

# **PROTECTION TUBES AND HEADS**

**This Section Contains**

Thermocouple Angle Assemblies

Thermocouple Heads

Protection Tube Reference Data

**Please CALL for Quote!**

*If you can't find what you need call!*

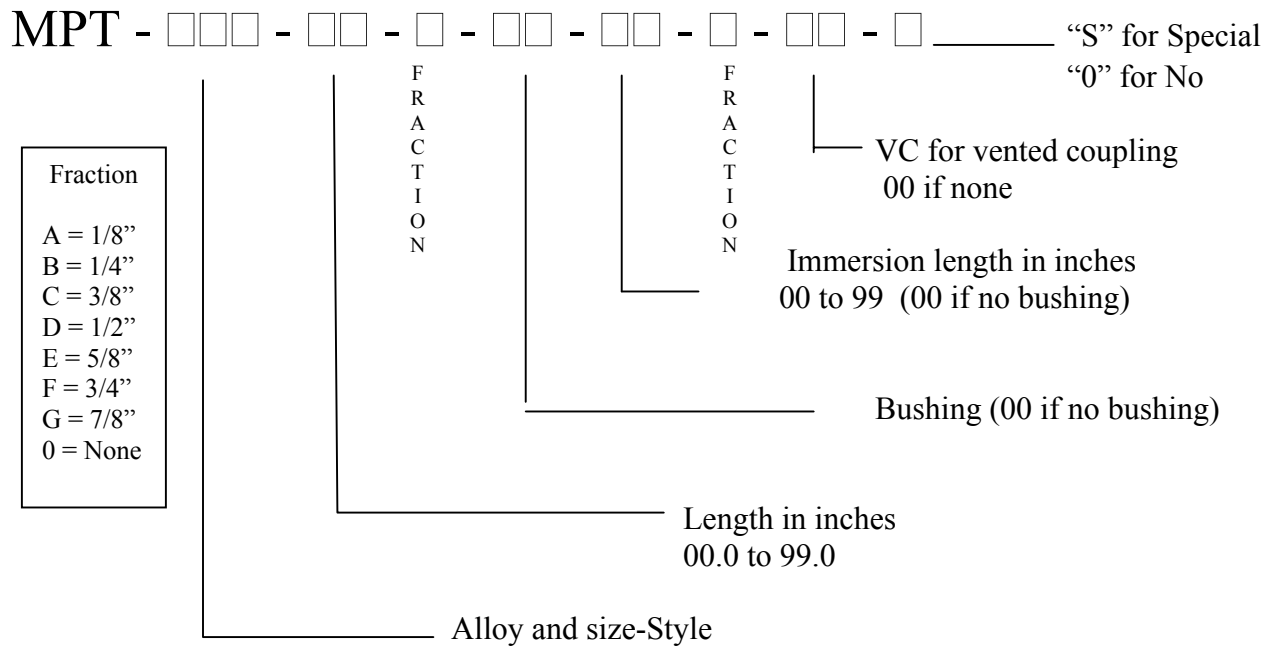
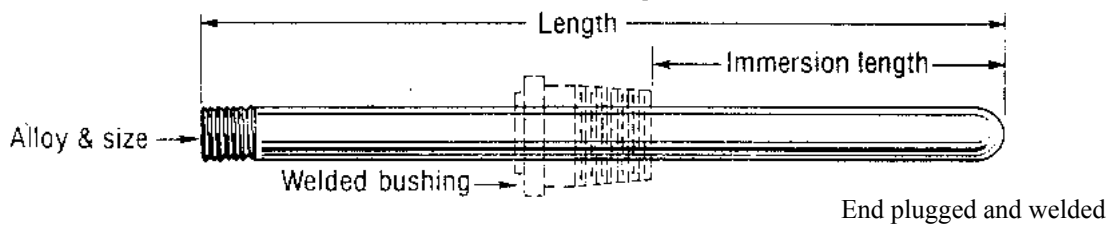
**From Illinois 618-465-7623**

