



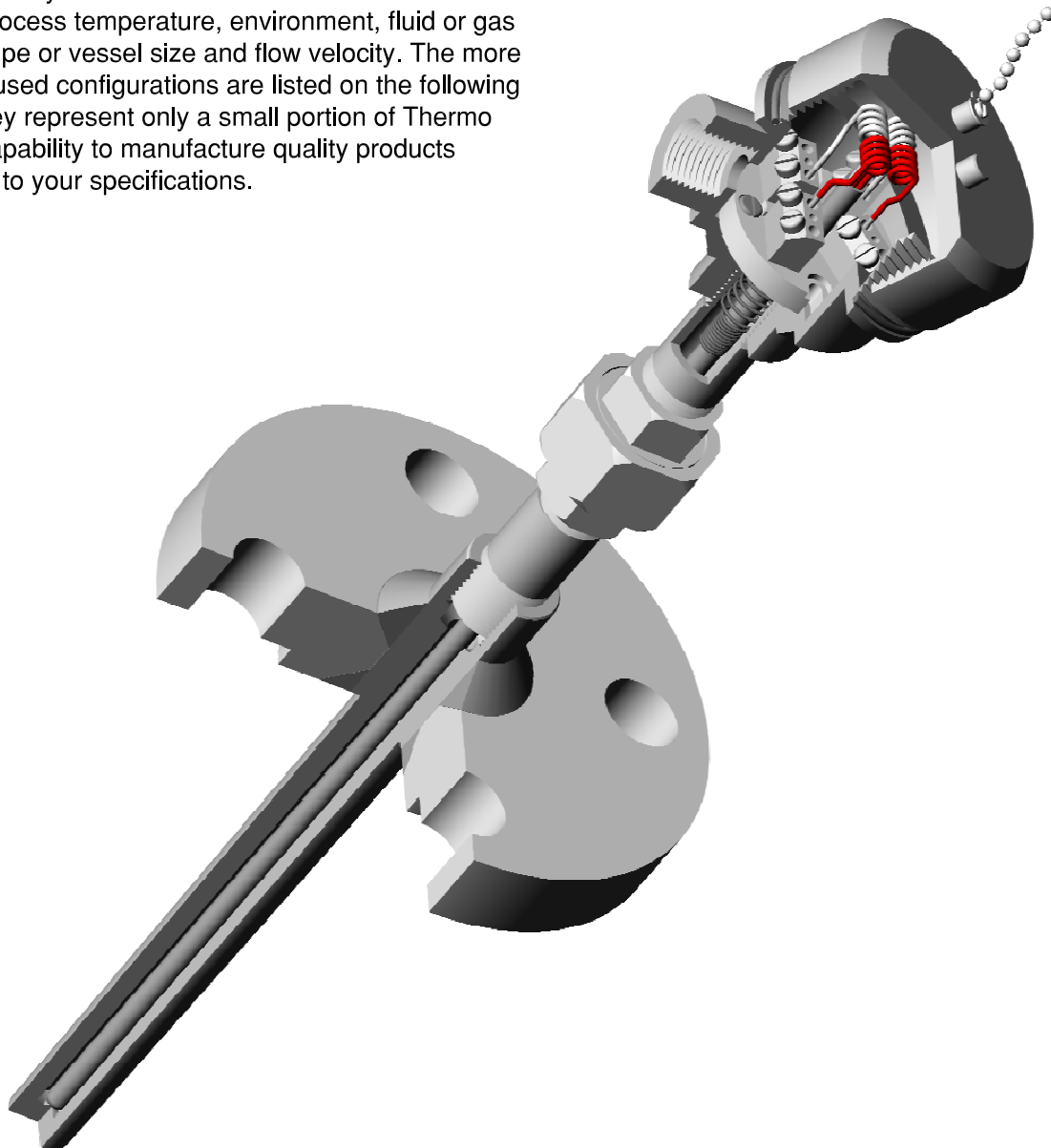
THERMO ELECTRIC

INDUSTRIAL THERMOCOUPLES

Section INTC

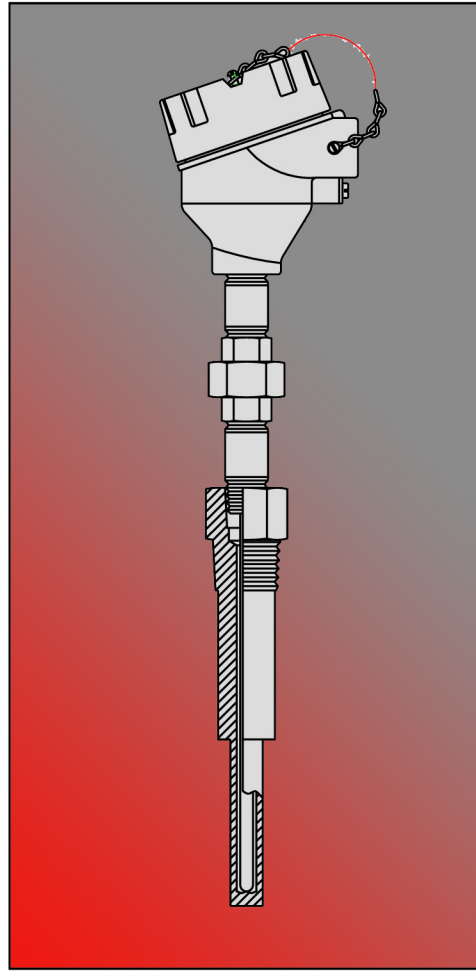
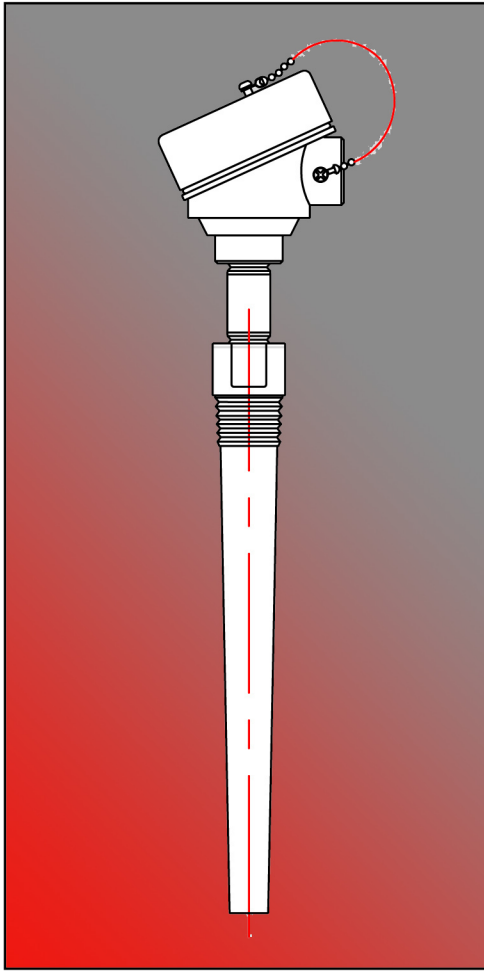
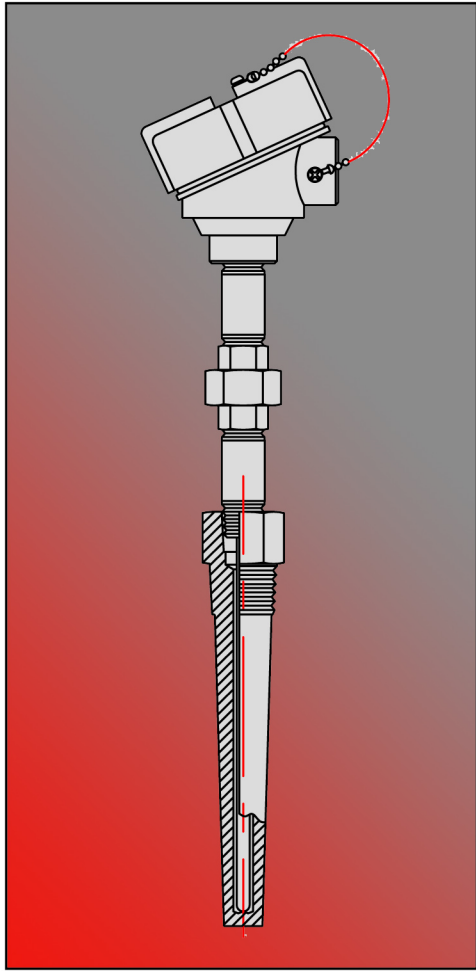
Industrial Thermocouple Assemblies

Industrial thermocouple assemblies are used in the process and power industries where thermocouples are installed in pipe lines or vessels. This type of assembly consists of three basic parts, the connection head, sensing element and thermowell or protection tube. Selecting the proper assembly involves consideration of several factors including process temperature, environment, fluid or gas pressure, pipe or vessel size and flow velocity. The more commonly used configurations are listed on the following pages. They represent only a small portion of Thermo Electric's capability to manufacture quality products conforming to your specifications.



Thermo Electric products offer the following advantages:
Complete in-house manufacturing and control of raw material.
Weatherproof, explosion proof, corrosion proof connection heads.
High temperature Platinum Assemblies with ceramic wells.
Long length pipe wells.
Assemblies manufactured to major oil, power company, and contractor specifications.

INDUSTRIAL THERMOCOUPLE ASSEMBLIES



**Drilled Threaded Bar Stock Well Assemblies
Tapered & Straight**

Process Connection - 3/4"NPT or 1"NPT
Well Material - 304 & 316 Stn. Stl. Carbon Steel, Brass
Calibration - J, K, T, E, N
Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

The most common type of well assembly style and size. Threaded well allows for insertion directly into process lines through pipe TEE's or Laterals. They can also be inserted into tanks with half couplings or threaded outlets. They are available with a straight shank for longer wear and tapered to limit flow restrictions or when velocity considerations must be taken into account.

Threaded Well Assemblies with Tapered Shank
See Document TE-CO010109-INTC-010
Threaded Well Assemblies with Straight Shank
See Document TE-CO010109-INTC-020

**Drilled Threaded Bar Stock Well Assemblies
Alloy Metals, Tapered**

Process Connection - 3/4"NPT or 1"NPT
Well Material - 310 & 446 Stn. Stl., Hastelloy C276, Monel 400, Inconel 600, F11, F22
Calibration - J, K, T, E, N
Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

Other environments, corrosive conditions or when additional strength is required. Bar stock wells can be fabricated in a number of austenitic, ferritic or martensitic stainless steels, nickel alloys, chrome-molys or other specialty metals. Wrench flats are machined into the neck for installation since these alloys are usually only available in round stock. Wells are available with standard tapered, straight or step down shanks.

Threaded Well Assemblies, Alloy Metals with Tapered Shank
See Document TE-CO010109-INTC-030

**Drilled Threaded Bar Stock Well Assemblies
Step Down**

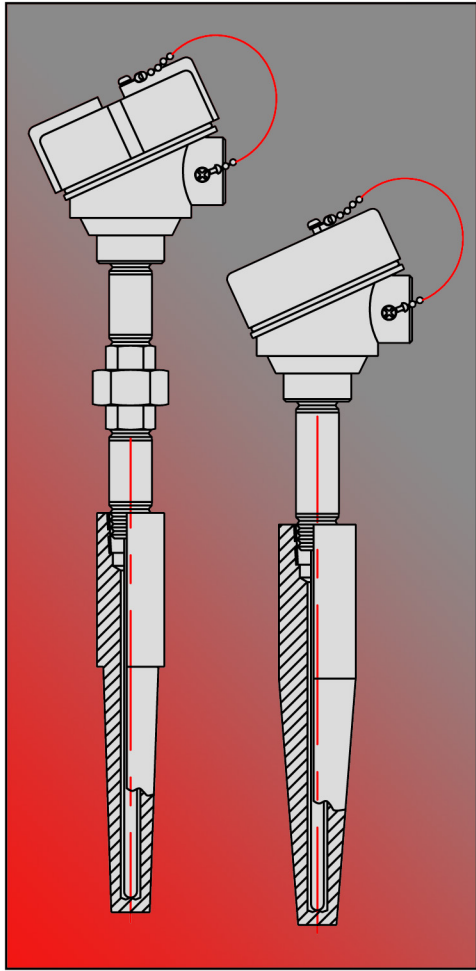
Process Connection - 3/4"NPT or 1"NPT
Well Material - 304 & 316 Stn. Stl. Carbon Steel, Brass
Calibration - J, K, T, E, N
Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

The stepped down shank construction provides a reduced wall thickness for the remaining 2 1/2" of well length. This design allows for improved response time of the thermocouple element. Wells 2 1/2" in length or less are supplied with the 1/2" diameter step for the entire shank length.

Threaded Well Assemblies with Stepped Down Shank
See Document TE-CO010109-INTC-040



INDUSTRIAL THERMOCOUPLE ASSEMBLIES

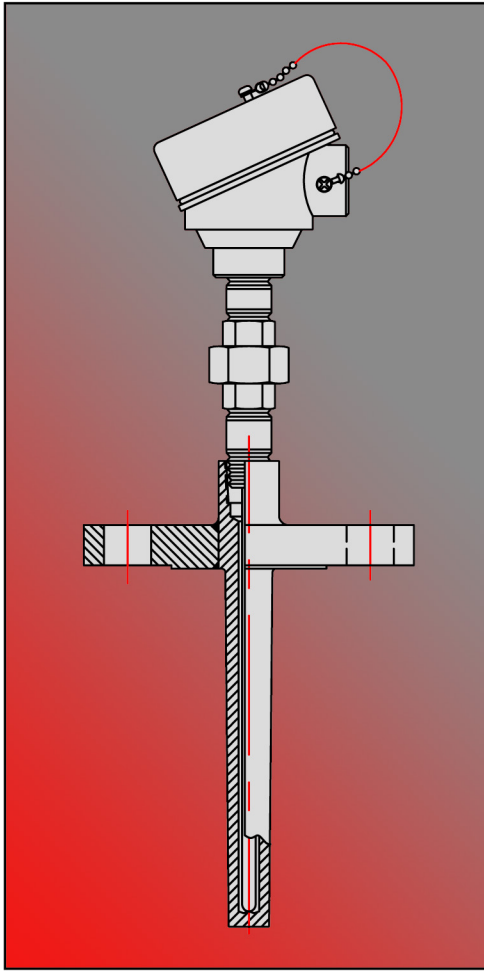


Drilled Socket & Weld-in Bar Stock Well Assemblies

Process Connection - 3/4"NPS or 1"NPS, 1.315 or 1.5
Weld-in
Well Material - 304 & 316 Stn. Stl. Carbon Steel,
Carbon Steel, Chrome-moly
Calibration - J, K, T, E, N
Connection Heads - Aluminum, Stainless Steel, Cast Iron
or Polypropylene
Head Certifications - NEMA-4, 4X, Explosion Proof FM,
CSA, ATEX

Socket and Weld-in bar stock wells are used in high temperature, high pressure service, most often steam. A regular product for the power industry where absolute leak proof permanent connections are mandatory. Socket wells are inserted into process lines through pipe TEE's or Laterals or on to branch lines with socket outlets. Weld-in wells are welded directly into heavy wall tanks.

Socket Well Assemblies
See Document TE-CO010109-INTC-050
Weld-in Well Assemblies
See Document TE-CO010109-INTC-060

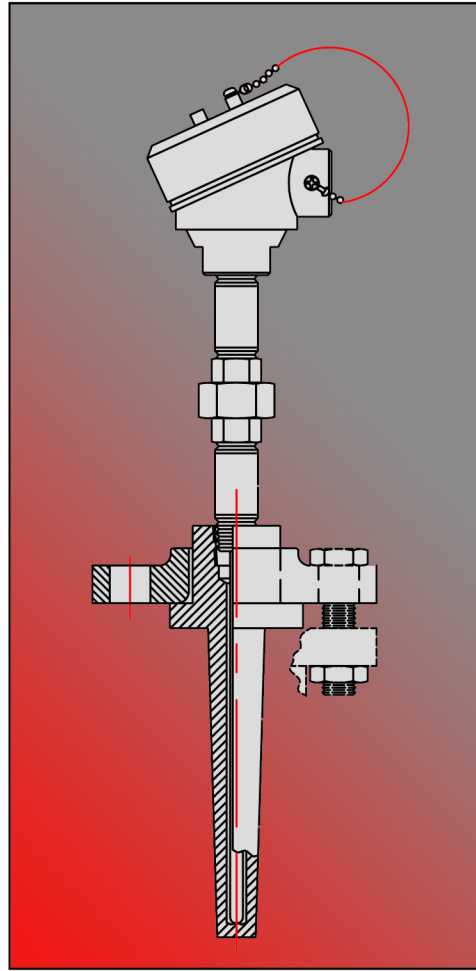


**Drilled Flanged Bar Stock Well Assemblies
Tapered, Straight, Stepped Down Shank**

Process Connection - Connects to Mating Flange
Well Material - All grades of Stainless Steel, Nickel
alloys, Hastelloy, Specialty metals
Calibration - J, K, T, E, N
Connection Heads - Aluminum, Stainless Steel, Cast Iron
or Polypropylene
Head Certifications - NEMA-4, 4X, Explosion Proof FM,
CSA, ATEX

Forged flanges in numerous sizes, ratings and facings mate to existing process flange connections in pipe lines or through welding neck flanges on reactors or tanks. These are available in raised face, flat face and ring joint connection. Flanges are welded to the bar stock stem on both sides. Optional full penetration welds are available for additional leak free protection.

Flange Well Assemblies with Tapered Shank
See Document TE-CO010109-INTC-070
Flange Well Assemblies with Straight Shank
See Document TE-CO010109-INTC-080
Flange Well Assemblies with Step Down Shank
See Document TE-CO010109-INTC-090



**Van Stone Well Assemblies
Tapered, Straight**

Process Connection - Connects to 1" or 1 1/2" Mating
Flange
Well Material - All grades of Stainless Steel, Nickel
alloys, Hastelloy, Specialty metals
Calibration - J, K, T, E, N
Connection Heads - Aluminum, Stainless Steel, Cast Iron
or Polypropylene
Head Certifications - NEMA-4, 4X, Explosion Proof FM,
CSA, ATEX

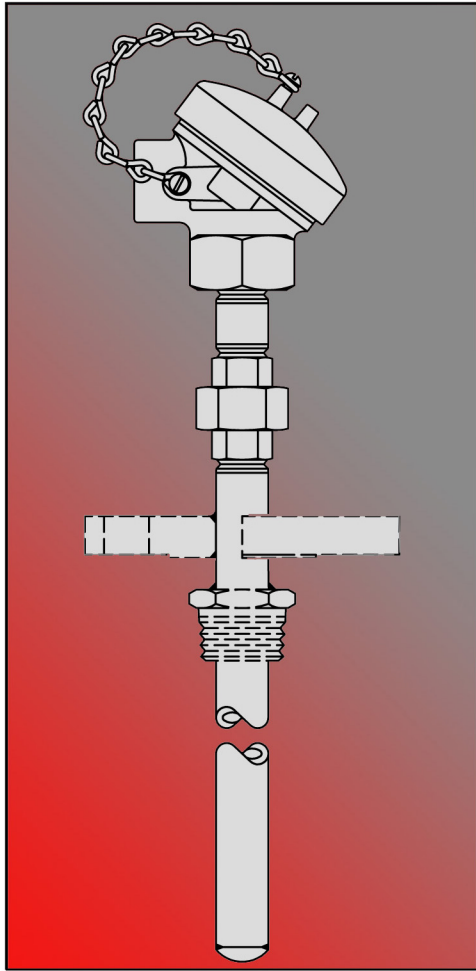
The Van Stone thermowell is machined from a single piece of bar stock with a neck the same as the face diameter of a 1" or 1 1/2" flange. This design allows for sandwiching of the van stone between the vessel process flange and a securing slip on flange. This design offers two advantages:

1. Any weld stress is eliminated.
2. The slip on flange not being exposed to the process conditions can be of a less expensive material.

Van Stone Well Assemblies with Tapered Shank
See Document TE-CO010109-INTC-100
Van Stone Well Assemblies with Straight Shank
See Document TE-CO010109-INTC-110



INDUSTRIAL THERMOCOUPLE ASSEMBLIES

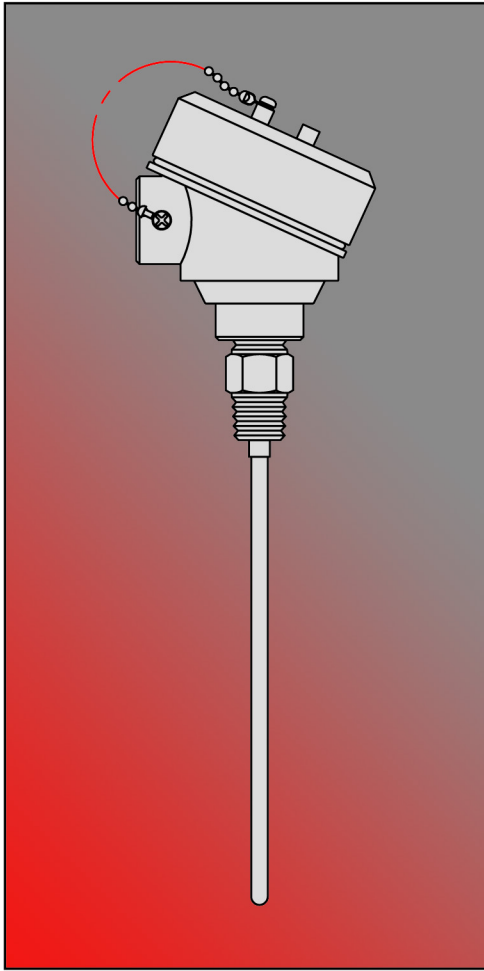


Pipe Well Assemblies
Plain, Threaded, Flanged

Process Connection - Welded, NPT Threaded or Flanged
 Pipe Material - All grades of Stainless Steel, Nickel alloys, Hastelloy, Specialty metals
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

A lower cost alternative to bar stock wells where pressure and velocities are low. Pipe wells are available in schedule 40, 80, 160 or XX strong, 1/4" to 1" pipe size. Plain wells can be welded directly into a tank or simply free hanging, threaded wells are supplied with a welded on NPT bushing for a threaded process connection, flanged pipe wells connect to a mating flange for a stronger connection. Pipe wells are commonly supplied in lengths up to 20 feet.

