

The straight base metal thermocouple elements illustrated on this catalog page are replacement elements for use in Pyromation's complete industrial thermocouple assemblies as found elsewhere in this catalog section. These replacement elements are also compatible for use in other manufacturers' thermocouple assemblies. These thermocouples are available as bare wire or ceramic insulated elements, with options as listed below, and with special construction designs.

BARE ELEMENT



INSULATED ELEMENT



DUPLEX INSULATED



INSULATED JUNCTION



TWIST WELD



TIG WELD



ORDER CODES

Example Order Number:

1 2 3 4
K8 C M - 24 - 1,341

1 Single Straight Element Type

CODE (Type + Wire Gauge)				DESCRIPTION
J8		J14	J20	Iron - Constantan
K8	K11	K14	K20	Chromel - Alumel
N8		N14		Nicrosil - Nisil
DUPLEX STRAIGHT ELEMENTS				
Use thermocouple type code letter twice. Example: JJ14 or KK11. Dual elements with ceramic insulators are supplied as two single elements.				

2 Element Insulation

CODE	DESCRIPTION	WIRE GAUGE	INSULATOR DIMENSIONS (inches)	
			SINGLE	DUPLEX
O	Bare Element		None Used	
C	Oval Ceramic	8 Ga.	0.500 x 0.281	
		11 Ga.	0.375 x 0.218	
		14 Ga.	0.313 x 0.188	
R	Round Ceramic	8 Ga.	0.465 O.D.	0.500 O.D.
		11 Ga.	0.465 O.D.	0.500 O.D.
		14 Ga.	0.250 O.D.	0.320 O.D.
		20 Ga.	0.150 O.D.	0.188 O.D.

The above insulated elements are supplied with refractory insulators: 1277 °C [2330 °F] maximum temperature.

Element Options

CODE	DESCRIPTION
M	Special limits wire - types J and K (consult factory for other types)

4 Element Options

CODE	DESCRIPTION
0	Standard weld as noted below
1	Twist and tig weld (not available with 8 gauge duplex)
2	Tig weld without twist
L	Insulated hot junction
341	Single terminal block on element
342	Duplex terminal block on element

Unless specified by option numbers above, all 8, 11, and 14 gauge elements will be provided with Opt. 2 (tig weld without twist). 20 gauge elements will be provided with Opt. 1 (twist and tig weld). All elements, regardless of gauge, over 96" will be supplied with Opt. 1 (twist and tig weld).

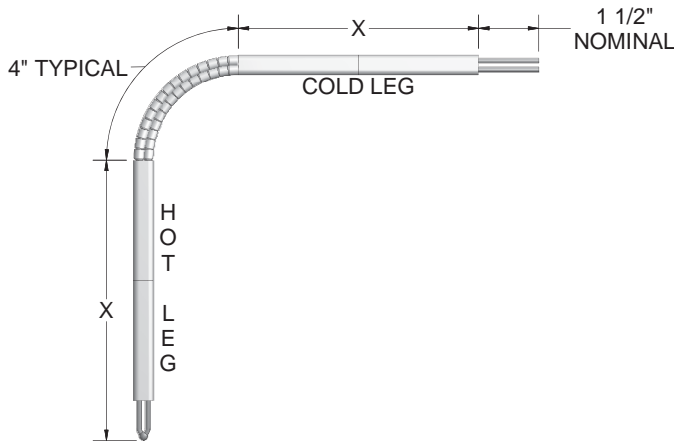
3 Element "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	

Specify other lengths in 1" increments.

Actual cut length will be 1(1/2)" longer than specified length to allow for terminal connections.

The angle base metal thermocouple elements illustrated on this catalog page are replacement elements for use in Pyromation's complete angle thermocouple assemblies as found elsewhere in this catalog section. These replacement elements are also compatible for use in other manufacturers' angle thermocouple assemblies. These thermocouples are available with the options listed below and with special construction designs. These replacement elements are shipped in a straight configuration and are to be bent at the time of installation.



INSULATED JUNCTION



TWIST WELD



TIG WELD



ORDER CODES

Example Order Number:

K8 A - 12 - 18 - 1, L, 341

1 Single Angle Element Type

CODE (Type + Wire Gauge)	DESCRIPTION
J8 J14	Iron - Constantan
K8 K11 K14	Chromel - Alumel
N8 N14	Nicrosil - Nisil

DUPLEX ANGLE ELEMENTS

Requires the use of 2 single elements.

2 Element Insulation

CODE	INSULATOR DESCRIPTION	WIRE GAUGE	INSULATOR DIMENSIONS (inches)
			SINGLE
A	Two hole oval ceramic insulators on hot and cold legs. Ball and socket insulators at bend	8 Ga.	0.500 x 0.281
		11 Ga.	0.500 x 0.286
		14 Ga.	0.375 x 0.218

The above insulated elements are supplied with refractory insulators: 1277 °C [2330 °F] maximum temperature.

Element Options

CODE	DESCRIPTION
M	Special limits wire - types J and K (consult factory for other types)

3 Hot Leg "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	Specify Other Lengths

5 Element Options

CODE	DESCRIPTION
0	Standard weld as noted below
1	Twist and tig weld
2	Tig weld without twist
L	Insulated hot junction
341	Single terminal block on element
342	Duplex terminal block on element

Unless specified by option numbers above, all 8, 11, and 14 gauge elements will be provided with Opt. 2 (tig weld without twist).

All elements, regardless of gauge, over 96" will be supplied with Option 1 (twist and tig weld).

4 Cold Leg "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	

Specify other lengths in 1" increments.

Actual cut length will be 1(1/2)" longer than specified length to allow for terminal connections.

The noble-metal platinum thermocouple elements illustrated on this catalog page are replacement elements for use in Pyromation's complete high temperature industrial thermocouple assemblies as found elsewhere in this catalog section. These replacement elements are also compatible for use in other manufacturers' high temperature thermocouple assemblies. All insulated elements are supplied with high temperature alumina insulators and are available with the options as listed below. Element types R, S, and B are supplied with a fusion weld. Custom designed constructions are available.

INSULATED ELEMENT without COLLAR (supplied with recessed junction as standard)



Note: Elements supplied without collars are intended to be used with ceramic tubes that are not supplied with hex fittings.

INSULATED ELEMENT with COLLAR



Note: Elements supplied with collars are intended to be used with ceramic tubes with hex fittings.

ORDER CODES

Example Order Number:

1 2 3 4
R24 - **R** - **18** - **3**

1 Single Straight Element Type

CODE (Type + Wire Gauge)		DESCRIPTION
R24	R26	Platinum - Platinum 13% Rhodium
S24	S26	Platinum - Platinum 10% Rhodium
B24		Platinum - 30% Rhodium - Platinum 6% Rhodium
DUPLEX STRAIGHT ELEMENTS		
Use thermocouple type code letter twice. EXAMPLES: RR24 or SS26		

2 Element Insulation

CODE	INSULATOR DESCRIPTION	WIRE GAUGE	INSULATOR DIMENSIONS (inches)
			<i>SINGLE and DUPLEX</i>
O	Uninsulated bare element		None
R	Round, 99.7% Alumina Insulator (4-hole, single and duplex) 1871 °C [3400 °F] maximum temp.	24	0.188 O.D. w 0.535 O.D. Collar
		26	0.188 O.D. w 0.535 O.D. Collar
CODE	DESCRIPTION		
M	Reference grade (consult factory for other types)		

4 Element Options

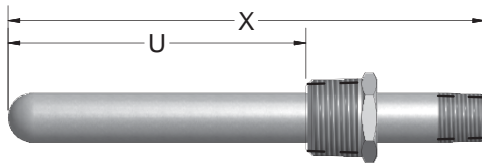
CODE	DESCRIPTION
3	Supplied without ceramic collar
L	Recessed insulated hot junction

3 Element "X" Length

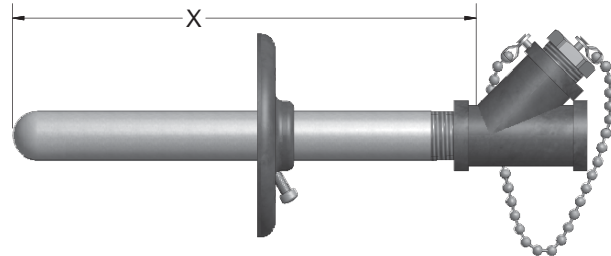
LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	
Specify other lengths in 1" increments.	

