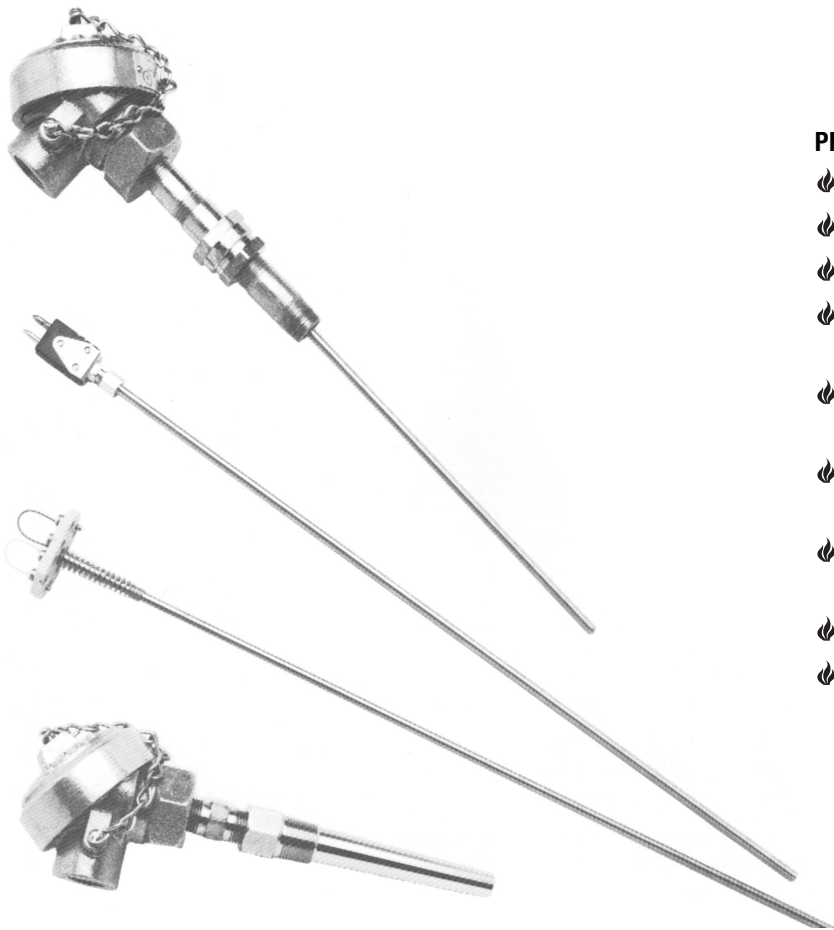




T-PAK[®] Thermocouples Probes & Assemblies



PRODUCT FEATURES

- ☛ Mineral Insulated Metal Sheathed Thermocouples
- ☛ Rugged Construction
- ☛ J, K, T, E and N Calibrations
- ☛ Probes and Assemblies in all sizes and sheath configurations
- ☛ General Purpose or Spring Loaded Mounting, with or without Thermowells
- ☛ Nipple, Nipple-Union-Nipple or Bushing Extension Hardware
- ☛ CSA Approved Assemblies for Hazardous Locations
- ☛ Custom Configurations
- ☛ Head Mounted Transmitter options

Please visit our website for our other Product Literature Guides : Resistance Temperature Detectors, Industrial Thermocouples, Thermowells, Protection Tubes, Calibration Services

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Benefits of T-PAK® THERMOCOUPLES

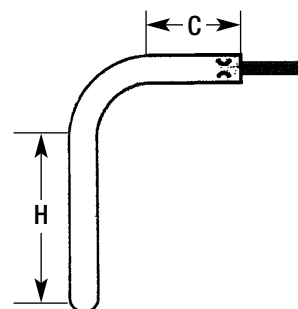
T-PAK® thermocouples are mineral insulated, metal sheathed assemblies that are accurate and sensitive. The outer sheath of stainless steel or other alloys, coupled with tightly compacted magnesia (MgO), ensures relatively long life by protecting the thermocouple from oxidizing, reducing or other corrosive atmospheres.

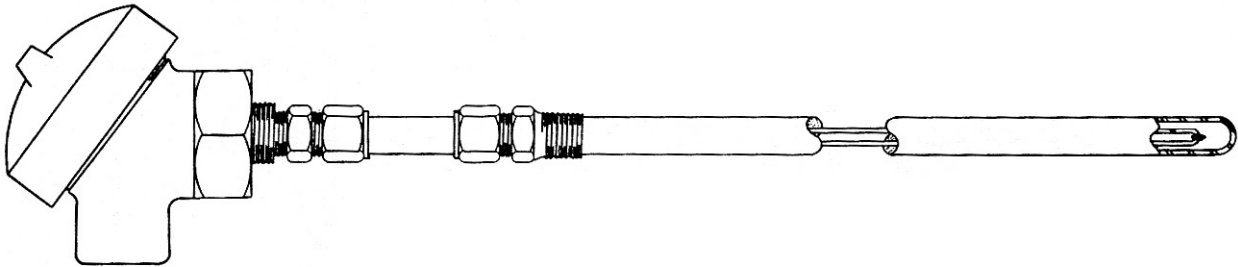
T-PAK® PROPERTIES

- Long Stable Life: Long element life is assured because the construction protects the conductor from adverse environmental effects.
- Mechanical Strength: The tightly compacted powder contained within the tough metal sheath locks the wires rigidly in position, permitting the cable to be bent, flattened, or twisted.
- Rapid Response: The small mass and high thermal conductivity promotes rapid heat transfer from heat source to measuring junction.
- Electrical Shielding: The sheath offers excellent shielding against electrostatic interference in sensitive temperature measuring circuits.
- Insulation Resistance: High insulation resistance is maintained over wide range of temperature and humidity conditions.
- Moisture/Pressure: The homogeneous metal sheath is impervious to most liquids and gases and will withstand high external pressure.
- Long Lengths: Continuous lengths up to 2000 feet are available in 1/8" diameter.
- Ease of Installation: The pliable construction of the cable allows it to be easily bent to a tight radius and retain its form after being bent. Its metal sheath can be welded or brazed to special attachments.
- Corrosion Resistance: Many sheath materials are available to ensure the proper selection depending on the detrimental elements present in the specific environment.