**From St. Louis 314-231-0752**

**Fax 618-465-7679**

**E-mail [info@ipscustom.com](mailto:info@ipscustom.com)**

# METAL PROTECTION TUBES



## ALLOY & SIZE

Material		Size		Schedule	
Carbon Steel	<b>C</b>	1/2"	<b>2</b>	40	<b>4</b>
304 Stainless	<b>4</b>	3/4"	<b>3</b>	80.	<b>8</b>
310 Stainless	<b>0</b>	1"	<b>4</b>		
316 Stainless	<b>6</b>	1 1/2"	<b>6</b>		
Inconel 600	<b>I</b>				
446 Stainless	<b>H</b>				
Other	<b>X</b>				

## BUSHING CHART

Male Pipe Thread	Carbon Steel	Stainless Steel
3/4"	B3	S3
1"	B4	S4
1 1/4"	B5	S5
1 1/2"	B6	S6
2"	B8	S8

Note: Other alloys and sizes available upon request.  
 Ex: 310 SS, 3/4", Schedule 40 = 034

# CERAMIC PROTECTION TUBES

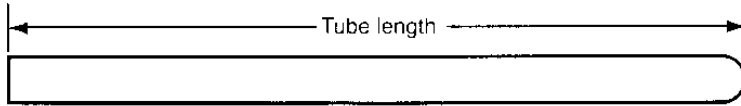


Figure A

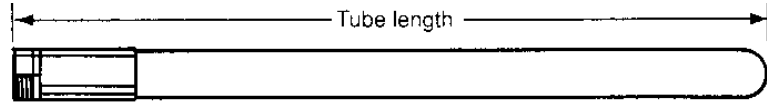


Figure B

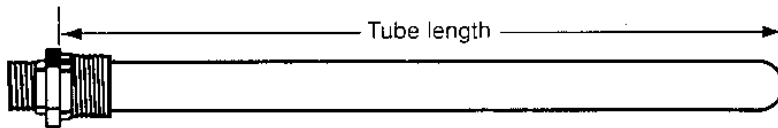
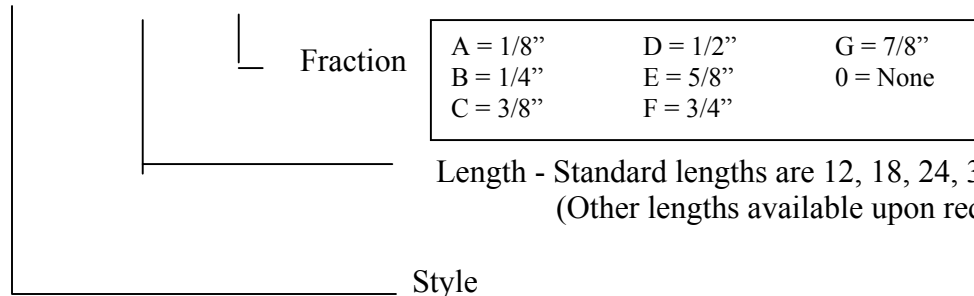