The thermocouple protection tubes illustrated on this catalog page are replacement tubes for Pyromation's complete thermocouple assemblies as found elsewhere in this catalog section. They are compatible replacements for other manufacturers' protection tubes. The materials of construction are those most commonly used in general purpose industrial process heating applications. These protection tubes are available with the options as listed below, with other pipe schedule sizes, and they can be supplied with custom designed constructions. **Note: Welded bushings will be welded at maximum length possible when X and U dimensions are specified as the same length. Actual U dimension will be 1 to 2 inches shorter than specified depending on bushing size.**

TUBE with OPTIONAL WELDED BUSHING



TUBE with OPTION CODE H and 6Y



ORDER CODES

Example Order Number:

1 **8-50** - **2** **18** - **3** **8D16**

1 Protection Tube NPT Connections

CODE	NPT SIZE (inches)	PIPE SCHEDULE ^[1]
<i>CARBON STEEL 538 °C [1000 °F] Max.</i>		
6 - 25	1/4	40
6 - 50	1/2	40
6 - 75	3/4	40
6 - 100	1	40
<i>316 SS 927 °C [1700 °F] Max.</i>		
8 - 25	1/4	40
8 - 50	1/2	40
8 - 75	3/4	40
8 - 100	1	40
<i>446 SS 1093 °C [2000 °F] Max.</i>		
5 - 50	1/2	40
5 - 75	3/4	40
<i>ALLOY 600 1149 °C [2100 °F] Max.</i>		
3 - 50	1/2	40
3 - 75	3/4	40
<i>ALLOY 601 1260 °C [2300 °F] Max.</i>		
7 - 50	1/2	40
7 - 75	3/4	40
7 - 100	1	40
<i>HR-160 1204 °C [2200 °F] Max.</i>		
41 - 50	1/2	40
41 - 75	3/4	40
41 - 100	1	40

2 Tube "X" Length

LENGTH (inches)
12
18
24
30
36
Specify other lengths in 1" increments up to 240". Consult factory for lengths above 20'.

[1] Schedule 80 and 160 are available in some alloys as special order items. Consult factory for price and delivery.

3 Protection Tube Options

CODE	DESCRIPTION
A	Open end tube (closed end standard)
H	Adjustable steel mounting flange
NT	Supplied without threads
6Y	Steel temperature check fitting

Optional Welded Bushings

CODE	DESCRIPTION
<i>STEEL</i>	<i>316 SS</i>
BUSHING SIZE (inches)	
6C(U)	8C(U) 1/2 NPT Bushing (25 tubes only)
6D(U)	8D(U) 3/4 NPT Bushing (25 and 50 tubes only)
6E(U)	8E(U) 1 NPT Bushing (25, 50, and 75 tubes only)
6F(U)	8F(U) 1(1/4) NPT Bushing
6G(U)	8G(U) 1(1/2) NPT Bushing

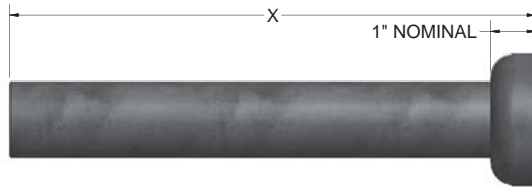
Substitute insertion length, in inches, measured from hot tip to bottom of bushing for (U) above. Insert NW in place of insertion length (U) for bushing supplied loose on tube.

Metal Alloy Tube Dimensions

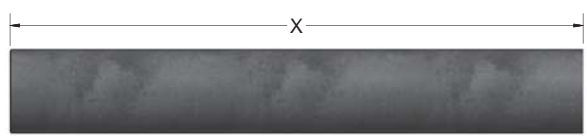
PIPE SIZE (inches)	O.D. (inches)	SCH. 40 I.D. (inches)	SCH. 80 I.D. (inches)	SCH. 160 I.D. (inches)
1/4	0.540	0.364	0.302	
1/2	0.840	0.622	0.546	0.466
3/4	1.050	0.824	0.742	0.612
1	1.315	1.049	0.957	0.815

The protection tubes listed below are designed for use in high temperature corrosive service applications. These protection tubes can be used in waste incineration, cement kilns, lime kilns, and other harsh process environments where high levels of sulfur, chlorides, ash, and salt deposits are commonly found. The series 12 protection tube is also an excellent choice for immersion into molten copper and brass alloys. The series 71 and series 18 protection tubes are typically used as outer protection tubes in high temperature applications such as ceramic kilns, brick kilns, and steel melting furnaces. These tubes are excellent choices in applications where direct flame impingement occurs.

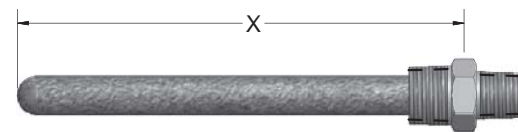
TUBE CODE 18JC



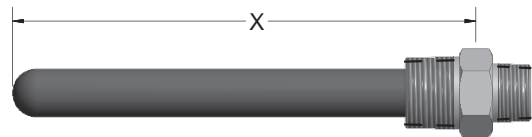
TUBE CODE 18J



TUBE CODE 71BH



TUBE CODE 12



ORDER CODES

Example Order Number:

12W4 - 24 - 8,NT

1

Metal Ceramic (LT-1) 1371 °C [2500 °F]^[1]					
CODE	Nominal I.D. (inches)	Nominal O.D. (inches)	FITTING DESCRIPTION	PROCESS THREADS (inches)	TERM THREADS (inches)
12WH	5/8	7/8	Steel hex fitting	1	3/4
12W(E)	5/8	7/8	Steel pipe nipple (specify "E" length)	1	1
Silicate-Bonded Silicon Carbide 1649 °C [3000 °F]					
18J	1	1(3/4)	Plain tube	None	None
18JC	1	1(3/4)	Tube with 3" O.D. collar	None	None
Recrystallized Silicon Carbide (RSiC) 1600 °C [2912 °F]					
71BH	3/8	11/16	Steel hex fitting	3/4	1/2
71B(E)	3/8	11/16	Steel pipe nipple (specify "E" length)	3/4	3/4
71WH	1/2	7/8	Steel hex fitting	1	3/4
71W(E)	1/2	7/8	Steel pipe nipple (specify "E" length)	1	1

[1] O.D. Tolerance ± 1/16", I.D. Tolerance + 1/16", - 3/32"

2 Tube "X" Length

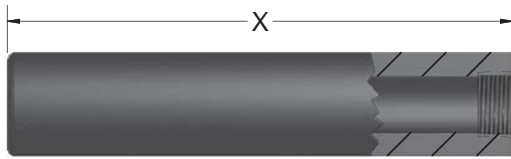
LENGTH (inches)
12
18
24
30
36
42
48

3 Options

CODE	DESCRIPTION
8	316 SS nipple or hex tube fitting
NT	No process mounting threads on pipe nipples

The Series 11, 13, and 14 protection tubes are used to protect thermocouple elements in molten aluminum and zinc applications such as diecasting, melting, smelting, and high temperature holding furnace environments. Series 13 and 14 protection tubes should be preheated and slowly immersed into any molten materials.