Pipe Well Assemblies, Plain
 See Document TE-CO010109-INTC-120
 Pipe Well Assemblies, Threaded
 See Document TE-CO010109-INTC-130
 Pipe Well Assemblies, Flanged
 See Document TE-CO010109-INTC-140

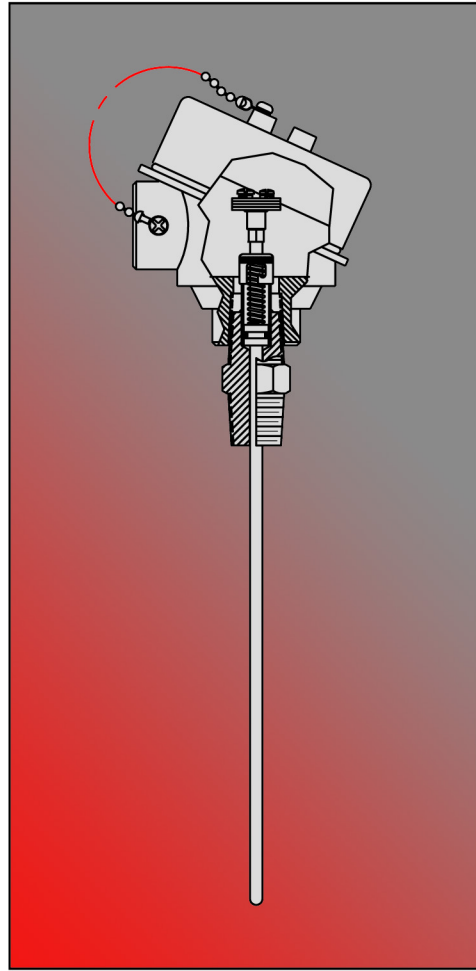


Ceramocouples®

Process Connection - 1/2"NPT Thread
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

CERAMOCOUPLES® are a cost effective alternative where the process doesn't require a thermowell or protection tube. Ceramocouples are available with the element sealed to a double ended fitting for a leak proof connection or spring loaded with the element captive to restrict side movement. Reducing bushings can be added for larger process openings.

Ceramocouples®
 See Document TE-CO010109-INTC-150



Oil Seal Thermocouples

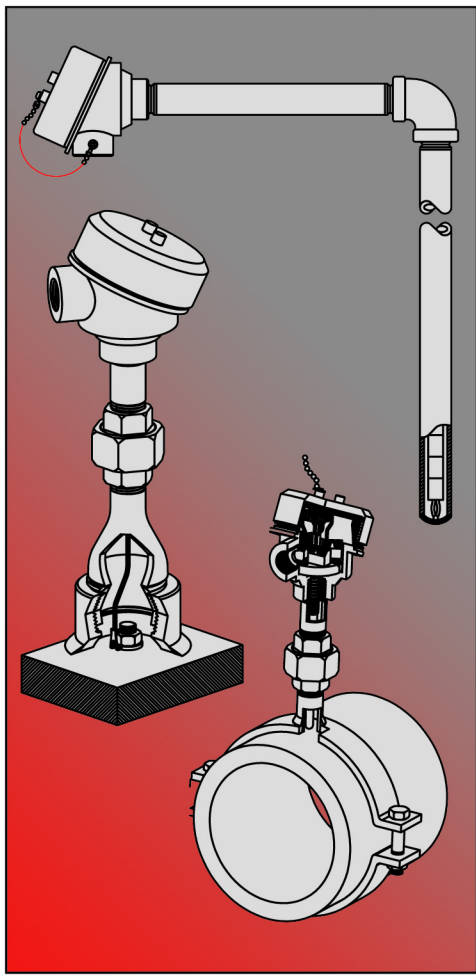
Process Connection - 1/2"NPT Thread
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

Oil seal thermocouples provide an efficient method of measuring bearing temperatures. An "O" ring designed into the assembly prevents the lubricating oil from entering the connection head. Oil seals are available with a floating collar and S head block or O-ring sealing fitting.

Oil Seal Thermocouples with Floating Collar
 See Document TE-CO010109-INTC-160
 Oil Seal Thermocouples
 See Document TE-CO010109-INTC-170



INDUSTRIAL THERMOCOUPLE ASSEMBLIES



Pipe Clamp, Gasket, Right Angle Assemblies

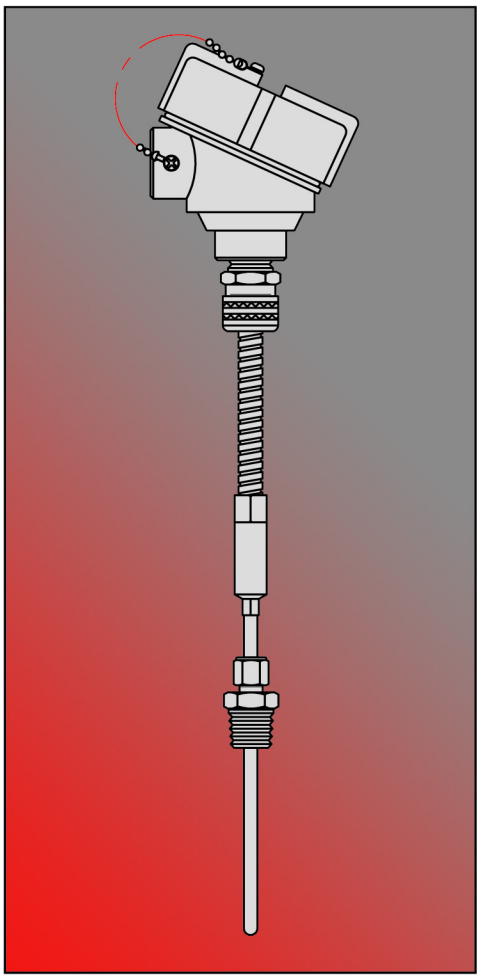
Process Connection - Surface Mounting or Tank Access
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

Industrial pipe clamp assemblies measures skin temperature on pipe. Can be mounted to process run pipes from 1/2" to over 48".

Industrial gasket assemblies are connected to a metal surface equipped with a stud and 1 1/2"NPT half coupling for a weather tight connection.

Right angle assemblies are for access to the top of tanks with the head extension to the side for a dropped down connection.

Industrial Pipe Clamp Assemblies
 See Document TE-CO010109-INTC-180
 Industrial Gasket Assemblies
 See Document TE-CO010109-INTC-190
 Right Angle Assemblies
 See Document TE-CO010109-INTC-200

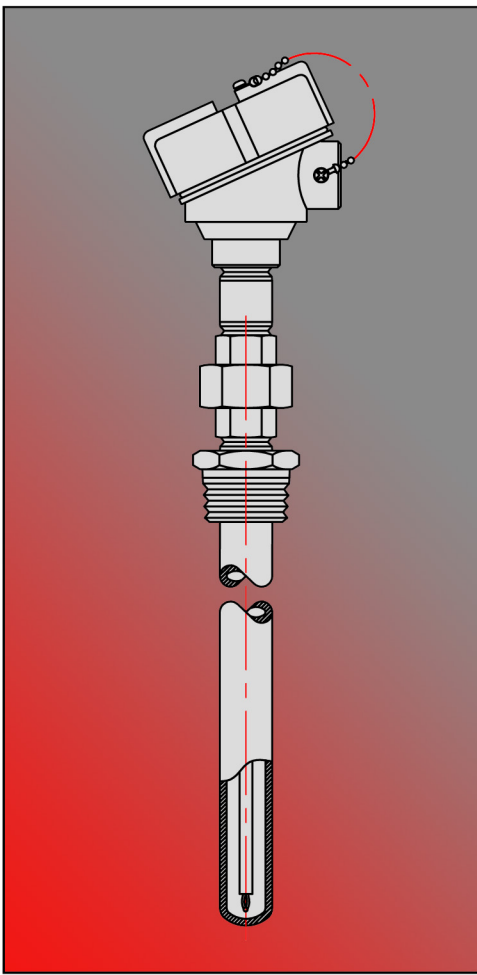


Remote Head Mounted Assemblies

Process Connection - 1/2"NPT Thread
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

A remote mounted head provides assurance that in the event of a well failure, the process media cannot leak into the head. A remote head is also useful where process vibration can cause connection problems within the head. It is an excellent method of utilizing a head where physical clearance at the process connection is limited. Remote head assemblies are supplied with a 1/2"NPT fitting for the well connection, the element terminates to PVC coated flexible armored leads of any length.

Remote Head Mount Assemblies
 See Document TE-CO010109-INTC-210



Ceramic Protection tube Assemblies

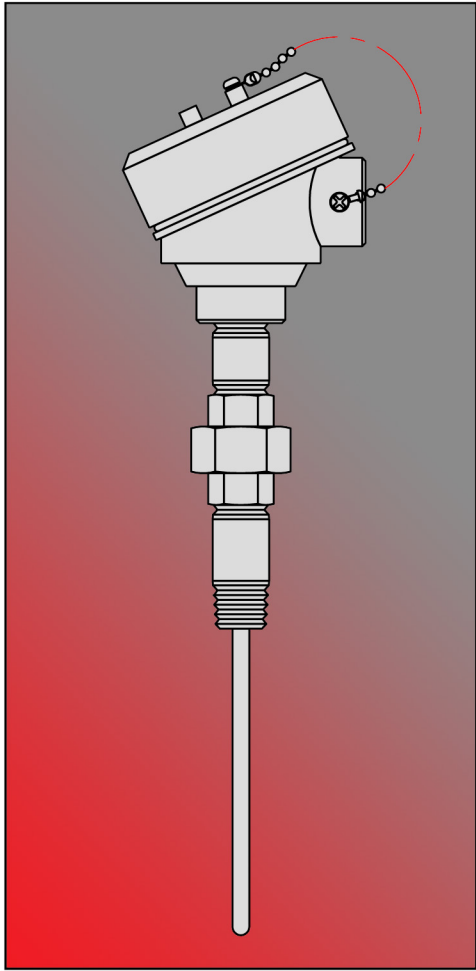
Process Connection - NPT or Flanged
 Tube Material - Alumina, Mullite, Cermet, Silicon Carbide
 Calibration - K, R, S, B
 Connection Heads - Aluminum, Stainless Steel, Cast Iron
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

Ceramic protection tubes are used in high temperature areas where metallic wells are not suitable. Various sizes and materials are available to meet the exact conditions of the process. Double ceramic tube assemblies provide additional protection from thermal shock during plant startup operations.

Ceramic Protection Tube Assemblies
 See Document TE-CO010109-INTC-220
 Double Ceramic Protection Tube Assemblies
 See Document TE-CO010109-INTC-230



INDUSTRIAL THERMOCOUPLE ASSEMBLIES



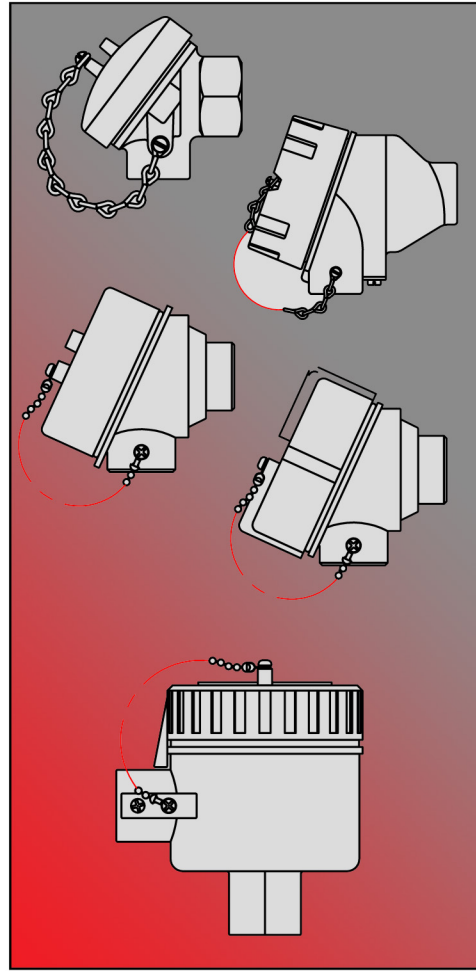
**Assemblies Less Thermowells
Spare Thermocouple Elements**

Process Connection - 1/2" or 3/4"NPT
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

Assemblies can be matched to fit existing wells or wells provided by another supplier. These assemblies can also be screwed into a bored opening of an equipment housing.

Replacement elements are available for any Thermo Electric assembly as startup or commission spares or manufactured and shipped to the site on express service.

Assemblies Less Thermowells
 See Document TE-CO010109-INTC-240
 Replacement Thermocouple Elements
 See Document TE-CO010109-INTC-250



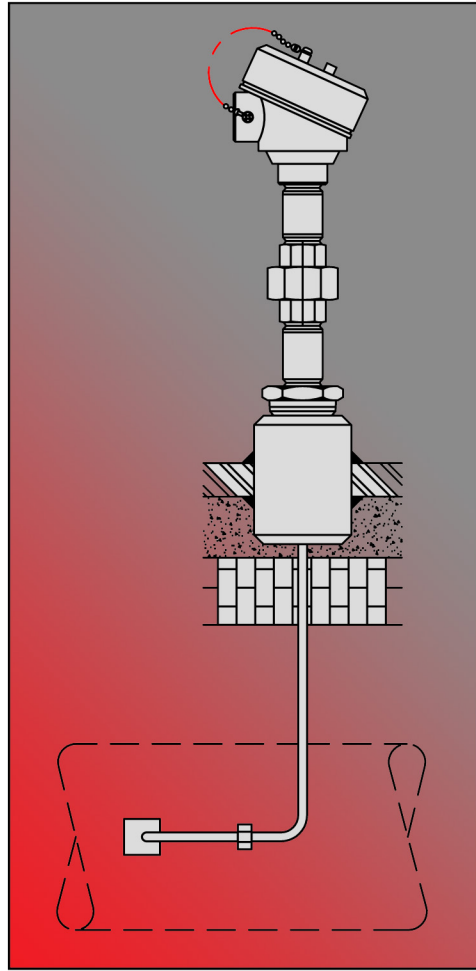
Connection Heads

Material - Aluminum, Stainless Steel, Cast Iron or polypropylene
 Terminal Block - 4 Point and 6 Point Standard, Transmitter
 Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

The connection head performs two essential functions. It provides a method of terminating the thermocouple by means of terminal block or transmitter mounted inside the head. It also provides protection for the element from environmental and mechanical conditions.

Thermo Electric's large device connection head is capable of containing excess coiled lead wire or a number of the large smart transmitters.

See Documents TE-CO010109-INTC-260 & TE-CO010109-INTC-270



Tube Skin Thermocouples

Process Connection - Welded
 Calibration - J, K, T, E, N
 Connection Heads - Aluminum, Stainless Steel, Cast Iron or Polypropylene
 Head Certifications - NEMA-4, 4X, Explosion Proof FM, CSA, ATEX

Tube skin thermocouples are used for monitoring surface temperatures on boilers, super heater or heat exchanger tubes. They are available with a weld pad shaped to the curvature of the tube or knife edge for fast response. Termination available with lead wire or sealed head extensions. Thermo Electric will custom shape for expansion loops or coils and provide weld clamp and heat shield as required.

Tube Skin Thermocouples, Type TSC-1
 See Document TE-CO010109-INTC-280
 Tube Skin Thermocouples, Type TSC-2
 See Document TE-CO010109-INTC-290
 Tube Skin Thermocouples, Boiler Casing
 See Document TE-CO010109-INTC-300
 Tube Skin Thermocouples, Type TSC-3 & TSC-4
 See Document TE-CO010109-INTC-310



INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	2	NIPPLE (NOTE 1)
	4	NIPPLE/UNION/NIPPLE (NOTE 1)

B	CODE	CONNECTION HEAD		
		MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2NPT			IN INCHES

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
	A316	AD316	3/16"	20	MgO-SHEATH	NO
	ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
	A14	AD14	1/4"	18	MgO-SHEATH	NO
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
	A516	AD516	5/16"	16	MgO-SHEATH	NO
	ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES
	A38	AD38	3/8"	15	MgO-SHEATH	NO
	ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES
	B14	BD14	.325"	14	CERAMIC BEAD	NO
	B20	BD20	.183"	20	CERAMIC BEAD	NO

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 4)	
		J	JJ
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
	-	EES	CHROMEL (+) vs CONSTANTAN (+) (NOTE 5)

H	CODE	MEASURING JUNCTION
		G
	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
	DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
	DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
		P	304 STN. STL.
	R	316 STN. STL.	J, K, T, E, N
	Q	310 STN. STL.	J, K, E
	J	INCONEL 600	K, N, KKS, EES (NOTE 5)

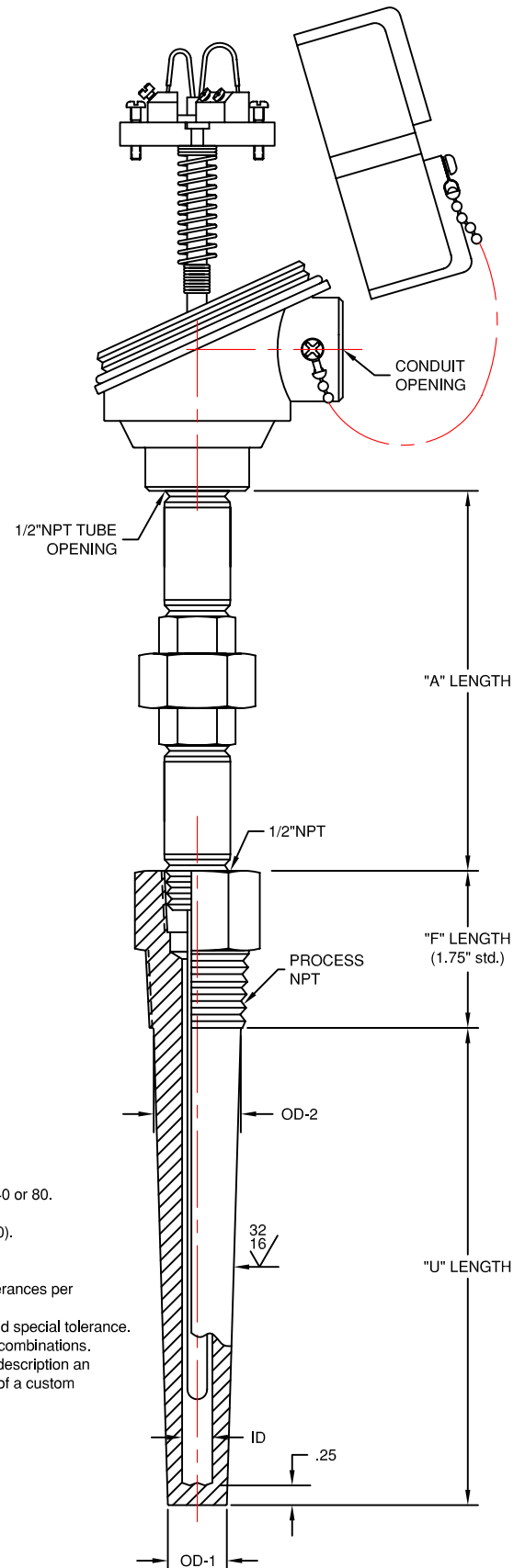
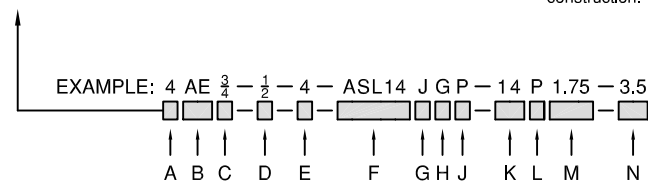
DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

K	CODE	WELL TYPE				
		PROCESS NPT	OD-1	OD-2	ID	HEX
	11	3/4"	.563	.844	.203	1.13
	12	3/4"	.750	.844	.385	1.13
	13	1"	.563	1.11	.203	1.38
	14	1"	.750	1.11	.385	1.38
	121	3/4"	.750	.844	.260	1.13
	141	1"	.750	1.11	.260	1.38

L	CODE	WELL MATERIAL
		P
	B	BRASS
	R	316 STAINLESS STEEL
	PLorRL	304or316 S. S. (LOW CARBON)
	N	CARBON STEEL

M	CODE	"F" LENGTH
		IN INCHES (1.75" STD.)

N	CODE	"U" LENGTH
		IN INCHES



Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 4AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.



