Tudor™

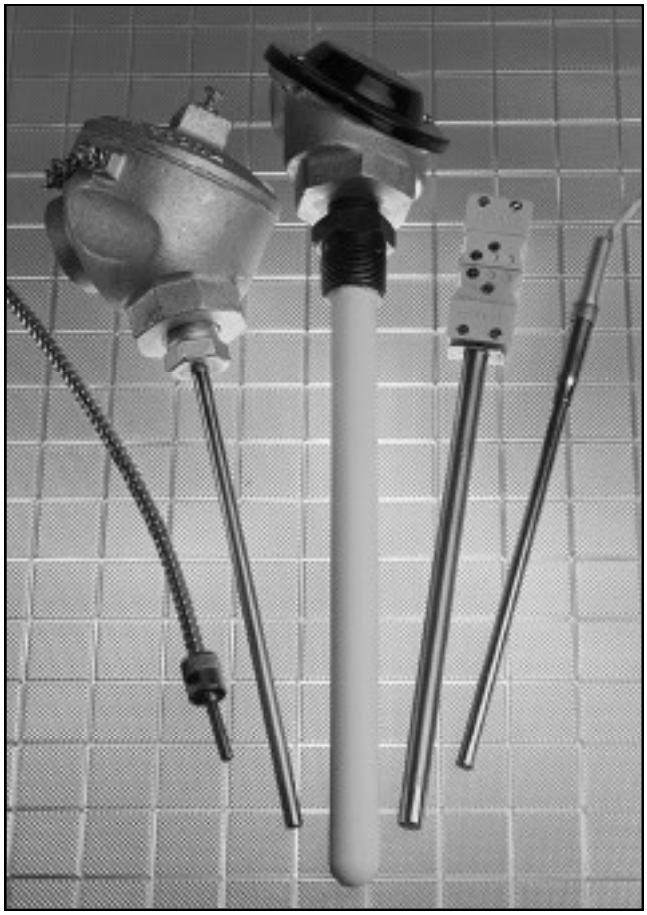
TEMPERATURE SENSORS

athenacontrols.com

ATHENA®
The Temperature Control Company

ATHENA CONTROLS, INC.
5145 Campus Drive
Plymouth Meeting, PA 19462-1129
U.S.A.

TUDOR™ TEMPERATURE SENSORS



When you have a technical problem or question about thermocouples, RTDs, or temperature measurement, give Athena a call. You'll speak with an experienced technician with a wide knowledge of the field. In addition to a complete line of Tudor brand temperature sensors, we build more "specials" and service a greater variety of industries than most any thermocouple manufacturer. In fact, chances are excellent we have already solved a problem similar to yours. We'll be happy to tell you about our experience and discuss possible solutions without obligation.

Many larger thermocouple manufacturers would rather not be bothered with "specials." They want large volume orders. So "specials" go to the bottom of the pile and delivery and communication with the customer are usually very poor.

Of course, we like large orders as much as the next company. But what sets us apart is our enthusiasm about solving problems for our customers, big and small. You can depend on Athena and Tudor brand temperature sensors to provide the temperature measurement and control solutions you need.

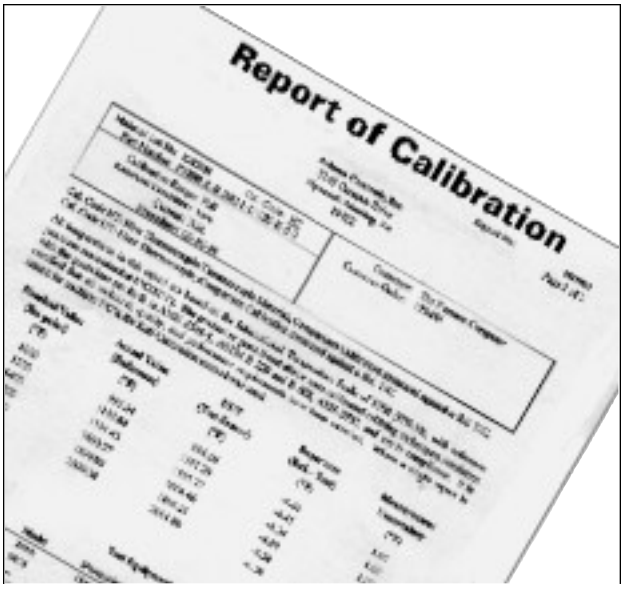
Tudor thermocouples and thermocouple wire meet accuracy standards as defined by the many technical societies and manufacturers. These accuracies are listed in the Engineering Data section of the Athena Reference Information publication, available on request and at our web site, www.athenacontrols.com. Special accuracy thermocouples and thermocouple wire are also defined and are detailed in this section.

Selected grade thermocouple wire can be supplied in instances where special or standard grade material does not provide the accuracy needed at specific temperatures. The availability of this grade depends on your specific requirements and stock levels.

Calibration of thermocouples or thermocouple wire is a laboratory test performed on a specific product or lot to determine its departure from a defined temperature — E.M.F. relationship. ASTM E 230 (ITS 90) describes the relationship for the various thermocouple types, portions of which can be found in the Engineering Data section of this catalog. Calibrations are conducted following the general guidelines of ASTM E 220. Test results are reported in certificate form indicating test temperatures, ˚F or ˚C corrections and standards traceable data.

Calibration is performed in accordance with MIL-C-45662, ANSI/NSCL Z540-1, and ISO 10012-1. Overall production satisfies the requirements of MIL-I-45208. Additionally, the product testing and certification requirements of AMS-2750-C and ASTM E 608 can be supplied.

Each product tested can be tagged with a test number, date and correction data. Pricing for calibration and testing is based on tests selected, quantity to be tested, and number of test temperatures. Test temperatures within the range of 0° C (32° F) to 1371° C (2500° F) are available at competitive pricing. Sub-zero checking and high temperature (above 1371° C) are available on special quotation only.



ATHENA
The Temperature Control Company

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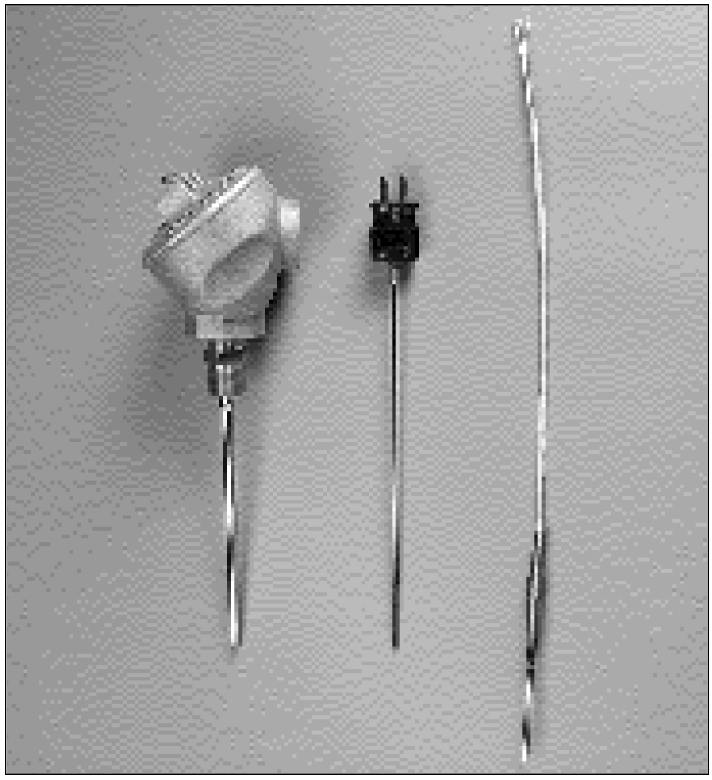
TU-PAK® THERMOCOUPLE ASSEMBLIES

Tu-Pak® is Athena's trademark for metal-sheathed, mineral-insulated (MI) thermocouple material. It is a departure from the traditional assembly of tubes, wires and insulators. It has a unit-construction with no replacement parts. Tu-Pak has improved thermal response, greater flexibility and, size for size, it is longer lasting than traditional types.



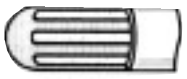
Tu-Pak® Dimensions and Wire Sizes

Sheath Outside Diameter	Outside Diameter Tolerance, ±in.	Nominal Wall Thickness, in.	Approximate Wire B&S gauge	Nom. Conductor Diameters, in. 2-wire	4-wire
0.062	0.002	0.010	29	0.011	0.006
0.125	0.002	0.018	24	0.022	0.011
0.188	0.003	0.025	18	0.032	0.022
0.250	0.003	0.032	17	0.040	0.032
0.313	0.003	0.040	16	0.051	0.040
0.375	0.003	0.049	14	0.064	0.051

Tu-Pak® Suggested Upper Temperature Limits for Sheathed Thermocouples (per ASTM E608)

Nom. Dia. (in)	0.062	0.125	0.188	0.250
Nom. Wall (in)	0.010	0.018	0.025	0.032
Type K/N (°F/°C)	1690/920	1960/1070	2100/1150	2100/1150
Type J (°F/°C)	825/440	970/520	1150/620	1330/720
Type E (°F/°C)	950/510	1200/650	1350/730	1510/820
Type T (°F/°C)	500/260	600/315	700/370	700/370

Measuring Junctions



Grounded Junction - The sheath and the thermocouple wires are welded together, forming a completely closed measuring junction. Recommended in the presence of liquids, moisture, gas, or high pressure. The thermocouple is protected from the environment. Response time approaches that of an exposed junction.

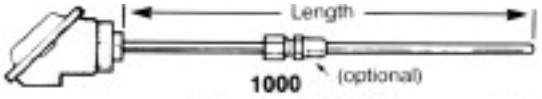
Ungrounded Junction - The thermocouple junction is insulated from the welded measuring junction closure. Recommended for applications where stray EMFs could affect the instrument reading and for frequent/rapid temperature cycling. Response time is slower than a grounded junction.

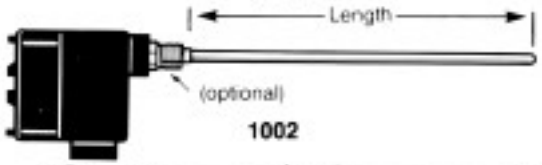
Exposed Junction - The thermocouple junction is not protected by a welded closure. Insulation is sealed against liquid or gas penetration. Provides fastest response time. Not recommended for applications that are corrosive.

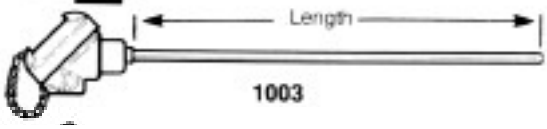
TU-PAK® HEAD-TYPE THERMOCOUPLE ASSEMBLIES

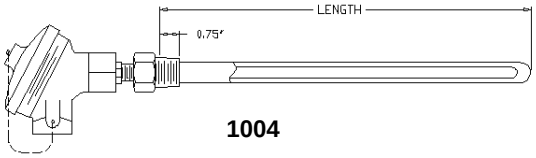
Terminations & Length Specifications
(Custom Head Type Terminations also available on request)

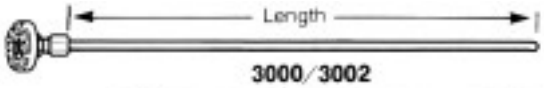
Part No.	Style
1000	General Purpose Cast Aluminum Head.
1002	Hazardous Location Cast Aluminum Head.
1003	Screw-Cover Thermoplastic Head.
1004	Screw-Cover Cast Iron Head.
2000	Screw-Cover Cast Aluminum Head.
2002	Screw-Cover Aluminum Head with 1/2" NPT SS spring loaded oil and vapor seal.
3000	300˚F (149°C) max. Open Head.
3002	1000˚F (538°C) max. Open Head – Simplex only.
4000	Screw Cover Mini-Head.
4002	Bayonet Cover Mini Head.

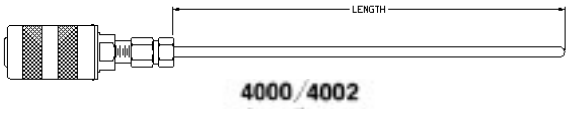












Ordering Information

Part Number Example: 2 0 0 0 J – S – A04 – 4 – U – 24 – 7S

Part Number: □□□□ – I – II – III – IV – V – VI – VII

I — T/C Calibration

Code

J	= Iron-Constantan
K	= Chromel-Alumel
T	= Copper-Constantan
E	= Chromel-Constantan
N	= Nicrosil-Nisil
S	= Pt 10% Rh-Pt
R	= Pt 13% Rh-Pt
B	= Pt 30% Rh-Pt 6% RH

II — T/C Form

Code

S	= Simplex
D	= Duplex
T**	= Triplex

**Available on 1000, 1002, 1003, 1004 and 2000 only.

III — Sheath Material

Code

A04	= 304SS
A10	= 310SS
A16	= 316SS
A21	= 321SS
F46	= 446SS
INC	= Inconel
ILY	= Incoloy
PT10	= Pt 10% Rh

IV — Sheath Diameter

Code

.040	= .040"
1	= .062"
2	= .125"
3	= .187"
4	= .250"
5	= .312"
6	= .375"

V — Measuring Junction

Code

G	= Grounded
U	= Ungrounded
E	= Exposed

VI — Length

Code
(Specify in inches)

VII — Optional Comp. Fitting - NPT

Code

1	= Brass - 1/8
2	= Brass - 1/4
3	= SS - 1/8
4	= SS - 1/4
5	= SS Adj. - 1/8
6	= SS Adj. - 1/4
*7C	= 1/2 x 1/2 Carb. Steel
*7S	= 1/2 x 1/2 SS
*7L	= 1/2 x 1/2 SS Sp. Ld.
0	= None

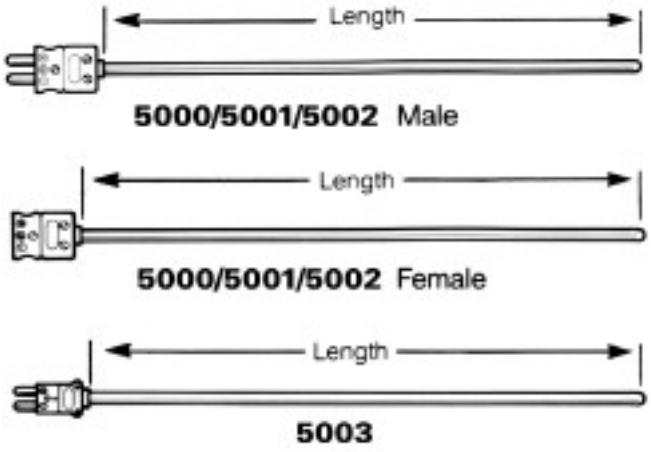
*Available on 1000, 1002, 1003, 1004, and 2000 only.

TU-PAK® CONNECTOR-TYPE THERMOCOUPLE ASSEMBLIES

Standard Terminations & Length Specifications
(Custom terminations also available on request)

Part No.	Style
5000	350˚F (177°C) Max Standard Connector
5001	500˚F (260°C) Max Standard Connector
5002	1000˚F (538°C) Max Standard Connector
5003	350˚F (177°C) Max Miniature Connector*

Temperatures are exposure ratings for connectors only.



Ordering Information

Part Number Example: P5001- J - S - A04 - 1 - U - 12 - H - F - 2

Part Number

I II III IV V VI VII VIII IX

Limit of Error

Code
P = Premium
H = High (>2200° F)
T = Standard

T/C Form

Code
S = Simplex
D = Duplex

Sheath Diameter

Code
.040 = .040″
1 = .062″
2 = .125″
3 = .187″
4 = .250″
5 = .312″
6 = .375″

Length

Code
(Specify in inches)

Female Jack

Code
0 = None
F** = Standard
FM*= Miniature
C = Ceramic

5 0 0 x – I – II – III – IV – V – VI VII VIII IX

Part Number

T/C Calibration

Code
J = Iron-Constantan
K = Chromel-Alumel
T = Copper-Constantan
E = Chromel-Constantan
N = Nicrosil-Nisil
S = Pt 10% Rh-Pt
R = Pt 13% Rh-Pt
B = Pt 30% Rh-Pt 6% RH

Sheath Material

Code
A04 = 304SS
A10 = 310SS
A16 = 316SS
A21 = 321SS
F46 = 446SS
INC = Inconel
ILY = Incoloy
PT10 = Pt 10% Rh

Measuring Junction

Code
G = Grounded
U = Ungrounded
E = Exposed

Male Plug

Code
0 = None
H** = Std. Hollow
S** = Std. Solid
M* = Miniature
C = Ceramic

Optional Comp. Fitting

Code
0 = None
1 = Brass - 1/8
2 = Brass - 1/4
3 = SS - 1/8
4 = SS - 1/4
5 = SS Adj. - 1/8
6 = SS Adj. - 1/4

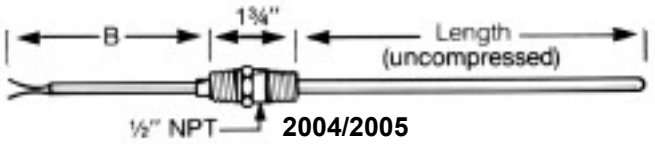
*Available in sizes .040 to 3/16″ only.
**Not available with 5003.

TU-PAK® LEAD WIRE-TYPE THERMOCOUPLE ASSEMBLIES

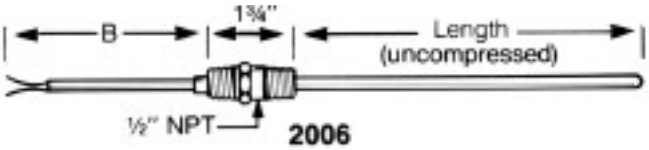
Standard Terminations & Length Specifications
(Custom terminations also available on request)

Part No.	Style/Description
2004	1/2" NPT x 1/2" NPT Carbon Steel Ftg.
2005	1/2" NPT x 1/2" NPT SS Fitting
2006	1/2" NPT x 1/2" NPT Spring Loaded Stainless Steel Fitting
6000	Transition Ftg. with Strain Relief Spring
6001	Transition Ftg. w/o Strain Relief Spring
6002*	Transition to Polyurethane Coiled Cord. Simplex only. Omit Tables VIII and IX. Not available in S, R, or B calibration.
7000	Stripped 1" Leads

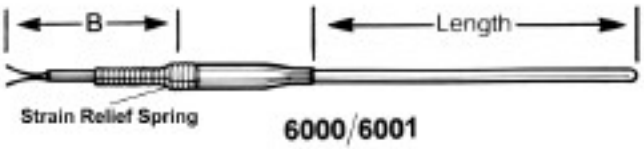
Noble metal elements are not recommended for use with base metal sheaths.
*Available on 6002 only. Expands to approximately 5' per coiled foot.



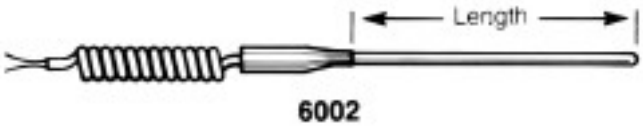
2004/2005



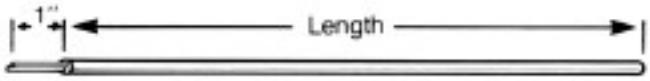
2006



6000/6001



6002



7000

Ordering Information

Part Number Example: P6001- J - S - A04 - 1 - U - 12 - GG - 8 - 0 - 1 - 0

I II III IV V VI VII VIII IX X XI

Part Number

Limit of Error
Code
P = Premium
H = High (>2200° F)
T = Standard

T/C Form
Code
S = Simplex
D = Duplex
T = Triplex

Sheath Diameter
Code
0 = .040"
1 = .062"
2 = .125"
3 = .187"
4 = .250"
5 = .312"
6 = .375"

Length
Code
(Specify in inches)

Lead Length
Code
B = If lead length is longer than 12", enter length over 12"

Optional Comp. Fitting
Code
1 = Brass - 1/8
2 = Brass - 1/4
3 = SS - 1/8
4 = SS - 1/4
5 = SS Adj. - 1/8
6 = SS Adj. - 1/4
0 = None

x 0 0 x – I – II – III – IV – V – VI – VII – VIII – IX – X – XI

Part Number

T/C Calibration
Code
J = Iron-Constantan
K = Chromel-Alumel
T = Copper-Constantan
E = Chromel-Constantan
N = Nicrosil-Nisil
S = Pt 10% Rh-Pt
R = Pt 13% Rh-Pt
B = Pt 30% Rh-Pt 6% RH

Sheath Material
Code
A04 = 304SS
A10 = 310SS
A16 = 316SS
A21 = 321SS
F46 = 446SS
INC = Inconel
ILY = Incoloy
PT10 = Pt 10% Rh

Measuring Junction
Code
G = Grounded
U = Ungrounded
E = Exposed

Lead Wire Insulation
Code
GG = Fiberglass
GS = Flberglass/ SS Overbraid
PP = Polyvinyl
PS = Polyvinyl/SS Overbraid
TT = Teflon
TS = Teflon/SS Overbraid
CC1* = 1' Coiled Cord
CC2* = 2' Coiled Cord
CC3* = 3' Coiled Cord
CC5* = 5' Coiled Cord
SG = Stranded Glass
ST = Stranded Teflon®
GSS = Stranded, with Overbraid

Extension Cover
Code
0 = None
Flex SS = Flex Armor

Connectors
Code
0 = None
P = Std. Plug (350° F max.)
J = Std. Jack (350°F max.)
MP = Miniature Plug (350° F max)
MJ = Miniature Jack (350°F max.)