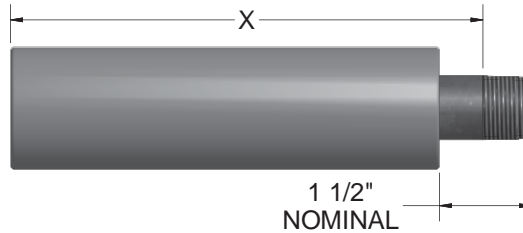
TUBE CODE 11



TUBE CODE 14^[1]



TUBE CODE 13^[1]



[1] Refractory length is 1" shorter than specified length

ORDER CODES

Example Order Number:

11-75 - 24

1 Protection Tube NPT Connections

CODE	DESCRIPTION	NPT SIZE (inches)	TUBE		MAX. LENGTH (inches)
			Nominal O.D. (inches)	Nominal I.D. (inches)	
<i>CAST-IRON 871 °C [1600 °F] Max.</i>					
11 - 75	Internally threaded	3/4	1.625	0.075	72
<i>VESUVIUS 927 °C [1700 °F] Max.</i>					
13 - 75		3/4	2.00	0.824	48
<i>CERITE® 815 °C [1300 °F] (36" maximum "X" length)</i>					
14-50 ^[1]	Cerite® II	1/2	2.00	0.622	36
[1] For Cerite® protection tubes supplied with 316SS pipe instead of a carbon steel pipe, change model number prefix code 14 to 148. EXAMPLE: 148-50-24					

2 Tube "X" Length

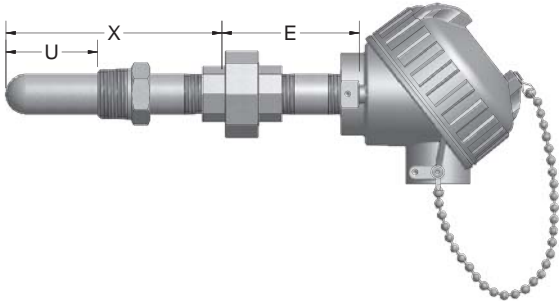
LENGTH (inches)
12
18
24
30
36
42
48

Recommended Applications

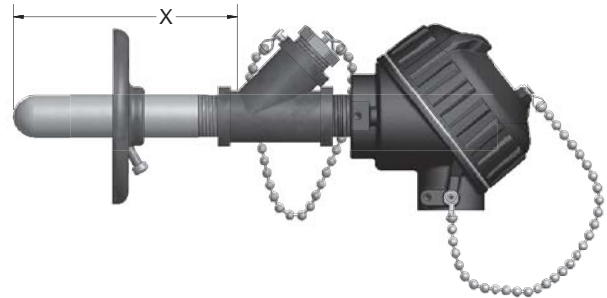
CAST-IRON	Aluminum
VESUVIUS	Aluminum
CERITE®	Aluminum, Zinc

The straight base metal thermocouple assemblies illustrated on this page are those most commonly used in industrial process heating applications. All listed assemblies are provided with schedule 40 protection tubes, and are available with listed options. Heavier pipe schedule protection tubes and special construction designs are also available. **Note: Welded bushings will be welded at maximum length possible when X and U dimensions are specified as the same length. Actual U dimension will be 1 to 2 inches shorter than specified depending on bushing size.**

ASSEMBLY with WELDED BUSHING



ASSEMBLY with OPTIONAL FLANGE



ORDER CODES

Example Order Number: **K8C** - **7** - **50** - **24** - **6E20** - **34**

1 Thermocouple Type and Wire Gauge Size

CODE		
J8C	K8C	N8C
J14C	K11C K14C	N14C
Thermocouples of 8 ga. wire require minimum of 1/2" NPT tube		
DUPLEX T/C ASSEMBLIES		
For duplex assemblies use the T/C type code letter twice. Example: K8C - 7 - 75 becomes KK8C - 7 - 75		

2 Protection Tube Material

CODE	MATERIAL	3 NPT Thread Size (inches)			
		1/4	1/2	3/4	1
6	CARBON STEEL	25	50	75	100
8	316 SS	25	50	75	100
5	446 SS		50	75	100
3	ALLOY 600		50	75	
7	ALLOY 601		50	75	100
41	HR 160®		50	75	100

4 Tube "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	
Specify other lengths in 1" increments up to 240". Consult factory for lengths above 20'.	

Duplex 8, 11, and 14 ga. assemblies require a minimum 1/2" NPT protection tube size (size codes 50 and larger).

8 gauge duplex thermocouple elements supplied in 1/2" NPT protection tubes will be supplied with round insulators.

5 Optional Welded Bushings

CODE		DESCRIPTION
STEEL	316SS	BUSHING SIZE (inches)
6C(U)	8C(U)	1/2 NPT Bushing (25 tubes only)
6D(U)	8D(U)	3/4 NPT Bushing (25 and 50 tubes only)
6E(U)	8E(U)	1 NPT Bushing (25, 50 and 75 tubes only)
6F(U)	8F(U)	1(1/4) NPT Bushing
6G(U)	8G(U)	1(1/2) NPT Bushing
Substitute insertion length, in inches, measured from hot tip to bottom of bushing for (U) above. Insert NW in place of insertion length (U) for bushing supplied loose on tube.		
Optional Union and Nipple Head Connection		
STEEL	316 SS	Union-nipple supplied as material specified
6PU(E) ^[1]	8PU(E) ^[1]	
[1] Insert extension length, in inches, for (E) above.		

6 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head
91 ^[1]	316L SS screw-cover head
93 ^[1]	Aluminum explosion-proof head, Group B
94 ^[1]	316L SS explosion-proof head, Group A
[1] Not available with 1" NPT protection tubes.	

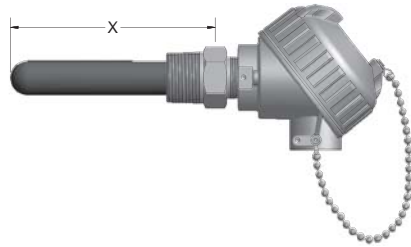
6-1 Assembly Options

CODE	DESCRIPTION
SB	1/2" NPT conduit reducer bushing
GS	Ground screw
H	Adjustable steel mounting flange
I	Stainless tag
6Y	Steel temperature check fitting
L	Insulated hot junction

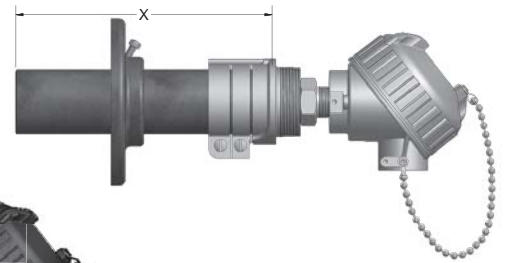
HR-160® is a registered trademark of Haynes International, Inc.

The straight base-metal thermocouple assemblies illustrated on this page are typically used in high temperature and highly corrosive applications commonly found in waste incinerators, cement and lime kilns, utility and waste recovery boilers, and other severe process environments. Special construction designs are also available.