TEMPERATURE MEASUREMENT DESIGNER'S GUIDE
WWW.THERMO-ELECTRIC-DIRECT.COM

SECTION INTC
DRILLED THREADED WELL ASSEMBLIES
TAPERED CONSTRUCTION
3/4 & 1" NPT PROCESS CONNECTIONS

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Doc. No.: TE-CO010109-INTC-010

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	2	NIPPLE (NOTE 1)
	4	NIPPLE/UNION/NIPPLE (NOTE 1)

B	CODE	CONNECTION HEAD		
		MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2			IN INCHES
					1/2NPT			

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
	A316	AD316	3/16"	20	MgO-SHEATH	NO
	ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
	A14	AD14	1/4"	18	MgO-SHEATH	NO
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
	A516	AD516	5/16"	16	MgO-SHEATH	NO
	ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES
	A38	AD38	3/8"	15	MgO-SHEATH	NO
	ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES
	B14	BD14	.325"	14	CERAMIC BEAD	NO
	B20	BD20	.183"	20	CERAMIC BEAD	NO

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 4)	
	J	JJ	IRON (+) vs CONSTANTAN (-)
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
	-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

H	CODE	MEASURING JUNCTION
	G	SINGLE GROUNDED, GROUNDED TO SHEATH
	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
	DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
	DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
	P	304 STN. STL.	J, K, T
	R	316 STN. STL.	J, K, T, E, N
	Q	310 STN. STL.	J, K, E
	J	INCONEL 600	K, N, KKS, EES (NOTE 5)

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

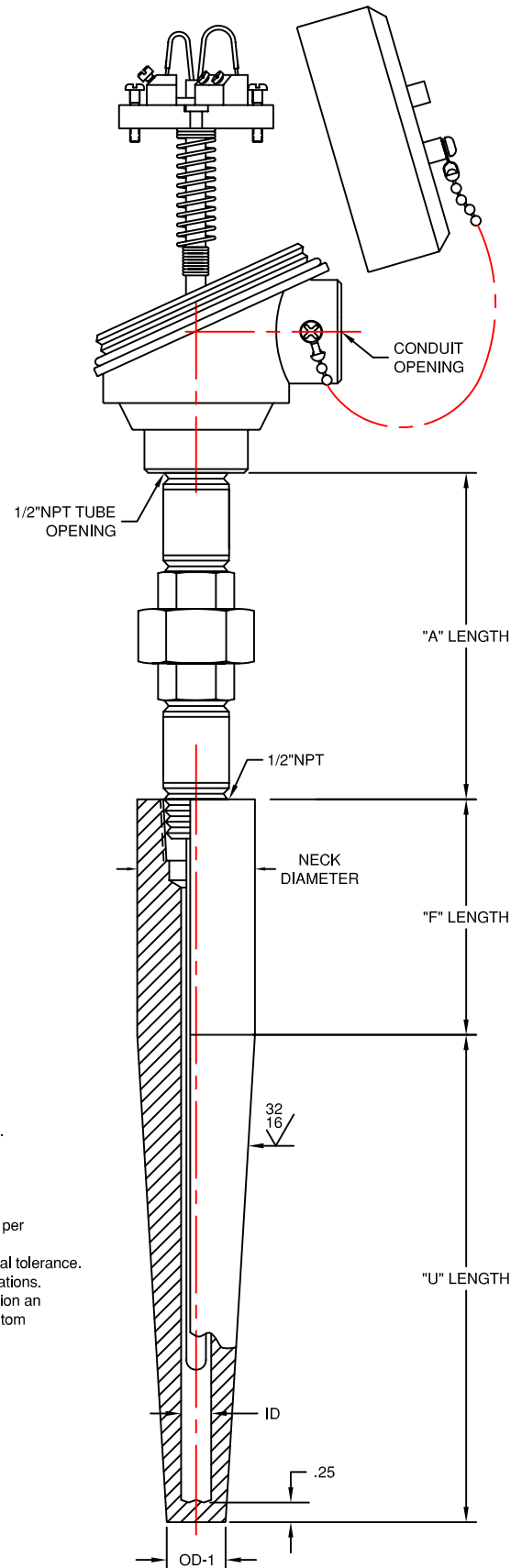
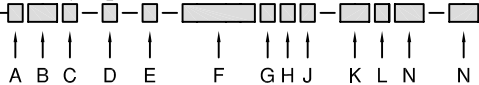
K	WELL TYPE		
	CODE	NECK DIAMETER	OD-1 ID
	03	1.50"	.750 .385
	031	1.50"	.750 .260
	04	1.315"	.750 .385
	041	1.315"	.750 .260

L	CODE	WELL MATERIAL
	P	304 STAINLESS STEEL
	R	316 STAINLESS STEEL
	PLorRL	304or316 S. S. (LOW CARBON)
	N	CARBON STEEL
	(F11)	1.25% CR - .5% MO
	(F22)	2.25% CR - 1% MO

M	CODE	"F" LENGTH
		IN INCHES

N	CODE	"U" LENGTH
		IN INCHES

EXAMPLE: 4 SN $\frac{3}{4}$ - $\frac{1}{2}$ - 4 - ASL14 JGP - 04 P 5 - 3.5



Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 4AE 3/4 1/2 (R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.



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SECTION INTC

DRILLED WELD-IN WELL ASSEMBLIES TAPERED CONSTRUCTION

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Doc. No.: TE-CO010109-INTC-060

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	2	NIPPLE (NOTE 1)
	4	NIPPLE/UNION/NIPPLE (NOTE 1)

B	CONNECTION HEAD			
	CODE	MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2NPT			IN INCHES

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
	A316	AD316	3/16"	20	MgO-SHEATH	NO
	ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
	A14	AD14	1/4"	18	MgO-SHEATH	NO
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
	AS16	AD516	5/16"	16	MgO-SHEATH	NO
	ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES
	A38	AD38	3/8"	15	MgO-SHEATH	NO
	ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES
	B14	BD14	.325"	14	CERAMIC BEAD	NO
	B20	BD20	.183"	20	CERAMIC BEAD	NO

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 4)	
	J	JJ	IRON (+) vs CONSTANTAN (-)
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
	-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

H	CODE	MEASURING JUNCTION
	G	SINGLE GROUNDED, GROUNDED TO SHEATH
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH	
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH	
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH	

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
	P	304 STN. STL.	J, K, T
Q	316 STN. STL.	J, K, T, E, N	
R	310 STN. STL.	J, K, E	
J	INCONEL 600	K, N, KKS, EES (NOTE 5)	

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

K	WELL TYPE			
	CODE	OD-1	OD-2	ID
	47	.750	.875	.385
	48	.750	.875	.260

L	CODE	WELL MATERIAL
	P	304 STAINLESS STEEL
Q	310 STAINLESS STEEL	
R	316 STAINLESS STEEL	
PLorRL	304or316 S. S. (LOW CARBON)	
N	CARBON STEEL	
J	INCONEL 600	
H	HASTELLOY C276	

M	CODE	"F" LENGTH

N	CODE	"U" LENGTH

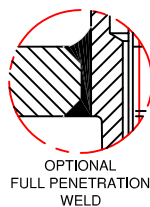
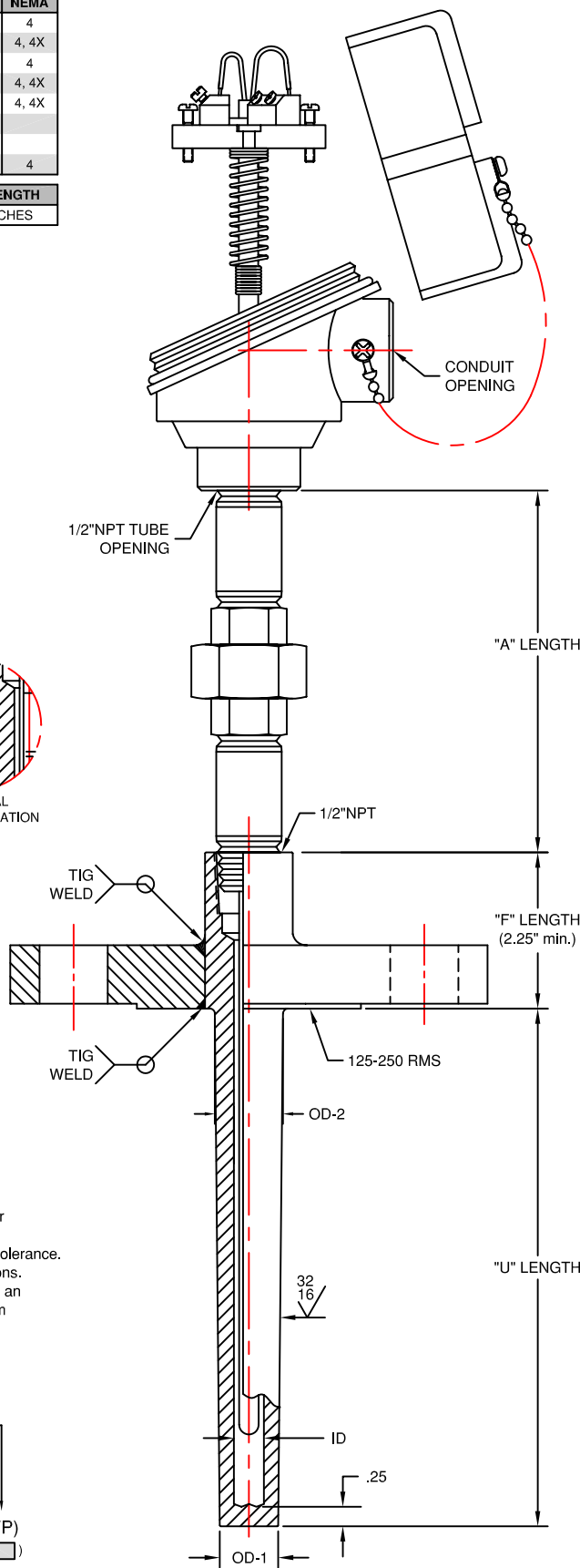
P	CODE	FLANGE SIZE

Q	CODE	FLANGE RATING

R	CODE	FLANGE TYPE
	FF	FLAT FACE
RF	RAISED FACE	
RJ	RING TYPE JOINT	

EXAMPLE: 4 AE 3/4 - 1/2 - 6 - ASL14 J G P - 47 R 2.25 - 12 - 1.5 - 300 RF (N) (FP)

A
B
C
D
E
F
G
H
J
K
L
M
N
P
Q
R
L



Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 4AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

OPTIONAL FULL PENETRATION WELD
USE ONLY IF FLANGE MATERIAL IS NOT THE SAME AS WELL MATERIAL



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SECTION INTC

DRILLED FLANGED WELL ASSEMBLIES TAPERED CONSTRUCTION

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Doc. No.: TE-CO010109-INTC-070

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	2	NIPPLE (NOTE 1)
	4	NIPPLE/UNION/NIPPLE (NOTE 1)

B	CONNECTION HEAD		NEMA
	MATERIAL	TYPE	
	AN	ALUMINUM WATER PROOF	4
	SN	STAINLESS STEEL WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON WEATHER PROOF, RUGGED	4
	L	POLYPROPYLENE WEATHER PROOF, LIGHT WEIGHT	4
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2NPT			IN INCHES

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
	A316	AD316	3/16"	20	MgO-SHEATH	NO
	ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
	A14	AD14	1/4"	18	MgO-SHEATH	NO
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
	A516	AD516	5/16"	16	MgO-SHEATH	NO
	ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES
	A38	AD38	3/8"	15	MgO-SHEATH	NO
	ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES
	B14	BD14	.325"	14	CERAMIC BEAD	NO
	B20	BD20	.183"	20	CERAMIC BEAD	NO

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 4)	
	J	JJ	IRON (+) vs CONSTANTAN (-)
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
	-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

H	CODE		MEASURING JUNCTION
	G	U	
	G	U	SINGLE GROUNDED, GROUNDED TO SHEATH
	U		SINGLE UNGROUNDED, ISOLATED FROM SHEATH
	DG	DU	DUPLEX GROUNDED, GROUNDED TO SHEATH
	DU		DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
		P	304 STN. STL.
	Q	316 STN. STL.	J, K, T, E, N
	R	310 STN. STL.	J, K, E
	J	INCONEL 600	K, N, KKS, EES (NOTE 5)

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

K	WELL TYPE			
	CODE	OD-1	OD-2	ID
	42	.875	.875	.385
	43	.875	.875	.260

L	CODE	WELL MATERIAL
		P
	Q	310 STAINLESS STEEL
	R	316 STAINLESS STEEL
	PLorRL	304or316 S. S. (LOW CARBON)
	N	CARBON STEEL
	J	INCONEL 600
	H	HASTELLOY C276

M	CODE	"F" LENGTH
		IN INCHES (2.25" STD.)

N	CODE	"U" LENGTH
		IN INCHES

P	CODE	FLANGE SIZE
		SPECIFY

Q	CODE	FLANGE RATING
		SPECIFY

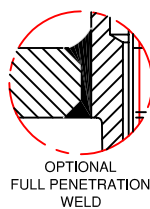
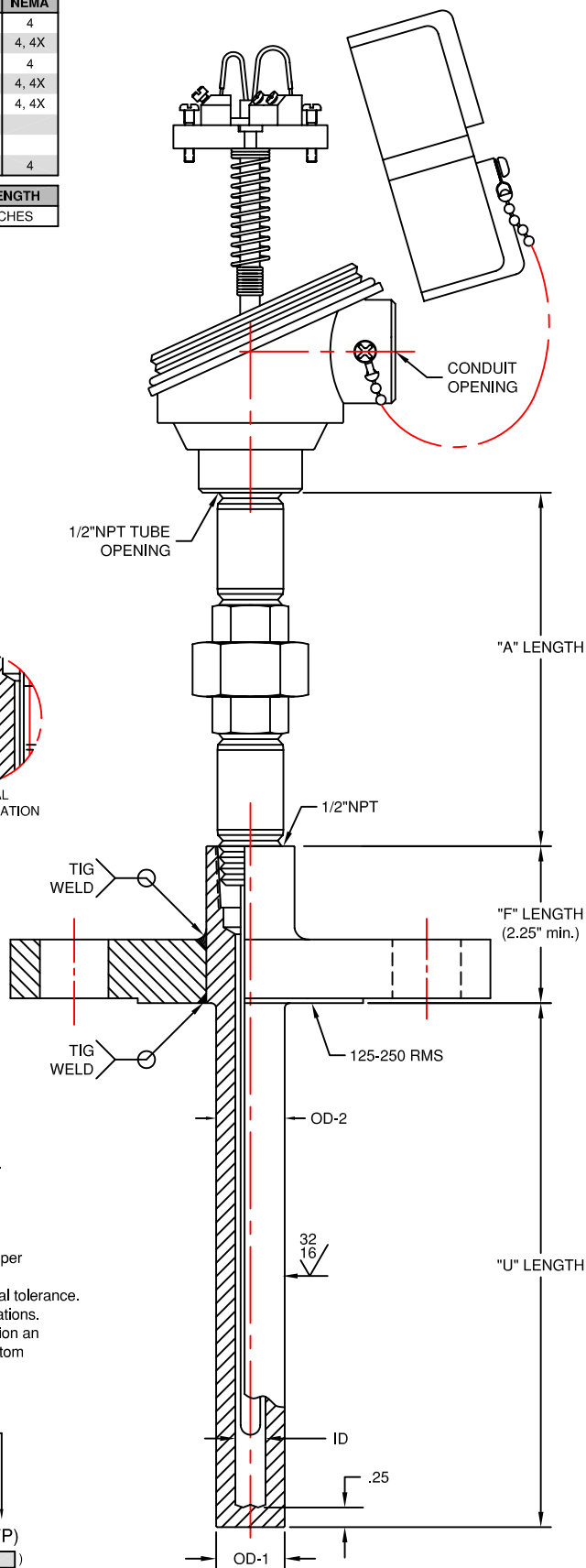
R	CODE	FLANGE TYPE
	FF	FLAT FACE
	RF	RAISED FACE
	RJ	RING TYPE JOINT

Notes:

- (1) Standard Nipples - Steel, Schedule 40. Standard Unions - Black Malleable Iron, 150#. OPTIONAL STAINLESS STEEL Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80. Unions - 304 or 316 Stainless Steel. Example Ordering Code: 4AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

EXAMPLE: 4 AE 3/4 - 1/2 - 4 - ASL14 K U J - 42 R 2.25 - 12 - 1.5 - 600 RF (N) (FP)

A B C D E F G H J K L M N P Q R L



OPTIONAL FULL PENETRATION WELD
USE ONLY IF FLANGE MATERIAL IS NOT THE SAME AS WELL MATERIAL



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SECTION INTC

DRILLED FLANGED WELL ASSEMBLIES STRAIGHT CONSTRUCTION

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Doc. No.: TE-CO010109-INTC-080

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	2	NIPPLE (NOTE 1)
	4	NIPPLE/UNION/NIPPLE (NOTE 1)

B	CODE	CONNECTION HEAD		
		MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2			IN INCHES

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
	A316	AD316	3/16"	20	MgO-SHEATH	NO
	ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
	A14	AD14	1/4"	18	MgO-SHEATH	NO
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
	B14	BD14	.325"	14	CERAMIC BEAD	NO
	B20	BD20	.183"	20	CERAMIC BEAD	NO

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 4)	
	J	JJ	IRON (+) vs CONSTANTAN (-)
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
	-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

H	CODE	MEASURING JUNCTION
	G	SINGLE GROUNDED, GROUNDED TO SHEATH
	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
	DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
	DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
	P	304 STN. STL.	J, K, T
	R	316 STN. STL.	J, K, T, E, N
	Q	310 STN. STL.	J, K, E
	J	INCONEL 600	K, N, KKS, EES (NOTE 5)

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

K	WELL TYPE		
	OD-1	OD-2	ID
	432	.500	.875 .260

L	WELL MATERIAL	
	P	304 STAINLESS STEEL
	Q	310 STAINLESS STEEL
	R	316 STAINLESS STEEL
	PLorRL	304or316 S. S. (LOW CARBON)
	N	CARBON STEEL
J	INCONEL 600	
H	HASTELLOY C276	

M	CODE	"F" LENGTH
		IN INCHES (2.25" STD.)

N	CODE	"U" LENGTH
		IN INCHES

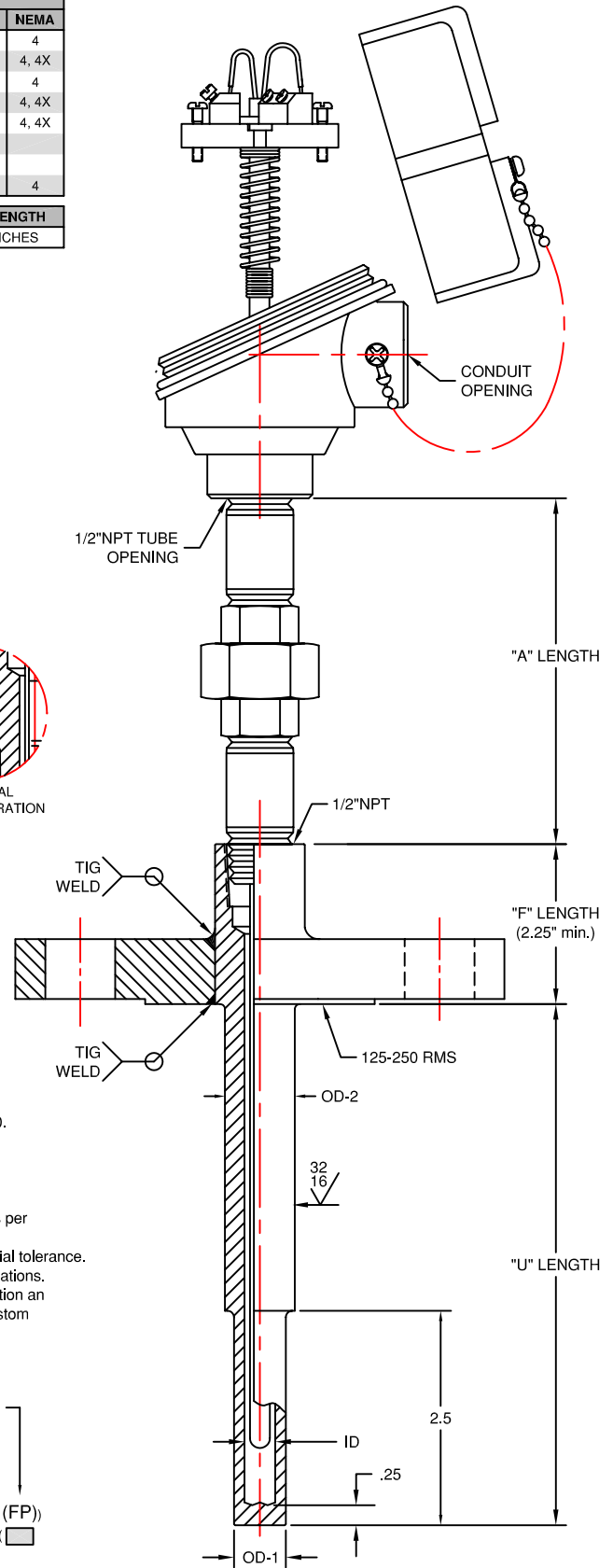
P	CODE	FLANGE SIZE
		SPECIFY

Q	CODE	FLANGE RATING
		SPECIFY

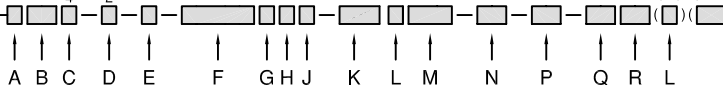
R	FLANGE TYPE	
	FF	FLAT FACE
	RF	RAISED FACE
	RJ	RING TYPE JOINT

Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 4AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.



