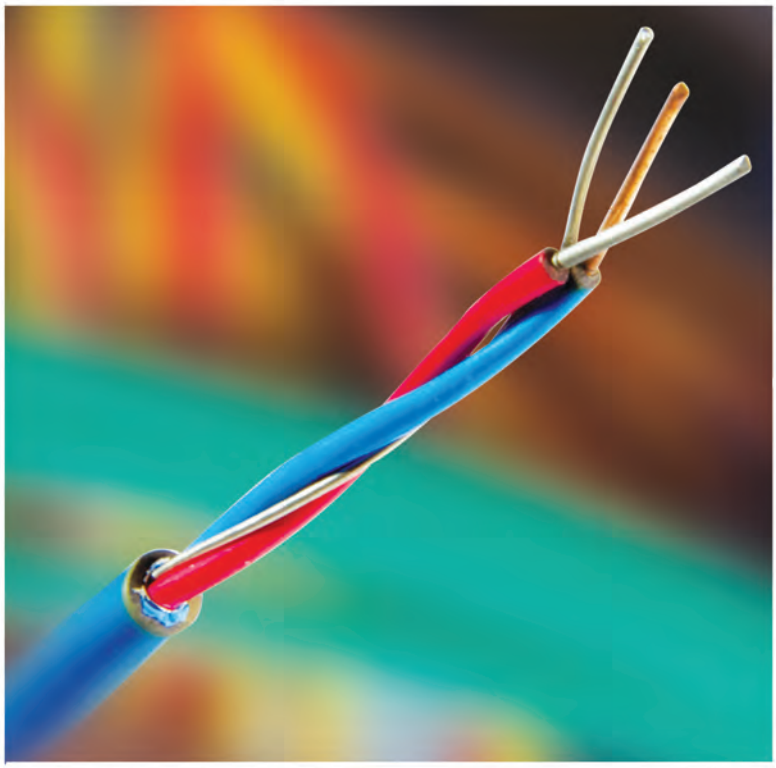
SERV-RITE® Wire



heaters | sensors | controllers

WATLOW®
Better Thermal Solutions...*Faster*

Proven Capabilities

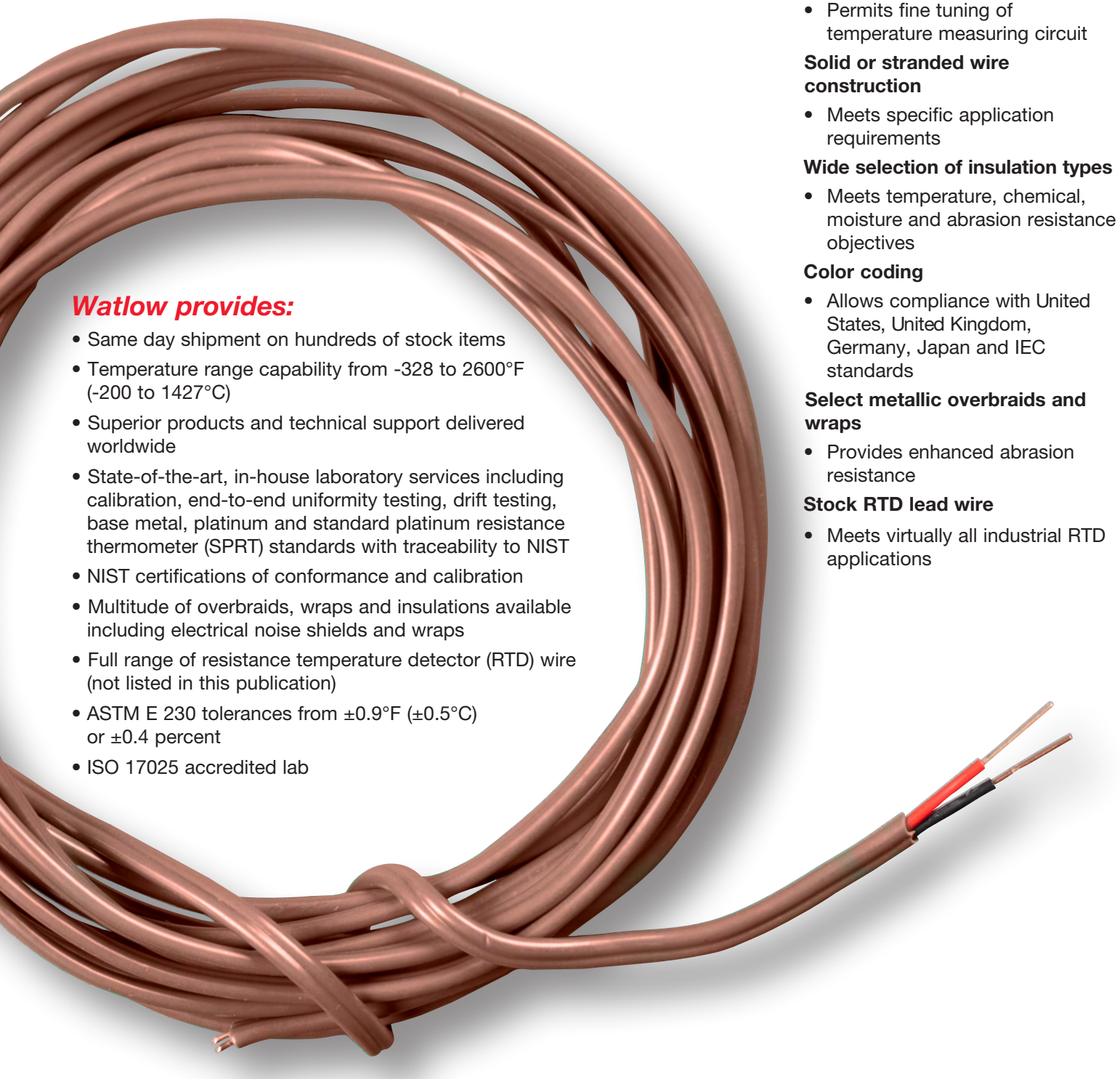
Since 1914, SERV-RITE® thermocouple wire and thermocouple extension wire from Watlow® have been known for premium performance and reliability.