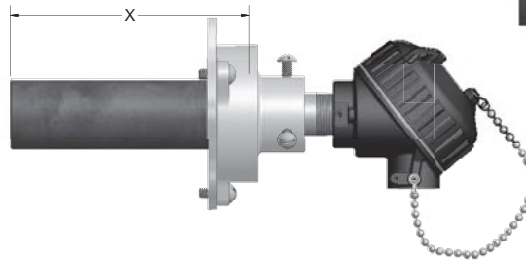
SERIES 12WH or 71WH ASSEMBLY with 1" STEEL HEX FITTING



SERIES 18J ASSEMBLY with OPTIONAL FLANGE



SERIES 18JC ASSEMBLY



ORDER CODES

Example Order Number:

1 **K8C** - **2** **12WH** - **3** **36** - **4** **34, I**

1 Thermocouple Type and Wire Gauge Size

CODE	DESCRIPTION
K8C	Type K 8 Gauge ceramic oval insulators
N8C	Type N 8 Gauge ceramic oval insulators

For duplex assemblies use the T/C type code letter twice. Round insulators will be supplied with 71 series tubes and duplex elements in 12 series tubes. Duplex elements are not available in series 71 tubes.

3 Tube "X" Length

LENGTH (inches)	
12	36
18	42
24	48
30	

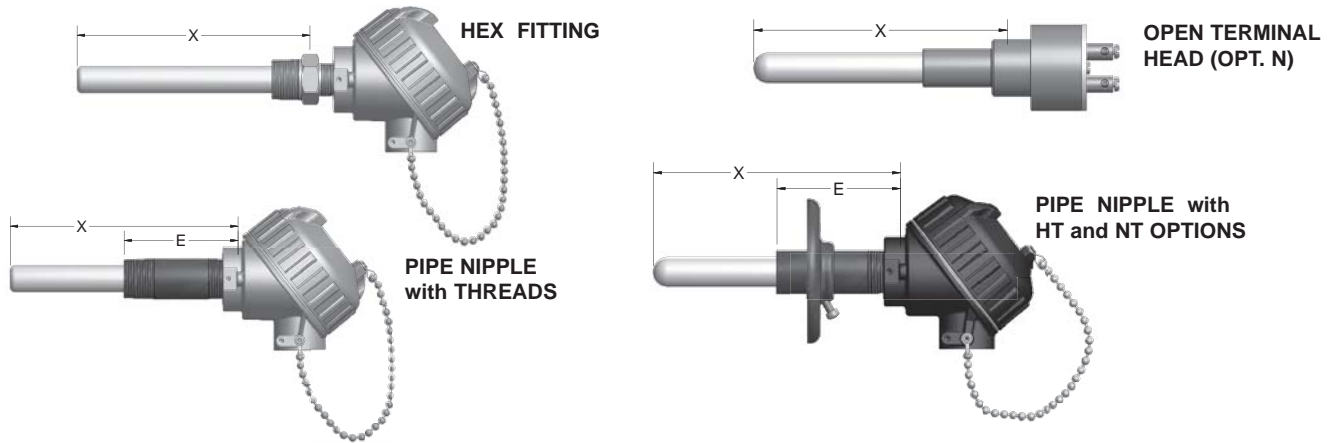
2 Protection Tube Material NPT Connection

CODE	I.D. (inches)	O.D. (inches)	FITTING DESCRIPTION	PROCESS THREADS (inches)	TERM THREADS (inches)
Metal Ceramic (LT-1) 1371 °C [2500 °F]					
12WH	5/8	7/8	Steel hex fitting	1	3/4
12W(E)	5/8	7/8	Steel pipe nipple (specify "E" length)	1	1
Silicate-Bonded Silicon Carbide 1649 °C [3000 °F]					
18J	1	1(3/4)	Plain tube	None	None
18JC	1	1(3/4)	Tube with 3" O.D. collar	None	None
Recrystallized Silicon Carbide (RSiC) 1600 °C [2912 °F]					
71WH	1/2	7/8	Steel hex fitting	1	3/4
71W(E)	1/2	7/8	Steel pipe nipple (specify "E" length)	1	1

4 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head
91	316 stainless steel screw-cover head
Assembly	
SB	1/2" NPT conduit reducer bushing
GS	Internal ground screw
H	Adjustable mounting flange
HT	Threaded flange on nipple
SB	1/2" NPT conduit reducer bushing
I	Stainless tag
8	316 stainless steel nipple or hex fitting
NT	Supplied without threads

The straight noble- and base-metal thermocouple assemblies, with Series 16 mullite and Series 17 alumina protection tubes, illustrated on this catalog page are those most commonly used in high temperature process heating applications. These assemblies are available with a variety of process mounting fittings and assembly options as listed below. Special construction designs are also available.



ORDER CODES

Example Order Number: **R24R** - **17BH** - **18** - **31, 8**

1 Thermocouple Type and Wire Gauge Size

CODE		
B24R R24R R26R S24R S26R	K8R ^[1] N8R ^[1]	K11C ^[2] N14C ^[2]
	[1] Use only with 16C or 16W series tubes	[2] Use only with 16B or 16C series tubes
8 ga. duplex elements only available in W series tubes. For duplex T/C's, use element type twice. Example: RR24R		

2 Protection Tube

TUBE MATERIAL AND SIZE				PROCESS MOUNTING FITTING
CODE	TUBE O.D. (inches)	NPT SIZE (inches)		
MULLITE 1482 °C [2700 °F]	ALUMINA 1871 °C [3400 °F]			
16AH ^[1]	17AH ^[1]	3/8	1/2	Steel hex fitting
16A(E) ^[1]	17A(E) ^[1]	3/8	1/2	Steel pipe nipple (Specify "E" length)
16AF	17AF	3/8	None	7/8" O.D. x 2" L open head fitting
16BH	17BH	11/16	3/4	Steel hex fitting
16B(E)	17B(E)	11/16	3/4	Steel pipe nipple (Specify "E" length)
16BF	17BF	11/16	None	7/8" O.D. x 2" L open head fitting
16CH		3/4	3/4	Steel hex fitting
16C(E)		3/4	3/4	Steel pipe nipple (Specify "E" length)
16WH		7/8	1	Steel hex fitting
[1] All assemblies with a 3/8" O.D. tube should be ordered with an aluminum termination head.				

4 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head
91	316L SS screw-cover head
N	Open terminal head - R, S, B only (require AF or BF protection tubes)

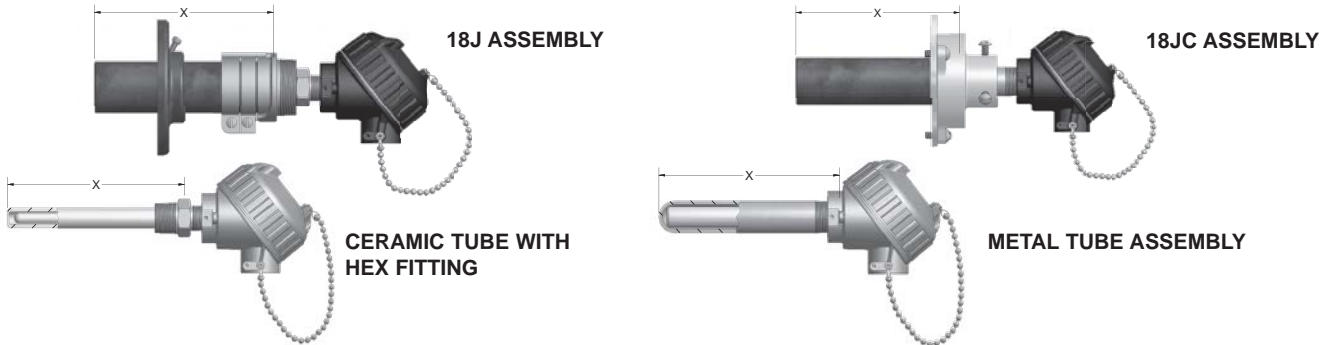
4-1 Assembly Options

CODE	DESCRIPTION
SB	1/2" NPT conduit reducer bushing
GS	Ground screw
NT	No process threads on pipe nipple
HT	Threaded flange on nipple
I	Stainless tag
8	316SS nipple or hex tube fitting
H	Adjustable steel mounting flange

