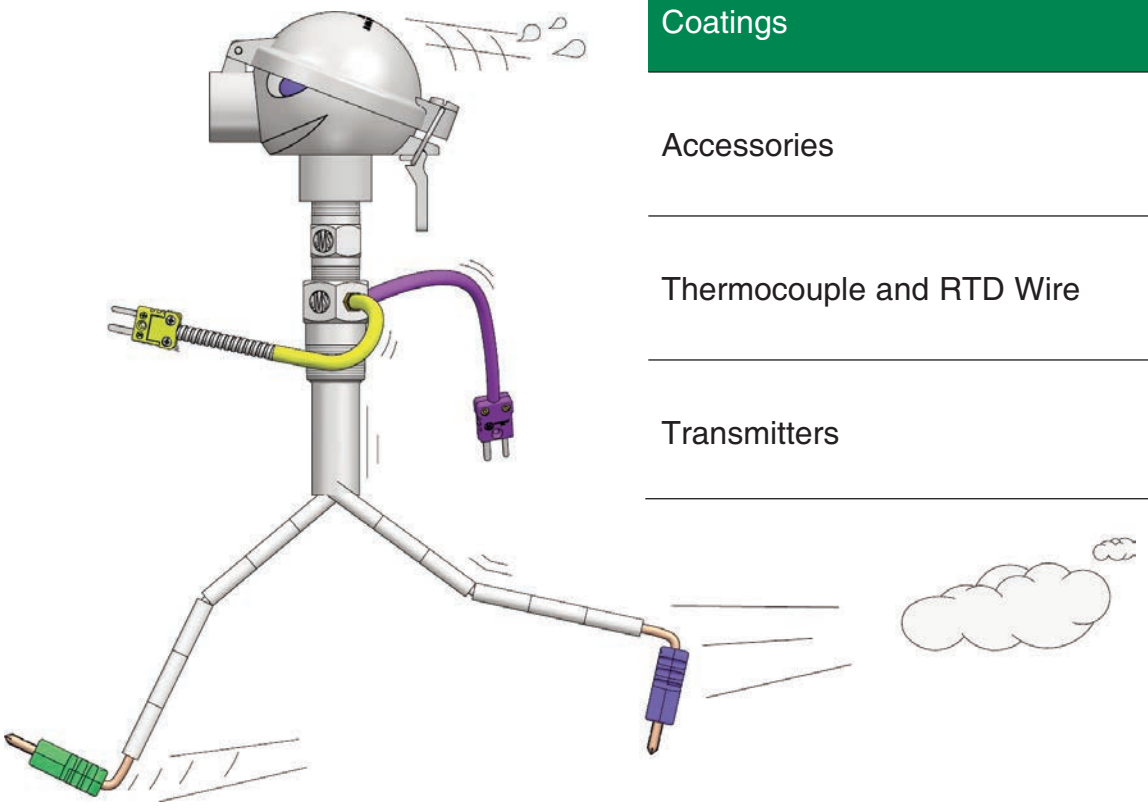
THERMOWELLS

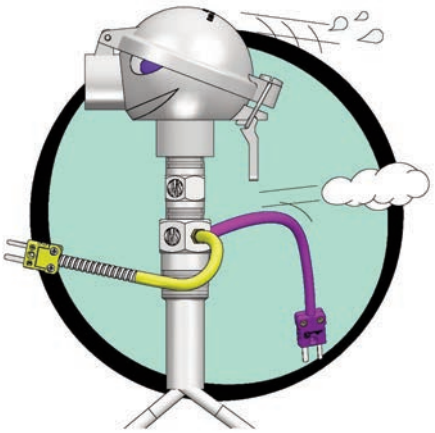
Swifty Sensor



Due to space limitations we have excluded some part number selections from publication. Additional selections are available via JMS catalog cut sheets posted at www.JMS-SE.com. It is the final reference for JMS part numbers. Custom products are also available with drawings to suit your application. Call 1-800-873-1835 or email Sensors@JMS-SE.com for more information.

WELCOME TO JMS SOUTHEAST!

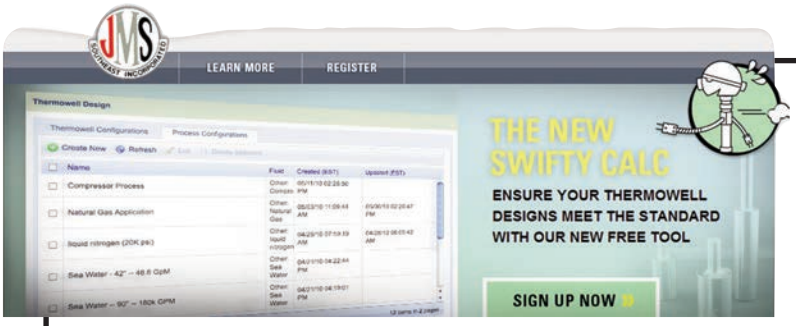
Swifty Sensor



Home of the next day *Swifty Sensor Service* and the New ***SwiftyCalc***!

What sets JMS apart from the average temperature sensor manufacturer?