Figure C

CPT - □□□ - □□ - □ - □ — “S” for Special, “0” for No

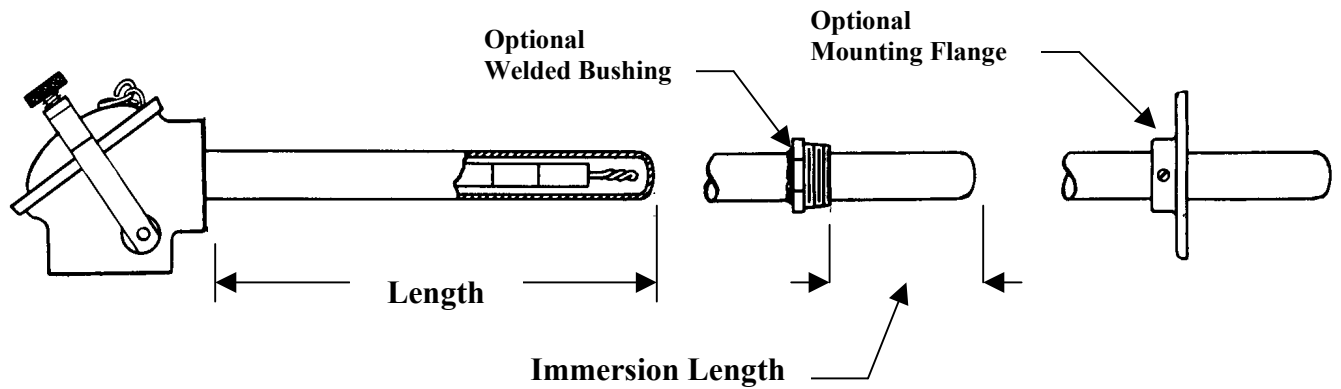


## STYLE

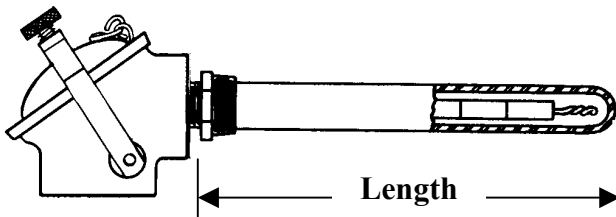
Mullite	Alumina	I.D. x O.D. and Example	I.D. x O.D. Decimal
150	250	1/4" x 3/8" Figure "A"	.250" x .375"
152	252	7/16" x 11/16" Figure "A"	.4375" x .6875"
158	258	1/2" x 3/4" Figure "A"	.500" x .750"
159	259	1/2" x 3/4" Figure "C" (with 1/2" x 3/4" hex metal fitting)	.500" x .750"
162	262	3/4" x 1" Figure "A"	.750" x 1.000"
154	254	7/16" x 11/16" Figure "B" (threaded metal sleeve 7/8" - 27)	.4375" x .6875"
156	256	7/16" x 11/16" Figure "C" (with 1/2" x 3/4" hex metal fitting)	.4375" x .6875"
164	264	1" x 1-1/4" Figure "A"	1.000" x 1.250"
166	266	1 x 1-1/8" Figure "A"	1.000" x 1.125"

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# INDUSTRIAL THERMOCOUPLE ASSEMBLY



**Thermocouple Assembly w/ Metal Protection Tube**



**Thermocouple Assembly w/ Ceramic Protection Tube**

If thermocouple is required then order the **Thermocouple Element**, by part number and mark "Assembly" with an "A".

If **Dual Tube** (ceramic and metal) is required then order Ceramic assembly, mark "Dual Tube" box with a "D" and order the Metal Protection Tube separately.

Note: If this is getting confusing, then call the factory for the part number.

Fraction		
A = 1/8"	D = 1/2"	G = 7/8"
B = 1/4"	E = 5/8"	0 = None
C = 3/8"	F = 3/4"	

<b>PREFIX</b>	TA
<b>TUBE STYLE</b> Select style from <b>Page 2</b> for Metal Protection Tube or <b>Page 3</b> for Ceramic Protection Tube.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>LENGTH</b> In Inches	<input type="checkbox"/> <input type="checkbox"/>
<b>FRACTION</b>	<input type="checkbox"/>
<b>ASSEMBLY</b> Use "A" if thermocouple to be included, "0" if none.	<input type="checkbox"/>
<b>DUAL TUBE</b> If dual tube required "D" or "0" for none.	<input type="checkbox"/>
<b>HEAD</b> Select Head from Chart on <b>Page 6</b> .	<input type="checkbox"/> <input type="checkbox"/>
<b>BUSHING</b> Select bushing from table on <b>Page 2</b> , "FL" for Flange or "00" if none.	<input type="checkbox"/> <input type="checkbox"/>
<b>IMMERSION LENGTH</b> In Inches	<input type="checkbox"/> <input type="checkbox"/>
<b>FRACTION</b>	<input type="checkbox"/>
"S" for Special "0" for No	<input type="checkbox"/>