All SERV-RITE wire is manufactured under rigid quality control. It is manufactured under ISO 9001 quality standards. Some wire can even be shipped next day for your convenience.

All testing has National Institute of Standards Technology (NIST), formally National Bureau of Standards (NBS), traceability. Unless otherwise specified, all SERV-RITE thermocouple wire and extension wire are supplied to meet standard tolerances of ASTM E 230. Special tolerances are also available.

Watlow provides:

- Same day shipment on hundreds of stock items
- Temperature range capability from -328 to 2600°F (-200 to 1427°C)
- Superior products and technical support delivered worldwide
- State-of-the-art, in-house laboratory services including calibration, end-to-end uniformity testing, drift testing, base metal, platinum and standard platinum resistance thermometer (SPRT) standards with traceability to NIST
- NIST certifications of conformance and calibration
- Multitude of overbraids, wraps and insulations available including electrical noise shields and wraps
- Full range of resistance temperature detector (RTD) wire (not listed in this publication)
- ASTM E 230 tolerances from ±0.9°F (±0.5°C) or ±0.4 percent
- ISO 17025 accredited lab



Features and Benefits

Type E, J, K, N and T thermocouple wire

- Fits virtually all applications

Type EX, JX, KX, NX, TX extension wire

- Matches thermocouple type

Compensation extension wire for Type R and S thermocouples

- Permits fine tuning of temperature measuring circuit

Solid or stranded wire construction

- Meets specific application requirements

Wide selection of insulation types

- Meets temperature, chemical, moisture and abrasion resistance objectives

Color coding

- Allows compliance with United States, United Kingdom, Germany, Japan and IEC standards

Select metallic overbraids and wraps

- Provides enhanced abrasion resistance

Stock RTD lead wire

- Meets virtually all industrial RTD applications

Nominal Resistance for Thermocouple Alloys in Ohms per Double Feet at 68°F (20°C)