3 Tube "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	
Specify other lengths in 1 inch increments.	

The noble-metal thermocouple assemblies illustrated on this page are provided with double protection tubes. Outer protection tube choices of ceramic, metal alloys, or composite materials offer protection from a variety of high temperature process environments. All assemblies are provided with a ceramic inner tube. The inner tubes are cemented to the outer tube and are not replaceable, except for 18J assemblies. These assemblies are available with a variety of process mounting fittings and assembly options as listed below. Special construction designs are also available. **Note: Welded bushings will be welded at maximum length possible when X and U dimensions are specified as the same length. Actual U dimension will be 1 to 2 inches shorter than specified depending on bushing size.**



ORDER CODES

Example Order Number:

1
2
3
5
5-1
S24R - **16BH-18J** - **36** - **31, H**

1 Thermocouple Type and Wire Gauge Size

CODE				
B24R	R24R	S24R	R26R	S26R
For duplex T/C's, use element type twice. Example: RR24R				

2 Protection Tubes (Inner and Outer)

CODE	MATERIAL TYPE		SIZE O.D. (inches)	PROCESS MOUNTING FITTING	
	INNER	OUTER		NPT. THREAD (inches)	FITTING TYPE
17A-17BH	Alumina	Alumina	11/16	3/4	Hex fitting
17A-17B(E)	Alumina	Alumina	11/16	3/4	Nipple (specify length)
17A-12WH	Alumina	LT-1	7/8	1	Hex fitting
17BH-18J	Alumina	Silicon Carbide	1(3/4)	None	None
17BH-18JC	Alumina	Silicon Carbide	1(3/4)	None	Support flange
16A-16BH	Mullite	Mullite	11/16	3/4	Hex fitting
16A-16B(E)	Mullite	Mullite	11/16	3/4	Nipple (specify length)
16A-12WH	Mullite	LT-1	7/8	1	Hex fitting
16BH-18J	Mullite	Silicon Carbide	1(3/4)	None	None
16BH-18JC	Mullite	Silicon Carbide	1(3/4)	None	Support flange
16B-41-75	Mullite	HR-160®	1.050	None	None
16B-7-75	Mullite	Alloy 601	1.050	None	None
17X-71BH	Alumina	RSiC	11/16	3/4	Hex fitting
17X-71B(E)	Alumina	RSiC	11/16	3/4	Nipple (specify length)
17A-71WH	Alumina	RSiC	7/8	1	Hex fitting
17A-71W(E)	Alumina	RSiC	7/8	1	Nipple (specify length)

4 Optional Welded Bushings (only on HR-160® and Alloy 601 Tubes)

CODE	DESCRIPTION
STEEL	316 SS
BUSHING SIZE (inches)	
6E(U)	8E(U)
6F(U)	8F(U)
6G(U)	8G(U)
1 NPT Bushing	
1 (1/4) NPT Bushing	
1 (1/2) NPT Bushing	
Substitute insertion length, in inches, measured from hot tip to bottom of bushing for (U) above.	
Insert NW in place of insertion length (U) for bushing supplied loose on tube.	

5 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head
91	316L SS screw-cover head

5-1 Assembly Options

CODE	DESCRIPTION
SB	1/2" NPT conduit reducer bushing
GS	Ground screw
NT	No mounting threads on pipe nipple
HT	Threaded flange on nipple
I	Stainless tag
8	316SS nipple or hex tube fitting
H	Adjustable steel mounting flange

3 Tube "X" Length

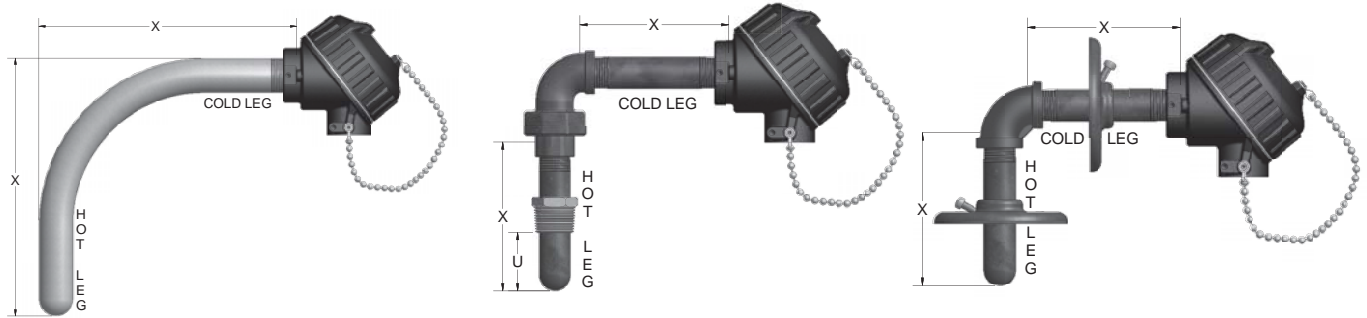
LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	
Specify other lengths in 1" increments.	

HR-160® is a registered trademark of Haynes International, Inc.



© 2006 Pyromation, Inc.

Angle thermocouple assemblies are most commonly used in general process applications requiring the use of "over-the-side" temperature sensors with metal-alloy protection tubes. Special construction designs are available. Assemblies may be shipped with the hot leg unattached for assembly at time of installation due to size limitations. Cold leg as standard is supplied as carbon steel.



ORDER CODES

Example Order Number:

K8A - 8 -75 - 18 - 18 - 8E16 - 34, GS

1 Thermocouple Type and Wire Gauge Size

CODE		
J8A	K8A	N8A
	K11A	
J14A	K14A	N14A

For duplex assemblies use the T/C type code letter twice. Example: J8A - 7 - 75 becomes JJ8A - 7 - 75

2 Hot Leg Protection Tube Material

CODE	MATERIAL	CODE (inches)		
		1/2	3/4	1
6	CARBON STEEL	50	75	100
8	316 SS	50	75	100
5	446 SS	50	75	100
3	ALLOY 600	50	75	N/A
7	ALLOY 601	50	75	100

3 Hot Leg NPT Thread Pipe Size

4 Hot Leg "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	

Specify other lengths in 1" increments.

5 Cold Leg "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	

Specify other lengths in 1" increments.

Continuous Bend Radius

1/2" NPT = 4(5/8)"
3/4" NPT = 4(5/8)"
1" NPT = 5(7/8)"

6 Optional Welded Bushings

CODE		DESCRIPTION
STEEL	316SS	BUSHING SIZE (inches)
6D(U)	8D(U)	3/4 NPT Bushing (50 tubes only)
6E(U)	8E(U)	1 NPT Bushing (50 and 75 tubes only)
6F(U)	8F(U)	1(1/4) NPT Bushing
6G(U)	8G(U)	1(1/2) NPT Bushing

Substitute insertion length, in inches, measured from hot tip to bottom of bushing for (U) above.
Insert NW in place of insertion length (U) for bushing supplied loose on tube.

