
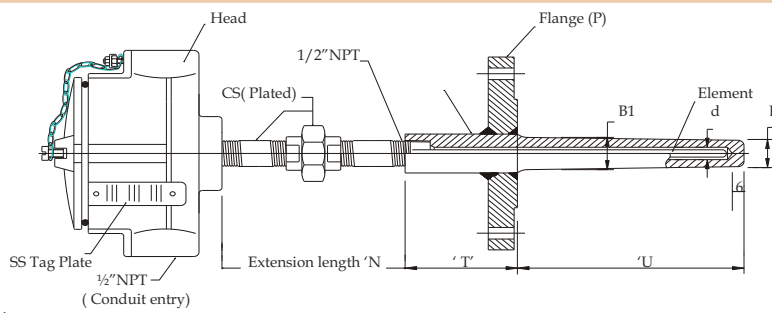


# 400 Series

## Thermocouple & Resistance Thermometer Assemblies with

- A Flanged tapered Thermowell.
- Certified for use in hazardous area. 
- Safe design as per ASME PTC19.3.
- Available with “in-head” 2-wire Temperature Transmitter.



Mi Thermocouple or Resistance Thermometer Sensor fitted into a terminal Head, and provided with head extension and drilled bar stock Flanged Thermowell would form a typical complete assembly ready for use in the application designed for. The design of the complete assembly depends on various parameters such as, temperature, dynamic pressure, flow velocity, abrasive nature of process fluid, intricate nature of installation and insertion lengths required.

High Velocity collar can be provided to reduce the suspended length of thermowell and to meet ASME PTC19.3 requirement. Thermowells are available in standard AISI 300 series Stainless Steel as well as exotic materials such as Incoloy 800, Inconel 600, Monel 400, Hastelloy alloys C276 and alloy B and flanges in ASTM grades A105, A182 and A350 and in sizes 3/4" to 2" (Dn20 to DN50).

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2"NPT and ungrounded Junction for Thermocouples unless specified otherwise.


Code	No of Elements	Code	Options	
1	Simplex	0	None	
2	Duplex	1	Head in 304SS	
3	Triplex	2	Head in 316SS	
		3	Extension in 304SS	
		4	Extension in 316SS	
		5	Other Conduit entry	
		6	In Head Transmitter	
		7	Brass Cable Gland	
		8	SS Cable Gland	
		10	Special requirement	
Code	Elements	Process Conn P	B	B
J	Iron-Constantan	3/4"ANSI or DN20	17	12.5
K	Chromel-Alumel	1"ANSI or DN 25	22	16
T	Copper-Constantan	1.5"ANSI or DN 40	25	19
E	Chromel-Constantan	2"ANSI or DN 50	28	25
N	Nicrosil-Nisil	Other sizes and dimensions on request		
R	PtRh 13%-Pt			
S	PtRh 10%-Pt			
B	PtRh30%-PtRh6%			
Pt	Pt100 RTD			
Code	Sheath Dia	'd'		
6	6mm	7.0mm		
8	8mm	8.5mm		
10	10mm	11.0mm		
Code	Sheath Material	Code	Well Extension	
316	316SS	T	Define	
321	321SS			
Inc	Inconel 600			
Code	Head Type	Code	Well Insertion	
D	Weatherproof	U	Define	
F	Flameproof IIA/IIB			
C	Flameproof IIC			
JB	Junction Box			
Code	No of entries	Code	Flange Material	
1	One entry	A105	ASTM A105 (CS)	
2	Two entries	F316	A182 F316	
		F304	A182 F304	
		F321	A182 F321	
		F5	A182 F5	
		LF2	A350 LF2	
		Other materials also available. Define grade		
Code	Well Material	Code	Well Material	
316	316SS	316	316SS	
304	304SS	304	304SS	
321	321SS	321	321SS	
446	446SS	446	446SS	