**INDUSTRIAL PROCESS AND SENSOR**

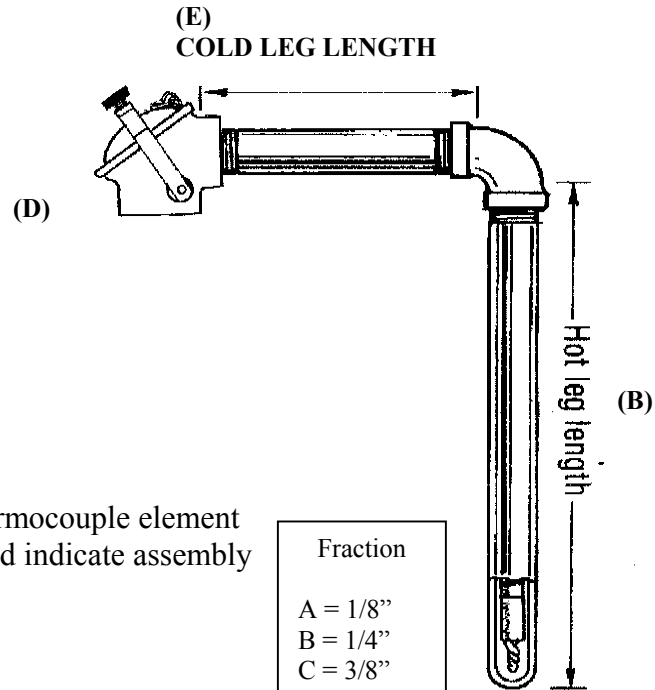
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# INDUSTRIAL THERMOCOUPLE ANGLE ASSEMBLY



\*If Thermocouple is to be included in the assembly, order the thermocouple element as a separate item from the **Industrial Thermocouple Section** and indicate assembly in part number below with an "A".

Other variations available please consult factory.

Fraction
A = 1/8"
B = 1/4"
C = 3/8"
D = 1/2"
E = 5/8"
F = 3/4"
G = 7/8"
0 = None

AA - □□□□ - □□ - □ - □ - □□ - □□ - □ - □ "S" for Special  
 "0" for No

F  
R  
A  
C  
T  
I  
O  
N

F  
R  
A  
C  
T  
I  
O  
N

(E) Cold leg length 00 to 99  
 (Cold leg and Ell to be carbon steel unless otherwise noted)

(D) Head - Select from chart.

(C) "A" if thermocouple to be included in assembly.  
 "0" if no thermocouple

(B) Hot leg length 00 to 99

(A) Alloy and Size - Select from chart on page 2 this section

# THERMOCOUPLE HEAD P/N for Assemblies

Use Table 6 to choose the head number and Table 6A to choose the size of the head for a Protection Tube assembly.

**Table 6**

Head No.	Head Description	Part No.	Terminal Block Description
<b>A</b>	IPS Cast Aluminum Head. Stainless Steel cover. Thumb screw for easy cover removal.	<b>HTB-7A</b>	Single element with lift out bail
<b>B</b>	Standard Cast Aluminum Head with screw cover	<b>HTB-M-100</b> <b>HTB-M-108</b> <b>HTB-M-200</b> <b>HTB-M-300</b>	Single element block
<b>C</b>	Standard Cast Iron Head with screw cover		Single element 8 AWG Dual Element 6-way terminal block
<b>D</b>	Cast Aluminum Head with hinged snap lever cap	<b>HTB-TC-E-2PC</b> <b>HTB-TC-N2PC</b> <b>HTB-TC-N4PC</b> <b>HTB-TC-N6PC</b>	2 pole elliptical Round single element 8 AWG Round dual Element Round 6-way
<b>E</b>	Large Cast Iron Head	<b>HTB-M-100</b> <b>HTB-M-108</b> <b>HTB-M-200</b> <b>HTB-M-300</b>	Single element block Single element 8 AWG Dual Element 6-way terminal block
<b>F</b>	Mini Aluminum Head for MgO ONLY	<b>Built in</b>	As required Single or Dual
<b>G</b>	Explosion Proof Head	<b>HTB-M-100</b> <b>HTB-M-108</b> <b>HTB-M-200</b> <b>HTB-M-300</b>	Single element block Single element 8 AWG Dual Element 6-way terminal block