BEND RADIUS

Diam (in)	Bend Radius		"H" Dim	"C" Dim
	Std	Min	Min	Min
.063	3/8	1/16	1/2	1 1/2
.125	3/4	3/8	1	2
.188	1 1/8	1/2	1	2
.250	1 1/2	3/4	2	2
.313	1 3/8	1 1/4	2	2
.375	2 1/4	1 1/2	3	2
.500	3	2	4	2

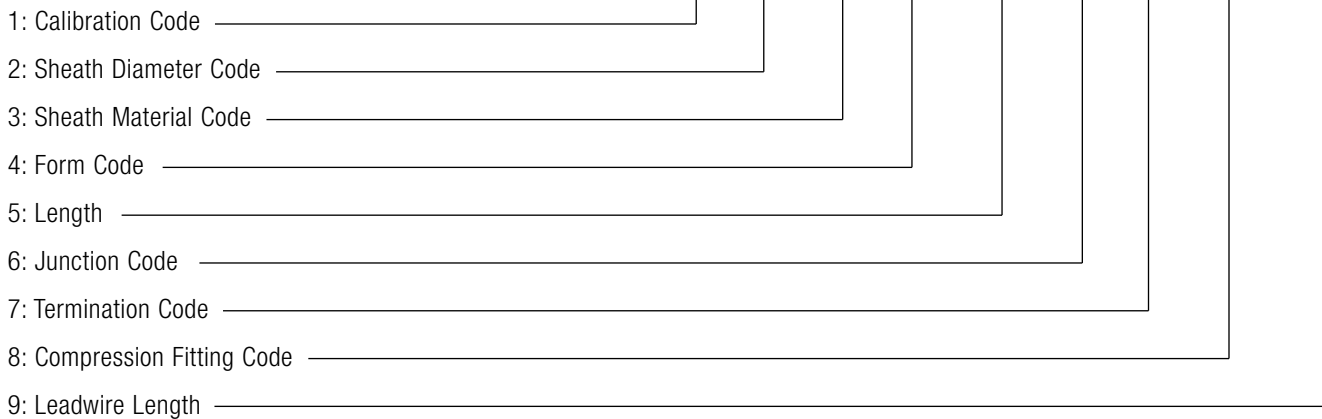




ORDERING INFORMATION

A 9-part catalog number is issued to specify a complete T-PAK® thermocouple probe:

K - 250 - 316 - S - 0036.0 - A - 965 - ZT4 - 0000



Example: The above catalog number identifies a type K thermocouple probe, with a .250" OD 316 stainless steel sheath, a single element 36" long with grounded junction, a heavy duty cast iron screw cover head, a 1/2" X 1/2" stainless steel spring-loaded bushing and a brass compression fitting (1/4" NPT) with teflon seal.

Many variations are available on **T-PAK®** elements and assemblies which are not covered in this sheet. Among them are multiple probe (bundle), coiled, bent/angled type and superheater, pad-type thermocouples. Post assembly certified traceable calibration, is available upon request. Consult the factory for further information and part numbers.

RESISTANCE DATA

Thermo Element	RESISTIVITY OF THERMO ELEMENTS (Ω-CM/ft)						
	0°C	20°C	50°C	100°C	200°C	400°C	600°C
JP	51.5	58.2	68.2	85.0	126	243	404
JN	294	294	294	294	293	293	300
KP	421	425	430	438	459	501	526
KN	169	177	189	209	241	276	307
NP	575	580	583	586	592	621	626
NN	206	220	228	235	249	279	306
TP	9.38	10.4	11.5	13.5	17.4	25.7	34.6
TN	294	294	294	294	293	293	300
EP	421	425	430	438	459	501	526
EN	294	294	294	294	293	293	300

Loop Resistance = $\frac{\text{Resistivity } (\Omega\text{-CM/ft}) \times \text{Length (ft)}}{\text{Cross-sectional Area (Circular Mils)}}$

Example: 200 ft of .063 type K at 50°C (Wire Diam = 0.011")

$$R = \frac{(430 + 189) \times 200}{(0.011 \times 1000)^2} = 1023\Omega$$

PHYSICAL PROPERTIES (Nominal)

SHEATH DIAMETER	SIMPLEX			DUPLEX		
	COND DIAM	SHEATH WALL	WEIGHT	COND DIAM	SHEATH WALL	WEIGHT
.040	.007	.006	4	-	-	-
.063	.011	.008	9	.009	.009	10
.125	.020	.014	34	.019	.019	38
.188	.029	.022	77	.029	.029	86
.250	.039	.029	130	.038	.039	139
.313	.048	.036	200	.048	.049	233
.375	.057	.045	320	.057	.058	335
.500	.077	.064	510	.076	.064	580
.625	.097	.080	565	.092	.080	644
.750	.116	.096	670	.110	.096	763

Dimensions are in inches; weight in #/mft

MgO CHEMISTRY

ELEMENT	INSULATION PURITY	
	STANDARD	HIGH*
MgO (%)	96.3-97.3	99.5-99.7
SiO ₂ (%)	1.45-2.06	.04-.14
CaO (%)	.73-1.25	.14-.21
Fe ₂ O ₃ (%)	.16-.30	.03-.10
Al ₂ O ₃ (%)	.06-.30	.03-.08
B (ppm)	85-1000	10-20
Cd (ppm)	< 10	< 10
S (ppm)	< 50	< 50
C (ppm)	< 200	< 200

*Conforms to ASTM E585-76 & E234-76

High Purity should be used in applications above 1000°C (1830°F)

SHEATH CHEMISTRY (%)

SHEATH	Ni	Cr	Si	Mn	C	Fe
304L	10	19	1	2	0.03	
310S	20	25	1.5	2	0.08	
316L	12	17	1	2	0.03	
321	10	18	1	2	0.08	
446	0.2	25	1	1.5	0.2	74
600	76	16	0.5	1	0.1	
PYD	72	22	1.4	0.2	0.05	