INDUSTRIAL PROCESS/PRESSURE VESSEL THERMOCOUPLES

Athena Control's Tudor brand Industrial Process/ Pressure Vessel thermocouples are suitable for many applications. This style is most frequently applied in Power Generating Stations, Chemical Process Plants, Petrochemical Process Plants, and Petroleum Refining Plants.

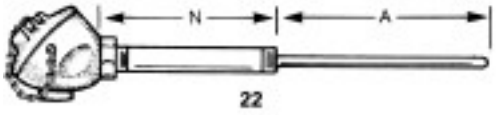
The ordering specifications and style offerings provide a most flexible method to describe the exact design required.

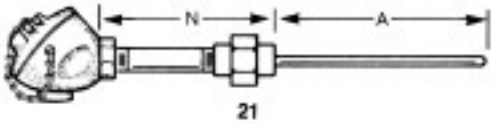
The thermocouples consist of four basic components

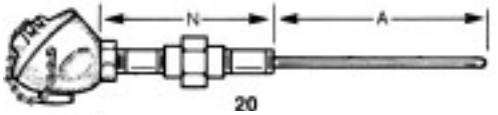
1. *Connection Head - An aluminum heavy duty screw cover head with terminal block*
2. *Thermocouple Element - A spring-loaded MgO insulated metal sheathed element. Standard sheath material is 304SS - maximum compression is 1/2 inch.*
3. *Mounting Fittings - Carbon steel nipples*
   - Female 150 lb steel unions
   - Nominal thread engagement is 1/2 inch
4. *Drilled Thermowell - Standard and heavy duty type*

Other materials and head assemblies are available upon request .

Part No.	Style
22	Aluminum heavy duty screw cover head with nipple and element.
21	Aluminum heavy duty screw cover head with nipple-union and element.
20	Aluminum heavy duty screw cover head with nipple-union-nipple and element.







Ordering Information

Part Number Example: 2 0 4 2 E S 4 G 12.5 W

Part Number: 2 x – I – II – III – IV – V – VI – VII – VIII

"N" Length
Enter length in inches (minimum 3 inches)

Nipple Size
Code
2 = 1/2" Pipe
3 = 3/4" Pipe

Calibration
Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
N = Nicrosil - Nisil

Form
Code
S = Simplex
D = Duplex
T = Triplex

Element
Code
3S = Spring - Loaded 3/16" Sheath
4S = Spring - Loaded 1/4" Sheath
6S = Spring - Loaded 3/8" Sheath
4IS = Spring - Loaded 1/4" Inconel

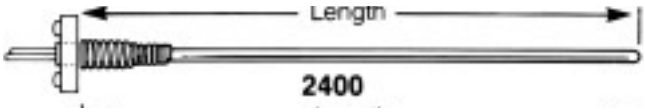
Measuring Junction
Code
G = Grounded
U = Ungrounded

"A" Length
Enter length in inches

Well Number
Code
0 = None
W = Select well part number from Page 14 and add as additional item on order.

INDUSTRIAL PROCESS/PRESSURE VESSEL THERMOCOUPLES

Replacement Element for 20/21/22 Series Assemblies



Tu-Pak Spring-Loaded Type
(Element Options 3S, 4S, 4IS, 6S)

Ordering Information

Part Number Example: 2400 E S AO4 4 G 16.5 0

2400	–	I	–	II	–	III	–	IV	–	V	–	VI	–	VII

Part Number

T/C Calibration
Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
N = Nicrosil - Nisil

Form
Code
S = Simplex
D = Duplex
T = Triplex

Sheath Material
Code
A04 = 304SS
A16 = 316SS
INC = Inconel

Sheath Diameter
Code
3 = .187″
4 = .250″
6 = .375″

Measuring Junction
Code
G = Grounded
U = Ungrounded

Length
Enter length in inches

Optional Comp. Fitting - NPT
Code
0= None

DRILLED THERMOWELLS

SELECTION OF THERMOWELLS

Material

Thermowell material chosen for an installation is governed by corrosive conditions. Occasionally, the material consideration is one of strength rather than a corrosive condition. Consult the pressure-temperature ratings given for each well type for proper selection.

Insertion Length "U"

The distance from the end of the well to the underside of the thread, or other connection means, (designated as "U" is the insertion length. For best accuracy, this length should be long enough to permit the entire temperature sensitive part of the thermocouple to project into the temperature medium being measured.

Bore Size

The bore size of wells shown in this catalog cover the most commonly used temperature sensing elements as follows:

.260 Diameter Bore: Bi-metal Thermometers (1/4" stem.). Thermocouples (#20 gauge) or sheathed type up to .250 inch diameter. Liquid-in-glass Test Thermometers (unarmored). Other elements having .252 inch maximum diameter.

.385 Diameter Bore: Bi-metal Thermocouples (3/8" stem.) Thermocouples (#14 gauge) or sheathed type up to .375 inch diameter. Liquid-in-glass Test Thermometers (armored). Other elements having .377 inch maximum diameter.

Tapered or Straight Shank

Tapered shank wells provide greater stiffness for the same sensitivity. The higher strength-to-weight ratio gives these wells higher natural frequency than equivalent length straight shank wells, thus permitting operation at higher fluid velocity.

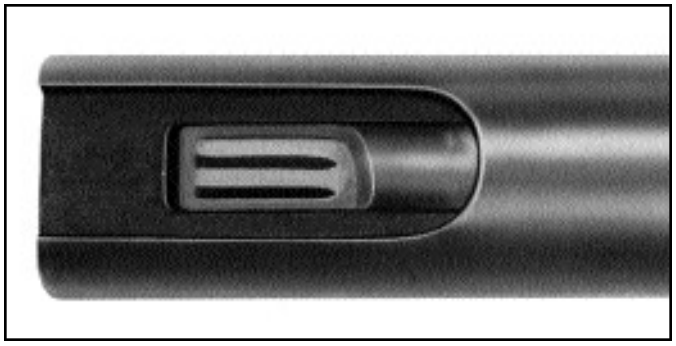
Velocity Ratings of Wells

Well failures in most cases are not due to the effect of pressure and temperature. The calculations necessary to provide adequate strength under given conditions are familiar enough to permit proper choice of wall thickness and material.

Less familiar, and more dangerous, are the vibrational effects to which wells are subjected. Fluid flowing by the well forms a turbulent wake (called the Von Karman Trail) which has a definite frequency based on the diameter of the well and the velocity of the fluid. It is important that the well have sufficient stiffness so that the wake frequency will never equal the natural frequency of the well itself. If the natural frequency of the well were to coincide with the wake frequency, the well would vibrate to destruction and break of in the piping.

A recommended maximum velocity rating for typical well lengths and materials is listed in the accompanying tables. To reduce the complexity of presenting this information, the ratings given are based on operating temperatures of 1000˚F for wells made of Carbon Steel (C-1018), A.I.S.I. 304 & A.I.S.I. 316. Values for brass wells are based on 350˚F (177°C) operation. Limits for Monel wells are based on 900˚F (482°C) service. Slightly higher velocity is possible at lower temperatures.

Where single values appear in the velocity tables, they may be considered safe for water, steam, air or gas. In the shorter insertion lengths, consideration is given to the velocity pressure effect of water flowing at higher velocities. The values in parenthesis, therefore, represent safe values for water flow while the unbracketed value may be used for steam, air, gas and similar density fluids. The values given are conservative and intended as a guide. Wells are also safe if the resonant frequency is well below the wake frequency or if the fluid velocity is constantly fluctuating through the critical velocity point. Nevertheless, if the installation is not hampered by the use of a sufficiently stiff well, the values given should not be exceeded.



ATHENA
The Temperature Control Company

VELOCITY TEMPERATURE AND PRESSURE DATA

Maximum Fluid Velocity In Feet Per Second

Table No.	Material	Insertion Length "U" 2½	4½	7½	10½	13½	16½	19½	22½
V1	Brass	207 (59.3)	75.5 (32.2)	27.3 (19.7)	13.9	8.4	5.6	4.1	3.0
	Carbon Steel	290 (106)	105 (59)	38.2 (36.3)	19.4	11.8	7.8	5.7	4.2
	A.I.S.I. 304 & 316	300 (148)	109 (82.2)	39.5	20.1	12.2	8.1	5.9	4.4
	Monel	261 (118)	95 (65.5)	34.4	17.5	10.5	7.1	5.2	3.8
V2	Brass	207 (59.3)	89.1 (39.8)	32.2 (23.9)	16.4	9.9	6.6	4.8	3.6
	Carbon Steel	290 (106)	123 (71.2)	44.9 (42.7)	22.8	13.8	9.3	6.7	4.9
	A.I.S.I. 304 & 316	300 (148)	128 (99.3)	46.4	23.6	14.3	9.6	6.9	5.1
	Monel	261 (118)	112 (79.8)	40.6	20.7	12.4	8.3	6.1	4.5
V3	Brass	207 (59.3)	102 (47.6)	37.0 (28)	18.8	11.4	7.6	5.5	4.1
	Carbon Steel	290 (106)	143 (84.3)	51.6 (50.6)	26.2	15.9	10.6	7.6	5.7
	A.I.S.I. 304 & 316	300 (148)	148 (117)	53.5	27.2	16.5	11.0	7.9	5.9
	Monel	261 (118)	128 (93.3)	46.7	23.7	14.4	9.5	6.9	5.1
V4	Brass	305 (97.5)	93.8 (54.1)	33.9	17.1	10.5	7.0	5.0	3.7
	Carbon Steel	386 (175)	180 (97.2)	65.3 (58.3)	33.0	20.1	13.4	9.6	7.1
	A.I.S.I. 304 & 316	440 (243)	197 (135)	71.2	36.0	22.0	14.7	0.5	7.8
	Monel	354 (195)	155 (108)	56.1	28.4	17.3	11.6	7.5	5.6
V5	Brass	354 (161)	108 (89.5)	39.4	19.8	12.2	8.1	5.8	4.3
	Carbon Steel	448 (289)	209 (161)	75.7	38.4	23.3	15.5	11.1	8.2
	A.I.S.I. 304 & 316	490 (403)	228 (225)	82.5	41.8	25.5	17.1	12.2	9.1
	Monel	410 (322)	179 (178)	65.1	33.0	20.1	13.5	8.7	6.5
V6	Brass	321 (150)	129 (83.5)	46.8	23.6	14.5	9.6	6.9	5.1
	Carbon Steel	410 (270)	249 (150)	90.3	45.6	27.8	18.5	13.2	9.8
	A.I.S.I. 304 & 316	483 (350)	272 (208)	97.3	49.7	30.4	20.3	14.5	10.7
	Monel	396 (300)	214 (167)	77.5	39.2	23.8	16.0	10.3	7.7
V7	Brass	290 (145)	150 (80)	54.1 (48)	27.6	16.7	11.1	8.0	6.0
	Carbon Steel	326 (260)	192 (144)	69.5	35.4	20.5	14.3	10.3	7.7
	A.I.S.I. 304 & 316	349 (360)	199	71.9	36.6	21.2	14.8	10.7	8.0
	Monel	316 (320)	189 (178)	68.1	34.8	20.8	14.0	10.0	7.5

Maximum Fluid Velocity In Feet Per Second

Table No.	Material	Insertion Length "U" 2	4	7	10	13	16	22
V8	Carbon Steel	404 (129)	184 (71.2)	67.0 (42.7)	34.0	20.6	13.7	7.4
	A.I.S.I. 304 & 316	430 (179)	192 (99.3)	69.7 (59.6)	35.4	21.5	14.3	7.7
	Monel	350 (143)	168 (79.8)	61 (47.7)	31.0	18.8	12.5	6.7
V9	Carbon Steel	410 (152)	248 (84.3)	91.3 (50.6)	45.7	27.6	18.5	10.0
	A.I.S.I. 304 & 316	444 (211)	258 (117)	95.2 (70.3)	47.6	28.8	19.3	10.4
	Monel	338 (168)	226 (93.3)	83.3 (56.0)	41.6	25.2	16.9	9.1

Pressure – Temperature Rating Lbs. Per Sq. Inch

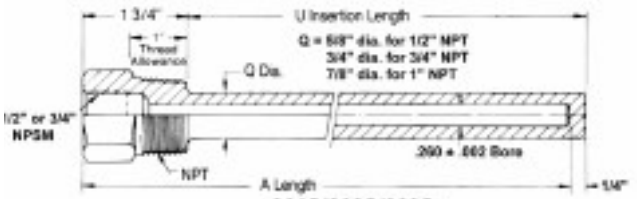
Table No.	Material	Temperature ˚F/°C 70˚/22°	200˚/94°	400˚/205°	600˚/316	800˚/427°	1000˚/538°	1200˚/649°
T1	Brass	5000	4200	1000	—	—	—	—
	Carbon Steel	5200	5000	4800	4600	3500	1500	—
	A.I.S.I. 304	7000	6200	5600	5400	5200	4500	1650
	A.I.S.I. 316	7000	7000	6400	6200	6100	5100	2500
	Monel	6500	6000	5400	5300	5200	1500	—
T2	Brass	5300	4750	1100	—	—	—	—
	Carbon Steel	5950	5750	5450	5250	4000	1750	—
	A.I.S.I. 304	7800	7050	6400	6150	6000	5190	1875
	A.I.S.I. 316	7800	7800	7250	7100	6950	5800	2720
	Monel	7450	6850	6150	6100	5940	1750	—

Maximum Flange Pressure – Temperature Rating Lbs. Per Sq. Inch

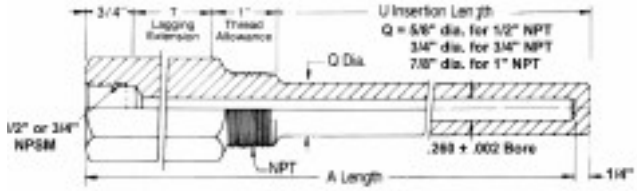
Material	Temperature ˚F/°C 0˚/-18°	200˚/94°	400˚/205°	600˚/316°	800˚/427°	1000˚/538°	1125˚/608°
Carbon Steel	____ up to _____ 2500#						
A.I.S.I. — 304	____ up to _____ 2500#						
A.I.S.I. — 316	____ up to _____ 2500#						
Monel	____ up to _____ 2500#						