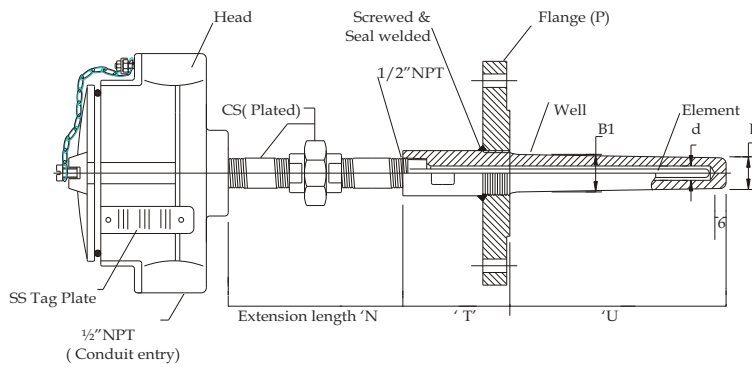
### ORDERING EXAMPLE

400# SERIES 1-K-6-316-D-1-316-F316-U=150-T=70-1"150#RF-Op0

# 410 Series

## Thermocouple & Resistance Thermometer Assemblies with

- ENI Standard 0165.00 Flanged Thermowell.
- Certified for use in hazardous area. 
- Safe design as per ASME PTC19.3.
- Available with "in-head" 2-wire Temperature Transmitter.



Mi Thermocouple or Resistance Thermometer Sensor fitted into a terminal Head, and provided with head extension and drilled bar stock Thermowell as per ENI standard 0165.00, is ideally suited for use in Fertiliser plants, Refineries and Petrochemical complexes.

The assembly can be supplied with 316SS terminal head and nipple-union-nipple in 316SS as a standard feature in weatherproof or flameproof execution. This will resist atmospheric corrosion and help in carrying out periodic maintenance with more ease.

Thermowells are available in standard AISI 300 series Stainless Steel as well as exotic materials such as Incoloy 800, Inconel 600, Monel 400, Hastelloy alloys C276 and alloy B and flanges in ASTM grades A105, A182 and A350 and in sizes 3/4" to 2" (Dn20 to Dn50).

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2"NPT and ungrounded Junction for Thermocouples.


Code	No of Elements	Code	Options		
1	Simplex	0	None		
2	Duplex	1	Head in 304SS		
3	Triplex	2	Head in 316SS		
		3	Extension in 304SS		
		4	Extension in 316SS		
		5	Other Conduit entry		
		6	In Head Transmitter		
		7	Brass Cable Gland		
		8	SS Cable Gland		
		10	Special requirement		
Code	Elements	Process Conn P	B1	B	
J	Iron-Constantan	3/4"ANSI or DN20	17	12.5	
K	Chromel-Alumel	1"ANSI or DN 25	22	16	
T	Copper-Constantan	1.5"ANSI or DN 40	25	19	
E	Chromel-Constantan	2"ANSI or DN 50	28	25	
N	Nicrosil-Nisil	Other sizes and dimensions on request			
R	PtRh 13%-Pt				
S	PtRh 10%-Pt				
B	PtRh30%-PtRh6%				
Pt	Pt100 RTD				
Code	Sheath Dia	'd'			
6	6mm	7.0mm			
8	8mm	8.5mm			
10	10mm	11.0mm			
Code	Sheath Material	Code	Well Extension		
316	316SS	T	Define		
321	321SS				
Inc	Inconel 600				
Code	Head Type	Code	Well Insertion		
D	Weatherproof	U	Define		
F	Flameproof IIA/IIB				
C	Flameproof IIC				
JB	Junction Box				
Code	No of entries	Code	Flange Material		
1	One entry	A105	ASTM A105 (CS)		
2	Two entries	F316	A182 F316		
		F304	A182 F304		
		F321	A182 F321		
		F5	A182 F5		
		Lf2	A350 Lf2		
		Other materials also available. Define grade			
Code	Well Material	Code	Well Material		
316	316SS	316	316SS		
304	304SS	304	304SS		
321	321SS	321	321SS		
446	446SS	446	446SS		