EXAMPLE: 2 AN $\frac{3}{4}$ - $\frac{1}{2}$ - 4 - ASL14 J G R - 432 R 2.25 - 8 - 2 - 300 RF (N) (FP)



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SECTION INTC

**DRILLED FLANGED WELL ASSEMBLIES
STEPPED DOWN SHANK CONSTRUCTION**

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Doc. No.: TE-CO010109-INTC-090

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	2	NIPPLE (NOTE 1)
	4	NIPPLE/UNION/NIPPLE (NOTE 1)

B	CODE	CONNECTION HEAD		
		MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2			IN INCHES

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
	A316	AD316	3/16"	20	MgO-SHEATH	NO
	ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
	A14	AD14	1/4"	18	MgO-SHEATH	NO
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
	A516	AD516	5/16"	16	MgO-SHEATH	NO
	ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES
	A38	AD38	3/8"	15	MgO-SHEATH	NO
	ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES
	B14	BD14	.325"	14	CERAMIC BEAD	NO
	B20	BD20	.183"	20	CERAMIC BEAD	NO

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 4)	
	J	JJ	IRON (+) vs CONSTANTAN (-)
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
	-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

H	CODE	MEASURING JUNCTION
	G	SINGLE GROUNDED, GROUNDED TO SHEATH
	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
	DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
	DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
	P	304 STN. STL.	J, K, T
	R	316 STN. STL.	J, K, T, E, N
	Q	310 STN. STL.	J, K, E
	J	INCONEL 600	K, N, KKS, EES (NOTE 5)

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

K	CODE	WELL TYPE				
		OD-1	OD-2	ID	FLANGE FACE DIA.	NECK DIAMETER
	41	.750	.875	.385	2.0	1.315
	44	.750	.875	.385	2.88	1.90
	411	.750	.875	.260	2.0	1.315
	441	.750	.875	.260	2.88	1.90

L	CODE	WELL MATERIAL
	P	304 STAINLESS STEEL
	Q	310 STAINLESS STEEL
	R	316 STAINLESS STEEL
	PLoR	304or316 S. S. (LOW CARBON)
	N	CARBON STEEL
	J	INCONEL 600
	H	HASTELLOY C276

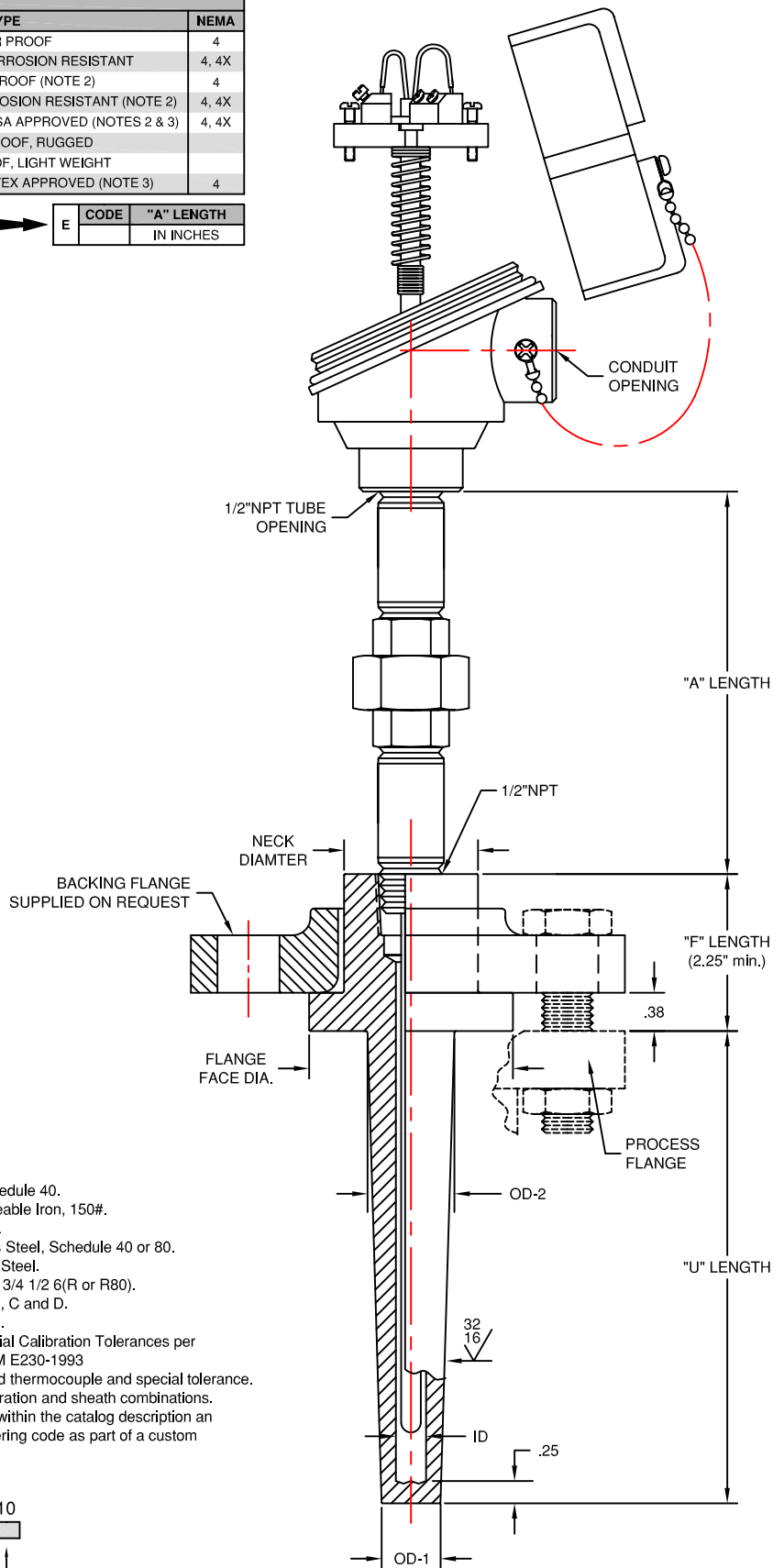
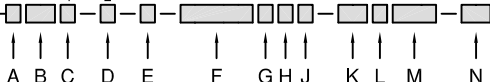
M	CODE	"F" LENGTH
		IN INCHES (2.25" STD.)

N	CODE	"U" LENGTH
		IN INCHES

Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 4AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

EXAMPLE: 4 AE 3/4 - 1/2 - 4 - ASL14 J U R - 44 R 2.25 - 10



TEMPERATURE MEASUREMENT DESIGNER'S GUIDE
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SECTION INTC
DRILLED VAN STONE WELL ASSEMBLIES
TAPERED CONSTRUCTION
1" & 1 1/2" FLANGE CONNECTION

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Doc. No.: TE-CO010109-INTC-100

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	1	(NO EXTENSION, 0" "A" LENGTH)
	3	NIPPLE/UNION/ (NOTE 1)

B	CONNECTION HEAD			
	CODE	MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			1/2 or 3/4NPT (NOTE 4)			IN INCHES

F	ELEMENT CONSTRUCTION						
	CODE	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
	A14	AD14	1/4"	18	MgO-SHEATH	NO	
	ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES	
	A516	AD516	5/16"	16	MgO-SHEATH	NO	
	ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES	
	A38	AD38	3/8"	15	MgO-SHEATH	NO	
	ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES	
	B14	BD14	.325"	14	CERAMIC BEAD	NO	
	B08	BD08	.5"-.69"	8	CERAMIC BEAD	NO	

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 5)	
	J	JJ	IRON (+) vs CONSTANTAN (-)
	K	KK	CHROMEL (+) vs ALUMEL (-)
	T	TT	COPPER (+) vs CONSTANTAN (-)
	E	EE	CHROMEL (+) vs CONSTANTAN (-)
	N	NN	NICROSIL (+) vs NISIL (-)
	-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 6)
	-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 6)

H	MEASURING JUNCTION	
	CODE	DESCRIPTION
	G	SINGLE GROUNDED, GROUNDED TO SHEATH
	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH	
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH	

J	CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
	P	304 STN. STL.	J, K, T
	R	316 STN. STL.	J, K, T, E, N
	Q	310 STN. STL.	J, K, E
	J	INCONEL 600	K, N, KKS, EES (NOTE 6)

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

K	PROTECTION TUBE TYPE			
	CODE	TUBE SIZE	PROCESS NPT	OD
	601		1/2" NPT	
	602	1/4" NPS	3/4" NPT	0.540
	603		1" NPT	
	606		3/4" NPT	
	607	1/2" NPS	1" NPT	0.840
	608		1 1/4" NPT	
	610		1" NPT	
	611	3/4" NPS	1 1/4" NPT	1.050
	612		1 1/2" NPT	
	613	1" NPS	1 1/4" NPT	1.315
	614		1 1/2" NPT	

L	TUBE SCHEDULE (INSIDE DIAMETER)				
	CODE	1/4"NPT	1/2"NPT	3/4"NPT	1"NPT
	40	0.364	0.622	0.824	1.049
	80	0.302	0.546	0.742	0.957
	160	N/A	0.464	0.612	0.815
	XXS	N/A	N/A	0.434	0.599

Notes:

- Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
- OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 3AE 3/4 1/2 6(R or R80).
- Rated NEC class 1, Groups B, C and D.
- ATEX approved EEx d IIC, T6.
- For 1/4" and 1" pipe size a reducing bushing or enlarger will be used to fit tube opening, specify 1/2 for 1/4" pipe size and 3/4 for 1" pipe size.
- Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- KKS & EES denotes stabilized thermocouple and special tolerance.
- Contact factory for other calibration and sheath combinations.
- For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

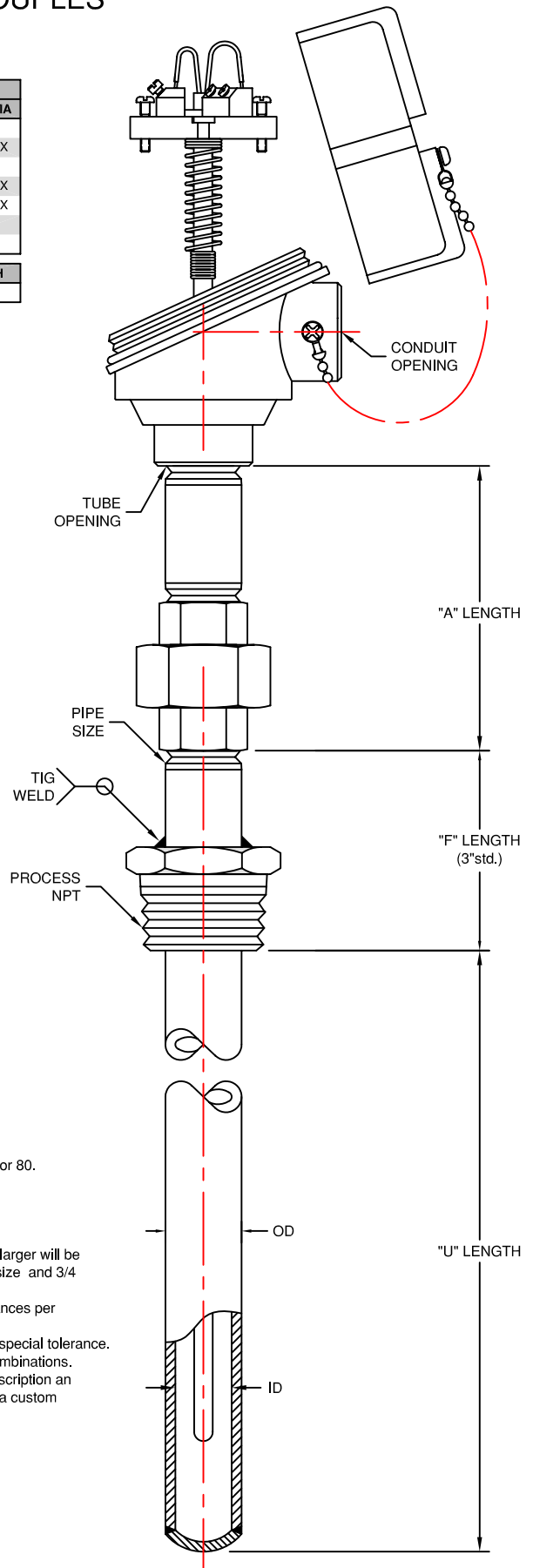
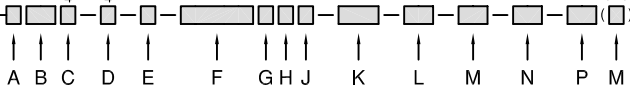
M	WELL MATERIAL	
	CODE	DESCRIPTION
	P	304 STAINLESS STEEL
	Q	310 STAINLESS STEEL
	R	316 STAINLESS STEEL
	PLorRL	304or316 S. S. (LOW CARBON)
N	CARBON STEEL	
J	INCONEL 600	
H	HASTELLOY C276	

N	CODE	"F" LENGTH
		IN INCHES (3" STD.)

P	CODE	"U" LENGTH
		IN INCHES

USE ONLY IF BUSHING MATERIAL IS NOT THE SAME AS TUBE MATERIAL

EXAMPLE: 3 AE 3/4 - 3/4 - 3 - ASL14 K U R - 611 - 80 - R - 3 - 48 (N)



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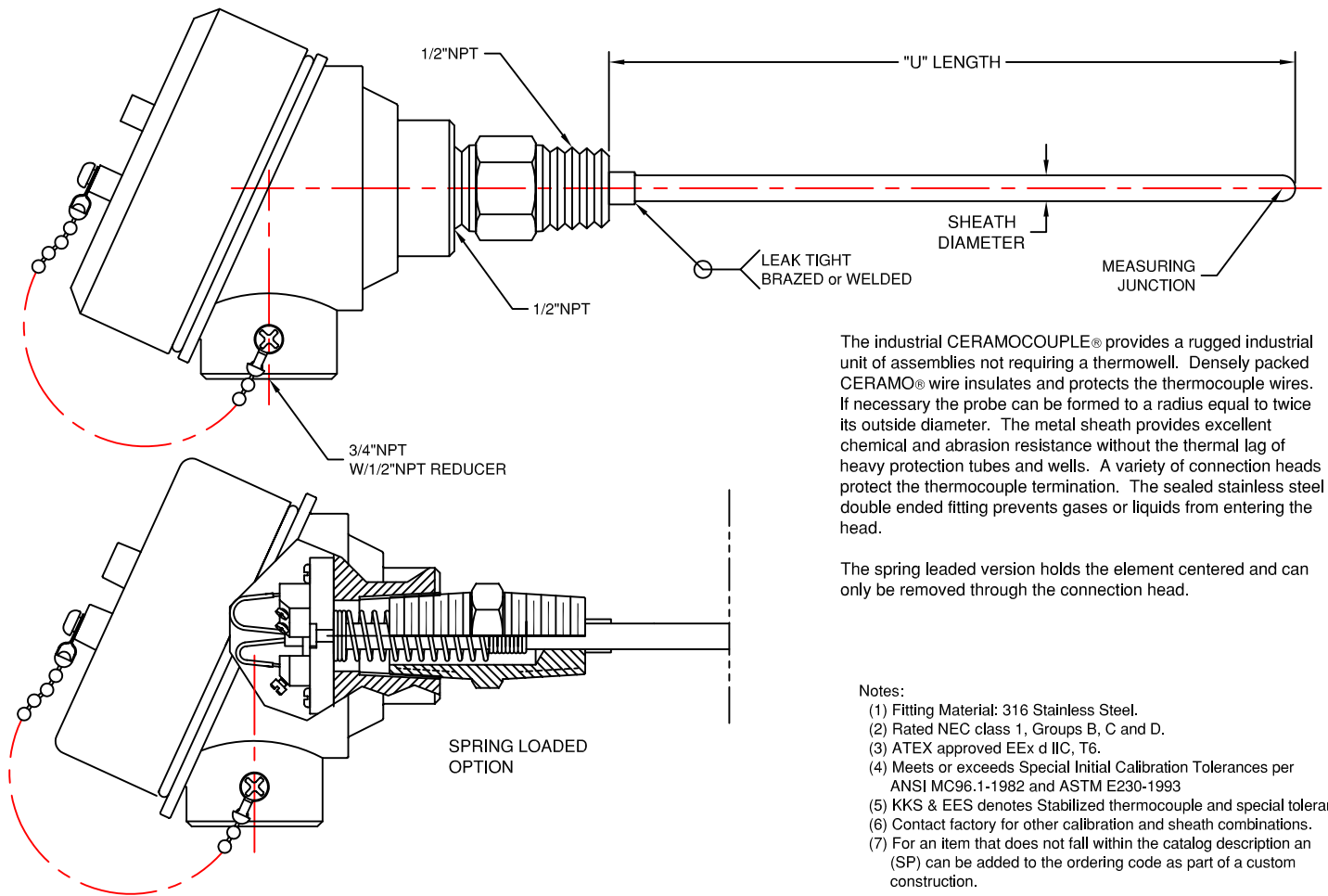
SECTION INTC

PIPE WELL ASSEMBLIES THREADED PROCESS CONNECTION

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Doc. No.: TE-CO010109-INTC-130

INDUSTRIAL THERMOCOUPLES



The industrial CERAMOCOUPLE® provides a rugged industrial unit of assemblies not requiring a thermowell. Densely packed CERAMO® wire insulates and protects the thermocouple wires. If necessary the probe can be formed to a radius equal to twice its outside diameter. The metal sheath provides excellent chemical and abrasion resistance without the thermal lag of heavy protection tubes and wells. A variety of connection heads protect the thermocouple termination. The sealed stainless steel double ended fitting prevents gases or liquids from entering the head.

The spring loaded version holds the element centered and can only be removed through the connection head.

Notes:

- (1) Fitting Material: 316 Stainless Steel.
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes Stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

ORDERING CODE:

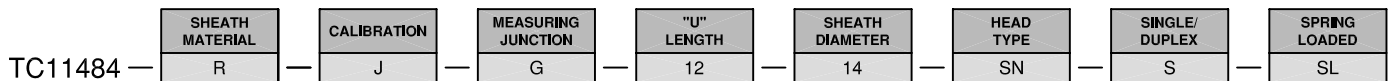
CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 4)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
T	TT	COPPER (+) vs CONSTANTAN (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

CODE	MEASURING JUNCTION	CODE	SINGLE/DUPLEX
G	SINGLE GROUNDED, GROUNDED TO SHEATH	S	SINGLE CONSTRUCTION
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH	D	DUPLEX CONSTRUCTION
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH		
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH		

CODE	"U" LENGTH IN INCHES	CODE	SHEATH DIAMETER
	18		1/8" (.125)
	316		3/16" (.188)
	14		1/4" (.25")
	516		5/16" (.313)
	38		3/8" (.375)

USE ONLY IF SPRING LOADED

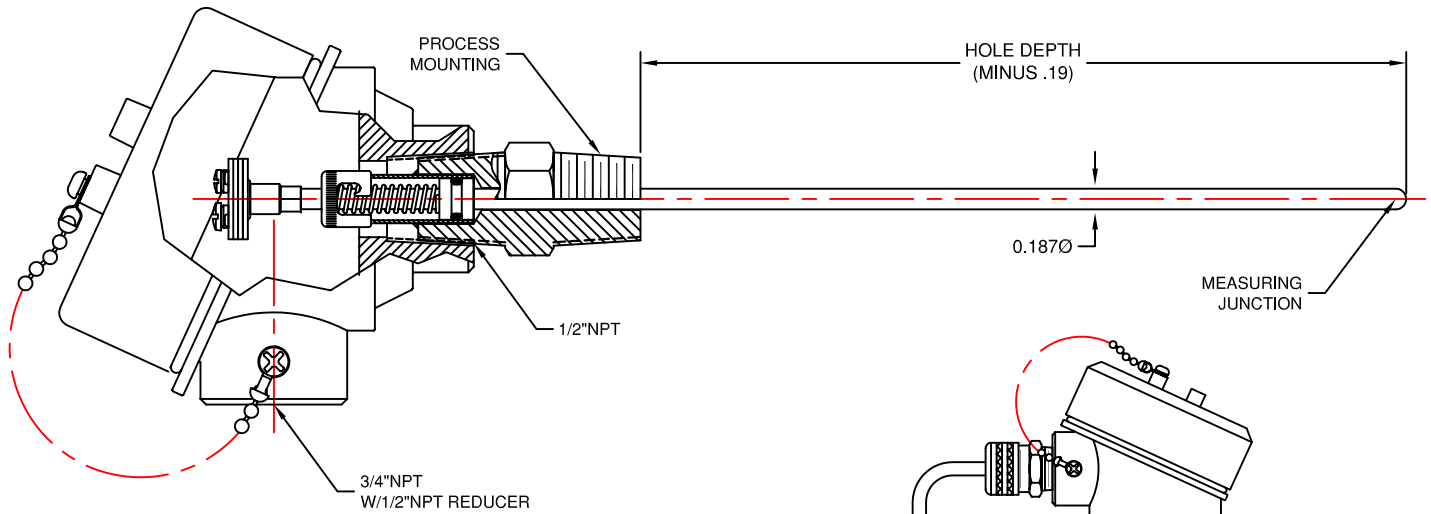
CODE	OPTIONAL
SL	SPRING LOADED



CONNECTION HEAD			
CODE	MATERIAL	TYPE	NEMA
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
A	CAST IRON	WEATHER PROOF, RUGGED	
L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT	
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 5)

INDUSTRIAL THERMOCOUPLES

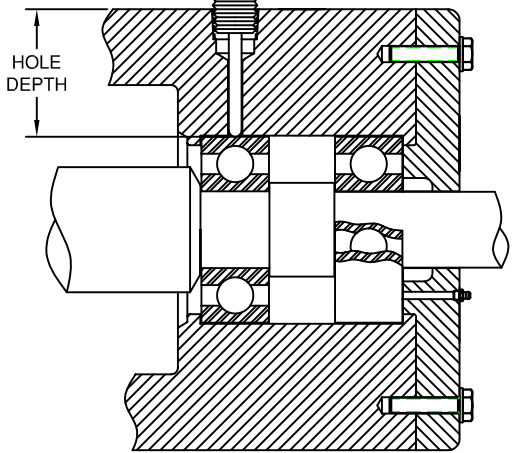
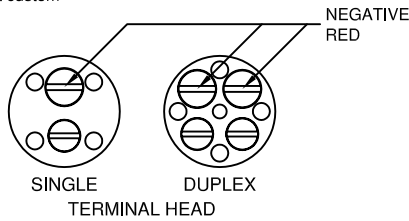


Specifications:

- (1) Fitting Assembly Material: Stainless Steel.
- (2) O-Ring: Viton.
- (3) Service Temperature: 400° F(205° C), Intermittent to 450 °F(260° C).