DRILLED THERMOWELLS

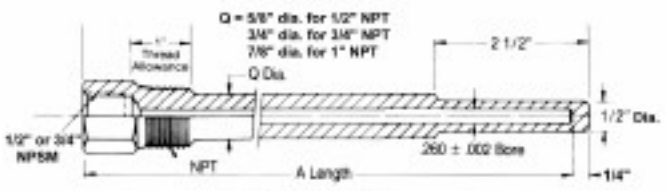
260 Series Thermowells



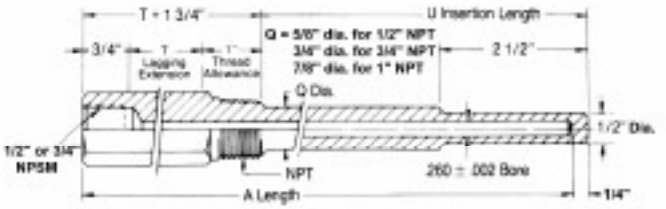
261S/262S/263S



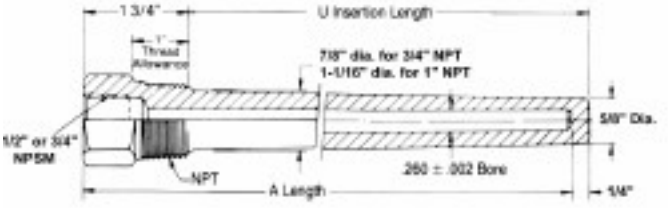
261SL/262SL/263SL



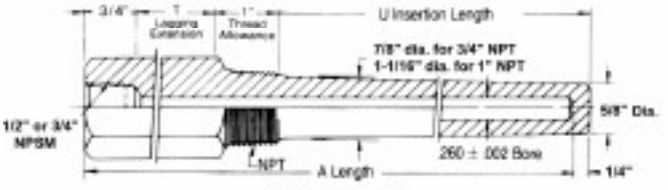
261R/262R/263R



261RL/262RL/263RL

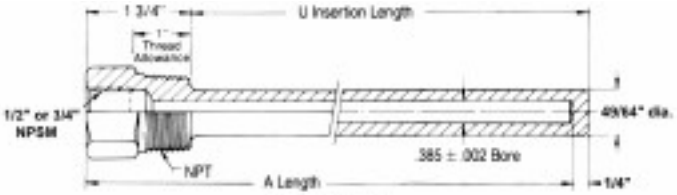


262H/263H

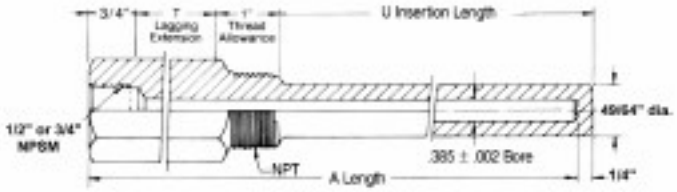


262HL/263HL

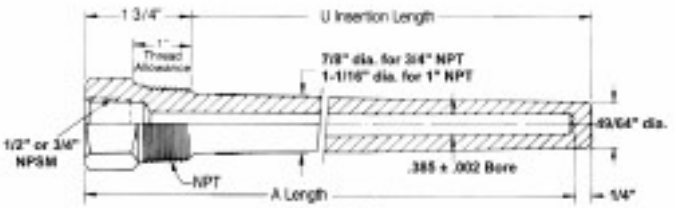
380 Series Thermowells



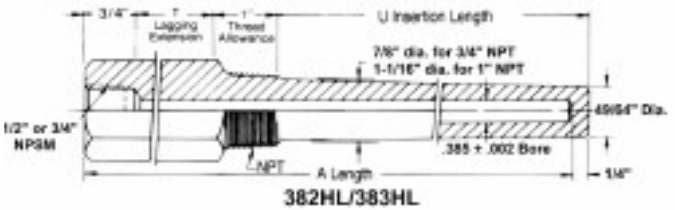
382S/383S



382SL/383SL



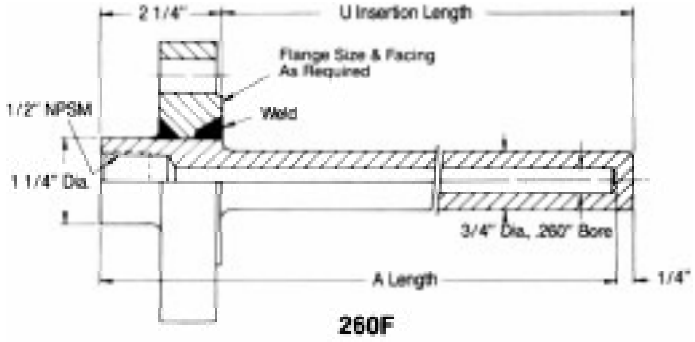
382H/383H



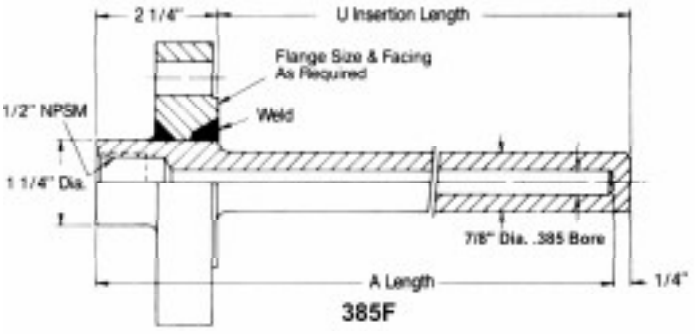
382HL/383HL

DRILLED THERMOWELLS

Flanged Thermowells

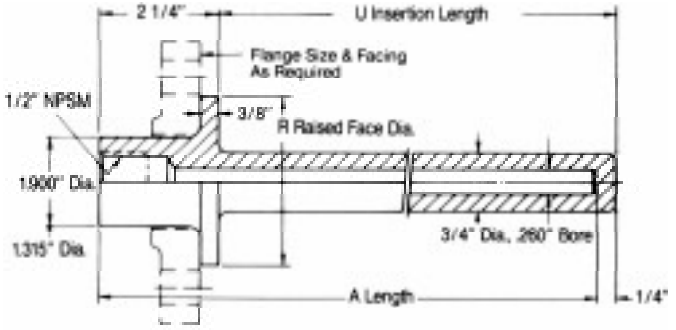


260F

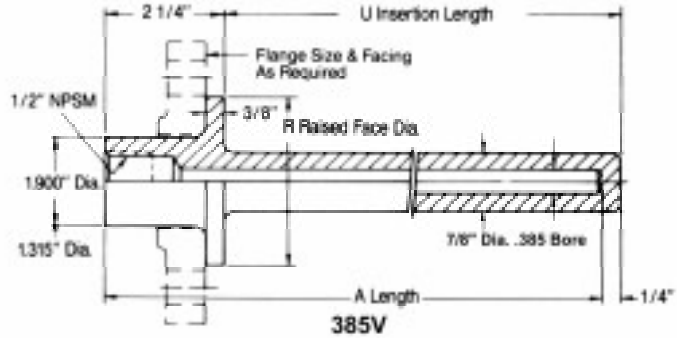


385F

Van Stone Thermowells



260V



385V

DRILLED THERMOWELLS

Part No.	Style	Applicable Tables Temperature	Velocity
261S	1/2" NPT Process Thread	T1	V1
262S	3/4" NPT Process Thread	T1	V2
263S	1" NPT Process Thread	T1	V3
261SL	1/2" NPT Process Thread with Lag	T1	V1
262SL	3/4" NPT Process Thread with Lag	T1	V2
263SL	1" NPT Process Thread with Lag	T1	V3
261R	1/2" NPT Process Thread	T1	V1
262R	3/4" NPT Process Thread	T1	V2
263R	1" NPT Process Thread	T1	V3
261RL	1/2" NPT Process Thread with Lag	T1	V1
262RL	3/4" NPT Process Thread with Lag	T1	V2
263RL	1" NPT Process Thread with Lag	T1	V3
262H	3/4" NPT Process Thread	T2	V4
263H	1" NPT Process Thread	T2	V5

Part No.	Style	Applicable Tables Temperature	Velocity
262HL	3/4" NPT Process Thread with Lag	T2	V4
263HL	1" NPT Process Thread with Lag	T2	V5
382S	3/4" NPT Process Thread	T1	V7
383S	1" NPT Process Thread	T1	V7
382SL	3/4" NPT Process Thread with Lag	T1	V7
383SL	1" NPT Process Thread with Lag	T1	V7
382H	**3/4"** NPT Process Thread	T1	V6
383H	1" NPT Process Thread	T1	V6
382HL	3/4" NPT Process Thread with Lag	T1	V6
383HL	1" NPT Process Thread with Lag	T1	V6
260F	.260 Bore with Flange	T3	V8
385F	.385 Bore with Flange	T3	V9
260V	.260 Bore, Van Stone Type	T3	V8
385V	.385 Bore, Van Stone Type	T3	V9

Ordering Information

Part Number Examples:

Thermowell:	2	6	2	S	L	4.5		A		2		0		0		0		0			
Flanged Thermowell:	2	6	0	F		10		A		0		RF		1.5		150		K			
Part Number						I	–	II	–	III	–	IV	–	V	–	VI	–	VII			

I — **"U" Length in inches**

II — **Material**

Code
A = 304 Stainless Steel
B = 309 Stainless Steel
C = 310 Stainless Steel
D = 316 Stainless Steel
E = 321 Stainless Steel
F = 347 Stainless Steel
G = 410 Stainless Steel
H = 446 Stainless Steel
J = Aluminum
K = Carbon Steel (C1018)
L = 304 ELC(Low Carbon)
M = 316 ELC(Low Carbon)
N = Brass
P = Monel (R)
R = Inconel 600
S = Hastelloy B
T = Hastelloy C
V = Carpenter 20
W = Titanium

III — **"T" Length in inches** (where applicable)

IV — **Flange style (where applicable)**

V — **Flange size (where applicable)**

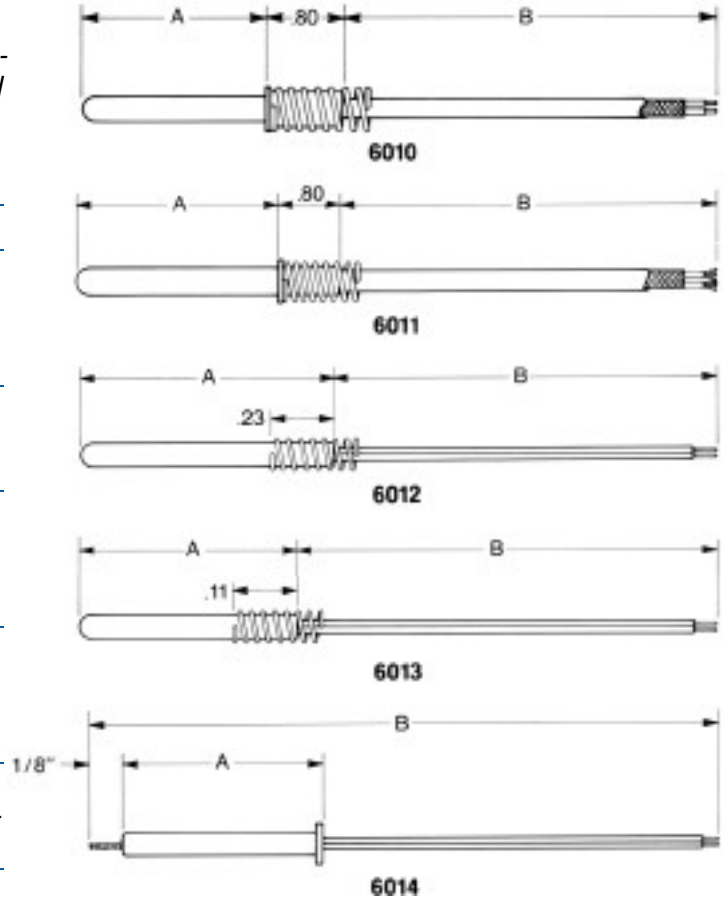
VI — **Flange rating (where applicable)**

VII — **Flange material (where applicable** See material table.

BEARING METAL THERMOCOUPLES

The sensors offered below are time-proven devices for measuring bearing temperatures on large rotating equip - ment found in generating stations. Their construction and materials meet rigid specifications and quality require - ments of original equipment manufacturers.

Part No.	Style
6010	3/16" diameter sensor, spring loaded with twisted and shielded lead wire for simplex or duplex bearing metal thermocouple requirements.
6011	1/4" diameter sensor, spring loaded with twisted and shielded lead wire for triplex bearing metal thermocouple requirements.
6012	3/16" diameter sensor, spring loaded with rip-cord style lead wire for simplex or duplex thrust bearing thermocouple requirements (deep mount).
6013	3/16" diameter sensor, spring loaded with rip-cord style lead wire for simplex or duplex thrust bearing thermocouple requirements (shallow mount).
6014	3/16" diameter sensor, internally spring loaded with flange, twisted measuring junc- tion, and rip-cord style simplex lead wire.



Ordering Information

Part Number Example: 6 0 1 0

6	0	1	x

Part Number

E – I – D – II – U – III – 2.4 – IV – 100 – V

I — Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan

II — Form*

Code
S = Simplex (2-wire)
D = Duplex (4-wire)

III — Junction**

Code
G = Grounded
U = Ungrounded

IV — "A" Length***

Code
034 = 0.34
056 = 0.56
081 = 0.81
100 = 1.00
131 = 1.31

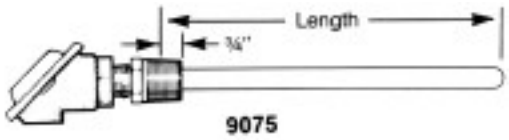
V — "B" Length

Specify lead wire length in inches

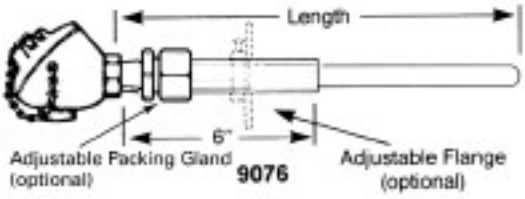
*Omit selection for part number **6011**.
Omit selection for part number **6014.
***These selections are only for part number **6014**; otherwise, any number may be specified.

CERAMIC-TYPE PROTECTION TUBE ASSEMBLIES

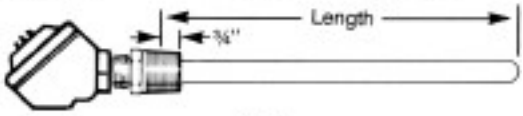
Ceramic protection tube assemblies are offered in a wide variety of aluminum connection heads and mounting options. Specifications and part numbers are detailed in the tables below to permit excellent flexibility in selecting the exact design required. Assemblies are shipped pre-tested and ready to install.



9075



9076



9077

STRAIGHT – CERAMIC PROTECTION TUBE ASSEMBLIES

Part No.	Style
9075	General Purpose connection head.
9076	Heavy Duty Screw Cover connection head.
9077	Light Weight Screw Cover connection head.

Ordering Information

Part Number Example: 9 0 7 6 K – 14 – D – M – 18 – 11 – 0

9	0	7	x	x	–	I	–	II	–	III	–	IV	–	V	–	VI	–	VII

Part Number

I – T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper Constantan
N = Nicrosil - Nisil

II – Gauge Size

Code
8 = 8
14 = 14
20 = 20

III – T/C Form

Code
S = Simplex
D = Duplex

IV – Protection Tube Material

Code
M = Mullite
A = 99.6% Alumina
L = Metal - Ceramic (7/8" O.D. Only)

V – Tube Length

Enter length in inches

VI – Tube O.D.

Code
6* = 3/8"
11 = 11/16"
14 = 7/8"
15 = 15/16"

VII – Mounting Options Choose One Only

Code
FL = Adjustable Carbon Steel Flange
AG = Adjustable Carbon Steel Packing Gland
PE = Pipe Extension
PE-FL = Pipe Extension and Adjustable Carbon Steel Flange
PE-AG** = Pipe Extension and Adjustable Carbon Steel Gland
0 = None

*Maximum wire size is 20 gauge.
**Minimum pipe extension length is four inches.

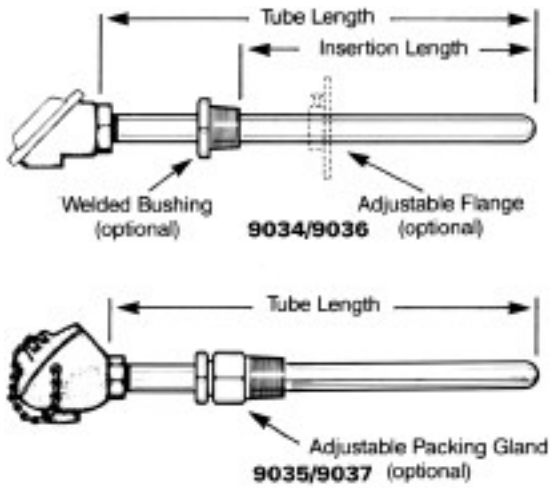
STRAIGHT-METAL PROTECTION TUBE ASSEMBLIES

These metal protection tube assemblies are offered in a wide variety of aluminum connection heads and mounting options. Specifications and part numbers are detailed in the tables below, permitting the greatest flexibility in selecting the exact design required. Assemblies are shipped pre-tested and ready to install.

STRAIGHT-METAL PROTECTION TUBE ASSEMBLIES

Part No.	Style
9034	Schedule 40 pipe with General Purpose connection head.
9036	Schedule 80 pipe with General Purpose connection head.
9035	Schedule 40 pipe with weatherproof Heavy Duty connection head.
9037	Schedule 80 pipe with weatherproof Heavy Duty connection head.

STRAIGHT ASSEMBLIES WITH OPTIONS



Ordering Information

Part Number Example: 9 0 3 5 — K — 14 — D — INC — 18 — 13 — WBSS — 12

9	0	3	x	–	I	–	II	–	III	–	IV	–	V	–	VI	–	VII	–	VIII

Part Number

T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
N = Nicrosil - Nisil

Gauge Size

8 = 8
14 = 14
20 = 20

T/C Form

Code
S = Simplex
D = Duplex

Note: Duplex available in 14 & 20 gauge only

Protection Tube Material*

Code
CS = Carbon Steel
F46 = 446 Stainless Steel
INC = Inconel 600
A04 = 304 Stainless Steel
A10 = 310 Stainless Steel
A16 = 316 Stainless Steel
A35 = 35 NI - 19CR
NI = Nickel
WI = Black Iron

Tube Length

Enter length in inches

Pipe Size O.D.

Code
9 = 1/4" (.540")
11 = 3/8" (.675")
13 = 1/2" (.840")
17 = 3/4" (1.05")
21 = 1" (1.32")

Mounting Options

Code	Length	
WBCS	- Specify	= **Carbon Steel Welded Bushing
WBSS	- Specify	= **Stainless Steel Welded Bushing
FL	- —	= Adjustable Carbon Steel Flange
AG	- —	= Adjustable Carbon Packing Gland (For 1/2" x 3/4" Pipe Only)
0	- —	= None

Insertion Length (if using mounting option)

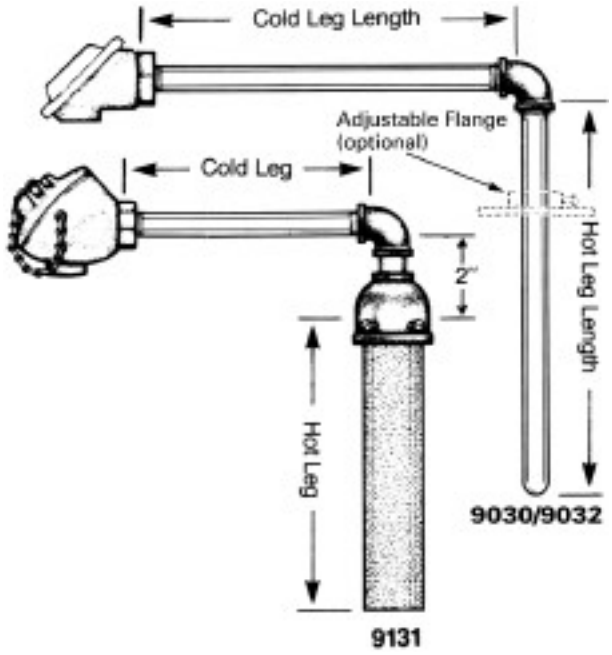
Enter length in inches

*See page 18 for protection tube specifications.
**Mounting thread standard is next larger pipe size thread.

ANGLED-METAL PROTECTION TUBE ASSEMBLIES

ANGLED-METAL PROTECTION TUBE ASSEMBLIES

Part No.	Style
9030	Schedule 40 H.L. pipe with General Purpose connection head.
9032	Schedule 80 H.L. pipe with General Purpose connection head.
9130	Silicone carbide H.L. with General Purpose connection head.
9033	Schedule 80 H.L. pipe with Heavy Duty connection head.
9131	Silicone carbide H.L. with Heavy Duty connection head.



Ordering Information

Part Number Example: 9 0 3 2 E 14 S SS 13 17 F46 12 0

9	x	x	x	–	I	–	II	–	III	–	IV	–	V	–	VI	–	VII	–	VIII	–	IX

Part Number

T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
N = Nicrosil - Nisil

Gauge Size

Code
8 = 8
14 = 14
20 = 20

T/C Form

Code
S = Simplex
D = Duplex*

*Available in 14 and 20 gauge only

Cold Leg Material

Code
CS = Carbon Steel
SS = 304 Stainless Steel

Note: 1/2" is standard pipe size

Cold Leg Length

Enter length in inches

Hot Leg Pipe Size

Code
13 = 1/2" (.840")
17 = 3/4" (1.05")
28 = 1 3/4" (1.75")

Hot Leg Material

Code
WI = Black Iron
A04 = 304 Stainless Steel
F46 = 446 Stainless Steel
INC = Inconel 600
SIC = Silicon Carbide

Hot Leg Length

Enter length in inches

Hot Leg Option

Code
FL = Adjustable Flange
0 = None

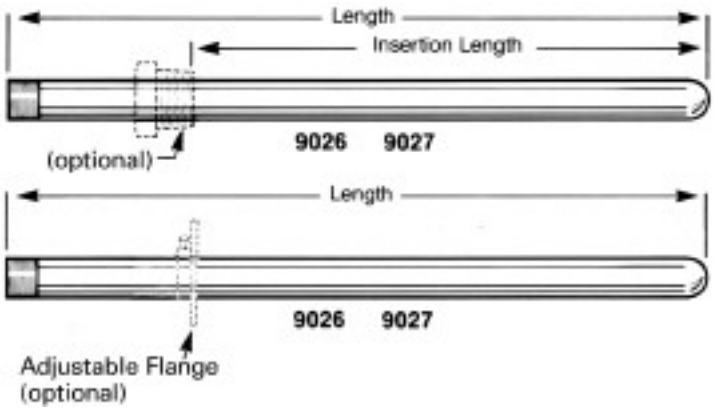
METAL PROTECTION TUBES

Metal protection tubes offer environmental and mechanical protection for base metal thermocouples. Care should be exercised in selection of material and design in order to achieve optimum performance and economy. Athena personnel can assist you in making the best selection based on experience and the technical data presented in this catalog. the specification selection tables below, offer a variety of standard mounting options.

METAL PROTECTION TUBES

Part No.	Style
9026	Schedule 40 pipe
9027	Schedule 80 pipe

METAL PROTECTION TUBES



PIPE SPECIFICATIONS

Nom. Size	Outside Diameter, in	Wall Thickness, inches	
		Sch. 40	Sch. 80
1/8	0.405	.068	.095
1/4	0.540	.088	.119
3/8	0.675	.091	.126
1/2	0.840	.109	.147
3/4	1.050	.113	.154
1	1.315	.133	.179
1-1/4	1.666	.140	.191
1-1/2	1.900	.145	.200
2	2.375	.154	.218

Ordering Information

Part Number Example: 9027 – INC – 13 – 36 – WBSS – 33

9	0	2	x
	I	II	III	IV	V

Part Number

Tube Material

Code
CS = Carbon Steel
F46 = 446 Stainless Steel
INC = Inconel 600
A04 = 304 Stainless Steel
A10 = 310 Stainless Steel
A16 = 316 Stainless Steel
A35 = 35 Ni. - 19 Cr.
NI = Nickel
WI = Black Iron

Tube Size

Code
9 = 1/4" (.540")
11 = 3/8" (.675")
13 = 1/2" (.840")
17 = 3/4" (1.05")
21 = 1" (1.32")

Tube Length

Specify length in inches

Mounting Options

Code	Length	
WBCS	Specify	= [1]Carbon Steel bushing
WBSS	Specify	= [1]Stainless Steel bushing
FL	—	= Adjustable Carbon Steel flange
AG	—	= Adjustable Carbon Steel packing gland (1/2" & 3/4" pipe only)
0		= None

Insertion Length

Specify length in inches

[1]Mounting thread standard is next larger pipe size thread.