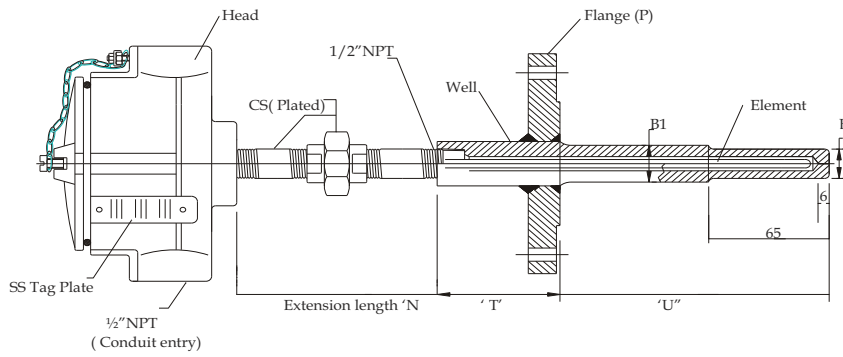
### ORDERING EXAMPLE

410# SERIES 1-K-6-316-D-1-316-F316-U=150-T=70-1"150#RF-Op4

# 420 Series

## Thermocouple & Resistance Thermometer Assemblies with

- A Flanged stepped shank or straight shank well.
- Certified for use in hazardous area. 
- Safe design as per ASME PTC19.3.
- Available with "in-head" 2-wire Temperature Transmitter.



Mi Thermocouple or Resistance Thermometer Sensor fitted into a terminal Head, and provided with head extension and drilled bar stock Thermowell would form a typical complete assembly ready for use in the application designed for.

Heavy Velocity collar can be provided to reduce the suspended length of thermowell and to meet ASME PTC19.3 requirement.

Thermowells are available in standard AISI 300 series Stainless Steel as well as exotic materials such as Incoloy 800, Inconel 600, Monel 400, Hastelloy alloys C276 and alloy B and flanges in ASTM grades A105, A182 and A350 and in sizes 3/4" to 2" (Dn20 to Dn50). Thermowell. The Thermocouple junctions are ungrounded unless otherwise specified.

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2 inch NPT and stepped shank Thermowell. The Thermocouple junctions are ungrounded unless otherwise specified.


Code	No of Elements	Code	Options	
1	Simplex	0	None	
2	Duplex	1	Head in 304SS	
3	Triplex	2	Head in 316SS	
		3	Extension in 304SS	
		4	Extension in 316SS	
		5	Other Conduit entry	
		6	In Head Transmitter	
		7	Brass Cable Gland	
		8	SS Cable Gland	
		10	Special requirement	
Code	Elements	Process Conn P	B1	B
J	Iron-Constantan	3/4"ANSI or DN20	17	12.5
K	Chromel-Alumel	1"ANSI or DN 25	22	16
T	Copper-Constantan	1.5"ANSI or DN 40	25	19
E	Chromel-Constantan	2"ANSI or DN 50	28	25
N	Nicrosil-Nisil	Other sizes and dimensions on request		
R	PtRh 13%-Pt			
S	PtRh 10%-Pt			
B	PtRh30%-PtRh6%			
Pt	Pt100 RTD			
Code	Sheath Dia	'd'		
6	6mm	7.0mm		
8	8mm	8.5mm		
10	10mm	11.0mm		
Code	Sheath Material			
316	316SS			
321	321SS			
Inc	Inconel 600			
Code	Head Type			
D	Weatherproof			
F	Flameproof IIA/IIB			
C	Flameproof IIC			
JB	Junction Box			
Code	No of entries			
1	One entry			
2	Two entries			
Code	Well Extension			
T	Define			
Code	Well Insertion			
U	Define			
Code	Flange Material			
A105	ASTM A105 (CS)			
F316	A182 F316			
F304	A182 F304			
F321	A182 F321			
F5	A182 F5			
Lf2	A350 Lf2			
Other materials also available. Define grade				
Code	Well Material			
316	316SS			
304	304SS			
321	321SS			
446	446SS			