Insulation Resistance: >200MΩ/1000 ft @ 500 VDC

1. CALIBRATION CODE

CODE	RECOMMENDED TEMP. RANGE	APPLICATION INFORMATION
J	0 to 760° C (32 to 1400°F)	Suitable for vacuum, reducing or inert atmosphere; oxidizing atmospheres with reduced life. Iron oxidizes rapidly about 540°C (1000°F) so only heavy gauge wire is recommended for high temperature. Bare elements should not be exposed to sulphurous atmospheres above 540°C (1000°F). Unprotected iron wire may be attacked by ammonia, nitrogen or hydrogen atmospheres. When used above 760°C (1400F), will lose accuracy when recycled to lower temperature. Unstable below 0°C (32°F).
K	0 to 1250°C (32 to 2280°F)	Recommended for continuous oxidizing or neutral atmospheres. Should not be used in reducing atmospheres or vacuum. Mostly used above 540°C (1000°F). Calibration shifts occur when operating in the range 370-540° (700-1000°F). Subject to failure if exposed to sulphur. Must be protected from marginally oxidizing atmospheres. Preferential oxidation of chromium in positive leg at certain low oxygen concentrations causes "green rot" and large negative calibration drifts; most serious in the 820-1040°C (1500-1900°F) range. Ventilation or inert sealing of the protection tube can prevent this.
T	-185 to 400°X (-300 to 750°F)	Usable in oxidizing, reducing or inert atmospheres as well as vacuum. Not subject to corrosion in moist atmospheres. Limit of error published for sub-zero temperature ranges. Traditionally used for low temperature applications. Copper oxidizes about 370°C (700°F).
N	0 to 1260°C (32 to 2300°F)	Suitable for use in oxidizing, inert or dry reducing atmospheres. Can be used in applications where type K elements have shorter life and stability problems due to oxidation and the development of "green rot". Must be protected from sulphurous atmospheres. Provides higher stability than K about 1000°C (1800°F).
E	0 to 1000°C (32 to 1830°F)	Recommended for continuously oxidizing or inert atmospheres. Highest thermoelectric output of common calibrations. Not subject to corrosion at sub-zero temperatures. Can be used for short periods time in vacuum. Must be protected from sulphurous or marginally oxidizing atmospheres. Subject to "green rot". Extended usage at high temperature causes chromium to vaporize altering calibration.
O	0 to 1290°C (32 -2280°F)	Enhanced type K which minimizes some of the problems encountered with standard type K

2. SHEATH MATERIAL CODE

CODE	SHEATH MATERIAL	MELTING TEMP.	CONTINUOUS MAX. TEMP.	APPLICATIONS NOTES
304	304L	1400°C (2550°F)	900°C (1650°F)	Good resistance to corrosion and oxidation. Lowest cost sheath.
310	310S	1400°C (2550°F)	1150°C (2100°F)	High temperature strength and scale resistance. Good resistance to carburizing and reducing environments. Withstands sulphurous gas at elevated temperatures.
316	316L	1370°C (2550°F)	925°C (1700°F)	Good corrosion resistance and creep strength at elevated temperatures. Resists tendency to pit in phosphoric and acetic acids. Withstands sulphuric acid compounds.
321	321	1400°C (2550°F)	870°C (1600°F)	Excellent scale and corrosion resistance at high temperature. Suitable for oxidizing, sulphurous and reducing atmospheres.
345	347	1425°C (2600°F)	870°C (1600°F)	High corrosion resistance. Excellent for heating and cooling applications between 425°C & 875°C (800 to 1600°F)
446	446	1480°C (2700°F)	1100°C (2000°F)	Good high temperature oxidation resistance. Resists attack by sulphur gas. Good in oxidizing and reducing atmospheres.
600	Inconel 600	1400°C (2550°F)	1150°C (2100°F)	High corrosion resistance at elevated temperatures. High hot strength. Used in sulphur-free environments. Resists oxidizing and reducing atmospheres.
825	825	1370°C (2500°F)	1000°C (1830°F)	Excellent resistance to a wide variety of corrosives. Resists pitting and intergranular corrosion.
PYD	Pyrosil D	1380°C (2510°F)	1250°C (2280°F)	Superior oxidation resistance and high temperature strength. Used in sulphur-free environments. Exceeds industrial demands for use at high temperatures for prolonged periods.

3: SHEATH DIAMETER CODE

CODE	040	063	125	188	250	313	375	500	625	750
SIMPLEX	.04"	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
DUPLEX	-	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	-	-

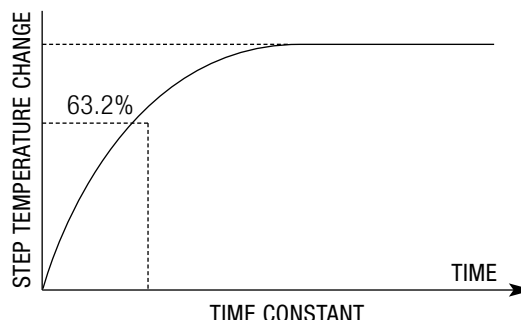
TIME CONSTANT

Time constant, or thermal response time, is an indication of how fast a sensor responds to temperature changes. Time response is defined as the time it takes the sensor to reach 63.2% of a step temperature change. It will take about 5 times constants to obtain steady state readings.

Response is a function of the mass of the sensor, and its efficiency in transferring heat from its outer surface to the wire sensing element. A rapid response is essential for accuracy in a system with fast temperature changes. Time response varies with the probe's physical size and design.

When used with a thermowell, the best response time is achieved when the thermocouple probe is spring loaded to maintain the measuring junction in intimate contact with the well tip.

The response times indicated below are representative of standard industrial probes.