7 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head

7-1 Assembly Options

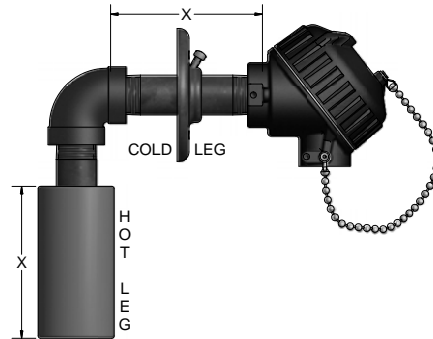
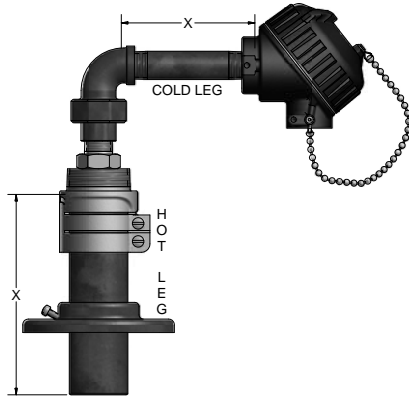
CODE	DESCRIPTION
SB	1/2" NPT conduit reducer bushing
GS	Ground screw
H	Adjustable steel mounting flange
HC	Adjustable steel flange (cold leg)
L	Insulated hot junction
I	Stainless tag
UL	Steel union elbow
CB ^[1]	Continuous bend-angle assembly

^[1] Requires 12" minimum on Hot Leg and Cold Leg

Standard Assembly Specifications

ELEMENT	HOT LEG TUBE CODE AVAIL.	COLD LEG SUPPLIED
SINGLE		
8, 11, 14 GA.	50, 75, 100	3/4" NPT on HL tube codes 50, 75. 1" NPT on HL tube codes 100. 1" NPT on duplex 8 and 11 gauge assemblies.
DUPLEX		
8, 11 GA.	75, 100	
14 GA.	50, 75, 100	

Angle thermocouple assemblies are those commonly used in industrial process heating applications requiring the use of "over-the-side" temperature sensors with special metal alloy, composite material, or silicon carbide protection tubes. Special construction designs are available. Assemblies may be shipped with the hot leg unattached for assembly at time of installation due to size limitations. Cold leg as standard is supplied as carbon steel.



ORDER CODES

Example Order Number: **K8A** - **14-50** - **18** - **18** - **49, L**

1 Thermocouple Type and Wire Gauge Size

CODE	
K8A	N8A
K11A	
K14A	N14A

For duplex assemblies use the T/C type code letter twice.
Example: K14A - 12 - 75 becomes KK14A - 12 - 75.

2 Protection Tube Material NPT Connection

CODE	HOT LEG PROT. TUBE	TUBE O.D. or NPT SIZE (inches)
11 - 75	Cast-Iron	1.625
12WH	Metal Ceramic	0.875
13 - 75	Vesuvius	2.000
18J	Silicone Carbide	1.750
14 - 50 ^[1]	Cerite® II	1/2 NPT

[1] For protection tubes with 316SS pipe instead of a carbon steel pipe, change order number to 148.
Example: K8A-148-50-24-K.

3 Hot Leg "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	

4 Cold Leg "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	

Specify other lengths in 1" increments.

Code 14 Cerite® II actual length is one inch shorter than above.

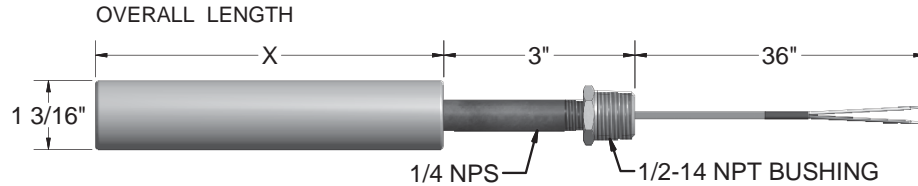
5 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head
91	316L SS screw-cover head

5-1 Assembly Options

CODE	DESCRIPTION
SB	1/2 NPT conduit reducer bushing
GS	Ground screw
H	Adjustable steel mounting flange
HC	Adjustable steel flange (cold leg)
L	Insulated hot junction
UL	Steel union elbow
I	Stainless tag

Cerite® III thermocouples are provided with a protection tube, integral thermocouple element with 36" of high temperature 704 °C [1300 °F] fiberglass leads, and a 1/2" NPT steel male face bushing for use in mounting. They are constructed by casting a phosphate bonded refractory material containing 85% alumina, 4% silica, and other trace elements around a 1/4" NPT steel pipe, containing an integral stainless steel sheathed magnesium oxide (MgO) insulated thermocouple element. The cast refractory material was developed for use in molten non-ferrous metals, specifically molten aluminum and zinc. It has excellent non-wetting properties, allowing easy slag removal, and the small diameter provides fast thermal response to process temperature changes. These assemblies provide good resistance to thermal shock and mechanical breakage. The refractory material is rated at 1538 °C [2800 °F] however, its use as a Cerite® III thermocouple assembly is generally limited to 815 °C [1500 °F] maximum. **Protection tube pre-heating and slow immersion into the process is recommended.**



ORDER CODES

Example Order Number:

1
2
K39G - 15 - 25 - 24 - 36 - **4**

1 Cerite® Thermocouple Specifications

CODE	T/C TYPE	"X" DIMENSION IMMERSION LENGTH (inches)	OVERALL LENGTH (inches)	LEAD LENGTH (inches)	APPROX. WGHT. (lbs.)
<i>SINGLE</i>					
K39G-15-25-12-36	K	12	15	36	1.75
K39G-15-25-18-36	K	18	21	36	2.50
K39G-15-25-24-36	K	24	27	36	3.25
K39G-15-25-30-36	K	30	33	36	4.00
K39G-15-25-36-36	K	36	39	36	4.75

2 Terminations

CODE	DESCRIPTION
0	No lead termination
2	2" split leads with 1/4" stripped leads
4	Standard plug
Options	
MC	Mating connector

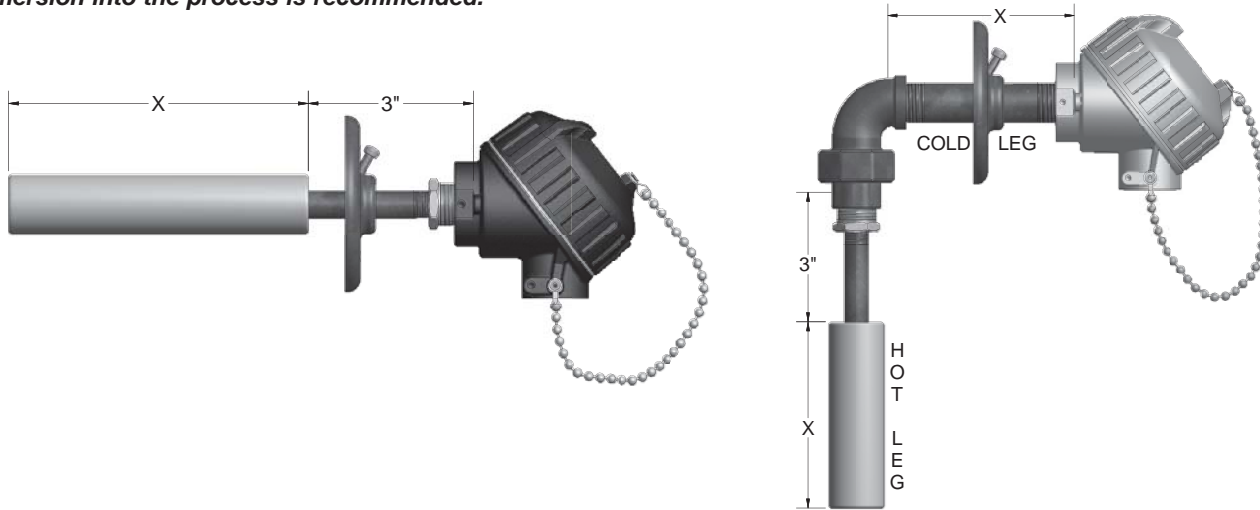
For duplex assemblies use thermocouple letter twice. **Example: KK39U - 15 - 25 - 24 - 36 - 0**