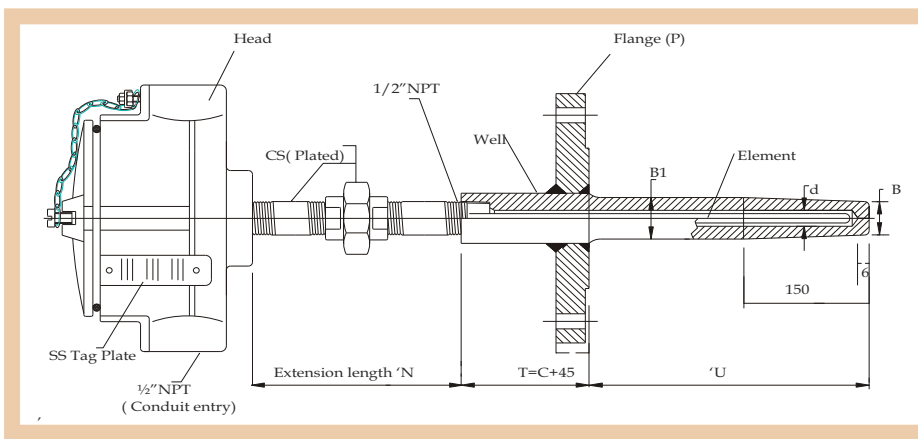
### ORDERING EXAMPLE

420# SERIES 1-K-6-316-D-1-316-F316-U=150-T=70-1"150#RF-Op4

# 430 Series

## Thermocouple & Resistance Thermometer Assemblies with

- A Flanged straight and tapered shank Thermowell.
- Certified for use in hazardous area. 
- Safe design as per ASME PTC19.3.
- Available with "in-head" 2-wire Temperature Transmitter.



The Thermocouple or Resistance Thermometer Sensor illustrated in this leaflet is a typical design specified by M/s Engineers India Ltd. A drilled bar stock Thermowell is welded to suitably drilled blind flange by employing a groove and fillet TIG weld joint. For pressure rating 900# and above a full penetration weld is carried out.

Heavy Velocity collar can be provided to reduce the suspended length of thermowell and to meet ASME PTC19.3 requirement. Thermowells are available in standard AISI 300 series Stainless Steel as well as exotic materials such as Incoloy 800, Inconel 600, Monel 400, Hastelloy alloys C276 and alloy B and flanges in ASTM grades A105, A182 and A350 and in sizes 3/4" to 2" ( Dn20 to Dn50).

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2" NPT and straight and tapered Thermowell. The Thermocouple junctions are ungrounded unless otherwise specified.

Code	No of Elements
1	Simplex
2	Duplex
3	Triplex

Code	Options
0	None
1	Head in 304SS
2	Head in 316SS
3	Extension in 304SS
4	Extension in 316SS
5	Other Conduit entry
6	In Head Transmitter
7	Brass Cable Gland
8	SS Cable Gland
10	Special requirement
11	Full penetration weld

Code	Elements
J	Iron-Constantan
K	Chromel-Alumel
T	Copper-Constantan
E	Chromel-Constantan
N	Nicrosil-Nisil
R	PtRh 13%-Pt
S	PtRh 10%-Pt
B	PtRh30%-PtRh6%
Pt	Pt100 RTD

Code	Sheath Dia	'd'
6	6mm	7.0mm
8	8mm	8.5mm
10	10mm	11.0mm

Code	Options	B1	B
3/4"ANSI or DN20		17	12.5
1"ANSI or DN 25		22	16
1.5"ANSI or DN 40		25	19
2"ANSI or DN 50		28	25