Notes:

- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (2) KKS & EES denotes stabilized thermocouple and special tolerance.
- (3) Contact factory for other calibration and sheath combinations.
- (4) Rated NEC class 1, Groups B, C and D.
- (5) ATEX approved EEx d IIC, T6.
- (6) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

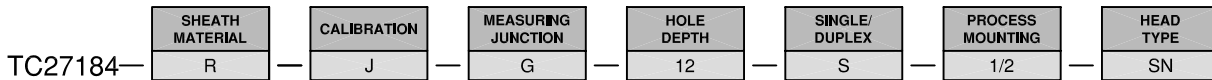


ORDERING CODE:

CODE		CALIBRATION	MEASURING JUNCTION		CODE	SINGLE/DUPLEX
STANDARD	SPECIAL (NOTE 1)		CODE	HOLE DEPTH		
J	JJ	IRON (+) vs CONSTANTAN (-)	G	SINGLE GROUNDED, GROUNDED TO SHEATH	S	SINGLE CONSTRUCTION
K	KK	CHROMEL (+) vs ALUMEL (-)	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH	D	DUPLEX CONSTRUCTION
T	TT	COPPER (+) vs CONSTANTAN (-)	DG	DUPLEX GROUNDED, GROUNDED TO SHEATH		
E	EE	CHROMEL (+) vs CONSTANTAN (-)	DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH		
N	NN	NICROSIL (+) vs NISIL (-)				
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 2)				
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 2)				

CODE	HOLE DEPTH
	IN INCHES

CODE	PROCESS MOUNTING
1/4	1/4\"NPT
3/8	3/8\"NPT
1/2	1/2\"NPT



CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 3)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 2)

CONNECTION HEAD			
CODE	MATERIAL	TYPE	NEMA
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 4)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 4)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 4 & 5)	4, 4X
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 5)	4



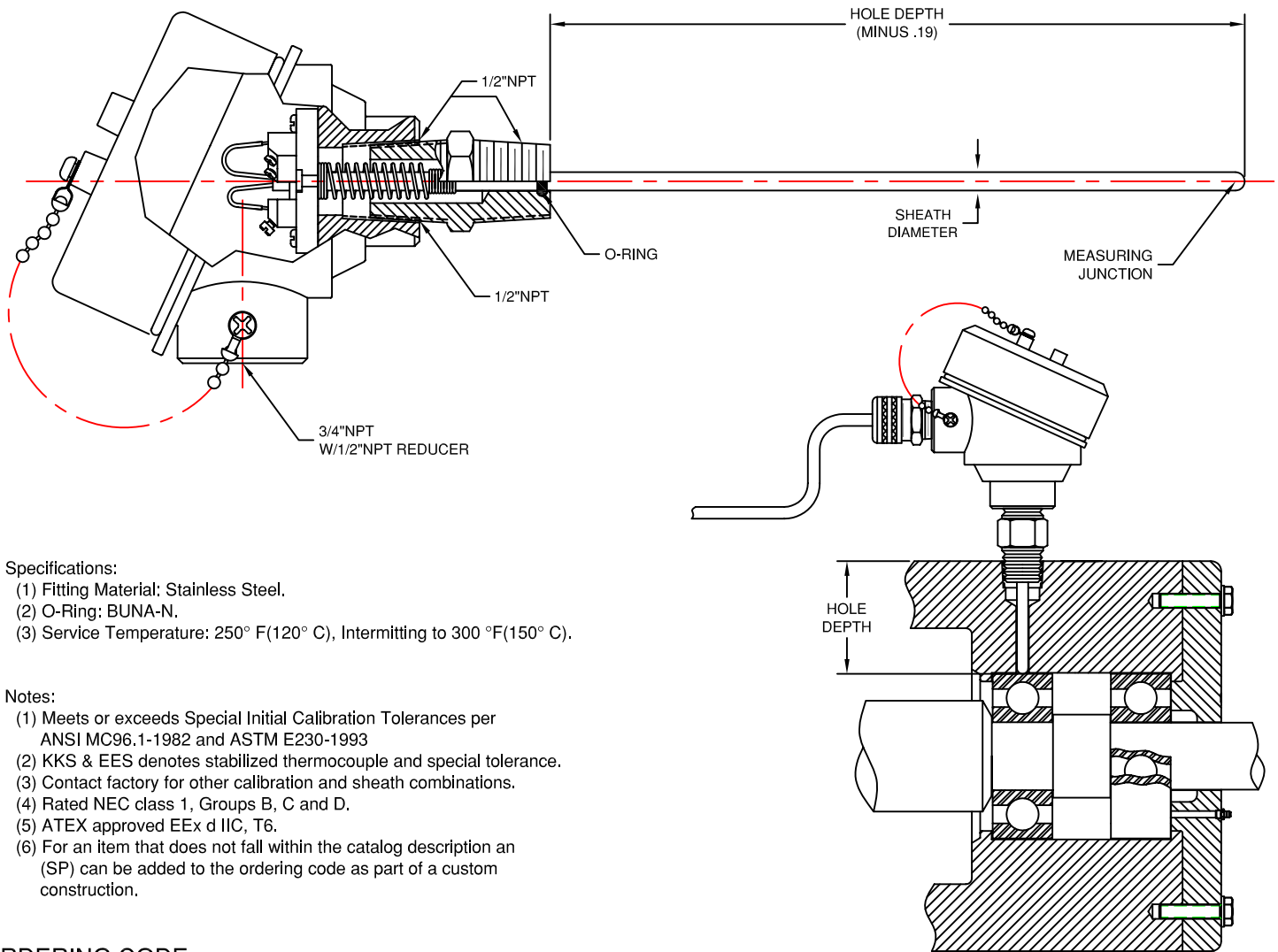
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SECTION INTC
OIL SEAL THERMOCOUPLES
with FLOATING COLLAR

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Doc. No.: TE-CO010109-INTC-160

INDUSTRIAL THERMOCOUPLES



Specifications:

- (1) Fitting Material: Stainless Steel.
- (2) O-Ring: BUNA-N.
- (3) Service Temperature: 250° F(120° C), Intermittent to 300 °F(150° C).

Notes:

- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (2) KKS & EES denotes stabilized thermocouple and special tolerance.
- (3) Contact factory for other calibration and sheath combinations.
- (4) Rated NEC class 1, Groups B, C and D.
- (5) ATEX approved EEx d IIC, T6.
- (6) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

ORDERING CODE:

CODE		CALIBRATION	CODE		MEASURING JUNCTION		CODE	SINGLE/DUPLEX
STANDARD	SPECIAL (NOTE 1)		CODE	SHEATH DIAMETER	CODE	HOLE DEPTH		
J	JJ	IRON (+) vs CONSTANTAN (-)	316	3/16" (.187)	G	SINGLE GROUNDED, GROUNDED TO SHEATH	S	SINGLE CONSTRUCTION
K	KK	CHROMEL (+) vs ALUMEL (-)	14	1/4" (.250)	U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH	D	DUPLEX CONSTRUCTION
T	TT	COPPER (+) vs CONSTANTAN (-)			DG	DUPLEX GROUNDED, GROUNDED TO SHEATH		
E	EE	CHROMEL (+) vs CONSTANTAN (-)			DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH		
N	NN	NICROSIL (+) vs NISIL (-)						
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 2)						
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 2)						

TC55575 — SHEATH MATERIAL **R** — CALIBRATION **J** — MEASURING JUNCTION **G** — SHEATH DIAMETER **316** — HOLE DEPTH **6** — SINGLE/DUPLEX **S** — HEAD TYPE **AN**

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 3)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 2)

CONNECTION HEAD			
CODE	MATERIAL	TYPE	NEMA
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 4)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 4)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 4 & 5)	4, 4X
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 5)	4



SECTION INTC

OIL SEAL THERMOCOUPLES

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INDUSTRIAL THERMOCOUPLES

SPECIFICATIONS

Nipple:

Material: Carbon Steel
Size: 1/2"NPS by Schedule 40

Union:

Material: Black Malleable Iron
Size: 1/2"NPS by 150#

Swage Nipple

Material: Carbon Steel
Steel 1/2" by 1 1/2"NPT by Schedule 80

Measuring Junction: Grounded

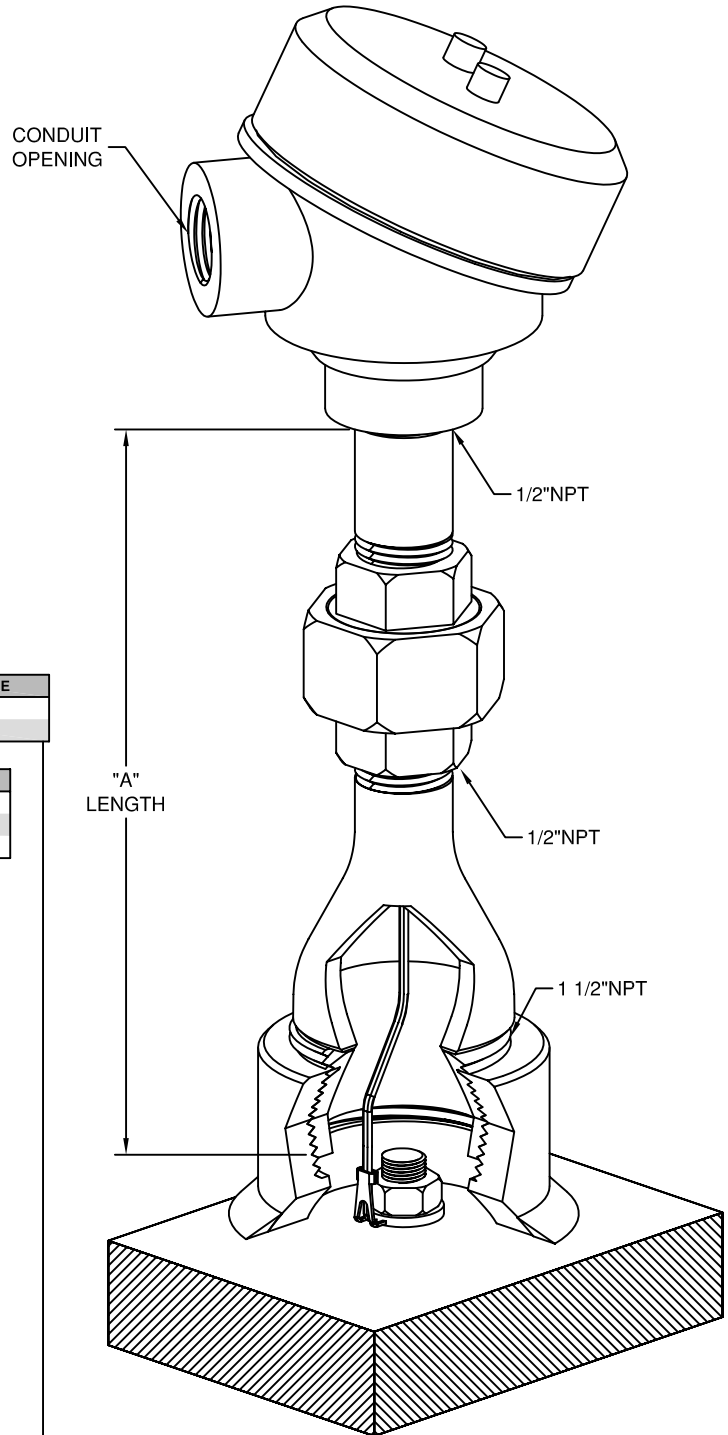
(Ungrounded available in Type A18 only)

Maximum Temperature Rating:

Type T: 700° F(370°C.)
All others in Code 1 or 3, 950°F(510°C)
All others in Code A18, 1200°F(650°C)

Notes:

- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (2) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.



CODE	STRUCTURE
S	SINGLE
D	DUPLEX

CODE	ELEMENT CONSTRUCTION
1	FIBERGLASS INSULATION AND JACKETED
3	FIBERGLASS INSULATION AND JACKETED W/ STN. STL. BRAID OVERALL
A18	MgO INSULATION WITH A 300 SERIES STN. STL. SHEATH, 1/8" DIAMETER

CODE	GASKET SIZE		
	BOLT SIZE	I. D.	O.D.
07	#10	13/64"	5/8"
08	#12	7/32"	5/8"
10	1/4"	9/32"	5/8"
12	5/16"	11/32"	5/8"
14	3/8"	13/32"	13/16"

CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 1)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
T	TT	COPPER (+) vs CONSTANTAN (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)

CODE	"A" LENGTH
	IN INCHES (6" MIN.)

CODE	CONDUIT OPENING
	1/2 or 3/4NPT

CONNECTION HEAD	
CODE	MATERIAL/TYPE
AN	ALUMINUM, WATER PROOF
SN	STN. STL., WEATHER PROOF, CORROSION RESISTANT
A	CAST IRON, WEATHER PROOF, RUGGED

TC29055- - - - - - - -
AN - 3/4 - 6 - J - 12 - 1 - S



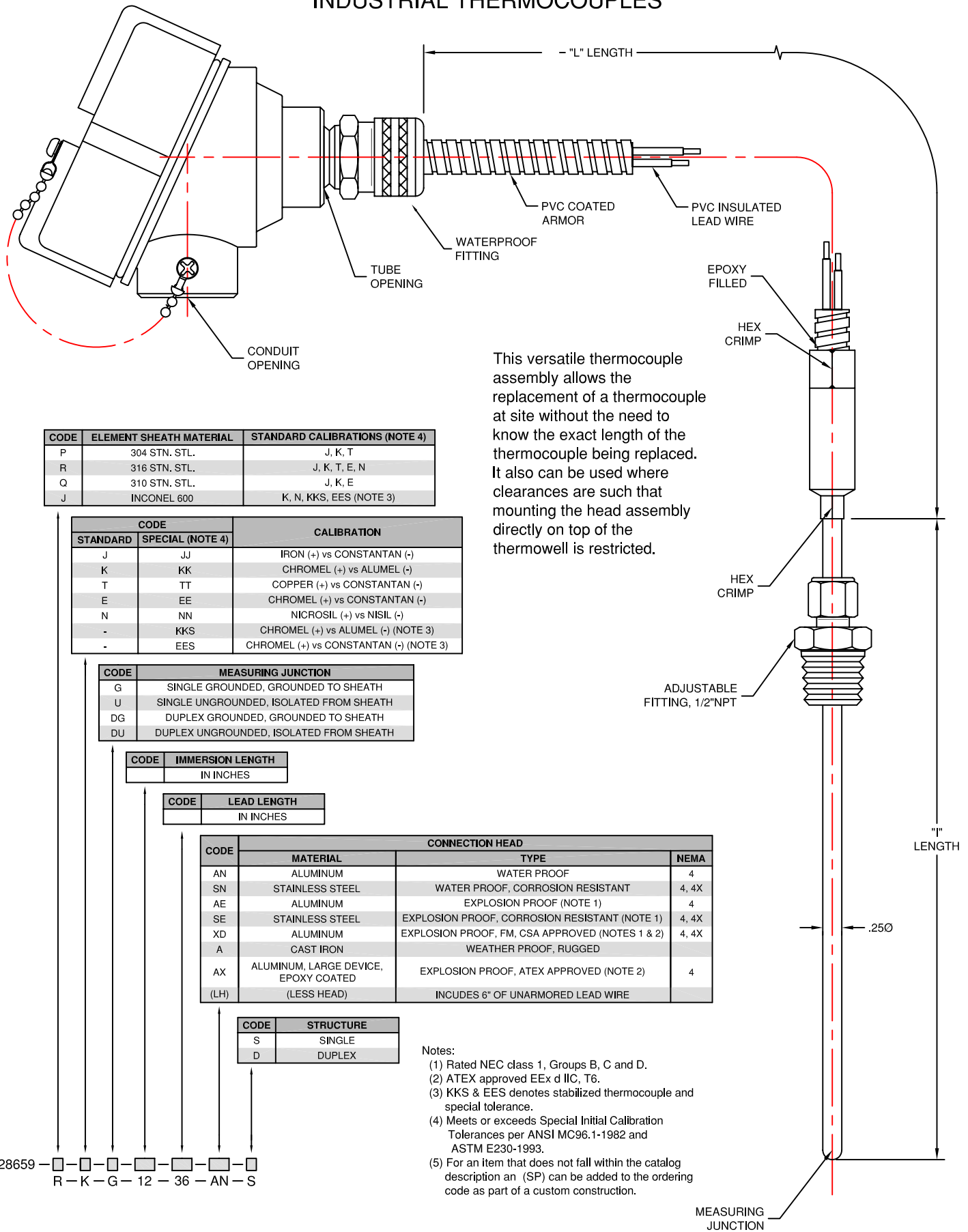
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SECTION INTC INDUSTRIAL GASKET ASSEMBLIES

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Doc. No.: TE-CO010109-INTC-190

INDUSTRIAL THERMOCOUPLES



This versatile thermocouple assembly allows the replacement of a thermocouple at site without the need to know the exact length of the thermocouple being replaced. It also can be used where clearances are such that mounting the head assembly directly on top of the thermowell is restricted.

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 4)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 3)

CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 4)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
T	TT	COPPER (+) vs CONSTANTAN (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 3)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 3)

CODE	MEASURING JUNCTION
G	SINGLE GROUNDED, GROUNDED TO SHEATH
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

CODE	IMMERSION LENGTH
	IN INCHES

CODE	LEAD LENGTH
	IN INCHES

CODE	CONNECTION HEAD		NEMA
	MATERIAL	TYPE	
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 1)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 1)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 1 & 2)	4, 4X
A	CAST IRON	WEATHER PROOF, RUGGED	
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 2)	4
(LH)	(LESS HEAD)	INCLUDES 6" OF UNARMORED LEAD WIRE	

CODE	STRUCTURE
S	SINGLE
D	DUPLEX

- Notes:
- (1) Rated NEC class 1, Groups B, C and D.
 - (2) ATEX approved EEx d IIC, T6.
 - (3) KKS & EES denotes stabilized thermocouple and special tolerance.
 - (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993.
 - (5) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

TC28659 - R - K - G - 12 - 36 - AN - S



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SECTION INTC REMOTE HEAD MOUNTED ASSEMBLIES

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Doc. No.: TE-CO010109-INTC-210

INDUSTRIAL THERMOCOUPLES

A	CODE	HEAD EXTENSION
	1	(NO EXTENSION, 0 "A" LENGTH)
	3	NIPPLE/UNION/ (NOTE 1)

B	CONNECTION HEAD			
	CODE	MATERIAL	TYPE	NEMA
	AN	ALUMINUM	WATER PROOF	4
	SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
	AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
	SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
	XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
	A	CAST IRON	WEATHER PROOF, RUGGED	
	AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

C	CODE	CONDUIT OPENING	D	CODE	TUBE OPENING	E	CODE	"A" LENGTH
		1/2 or 3/4NPT			(NOTE 4)			IN INCHES

F	CODE		ELEMENT CONSTRUCTION			
	SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	AVAILABLE CALIB.
	B14	BD14	.325"	14	CERAMIC BEAD	K
	B08	BD08	.5"/.69"	8	CERAMIC BEAD	K
	B20	BD20	.125"	20	CERAMIC BEAD	R, S, B
	B22	BD22	.125"	22	CERAMIC BEAD	R, S, B
	B24	BD24	.125"	24	CERAMIC BEAD	R, S, B

G	CODE		CALIBRATION
	STANDARD	SPECIAL (NOTE 5)	
	K	KK	CHROMEL (+) vs ALUMEL (-)
	R	RR	PLATINUM-13%RHODIUM (+) vs PLATINUM (-)
	S	SS	PLATINUM-10%RHODIUM (+) vs PLATINUM (-)
	B	BB	PLATINUM-30%RHOD. (+) vs PLATINUM-6%RHOD (-)

H	CODE		MEASURING JUNCTION
	STANDARD	SPECIAL (NOTE 5)	
	G		SINGLE GROUNDED
	U		SINGLE UNGROUNDED
	DG		DUPLEX GROUNDED
	DU		DUPLEX UNGROUNDED

J	PROTECTION TUBE TYPE					
	CODE	MOUNTING CONNECTION	HEAD CONNECTION	TUBE SIZE I.D.	TUBE SIZE O.D.	MATERIAL
	900	1/2"NPT	1/2"NPT	1/4"	3/8"	MULLITE
	901	3/4"NPT	1/2"NPT	3/8"	1/2"	
	902	1"NPT	3/4"NPT	7/16"	11/16"	
	903	1 1/4"NPT	3/4"NPT	5/8"	7/8"	
	904	1 1/4"NPT	3/4"NPT	3/4"	1"	99.5% PURE ALUMINA
	910	1/2"NPT	1/2"NPT	5/32"	1/4"	
	911	1/2"NPT	1/2"NPT	3/16"	5/16"	
	912	1/2"NPT	1/2"NPT	1/4"	3/8"	
	913	3/4"NPT	1/2"NPT	5/16"	1/2"	
	914	3/4"NPT	1/2"NPT	7/16"	9/16"	
	915	3/4"NPT	1/2"NPT	7/16"	11/16"	CERMET
	916	1 1/4"NPT	3/4"NPT	5/8"	7/8"	
	917	1 1/4"NPT	3/4"NPT	3/4"	1"	
	930	NONE	1/2"NPT	5/8"	7/8"	
	930T	3/4"NPT	1/2"NPT	5/8"	7/8"	

K	PROTECTION TUBE MATERIAL		
	CODE	MATERIAL	MAXIMUM TEMPERATURE
	U	MULLITE (SILICA-ALUMINA)	3,000°F (1,650°C)
	S	99.5% PURE ALUMINA	3,450°F (1,900°C)
	CERMET	METAL-CERAMIC	2,500°F (1,370°C)

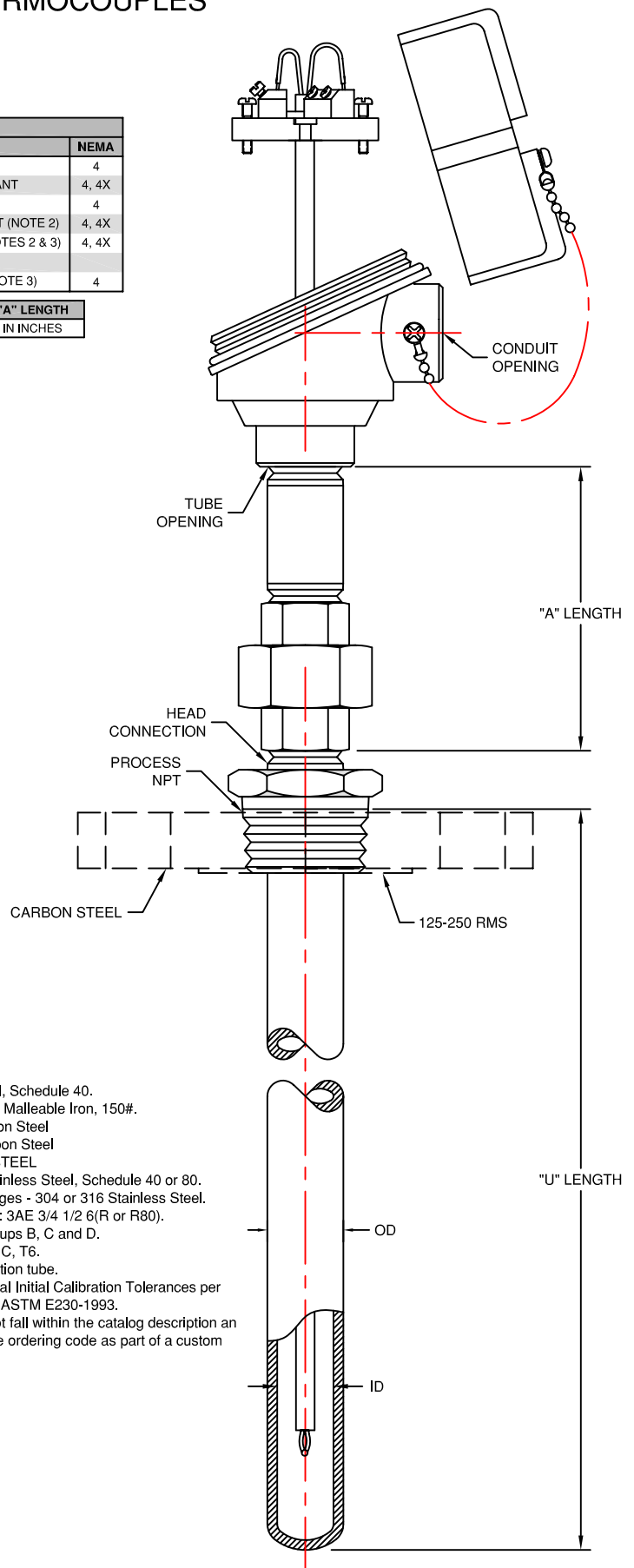
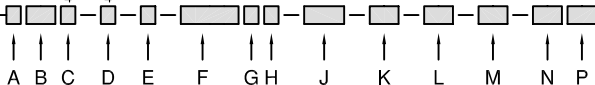
L	CODE	"U" LENGTH
		IN INCHES

M	CODE	FLANGE SIZE
		IN INCHES

N	CODE	FLANGE RATING
		SPECIFY

P	CODE		FLANGE TYPE
	FF	RF	
	RF	RJ	
	RJ		
			FLAT FACE
			RAISED FACE
			RING TYPE JOINT

EXAMPLE: 3 AE 3/4 - 3/4 - 3 - BD24 K U - 916 - S - 18 - 1.5 - 300 RF



Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
Standard Fittings - Carbon Steel
Standard Flanges - Carbon Steel
- OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions, Fittings and flanges - 304 or 316 Stainless Steel.
Example Ordering Code: 3AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Match opening to protection tube.
- (5) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993.
- (6) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.