COMPARATIVE RESPONSE DATA

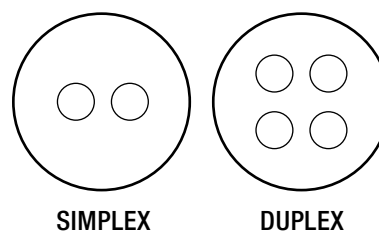
SHEATH SIZE	GROUNDED JCT		INSULATED JCT		EXPOSED JCT	
	WATER	AIR	WATER	AIR	WATER	AIR
.313	5.5	55	16	150	.5	5.0
.250	4.0	34	10	120	.3	2.5
.188	2.5	26	5	75	.2	2.0
.125	1.5	14	3	28	.1	1.0
.063	0.5	5	1	10	.05	0.5
.040	0.3	2.5	0.6	5	.01	0.05

No of Time Constants	% Change
0.1	10.0%
1.0	63.2%
2.3	90.0%
4.6	99.0%
6.9	99.9%

Time in seconds (per ASTM). Air flow: 60 ft/sec. Water flow: 5 ft/sec

4: FORM CODE

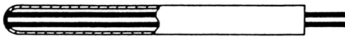
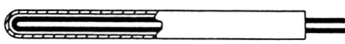

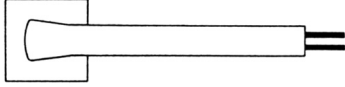
CODE		INSULATION PURITY	LIMITS OF ERROR
SPLX	DPLX		
S	D	Standard	Standard
R	E	Standard	Special
Q	F	High	Standard
P	G	High	Special



High purity & special limits of error not available for sizes larger than .375"

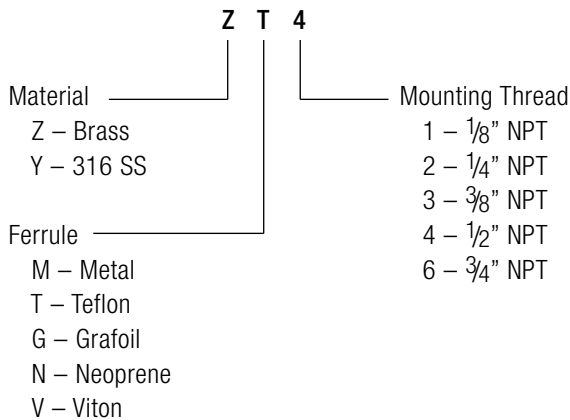
5: LENGTH Specify probe "X" length to 0.1"

6: JUNCTION CODE

JUNCTION	CODE	DESCRIPTION
	A	GROUNDING JUNCTION The junction is welded directly to the sheath.
	B	INSULATED JUNCTION The junction is insulated from the sheath. Duplex junctions are also insulated from each other:
	K	INSULATED COMMON JUNCTIONS Duplex junctions are welded together, but are insulated from the sheath.
	C	EXPOSED JUNCTION The junction is formed beyond the end of the sheath.
	E	WELD PAD with GROUNDING JUNCTION The junction is grounded to the sheath which is welded to a 1" x 1" x 1/8" 316 S.S pad.
	H	WELD PAD with INSULATED JUNCTION The junction is insulated from the sheath with is welded to a 1" x 1" x 1/8" 316 S.S pad.
	M	Same as "E" except weld pad is same alloy as sheath.
	N	Same as "H" except weld pad is same alloy as sheath.

NOTES: Standard weld pad construction is T/C parallel to pad. If pad is to be curved specify tube diameter.

8: COMPRESSION FITTING CODE



SEAL MATERIAL GUIDE

CODE	Sealant	Temp Rating	Press Rating
T	Teflon	-175° to 260°C	Vac to 5,000 psi
G	Grafoil	-200° to 3000°C*	0 to 3,000 psi
L	Lava	-175° to 1000°C	0 to 7,500 psi
N	Neoprene	-40° to 200°C	Vac to 10,000 psi
V	Viton	-10° to 260° C	Vac to 10,000 psi

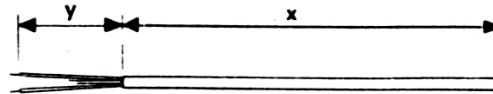
* for reducing atm (450°C max if oxidizing)

Shth Size	COMPATIBILITY CHART				
	Mounting Thread Code				
	1	2	3	4	6
063	X				
125	X	X			
188	X	X			
250	X	X	X		
313		X			
375		X	X	X	
500				X	X

7: TERMINATION CODE

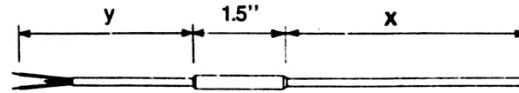
Exposed leadwire

Sheath sizes: .125-.750
Specify "Y" length (Standard = 2")



Potting Adapter with flexible leadwire

(20 ga for single; 24 ga for duplex)
Sheath sizes: .040 - .750
Specify "Y" length (Standard = 3ft.)



LEADWIRE INSULATION	OPTIONS	LEADS ONLY*	PLUG	JACK	MINI PLUG	MINI JACK
Fiberglass (475°C)	None	10N	11N	13N	15N	17N
	Relief Spring	10R	11R	13R	15R	17R
	Overbraid	10S	11S	13S	15S	17S
	O/B + Relief Spring	10Q	11Q	13Q	15Q	17Q
	Armour **	10X	11X	13X	15X	17X
	Armour + PVC Jacket**	10Y	11Y	13Y	15Y	17Y
PVC (100°C)	None	40N	41N	43N	45N	47N
	Relief Spring	40R	41R	43R	45R	47R
	Overbraid	40S	41S	43S	45S	47S
	O/B Relief Spring	40Q	41Q	43Q	45Q	47Q
Teflon (200°C)	None	70N	71N	73N	75N	77N
	Relief Spring	70R	71R	73R	75R	77R
	Overbraid	70S	71S	73S	75S	77S
	O/B + Relief Spring	70Q	71Q	73Q	75Q	77Q
	Armour**	70X	71X	73X	75X	77X
	Armour + PVC Jacket**	70Y	71Y	73Y	75Y	77Y

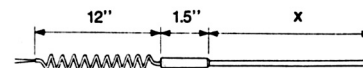
*Solid leads are standard; for stranded, change 1 to 2, 4 to 5 or 7 to 8.

