

Thermocouples

Industrial Base/ Noble Metal

Watlow offers two basic types of base metal thermocouples: bare and ceramic insulated elements and thermocouples with protection tubes. Many variations of each type are available to meet your application needs.

Performance Capabilities

- 1260°C (2300°F) maximum temperature

Features and Benefits

Insulated wire thermocouples

- Suitable for most general purpose applications

Bare and ceramic insulated elements

- Available in ASTM E 230 Types K and J, can be twisted or butt welded
- Choices include straight or angle types, two- or four-hole insulators and single or dual element

Protected thermocouples

- Supplied complete with head, block and protection tube
- Several styles available

Applications

- Metal processing such as aluminum, zinc, brass (with appropriate protection tube)
- Chemical
- Petrochemical
- Industrial storage tanks



Thermocouples

Base Metal

Rapid Ship Sensors

Rapid Ship Type K calibration, standard limits, 8 AWG gauge with two-hole ceramic insulators, twisted and welded junction.

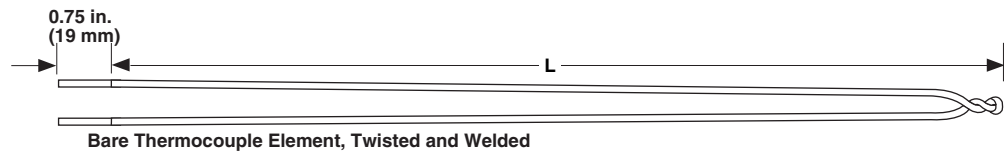
Lead Length		Part Number
in.	(mm)	
12	(305)	1409-12
18	(457)	1409-18
24	(610)	1409-24
36	(914)	1409-36
48	(1219)	1409-48

Bare Elements

To order, specify:

Part number-length.

Example: 1402-36 or
1432-BW-24

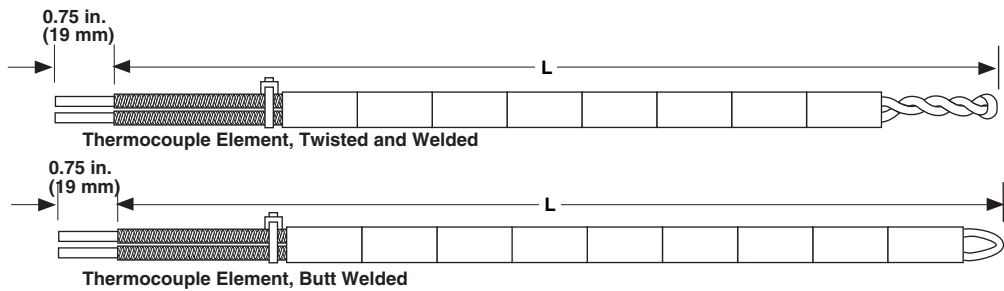


Straight Elements with Two-Hole Insulators

To order, specify:

Part number-length.

Example: 1409-48 or
1436-BW-18



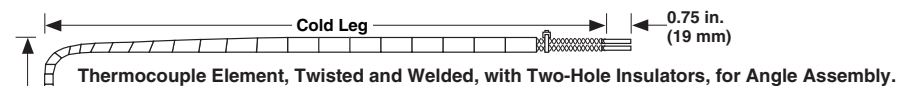
Code Number				AWG Gauge	Insulator Part No.	Length (in.)
Type K		Type J				
Twisted and Welded	Butt Welded	Twisted and Welded	Butt Welded			
1402	1432-BW	—	—	8	BARE	12, 18,
1403	1433-BW	—	—	11	BARE	24, 30,
1404	1434-BW	1503	1576-BW	14	BARE	36, 42,
1409	1436-BW	1507	1578-BW	8	301	48, 54,
1410	1437-BW	—	—	11	304	60, 66,
1411	1438-BW	1509	1579-BW	14	304	72
1412	1439-BW	1510	1580-BW	20	328	

Angle Type with Two-Hole Insulators

To order, specify:

Part number-cold leg length-hot leg length.

Example: 1440-BW-12-24



Code Number		Insulator Part No. Hot and Cold Sections*	Hot Leg Length (in.)
Type K			
Butt Welded	AWG Gauge		
1440-BW	8	301	24, 30, 36, 42 48, 54, 60

*Curved section insulators are Part No. 302 for 8 AWG gauge. Insulator dimensions on page 165.

Note: Cold leg minimum 6 in. (152 mm), maximum 36 in. (914 mm)

Note: Items in **Bolded Green Type** are preferred with shorter lead times.

Thermocouples

Base Metal

Rapid Ship Sensors

Rapid Ship dual Type K calibration, standard limits, 14 AWG gauge with four-hole ceramic insulators and butt-welded junction.