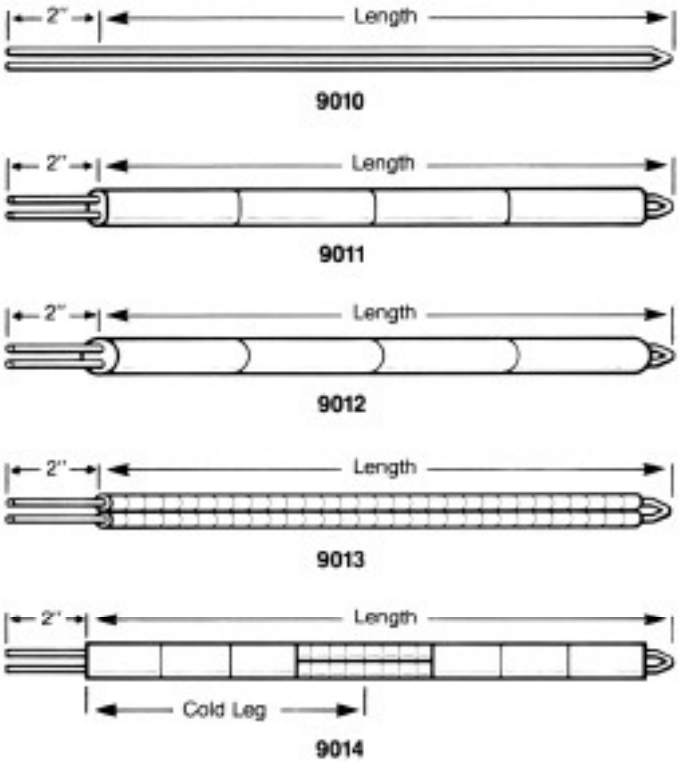
REPLACEMENT ELEMENTS - BASE METAL TYPE

A thermocouple element is the heart of all thermocouple assemblies. Prudent selection of gauge size, length and type of insulation is essential for optimum performance and economy. Tudor personnel can assist you in making the best selection based on the experience and the technical data present in this catalog.

BASE METAL REPLACEMENT ELEMENTS

Part No.	Style
9010	Bare wire without insulators.
9011	3" oval insulators. Not available in duplex.
9012	3" round insulators.
9013	Ball & socket insulators.
9014	Flexible section for angle type.

BASE METAL ELEMENTS



Ordering Information

Part Number Example: 9 0 1 2 K 14 S 36 – V

9	0	1	x

Part Number

– I – II – III – IV –

I – T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
N = Nicrosil - Nisil
T = Copper - Constantan

II – Gauge Size

Code
8 = 8 ga
14 = 14 ga
20 = 20 ga
30 = 30 ga

III – T/C Form

Code
S = Simplex
D = Duplex

IV – Length

Specify length in inches

V – Cold Leg Length

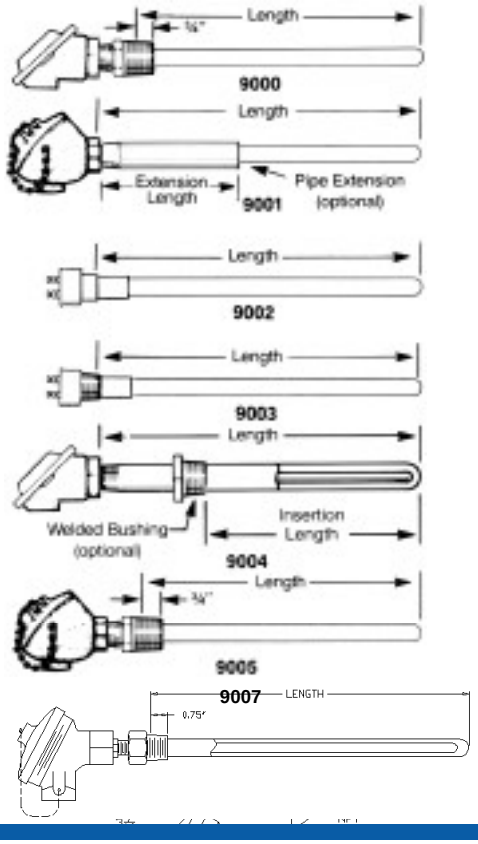
Specify length in inches (9014 only)

NOBLE METAL THERMOCOUPLE ASSEMBLIES

Noble metal thermocouple assemblies are for measurement of temperatures that range above that of base-metal couples, (to 3200˚F/1760°C), or for more precise measurements at lower temperatures where the additional cost is justified. These assemblies come in a wide variety of ceramic primary protections tubes, and with ceramic or metal secondary protection tubes. Thermocouple conductors are 24 gauge (0.020) unless otherwise specified. All assemblies are pretested and ready to install.

NOBLE METAL ASSEMBLIES

Part No.	Style
9000	Noble metal assembly with General Purpose head.
9001	Noble metal assembly with Heavy Duty Screw Cover head.
9002	Noble metal assembly with Open Terminal head.
9003	Noble metal assembly with Open Terminal head and 1" NPT mounting thread.
9004	Noble metal assembly with General Purpose head and Ceramic Primary tube, Inconel 1/2" I.P.S. Secondary tube.
9005	Noble metal assembly with Heavy Duty Screw Cover head with Primary and Secondary ceramic tubes.
9007	Noble metal assembly with cast iron head.



Ordering Information

Part Number Example:

P 9 0 0 1 — S — D — A11 — 24 — PE — 6

P 9 0 0 x — I — II — III — IV — V — VI

Part Number

Limit of Error
Code
T = Standard
P = Premium

T/C Calibration
Code
B = Plat. 30% Rh-Plat. 6% Rh
R = Plat. 13% Rh-Plat.
S = Plat. 10% Rh-Plat.
B3= Plat. 30% Rh-Plat. 6% Rh
R3 = Plat. 13% Rh-Plat.
S3 = Plat. 10% Rh-Plat.

T/C Form
Code
S = Simplex
D = Duplex**

Tube Material
Code
*A11 = 99.6% Alumina 7/16" x 11/16"
*M11 = Mullite 7/16" x 11/16"
***A6 = 99.6% Alumina 1/4" x 3/8
***M6 = Mullite 1/4" x 3/8"

Tube Length
Specify length in inches

Mounting Options

Code	Length	
PE	- Specify	= Pipe Extension
PE-FL	- Specify	= Pipe Extension with Flange
VF**	- —	= Vented Fitting
0	- —	= N/A
WBCS	- Specify	= Carbon Steel Welded Bushing
WBSS	- Specify	= Stainless Steel Welded Bushing
TN	- —	= 3/4" NPT Process Connection

Pipe Extension Length
(where applicable)
Specify length in inches

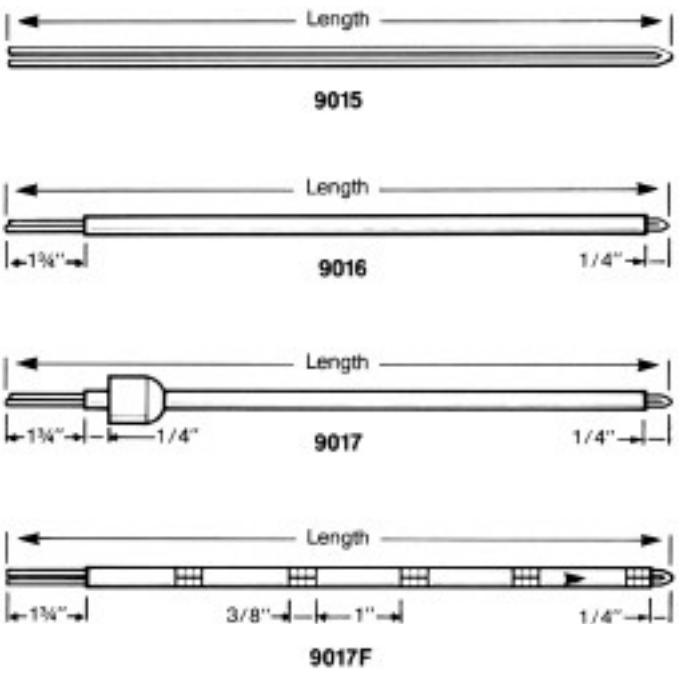
*Not available when ordering **9004**.
Not available when ordering **9002 and **9003**.
***Not available when ordering **9005**.

THERMOCOUPLE REPLACEMENT ELEMENTS

NOBLE METAL & REFRACTORY METAL REPLACEMENT ELEMENTS

Part No.	Style
9015	Bare wire without insulators.
9016	Full length insulators.
9017	Full length insulator & collar.
9017F	Flexible noble metal.

NOBLE AND REFRACTORY METAL ELEMENTS



Ordering Information

Part Number Example: T 9 0 1 6 B 24 S A3 18

	9	0	1	x	x	–	I	–	II	–	III	–	IV	–	V

Part Number

Limit of Error

Code
T = Standard
P = Premium

T/C Calibration

Code
B = Platinum 30% Rhodium - Platinum 6% Rhodium
R = Platinum 13% Rhodium - Platinum
S = Platinum 10% Rhodium - Platinum
W5 = Tungsten 5% Rhenium - Tungsten 26% Rhenium (available in 24 gauge only)

Gauge Size

Code
20 = 20 ga
22 = 22 ga
24 = 24 ga
30 = 30 ga

T/C Form

Code
S = Simplex
D = Duplex
T = Triplex[2]

Insulator and Diameter

Code
M3 = Mullite 3/16" diameter
A3 = 99.6% Alumina 3/16" diameter
M2 = Mullite 1/8" diameter
A2 = 99.6% Alumina 1/8" diameter

Length

Specify length in inches (9016, 9017 only)

CERAMIC AND NON-METALLIC PROTECTION TUBES

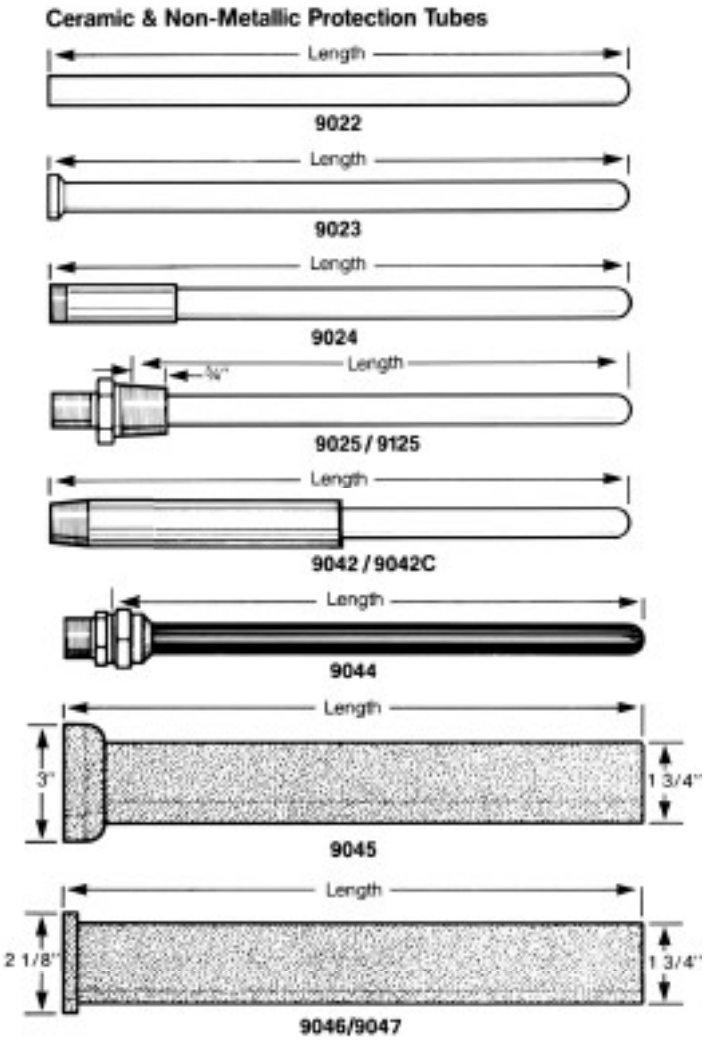
Ceramic protection tubes are hemispherically closed on one end, and are offered in mullite, hi-purity alumina, and high temperature materials. These tubes are superior to metallic tubes at high temperatures and provide a virtually gas-tight enclosure to protect against harsh environments.

CERAMIC AND NON-METALLIC PROTECTION TUBES

Part No.	Style
9022	Plain
9023	With collar.
9024	With 2" brass ferrule (7/8" — 27 thread)
9025	With fitting — 3/4" NPT thread[1]
9125	With fitting — 1 1/4" NPT thread
9042	With 6" stainless steel pipe extension
9042C	With 6" carbon steel pipe extension
9044[2]	Metal-Ceramic — 7/8" O.D. — 3/4 NPT conduit connection
9045[2]	Silicon-Carbide with 3" collar — 1" I.D.
9046[2]	Silicon-Carbide with 2 1/8" collar — 1" I.D.
9047[2]	Silicon-Carbide plain — 1" I.D.

[1]Maximum tube size is 11/16" O.D.

[2]Omit selection from **Tube Material** and **Tube Size**.



Ordering Information

Part Number Example: 9025 A – 11 – 30

9	0	x	x	x	– I	– II	– III

Part Number

Tube Material

Code
M = Mullite
A = 99.6% Alumina

Tube Size

Code
3 = 3/16" o.d.
4 = 1/4" o.d.
5 = 3/16" x 5/16"
6 = 1/4" x 3/8"
11 = 7/16" x 11/16"
14 = 5/8" x 7/8"
16 = 3/4" x 1"
20 = 1" x 1-1/4"

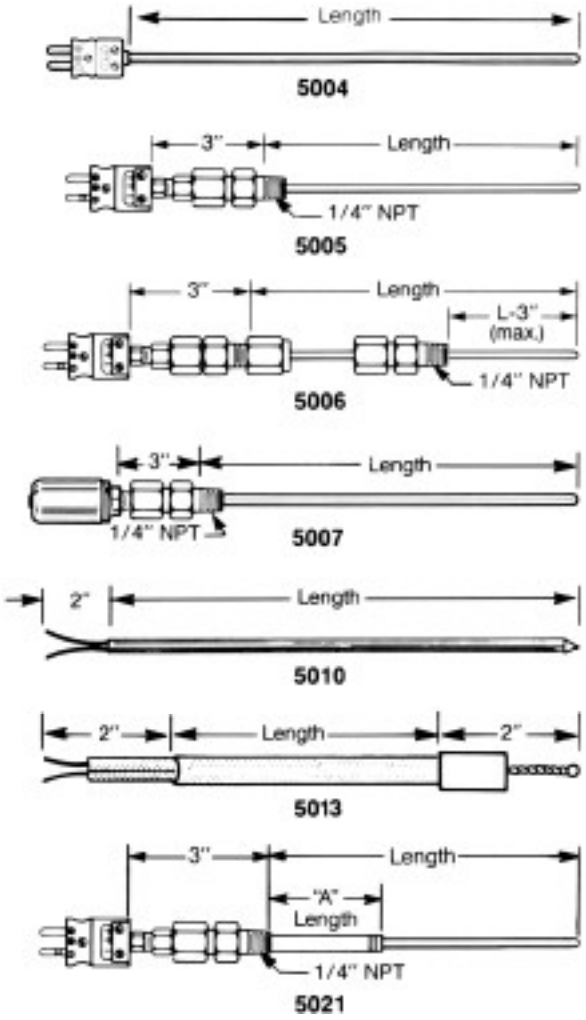
Insertion Length

Specify length in inches

VACUUM FURNACE THERMOCOUPLES

Athena's vacuum furnace thermocouples offer high reliability and time-proven performance. Made of the highest quality materials, some of these thermo - couple assemblies feature vacuum tight seals and threaded process connections as standard features. Other quality accessory products and factory replacement parts are also listed to complete the temperature measurement system. ***Other sheath materials are available - consult factory.***

Part No.	Style
5004	Quick connect plug with molybdenum sheath and potted end seal.
5005	Quick connect plug with 3/16" OD molybdenum sheath and vacuum gland end seal.
5006	Same as 5005 with a vacuum type variable immersion fitting.
5007	Miniature lightweight head with 3/16" OD molybdenum sheath and vacuum gland end seal.
5008	Same as 5007 with a vacuum type variable immersion fitting.
5010	T/C element in 1/8" diameter high purity alumina insulator, 24 gauge.
5011	Same as 5010 except with a 3/16" OD insulator.
5013	Work-survey chromel-alumel (Type "K") T/C. High temperature glass insulation, 20 gauge. Maximum measuring temperature 2000˚ F (1093° C).
5014	Same as 5013 except ceramic fiber insulation. Maximum measuring temperature 2300˚ F (1260°C).
5021	Quick connect plug with 1/4" OD high purity alumina tube, inconel sleeve and vacuum gland end seal.



Ordering Information

Part Number Example:

T 5 0 0 5 K S 9

x 5 0 x x – I – II – III – IV – V – VI

Part Number

Limits of Error Prefix
Code
T = Standard
P = Premium

T/C Calibration
Code
K = Chromel - Alumel
N = Nicrosil - Nisil
B = Platinum
R = Platinum 13% Rhodium - Platinum
S = Platinum 10% Rhodium - Platinum
W5 = Tungsten 5% Rhenium - Tungsten 26% Rhenium (not available for 5004)

T/C Form
Code
S = Simplex
D = Duplex

Length
Code
Enter Length in Inches

"A" Inconel Sleeve
(5021)
Code
Enter Length in Inches

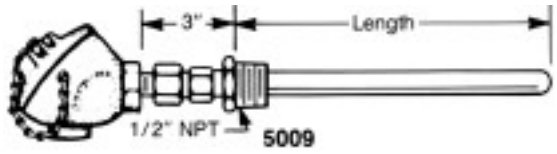
Mounting Options
(5004 and 5021 only)
Code
1 = 1/4" NPT Adjustable Mounting Fitting
0 = None

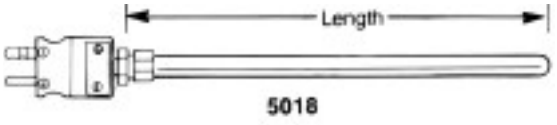
Tube O.D.
(5004 to 5008)
Code
2 = 1/8" outside tube diameter
3 = 3/16" outside tube diameter
4 = 1/4" outside tube diameter

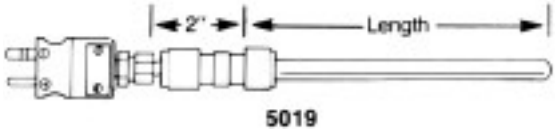
For work survey thermocouples, refer to Tu-Pak 5000 Series on page 6.

VACUUM FURNACE THERMOCOUPLES

Part No.	Style
5009	Recrystallized alumina tube assembly with Screw Cover head and vacuum gland seal end.
5018	Recrystallized alumina tube assembly with Quick Connect plug and potted seal end.
5019	Recrystallized alumina tube assembly with Quick Connect plug and vacuum gland seal end.







Ordering Information

Part Number Example: 5018-N-S-12-5-1

5	0	x	x	–	I	–	II	–	III	–	IV	–	V

Part Number

T/C Calibration

Code
- K = Chromel - Alumel
- N = Nicrosil - Nisil
- B = Platinum
- R = Platinum 13% Rhodium - Platinum
- S = Platinum 10% Rhodium - Platinum
- W5 = Tungsten 5% Rhenium - Tungsten 26% Rhenium (Not available in 5018 assembly)

T/C Form

Code
- S = Simplex
- D = Duplex

Tube Length

Code
Enter Length in Inches

Tube O.D.

Code
- 3F= 3/16" outside tube diameter
- 4 = 1/4" outside tube diameter
- 5 = 5/16" outside tube diameter
- 6 = 3/8" outside tube diameter

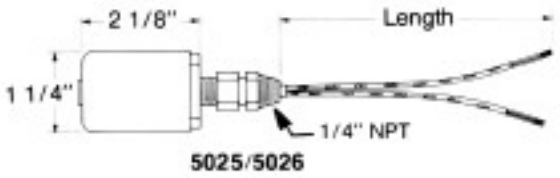
Mounting Options

Code
- 0 = None
- 1 = Adjustable 1/2" NPT Mounting Adapter
- 2 = Adjustable 1/4" NPT SS Compression Fitting

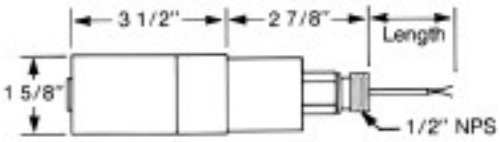
VACUUM FURNACE THERMOCOUPLES

Part No.	Style
5025	Cold wall simplex vacuum feed through assembly with miniature closed head.
5026	Cold wall duplex vacuum feed through assembly with miniature closed head.
5030	Cold wall multiple conductor vacuum feed through assembly with compensated terminals. Four circuits maximum.