B and S Gauge	Diameter in.	(mm)	E	J	K	N	RX, SX	T
2	0.258	(6.5)	0.011	0.006	0.009	0.012		
4	0.204	(5.2)	0.017	0.009	0.014	0.019		
6	0.162	(4.1)	0.028	0.014	0.023	0.030		
8	0.129	(3.3)	0.044	0.023	0.036	0.048		
10	0.102	(2.6)	0.070	0.036	0.058	0.077		
12	0.081	(2.1)	0.111	0.057	0.092	0.123	0.006	0.048
14	0.064	(1.6)	0.177	0.091	0.147	0.195	0.010	0.076
16	0.051	(1.3)	0.281	0.145	0.233	0.310	0.016	0.120
18	0.040	(1.0)	0.453	0.234	0.376	0.500	0.025	0.194
20	0.032	(0.8)	0.709	0.367	0.589	0.783	0.040	0.304
22	0.025	(0.7)	1.129	0.584	0.937	1.245	0.063	0.483
24	0.020	(0.5)	1.795	0.928	1.490	1.980	0.100	0.768
26	0.016	(0.4)	2.853	1.476	2.369	3.148	0.159	1.221
28	0.013	(0.3)	4.537	2.347	3.767	5.006	0.253	1.942
30	0.010	(0.3)	7.214	3.731	5.990	7.960	0.402	3.088
32	0.008	(0.2)	11.470	5.933	9.524	12.656	0.639	4.910
34	0.006	(0.2)	18.239	9.434	15.145	20.126	1.016	7.808
36	0.005	(0.1)	29.000	15.000	24.080	32.000	1.615	12.415
14 Stranded	0.076	(1.9)	0.161	0.083	0.134	0.178	0.009	0.069
16 Stranded	0.060	(1.5)	0.256	0.133	0.213	0.283	0.014	0.110
18 Stranded	0.048	(1.2)	0.408	0.211	0.338	0.450	0.023	0.174
20 Stranded	0.038	(1.0)	0.648	0.335	0.538	0.715	0.036	0.277
22 Stranded	0.030	(0.8)	1.031	0.533	0.856	1.137	0.057	0.441
24 Stranded	0.024	(0.6)	1.639	0.848	1.361	1.808	0.091	0.701

Conductor Size

B and S Gauge	Solid Diameter in.	(mm)	Stranded Diameter in.	(mm)	Number of Strands	Stranding Gauge
14	0.064	(1.6)	0.076	(1.9)	7	22
16	0.051	(1.3)	0.060	(1.5)	7	24
18	0.040	(1.0)	0.048	(1.2)	7	26
20	0.032	(0.8)	0.038	(1.0)	7	28
22	0.025	(0.6)	0.030	(0.8)	7	30
24	0.020	(0.5)	0.024	(0.6)	7	32
26	0.016	(0.4)				
28	0.013	(0.3)				
30	0.010	(0.3)				
32	0.008	(0.2)				
34	0.006	(0.2)				
36	0.005	(0.1)				