** Single conductor stranded used in armour (in lieu of duplex solid).

For high temperature plugs/jacks (Fiberglass leadwire only), change 2nd digit from "1,3,5,7" to "A,C,E,G"

Retractable Cable 100°C PVC jacket
12" coiled, extends to 60"

Sheath sizes: .063-.375
Duplex not available

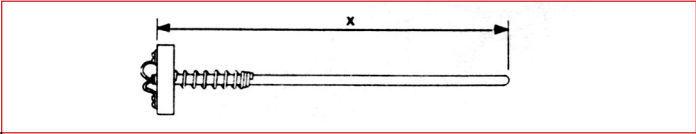


END OF CABLE TERMINATION	CODE
Stripped Leads	210
Plug	220
Jack	221
Mini plug	225
Mini jack	226

7: TERMINATION CODE (cont'd)

Spring-loaded, Captive T/B

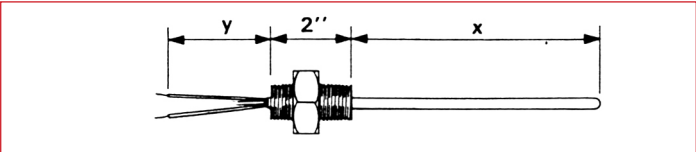
Replacement element for T-PAK Assemblies (pages 14 & 15)
Sheath sizes: .188 & .250 only



FOR USE WITH HEAD P/N	CODE	"X" Length
14-0008/14-0022	250	A + N + 2.25"
14-0304/7, 14-0804/7	260	A + N + 2"
14-1080A/S, 1086	270	A + N + 1.75"
14-0007	280	A + N + 2.25"
14-0067/94	290	A + N + 1.75"

Mounting Adapter

1/2" X 1/2" NPT SS
Specify "Y" length (Standard = 3")

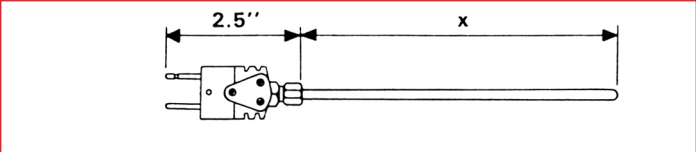


PROBE ATTACHMENT TO ADAPTER	CODE	SHEATH SIZE
Probe Welded to adapter	310	.125 to .375
Fixed Compression Adapter	312	.250
Adjustable Compression Adapter	313	.250
Spring-loaded	320	.188 & .250
Spring-loaded, O-Ring Seal*	330	.188 & .250

Notes: If used with a Thermowell:
X = A - 1/2" (for fixed probes)
X = A (for spring-loaded probes)
A = bore length of thermowells

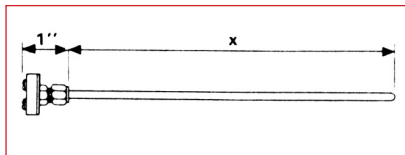
* O-Ring seal rated 500 psig at 260°C

2- Pole Connectors Plug or Jack



TYPE	PLUG	JACK
Standard (200°C)	410	411
Standard HiTemp (425°C)	450	451
Mini (200°C)	430	431
Mini HiTemp (425°C)	470	471

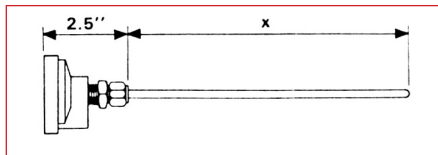
Notes: 1. Sizes: Standard: .063-.375
Mini: .040-.063



Open-type Micro Connector Block

200°C	425°C
510	520

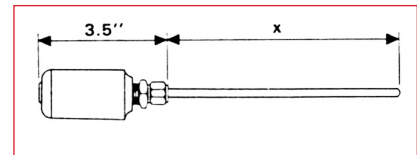
Sizes: .063-.250



Miniature Plastic Weatherproof Head

Material	200°C	425°C
Brass C.F.	550	560
S/S C.F	555	565

Sizes: .063-.313



Miniature Aluminum Screw Cover Head

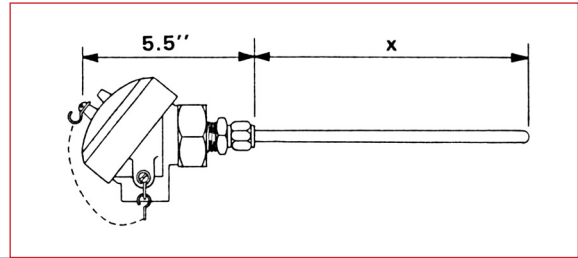
Brass C.F	610
S/S C/F	620

Sizes: .063-.375

7: TERMINATION CODE (cont'd)

Screw Cover Terminal Head

Mounted to probe with compression fitting



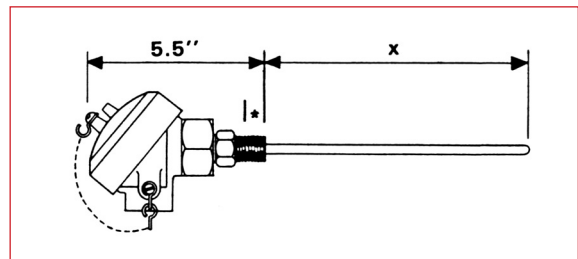
HEAD					COMPRESSION FITTING	
Style	Material	Type* ²	Haz Loc* ³	Fig	Brass	Stainless
General Purpose	Aluminum	4	--	1	710	720
	Cast Iron	4	--	1	750	760
	CI/Al Cap* ¹	--	C D	1	755	765
	Stainless	4X	--	3	---	785
Heavy Duty	Aluminum	4	B C D	4	735	745
	Cast Iron	--	--	2	770	780
	Stainless	4X	B C D	4	---	786

Notes: Sheath sizes: 063 to .500

Screw Cover Terminal Head

1/2" X 1/2" NPT SS Mounting Adapter

Fixed probe



HEAD					COMPRESSION ADAPTER	
Style	Material	Type* ²	Haz Loc * ³	Fig	WELDED	ADAPTER
General Purpose	Aluminum	4	--	1	810	812
	Cast Iron	4	--	1	910	912
	CI/Al Cap* ¹	--	C D	1	913	915
	Stainless	4X	--	3	891	896
Heavy Duty	Aluminum	4	B C D	4	691	696
	Cast Iron	--	--	2	950	952
	Stainless	4X	B C D	4	791	796

Notes:

Sheath Sizes: .063 to .375 for Welded
.250 only for Compression Adapter

* Thread Engagement .35" for 1/2" NPT

*¹ Cast Iron body, Aluminum cap.

*² CSA or Nema type.

*³ Heads meet requirements for Class I Div 1 & 2 (Class I Zone 1 & 2).

For Explosion Proof assemblies, refer to T-PAK® Thermocouple Assemblies starting on page 12.