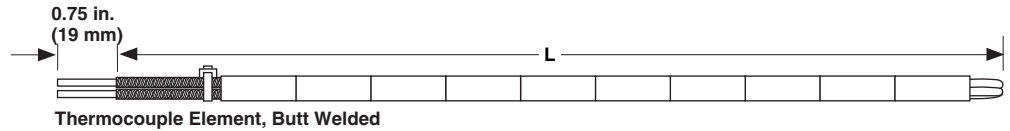
Lead Length in. (mm)	Part Number	Insulator Part No.
12 (305)	1442-BW-12	360
18 (457)	1442-BW-18	360
24 (610)	1442-BW-24	360

Dual Element with Four-Hole Insulators

To order, specify:

Part number-length.

Example: 1442-BW-36



Code Number (Butt Welded Only)		AWG Gauge	Insulator Part No.	Length
Type K	Type J			
1442-BW	1584-BW	14	360	12, 18, 24, 30, 36, 42, 48,
1443-BW	1585-BW	20	378	54, 60, 66, 72 Inches

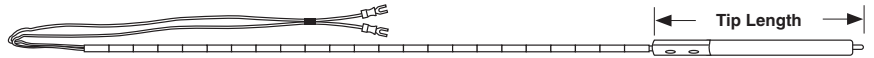
Immersion Tips

SERV-RITE immersion tips are superior thermocouples for nonferrous molten metals. The hot junction is forged into the 446 stainless steel sheath for maximum sensitivity. Available in Type K calibration only.

To order, specify:

Part number-tip length-lance length.

Example: 1449-501-T-8-43
1449-M-12-43



Length of Tip in. (mm)	Length of Leads in. (mm)	Part Number
8 (203)	31 (787)	1449-501-T-8-31
	43 (1092)	1449-501-T-8-43
	55 (1397)	1449-501-T-8-55
12 (305)	31 (787)	1449-M-12-31
	43 (1092)	1449-M-12-43
	55 (1397)	1449-M-12-55
15 (381)	31 (787)	1449-M-15-31
	43 (1092)	1449-M-15-43
	55 (1397)	1449-M-15-55
20 (508)	31 (787)	1449-M-20-31
	43 (1092)	1449-M-20-43
	55 (1397)	1449-M-20-55

Note: Items in **Bolded Green Type** are preferred with shorter lead times.

Thermocouples

Thermocouples

Base Metal

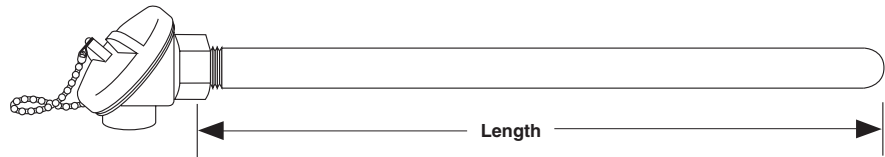
Standard Thermocouple with Protection Straight Type

To order, specify:

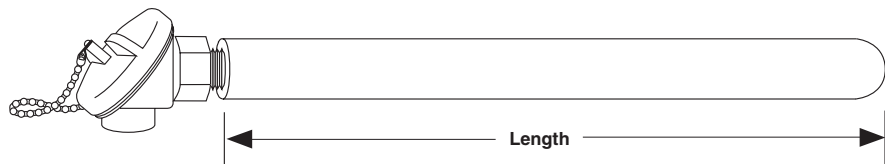
Part number-length.

Example: 1409-1308-24

Metal Tube



Cast Iron Tube



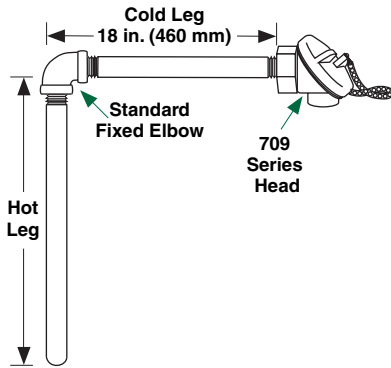
Code Number		AWG Gauge	Protection Tube		Pipe Diameter in.	Construction	Cast Iron Head	Length in.
Type K	Type J		Material	NPT Size in.				
1409-1395	1507-1395	8	Alloy 601	$\frac{1}{2}$	0.840	Seamless	70900203	12, 18, 24, 30, 36, 42, 48, 54, 60
1409-1396	1507-1396	8	Alloy 601	$\frac{3}{4}$	1.050	Seamless	70900202	
1409-1341	1507-1341	8	304 SS	$\frac{1}{2}$	0.840	Welded	70900203	
1409-1342	1507-1342	8	304 SS	$\frac{3}{4}$	1.050	Welded	70900202	
1409-1307	1507-1307	8	446 SS	$\frac{1}{2}$	0.840	Seamless	70900203	
1409-1308	1507-1308	8	446 SS	$\frac{3}{4}$	1.050	Seamless	70900202	
1409-1309	1507-1309	8	446 SS	1	1.315	Seamless	70900201	
1409-1375	1507-1375	8	Cast Iron	$\frac{3}{4}$ int	1.625	Cast	70900202	

Note: Items in **Bolded Green Type** are preferred with shorter lead times.