It's all the "extras" we provide to ensure customer satisfaction. Such as our unique 24 hour delivery service of products called ***Swifty Sensor Service***. Have an emergency? Need it overnight? We will manufacture whatever your need may be to get you out of that "situation". This is at NO extra charge to you.



DESIGN THERMOWELLS THAT LAST AND EXTEND THE LIFE OF YOUR TEMPERATURE SENSORS WITH JMS SwiftyCalc!

In 2010, **the only US Standard** regarding the strength of thermowells had its first significant revision in **35 years**. New geometries, new requirements, new capabilities and more than 40 new pages of math and physics calculations to boot in the ASME PTC 19.3-TW (2010). Now, in 2016 that standard has been further updated in ASME PTC 19.3TW-2016.

Your objective? To ensure your thermowell designs meet the standard.

Your tool? ***SwiftyCalc.*** Now *free* from JMS Southeast, Inc. to registered users.

The JMS SwiftyCalc software quickly provides you with a thermowell design based upon your material requirements and process variables meeting the ASME PTC 19.3TW standard. Save your results to your own account and return later to modify on the fly. JMS SwiftyCalc also provides you with instant theoretical maximums for insertion length. SwiftyCalc is perfect for faster response time and increased reliability in your temperature measurement system. Push a button and generate fully developed data sheets.

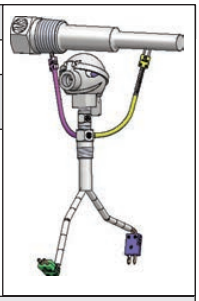
Need to develop a quick budget for your temperature application project? Push a button and get pricing from a friendly and knowledgeable JMS sales engineer.

To sign up for SwiftyCalc, register at www.jms-se.com/SwiftyCalc or call 1.800.873.1835

THREADED, SOCKET WELD, & WELD-IN THERMOWELLS

NEW ***FREE*** Wake Frequency Calculations to ASME PTC 19.3 TW, ***SwiftyCalc!***
Visit JMS-SE.com to sign up today! www.JMS-SE.com/SwiftyCalc

#1	DESCRIPTION [See pages 5-20 through 5-24 for detailed information on dimensions, velocity ratings, and pressure ratings]
5	Thermowells - Add a W here for a Brass plug and stainless steel chain attached to well. (Example: 5W)



#2	SIZE	THREADED WELL External thread	SOCKET WELL Pipe size	SOCKET WELL Actual external Ø	WELD IN Actual external Ø
1	1/2"	1/2" NPT	N/A	N/A	N/A
2	3/4"	3/4" NPT (Standard)	3/4" pipe	1.050"Ø (Standard)	N/A
3	1"	1" NPT	1" pipe	1.315"Ø	1.00"Ø
4	1-1/2"	1-1/2" NPT	1-1/2" pipe	1.900"Ø	1.50"Ø (Standard)
5	1-1/4"	1-1/4" NPT	1-1/4" pipe	1.660"Ø	1.25"Ø
X	Other, specify				

Note: See illustrations below and on page 5-2 for specifications.

#3	SHANK STYLE [15]	**NOTE:** Standard shank geometry fits 3000# rated sockolet/threadolet fittings. Use X to specify alternate geometry if needed.
A	Step (Standard)	
S	Straight	
T	Tapered	
B*	Built-up (see page 5-2)	
X	Other, specify	*Recommended if overall length of thermowell is 40" or greater

#4	PROCESS ENGAGMENT		
T	Threaded well design	W*	Weld In design
S	Socket weld well design	X	Other, specify
			*Tapered shank standard

Note: Standard sensor connections are 1/2" FNPSM (female straight) to match 1/2" MNPT (male tapered) per ASME B40.200-2008 (B40.9)

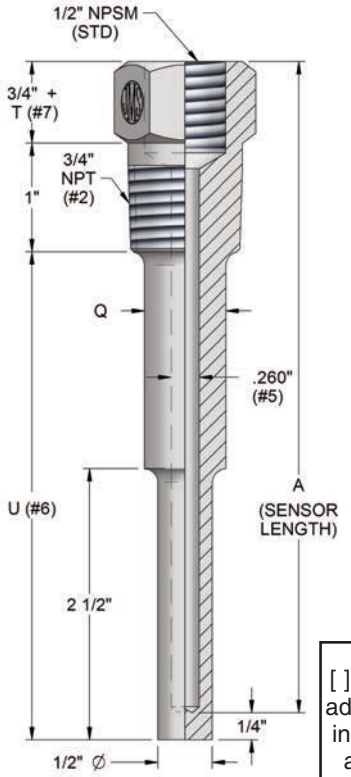
#5	BORE SIZE & SENSOR CONNECTION
2	.260" ID used for .250" OD sensors (Standard)
3	.385" ID used for .375" OD sensors (straight or tapered shank style only)
X	Other, specify **NOTE:** Add a N suffix for FNPT.(Example: 2N = .260" ID with 1/2" FNPT sensor connection)