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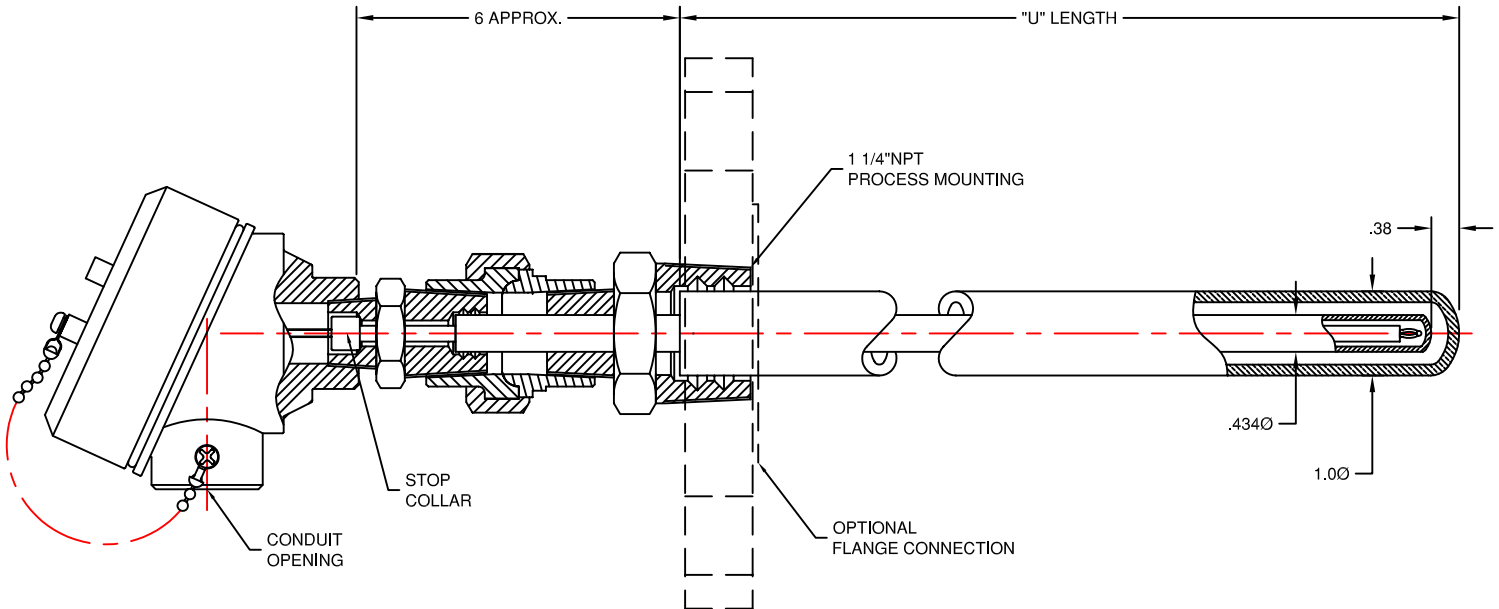
SECTION INTC

CERAMIC PROTECTION TUBE ASSEMBLIES THREADED or FLANGED

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INDUSTRIAL THERMOCOUPLES



This double tube construction allows the use of an alumina primary tube which protects the element and a silicon carbide secondary (or outer) tube which protects the alumina tube from the thermal shock associated with startup conditions.

The alumina inner tube is attached to the upper fitting (between head and union) with a high temperature cement. The silicon carbide outer tube is cemented to the process fitting. Grooves for the tube are machined into the fittings provide additional holding strength. The thermocouple is equipped with a collar seated in the inner fitting to prevent the measuring junction from being crushed.

Assemblies can be used in an oxidizing atmosphere up to 1900°F (1600°C) and 3600°F (2000°C) in a reducing atmosphere.

This unique design seals the thermocouples and prevents breakage by restricting movement of the tubes. Protection tubes are field replaceable.

TC29620-AN $\frac{3}{4}$ -R-12-S-1.5-300 RF

CODE	FLANGE TYPE
FF	FLAT FACE
RF	RAISED FACE
RJ	RING TYPE JOINT

CODE	FLANGE RATING
	SPECIFY

CODE	FLANGE SIZE
	IN INCHES

CODE	STRUCTURE
S	SINGLE
D	DUPLEX

CODE	"U" LENGTH
	IN INCHES

CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 3)	
R	RR	PLATINUM-13%RHODIUM (+) vs PLATINUM (-)
S	SS	PLATINUM-10%RHODIUM (+) vs PLATINUM (-)
B	BB	PLATINUM-30%RHOD. (+) vs PLATINUM-6%RHOD (-)

CODE	CONDUIT OPENING
	1/2 or 3/4NPT

CODE	CONNECTION HEAD		
	MATERIAL	TYPE	NEMA
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 1)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 1)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 1 & 2)	4, 4X
A	CAST IRON	WEATHER PROOF, RUGGED	
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

SPECIFICATIONS

Calibration: R, S or B
 Element Size: 24 gauge
 Element Insulator: 2 or 4 hole Alumina Beads
 Stop Collar: Mullite Bead
 Upper Fitting
 Size: 1/2" by 3/4"NPT
 Material: Stainless Steel
 Union
 Size: 3/4"NPT
 Material: Steel, (Stainless Steel Available)
 Process Fitting
 Size: 3/4" by 1 1/4"NPT
 Material: Stainless Steel
 Primary Tube
 Size: 7/16"OD by 5/16"ID
 Material: High purity Alumina
 Secondary Tube
 Size: 1"OD by 9/16"ID
 Material: Recrystallized Silicon Carbide

Notes:

- (1) Rated NEC class 1, Groups B, C and D.
- (2) ATEX approved EEx d IIC, T6.
- (3) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993.
- (4) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.



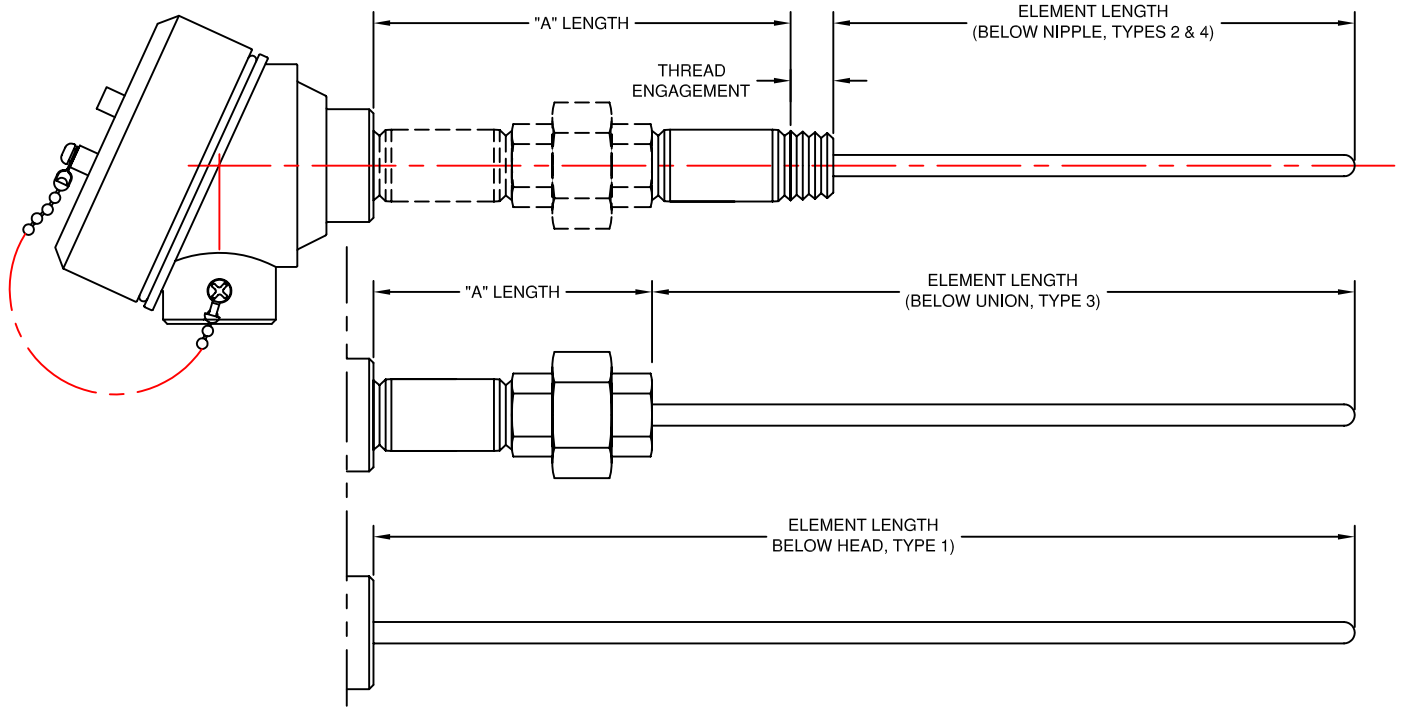
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SECTION INTC DOUBLE CERAMIC PROTECTION TUBE ASSEMBLIES THREADED or FLANGED

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INDUSTRIAL THERMOCOUPLES



DETERMINING ELEMENT LENGTH

In most cases to determine element length for existing wells, simply measure the overall length of the well and subtract 1/2" for thread engagement. This allows for spring compression on spring loaded elements and minor adjustment to non-spring loaded elements.

Notes:

- (1) Standard Nipples - Steel, Schedule 40.
Standard Unions - Black Malleable Iron, 150#.
- OPTIONAL STAINLESS STEEL
Nipples - 304 or 316 Stainless Steel, Schedule 40 or 80.
Unions - 304 or 316 Stainless Steel.
Example Ordering Code: 4AE 3/4 1/2 6(R or R80).
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
- (5) KKS & EES denotes stabilized thermocouple and special tolerance.
- (6) Contact factory for other calibration and sheath combinations.
- (7) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

CODE	CONNECTION HEAD			NEMA
	MATERIAL	TYPE		
AN	ALUMINUM	WATER PROOF		4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT		4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)		4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)		4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)		4, 4X
A	CAST IRON	WEATHER PROOF, RUGGED		
L	POLYPROPYLENE	WEATHER PROOF, LIGHT WEIGHT		
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)		4

CODE	HEAD EXTENSION
1	(NO EXTENSION, 0 "A" LENGTH)
2	NIPPLE
3	NIPPLE/UNION
4	NIPPLE/UNION/NIPPLE

CODE	CONDUIT OPENING
	1/2 or 3/4NPT

CODE	TUBE OPENING
	1/2 or 3/4NPT

CODE	"A" LENGTH
	IN INCHES

CODE		ELEMENT CONSTRUCTION			
SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED
ASL18	ADSL18	1/8"	24	MgO-SHEATH	YES
A316	AD316	3/16"	20	MgO-SHEATH	NO
ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES
A14	AD14	1/4"	18	MgO-SHEATH	NO
ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES
A516	AD516	5/16"	16	MgO-SHEATH	NO
ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES
A38	AD38	3/8"	15	MgO-SHEATH	NO
ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES
B14	BD14	.325"	14	CERAMIC BEAD	NO
B20	BD20	.183"	20	CERAMIC BEAD	NO
B08	BD08	.57/.69"	8	CERAMIC BEAD	NO

4 AE 3/4 - 1/2 - 4 - ASL14 J G P - 10 B.N.

CODE	ELEMENT EXTENSION
B.H.	BELOW HEAD (TYPE 1)
B.N.	BELOW NIPPLE (TYPE 2 & 4)
B.U.	BELOW UNION (TYPE 3)

CODE	ELEMENT LENGTH
	(IN INCHES)

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 6)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 5)

CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 4)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
T	TT	COPPER (+) vs CONSTANTAN (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 5)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 5)

CODE	MEASURING JUNCTION
G	SINGLE GROUNDED, GROUNDED TO SHEATH
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH



SECTION INTC

ASSEMBLIES LESS THERMOWELLS

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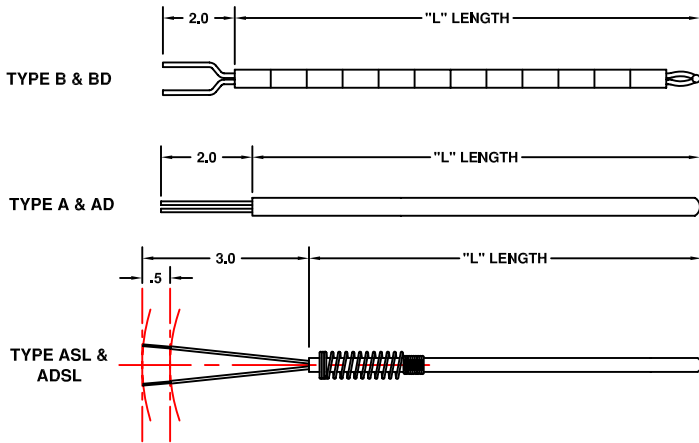
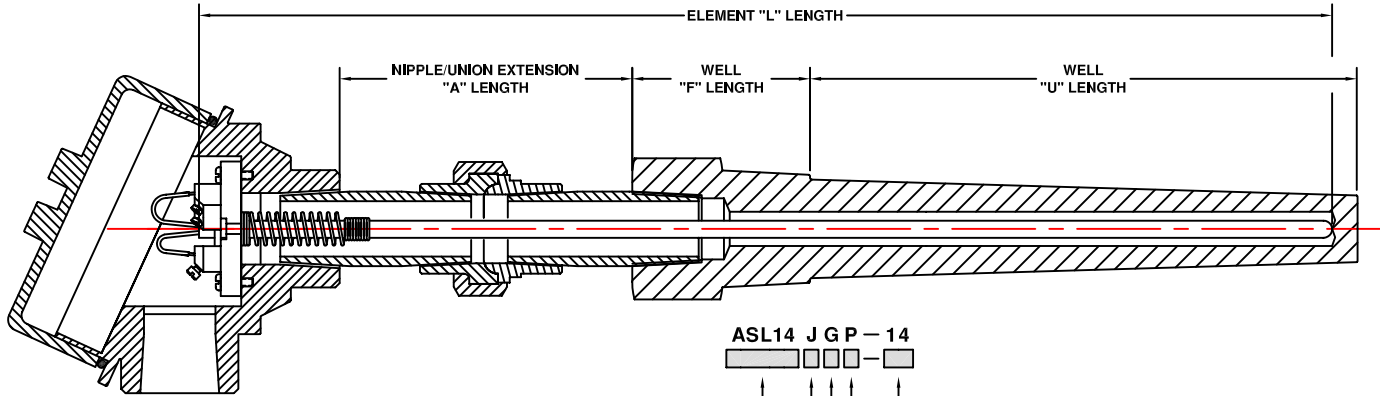
INDUSTRIAL THERMOCOUPLES

Type A and AD or sheath thermocouple elements are manufactured with CERAMO®, a metal sheath with a hard packed MgO insulation. The sheath material is usually a standard 300 series stainless steel or a nickel base alloy. In most cases the sheath material matches the well material or where the well material is a more special alloy the sheath should match the same temperature rating. Sheath elements are mostly spring loaded by means of a self gripping stainless steel spring which backs up under the terminal block for a constant tip contact inside the well. Insulation resistance (IR) remains high for effective readings at elevated temperatures. Non spring loaded elements terminate with the conductors skinned back from the sheath and the MgO removed for 2 inches. The connection is usually made underneath the block through holes in the ceramic base leading directly to the terminal post. The spring loaded and more common version consists of 3" of stranded and insulated thermocouple lead wire epoxy sealed into the end of the sheath or a transition piece. The leads extend through the hole in the center of the block to the posts. Non spring loaded elements are identified with "+" sticker on the positive leg of the element and the spring loaded by the ANSI color code.

Type B and BD thermocouple elements are the bare thermocouple conductors separated with hard fired ceramic beads. The measuring junction is considered a grounded construction with the tip extending beyond the last bead and fused together. The junction is available ungrounded with the last bead sliced across the holes for a recessed tip or sealed with a high temperature ceramic potting compound. Beaded elements terminated with 2 inches of unbeaded ends and usually connects to the block the same as the non spring loaded type A and AD. The thermocouple conductors are provided in 20 and 14 gauge used with the bar stock wells with the smaller drilled inside diameters. The larger 8 gauge conductors are used in the larger pipe size protection tubes. This type of element can be supplied in one length and reduced for field installation by simply removing beads and cutting the conductors. Beaded elements are not available spring loaded, the polarity is identified with "+" sticker on the positive leg.

Type B and BD element in the noble alloys, R, S & B are available in 20 and the more common 24 gauge and insulated with high purity alumina beads for high temperature service.

Elements may be ordered by measuring the "L" length of the existing element or using the guide below.



ELEMENT "L" LENGTH EQUALS ASSEMBLY "U" + "F" + "A" + HEAD EXTENSION ADDER BELOW.

CODE	HEAD EXTENSION ADDER		TYPE ASL, ADSL	TYPE B, BD
	MATERIAL			
AN	ALUMINUM		1.5"	0"
SN	STAINLESS STEEL		1.5"	0"
AE	ALUMINUM		1.5"	0"
SE	STAINLESS STEEL		1.5"	0"
XD	ALUMINUM		2.38"	1.0
A	CAST IRON		2.25"	1.0
L	POLYPROPYLENE		2.25"	.5"
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED		2.0"	1.25"

- Notes:
- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993
 - (2) KKS & EES denotes stabilized thermocouple and special tolerance.
 - (3) Contact factory for other calibration and sheath combinations.

