**Thermocouple type
& weight in gram per meter.

ELEMENT DIAMETER IN MM	S	R	B
0.1000	0.325	0.322	0.295
0.2000	1.295	1.283	1.178
0.3000	2.922	2.895	2.659
0.3300	3.634	3.6	3.306
0.3500	3.982	3.945	3.622

ELEMENT DIAMETER IN MM	S	R	B
0.4000	5.2	5.151	4.731
0.5000	8.118	8.043	7.386
0.6000	11.675	11.566	10.623
0.7000	15.909	15.76	14.475
0.7500	19.272	19.093	17.535

Aavad RTD Temperature Table

Temperature Table for RTD Sensor								According to IEC 751. Output in ohm.			
TEMP °C	-100	-50	0	50	100	150	200	300	400	500	600
PT-100	60.26	80.31	100	119.4	138.51	157.33	175.86	212.05	247.09	280.98	313.71
PT-200	120.52	160.62	200	238.8	277.02	294.905	351.72	424.1	494.18	561.96	627.42
PT-500	301.28	401.53	500	596.99	692.53	786.63	879.23	1060.26	1235.46	1404.89	1568.54
PT-1000	602.6	803.1	1000	1194	1385.1	1573.3	1758.6	2120.5	2470.9	2809.8	3137.1
PT-2000	1205.2	1606.2	2000	2388	2770.2	3146.6	3517.2	4241	4941.8	5619.6	6274.2
CU-53	-	-	-	64.29	75.5	86.37	-	-	-	-	-
NI-100	-	74.24	100	129.14	161.73	198.69	-	-	-	-	-

Aavad Thermocouple Sheath Material Temperature Limit

	0F -18C	500F 280C	1,000F 538C	1,500F 815C	2,000F 1093C	2,500F 1371C		0F -18C	500F 280C	1,000F 538C	1,500F 815C	2,000F 1093C	2,500F 1371C
316 Stainless Steel							321 Stainless Steel						
316L Stainless Steel							446 Stainless Steel						
304 Stainless Steel							Inconel 600						
304L Stainless Steel							Inconel 601						
310 Stainless Steel							Inconel 800						



Aavad Thermocouple Temp. Table

Temperature Table for TC Sensor								Output In mV. Referenced To 0°C			
Temp°C TC Type	0	100	200	300	400	600	800	1000	1200	1400	1600
J	0.0	5.269	10.779	16.327	21.848	33.102	45.494	-	-	-	-
K	0.0	4.096	8.138	12.209	16.397	24.905	33.275	41.276	48.838	-	-
N	0.0	2.774	5.913	9.341	12.947	20.613	28.455	36.258	43.846	-	-
T	0.0	4.279	9.288	14.862	20.872	-	-	-	-	-	-
E	0.0	6.319	13.421	21.036	28.946	45.093	61.017	76.373	-	-	-
R	0.0	0.647	1.469	2.401	3.408	5.583	7.95	10.506	13.228	16.04	18.849
S	0.0	0.646	1.441	2.323	3.259	5.239	7.345	9.587	11.951	14.373	16.777
B	0.0	0.033	0.178	0.431	0.787	1.792	3.154	4.834	6.786	8.956	11.263

Aavad Conductor Size Equivalents (Diameter)

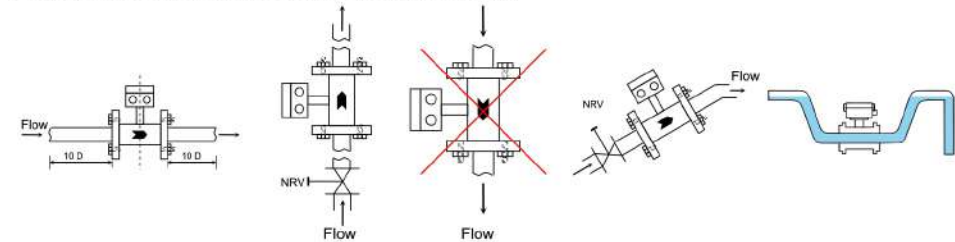
SWG		B&S (AWG)		SWG		B&S (AWG)		SWG		B&S (AWG)	
	mm		mm		mm		mm		mm		mm
0	8.23	8.25		8	4.06	3.26		17	1.42	1.15	
1	7.62	7.35		9	3.66	2.91		18	1.22	1.02	
2	7.01	6.54		10	3.25	2.59		19	1.02	0.912	
3	6.40	5.83		11	2.95	2.3		20	0.914	0.813	
4	5.89	5.19		12	2.64	2.05		21	0.813	0.724	
5	5.38	4.62		13	2.34	1.83		22	0.711	0.643	
6	4.88	4.11		14	2.03	1.63		23	0.610	0.574	
7	4.47	3.67		15	1.83	1.45		24	0.559	0.511	
				16	1.63	1.29		25	0.508	0.455	