#6	U (INSERTION) DEPTH [15]	STANDARD T DIMENSION	S/L SENSOR LENGTH NO LAG	S/L SENSOR LENGTH WITH LAG
B	2-1/2"	2	4	6
C	4-1/2"	3	6	9
D	6"	3	7-1/2	10-1/2
E	7-1/2"	3	9	12
F	10-1/2"	3	12	15
G	13-1/2"	3	15	18
H	16-1/2"	3	18	21
I	22-1/2"	3	24	27
U__"*	Other, specify			

*If overall length of thermowell is 40" or greater, JMS recommends the use of our "Built-up" shank style (option # 3) (see illustration on page 5-2)

NOTE: Use U_ selection in place of X in legacy part numbers. (example: legacy part # 52AT2XTK1 X=5", is equivalent to 52AT2U5TK1)

THREADED STEP SHANK THERMOWELL DESIGN



#7	T (LAG) EXTENSION [15]
T	Standard lag (For lengths see chart in option #6)
Z	N/A (No lag)
T__"	Other, specify

Matching sensor lengths:

-All Spring-loaded designs and all Compression designs with a nipple/union extension
A = U length(#6) + 1 1/2" + T length(#7)

-All Welded designs
A = U length(#6) + 3/4" + T length(#7)

-All Compression designs without a nipple/union extension
A = U length(#6) + 3 3/4" + T length(#7)

#8	WELL MATERIAL [31-34]		
A	Alloy 800H/HT	M	Inconel 600
B	F5	N	Monel 400
C	F9	Q	Hastelloy C-276
D	F91	S	Titanium
E	F22	X*	Other, specify
F	F11		
G	Carbon steel		
H	304 stainless steel		
I	Low Carbon 304 stainless steel		
J	310 stainless steel		
K	316 stainless steel (Standard)		
L	Low Carbon 316 stainless steel		

*For more options, like special jackets and coatings or unique material requirements, consult your sales representative directly.

#9	TAGGING OPTIONS
1	Stamped on well (Standard)
X*	Other, specify
M	MTR
W	Premium SwiftyCalc ASME 19.3TW calculation
	Note: You must always specify information required on tag.

[ ] Brackets indicate page numbers where additional helpful information can be found in technical catalog. Now available online at www.JMS-SE.com/TechnicalCatalog

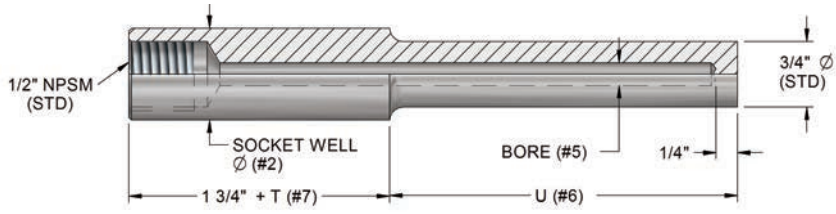
5	2	A	T	2	E	T	H	1

THREADED, SOCKET WELD & WELD-IN THERMOWELLS

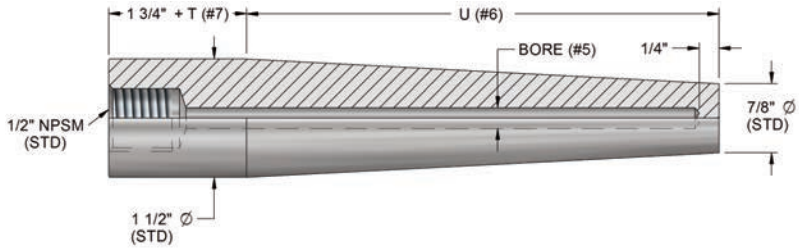
NEW ***FREE*** Wake Frequency Calculations to ASME PTC 19.3 TW, ***SwiftyCalc!***
Visit JMS-SE.com to sign up today! www.JMS-SE.com/SwiftyCalc

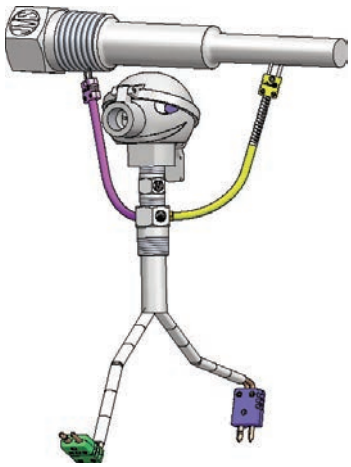
(JMS Southeast, Inc. participated in the ASME 19.3 TW committee performing the first major revision since 1974 to the only US thermowell strength standard. The new ASME PTC 19.3 TW standard addresses wake frequency calculations.)

SOCKET WELD WELL DESIGN (SERIES 52SS2)

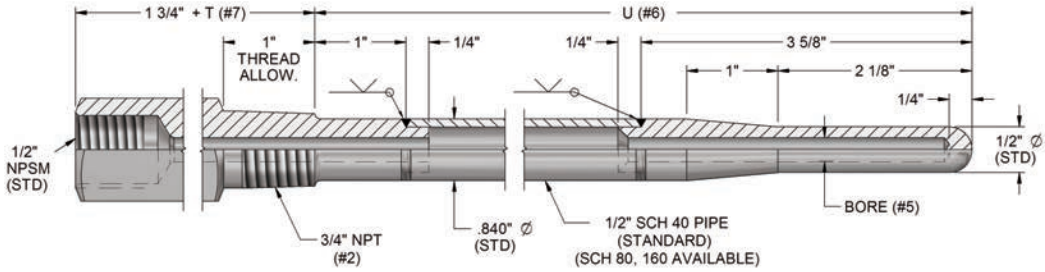


WELD IN THERMOWELL (SERIES 54TW2)





BUILT UP THERMOWELL* (SERIES 52BT2)



*Design does not meet ASME PTC 19.3 TW specifications.