Thermocouple Calibration Types

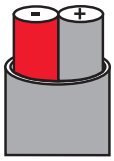
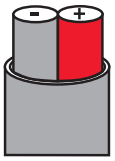
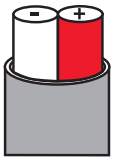
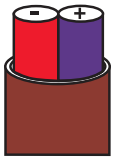
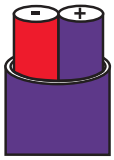
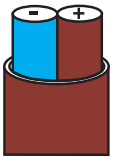
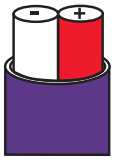
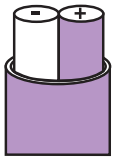
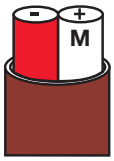
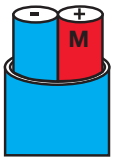
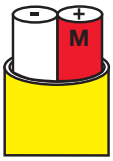
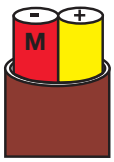
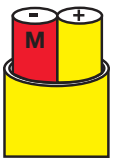
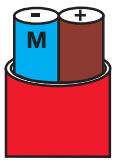
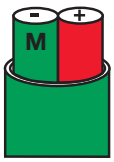
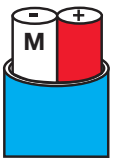
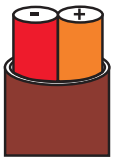
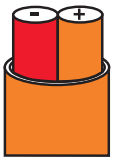
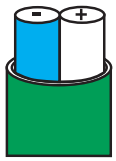
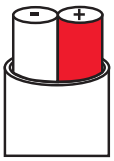
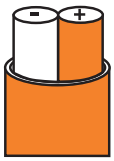
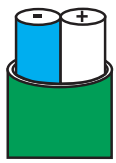
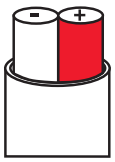
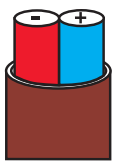
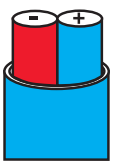
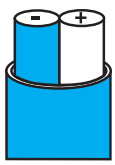
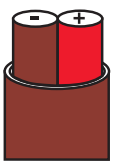
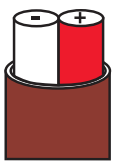
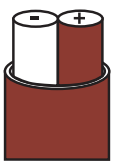
ANSI Code	Conductor	Popular Generic and Trade Names	Maximum Useful Temperature Ranges*	Limits of Error (whichever is greater) Standard	Special
B	BP	Platinum 30% Rhodium	T/C grade 1600 to 3100°F (870 to 1700°C)	0.5%	±0.25%
	BN	Platinum 6% Rhodium	Extension grade 1600 to 3100°F (870 to 1700°C)	1.0%	
E	EP	Chromel®	T/C grade -328 to 1650°F (-200 to 900°C)	Above 32°F (0°C) ±3.0°F (1.7°C) or 0.5%	±1.8°F (1.0°C) or 0.4%
	EN	Constantan	Extension grade 32 to 392°F (0 to 200°C)	Below 32°F (0°C) ±3.0°F (1.7°C) or 1.0%	
J	JP	Iron	T/C grade 32 to 1400°F (0 to 760°C)	±4.0°F (2.2°C) or 0.75%	±2.0°F (1.1°C) or 0.4%
	JN	Constantan	Extension grade 32 to 392°F (0 to 200°C)		
K	KP	Chromel®	T/C grade -328 to 2300°F (-200 to 1260°C)	Above 32°F (0°C) ±4.0°F (2.2°C) or 0.75%	±2.0°F (1.1°C) or 0.4%