Other sizes and dimensions on request

Code	Well Extension
T	Define

Code	Well Insertion
U	Define

Code	Sheath Material
316	316SS
321	321SS
Inc	Inconel 600

Code	Well Material
A105	ASTM A105 (CS)
F316	A182 F316
F304	A182 F304
F321	A182 F321
F5	A182 F5
Lf2	A350 Lf2

Other materials also available. Define grade

Code	Head Type
D	Weatherproof
F	Flameproof IIA/IIB
C	Flameproof IIC
JB	Junction Box

Code	Flange Material
A105	ASTM A105 (CS)
F316	A182 F316
F304	A182 F304
F321	A182 F321
F5	A182 F5
Lf2	A350 Lf2

Other materials also available. Define grade

Code	No of entries
1	One entry
2	Two entries


Code	Well Material
316	316SS
304	304SS
321	321SS
446	446SS

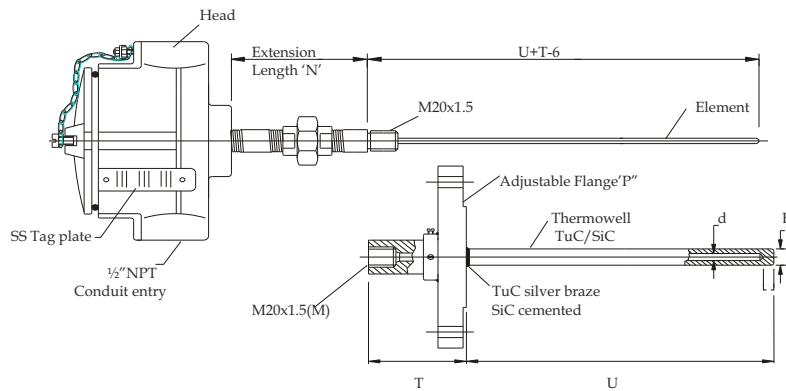
### ORDERING EXAMPLE

430# SERIES 1-K-6-316-D-1-316-F316-U=150-T=70-1"150#RF-Op4

# 440 Series

## Thermocouple & Resistance Thermometer Assemblies with

- Solid Sintered Tungsten Carbide Thermowell for mill Classifier Outlet.
- Recrystallized Silicon Carbide for use on high temperature and abrasive services.
- Certified for use in hazardous area. 
- Available with "in-head" 2-wire Temperature Transmitter.



Mi Thermocouple or Resistance Thermometer Sensor fitted into a terminal Head, and provided with head extension and solid sintered Tungsten carbide Thermowell would form typically, a complete assembly for use in Power Plants for highly abrasive services such as mill classifier outlet for temperature measurement of Coal + Air Mixture.

For use at relatively high temperatures we recommend re-crystallized Silicon Carbide, which also has a very high abrasion resistance characteristics. These are recommended for use in Flue gas application in power plants or for use on incinerators employed in modern day waste management systems of process plants. Standard well is available in diameter of 20mm; and is cemented into stainless steel bushing.

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2" NPT and well entry of M20x1.5 and ungrounded Thermocouple.


Code	No of Elements	Code	Options																																
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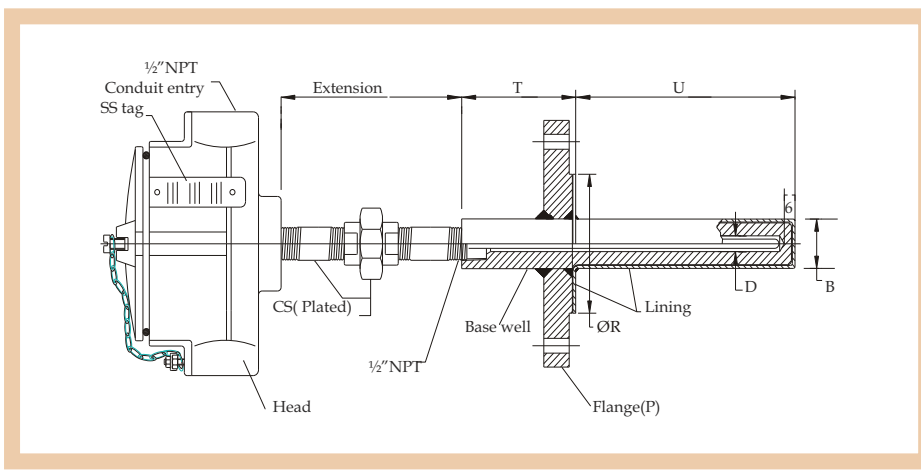
### ORDERING EXAMPLE