LIMITED SPACE THERMOWELLS

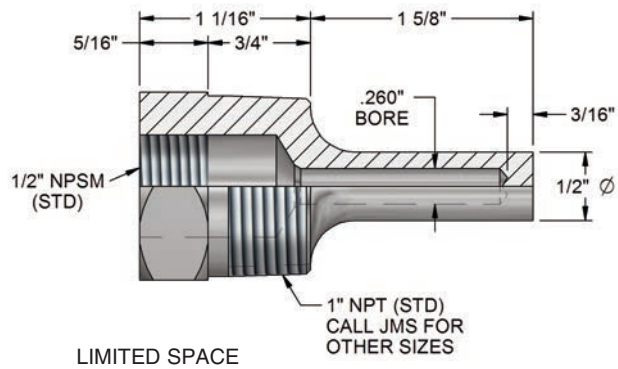
#1	DESCRIPTION
5L	Limited space thermowells - Add a W here for a Brass plug and stainless steel chain attached to well (Example: 5LW)

#2	WELL MATERIAL
H	304 stainless steel
K	316 stainless steel
M	Inconel 600
X	Other, specify

#3	TAGGING OPTIONS
1	Stamped on well (Standard)
X*	Other
M	MTR

5L	M	1

Note: Immersion length of a spring-loaded sensor to fit this well is 2-1/2".



LIMITED SPACE THERMOWELL

FLANGED THERMOWELLS

#1	DESCRIPTION [See pages 5-25 through 5-27 for detailed information on dimensions, velocity ratings, and pressure ratings)
5T	Thermowells - Add a W here for a Brass plug and stainless steel chain attached to well (Example: 5TW)

#2 SHANK STYLE [15]

A	Step (Standard)	B*	Built-up (see page 5-2)
S	Straight	X	Other, specify
T	Tapered		

*Recommended if overall length of thermowell is 40" or greater

#3 BORE SIZE & SENSOR CONNECTION Standard is NPSM.

2	.260" ID used for .250" OD sensors (Standard)
3	.385" ID used for .375" OD sensors (straight or tapered shank style only)
X	Other, specify

NOTE: Add N suffix for FNPT.(Example: 2N = .260" ID with 1/2" FNPT sensor connection)

Note: Standard sensor connections are 1/2" FNPSM (female straight) to match 1/2" MNPT (male tapered)

#4 U (INSERTION) DEPTH [15]

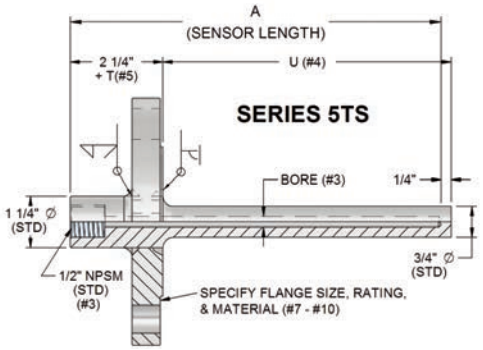
A	2"	*If overall length of thermowell is 40" or greater, JMS recommends the use of our "Built-up" shank style (option # 3) (see illustration on page 5-2)
B	4"	
C	7"	
D	10"	
E	13"	**NOTE:** Use U_ selection in place of X in legacy part numbers. (example: legacy part # 5TA2XZK3A1K1 X=5", is equivalent to 5TA2U5ZK3A1K1)
F	16"	
G	22"	
U__"*	Other, specify	

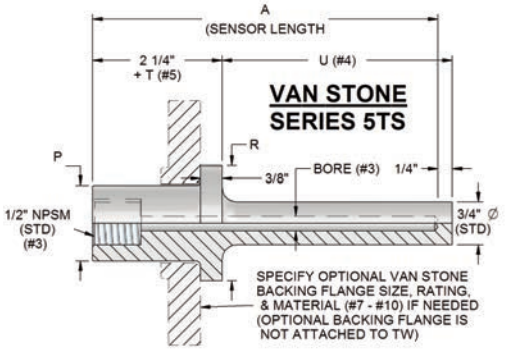
U DIMENSION	SENSOR LENGTH
2"	4"
4"	6"
7"	9"
10"	12"
13"	15"
16"	18"
22"	24"

#5 T (LAG) EXTENSION [15]

T__"	Length in inches
Z	N/A (Standard)

NOTE: Lag extension is needed if flange thickness exceeds 1 3/4".