For assemblies with ungrounded junctions, substitute U for G in order code number. **Example: K39U - 15 - 25 - 24 - 36 - 0**

For additional lead length, change the last 2 digits of the order code number to desired length. **Example: K39G - 15 - 25 - 24 - 48 - 0**

For assemblies supplied with optional 316SS pipe insert, change order code number 15 to 158. **Example: K39G - 158 - 25 - 24 - 36 - 0**

Cerite® III thermocouple assemblies are complete thermocouple and protection tube assemblies. These Cerite® III assemblies are constructed by casting a phosphate bonded refractory material containing 85% alumina, 4% silica, and other trace elements around a 1/4" NPT steel pipe containing an integral stainless steel sheathed magnesium oxide (MgO) insulated thermocouple element. The cast refractory material was developed for use in molten non-ferrous metals, specifically molten aluminum and zinc. It has excellent non-wetting properties allowing easy slag removal, and the small diameter provides fast thermal response to process temperature changes. These assemblies also provide good resistance to thermal shock and mechanical breakage. The refractory material is rated at 1538 °C [2800 °F] however its use as a Cerite® III thermocouple assembly is generally limited to 815 °C [1500 °F] maximum. Cold leg as standard is supplied as carbon steel. **Protection tube pre-heating and slow immersion into the process is recommended.**



ORDER CODES

Example Order Number:

K39GS-15-25 - **24** - **—** - **34, H** *Straight Assembly, Single*

K39GA-15-25 - **24** - **24** - **49, HC** *Angle Assembly, Single*

1 Thermocouple Type and Assembly Style

CODE	STYLE	CODE	STYLE
SINGLE ELEMENT		DUPLEX ELEMENT	
K39GS-15-25	Straight	KK39GS-15-25	Straight
K39GA-15-25	Angle	KK39GA-15-25	Angle

For ungrounded hot junctions change above letter code "G" to letter code "U". Example: K39US

For assemblies supplied with optional 316SS pipe insert, change order code number 15 to 158. Example: K39G-158-25-24-36-34

2 Straight or Angle Hot Leg Length

"X" LENGTH (inches)	"X" LENGTH (inches)
12	30
18	36
24	

4 Head Terminations

CODE	DESCRIPTION
31	Aluminum screw-cover head
34	Cast-Iron screw-cover head
49	Flip-top aluminum head

4-1 Assembly Options

CODE	DESCRIPTION
SB	1/2" NPT conduit reducer bushing
GS	Ground screw
H	Adjustable steel mounting flange
HC	Adjustable steel flange (cold leg)
I	Stainless tags

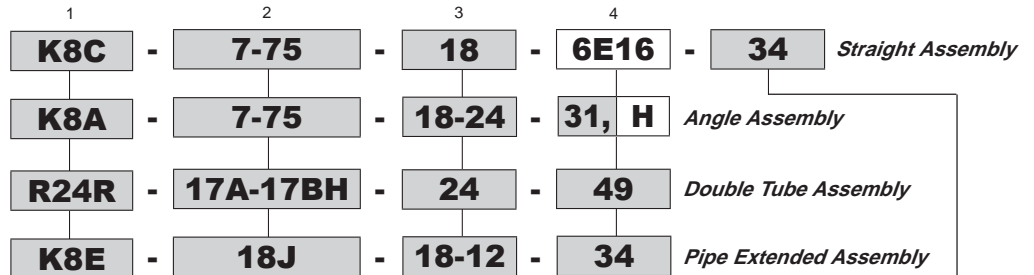
3 Angle Assembly Cold Leg Length

"X" LENGTH (inches)	"X" LENGTH (inches)
12	30
18	36
24	

The preceding catalog pages have provided order code numbers for thermocouple elements, protection tubes, and the most commonly used industrial thermocouple assemblies. Non-standard assemblies can be designated by selecting the proper thermocouple element(s) and protection tube(s) from the appropriate pages in this catalog section. Component part order code numbers selected from those pages, and assembled as described below, with desired options from below, will provide the part number for a complete industrial thermocouple assembly. Special construction designs, using non-cataloged components, are also available. Consult factory for details.

ORDER CODES

Example Order Number:



1 Thermocouple Element

Insert **order code** for thermocouple type, wire gauge size, and insulator type from the appropriate thermocouple element pages located in this catalog section.

2 Protection Tube

Insert **order code** for tube material and size from the appropriate protection tube pages located in this catalog section.

Double protection tube assemblies require selection of 2 tubes. **Example: 17A - 17BH**

3 Protection Tube Length

STRAIGHT ASSEMBLIES: Insert the desired protection tube "X" length in inches.

ANGLE ASSEMBLIES: Requires specifying **hot** and **cold** leg length in inches.

PIPE EXTENDED ASSEMBLIES: (Supplied with steel coupling and pipe extension beyond protection tube) Insert letter code "E" after wire gauge and specify extension length in inches.

4 Optional Welding Bushings (Applies to Metal-Alloy Tubes only)

CODE		DESCRIPTION
STEEL	316SS	BUSHING SIZE (inches)
6C(U)	8C(U)	1/2 NPT bushing (25 tubes)
6D(U)	8D(U)	3/4 NPT bushing (25 and 50 tubes)
6E(U)	8E(U)	1 NPT bushing (25, 50, 75 tubes)
6F(U)	8F(U)	1(1/4) NPT bushing (50, 75, 100 tubes)
6G(U)		1(1/2) NPT bushing (50, 75, 100 tubes)

Substitute insertion length, in inches, measured from hot tip to bottom of bushing for (U) above. Insert NW in place of insertion length (U) for bushing supplied loose on tube.