	KN	Alumel®	Extension grade 32 to 392°F (0 to 200°C)	Below 32°F (0°C) ±4.0°F (2.2°C) or 2.0%	
N	NP	Nicrosil	T/C grade 32 to 2300°F (0 to 1260°C)	Above 32°F (0°C) ±4.0°F (2.2°C) or 0.75%	±2.0°F (1.1°C) or 0.4%
	NN	Nisil	Extension grade 32 to 392°F (0 to 200°C)		
R**	RP	Copper	Extension grade 32 to 392°F (0 to 200°C)	±9.0°F (±5.0°C)	±1.1°F (0.6°C) or 0.1%
	RN	#11 Alloy			
S**	SP	Copper	Extension grade 32 to 392°F (0 to 200°C)	±9.0°F (±5.0°C)	±1.1°F (0.6°C) or 0.1%
	SN	#11 Alloy			
T	TP	Copper	T/C grade -328 to 660°F (-200 to 350°C)	Above 32°F (0°C) ±1.8°F (1.0°C) or 0.75%	±1.1°F (0.6°C) or 0.4%
	TN	Constantan	Extension grade 32 to 212°F (0 to 100°C)	Below 32°F (0°C) ±1.8°F (1.0°C) or 1.5%	

* **Note:** Conductor gauge size may limit upper temperature ranges. Contact a Watlow representative for additional information.
****Note:** Compensating alloys used for extension wire applications.





International Color Codes

ANSI/ASTM T/C	ANSI/ASTM Exten.	BS 1843 (Britian)	DIN 43710 (Germany)	JIS C1610-1981 (Japan)	IEC 584-3 (Europe)	Common Uses
						Suitable for use in an oxidizing or inert atmosphere. Do not insert in metal tubes. Beware of contamination at high temperatures. Not suitable for use below 122°F (50°C).
						Suitable for use in an oxidizing or inert atmosphere. Limited use in vacuum or reducing atmosphere. Suitable for sub zero.
						Reducing vacuum, inert atmosphere. Limited use in oxidizing above 1004°F (540°C). Not recommended for sub zero.
						Suitable for use in an oxidizing or inert atmosphere. Limited use in vacuum or reducing atmosphere. Suitable for sub zero.
						Alternative to Type K. More stable at high temperatures.
						Suitable for use in an oxidizing or inert atmosphere. Do not insert in metal tubes. Beware of contamination at high temperatures.
						Suitable for use in an oxidizing or inert atmosphere. Do not insert in metal tubes. Beware of contamination at high temperatures.
						Mild oxidizing, reducing vacuum or inert atmosphere. Good where moisture is present. Low temperature and cryogenic applications.