Thermocouples

Base Metal

Standard Thermocouple with Protection 90 Degree Angle Type



To order, specify:

Part number-cold leg length
hot leg length.

Example: 1414-1395-18-24

Standard Thermocouple with Protection — 90 Degree Angle

Code Number		AWG Gauge	Protection Tube (Hot Leg)			Cast Iron Head	Hot Leg Length in.
Type K	Type J		Material	NPT Size in.	Construction		
1414-1307-18	1517-1307-18	8	446 SS	$\frac{1}{2}$	Seamless	70900203	12, 18, 24, 30, 36
1414-1328-18	1517-1328-18	8	Black Steel	1	Welded	70900201	
1414-1375-18	1517-1375-18	8	Cast Iron	$\frac{3}{4}$ int	Cast	70900202	
1414-1395-18	1517-1395-18	8	Alloy 601	$\frac{1}{2}$	Seamless	70900203	
1415-1307-18	1518-1307-18	14	446 SS	$\frac{1}{2}$	Seamless	70900203	
1415-1326-18	1518-1326-18	14	Black Steel	$\frac{1}{2}$	Welded	70900203	
1415-1328-18	1518-1328-18	14	Black Steel	1	Welded	70900201	
1415-1375-18	1518-1375-18	14	Cast Iron	$\frac{3}{4}$ int	Cast	70900202	
1415-1395-18	1518-1395-18	14	Alloy 601	$\frac{1}{2}$	Seamless	70900203	

Pipe Diameters

- Cast iron = 1 $\frac{5}{8}$ inch
- $\frac{1}{2}$ in. NPT = 0.840 inch
- $\frac{3}{4}$ in. NPT = 1.050 inch
- 1 in. NPT = 1.315 inch

Notes: Items in **Bolded Green Type** are preferred with shorter lead times.

Standard cold leg is 18 inches.

Thermocouples

Noble Metal

Watlow's noble metal thermocouples offer the advantages of handling higher temperatures and providing greater accuracy than base metal thermocouples. Depending on your temperature and tolerance requirements choose from ASTM E 230 Types S, R or B.

The noble metal thermocouples can be ordered as bare elements, elements with insulators or assemblies. A typical assembly includes a head, alumina insulators and a protecting tube. A variety of hardware choices are available.

Performance Capabilities

- Platinum assemblies can handle temperatures to 1700°C (3100°F)

Applications

- Heat treating and control sensors
- Semiconductor: CVD processing, control spikes
- Glass manufacturing
- Ferrous and non-ferrous metals

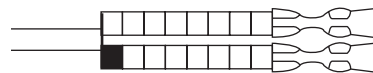


Type S, R, or B 24 AWG

To order, specify:

Part number-calibration-length.

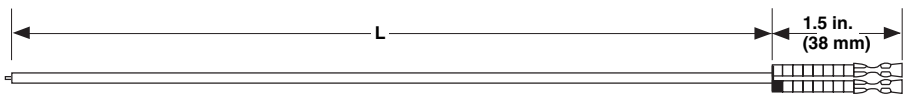
Example: 2114-R-24-MC



Enlarged picture of copper sleeves

For use with standard, general purpose heads; platinum assemblies can be furnished with MC-124 copper sleeves; no additional charge. Add suffix "-MC" to part number.

① Insulation consists of a one-piece two-hole alumina (0.125 diameter) insulator. For lengths over 24 in. (610 mm), a single piece alumina 3/16 inch diameter insulator is used.



Elements with Insulators; Shown with Optional MC-124 Copper Sleeves

Calibration	Length in.	Part Number Bare T/C	Part Number T/C With Alumina Insulator ^①
B	12	2110-B-12	2114-B-12
	18	2110-B-18	2114-B-18
	24	2110-B-24	2114-B-24
	30	2110-B-30	2114-B-30
	36	2110-B-36	2114-B-36
	42	2110-B-42	2114-B-42
R	48	2110-B-48	2114-B-48
	12	2110-R-12	2114-R-12
	18	2110-R-18	2114-R-18
	24	2110-R-24	2114-R-24
	30	2110-R-30	2114-R-30
	36	2110-R-36	2114-R-36
S	42	2110-R-42	2114-R-42
	48	2110-R-48	2114-R-48
	12	2110-S-12	2114-S-12
	18	2110-S-18	2114-S-18
	24	2110-S-24	2114-S-24
	30	2110-S-30	2114-S-30
	36	2110-S-36	2114-S-36
	42	2110-S-42	2114-S-42
	48	2110-S-48	2114-S-48