Omit selections from Number of Circuits when ordering 5025 and 5026.



5025/5026



5030

Ordering Information

Part Number Example: 5025 – K – 0 – GG – 24

5	0	x	x	–	I	–	II	–	III	–	IV

Part Number

T/C Calibration

Code
K = Chromel - Alumel
N = Nicrosil - Nisil
R = Platinum 13% Rhodium - Platinum
S = Platinum 10% Rhodium - Platinum
W5 = Tungsten 5% Rhenium - Tungsten 26% Rhenium

Number of Circuits

Code
Indicate number of circuits

Cold End Terminators

Code
GG = Glass/Glass (600˚F max.)
ALL = Refrasil/Refrasil (2000˚F max.)

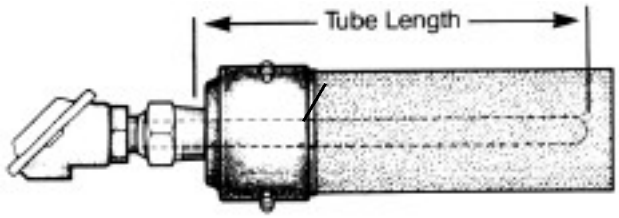
Length

Code
Enter Length in Inches

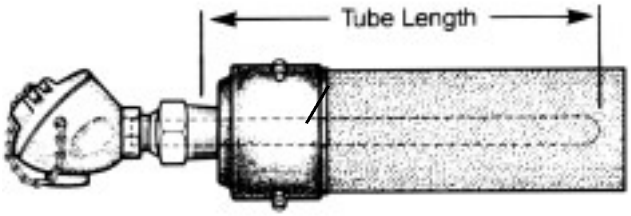
[1]Omit selections from **Number of Circuits** when ordering **5020**, **5025** and **5026**.
[2]Four circuits maximum

DOUBLE-TUBE ASSEMBLIES

Double tube assemblies are resistant to thermal shock and contaminating environments. They provide greater resistance to deterioration by combining the temperature and chemical resistance properties of both primary and secondary protection tubes. All assemblies are pretested and ready to install.



9038 9040



9039 9041

DOUBLE TUBE ASSEMBLIES

Part No.	Style
9038	General Purpose Head with Silicon Carbide and Mullite Tubes.
9040	General Purpose Head with Silicon Carbide and 99.6% Alumina Tubes.
9039	Heavy Duty Head with Silicon Carbide and Mullite Tubes.
9041	Heavy Duty Head with Silicon Carbide and 99.6% Alumina Tubes.

Ordering Information

Part Number Example: 9039 – K – D – 24

9	0	x	x	–	I	–	II	–	III

Part Number

T/C Calibration

Code
B = Plat. 30% Rh-Plat. 6% Rh
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
N = Nicrosil - Nisil
R = Plat. 13% Rh-Plat.
S = Plat. 10% Rh-Plat.

T/C Form

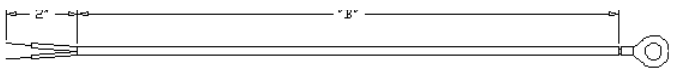
Code
S = Simplex
D = Duplex

Tube Length

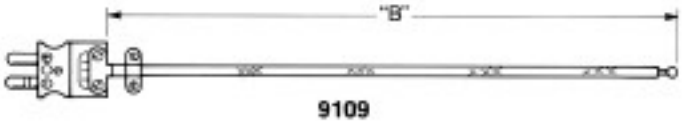
Code
12 = 12 Inches
18 = 18 Inches
24 = 24 Inches
30 = 30 Inches
36 = 36 Inches
42 = 42 Inches
48 = 48 Inches

WIRE-TYPE THERMOCOUPLES

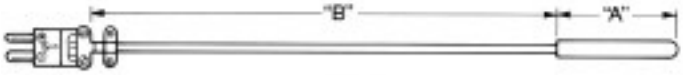
The Wire Type is a basic thermocouple which can be used for a variety of applications. The Washer Type can be easily mounted on any existing surface with a screw or a bolt. The insulated Wire Type and the Tube End Type are intended for general applications which require a basic, yet durable thermocouple for temperature measurement.



9108



9109



9110

WIRE-TYPE THERMOCOUPLES

Part No.	Style
9108	Washer-Type assembly.
9109	Insulated Wire-Type assembly.
9110	Tube End-Type assembly, 3/16" OD tube.

Ordering Information

Part Number Example: 9 1 1 0 — J — GG — 1 — 3 — 18 — MP — U

9	1	x	x	–	I	–	II	–	III	IV	V	VI	VII

Part Number

T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan

Wire Insulation

Code
GG = Glass
GGS = Glass with SS
TT = Teflon
TTS = Teflon with SS

"A" Length[1]

Code
Enter Length in Inches

"X" Washer[2] **(for 9108)**

Code
1 = # 6 (.145")
2 = # 8 (.170")
3 = # 10 (.195")
4 = 1/4 (.260")

"X" Diameter[2] **(for 9110)**

Code
2 = 1/8"
3 = 3/16"
4 = 1/4"

"B" Length

Code
Enter Length in Inches

Cold End Terminations

Code
S = Stripped Leads
P = Male Plug (300°F/149°C max.)
MP = Mini Plug (300°F/149°C max.)
J = Female Jack (300°F/149°C max.)
MJ = Mini Jack (300°F max.)

Measuring Junction

Code
G = Grounded (9108/9110)
U = Ungrounded (9108/9110)
E = Exposed (9108/9109)

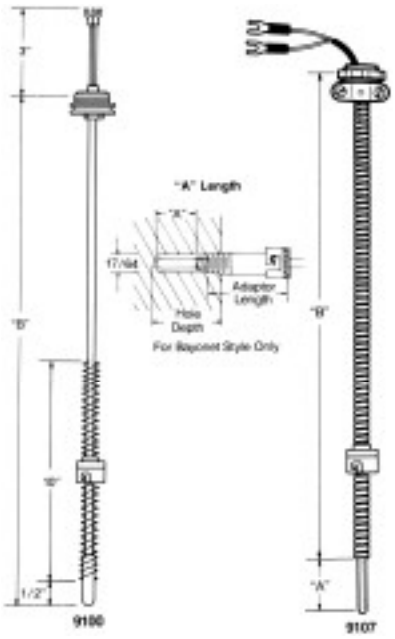
[1]Omit on part numbers **9108** and **9109**.
[2]Omit on part numbers **9109.**

BAYONET-STYLE THERMOCOUPLES

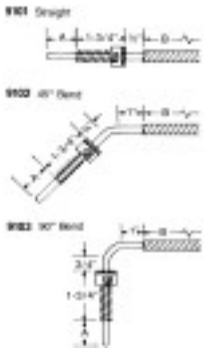
Tudor brand bayonet-style thermocouples are available in a wide selection of types, terminations, and accessories, including variable immersion to assure versatility. All bayonet thermocouples are shipped ready to install.

Part No.	Style
9100	Variable immersion bayonet assembly.
9101	Straight bayonet assembly.
9102	45° Bend bayonet assembly.
9103	90° Bend bayonet assembly.
9104	Straight immersion bayonet assembly.
9105	45° Bend immersion bayonet assembly.
9106	90° Bend immersion bayonet assembly.
9107	Variable immersion bayonet assembly with flex armor.

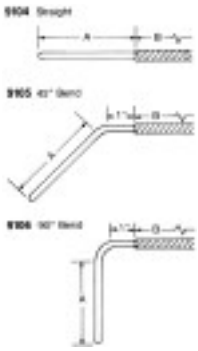
All tube diameters are 3/16" OD standard.



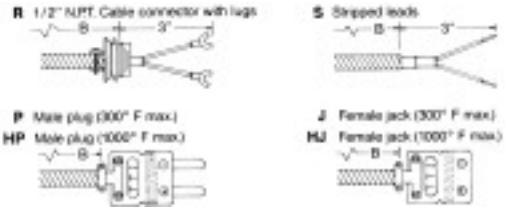
Bayonet Type



Immersion Type



Terminations & Accessories



Ordering Information

Part Number Example: 9 1 0 1 – E – 6 – 12 – R – 1

Part Number: 9 1 0 x – I – II – III – IV – V

T/C Calibration

Code
- E = Chromel - Constantan
- J = Iron - Constantan
- K = Chromel - Alumel
- T = Copper - Constantan
- R = 100 ohm, 2-wire
- RI = 100 ohm, 3-wire

"A" Length

Code
Enter length in inches **(Omit on 9100)**

"B" Length

Code
Enter length in inches

Cold End Terminators

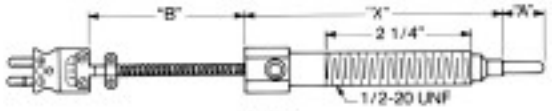
Code
- R = 1/2" NPT cable connector with lugs
- P = Male plug (300°F max)
- HP = Male plug (1000°F max)
- S = Stripped leads
- J = Female jack (300°F max.)
- HJ = Female jack (1000°F max.)

Bayonet Accessories

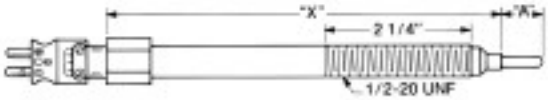
Code
- 1 = 7/8" Bayonet adapter (nickel-plated brass)
- 2 = 1-1/2" Bayonet adapter (nickel-plated brass)
- 3 = 2-1/2" Bayonet adapter (nickel-plated brass)
- 4 = Brass (one time adjustable) compression fitting
- 5 = Stainless steel (one time adjustable) compression fitting
- 6 = Stainless steel (readjustable) compression fitting
- 0 = Enter 0 if no accessories are required

MELT-BOLT THERMOCOUPLES

Athena's Tudor brand Melt Bolt thermocouples are a reliable, quality product manufactured for a variety of uses in the plastics and packaging industries. Made of the finest materials, they meet rigid quality control and inspection standards. They feature easy installation with fast response to provide accurate control. All Melt Bolt thermocouples are shipped ready to install.



9111



9112

WIRE TYPE THERMOCOUPLES

Part No.	Style
9111	Melt Bolt Thermocouple with flex armor extension and male plug.
9112	Melt Bolt Thermocouple with male plug.

Ordering Information

Part Number Example: 9 1 1 1

9	1	1	x

Part Number

– I – II – III – IV – V – VI

Calibration
Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan

Form
Code
S = Simplex
D = Duplex

Measuring Junction
Code
G = Grounded
U = Ungrounded

"A" Length
Code
Enter Length in Inches

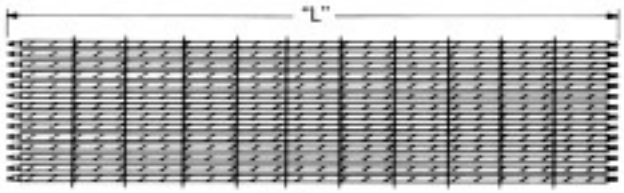
"X" Length
Code
3 = 3"
4 = 4"
6 = 6"

"B" Length*
Code
Enter Length in Inches
(Omit on 9112)

PHARMACEUTICAL THERMOCOUPLES

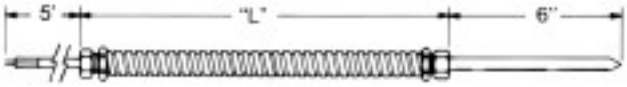
Athena's Tudor brand pharmaceutical thermocouples are designed especially for use in processing vaccines and other med - ications where very accurate temperature measurement is critical. Typical applications include steam sterilizers, autoclaves, steam and liquid pipe lines, tanks, etc. The units provide accurate temperature signals, fast response and can be supplied with calibration certificates for validation studies.

Part No.	Style
3201	Wire harness assembly (multiple thermocouple bundle).
3202	1/8" diameter stainless steel sheath probe.
3203	Replacement T/C element for P/N 3202.



3201


Thermocouple Harness Assembly



3202

Ordering Information

Part Number Example: 3 2 0 2 – E – 1 – 22 1 96

3	2	0	x

Part Number

– I – II – III – IV V VI

Calibration Type (I)
Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan

Harness Code* (II)
Code
Indicate number of T/C's in harness assembly

Wire Insulation (III)
Code
1 = Taped Teflon Jacket
2 = Extruded Teflon Jacket

Wire Size (IV)
Code
20**= 20 Gauge
22 = 22 Gauge
24 = 24 Gauge

Wire Type & Grade (V)
Code
1 = Premium grade solid wire
2 = Standard grade solid wire
3 = Premium grade stranded wire
4 = Standard grade stranded wire

Length (VI)
Code
Indicate length in inches

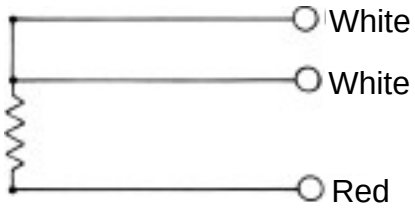
*Omit selection when ordering part numbers **3202** and **3203**.
Not available in part numbers **3202 and **3203**.

RESISTANCE TEMPERATURE DETECTORS (RTDs)

Lead Wire Configurations

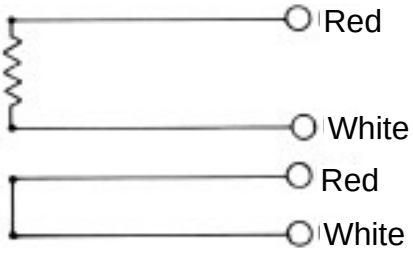
2-Wire RTD

Provides one connection to each end of the sensor. This configuration is suitable when the resistance of the lead wire can be considered an additive constant in the circuit and when changes in lead resistance, due to ambient temperature changes may be ignored.



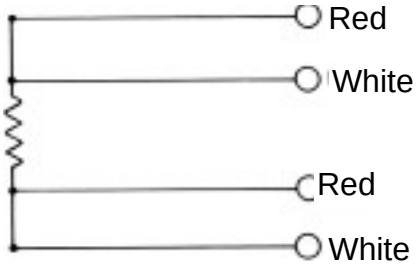
3-Wire RTD Compensated

This is the most commonly used configuration. It provides one connection to one end of the sensor and two to the other end. When connected to an instrument designed to accept a three wire input, compensation is achieved for lead resistance and temperature change in lead resistance.



4-Wire RTD Compensated

Similar to 2-wire configuration except that a separate pair of wires is provided as a loop to compensate for lead resistance and ambient temperature changes in lead resistance.



4-Wire RTD Connected

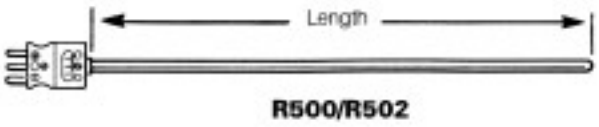
Provides connections to each end of the sensor. Used for measurements requiring highest precision.

Note: Above color coding may change due to various wire requirements.

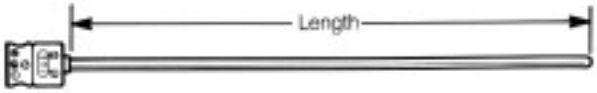
RTDS - CONNECTOR-TYPE

RTD Assemblies

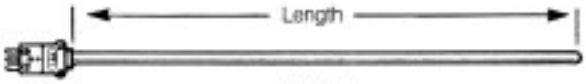
Part No.	Style
R500	350˚F (177°C) max. Standard Male Connector.
R501	350˚F (177°C) max. Standard Female Connector.
R502	1000˚F (538°C) max. Standard Male Connector.
R503	1000˚F (538°C) max. Standard Female Connector.
R504	350˚F (177°C) max. Miniature Male Connector, available in 1/8 and 3/16 sheath diameter only.
R505	350˚F (177° C) max. Miniature Female Connector, available in 1/8 and 3/16 sheath diameter only.



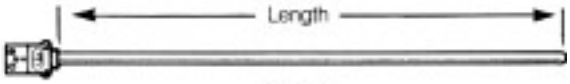
R500/R502



R503



R504



R505

Ordering Information

Part Number Example: R 5 0 0

R	5	0	x	–	12 (I)	–	10 (II)	–	3 (III)	–	9 (IV)	–	3 (V)	–	3 (VI)

Part Number

Length
Code
Enter Length in Inches

Element
Code
10 = 100 ohms
21 = 2 x 100 ohms
20 = 200 ohms
50 = 500 ohms
1000 = 1000 ohms
Other elements available; consult factory

Leads/ Resistor
Code
2 = 2
3 = 3

Temperature
Code
5 = 500˚F (260° C)
9 = 900˚F (482° C)
12= 1200˚F (649° C)

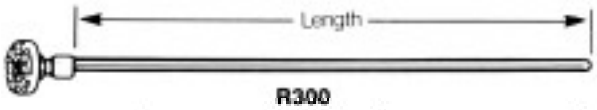
Sheath Diameter
Code
2 = 1/8 OD
3 = 3/16 OD
4 = 1/4 OD

Optional Ftg.
Code
1 = 1/8" Brass)
2 = 1/4" Brass)
3 = 1/8" SS
4 = 1/4" SS
5 = 1/8" SS adj.
6 = 1/4" SS adj.
0 = None

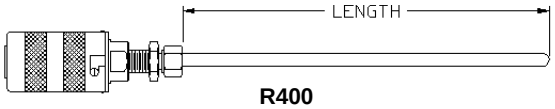
RTDs - HEAD-TYPE

RTD ASSEMBLIES

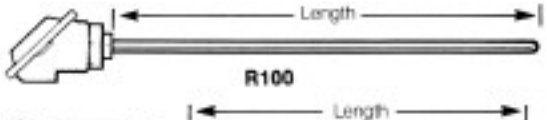
Part No.	Style
R100	Gen. Purpose Cast Aluminum Head (4 wires max.)
R102	Hazardous Location Cast Aluminum Head.
R103	Screw Cover Thermoplastic Head.
R104	Screw Cover Cast Iron Head.
R200	Screw Cover Cast Aluminum Head.
R202	Screw Cover Cast Aluminum Head with 1/2" NPT SS spring loaded oil and vapor seal.
R204	Screw Cover Cast Aluminum Head with 1/2" NPT nipple spring loaded.
R205	Screw Cover Cast Aluminum Head with 1/2" NPT nipples and union, spring loaded.
R300	300˚F (149°C) max. Open Head (4 wires max.)
R400	Bayonet Cover Mini-Head (4 wires max.)



R300

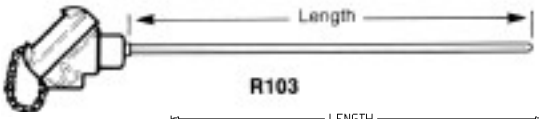


R400

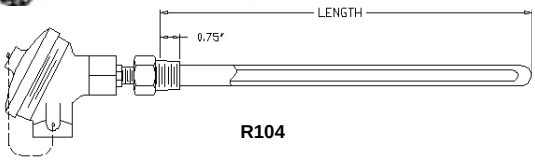


R100

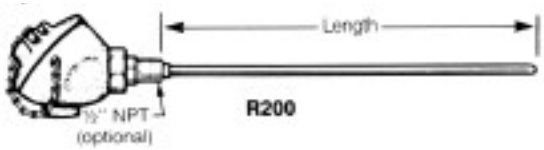
R102



R103

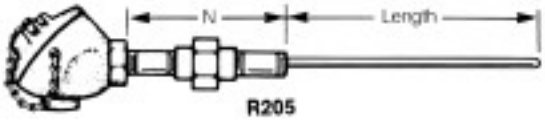


R104



R200

R204



R205

Ordering Information

Part Number Example:

R 1 0 3 — 8 — 21 — 3 — 5 — 4 — 7S

R x 0 x — I — II — III — IV — V — VI — VII

Part Number

Length
Code
Enter Length in Inches

"N" Length*
Code
Enter Length in Inches.
Enter "N" dimension in Part Numbers **R204** and **R205** only.