440# SERIES 1-K-6-316-D-1-TuC-A105-U=150-T=50-N=150-1.5"150#RF-Op 1,3

# 450 Series

## Thermocouple & Resistance Thermometer Assemblies with

- A Flanged well with Lining
- Lining in Ta, Ti, Ni, Hast C.
- Certified for use in hazardous area. 
- Available with "in-head" 2-wire Temperature Transmitter.



Thermocouples or resistance Thermometers are often required with Thermowells which can withstand corrosion caused by the process medium. It is expensive to manufacture bar stock thermowells in materials which can withstand the corrosion. An effective and less expensive alternative is to manufacture the thermowells from 300 series Stainless steel bar stocks and provide a sleeve or loose lining over the entire wetted portion of the well including the raised face of the flange, which can withstand the corrosive attack from process medium.

Thermowells can be provided with lining in various materials such as Tantalum (Ta), Titanium (Ti), Nickel (Ni), Hastelloy 'C', Hastelloy 'B', Silver (Ag) and Platinum - Rhodium alloy (PtRh)

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2" NPT and well entry of M20x1.5 and ungrounded Thermocouple.

Code	No of Elements
1	Simplex
2	Duplex
3	Triplex

Code	Options
0	None
1	Head in 304SS
2	Head in 316SS
3	Extension in 304SS
4	Extension in 316SS
5	Other Conduit entry
6	In Head Transmitter
7	Brass Cable Gland
8	SS Cable Gland
10	Special requirement

Code	Elements
J	Iron-Constantan
K	Chromel-Alumel
T	Copper-Constantan
E	Chromel-Constantan
N	Nicrosil-Nisil
R	PtRh 13%-Pt
S	PtRh 10%-Pt
B	PtRh30%-PtRh6%
Pt	Pt100 RTD

Code	Process Conn P	D	B
	3/4" ANSI or DN20	43	12.5
	1" ANSI or DN 25	51	16
	1.5" ANSI or DN 40	73	19
	2" ANSI or DN 50	92	25

Other sizes and dimensions on request

Code	Well Extension
T	Define

Code	Well Insertion
U	Define

Code	Flange Material
A105	ASTM A105 (CS)
F316	ASTM A182 F316

Code	Head Type
D	Weatherproof
F	Flameproof IIA/IIB
C	Flameproof IIC
JB	Junction Box

Code	Lining Material	Lining Thickness
Ta	Tantalum	0.4mm
Ti	Titanium	1.0mm
Ni	Nickel	1.0mm
Hc	Hastelloy C	1.0mm