CODE	"L" LENGTH IN INCHES
P	304 STN. STL.
R	316 STN. STL.
Q	310 STN. STL.
J	INCONEL 600

DROP CODE WHEN USING CERAMIC BEADED ELEMENTS

CODE	MEASURING JUNCTION
G	SINGLE GROUNDED, GROUNDED TO SHEATH
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

CODE	CALIBRATION	
	STANDARD	SPECIAL (NOTE 1)
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
T	TT	COPPER (+) vs CONSTANTAN (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 2)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 2)

CODE		ELEMENT CONSTRUCTION				
SINGLE	DUPLEX	DIAMETER	WIRE SIZE (AWG)	INSULATION	SPRING LOADED	AVAILABLE CALIBRATION
A316	AD316	3/16"	20	MgO-SHEATH	NO	J, K, T, E, N
ASL316	ADSL316	3/16"	20	MgO-SHEATH	YES	J, K, T, E, N
A14	AD14	1/4"	18	MgO-SHEATH	NO	J, K, T, E, N
ASL14	ADSL14	1/4"	18	MgO-SHEATH	YES	J, K, T, E, N
A516	AD516	5/16"	16	MgO-SHEATH	NO	J, K, T, E, N
ASL516	ADSL516	5/16"	16	MgO-SHEATH	YES	J, K, T, E, N
A38	AD38	3/8"	15	MgO-SHEATH	NO	J, K, T, E, N
ASL38	ADSL38	3/8"	15	MgO-SHEATH	YES	J, K, T, E, N
B20	BD20	.183"	20	CERAMIC BEAD	NO	J, K, T, E, N
B14	BD14	.325"	14	CERAMIC BEAD	NO	J, K, T, E, N
B08	BD08	.687"	08	CERAMIC BEAD	NO	J, K, T, E, N
B20	BD20	.187"	20	ALUMINA BEAD	NO	R, S, B
B24	BD24	.187"	24	ALUMINA BEAD	NO	R, S, B

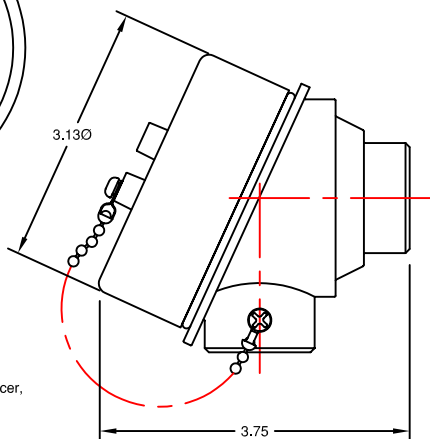
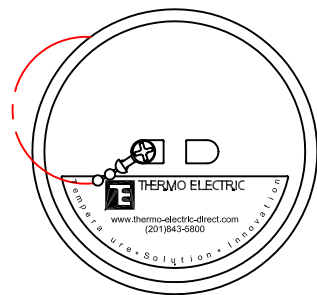
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REPLACEMENT THERMOCOUPLE ELEMENTS

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INDUSTRIAL THERMOCOUPLES

TYPE AN



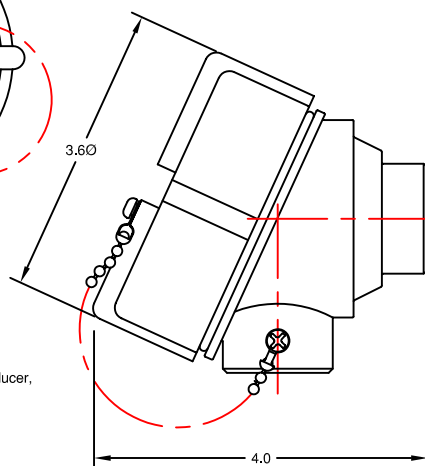
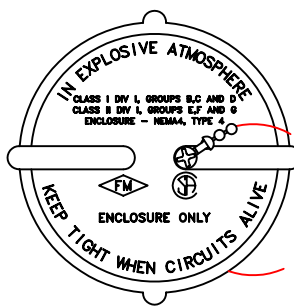
WATERPROOF ALUMINUM HEAD

STANDARD FEATURES

- Gray Polyester Coated Cast Aluminum Body & Cover
- Stainless Steel Ball Chain
- Neoprene O-ring
- Internal Ground Screw
- Available Tube Openings: 1/2", 3/4"NPT
- Available Conduit Openings: 1/2" with reducer, 3/4"NPT

COMPLIANCE

NEMA-4



EXPLOSION PROOF ALUMINUM HEAD

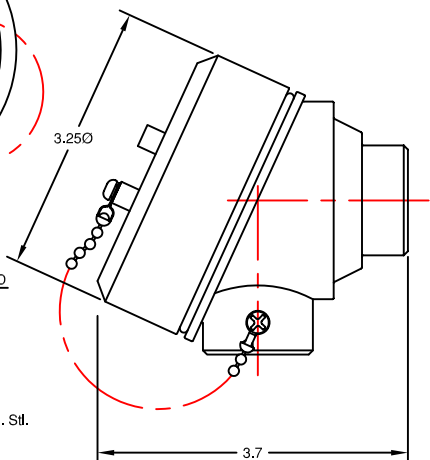
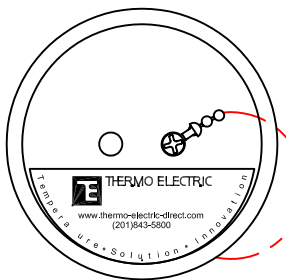
STANDARD FEATURES

- Gray Polyester Coated Cast Aluminum Body & Cover
- Stainless Steel Ball Chain
- Neoprene O-ring
- Internal Ground Screw
- Available Tube Openings: 1/2", 3/4"NPT
- Available Conduit Openings: 1/2" with reducer, 3/4"NPT

COMPLIANCE

CSA & FM Approved for Class 1, Division 1, Groups B, C, & D Class 2, Division 2, Groups E, F & G NEMA-4

TYPE SN



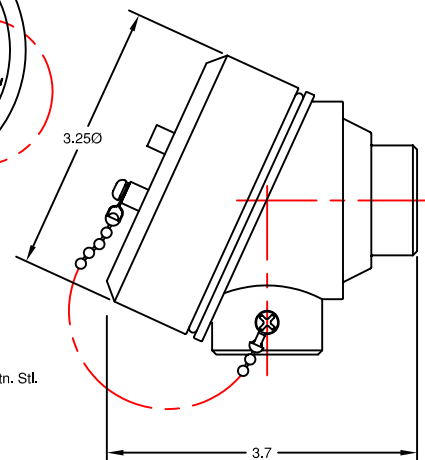
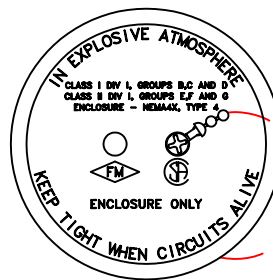
CORROSION RESISTANT STN. STL. HEAD

STANDARD FEATURES

- 316 Stainless Steel Body & Cover
- Stainless Steel Ball Chain
- Neoprene O-ring
- Internal Ground Screw
- Available Tube Openings: 1/2", 3/4"NPT
- Available Conduit Openings: 1/2" with Stn. Stil. reducer, 3/4"NPT

COMPLIANCE

NEMA-4, -4X



CORROSION RESISTANT EXPLOSION PROOF STN. STL. HEAD

STANDARD FEATURES

- 316 Stainless Steel Body & Cover
- Stainless Steel Ball Chain
- Neoprene O-ring
- Internal Ground Screw
- Available Tube Openings: 1/2", 3/4"NPT
- Available Conduit Openings: 1/2" with Stn. Stil. reducer, 3/4"NPT

COMPLIANCE

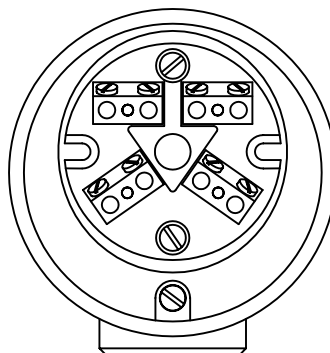
CSA & FM Approved for Class 1, Division 1, Groups B, C, & D Class 2, Division 2, Groups E, F & G NEMA-4, -4X

CODE	HEAD TYPE	
	SERVICE	MATERIAL
AN	WATERPROOF	ALUMINUM
AE	EXPLOSION PROOF	ALUMINUM
SN	CORROSION RESISTANT	STAINLESS STEEL
SE	CORROSION RESISTANT, X-PROOF	STAINLESS STEEL

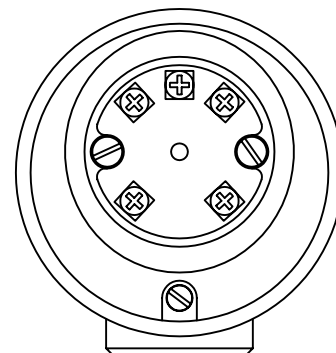
CODE	CONDUIT OPENING
	1/2 or 3/4"NPT

CODE	TUBE OPENING
	1/2 or 3/4"NPT

HD: .4P
AN 3/4 - 1/2



STANDARD 4 POINT TERMINAL BLOCK



TRANSMITTER MOUNTED



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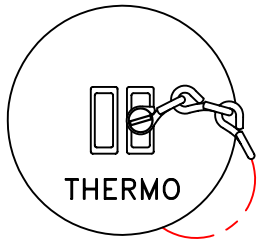
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CONNECTION HEADS

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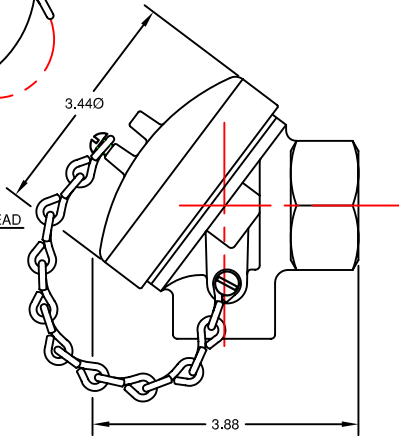
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INDUSTRIAL THERMOCOUPLES



THERMO

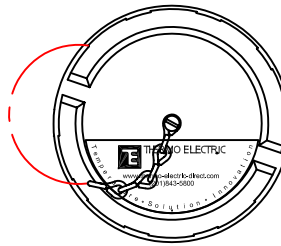
TYPE A



WEATHERPROOF HEAVY DUTY CAST IRON HEAD

STANDARD FEATURES

- Cast Iron Body & Cover with Heat Resistant Aluminum Paint
- Galvanized Jack Chain
- Fiber Gasket
- Available Tube Openings: 1/2", 3/4", 1"NPT
- Available Conduit Openings: 1/2" with reducer, 3/4"NPT
- Optional Neoprene gasket: Add "OR" to Code (A-OR)



EXPLOSION PROOF ALUMINUM HEAD

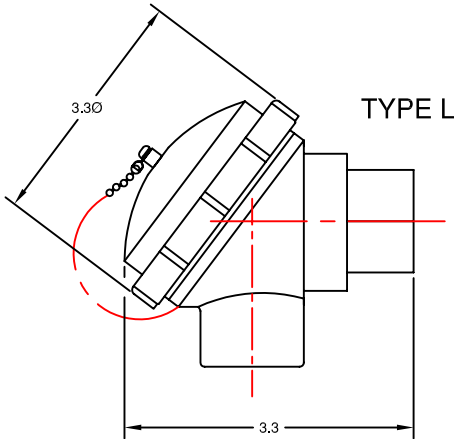
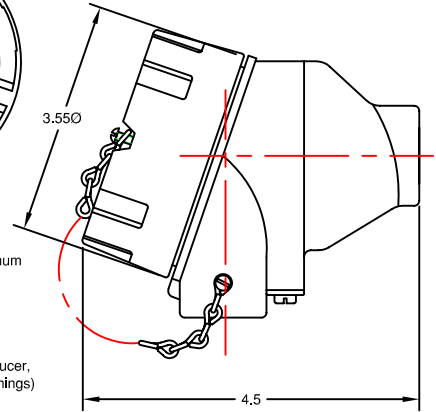
STANDARD FEATURES

- Chemically Resistant Painted Cast Aluminum Body & Cover
- Stainless Steel Link Chain
- Neoprene O-ring
- Internal, External Ground Screw
- Available Tube Openings: 1/2", 3/4"NPT
- Available Conduit Openings: 1/2" with reducer, 3/4"NPT, M20 X 1.5, (Dual Conduit Openings)

COMPLIANCE

- ATEX Approved EEx d IIC T6
- CSA & FM Approved for Class 1, Division 1, Groups A, B, C, & D
- Class 2, Division 2, Groups E, F & G
- NEMA-4, -4X, IP66

TYPE XD

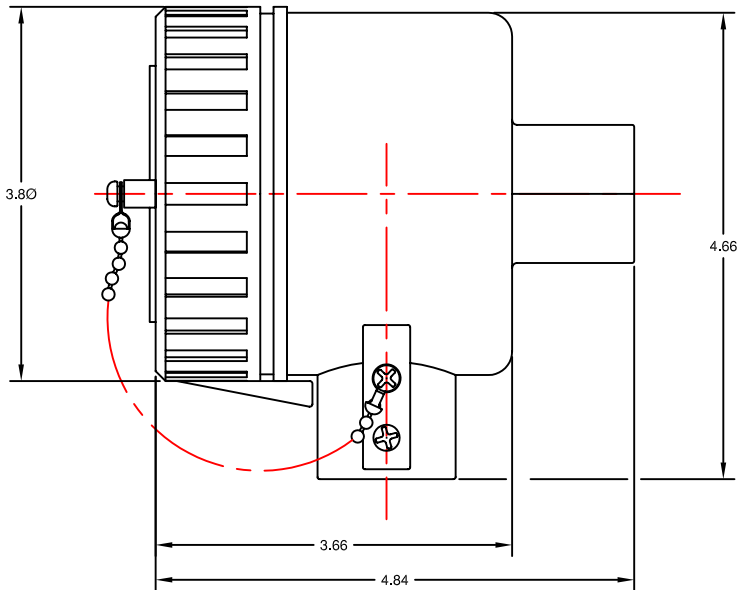


TYPE L

POLYPROPYLENE HEAD

STANDARD FEATURES

- Black Polypropylene Body & Cover
- Stainless Steel Ball Chain
- Rubber Gasket
- Available Tube Openings: 1/2", 3/4", 1"NPT
- Available Conduit Openings: 1/2" with PVC reducer, 3/4"NPT



TYPE AX

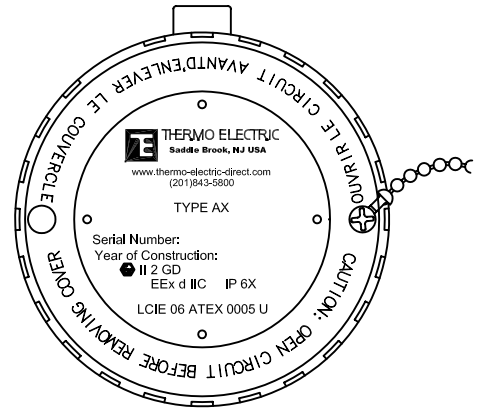
**LARGE DEVICE
ATEX APPROVED ALUMINUM HEAD**

STANDARD FEATURES

- Epoxy Coated Blue Cast Aluminum Body & Cover
- Stainless Steel Ball Chain
- Neoprene O-ring
- Internal, External Ground Screw
- Available Tube Openings: 1/2", 3/4"NPT
- Available Conduit Openings: 1/2", 3/4"NPT, M20 x 1.5

COMPLIANCE

- ATEX Approved EEx d IIC T6
- CSA & FM approval Pending



CODE	HEAD TYPE	
	SERVICE	MATERIAL
A	WEATHERPROOF, HEAVY DUTY	CAST IRON
XD	EXPLOSION PROOF	ALUMINUM
L	LIGHT WEIGHT PLASTIC	POLYPROPYLENE
AX	LARGE DEVICE	ALUMINUM

CODE	CONDUIT OPENING
	1/2, 3/4", 1"NPT, M20 x 1.5

CODE	TUBE OPENING
	1/2 or 3/4"NPT

HD: — .4P
XD 3/4 — 1/2



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SECTION INTC
CONNECTION HEADS

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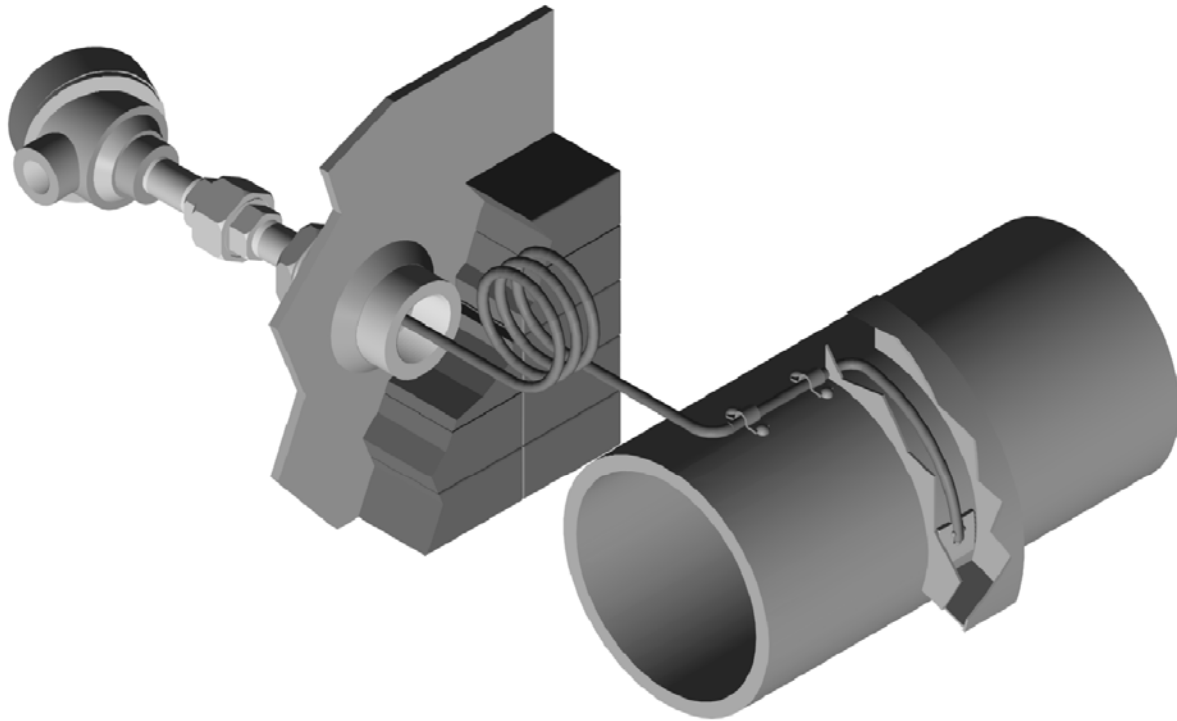
Doc. No.: TE-CO010109-INTC-270



THERMO ELECTRIC

TUBESKIN THERMOCOUPLES

Section INTC



Tube skin thermocouples provide an efficient means of temperature measurement of tube walls in petrochemical plants and of boiler and super heater tubes in power plants. Made of metal sheath, MgO insulated thermocouple wire (CERAMO®) the runs can vary from just a few feet to over 50. Tube skins are usually a grounded junction with a one inch square by 1/8" thick weld pad factory curved to fit the contour of the process pipe. Pads may also be supplied wider and 1/16" thick enabling the site to peen the pad to the pipe. Still others are equipped with a knife shape at the tip for faster response time. Knife edge tube skins can be provided in 1/2" diameter, heavy wall sheath.

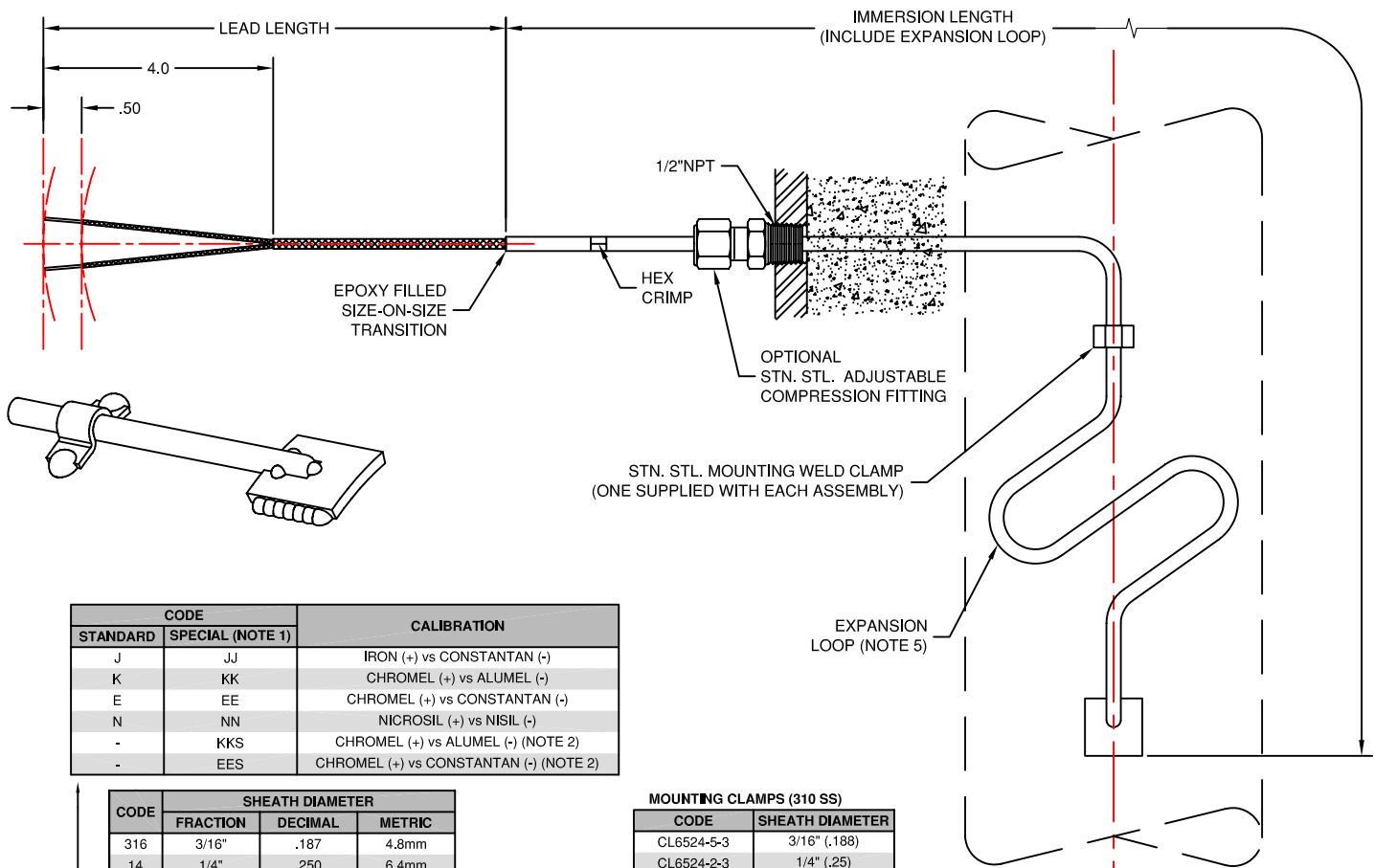
Shields may be added which curve around the pipe and over the junction and packed with a high temperature insulation to prevent heat from being transferred away from the junction thereby providing a more accurate temperature measurement.

Expansion loops or coils compensate for movement as the tubes are subject to thermal growth. Mounting clamps can be welded along the pipe for additional security.

Tube skins can be terminated in nipple extension with a compression fitting sealed inside the union to hold the sheath rigid then to a connection head. They can also be supplied to a same size transition as the sheath to allow for installation of a compression fitting attached to the housing wall then flexible lead wire for junction box termination. This design also allows the sheath to extend inside the junction box.

Thermo Electric will fabricate tube skin thermocouples to the requirements based on your installation drawings.