Element
Code
10 = 100 ohms
21 = 2 x 100 ohms
20 = 200 ohms
50 = 500 ohms
1000 = 1000 ohms
Other elements available; consult factory

Leads/ Resistor
Code
2 = 2
3 = 3
4 = 4

Temperature
Code
5 = 500˚F (260°C)
9 = 900˚F (482°C)
12= 1200˚F (649°C)

Sheath Diameter
Code
2 = 1/8 OD
3 = 3/16 OD
4 = 1/4 OD

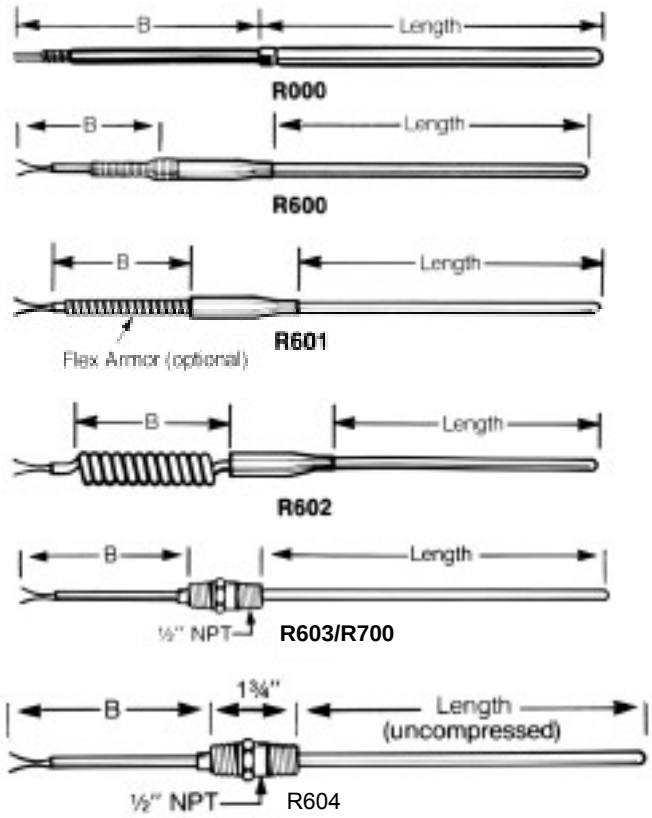
Optional Ftg.
Code
1 = 1/8" Brass
2 = 1/4" Brass
3 = 1/8" SS
4 = 1/4" SS
5 = 1/8" SS adj.
6 = 1/4" SS adj.
7C* = 1/2 x 1/2 CS
7S* = 1/2 x 1/2 SS
7SL* = 1/2 x 1/2 SS Spring loaded
0 = None

*Only available on **R100**, **R102**, **R103**, **R104** and **R200** in 1/4" and 3/16" diameter.

RTDs - LEAD WIRE-TYPE

RTD ASSEMBLIES

Part No.	Style
R000	Tube assembly with lead wires
R600	Transition to lead wires with strain relief spring.
R601	Transition to lead wires w/o strain relief spring.
R602	Transition to polyurethane coiled cord. (3 wire only) Omit "B" length and extension cover blocks.
R603	1/2" NPT x 1/2" NPT stainless steel ftg. with lead wires.
R604	1/2" NPT x 1/2" NPT spring loaded SS ftg. with lead wires (1/4 & 3/16 dia. only).
R700	1/2" NPT x 1/2" NPT carbon steel fitting with lead wires.



Ordering Information

Part Number Example: R700 - 12 - 10 - 3 - 9 - 2 - TT - 8 - 0 - 0 - P

I II III IV V VI VII VIII IX X

Part Number

x 0 0 x – I – II – III – IV – V – VI – VII – VIII – IX – X

Part Number

Element
Code
10 = 100 ohms
21 = 2 x 100 ohms
20 = 200 ohms
50 = 500 ohms
1000 = 1000 ohms
Other elements available; consult factory

Temperature
Code
5 = 500˚F (260°C)
9 = 900˚F (482°C)
12 = 1200˚F (649°C)

Lead Wire
Code
GG = Fiberglass
TT = Teflon
CC1* = 1" Coiled cord
CC3* = 3" Coiled cord
CC8* = 8" Coiled cord

Extension Cover
Code
0 = None
F = SS Flex Armor
(Available on R601, R603, R604, and R700 only.)

Cold End Terminations
Code
0 = None
P = Std. Plug (350˚F max.)
J = Std. Jack (350˚F max.)
MP = Mini Plug (350˚F max.)
MJ = Mini Jack (350˚F max.)

Length
Code
Enter Length in Inches

Leads/ Resistor
Code
2 = 2
3 = 3
4 = 4

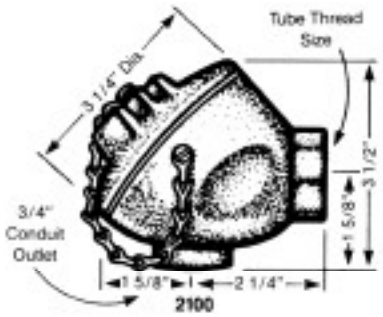
Sheath Diameter
Code
2 = 1/8 OD
3 = 3/16 OD
4 = 1/4 OD

"B" Length
Code
If lead length is longer than 12", enter length over 12"

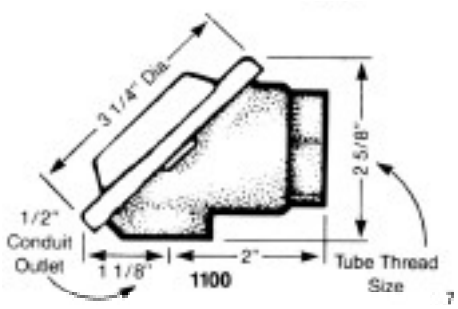
Optional Ftg.
Code
0 = None
1 = 1/8" Brass)
2 = 1/4" Brass)
3 = 1/8" SS
4 = 1/4" SS
5 = 1/8" SS adj.
6 = 1/4" SS adj.

*Available on **R602** only (Expands to approximately 5' per coiled foot).

CONNECTION HEADS



2100 heavy-duty cast aluminum screw cover **1.4 lbs.**



1100 General purpose cast aluminum with pressed steel cover. **0.9 lbs.**

3100 Molded single or dual circuit open terminal (400˚F max.). **0.2 lbs**

3101 Ceramic single circuit open terminal (1000˚F max.). Duplex is not available **0.2 lbs.**

2100 – I – II

Terminal Block
Code
S = Simplex
D = Duplex
T = Triplex
O = None

Tube Thread Size
Code
9 = 1/4" NPT thread
13 = 1/2" NPT thread
17 = 3/4" NPT thread
21 = 1" NPT thread

1100 – I – II

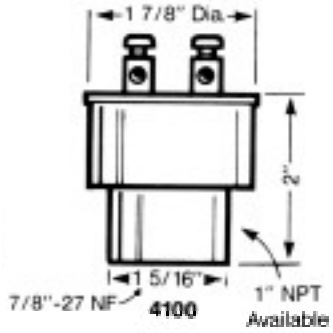
Terminal Block
Code
S = Simplex
D = Duplex
O = None

Tube Thread Size
Code
9 = 1/4" NPT thread
13 = 1/2" NPT thread
17 = 3/4" NPT thread
21 = 1" NPT thread

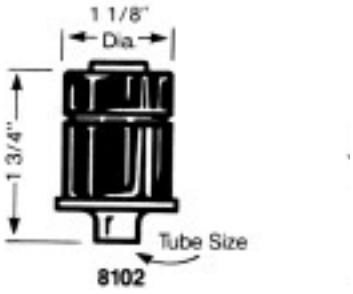
3101 – I – II

Terminal Block
Code
S = Simplex
D = Duplex

Tube Thread Size
Code
1 = 1/16" diameter
2 = 1/8" diameter
3 = 3/16" diameter
4 = 1/4" diameter



4100 Lightweight, "O" ring sealed single or dual circuit. **0.3 lbs.**



8102 Diesel engine type single circuit snap-can. **0.3 lbs.**

4100 – I

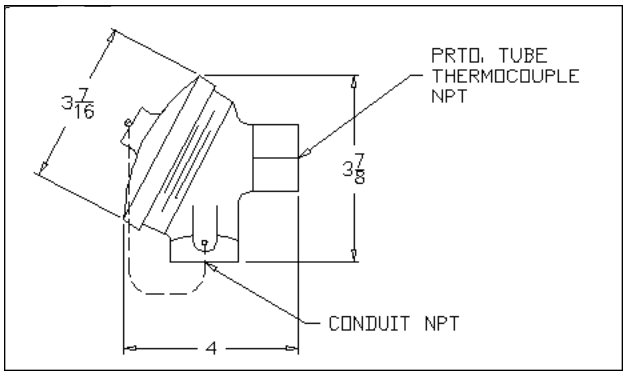
Terminal Block
Code
I = 7/8" - 27" Internal
E = 1" NPT thread

8102 – I – II

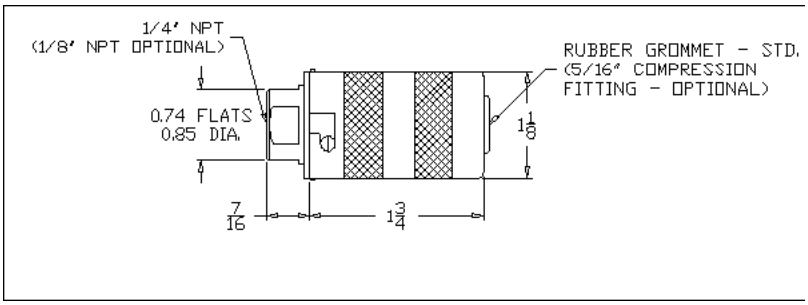
Terminal Block
Code
0 = No thread
13 = 1/2" NPT thread

Tube Thread Size
Code
4 = .25 diameter
6 = .38 diameter

CONNECTION HEADS



1104 Cast iron head. **2.6 lbs.**



4101 Screw cover mini-head. **0.3 lbs.**

Part Number

1	1	0	4	–	I	–	II

Terminal Block

Code
S = Simplex
D = Duplex
0 = None

Tube Thread Size

Code
13 = 1/2" NPT thread
17 = 3/4" NPT Thread

Part Number

4	1	0	1	–	I	–	II

Terminal Block

Code
S = Simplex
D = Duplex
0 = None

Tube Thread Size

Code
2 = 1/8" NPT thread
4 = 1/4" NPT thread

TERMINAL BLOCKS

Part No.	Style	Description
100B	Single-circuit	Floating brass terminals in pressed ceramic materials, suitable for use in 2100 and 1100 heads. Accepts up to 8 gauge wire. No specification selection is required.
101B	Multi-circuit	Rigid, plated brass terminals, pressed ceramic material, accepts up to 14 gauge wire, suitable for spring loading and use in 2100 heads for T/C or RTD.
104B	Multi-circuit	Rigid brass terminals in pressed ceramic material for use in 2100 and 110 heads. Accepts up to 14 gauge wire.
105B	Single-circuit	Floating brass terminals in pressed ceramic material. Accepts up to 8 gauge wire. No specification selection required.

100B

101B
Available in
Triplex

105B

104B

Ordering Information

Part Number Example: 1 0 1 B D

1	0	x	x	–	I

Part Number

Calibration Type

Code
S = Single circuit
D = Double circuit
T = Triple circuit

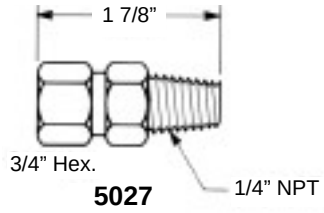
VACUUM SEALING FITTINGS

Features

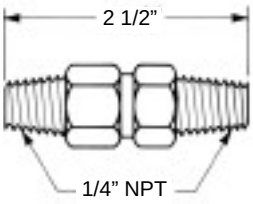
- Stainless Steel Material
- Reusable Sealing Insert for Tubing or Bare Wire
- Temperature Range from -40˚F to +200˚F
- 3 Optional End Terminators

Part No.	Style
5027	1/4" NPT thread one end. For open lead wire extension.
5028	1/4" NPT thread two end. For connection head mounting.
5029	1/4" NPT one end. 1/4" diameter tube extension other end. for polarized connector compression type mounting.
BCM	Brass Compression*
BCT	Brass Compression Readjustable*
SSM	Stainless Steel Compression*
SST	Stainless Steel Compression Readjustable*

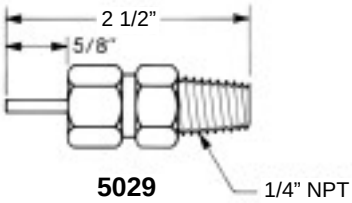
*To order specify Part No., thread size and tube size.



5027



5028



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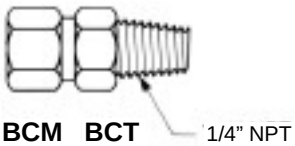


BCM BCT
SSM SST

Ordering Information

Part Number Example: 5 0 2 9 – 4 – 24

X	X	X	X	–	I	–	II

Part Number

Conductor or Tube

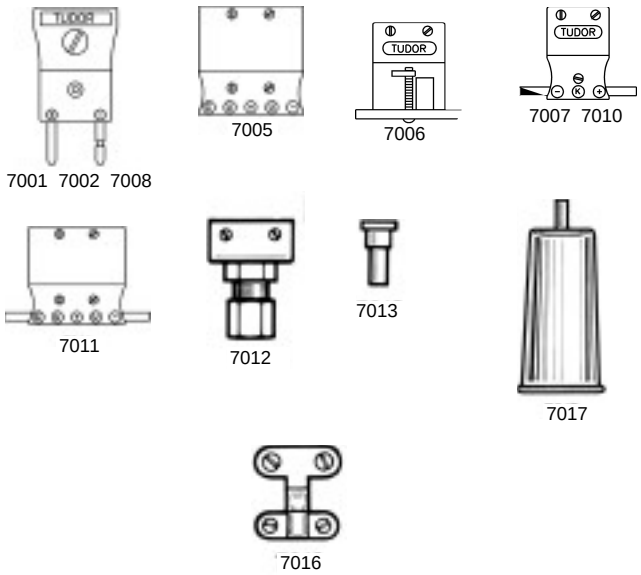
Code
2 = 2 Conductor
4 = 4 Conductor
T = Tube

Wire or Tube Diameter

Code
24= .020
20= .032
2 = .125
3 = .188
4 = .250

CONVENIENCE CONNECTORS *STANDARD SIZE*

Part No.	Style
7001	Male convenience connector with protected terminal connections, solid pins. Selections from Table 1 & 2.
7002	Male convenience connector with protected terminal connections, hollow pins. Selections from Table 1 & 2.
7003	Female convenience connector with protected terminal connections. Selection from Table 1 & Table 2. (not shown)
7004	Male convenience connector with protected terminals and ground wire pin. Selection from Table 1. (not shown)
7005	Female convenience connector with protected terminals and ground wire socket. Selection from Table 1.
7006	Female circular convenience connector with protected terminals for panel mounting in 1 1/8" diameter knockout. Selections from Table 1 & 2.
7007	Female convenience connector with protected terminals for panel mounting in 1" x 9/16" knockout. Selections from Table 1 & 2.
7008	Male convenience connector with external access terminals and solid pins. Selection from Table 1.
7009	Female convenience connector with external access terminals. Selection from Table 1. (not shown)
7010	Female convenience connector with external access terminals for panel mounting in 1" x 9/16" knockout. Selection from Table 1.
7011	Female convenience connector with protected terminals and ground socket panel mounting in 1 1/2" x 9/16" knockout. Selection from Table 1.



Standard Size Accessories

Part No.	Style
7012	Compression type tube adapter. Selections from Tables 3 & 4.
7013	Crimping type tube adapter. Selection from Table 3.
7016	Insulated-wire clamp. Selection from Table 4.
7017	Weather proof rubber boot (pair). Omit Table selection.

Ordering Information

Part Number Example: 7006 J 10

7	0	x	x	–	I	–	II	–	III	–	IV

Part Number

Table 1

T/C Calibration

Code	Body Color*
E = Chromel - Constantan	Purple
J = Iron - Constantan	Black
K = Chromel - Alumel	Yellow
T = Copper - Constantan	Blue
N = Nicrosil - Nisil	Orange
S = Plat. 10% Rh. - Plat.	Green
R = Plat. 13% Rh. - Plat.	Green
B = Plat. 30% Rh. - Plat. 6%	White
W = Tungsten - Tungsten Re.	White
U = Uncompensated	White

Table 2

Maximum Temperature*

Code
- 3 = 350°F (177°C)
- 5 = 550°F (288°C)
- 10 = 1000°F (538°C)

Tube Size

Code
- 0 = .040" tube diameter
- 1 = .063" tube diameter
- 2 = .125" tube diameter
- 3 = .188" tube diameter
- 4 = .250" tube diameter
- 5 = .312" tube diameter

T/C Circuits

Code
- S = Simplex (1 Pair)
- D = Duplex (2 Pair)

*Body color for **Maximum Temperature** selection code 5 is black.

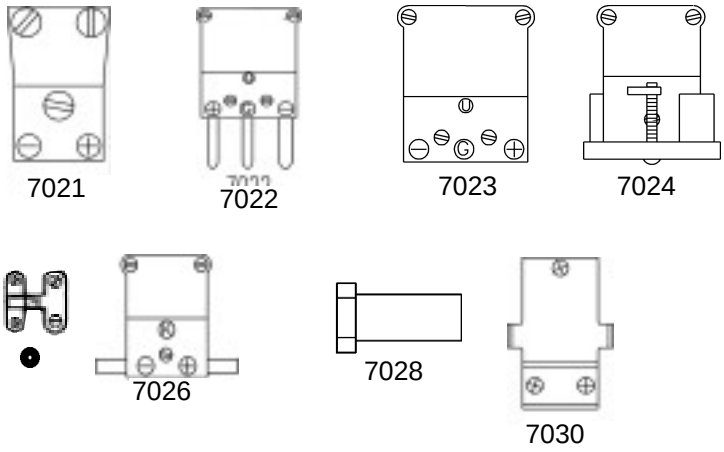
CONVENIENCE CONNECTORS *MINIATURE SIZE*

MINIATURE SIZE CONNECTORS

Part No.	Style
7020	Male convenience connector. Selections from Table 1.
7021	Female convenience connector. Selections from Table 1.
7022	Male convenience connector with ground pin. Selections from Table 1.
7023	Female convenience connector with ground socket. Selections from Table 1.
7024	Female circular convenience connector panel mounting in 7/8" diameter knockout. Selections from Table 1.
7025	Female circular convenience connector panel mounting in 1-1/16" diameter knockout, with ground socket. Selections from Table 1.
7026	Female convenience connector panel mounting in 5/8" x 3/8" knockout. Selection from Table 1.
7027	Female convenience connector panel mounting in 1" x 3/8" knockout with ground socket. Selection from Table 1.

Miniature Size Accessories

Part No.	Style
7028	Adapter type insert. Select from Table 2.
7030	Insulated-wire clamp. Omit table selection.
7031	Neoprene grommet. Omit table selection.