Van Stone Dimensions Chart

Flange Size	P (Stem Ø)	R (Sealing FaceØ)	Flange Bore
1"	1.315"	2.000"	1.375"
1 1/2"	1.900"	2.875"	1.970"
2"	2.375"	3.625"	2.460"

#6 WELL MATERIAL [31-34] Special jackets & coatings are available for thermowells. *Call JMS for more information or www.JMS-SE.com.*

G	Carbon steel	A	Alloy 800H/HT
H	304 stainless steel	P	Hastelloy B-3
I	Low Carbon 304 stainless steel	Q	Hastelloy C-276
J	310 stainless steel	S	Titanium
K	316 stainless steel	X*	Other, specify
L	Low Carbon 316 stainless steel		
M	Inconel 600		
N	Monel 400		

*For more options and unique material requirements, consult your sales representitive directly.

#7 WELD AND SIZE OF FLANGE [27]

3	1"	6	3"
4	1 1/2"	X	Other, specify
5	2"		

Note: Add F prefix to selection to specify a Full Penetration Weld is required. (example: F4 =1 1/2" flange Full Penetration weld)

#8 FLANGE PRESSURE RATING (PSI) per ASME B-16.5

A	150	E	900
B	300	F	1500
C	400	G	2500
D	600	X	Other, specify

#9 FACING

1	Raised (Standard)	4	Van Stone no flange
2	Flat	5	Van Stone w/flange
3	Ring Joint Type	X	Other, specifiy

#10 FLANGE MATERIAL [31-34]

G	Carbon steel	N	Monel 400
H	304 stainless steel	A	Alloy 800H/HT
I	Low Carbon 304 stainless steel	P	Hastelloy B-3
J	310 stainless steel	Q	Hastelloy C-276
K	316 stainless steel	S	Titanium
L	Low Carbon 316 stainless steel	X*	Other, specify
M	Inconel 600		

*For more options and unique material requirements, consult your sales representative directly.

Economical sleeve alternatives available. *Call JMS for details.*

#11 TAGGING OPTIONS

1	Tag # stamped on well (Standard)
X*	Other
M	MTR
W	Premium SwiftyCalc ASME 19.3TW Calculation

Matching sensor lengths:

-All Spring-loaded designs and all Compression designs with a nipple/union extension
A = U length(#6) + 2" + T length(#7)

-All Welded designs
A = U length(#6) + 1 1/4" + T length(#7)

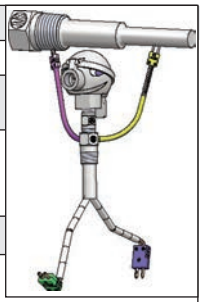
-All Compression designs without a nipple/union extension
A = U length(#6) + 4 1/4" + T length(#7)

5T	A	2	C	Z	H	4	A	1	H	1

Note: You must always specify information required on tag.

THREADED SAMPLE PROBE

#1	DESCRIPTION
5S	Sample probe - Add a W here for a Brass plug and stainless steel chain attached to probe. (Example: 5SW)



#2	PROCESS CONNECTION		
1	1/2" NPT	4	1-1/2" NPT
2	3/4" NPT (Standard)	5	1-1/4" NPT
3	1" NPT	X	Other, specify (Example: 2" 150# raised face flange.)

#3	SHANK STYLE [15]
A	Step
S	Straight (Standard)
T	Tapered
X	Other, specify

#4	SAMPLING DEVICE CONNECTION
M	1/4" NPT
P	1/2" NPT
O	3/4" NPT
N	1" NPT
X	Other, specify

#5	BORE SIZE
2	.260" ID (Standard)
3	.385" ID
X	Other, specify

#6	U (INSERTION) DEPTH [15]
U__"*	Specify insertion length

#7	T (LAG) EXTENSION [15]
T__"	Specify lag length

#8	WELL MATERIAL [31-34]
G	Carbon steel
H	304 stainless steel
K	316 stainless steel (Standard)
M	Inconel 600
X*	Other, specify

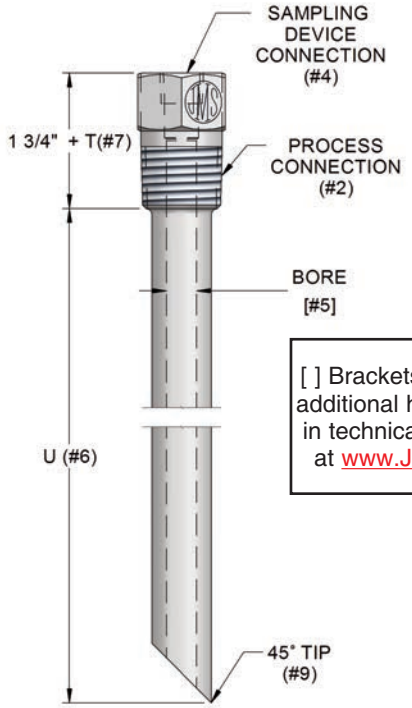
*For more options and unique material requirements, consult your sales representative directly.

#9	OPEN TIP STYLE
A	45°
F	Flat tip
X	Other, specify

#10	TAGGING OPTIONS
1	Stamped on well (Standard)
X*	Other, specify
M	MTR

Note: You must always specify information required on tag.