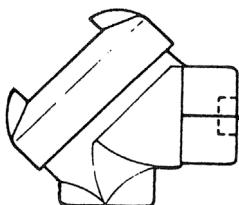


Fig. 1

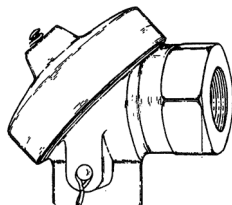


Fig. 2

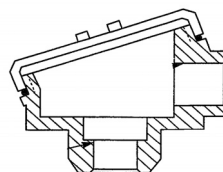


Fig. 3

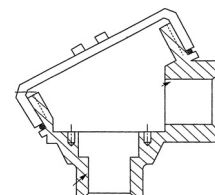


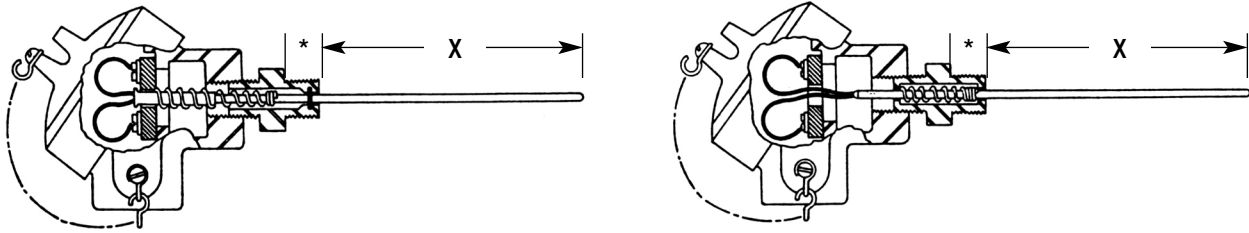
Fig. 4

7: TERMINATION CODE (cont'd)

Screw Cover Terminal Head

1/2" X 1/2" NPT SS Mounting Adapter

Spring-Loaded Probe



Style	Material	HEAD			CAPTIVE T/B		SPRG-LOADED ADAPTER	
		Type* ²	Haz Loc* ³	Fig	Std	O-Ring	Std	O-Ring
General Purpose	Aluminum	4	--	1	820	830	825	835
	Cast Iron	4	--	1	920	930	925	935
	CI/Al Cap* ¹	--	C D	1	940	942	941	943
	Stainless	4	--	3	892	893	894	895
Heavy Duty	Aluminum	4	B C D	4	692	693	694	695
	Cast Iron	--	--	2	960	970	965	975
	Stainless	4	B C D	4	792	793	794	795

Note: If used with a thermowell, X = A (bore length of thermowell)

* Thread Engagement .35" for 1/2" NPT

Sheath Size: .188 & .250 only

*¹ Cast Iron body, Aluminum cap.

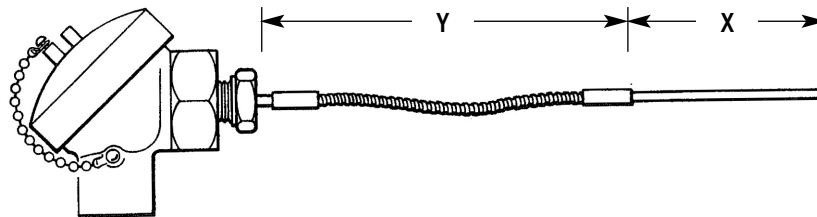
*² CSA or Nema type.

*³ Meets Class I Div 2 Group C.D.

Division 2 (Zone 2) Assemblies

Remote Mounted Head

Flexible Armour **



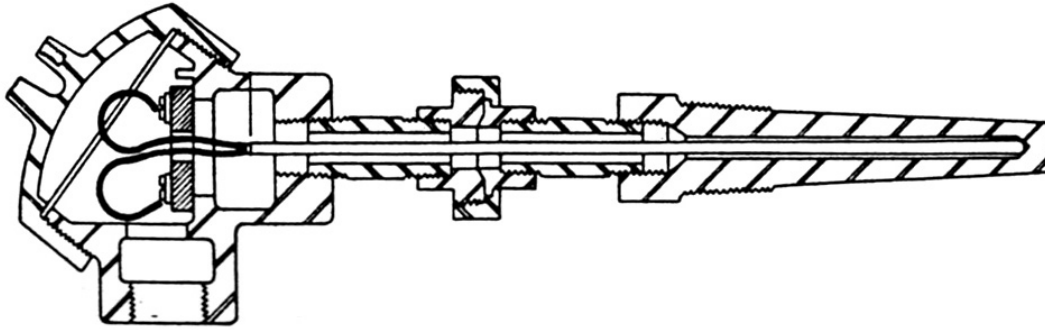
Style	Material	HEAD			TRANSMITTER	CLASS I * ³	CLASS II * ⁴
		Type* ²	Fig	Fig			
General Purpose	CI/Al Cap* ¹	--	1		None	99B	98B
	Stainless	4X	1		None	99A	98A
Heavy Duty	Aluminum	4	4		None	99E	98E
			4		IPAQ-H	99G	98G
			4		TK381	99T	98T
	Stainless	4X	4		None	99F	98F
			4		IPAQ-H	99H	98H
			4		TK381	99U	98U

*¹ Cast Iron body, Aluminum cap.

*² CSA or Nema type.