Ordering Information

Part Number Example: 7 0 2 1 K

7	0	x	x	–	I	–	II

Part Number

T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
N = Nicrosil - Nisil
P = Plat. 10% Rh. - Plat
P = Plat. 13% Rh. - Plat
B = Plat. 30% Rh. - Plat
W = Tungsten - Tungsten Re.
U = Uncompensated

Tube Size
(for 7028 and 7029 only)

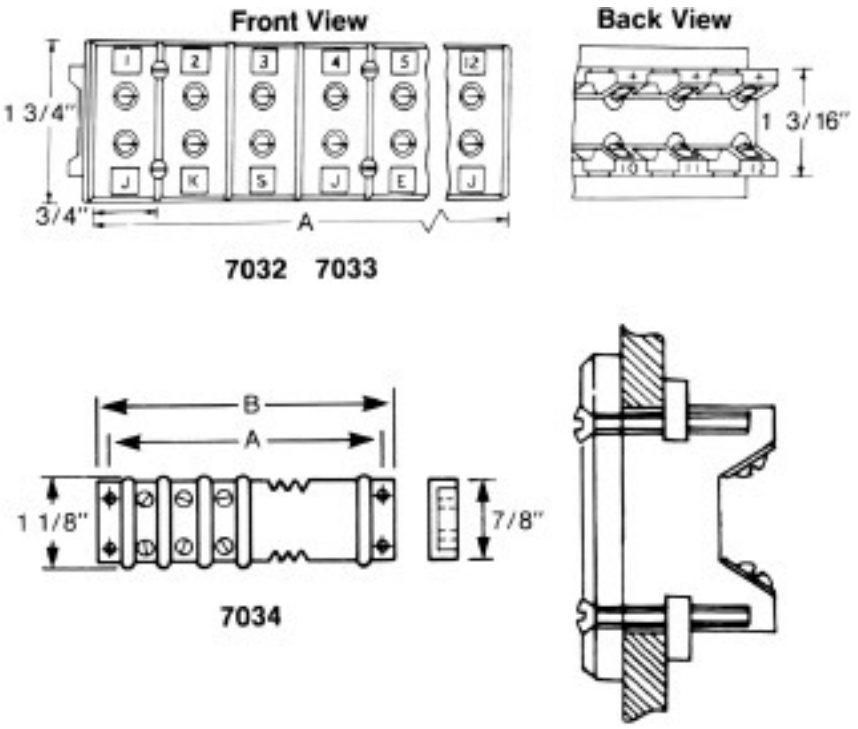
Code
0 = .040" tube diameter
1 = .063" tube diameter
2 = .125" tube diameter
3 = .187" tube diameter

CONVENIENCE CONNECTORS *STRIP PANELS AND TERMINAL BLOCKS*

Strip panels can be wired and installs completely from the front. A self-contained fastening device is permanently attached which simplifies mounting and holds tight. Alloys of inserts match ISA thermocouple grade calibrations to maintain sensing accuracy. Alloy and circuit numbers are marked on face of strip panel with corresponding circuit numbers and polarity identification on the back. Collet type spring loaded inserts have low mass, eliminate temperature gradients and spurious e.m.f. Negative inserts are larger than positives to avoid polarity mix-ups. Large head brass terminal screws facilitate tight connections without deforming or stressing the finest wire. Molded of high impact and shock resistant compound.

Strip Panel & Terminal Block Connectors

Part No.	Style
7032	Polarized strip panel, maximum temperature 300° F (149° C), two to twelve circuits. Selection from Table 1.
7033	Polarized strip panel, maximum temperature 1000° F (538° C), two to twelve circuits. Selection from Table 1.
7034	Barrier type terminal strip, two to ten circuits. Selection from Table 1.



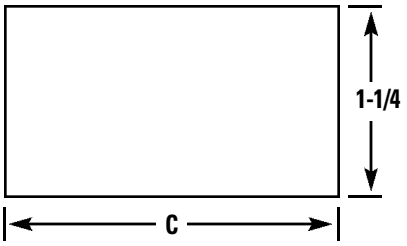
Ordering Information

Table 1

T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
N = Nicrosil - Nisil
P = Plat. 10% Rh. - Plat
P = Plat. 13% Rh. - Plat
B = Plat. 30% Rh. - Plat
W = Tungsten - Tungsten Re.
U = Uncompensated

Strip Panel Mounting Cutout Dimensions



Dimensions	Number of Circuits										
	2	3	4	5	6	7	8	9	10	11	12
"A"	1 1/2"	2 1/4"	3"	3 3/4"	4 1/2"	5 1/4"	6"	6 3/4"	7 1/2"	8 1/4"	9"
"B"	1 5/16"	2 1/16"	2 13/16"	3 9/16"	4 5/16"	5 1/16"	5 13/16"	6 9/16"	7 5/16"	8 1/16"	8 13/16"

How to Order

To order 7032 or 7033:
1. Give part number.
2. Specify number of circuits.
3. Name calibration code (specify each circuit if mixed). **Table 1**
4. Indicate vertical mounting position if other than horizontal as illustrated.
5. Specify number sequence if other than series beginning with 1.

Example: 7032 - 12 - 6K - 6J - HOR - 1 to 12

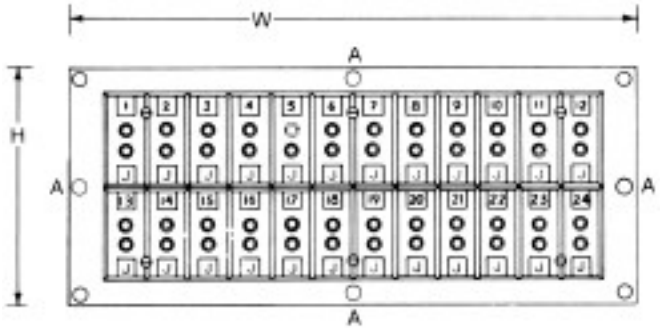
To order 7034:
1. Give part number.
2. Specify number of circuits.
3. Name calibration code (specify each circuit if mixed). **Table 1**

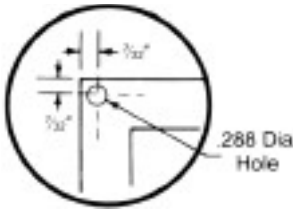
Example: 7034 - 10- E

CONVENIENCE CONNECTORS *STRIP PANELS WITH MOUNTING FRAME*

An assembly of strip panel modules can be combined to accommodate any number of connections. A one-piece mounting frame made of 3/32" thick rigid steel, with dull black finish, holds strip panel modules (shown on previous page).

Part No.
7035





Strip Panel Frame Detail For Mounting Holes In Panel.

Mounting holes "A" are used only when "H" and "W" dimensions each exceed 13 1/2".

DIMENSIONS FOR PANEL ASSEMBLY

H_0 And W_0 Are Mounting Cutout Dimensions

Number of Row	H / H_0		Circuits Per Row: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			W = 2¾" W_0 = 1½"	W = 3½" W_0 = 2¼"	W = 4¼" W_0 = 3"	W = 5" W_0 = 3¾"	W = 5¾" W_0 = 4½"	W = 6½" W_0 = 5¼"	W = 7¼" W_0 = 6"	W = 8" W_0 = 6¾"	W = 8¾" W_0 = 7½"	W = 9½" W_0 = 8¼"	W = 10¼" W_0 = 9"	W = 11" W_0 = 9¾"	W = 11¾" W_0 = 10½"	W = 12½" W_0 = 11¼"	W = 13¼" W_0 = 12"	W = 14" W_0 = 12¾"	W = 14¾" W_0 = 13½"	W = 15½" W_0 = 14¼"	W = 16¼" W_0 = 15"	W = 17" W_0 = 15¾"	W = 17¾" W_0 = 16½"	W = 18½" W_0 = 17¼"	W = 19¼" W_0 = 18"
	H = 2 5/8" H_0 = 1½"	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	H = 4 3/8" H_0 = 3¼"	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
	H = 6⅛" H_0 = 5"	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72
	H = 7 7/8" H_0 = 6¾"	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96
	H = 9 5/8" H_0 = 8½"	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
	H = 11 5/8" H_0 = 10¼"	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144
	H = 13⅜" H_0 = 12"	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168
	H = 14 7/8" H_0 = 13¾"	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192
	H = 16 5/8" H_0 = 15½"	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216
	H = 18 3/8" H_0 = 17¼"	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240

How to Order

1. Give catalog number.
2. Specify number of rows and circuits per row.
3. Name calibration s, use strip panel table on opposite page (specify each circuit if mixed).
4. Indicate vertical mounting position if other than horizontal as illustrated.
5. Specify numbering sequence if other than series beginning with 1.

Example: 7035 - 4 rows - 12C per row - Hor - 1 to 48

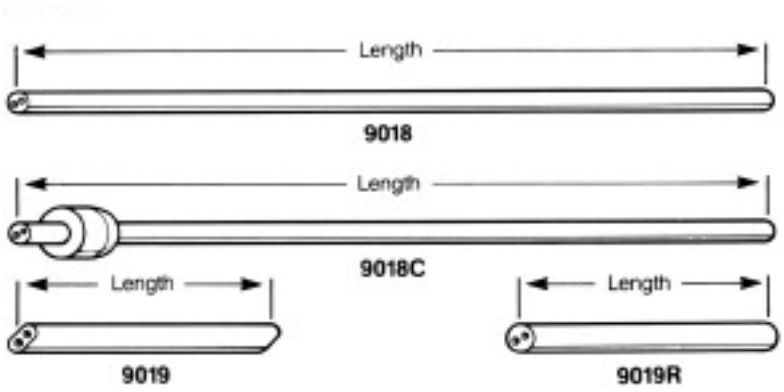
INSULATORS

Our thermocouple insulators are fully vitrified, impervious and uniform. They are of the highest quality and have excellent mechanical strength as well as high thermal shock resistance. The beads, oval and round insulators listed are normally for base metal thermocouples. Noble metal and other high-temperature thermocouples should utilize the one-piece round construction insulators.

INSULATOR TYPES

Part No.	Style
9018	Round full length.
9018C	Round full length with collar.
9019	Oval.
9019R	Round.

INSULATORS



Ordering Information

Part Number Example: 9 0 1 8 C — A — D — 3 — 30

9	0	1	x	x	— I —	— II —	— III —	— IV

Part Number

Insulator Material

Code
M*= Mullite
A* = 99.6% Alumina
C = Ceramic

*Not available in oval.

Insulator Form

Code
S = 2 Bore simplex
D* = 4 Bore duplex

Insulator Size

Code (for 9018 and 9018C)
2*= 1/8" diameter x .040 bore
3*= 3/16" diameter x .060 bore
4*= 1/4" diameter x .090 bore

Code (for 9019 and 9019R)
8 = For 8 gauge element
14 = For 14 gauge element
20 = For 20 gauge element
24 = For 24 gauge element

Insulator Length

Code
1 = 1 inch long
3 = 3 inches long (or any other length in inches)

RETRACTABLE CORD SETS *FOR THERMOCOUPLES AND RESISTANCE THERMOMETERS*

Retractable cords offer flexible and neat methods of connecting thermocouples and resistance thermometers. The cord insulation is resistant to moisture, oil and many chemicals in environments not exceeding 220˚ F (105° C). Each one (1) foot of retracted cord extends approximately five (5) feet.

GENERAL SPECIFICATIONS

Insulation: Teflon on primaries with TPR (thermoplastic rubber) for the main cable body (not recommended for use above 220˚F).

Conductors: 26 Awg stranded conductors composed of 7 strands of 36 gauge wire.

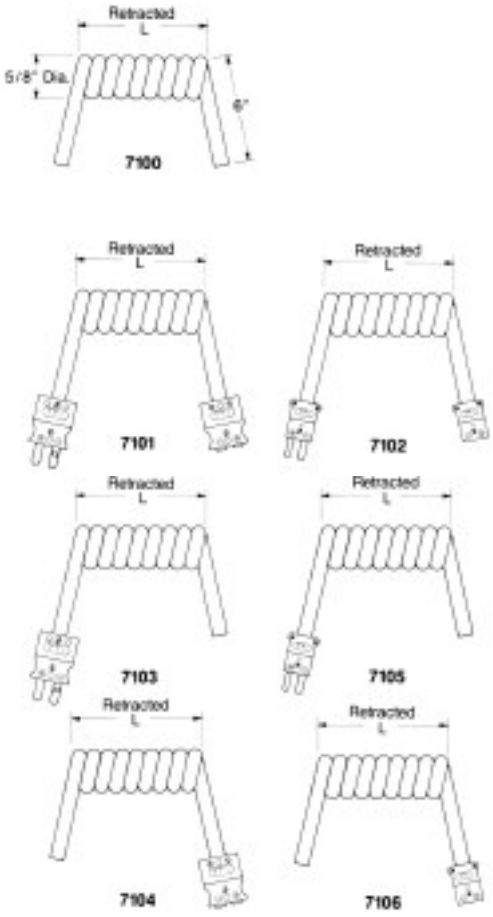
ANSI Limits: Standard limits of error for the thermocouple's extension wire.

Nominal Cable Diameter: Thermocouple .170" diameter round.

Retracted Cord Length Tolerance: ± 10%.

Retracted Coil Diameter: Approximately 5/8" diameter.

Extended Length: Approximately 5 ft. per foot of retracted coil.



Part No.	Style
7100	Cord with 6" straight length.
7101	Cord with standard size convenience male and female connectors.
7102	Cord with miniature size convenience male and female connectors.
7103	Cord with standard size convenience male connector on one end only.
7104	Cord with standard size convenience female connector on one end only.
7105	Cord with miniature size convenience male connector on one end only.
7106	Cord with miniature size convenience female connector on one end only.

Ordering Information

Part Number Example: 7 1 0 1 K 2

7	1	0	x	–	I	–	II

Part Number

Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
T = Copper - Constantan
U = Resistance Thermometer or Thermistor

Retracted Length Feet

Code
1 = 1
2 = 2
3 = 3
4 = 4

COLOR CODING: INDUSTRY STANDARD

Type	Jacket	Positive	Negative
K	yellow	yellow	red
J	black	white	red
T	blue	blue	red
E	purple	purple	red
U	white	2 black	1 red

BARE THERMOCOUPLE WIRE

Close control of composition is very necessary as far as the properties of thermocouple material alloys are concerned. We insist that constant adherence to established high standards of accuracy are maintained by special processing and quality control techniques at the primary source. Final check and calibration of all bare and insulated thermocouple materials are done in our own laboratory by the most modern and efficient test instruments and calibration procedures.

Ordering Information

BASE METAL THERMOCOUPLE WIRE

Part Number Example: K – 8 – M – 24

I – II – III – IV

T/C Calibration

Code
E = Chromel - Constantan
J = Iron - Constantan
K = Chromel - Alumel
N = Nicrosil - Nisil
T = Copper - Constantan
NM = Nickel - Nickel Moly

Gauge Size

Code
8 = 8/.128 diameter
14 = 14/.064 diameter
20 = 20/.032 diameter
24 = 24/.020 diameter
30 = 30/.010 diameter

T/C Form

Code
P = Positive Conductor
N = Negative Conductor
M = Matched Pair

Insertion Length

Specify length in inches

NOBLE AND REFRACTORY METAL THERMOCOUPLE WIRE

Part Number Example: S – 24 M 18

I – II III IV

T/C Calibration

Code
B = Platinum 30% Rhodium - Platinum 6% Rhodium
R = Platinum 13% Rhodium - Platinum
S = Platinum 10% Rhodium - Platinum
W3 = Tungsten 3% Rhenium - Tungsten 25% Rhenium
W5 = Tungsten 5% Rhenium - Tungsten 26% Rhenium

Gauge Size
(24 gauge standard)

Code
20 = 20/.032 diameter
24 = 24/.020 diameter
30 = 30/.010 diameter

T/C Form

Code
P = Positive Conductor
N = Negative Conductor
M = Matched Pair

Insertion Length

Specify length in inches

INSULATED THERMOCOUPLE AND EXTENSION WIRE

Tudor brand thermocouple wire and thermocouple extension wire are known for premium performance and reliability. Careful selection of materials, plus the latest type of special machinery and quality control, assure superior wire uniformity.

Quality Control

Quality control of all Tudor brand thermocouple wire and thermocouple extension wire provides testing in accordance with NBS Circular 590 and are traceable to NIST.

Shipping

All Tudor brand duplex insulated thermocouple and extension wires are normally packaged in 1000-foot reels. This length is plus or minus 10% on each reel. However, each reel and the container in which it is shipped is marked with the exact length. On any order for either standard or special wire, we reserve the right to ship plus or minus 10% of the total amount ordered.

Calibrating, Checking and Tagging

Thermocouple wire and extension wire are available calibrated, when so specified, at an extra charge. Wires of this classification are within the Standard Limits of Error but, most important, their specific departure temperatures specified is known and can be taken into account. Each thermocouple, coil, reel, or spool of wire is checked and tagged to show the departure from the curve. Refer to the Engineering Data section of the Reference Information publication (available on request) for limits of error applicable to your particular thermocouple wire or extension wire.

Color Coding

Standard ANSI color coding is used on all insulated thermocouple wire and extension wire when type of insulation permits. In color coding, a tracer may be used to distinguish the calibration.

ANSI Type		Magnetic		ANSI Color Code		
T/C	Single	Yes	No	Single	Overall Extension Wire	Overall T/C Wire
	TP		X	Blue		
T	TN		X	Red	Blue	Brown
	JP	X		White		
J	JN		X	Red	Black	Brown
	EP		X	Purple		
E			X	Red	Purple	Brown
	KP		X	Yellow		
K	KN	X		Red	Yellow	Brown
	RP, SP		X	Black		
R, S	RN, SN		X	Red	Green	—
	BP		X	Grey		
B	BN		X	Red	Grey	—
	NP		X	Orange		
N	NN	X		Red	Orange	Brown

ANSI Letter Designations

Thermocouple and extension wires are specified by ANSI letter designations for calibration. Positive and negative legs are identified by the appropriate letter suffixes P and N, respectively.

ANSI Letter	Description	Popular Generic & Trade Names*
T	TP	Copper
	TN	Constantan, Cupron, Advanced
J	JP	Iron
	TN	Constantan, Cupron, Advanced
E	EP	Chromel, Tophel, T_1
	EN	Constantan, Cupron, Advanced
K	KP	Chromel, Tophel, T_1 Thermokanthal KP
	KN	Alumel, Nial, T_2 Thermokanthal KN
R	RP	Platinum 13% Rhodium
	RN	Pure Platinum
S	SP	Platinum 10% Rhodium
	SN	Pure Platinum
B	BP	Platinum 30% Rhodium
	BN	Platinum 6% Rhodium
N	NP	Nicrosil
	NN	Nisil

*Trade Names: Cupron, Nial and Tophel — AMAX; Advance, T1, and T2 — Driver-Harris Co.; Chromel and Alumel — Hoskins Mfg. Co.; Thermokanthal KP and Thermokanthal KN — Kanthal Co.

Solid and Stranded Conductors

Thermocouple wire and extension wire are usually solid conductors. When greater flexibility is required, stranded construction is available. The accompanying table gives the stranding combinations used.

Stranding Combinations

Conductor Gauge	ANSI Type	No. of Strands	Stranding Gauge
14	All	7	22
16	All	7	24
18	All	7	26
20	All	7	28
22	All	7	30
24	All	7	32

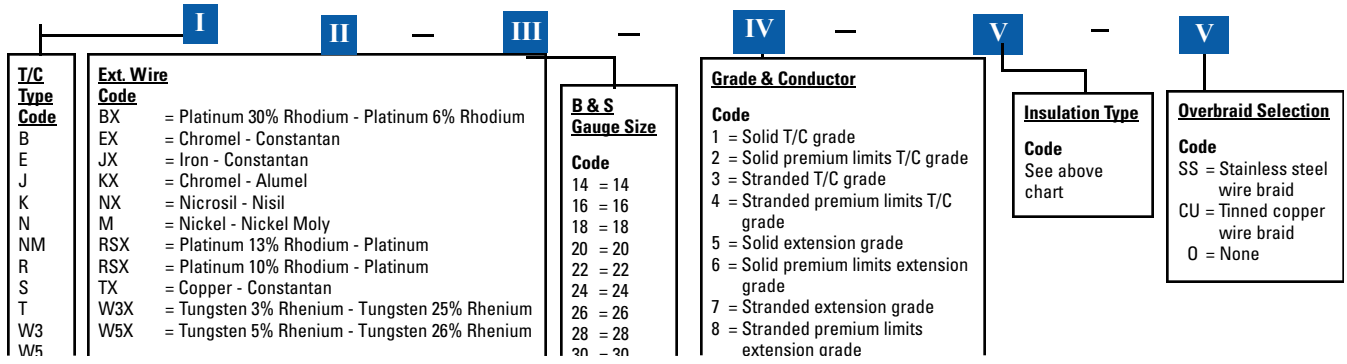
Not all combinations are standard and may require a minimum purchase quantity.