**Table 6A**




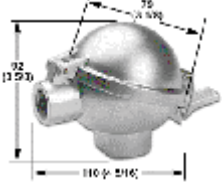

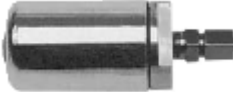
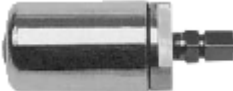
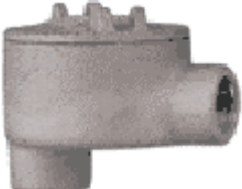
Head Sizes			
Head Size	Process x Conduit	Head Size	Process x Conduit
<b>1</b>	1/2" x 1/2"	<b>4</b>	1/2" x 3/4"
<b>2</b>	3/4" x 1/2"	<b>5</b>	3/4" x 3/4"
<b>3</b>	1" x 1/2"	<b>6</b>	1" x 3/4"

When selecting a head for an assembly, the first digit will be the **Head No.** and the second digit is the **Head Size**. For example **C5** is a cast iron head with a 3/4" NPT process connection and a 3/4" NPT conduit connection.

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# THERMOCOUPLE HEADS

**Table 8**

Head No.	Head Description	Part No.	Available Terminal Block Description
<b>H-7-X<sup>1</sup></b>	IPS cast aluminum Head. Stainless Steel cover. Thumb screw for easy cover removal.	 <p style="text-align: center; font-size: small;">Covering the head with H-7-X Terminal Block</p>	<ul style="list-style-type: none"> <li>◆ Single element with lift out bail</li> </ul>
<b>H-7-A-X<sup>1</sup></b>	Standard cast aluminum head with screw cover		<ul style="list-style-type: none"> <li>◆ Single element block</li> <li>◆ Single element 8 AWG</li> </ul>
<b>H-7-CI-X<sup>1</sup></b>	Standard cast iron head with screw cover		<ul style="list-style-type: none"> <li>◆ Dual Element</li> <li>◆ 6-way terminal block</li> </ul>
<b>H-KNPL-X<sup>1</sup></b>	Cast Aluminum Head with hinged snap lever cap		<ul style="list-style-type: none"> <li>◆ 2 pole elliptical</li> <li>◆ Round single element 8 AWG</li> <li>◆ Round dual Element</li> <li>◆ Round 6-way</li> </ul>
<b>H-LCI-X<sup>1</sup></b>	Large Cast Iron Head		<ul style="list-style-type: none"> <li>◆ Single element block</li> <li>◆ Single element 8 AWG</li> <li>◆ Dual Element</li> <li>◆ 6-way terminal block</li> </ul>
<b>H-SMAH</b>	.250 MgO Head Mini Aluminum Head Single Termination		<ul style="list-style-type: none"> <li>◆ Single Termination</li> </ul>
<b>H-DMAH</b>	.250 MgO Head Mini Aluminum Head Dual Termination		<ul style="list-style-type: none"> <li>◆ Dual termination</li> </ul>
<b>H-EX-X<sup>1</sup></b>	Explosion Proof Head		<ul style="list-style-type: none"> <li>◆ Single element block</li> <li>◆ Single element 8 AWG</li> <li>◆ Dual Element</li> <li>◆ 6-way terminal block</li> </ul>

<sup>1</sup> **Note:** The last X in the Head P/N designates the Process x Conduit sizes. See Table 8A, next page.

## Thermocouple Head Size Selection

Use table 8A to select the head size for the thermocouple heads in Table 8.

Example: If you want an IPS Thermocouple head with, a cast aluminum body and a stainless steel cover, select an H-7 head.