THREADED STRAIGHT SHANK SAMPLE PROBE DESIGN



[ ] Brackets indicate page numbers where additional helpful information can be found in technical catalog. Now available online at www.JMS-SE.com/TechnicalCatalog

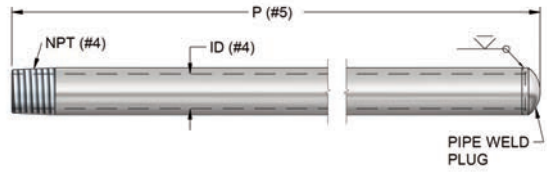
5S	2	A	1	2	U10"	T3"	H	A	1

METAL PROTECTION TUBES

#1	DESCRIPTION
5P	Metal protection tube - Add a W here for a Brass cap and stainless steel chain attached to well (Example: 5PW)

#2	RESPONSE TYPE (see illustrations below)
1	Fast response tip
2	Standard response tip

#3	ATTACHING DEVICES
B	Carbon steel bushing
K	Stainless steel bushing
J	Adjustable cast iron floor flange
Z	N/A
X	Other, specify (Example: 3" 150 lb raised face flange.)



ATTACHING DEVICE STYLE "Z"

#4	NOMINAL SIZE [30]	*ID	OD	NPT	STANDARD BUSHING PROCESS CONNECTION	STANDARD FLOOR FLANGE SIZE
18	1/8"	.269	.405	1/8"	1/4" NPT	3"
14	1/4"	.364	.540	1/4"	1/2" NPT	3"
12	1/2" (Standard)	.622	.840	1/2"	3/4" NPT	3"
34	3/4"	.824	1.050	3/4"	1" NPT	4"
10	1"	1.049	1.315	1"	1-1/4" NPT	4"
X	Other, specify					

*Refers to schedule 40 pipe. For other pipe schedules, use X in the above symbol and specify the pipe schedule in description. Example: 5P1BXA10G X=1/2" Schedule 80 pipe.

Note: Bends and elbows are available. Call your salesperson for drawing(s).

#5	OVERALL LENGTH (P)		
A	12"	E	36"
B	18"	F	48"
C	24"	G	60"
D	30"	X	Other, specify

Note: Matching spring-loaded sensor length will be the overall length of the protection tube minus 1/4". Welded sensors will be 1" less than the overall length of the protection tube. See illustrations below.

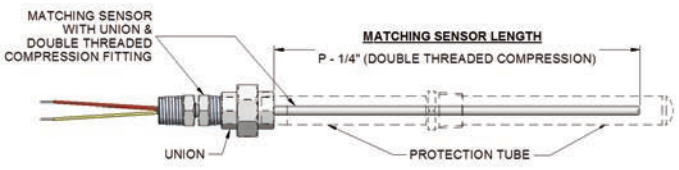
#6	MOUNTING METHOD (see illustrations below)
__" Z	Insert U dimension. (Only if using a permanently fixed attaching device) N/A (Bushing if specified will be adjustable)

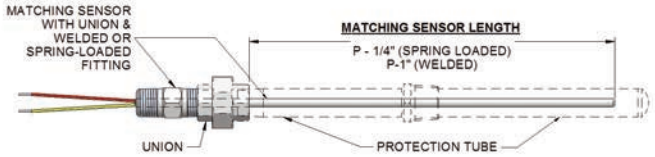
#7	PROTECTION TUBE MATERIAL [31-34]		
G	Carbon steel	M	Inconel 600
H	304 Stainless steel	Q	Hastelloy C-276
J	310 Stainless steel	T	446 Stainless Steel
K	316 Stainless steel (Standard)	X*	Other, specify

Economical sleeve alternatives available. *Call JMS for details.*

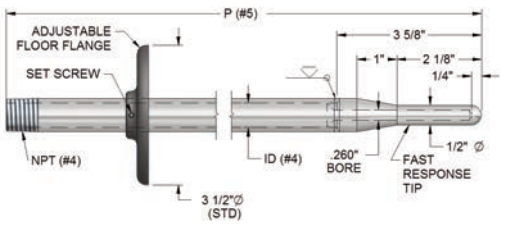
#8	TAGGING OPTIONS
1	Tag # stamped on well (Standard)
M	MTR
X*	Other, specify

Note: You must always specify information required on tag.

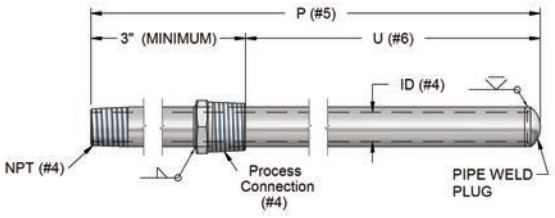




STYLE 5P1



STYLE 5P2



5P	2	B	12	A	9"	K	1

CERAMIC PROTECTION TUBES

Alumina, Mullite and Hexoloy SE protection tubes are used at high temperatures that have a small slope of temperature change. Any thermocouple type can be used in these ceramic tubes; however, Platinum-Rhodium and Chromel-Alumel are used most often due to their high operating temperature range. “Alumina” is an Aluminum Oxide ceramic (99.7% Al_2O_3). “Mullite” is a compound of Alumina and Silica (Silicon Carbide). "Hexoloy" is a sintered alpha Silicon Carbide. Alumina tubes can be used at 3400°F (1870°C), Mullite tubes can be used at 3100°F (1700°C) and Hexoloy will not slump at 3000°F (1648°C) even under load. These tubes are somewhat gas tight, sensitive to thermal shock, and can crack if one end of the tube is heated at a different rate than the other. If the tubes are exposed to a significant sharp decline or rise in temperature, they may crack. Hexoloy has excellent thermal shock resistance, universal corrosion resistance and exceptional wear with high strength and extreme hardness for severe environment applications.