INSULATED THERMOCOUPLE & EXTENSION WIRE

Insulation Type

Code	Single Conductor Insulation Wall Thickness	Single Conductor Impregnation	Duplex Conductors Insulation Wall Thickness	Duplex Conductors Impregnation	Temperature Rating Continuous	Temperature Rating Single Reading	ANSI Color Coded	Physical Properties Abrasion Resistance	Physical Properties Moisture Resistance	Notes
301	Amorphous Silica Fiber .015"	None	Amorphous Silica Fiber .020"	None	871°C 1600°F	1093°C 2000°F	No	Fair	Fair	
302	Double Glass Braid .012" Wall	Silicone Modified Resin	Glass Braid .006"	Silicone Modified Resin	482°C 900°F	538°C 1000°F	Yes	Good	Good	Impregnation retained to 204°C (400°F)
304	Glass Braid .006"	Silicone Modified Resin	Glass Braid .006"	Silicone Modified Resin	482°C 900°F	538°C 1000°F	Yes	Fair	Good	Impregnation retained to 204°C (400°F)
305	Double Glass Wrap .005"	High Temp. Varnish	Glass Braid .006"	Silicone Modified Resin	482°C 900°F	538°C 1000°F	Yes	Fair	Good	Impregnation retained to 204°C (400°F)
321	Hi-Temp Glass Braid .012"	Hi-Temp Varnish	Hi-Temp Glass Braid .012"	Hi-Temp Varnish	704°C 1300°F	871°C 1600°F	Yes	Good	Good	Impregnation retained to 204°C (400°F)
350	Polycrystaline Braid .012" Wall	None Modified Resin	Polycrystaline .006"	None Modified Resin	1430°C 2600°F	1430°C 2600°F	No	Good	Fair	
502	Polyvinyl .013" to #20 .014" to #16 .016" to #14	—	Polyvinyl .016"	—	-29 to +105°C -20 to +221°F	105°C 221°F	Yes	Good	Excellent	
504	Nylon .010"	—	Nylon .008" - .010"	—	150°C 300°F	150°C 300°F	Yes	Excellent	Fair	Over-all jacket is clear
505	Polyvinyl .012" - .014"	—	Ripcord	—	-29 to +105°C -20 to +221°F	105°C 221°F	Yes	Good	Excellent	
506	Teflon TFE Tape fused .005"	—	Teflon TFE Tape fused .0075"	—	204°C 400°F	316°C 600°F	Yes	Very Good	Excellent	Aluminum/Kapton Foil Shield with #20 Nickel plated copper Drain Wire
507	Teflon FEP Extr. .008"	—	Teflon FEP Extr. .010"	—	204°C 400°F	316°C 600°F	Yes	Very Good	Excellent	
508	Teflon TFE Tape fused .005"	—	Teflon TFE Tape fused .0075"	—	260°C 500°F	316°C 600°F	Yes	Good	Excellent	
509	Teflon FEP Extr. .009"	—	Teflon FEP Extr. .010", twisted	—	204°C 400°F	316°C 600°F	Yes	Very Good	Excellent	Aluminum/Mylar shield w/ #20 drain wire
510	Polyvinyl .015"	—	Polyvinyl .020" Twisted	—	-29 to +80°C -20 to +176°F	80°C 176°F	Yes	Good	Excellent	Aluminum/Mylar shield w/ #20 drain wire
511	Fused Kapton Tape .004"	—	None Twisted	—	316°C 600°F	427°C 800°F	Both legs have tracer	Excellent	Excellent	FEP binder melts at approximately 260°C (500°F)
513	Fused Kapton Tape .006"	—	Fused Kapton .004"	—	316°C 600°F	427°C 800°F	Yes	Excellent	Excellent	FEP binder melts at approximately 260°C (500°F)
516	Extruded PFA .008"	—	Extruded PFA .010"	—	260°C 500°F	316°C 600°F	Yes	Good	Excellent	

Part Number Example: B BX – 16 – 1 – 506 – 0



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PART NO.	PAGE NO.	DESCRIPTION
BCM	39	BRASS COMPRESSION FITTING
BCT	39	BRASS COMPRESSION FITTING (ADJ)
SSM	39	SS COMPRESSION FITTING
SST	39	SS COMPRESSION FITTING (ADJ)
20	8	AL HD SC HEAD W/NIPPLE-UNION NIPPLE & ELEMENT
21	8	AL HD SC HEAD W/NIPPLE-UNION & ELEMENT
22	8	AL HD SC HEAD W/NIPPLE & ELEMENT
100B	38	SINGLE CIRCUIT TERMINAL BLOCK –ACCEPTS 8GA WIRE
101B	38	MULTI CIRCUIT TERMINAL BLOCK –ACCEPTS 14GA WIRE
104B	38	MULTI CIRCUIT TERMINAL BLOCK – ACCEPTS 14GA WIRE
105B	38	SINGLE CIRCUIT TERMINAL BLOCK – ACCEPTS 8GA WIRE
261L	12-14	REDUCED TIP THERMOWELL W/LAG 0.260 BORE 1/2 NPT
261R	12-14	REDUCED TIP THERMOWELL 0.260 BORE 1/2 NPT
261S	12-14	STRAIGHT THERMOWELL 0.260 BORE 1/2 NPT
262L	12-14	REDUCED TIP THERMOWELL W/LAG 0.260 BORE 3/4 NPT
262R	12-14	REDUCED TIP THERMOWELL 0.260 BORE 3/4 NPT
262S	12-14	STRAIGHT THERMOWELL 0.260 BORE 3/4 NPT
263L	12-14	REDUCED TIP THERMOWELL W/LAG 0.260 BORE 1 NPT
263R	12-14	REDUCED TIP THERMOWELL 0.260 BORE 1 NPT
263S	12-14	STRAIGHT THERMOWELL 0.260 BORE 1 NPT
262H	12-14	TAPERED THERMOWELL 0.260 BORE 3/4 NPT
262HL	12-14	TAPERED THERMOWELL W/LAG 0.260 BORE 3/4 NPT
263H	12-14	TAPERED THERMOWELL 0.260 BORE 1 NPT
263HL	12-14	TAPERED THERMOWELL 0.260 BORE 1 NPT
382H	12-14	TAPERED THERMOWELL 0.385 BORE 3/4 NPT
382HL	12-14	TAPERED THERMOWELL W/LAG 0.385 BORE 1 NPT
382S	12-14	STRAIGHT THERMOWELL 0.385 BORE 3/4 NPT
382SL	12-14	STRAIGHT THERMOWELL W/LAG 0.385 BORE 3/4 NPT
383H	12-14	TAPERED THERMOWELL 0.385 BORE 1 NPT
383HL	12-14	TAPERED THERMOWELL W/LAG 0.385 BORE 1 NPT
383S	12-14	STRAIGHT THERMOWELL 0.385 BORE 1 NPT
1000	5	TU-PAK TC ASSEMBLY W/GP CAST ALUMINUM HEAD
1002	5	TU-PAK TC ASSEMBLY W/HAZARDOUS CAST ALUM. HEAD
1003	5	TU-PAK TC ASSEMBLY W/SCREW COVER PLASTIC HEAD
1004	5	TU-PAK TC ASSEMBLY W/SCREW COVER CAST IRON HEAD
1100	36	GP CAST ALUMINUM HEAD WITH PRESSED STEEL COVER
2000	5	TU-PAK TC ASSEMBLIES W/SCREW COVER CAST ALUM HEAD
2002	5	TU-PAK TC ASSEMBLY W/SCREW COVER ALUMINUM HEAD WITH _ NPT SS SPRING LOADED OIL AND VAPOR SEAL

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PART NO.	PAGE NO.	DESCRIPTION
2004	7	TU-PAK LEAD WIRE TC ASSEMBLY 1/2 X 1/2 NPT CS FITTING
2005	7	TU-PAK LEAD WIRE TC ASSEMBLY 1/2 X 1/2 NPT SS FITTING
2006	7	TU-PAK LEAD WIRE TC ASSEMBLY 1/2 X 1/2 NPT SPRING LOADED SS FITTING
2100	36	HEAVY DUTY CAST ALUMINUM HEAD WITH SCREW COVER
2400	9	SPRING LOADED REPLACEMENT ELEMENT FOR INDUSTRIAL PROCESS TYPE ASSEMBLIES
3000	5	TU-PAK TC ASSEMBLY WITH 300°F OPEN TYPE HEAD
3002	5	TU-PAK TC ASSEMBLY WITH 1000°F OPEN TYPE HEAD
3100	36	MOLDED SINGLE/DUAL CIRCUIT OPEN TERMINAL HEAD 400°F
3101	36	CERAMIC SINGLE CIRCUIT OPEN TERMINAL HEAD 1000°F
3201	31	PHARMACEUTICAL TC WIRE HARNESS (MULTIPLE TC BUNDLE)
3202	31	PHARMACEUTICAL TC 1/8 DIA. SS SHEATH PROBE
3203	31	PHARMACEUTICAL TC REPLACEMENT ELEMENT FOR 3202
4000	5	TU-PAK TC ASSEMBLY SCREW COVER MINI HEAD
4002	5	TU-PAK TC ASSEMBLY BAYONET COVER MINI HEAD
4100	36	BRASS HEAD-OPEN TERMINALS
4101	37	MINIATURE HEAD O RING SEALED
5000	6	TU-PAK STANDARD CONNECTOR TC ASSEMBLY (350°F)
5001	6	TU-PAK STANDARD CONNECTOR TC ASSEMBLY (500°F)
5002	6	TU-PAK STANDARD CONNECTOR TC ASSEMBLY (1000°F)
5003	6	TU-PAK MINIATURE CONNECTOR TC ASSEMBLY (350°F)
5004	24	VACUUM FURNACE TC QUICK CONNECT PLUG WITH MOLYBDENUM SHEATH AND POTTED END SEAL.
5005	24	VACUUM FURNACE TC QUICK CONNNECT PLUG WITH 3/16 OD MOLYBDENUM SHEATH AND VACUUM GLAND END SEAL
5006	24	VACUUM FURNACE TC SAME AS 5005 WITH A VACUUM TYPE VARIABLE IMMERSION FITTING
5007	24	VACUUM FURNACE TC MINIATURE LIGHTWEIGHT HEAD WITH 3/16OD REFRACTORY SHEATH AND VACUUM GLAND END SEAL.
5008	24	VACUUM FURNACE TC SAME AS 5007 WITH A VACUUM TYPE VARIABLE IMMERSION FITTING
5010	24	VACUUM FURNACE TC ELEMENT IN 1/8 DIA. HIGH PURITY ALUMINA INSULATOR 24 GAUGE.

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PART NO.	PAGE NO.	DESCRIPTION
5011	24	VACUUM FURNACE TC SAME AS 5010 EXCEPT WITH A 3/16 OD INSULATOR.
5013	24	VACUUM FURNACE TC WORK SURVEY CHROMEL ALUMEL (TYPE K) TC. HIGH TEMPERATURE GLASS INSULATION, 20 GAUGE MAXIMUM MEASURING TEMPERATURE 2000°F (1093°C).
5014	24	VACUUM FURNACE TC SAME AS 5013 EXCEPT CERAMIC FIBER INSULATION. MAXIMUM MEASURING TEMPERATURE 2300°F (1260°C)
5018	25	VACUUM FURNACE TC RECRYSTALLIZED ALUMINA TUBE ASSEMBLY WITH QUICK CONNECT PLUG AND POTTED SEAL END.
5021	24	VACUUM FURNACE TC QUICK CONNECT PLUG WITH 1/4 OD HIGH PURITY ALUMINA TUBE, INCONEL SLEEVE AND VACUUM GLAND END SEAL.
5025	26	VACUUM FURNACE TC COLD WALL SIMPLEX VACUUM FEED THROUGH ASSEMBLY WITH MINIATURE CLOSED HEAD.
5026	26	VACUUM FURNACE TC COLD WALL DUPLEX VACUUM FEED THROUGH ASSEMBLY WITH MINIATURE CLOSED HEAD.
5027	39	VACUUM SEALING FITTING – 1/4 NPT THREAD ONE END. FOR OPEN LEAD WIRE EXTENSION.
5028	39	VACUUM SEALING FITTING – 1/4 NPT THREAD TWO END. FOR CONNECTION HEAD MOUNTING.
5029	39	VACUUM SEALING FITTING – 1/4_ NPT ONE END. 1/4 DIAMETER TUBE EXTENSION OTHER END. FOR POLARIZED CONNECTOR COMPRESSION TYPE MOUNTING.
5030	26	VACUUM FURNACE TC COLD WALL MULTIPLE CONDUCTOR VACUUM FEED THROUGH ASSEMBLY WITH COMPENSATED TERMINALS.
6000	7	TU-PAK LEAD WIRE TC ASSEMBLY W/TRANSITION FITTING WITH STRAIN RELIEF SPRING.
6001	7	TU-PAK LEAD WIRE TC ASSEMBLY W/TRANSITION FITTING W/O STRAIN RELIEF SPRING.
6002	7	TU-PAK LEAD WIRE TC ASSEMBLY WITH TRANSITION TO POLY-URETHANE COILED CORD. SIMPLEX ONLY.
6010	15	BEARING METAL TC – 3/16 DIA. SENSOR, SPRING LOADED WITH TWISTED AND SHIELDED LEAD WIRE FOR SIMPLEX OR DUPLEX BEARING METAL TC REQUIREMENTS.
6011	15	BEARING METAL TC – 1/4 DIA. SENSOR, SPRING LOADED WITH TWISTED AND SHIELDED LEAD WIRE FOR TRIPLEX BEARING METAL TC REQUIREMENTS.

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6013	15	BEARING METAL TC – 3/16 DIA. SENSOR, SPRING LOADED WITH RIP-CORD STYLE LEAD WIRE FOR SIMPLEX OR DUPLEX THRUST BEARING TC REQUIREMENTS. (SHALLOW MOUNT)
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7000	7	TU-PAK LEAD WIRE TC ASSEMBLY STRIPPED 1 INCH LEADS
7001	40	MALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINAL CONNECTIONS – SOLID PINS.
7002	40	MALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINAL CONNECTIONS – HOLLOW PINS.
7003	40	FEMALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINAL CONNECTIONS.
7004	40	MALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINALS AND GROUND WIRE PIN.
7005	40	FEMALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINALS AND GROUND WIRE SOCKET.
7006	40	FEMALE CIRCULAR CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINALS FOR PANEL MOUNTING IN 1-1/8 DIAMETER KNOCKDOWN.
7007	40	FEMALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINALS FOR PANEL MOUNTING IN 1 X 9/16 KNOCKOUT.
7008	40	MALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH EX-TERNAL ACCESS TERMINALS AND SOLID PINS.
7009	40	FEMALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH EXTERNAL ACCESS TERMINALS.
7010	40	FEMALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH EXTERNAL ACCESS TERMINALS FOR PANEL MOUNTING IN 1 X 9/16 KNOCKOUT.
7011	40	FEMALE CONVENIENCE CONNECTOR UNIVERSAL SIZE WITH PROTECTED TERMINALS AND GROUND SOCKET PANEL MOUNTED IN 1-1/2 X 9/16 KNOCKOUT.
7012	40	COMPRESSION TYPE TUBE ADAPTER UNIVERSAL SIZE
7013	40	CRIMPING TYPE TUBE ADAPTER
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7017	40	WEATHERPROOF RUBBER BOOT (PAIR)
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7025	41	FEMALE CIRCULAR CONVENIENCE CONNECTOR MINIATURE SIZE FOR PANEL MOUNTING IN 1-1/16 DIAMETER KNOCKOUT WITH GROUND SOCKET.
7026	41	FEMALE CONVENIENCE CONNECTOR MINIATURE SIZE FOR PANEL MOUNTING IN 5/8 X 3/8 KNOCKOUT.
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7030	41	INSULATED CLAMP
7031	41	NEOPRENE GROMMET
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7101	45	RETRACTABLE CORD WITH STANDARD SIZE CONVENIENCE MALE AND FEMALE CONNECTORS
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7104	45	RETRACTABLE CORD WITH STANDARD SIZE CONVENIENCE FEMALE CONNECTOR ON ONE END ONLY.
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9004	21	NOBLE METAL TC ASSEMBLY WITH GP HEAD AND CERAMIC PRIMARY TUBE INCONEL _ INCH NPT, SECONDARY TUBE.
9005	21	NOBLE METAL TC ASSEMBLY WITH HEAVY DUTY SCREW COVER HEAD WITH PRIMARY AND SECONDARY CERAMIC TUBES.
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9010	20	BASE METAL REPLACEMENT ELEMENTS – BARE WIRE WITHOUT INSULATORS.
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9012	20	BASE METAL REPLACEMENT ELEMENTS WITH 3 INCH ROUND INSULATORS.
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9037	17	BASE METAL TC ASSEMBLIES STRAIGHT TYPE – SCHEDULE 80 PIPE WITH WEATHERPROOF HEAVY DUTY CONNECTION HEAD.
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9039	27	DOUBLE TUBE ASSEMBLIES – HEAVY DUTY HEAD WITH SILICON CARBIDE AND MULLITE TUBES.
9040	27	DOUBLE TUBE ASSEMBLIES – GP HEAD WITH SILICON CARBIDE AND 99.6% ALUMINA TUBES.
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9045	23	CERAMIC & NON-METALLIC PROTECTION TUBES – SILICON CARBIDE WITH 3 INCH COLLAR – 1 INCH ID.
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9100	29	BAYONET STYLE TC ASSEMBLIES – VARIABLE IMMERSION
9101	29	BAYONET STYLE TC ASSEMBLIES – STRAIGHT WITH BAYONET LOCK CAP.
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9104	29	BAYONET STYLE TC ASSEMBLIES – STRAIGHT IMMERSION.
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9112	30	MELT BOLT TC ASSEMBLY – WITH MALE PLUG.
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R000	35	RTD LEAD WIRE TYPE – TUBE ASSEMBLY WITH LEAD WIRES.
R100	34	RTD HEAD TYPE – GP CAST ALUMINUM HEAD (4 WIRES MAX.)
R102	34	RTD HEAD TYPE – HAZARDOUS LOCATION CAST ALUMINUM HEAD
R103	34	RTD HEAD TYPE – SCREW COVER THERMOPLASTIC HEAD.
R104	34	RTD HEAD TYPE – SCREW COVER CAST IRON HEAD.
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R501	33	RTD CONNECTOR TYPE – 350°F (177°C) MAXIMUM STANDARD FEMALE CONNECTOR.
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R601	35	RTD LEAD WIRE TYPE – TRANSITION TO LEAD WIRES WITHOUT STRAIN RELIEF.
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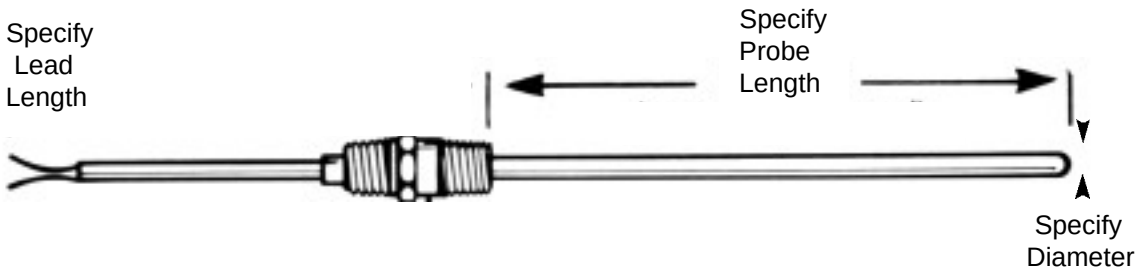
R700	35	RTD LEAD WIRE TYPE – 1/2 NPT X 1/2 NPT CARBON STEEL FITTING WITH LEAD WIRES.

CUSTOM PROBE QUOTE FORM



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Name: _____ Date: _____
Title: _____ RFQ #: _____
Company: _____
Address: _____
City, State, Zip: _____
Tel: _____
Fax: _____

Specify:

- ❑ Probe Length: _____
- ❑ Lead Length: _____
- ❑ Probe Diameter: _____
- ❑ Probe Material: _____
- ❑ Termination: _____
- ❑ Max. Temperature: _____
- ❑ Atmosphere: _____
- ❑ Thermocouple Type: _____
- ❑ RTD: _____

Additional Comments or Requirements:

NOTES

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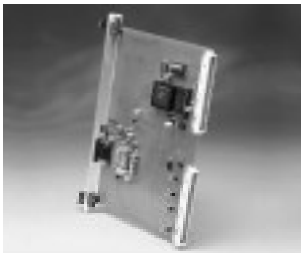

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