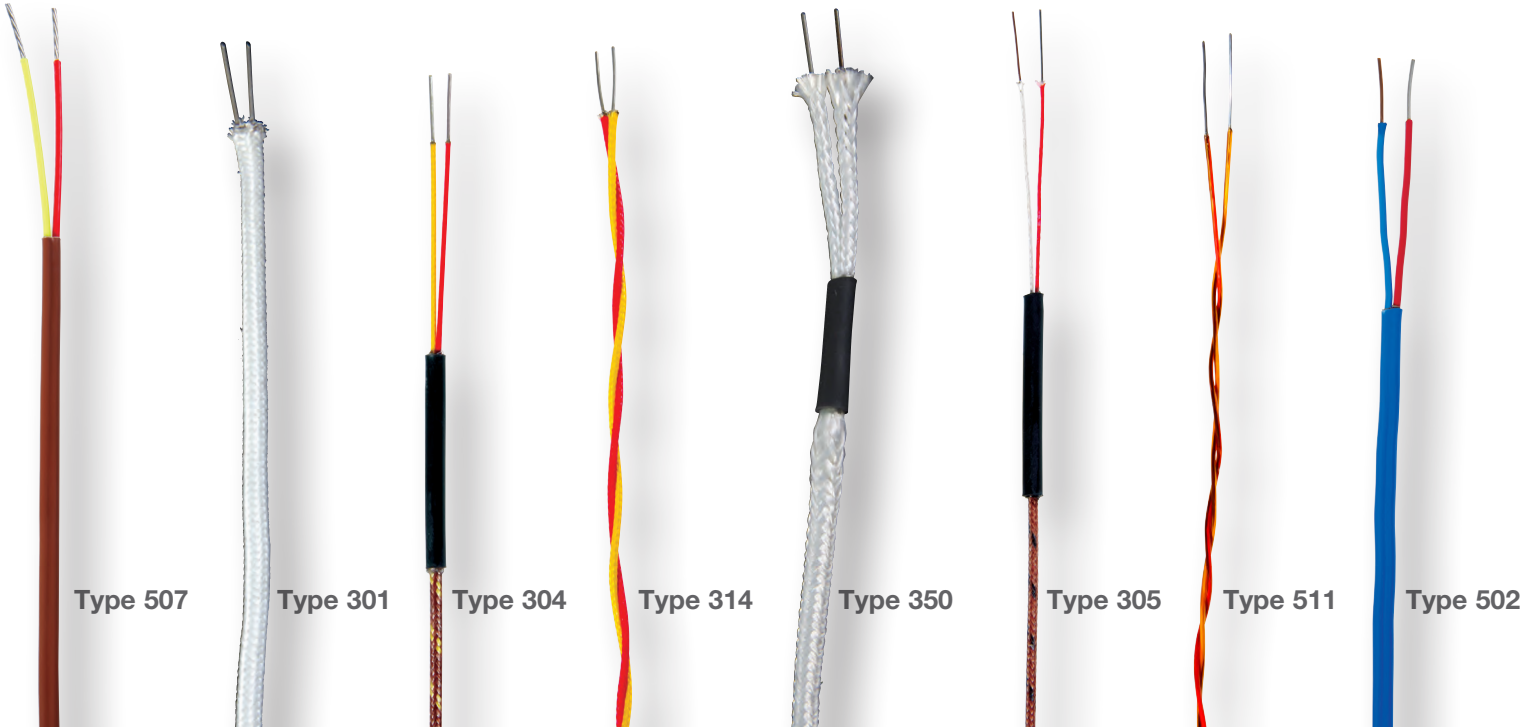
Braided Insulations

Insulation Series Number	Insulations		Temperature Range Continuous		Temperature Range Single Reading		Abrasion	Moisture	Chemical
	Primary	Secondary	°F	(°C)	°F	(°C)			
301	Vitreous Silica	Vitreous Silica	1800	(982)	2000	(1093)	F	F	G
304	Glass	Glass	900	(482)	1000	(538)	F	G	G
305	Double Glass Wrap	Glass	900	(482)	1000	(538)	F	G	G
314	Glass	Twisted	1300	(704)	1600	(871)	G	G	G
321	Glass	Glass	1300	(704)	1600	(871)	G	G	G
350	Ceramic Fiber	Ceramic Fiber	2200	(1204)	2600	(1427)	G	F	G
355	Ceramic Fiber	Ceramic Fiber	2200	(1204)	2600	(1427)	G	F	G
365	Vitreous Silica	Vitreous Silica	1800	(982)	2000	(1093)	F	F	G

Tape and Extruded Insulations

Insulation Series Number	Insulation Construction			Temperature Range Continuous		Temperature Range Single Reading		Abrasion	Moisture	Chemical
	Single	Shield	Jacket	°F	(°C)	°F	(°C)			
502	PVC		PVC	221	(105)	221	(105)	E	E	G
505	PVC		Ripcord	221	(105)	221	(105)	G	E	G
506	FEP		FEP (<26 AWG)	400	(204)	500	(260)	E	E	E
507	FEP		FEP	400	(204)	500	(260)	E	E	E
508	TFE Tape		TFE Tape	500	(260)	600	(316)	G	E	E
509	FEP	Shield	FEP	400	(204)	500	(260)	E	E	E
510	PVC	Shield	PVC	221	(105)	221	(105)	G	E	G
511	Polyimide Tape		Twisted	600	(316)	800	(427)	E	E	E
512	Polyimide Tape		Polyimide Tape	600	(316)	800	(427)	E	E	E
516	PFA		PFA	500	(260)	550	(288)	G	E	E

F = Fair, G = Good, E = Excellent



Ordering Information*

Part Number

① ANSI Calibration	② ③ B and S Gauge	④ Conductor Type/ Tolerance	⑤ Metallic Overbraids (Optional)	⑥ ⑦ ⑧ Insulation Series	⑨ ⑩ ⑪ Color Codes

①	ANSI Calibration
B =	Type B
E =	Type E
J =	Type J
K =	Type K
N =	Type N
R =	Type R
S =	Type S
T =	Type T
Note: Color coding will be to ANSI standards, unless specified.	