Code	No of entries
1	One entry
2	Two entries


Code	Well Material
316	316SS
304	304SS

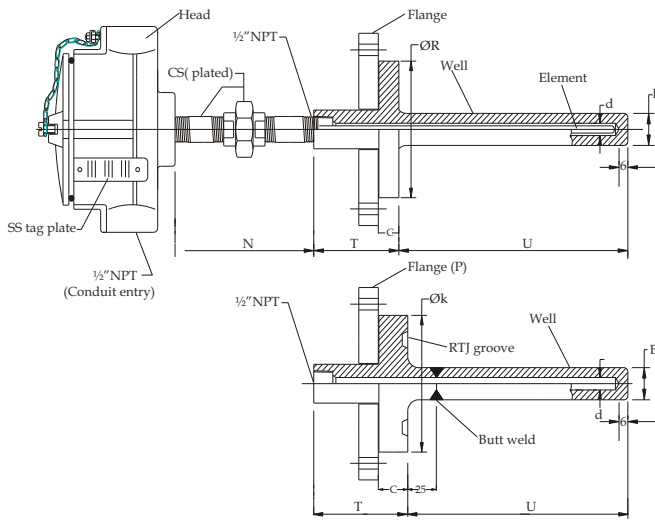
### ORDERING EXAMPLE

450# SERIES 1-K-6-316-D-1-316-Ti-F316-U=150-T=50-1.5"150#RF-Op 1,3

# 460 Series

## Thermocouple & Resistance Thermometer Assemblies with

- A Van Stone Thermowell with or without weld joints.
- Certified for use in hazardous area. 
- Safe design as per ASME PTC19.3.
- Available with "in-head" 2-wire Temperature Transmitter.
- Raised face or RTJ facing.
- Mounting flange in A105 or A182 F316
- 100% Radiography for weld joints.
- PWHT
- Hardness to NACE MR-01-75
- Ferrite Number between 3 and 10



For Highly corrosive services, Thermowells without a weld joint are recommended. If weld joints cannot be avoided, full penetration weld is carried out and checked by 100% radiography test.

The design shown in this leaflet fulfills this criteria. Thermowells can also be offered with PWHT of weld joint, hardness check as per NACE MR-01-75, DP test, hydro test and ferrite number test.

Code	No of Elements
1	Simplex
2	Duplex
3	Triplex

Code	Elements
J	Iron-Constantan
K	Chromel-Alumel
T	Copper-Constantan
E	Chromel-Constantan
N	Nicrosil-Nisil
R	PtRh 13%-Pt
S	PtRh 10%-Pt
B	PtRh30%-PtRh6%
Pt	Pt100 RTD

Code	Sheath Dia	'd'
6	6mm	7.0mm
8	8mm	8.0mm
10	10mm	10.0mm

Code	Sheath Material
316	316SS
321	321SS
Inc	Inconel 600

Code	Head Type
D	Weatherproof
F	Flameproof IIA/IIB
C	Flameproof IIC
JB	Junction Box

Code	No of entries
1	One entry
2	Two entries

Code	Options
0	None
1	Head in 304SS
2	Head in 316SS
3	Extension in 304SS
4	Extension in 304SS
5	Other Conduit entry
6	In Head Transmitter
7	Brass Cable Gland
8	SS Cable Gland
10	Special requirement
11	Full penetration weld

Process Conn P	B1	B
3/4"ANSI or DN20	17	12.5
1"ANSI or DN 25	22	16
1.5"ANSI or DN 40	25	19
2"ANSI or DN 50	28	25

Other sizes and dimensions on request

Code	Well Extension
T	Define

Code	Well Insertion
U	Define

Code	Flange Material
A105	ASTMA105 (CS)
F316	A182 F316
F304	A182 F304
F321	A182 F321
F5	A182 F5
Lf2	A350 Lf2