Aavad Electromagnetic Flowmeter Velocity To Flow Chart

DN (MM)	FLOW RANGE 0.3 m/s to 10 m/s	ACCURACY RANGE 1 m/s to 6 m/s	DN (MM)	FLOW RANGE 0.3 m/s to 10 m/s	ACCURACY RANGE 1 m/s to 6 m/s
DN 15	0.19 ~ 6.35	0.64 ~ 3.82	DN 125	13.25 ~ 441	44.18 ~ 365.07
DN 20	0.33 ~ 11.34	1.13 ~ 6.78	DN 150	19.08 ~ 635	63.62 ~ 381.7
DN 25	0.52 ~ 17.66	1.77 ~ 10.6	DN 200	33.91 ~ 1130	113.09 ~ 678.58
DN 32	0.86 ~ 29.93	2.90 ~ 17.4	DN 250	52.99 ~ 1766	176.7 ~ 1060.3
DN 40	1.35 ~ 45.21	4.52 ~ 27.24	DN 300	76 ~ 3461	346.35 ~ 2078.3
DN 50	2.12 ~ 70.65	7.07 ~ 42.41	DN 350	103 ~ 3461	346.35 ~ 2078.3
DN 65	3.58 ~ 119	11.95 ~ 71.68	DN 400	135 ~ 4521	452.3 ~ 2714.3
DN 80	5.43 ~ 180	18.10 ~ 108.87	DN 450	171 ~ 5722	572.54 ~ 3435.3
DN 100	8.48 ~ 282	28.27 ~ 169.65	DN 500	211 ~ 7065	706.84 ~ 4241.2

Aavad Electromagnetic Flowmeter Installation Guide

The Primary Flow Tube can be installed at any point in the pipe run either horizontal or vertical provided the following conditions are met: Straight lengths of maximum 10 D on upstream and minimum 10 D on down-stream as shown. If disturbances like cork screwing or vortex flow conditions are present straight lengths should be increased or flow straighteners should be used. Flaps, slidegates, valves etc should be arranged at a distance of at least 5D downstream of primary flow tube.



Electromagnetic Flowmeter Electrode Selection Guide

Electrode	Suitable	Not suitable for
316L	Domestic water, industrial water, raw water, city sewage, weak corrosion of acid, alkali, salt solution	Strong acid, alkali etc
Hastelloy alloy B	Concentration is less than 10% of non oxidizing acid, concentration of less than 50% sodium hydroxide, all concentrations of ammonium hydroxide alkaline solution; phosphoric acid and organic acid	Nitric acid
Hastelloy C	Mixed acid (such as chromic acid and sulfuric acid solution); oxidizing salts (such as seawater, including Cu ⁺⁺⁺ , Fe ⁺⁺⁺)	Hydrochloric acid
Titanium	Salts (such as sodium, potassium, chloride, ammonium salts, sodium hypochlorite, still water), concentration of less than 50% potassium hydroxide, ammonium hydroxide, barium hydroxide alkaline solution	Hydrochloric acid, sulfuric acid, phosphoric acid, hydrofluoric acid and other reductive acid
Tantalum	Hydrochloric acid (concentrations of less than 40%), dilute sulfuric acid and concentrated sulfuric acid (not including oleum); chlorine dioxide, ferric chloride, hypochlorous acid, sodium chloride, lead acetate; nitric acid (including fuming nitric acid, an oxidizing acid)	Alkali, hydrofluoric acid
Platinum gold	Almost all of the sour alkali salt solution (including fuming sulfuric acid & fuming nitric acid)	Aqua regia, ammonium salt

How to choose The Lining Material Of Electromagnetic Flowmeter

According to the measured medium corrosion, wear and temperature, select lining material, as shown in the following table:

Lining	Symbol	Performance	Temperature	Usage occasions
Rubber	CR	Wear resistance of medium, high average concentrations of acid-base salt solution	≤70°C	Tap water, industrial water, sea water
PTFE	PTFE	The chemical properties of stability, high boiling hydrochloric acid, sulfuric acid aqua regia, concentrated alkali corrosion	≤150°C	Corrosive acid, salt, solution
Fluorinated ethylene propylene	F46 or FEP	Chemical properties equivalent to F4, tensile strength is higher than that of F4	≤180°C	Corrosive acid salt solution, negative pressure
Polyurethane	PU	Excellent wear resistance, Not suitable for resistance to acid	≤70°C	Slurry, pulp and other abrasive



Mfg. of Electromagnetic Flow Meter, Pressure & Temperature Gauges, RTD Sensors, Thermocouples, Thermowell.