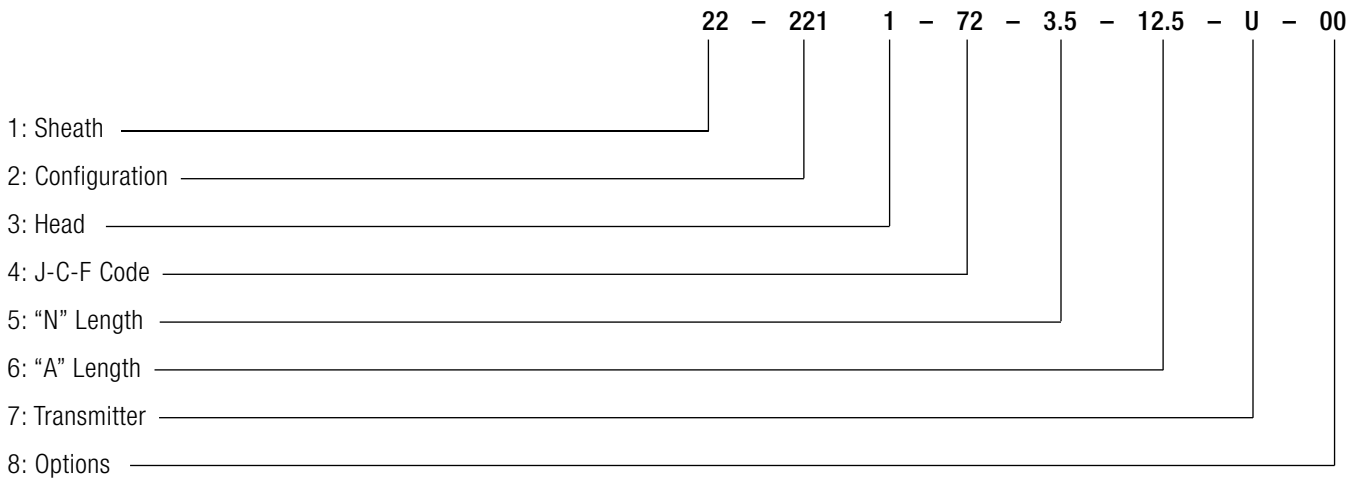
*³ Meets Class I Div 2 Group C.D.

*⁴ Meets Class I Div 2 Group C.D.; Class II Div 2 Group E, F, G.



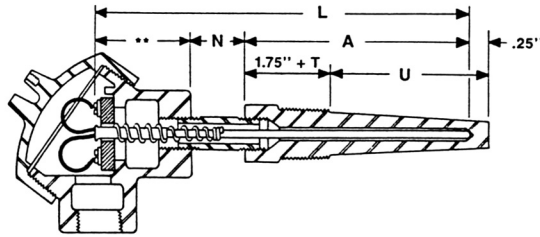
ORDERING INFORMATION

An 8-part catalog number is used to specify a complete T-PAK® thermocouple assembly:



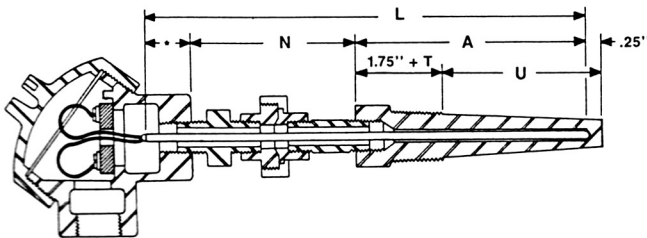
Example: The above catalog number specifies a 316 stainless steel .25" OD probe, spring-loaded captive terminal block mounting assembly with NUN extension hardware, 1/2" NPT galvanized steel fittings, a general purpose aluminum head, and a type T duplex element with insulated junction; "N" length = 3.5" and "A" length = 12.5"; a TK381 transmitter, no options.

N or N-U-N Extension

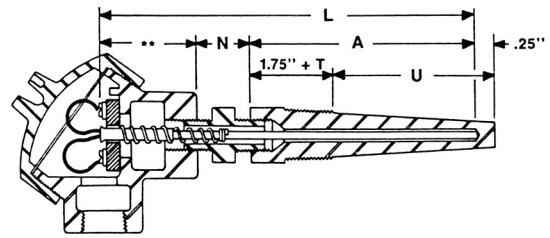


Type 2 Mounting Arrangement

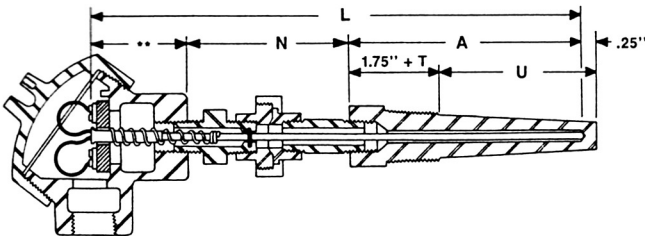
B or B-U-N Extension



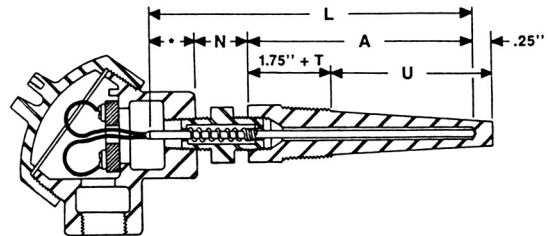
Type 1 Mounting Arrangement



Type 2 Mounting Arrangement



Type 3 Mounting Arrangement



Type 4 Mounting Arrangement

**2.0" for HD Head
1.75" for GP Head

Thread Engagement
.35" for 1/2" NPT

*1.0" for HD Head
0.5" for GP Head

"N" DIMENSION

The "N" dimension is the overall hardware length between the head and the thermowell.

"U" DIMENSION

The "U" dimension is the thermowell insertion length below the thread which is exposed to the process.

"A" DIMENSION

The "A" dimension is the probe immersion length into the cavity of the thermowell.

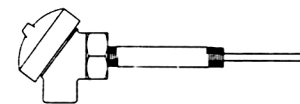
"L" LENGTH

The "L" length is the overall length of the probe. For spring loaded assemblies, an extra .25" is added to ensure contact with the bottom of the thermowell.

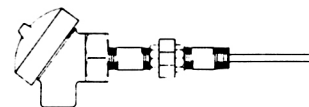
1. SHEATH CODE

MATERIAL	CODE
304 SS	1
316 SS	2
INC 600	3
310 SS	4
Pyrosil D	7

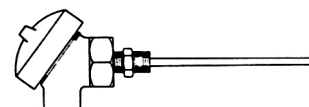
DIAMETER	CODE
.188" OD	1
.250" OD	2



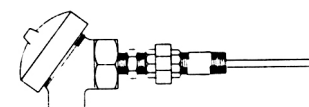
1: Type N



2: Type NUN



3: Type B



4: Type BUN

2. CONFIGURATION CODE

MOUNTING	CODE
General Purpose (B, BUN only)*	1
Spring-Loaded, Captive T/B	2
Sprg-LD Capt T/B, O-Ring Seal	3
Spring-Loaded Adapter	4
Sprg-Ld Adapter, O-Ring Seal	5
Compression Adapter	7