Platinum-Rhodium thermocouples should always be protected in ceramic protection tubes. Alumina should be used rather than Mullite for all atmospheres, except oxidizing, where Mullite can be used. The Silicon from the Mullite can contaminate the Platinum-Rhodium thermocouple.

We recommend that the user preheat the entire tube to ≈ 900°F before installing it into a hot process environment.

#1	DESCRIPTION
5D	Ceramic protection tubes - Add a W here for a Brass cap and stainless steel chain attached to threaded protection tubes only (Example: 5DW)

#2	MATERIAL
A	Alumina
M	Mullite
H	Hexoloy SE Silicon Carbide
G	Alumina/Mullite 60/40
X	Other, specify

#3	ATTACHING DEVICE (see illustrations to the right and below)
O	No fitting
P	Open both ends, no fitting
C	Collar (see dimensions below in option #4)
B*	Hex bushing (Std for option #4 selections: 14,38,76,12)
S**	Carbon steel sleeve (Std for option #4 selections: 34 & 10)
X	Other, specify

NOTES:

*Standard hex bushings are 1/2” NPT head connection, and 3/4” NPT process connection.

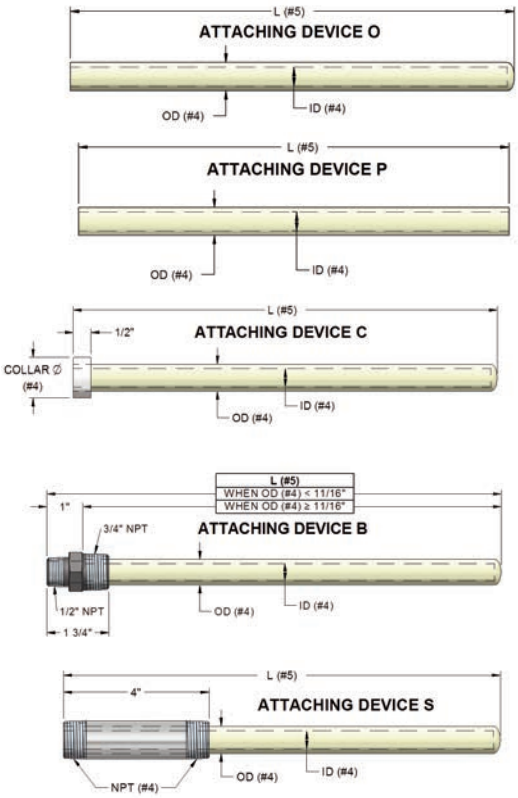
**CS sleeve for tube NPT will equal tube OD (Example: 1” OD will use 1” NPT threads). It can be used to attach adjustable flanges and bushings. Use X in symbol number 3 and describe.

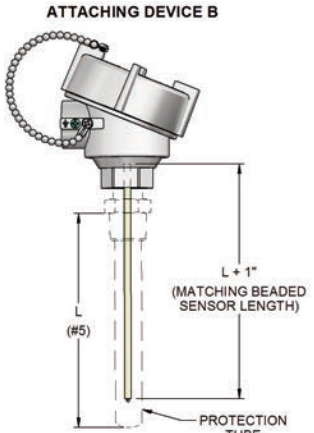
***For tubes smaller than 11/16” OD(selection #4), the L length will equal the total length including the entire hex bushing.

#4	TUBE SIZE			
	Tube ID x OD		Collar OD	
	Alumina Mullite	Hexoloy	Alumina Mullite	Hexoloy
14	1/4” x 3/8”	1/4” x 3/8”	5/8”	5/8”
38	3/8” x 1/2”	3/8” x 5/8”	3/4”	1”
76	7/16” x 11/16”	N/A	1”	N/A
12	1/2” x 3/4”	1/2” x 3/4”	1-1/8”	1-1/8”
34*	3/4” x 1”	3/4” x 1-1/4”	1-3/8”	1-3/4”
10*	1” x 1-1/4”	1” x 1-1/2”	1-3/4”	2”
X	Other, specify			

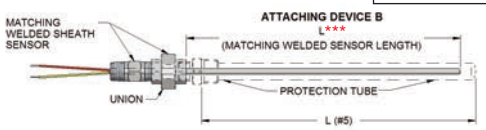
#5	LENGTH (L)***
A	6”
B	12” (Standard)
C	18”
D	24” (Standard)
E	30”
F	36”
X	Other, specify