Thermocouples

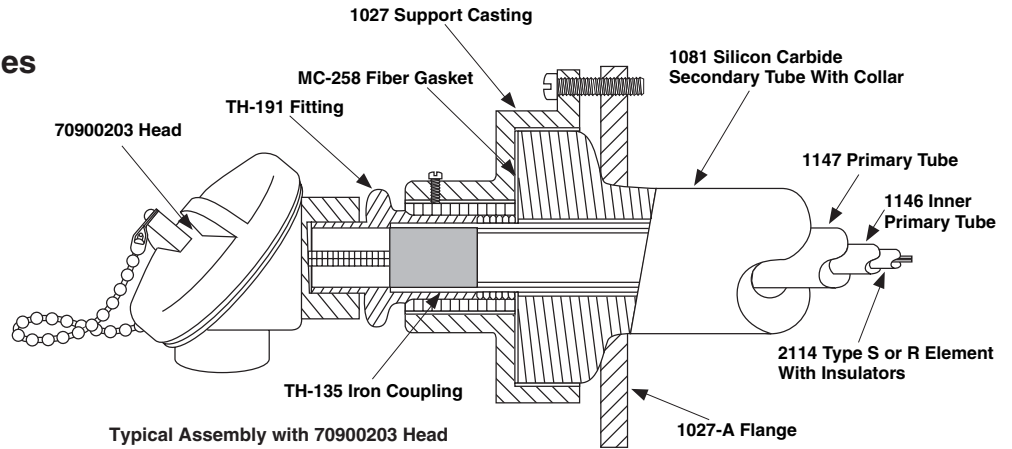
Noble Metal

Thermocouple Assemblies

To order, specify:

Part no.-calibration-length of tube.

Examples: 2144-S-12
2147-R-36

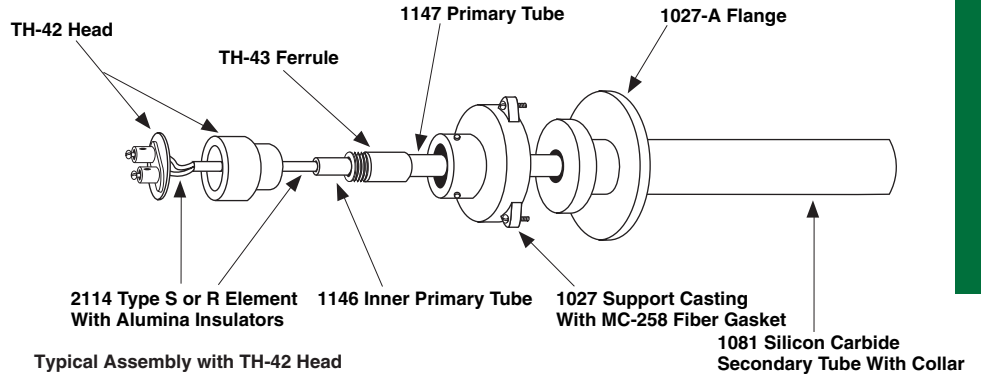


Typical Assembly with 70900203 Head

70900203 Head* and Alumina Ceramics

Code No.*	Calibration	AWG Gauge	Protecting Tubes	Size I.D. x O.D. in.	Length in.
2144	B, R, S	24	1147 Alumina Primary only	$\frac{7}{16} \times \frac{1}{16}$	12, 18, 24 30, 36, 42, 48
2145	B, R, S	24	1147 Primary 1146 Alumina Inner Primary	$\frac{1}{4} \times \frac{1}{16}$	
2147	B, R, S	24	1147 Alumina Primary 1146 Alumina Inner Primary 1081 Secondary	$\frac{1}{4} \times 1 \frac{3}{4}$	

Examples: 2140-B-18
2141-R-24



Typical Assembly with TH-42 Head

TH-42 Head and Alumina Ceramics

Code No.*	Calibration	AWG Gauge	Protecting Tubes	Size I.D. X O.D. in.	Length in.
2140	B, R, S	24	1147 Alumina Primary only	$\frac{7}{16} \times \frac{1}{16}$	12, 18, 24 30, 36, 42, 48
2141	B, R, S	24	1147 Alumina Primary 1146 Alumina Inner Primary	$\frac{1}{4} \times \frac{1}{16}$	

* Specify Type S, R or B by adding -S, -R, or -B after the part number. Types S, R and B thermocouples and the thermoelements are provided in accordance with ITS-90.

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