EXTENSION	CODE
Nipple	1
Nipple-Union-Nipple	2
Bushing	3
Bushing-Union-Nipple	4

SIZE/MAT'L	CODE
1/2" NPT, Galvanized	1
1/2" NPT, Stainless	2

* Probe welded to bushing

3. HEAD CODE

Type	Material	Type* ²	Haz Loc* ³	Part No.	Fig.	Tx* ⁴	CODE
General Purpose	Aluminum	4	--	14-0304	1	Y	1
	Cast Iron	4	--	14-0307	1	N	2
	Cl/Alum Cap* ¹	--	C D	14-0807	1	N	B
	Stainless	4X	--	14-1086S	3	Y	W
Heavy Duty	Cast Iron	--	--	14-0007	2	N	4
	Aluminum	4	B C D	14-1080A	4	Y	U
	Stainless	4X	B C D	14-1080S	4	Y	V
DIN	Nylon	IP65 * ⁵	--	14-0067	5	Y	F
	Aluminum	IP67 * ⁵	--	14-0094	5	Y	H

*¹ Cast Iron body, Aluminum cap.

*² CSA or Nema type.

*³ Heads meet requirements of Class I Div 1 & 2 Group CD (or BCD), Class II Div 1 & 2, Group EFG and Class II.

*⁴ Transmitter compatible

*⁵ IEC approval

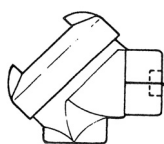


Fig. 1

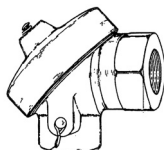


Fig. 2

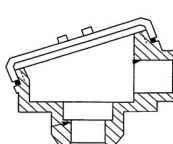


Fig. 3

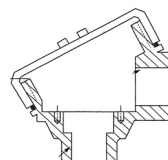


Fig. 4

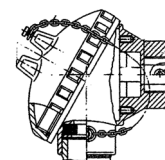


Fig. 5

4: JCF CODE

JUNCTION	FORM	CALIBRATION					
		J	K	T	E	N	O
Grounded	Simplex	11	21	31	41	01	24
	Duplex	12	22	32	42	02	25
Insulated	Simplex	51	61	71	81	91	27
	Duplex, Sep*	52	62	72	82	92	28
	Duplex, Com	55	65	75	85	95	68

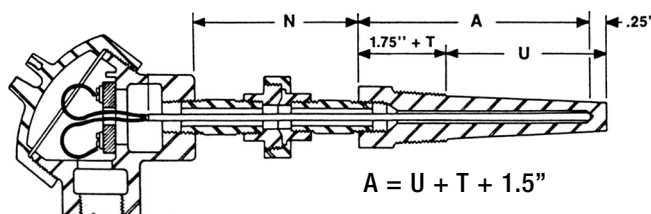
* Separate duplex junctions are insulated from each other as well as from the sheath.

5: "N" LENGTH

Specify "N" length to 0.1"

6: "A" LENGTH

Specify "A" length to 0.1"



7: TRANSMITTER CODE

TRANSMITTER	CODE
None	O
IPAQ-H	A
STT173	M
TK381	U



TK model 381 shown.

8: OPTION CODE

DESCRIPTION	CODE
None	00
CSA Type 1 Electrical Approval (Fig 1 & 2 only – Codes 1, 2, 3, 4)	CS
Assembled to Thermowell (Ordered separately)	TW
CSA Hazardous Location Approval for selected configurations only (Class I, Group B,C & D)	EX

OPERATING RANGE

TC TYPE	RECOMMENDED MAX TEMP (°C)								
	.063	.125	.188	.250	.313	.375	.500	.625	.750
J	500	600	600	700	700	700	750	750	750
K	900	1000	1000	1100	1100	1100	1200	1200	1200
N	900	1000	1000	1100	1100	1100	1200	1250	1250
T	200	300	300	370	370	370	370	370	370
E	700	700	800	1000	1000	1000	1000	1000	1000

INITIAL CALIBRATION TOLERANCES

TC TYPE	TEMPERATURE RANGE		TOLERANCES*	
	°C	°F	STANDARD	SPECIAL
J	0 to 750°C	32 to 1400°F	± .75% or 2.2°C (4°F)	± .4% or 1.1°C (2°F)
K	0 to 1250°C -200 to 0°C	32 to 2300°F -330 to 32°F	± .75% or 2.2°C (4°F) ± 2% or 2.2°C (4°F)	± .4% or 1.1°C (2°F) **
N	0 to 1260°C	32 to 2300°F	± .75% or 2.2°C (4°F)	± .4% or 1.1°C (2°F)
T	0 to 350°C -200 to 0°C	32 to 700°F -330 to 32°F	± .75% or 1°C (1.8°F) ± 1.5% or 1°C (1.8°F)	± .4% or .5°C (.9°F) ± .8% or .5°C (.9°F)***
E	0 to 900°C -200 to 0°C	32 to 1600°F -330 to 32°F	± .5% or 1.7°C (3°F) ± 1% or 1.7°C (3°F)	± .4% or 1°C (1.8°F) ± .5% or 1°C (1.8°F)***

* Percent or fixed error, whichever is greater.
 ** Special tolerances below 0°C for type K are not available.
 *** Special tolerances below 0°C are listed as a guide only.

Notes: The tolerance in °F is equal 1.8 times the tolerance in °C. Percentage-based tolerances must first be calculated in °C then converted to °F. (Eg: Tolerance at 752°F: 400 (=°C) x 0.75% x 1.8 = 5.4°F)

Tolerances listed above are applicable only to new homogenous wire and used at temperatures not exceeding the recommended limits shown in the table above. If used at higher temperatures, these tolerances may not apply.

Thermocouple materials are normally supplied to meet the specified tolerances for temperatures above 0°C. The same materials may not fall within these tolerances for temperatures below 0°C. Wire required for use below 0°C should be ordered specifically for this application.

The magnitude of errors introduced by extension or compensating leadwire is equal to the algebraic difference of the deviations at its two ends.

Due to possible changes in homogeneity, recalibration of used thermocouple wire will likely yield irrelevant results. It is better to compare used thermocouples in-situ with a new or known good one to determine their suitability for further service.



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