INDUSTRIAL THERMOCOUPLES



CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 1)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 2)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 2)

CODE	SHEATH DIAMETER		
	FRACTION	DECIMAL	METRIC
316	3/16"	.187	4.8mm
14	1/4"	.250	6.4mm
38	3/8"	.375	9.5mm

MOUNTING CLAMPS (310 SS)	
CODE	SHEATH DIAMETER
CL6524-5-3	3/16" (.188)
CL6524-2-3	1/4" (.25)
CL6524-3-3	3/8" (.375)

CODE	MEASURING JUNCTION
G	SINGLE GROUNDED, GROUNDED TO SHEATH
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH
DG	DUPLEX GROUNDED, GROUNDED TO SHEATH
DU	DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 3)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 2)

CODE	IMMERSION LENGTH
	(IN INCHES)

CODE	BEND RADIUS
R	RIGHT ANGLE
L	LONGITUDINAL
FLAT	FLAT SURFACE

TSC-1 - [] - [] - [] - [] - [] - [] - [] - [] - [] - []
 K - 14 - G - R - 60 - L 12 - 36 - GGS

CODE	PIPE DIAMETER
	(IN INCHES)

CODE	LEAD LENGTH
	(IN INCHES)

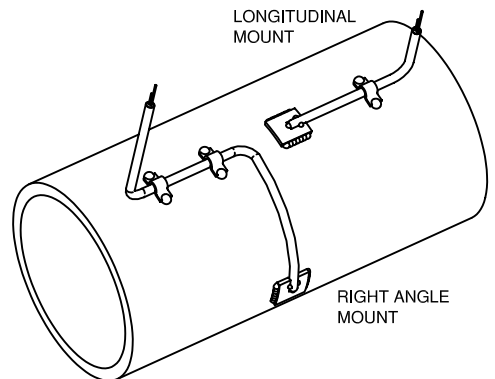
CODE	LEAD TYPE
GG	FIBERGLASS INSULATION & JACKETED
GGS	FIBERGLASS INSULATION & JACKETED WITH STN. STL. BRAID OVERALL

Notes:

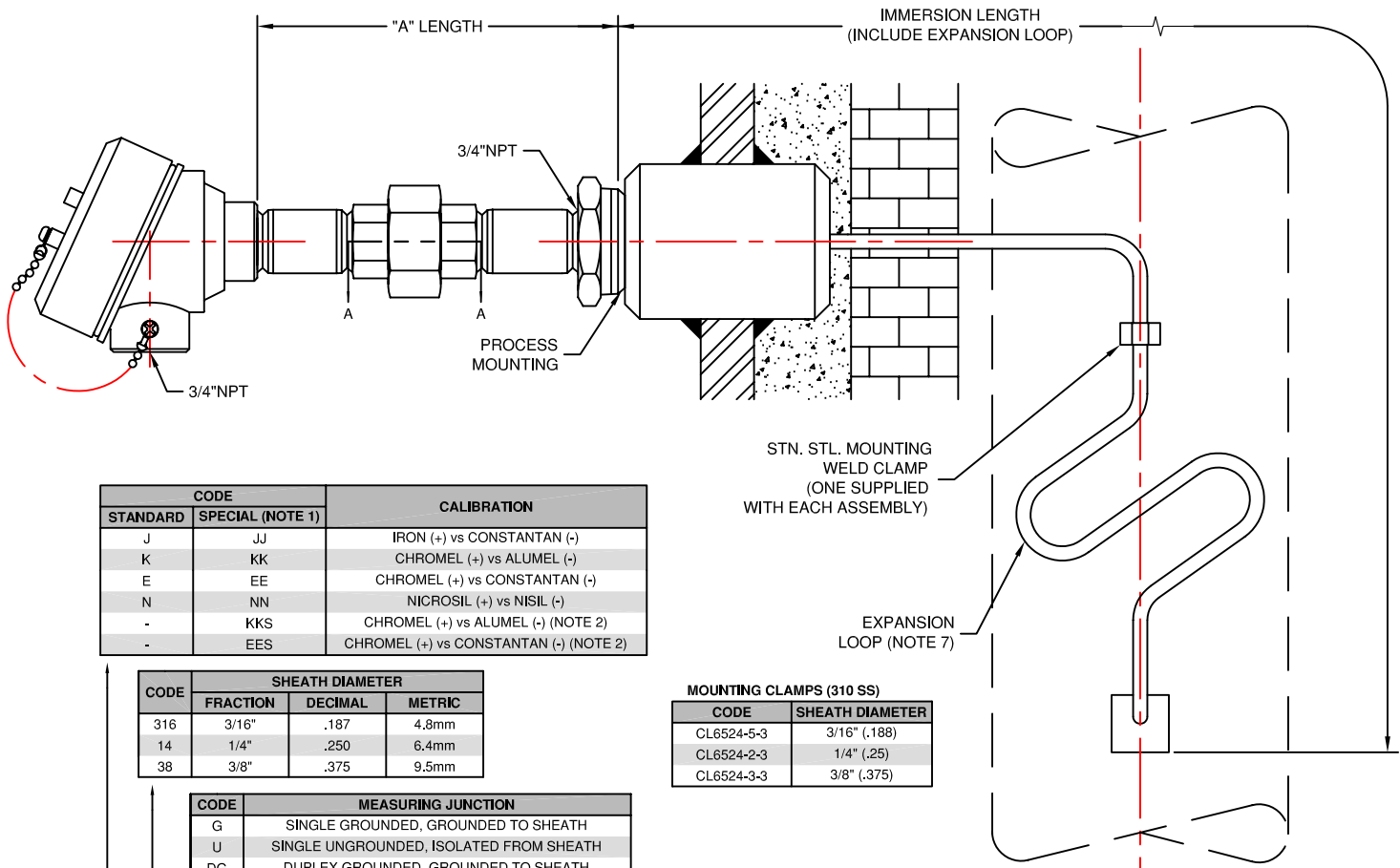
- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993.
- (2) KKS & EES denotes stabilized thermocouple and special tolerance.
- (3) Contact factory for other calibration and sheath combinations.
- (4) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.
- (5) Tube skins are normally shipped straight or coiled. Expansion loops or coils are available formed at factory to specification.

Specifications

- (1) Lead Wire Standard 20 gauge stranded conductors.
- (2) Weld pad of same material as sheath unless specified otherwise.
- (3) Pad size, 1" by 1" by .13" thk.



INDUSTRIAL THERMOCOUPLES



CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 1)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 2)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 2)

CODE	SHEATH DIAMETER		
	FRACTION	DECIMAL	METRIC
316	3/16"	.187	4.8mm
14	1/4"	.250	6.4mm
38	3/8"	.375	9.5mm

MOUNTING CLAMPS (310 SS)	
CODE	SHEATH DIAMETER
CL6524-5-3	3/16" (.188)
CL6524-2-3	1/4" (.25)
CL6524-3-3	3/8" (.375)

CODE		MEASURING JUNCTION
G		
U		SINGLE UNGROUNDED, ISOLATED FROM SHEATH
DG		DUPLEX GROUNDED, GROUNDED TO SHEATH
DU		DUPLEX UNGROUNDED, ISOLATED FROM SHEATH

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 3)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 2)

CODE	IMMERSION LENGTH
	(IN INCHES)

CODE	BEND RADIUS
R	RIGHT ANGLE
L	LONGITUDINAL
FLAT	FLAT SURFACE

TSC-2 - [] - [] - [] - [] - [] - [] - [] - [] - []
 K - 14 - G - R - 60 - L 12 - 6 - AN - 1NPT

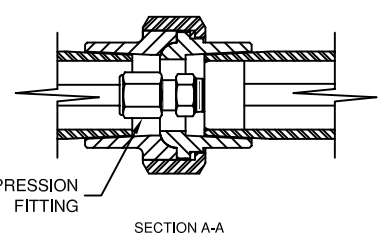
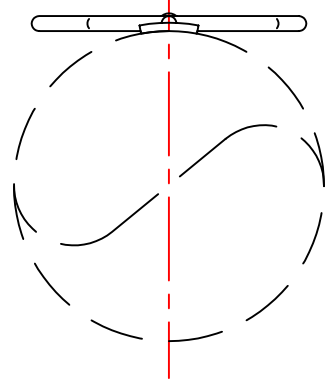
CODE	PIPE DIAMETER
	(IN INCHES)

CODE	"A" LENGTH
	(IN INCHES)

CODE	PROCESS MOUNTING
3/4NPT	3/4"NPT (NO REDUCER)
1NPT	1"NPT
1 1/2NPT	1 1/2"NPT
2NPT	2"NPT

CODE	CONNECTION HEAD		NEMA
	MATERIAL	TYPE	
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 4)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 4)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 4 & 5)	4, 4X
A	CAST IRON	WEATHER PROOF, RUGGED	
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 5)	4

LONGITUDINAL MOUNT SHOWN



- Specifications
- (1) Union Material - Standard Black Malleable Iron.
 - (2) Nipple Material - Standard Carbon Steel.
 - (3) Weld pad of same material as sheath unless specified otherwise.
 - (4) Pad size, 1" by 1" by .13" thk.



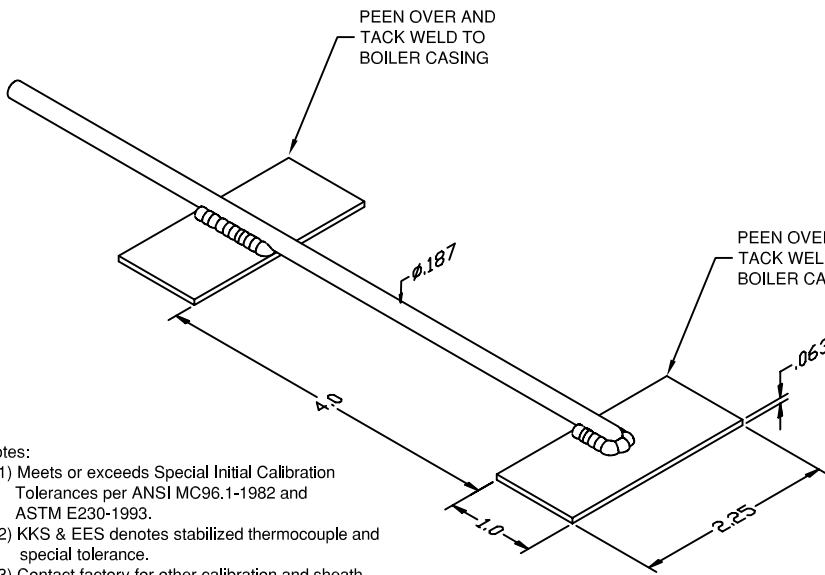
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SECTION INTC TUBE SKIN THERMOCOUPLES TYPE TSC-2

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INDUSTRIAL THERMOCOUPLES

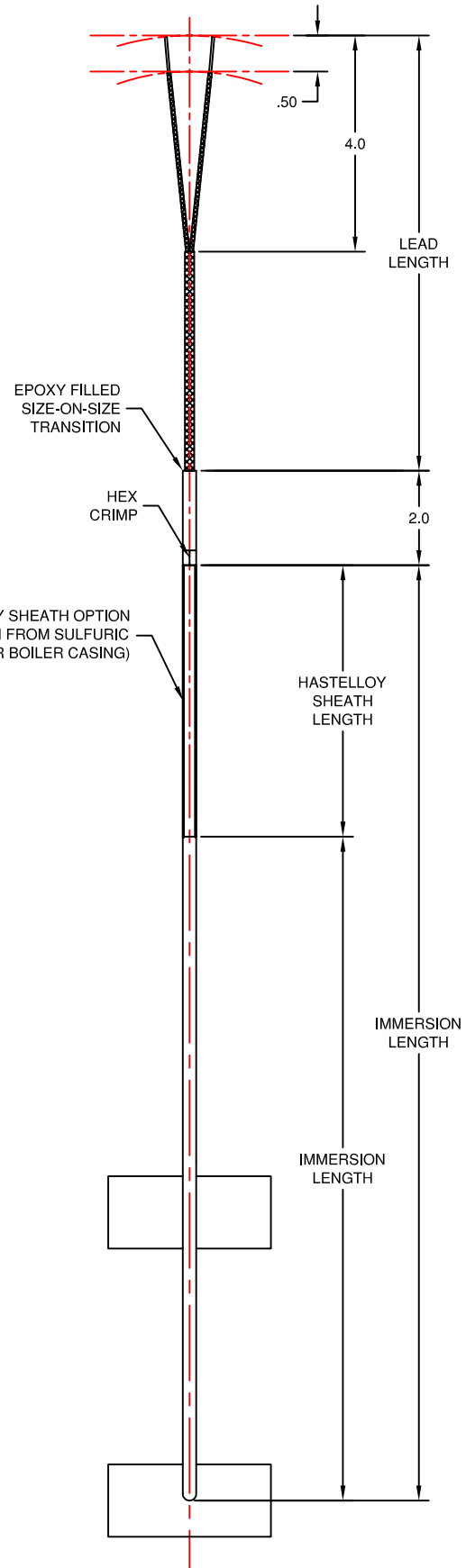


Notes:

- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993.
- (2) KKS & EES denotes stabilized thermocouple and special tolerance.
- (3) Contact factory for other calibration and sheath combinations.
- (4) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

Specifications

- (1) Lead Wire Standard 20 gauge stranded conductors, Fiberglass insulation and jacketed.
- (2) Measuring Junction: Single, Grounded
- (3) Sheath Insulation: Hard Packed MgO.
- (4) Weld pad of same material as sheath unless specified otherwise.
- (5) Pad size, 2.25" by 2.25" by .063" thk.



CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 1)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)
N	NN	NICROSIL (+) vs NISIL (-)
-	KKS	CHROMEL (+) vs ALUMEL (-) (NOTE 2)
-	EES	CHROMEL (+) vs CONSTANTAN (-) (NOTE 2)

CODE	MEASURING JUNCTION
G	SINGLE GROUNDED, GROUNDED TO SHEATH
U	SINGLE UNGROUNDED, ISOLATED FROM SHEATH

CODE	ELEMENT SHEATH MATERIAL	STANDARD CALIBRATIONS (NOTE 3)
P	304 STN. STL.	J, K, T
R	316 STN. STL.	J, K, T, E, N
Q	310 STN. STL.	J, K, E
J	INCONEL 600	K, N, KKS, EES (NOTE 2)

CODE	IMMERSION LENGTH (IN INCHES)

TC29080 - [] - 316 - [] - [] - [] - [] - [] - []
 K - 316 - G - R - 60 - 36 - HC - 60

CODE	HASTELLOY LENGTH (IN INCHES)

CODE	OPTIONAL
HC	HASTELLOY SHEATH

CODE	LEAD LENGTH (IN INCHES)



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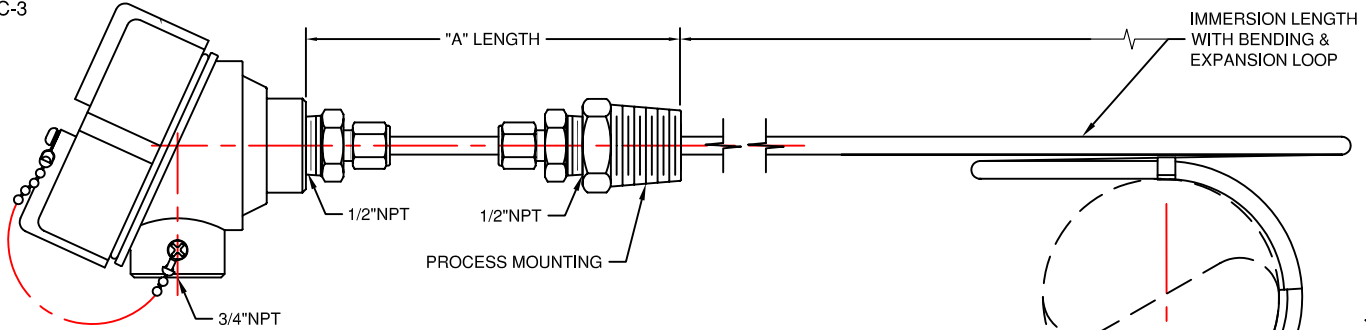
SECTION INTC TUBE SKIN THERMOCOUPLES BOILER CASING

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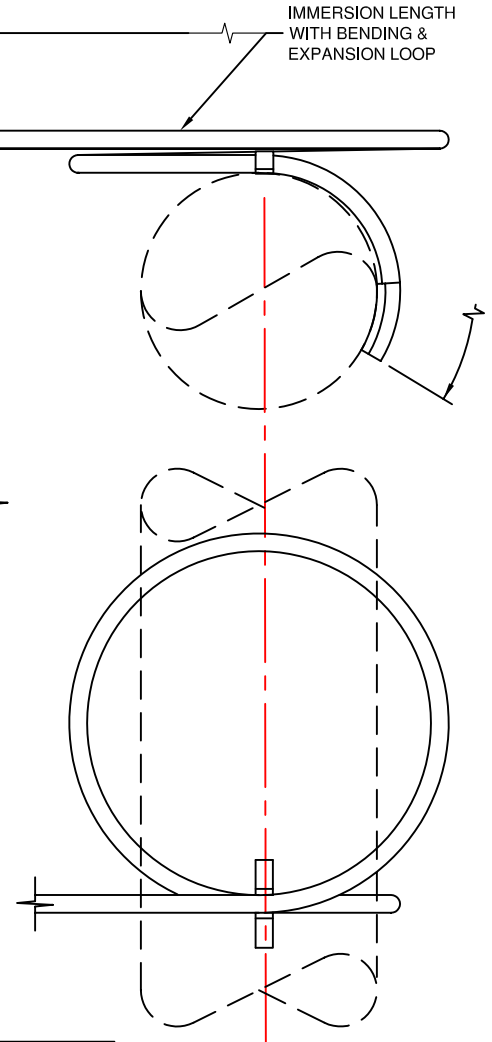
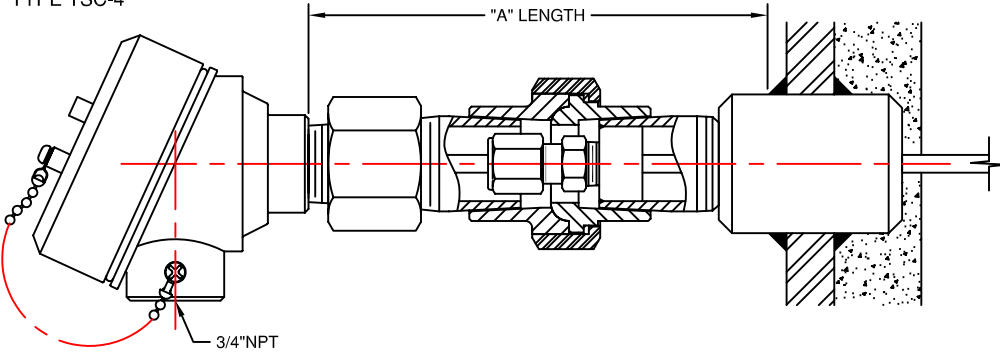
Doc. No.: TE-CO010109-INTC-300

INDUSTRIAL THERMOCOUPLES

TYPE TSC-3



TYPE TSC-4



CODE	HEAD EXTENSION
3	DIRECT SHEATH EXTENSION
4	NIPPLE/UNION/SEALING FITTING/NIPPLE

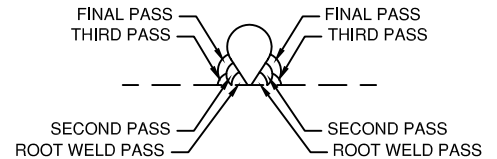
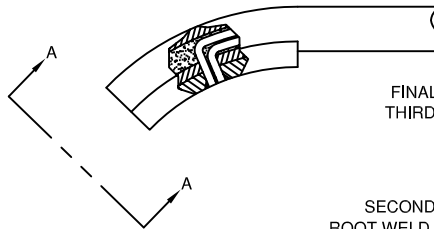
CODE		CALIBRATION
STANDARD	SPECIAL (NOTE 1)	
J	JJ	IRON (+) vs CONSTANTAN (-)
K	KK	CHROMEL (+) vs ALUMEL (-)
E	EE	CHROMEL (+) vs CONSTANTAN (-)

SHEATH DIAMETER & WALL THICKNESS		
CODE	FRACTION	WALL THICKNESS
12	1/2"	STANDARD WALL THICKNESS - .064"
12H	1/2"	HEAVY WALL - .120"

CODE	ELEMENT SHEATH MATERIAL
Q	310 STAINLESS STEEL
J	INCONEL 600
Y	446 STAINLESS STEEL

CODE	IMMERSION LENGTH (IN INCHES)

CODE	BEND RADIUS
R	RIGHT ANGLE
L	LONGITUDINAL



VIEW A-A

TSC-3-K-12-G-Q-60-L12-6-AN-1NPT

CODE	PIPE DIAMETER (IN INCHES)

CODE	"A" LENGTH (IN INCHES)

CODE	PROCESS MOUNTING
3/4NPT	3/4"NPT
1NPT	1"NPT
1 1/2NPT	1 1/2"NPT
2NPT	2"NPT

CODE	CONNECTION HEAD		NEMA
	MATERIAL	TYPE	
AN	ALUMINUM	WATER PROOF	4
SN	STAINLESS STEEL	WATER PROOF, CORROSION RESISTANT	4, 4X
AE	ALUMINUM	EXPLOSION PROOF (NOTE 2)	4
SE	STAINLESS STEEL	EXPLOSION PROOF, CORROSION RESISTANT (NOTE 2)	4, 4X
XD	ALUMINUM	EXPLOSION PROOF, FM, CSA APPROVED (NOTES 2 & 3)	4, 4X
A	CAST IRON	WEATHER PROOF, RUGGED	
AX	ALUMINUM, LARGE DEVICE, EPOXY COATED	EXPLOSION PROOF, ATEX APPROVED (NOTE 3)	4

Notes:

- (1) Meets or exceeds Special Initial Calibration Tolerances per ANSI MC96.1-1982 and ASTM E230-1993.
- (2) Rated NEC class 1, Groups B, C and D.
- (3) ATEX approved EEx d IIC, T6.
- (4) For an item that does not fall within the catalog description an (SP) can be added to the ordering code as part of a custom construction.

Specifications

- (1) Fitting Material - Stainless Steel
- (2) TCS-4, Union Material - Standard Black Malleable Iron.
- (3) TSC-4, Nipple Material - Standard Carbon Steel.



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SECTION INTC

KNIFE EDGE THERMOCOUPLES

TYPE TSC-3 & TSC-4

SINGLE CONSTRUCTION

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Doc. No.: TE-CO010109-INTC-310

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SECTION INTR

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