Other materials also available. Define grade


Code	Well Material
316	316SS
304	304SS
321	321SS
446	446SS

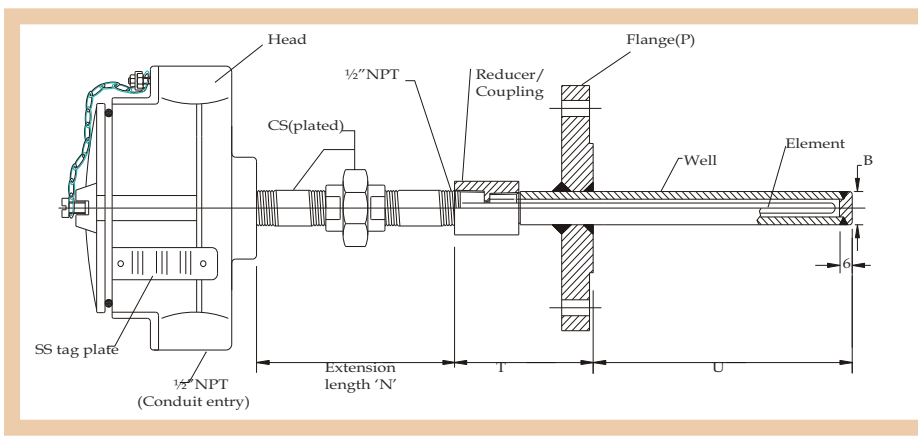
### ORDERING EXAMPLE

460# SERIES 1-K-6-316-D-1-316-F316-U=150-T=70-1"150#RF-Op4

# 470 Series

## Thermocouple & Resistance Thermometer Assemblies with

- A Protecting Tube.
- Built up from seamless tubes, fixed or adjustable.
- Certified for use in hazardous area. 
- Available with "in-head" 2-wire
- Temperature Transmitter.



Mi Thermocouple or Resistance Thermometer Sensor fitted into a terminal Head, and provided with or without head extension and a protecting tube would form a typical complete assembly ready for use in the application where flow and pressure are not a major concern.

Protecting tubes are built from seamless tubes with hot end plugged and TIG welded and a blind flange is drilled to suit the outer diameter of the tube and TIG welded to it. These thermowells are available in standard AISI 300 series Stainless Steel as well as exotic materials such as Incoloy 800, Inconel 600, 446SS and flanges in ASTM grades A105, A182 and A350 in sizes 3/4" to 2" (DN20 to DN50).

The standard execution as shown in this leaflet is with plated CS extension and Aluminum head with conduit entry of 1/2"NPT and ungrounded Junction for Thermocouples unless specified otherwise.

Code	No of Elements	Code	Options
1	Simplex	0	None
2	Duplex	1	Head in 304SS
3	Triplex	2	Head in 316SS
<b>Code Elements</b>		3	Extension in 304SS
J	Iron-Constantan	4	Extension in 316SS
K	Chromel-Alumel	5	Other Conduit entry
T	Copper-Constantan	6	In Head Transmitter
E	Chromel-Constantan	7	Brass Cable Gland
N	Nicrosil-Nisil	8	SS Cable Gland
R	PtRh 13%-Pt	10	Special requirement
S	PtRh 10%-Pt	<b>Process Conn P</b>	
B	PtRh30%-PtRh6%	3/4"ANSI or DN20	Max B 16 Min B 10
Pt	Pt100 RTD	1"ANSI or DN 25	22 16
<b>Code Sheath Dia</b>		1.5"ANSI or DN 40	26 19
6	6mm	2"ANSI or DN 50	33 26
8	8mm	Other sizes and dimensions on request	
10	10mm	<b>Code Well Extension</b>	
<b>Code Sheath Material</b>		T	Define
316	316SS	<b>Code Well Insertion</b>	
321	321SS	U	Define
Inc	Inconel 600	<b>Code Flange material</b>	
<b>Code Head Type</b>		A105	ASTM A105 (CS)
D	Weatherproof	F316	ASTM A182 F316
F	Flameproof IIA/IIB	F304	ASTM A182 F304
C	Flameproof IIC	Other materials are also available . Define grade.	
JB	Junction Box	<b>Code Tube Dimensions OD x W/t</b>	
<b>Code No of entries</b>		1/8"Sch80	10.29x2.41
1	One entry	1/4"Sch80	13.72x3.02
2	Two entries	3/8"Sch80	17.15x3.18
<b>Code Well Material</b>		1/2"Sch80	21.30x3.73
316	316SS	1/2"Sch160	21.30x4.75
304	304SS	3/4"Sch80	26.60x3.91
321	321SS	3/4"Sch160	26.60x5.53
Inc6	Inconel 600	Other dimensions are also available.	

### ORDERING EXAMPLE

470# SERIES 1-K-6-316-D-1-316-1/2"Sch80-F316-U=640-T=60-1.5"150-Op0