② ③	B and S Gauge
14 - 36	

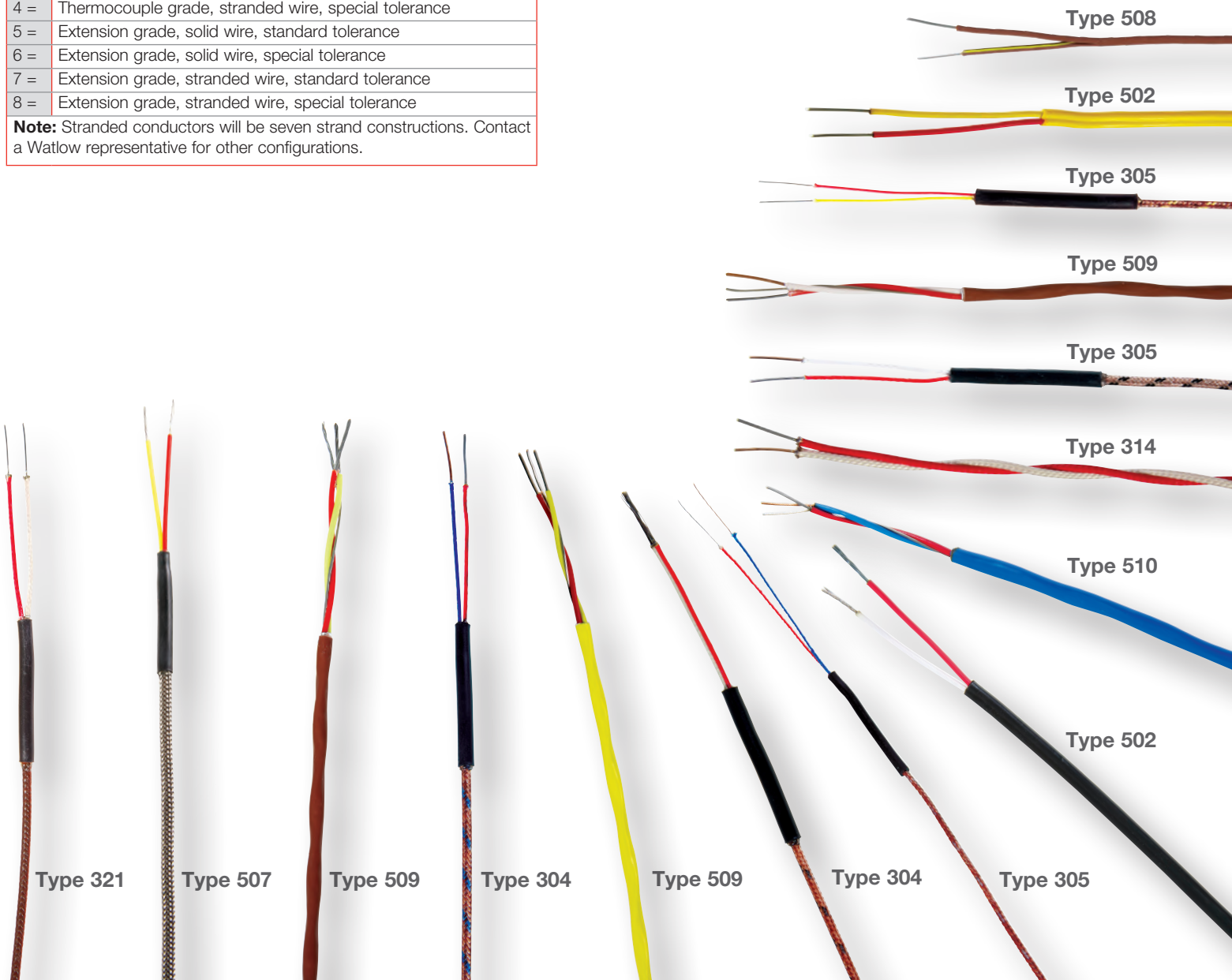
④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance
Note: Stranded conductors will be seven strand constructions. Contact a Watlow representative for other configurations.	

⑤	Metallic Overbraids (optional)
S =	Stainless steel
N =	Alloy 600
C =	Tinned copper

⑥ ⑦ ⑧	Insulation Series
Refer to insulation chart on previous page.	

⑨ ⑩ ⑪	Color Codes
Blank =	ANSI/ASTM E230 (formally ANSI MC96.1)
BSC =	BS 1843
DIN =	DIN 43710
JIS =	JIS C 1610-1981
IEC =	IEC 584-3

* Product normally shipped in 1,000 foot spools. Contact a Watlow representative for special packaging.



WATLOW®
www.watlow.com

Find out more about Watlow and how we can provide thermal solutions for your company:

Phone: 1-800-WATLOW2 (1-800-928-5692)

E-mail: inquiry@watlow.com

Website: www.watlow.com

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Japan	+81 3 3518 6630
Korea	+82 2 2628 5770
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France	+33 (0) 1 41 32 79 70
Germany	+49 (0) 72 53 / 94 00-0
Italy	+39 024588841
Spain	+34 91 675 12 92
United Kingdom	+44 (0) 115 964 0777

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About Watlow

Watlow designs and manufactures industrial heaters, temperature sensors, controllers and supporting software as well as assemblies – all of the components of a thermal system. The company partners with its customers to optimize thermal performance, decrease design time and improve efficiency of their products and applications.

Watlow brings its experience to numerous industries, including semiconductor processing, environmental chambers, energy processes, diesel emissions, medical and foodservice equipment.

Since 1922, Watlow has grown in product capability, market experience and global reach. The company holds more than 200 patents and employs 2,000 employees working in nine manufacturing facilities and three technology centers in the United States, Mexico, Europe and Asia. Watlow also has sales offices in 15 countries around the world. The company continues to grow, while the commitment remains the same – to provide its customers with superior products and services for their individual needs.

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