Optional Union and Nipple Connections

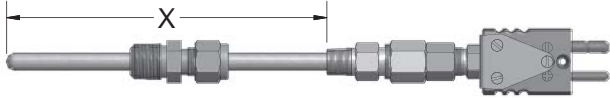
CODE		DESCRIPTION
STEEL	316SS	Both union and nipple supplied as material specified
6PU(E)	8PU(E)	

Insert extension length, in inches, for (E)

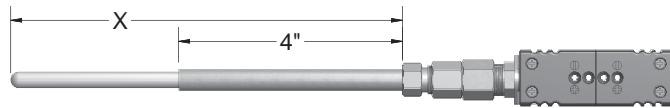
Head Terminations		Assembly Options	
CODE	DESCRIPTION	CODE	DESCRIPTION
31	Aluminum screw-cover head	A	Open-end protection tube
34	Cast-Iron screw-cover head	CB	Continuous-bend angle assembly
49	Flip-top aluminum head	GS	Ground screw
91 ^[1]	316L SS screw-cover head	6Y	Steel temperature check fitting
93 ^[1]	Aluminum explosion-proof head, Group B	H	Adjustable steel mounting flange
94 ^[1]	316L SS explosion-proof head, Group A	HC	Adjustable steel flange (cold leg)
N	Open type terminal head (B,R,S) with 16AF, 16BF, 17AF, 17BF tubes only	HT	Threaded flange on nipple
[1] Not Available with 1" NPT protection tubes		I	Stainless tags
		L	Insulated hot junction or recessed junction
		NT	Supplied without threads
		UL	Steel union elbows
		SB	1/2" NPT Conduit Reducer Bushing

Pyromation's high-temperature thermocouples are designed to operate in a temperature range of (982 to 1871) °C [1800 to 3400] °F. They are designed for use in vacuum furnaces and other applications requiring high-temperature measurement in controlled atmospheric conditions. Metal sheaths of Alloy 600 and molybdenum are available as well as alumina ceramic sheaths. All assemblies are supplied with ungrounded, isolated hot junctions. The construction style consists of an alumina-insulated element inside the tube of choice as listed below. Special construction designs are also available.

METAL-SHEATHED ASSEMBLY



ALUMINA-SHEATHED ASSEMBLY



ORDER CODES

Example Order Number:



Select from following page

1 Single Elements

2 Sheath Size and Material

TYPE AND WIRE GAUGE	CODE	SHEATH DIA. (inches)	MAX. TEMP.	ATMOSPHERE
ALLOY 600	ALLOY 600			
B24U C24U R24U S24U	R26U S26U	303 303 303 303	0.188 0.188 0.188 0.188	1149 °C [2100 °F] Oxidizing, Inert or Vacuum
B24U C24U R24U S24U	R26U S26U	403 403 403 403	0.250 0.250 0.250 0.250	1149 °C [2100 °F] Oxidizing, Inert or Vacuum
MOLYBDENUM	MOLYBDENUM			
B24U C24U R24U S24U	R26U S26U	302 302 302 302	0.188 0.188 0.188 0.188	1704 °C [3100 °F] 1871 °C [3400 °F] 1482 °C [2700 °F] 1482 °C [2700 °F] Inert or Vacuum
B24U C24U R24U S24U	R26U S26U	402 402 402 402	0.250 0.250 0.250 0.250	1704 °C [3100 °F] 1871 °C [3400 °F] 1482 °C [2700 °F] 1482 °C [2700 °F] Inert or Vacuum
ALUMINA	ALUMINA			
B24U C24U R24U S24U	R26U S26U	617 617 617 617	0.275 ^[1] 0.275 ^[1] 0.275 ^[1] 0.275 ^[1]	1704 °C [3100 °F] 1871 °C [3400 °F] 1482 °C [2700 °F] 1482 °C [2700 °F] Oxidizing, Inert or Vacuum
For duplex elements use order code pre-fix letter twice. Example: RR24U	[1] Sheath supplied with 3/8" O.D. x 4" long stainless steel sleeve on tube cold end. Only available with size B and C compression fittings.			
CC24 assemblies not available in 0.188" O.D. sheath diameter.	Consult factory for availability of other diameters or insulations.			

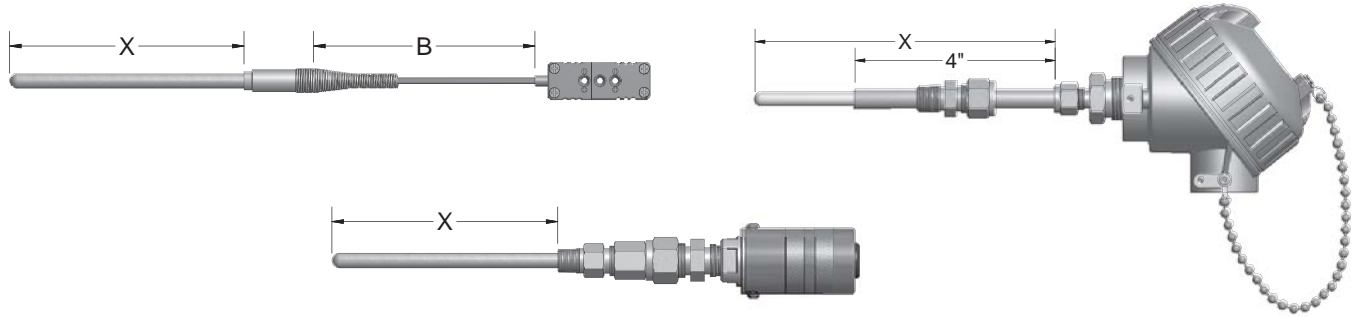
4 Sheath Mounting Fittings

CODE	TYPE	NPT SIZE (inches)	AVAILABLE SHEATH DIA. (inches)
00	No sheath mounting fitting		
One-Time Adjustable Compression Fittings			
05A	Stainless steel	1/8	3/16, 1/4
05B	Stainless steel	1/4	3/16, 1/4, 3/8
05C	Stainless steel	1/2	1/4, 3/8
Re-Adjustable Compression Fittings			
12A	Stainless steel	1/8	3/16, 1/4
12B	Stainless steel	1/4	1/4, 3/8
12C	Stainless steel	1/2	1/4, 3/8
FEP gland standard (400 °F max.)			

3 Sheath "X" Length

LENGTH (inches)	LENGTH (inches)
12	30
18	36
24	
Specify other lengths in 1" increments.	

All assemblies are provided with wire seal fitting except platinum element assemblies in Alloy protection tubes. All C24 assemblies in alumina protection tubes can only be used in inert or vacuum atmospheres.



ORDER CODES

Example Order Number:

R24U - **403** - **24** - **05A** - **15** - **F1A036** - **4**

Select from preceding pages

5 Plug and Jack Terminations

CODE	DESCRIPTION	SHEATH O.D. (inches)
4	Standard plug	3/16 thru 3/8
4,HT	Standard hi-temp plug 385 °C [725 °F]	3/16 thru 3/8
MC	Mating connector	

Head Terminations

CODE	DESCRIPTION
9CF31	Aluminum screw-cover head secured to sheath with SS compression fitting
8HN31 ^[1]	Aluminum screw-cover head with 1/2" NPT stainless steel hex fitting
9CF25	Mini nickel-plated steel head

Leadwire Transitions (requires leadwire selections)

CODE	DESCRIPTION
15 ^[1]	Extension leadwire transition fitting with relief spring 204 °C [400 °F]
15HT ^[1]	Extension leadwire transition fitting with relief spring and High temperature potting 538 °C [1000 °F]

7 Terminations

CODE	DESCRIPTION
0	Leads not stripped
2	2" split leads, 1/4", stripped
3	2" split leads with spade lugs
4 ^[1]	Standard plug
6 ^[1]	Miniature plug

Options

CODE	DESCRIPTION
MC ^[1]	Mating connector

6 Extension Leadwire

CODE	WIRE GAUGE INSULATION DESCRIPTION	T/C AVAILABLE
F1	Solid; fiberglass insulation	R,S,B
F1A	Solid; fiberglass insulation with flexible S.S. armor	R,S,B
T1	Solid; fluoropolymer insulation	R,S
T1A	Solid; fluoropolymer insulation with flexible S.S. armor	R,S

To complete order code, insert wire code and 3 digit "B" length code. Example: F1A036=36" "B" length

[1] Only with platinum elements in 303-403 sheaths.