And you want 1/2" X 1/2" connections, select Head Size 1 from Table 8A. Use the 1 to replace the "X" in the head P/N above.

The full part number of the thermocouple head is H-7-1

**TABLE 8A**

Head Sizes			
Head Size	Process x Conduit	Head Size	Process x Conduit
<b>1</b>	1/2" x 1/2"	<b>4</b>	1/2" x 3/4"
<b>2</b>	3/4" x 1/2"	<b>5</b>	3/4" x 3/4"
<b>3</b>	1" x 1/2"	<b>6</b>	1" x 3/4"

### Terminal Block Part Numbers

**Table 8B**

Head No.	Head Description	Terminal Block Part No.	Terminal Block Description
<b>H-7</b>	IPS Cast Aluminum Head. Stainless Steel cover. Thumb screw for easy cover removal.	<b>HTB-7A</b>	◆ Single element with lift out bail
<b>H-7A</b>	Standard Cast Aluminum Head with screw cover	<b>HTB-M-100</b> <b>HTB-M-108</b> <b>HTB-M-200</b> <b>HTB-M-300</b>	◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block
<b>H-CI</b>	Standard Cast Iron Head with screw cover		
<b>H-KNPL</b>	Cast Aluminum Head with hinged snap lever cap	<b>HTB-TC-E-2PC</b> <b>HTB-TC-N2PC</b> <b>HTB-TC-N4PC</b> <b>HTB-TC-N6PC</b>	◆ 2 pole elliptical ◆ Round single element 8 AWG ◆ Round dual Element ◆ Round 6-way
<b>H-LCI</b>	Large Cast Iron Head	<b>HTB-M-100</b> <b>HTB-M-108</b> <b>HTB-M-200</b> <b>HTB-M-300</b>	◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block
<b>H-EX</b>	Explosion Proof Head	<b>HTB-M-100</b> <b>HTB-M-108</b> <b>HTB-M-200</b> <b>HTB-M-300</b>	◆ Single element block ◆ Single element 8 AWG ◆ Dual Element ◆ 6-way terminal block

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# PROTECTION TUBE DATA

MATERIAL	SIZE			OPERATING TEMP. °F	REMARKS
	Thread	ID	OD		
600 Inconel	1/2" 3/4" 1"	.622 x .824 x 1.049	.840 1.050 1.315	2220	Generally used for high temperature. Good corrosion resistance.
304 Stainless	1/2" 3/4" 1"	.622 x .824 x 1.049	.840 1.050 1.315	1800	Good corrosion resistance. Embrittles in the 900 – 1450 °F range.
310 Stainless	1/2" 3/4" 1"	.622 x .824 x 1.049	.840 1.050 1.315	2100	High mechanical and creep strength at elevated temperatures. Very good corrosion resistance.
316 Stainless	1/2" 3/4" 1"	.622 x .824 x 1.049	.840 1.050 1.315	1700	Higher corrosion resistance than 304. Resists pitting in sulfuric, phosphoric acids.
446 Stainless	1/2" 3/4" 1"	.622 x .824 x 1.049	.840 1.050 1.315	2000	Highly resistant to sulfur attack. General purpose alloy.
Carbon Steel	1/2" 3/4" 1"	.622 x .824 x 1.049	.840 1.050 1.315	1000	For non-corrosive gases and liquids. Scales quickly at higher temperatures.
Alumina		1/4" x 3/8" 7/16" x 11/16" 1/2" x 3/4" 1" x 1-1/8" 1" x 1-1/4"		Max. 3400 °F	Susceptible to thermal shock, needs preheating. Good mechanical strength. Resists chemicals and will not contaminate platinum.
Mullite		1/4" x 3/8" 7/16" x 11/16" 1/2" x 3/4" 1" x 1-1/8" 1" x 1-1/4"		Max. 2800 °F	Good resistance to thermal shock and chemicals. Good mechanical strength. Glazed tube recommended for generator and atmosphere furnaces. Can contaminate the platinum element above 2400 °F

Data available on other materials upon request.

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