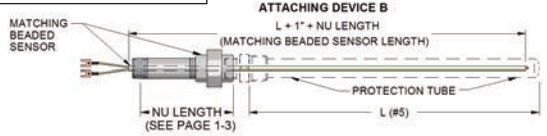
#6	TAGGING OPTIONS
1	Tag # is indelibly marked on well or attaching device (Standard)
X	Other
M	MTR

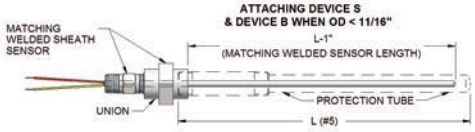


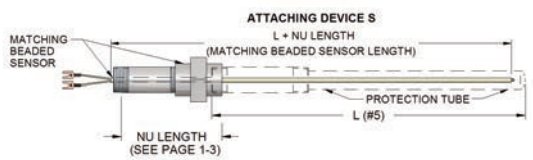


MATCHING SENSOR LENGTHS







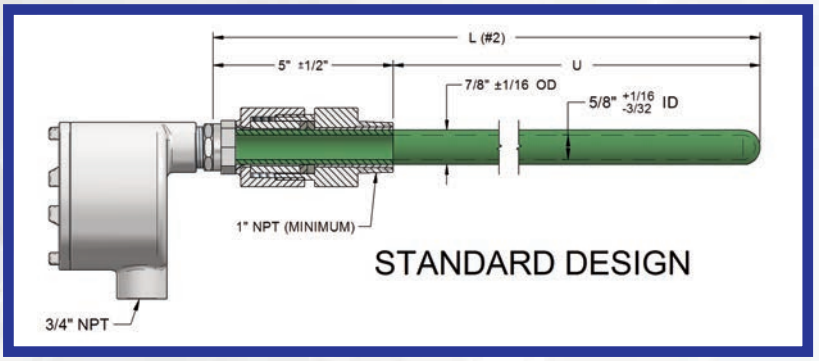


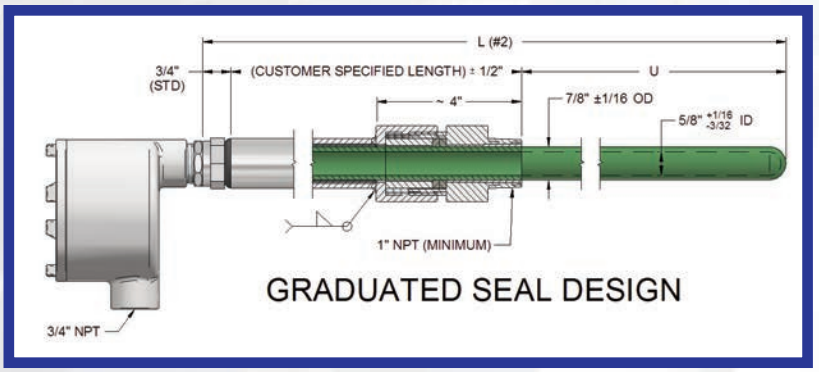
5D	A	B	12	B	1

Note: Do NOT use spring-loaded sensors in ceramic protection tubes.

SULFUR PROTECTION TUBE

DESIGN ASPECTS





See page 5-9 (5G) for ordering.

- Excellent corrosion resistance capable of resisting even the punishing temperatures and corrosion of a sulfur burner.
- Dual graduated seals allow the end user to access and monitor the sensor, while preventing leakage of sulfur burner contents.
- Maximized lifespan of wells and sensors.
- Tightly bonded layer of Chromium Oxide which, together with the naturally inert nature of Alumina, provides protection tubing with a remarkable resistance to oxidizing and corrosive atmospheres over 2200°F.
- High thermal conductivity and sensitivity to temperature changes makes it an excellent choice for thermocouples used to monitor or control high temperature environments.
- Great strength at temperatures where many high temperature metals melt. Above 2800°F it begins to soften and becomes plastic.
- Less porous than most compacts. No significant passage of gas through the body at high temperatures, except under high vacuum. Sufficiently impermeable for most industrial applications.
- Superior to “straight ceramics” in resisting thermal and mechanical shock.
- Sturdy UL, FM and CSA approved explosion proof head.
- Not recommended in boiling sulfuric acid -- 10%. For more information regarding its suitability to your application, **Call JMS Today!!!**

SULFUR PROTECTION TUBE

See page 5-9 (5G) series for ordering.

PROCESS BENEFITS

- **JMS provides experienced engineering capable of designing to suit your specification needs.**
- **Maximized lifespan of wells and sensors.**
- **Increases reliable temperature measurements in Sulfur burners on an ongoing basis.**
- **Reduces risk of Sulfuric acid leaking into uncontained areas.**
- **Reduces shut downs due to sensor replacement.**
- **Avoids the high cost of repetitive replacements.**

Published with permission. PCS Phosphate - NC.

APPLICATIONS

Sulfuric acid plants

H_2SO_4

Corrosive SO_2 and SO_3 gas to 2500°F at tip

Corrosive SO_3 and HF gas to 2000°F

Boiling H_2SO_4 – 97%

Many additional applications.

Call JMS today for prompt and friendly assistance with your specification needs.

MCPT - METAL CERAMIC PROTECTION TUBES

The MCPT consists of a hard abrasion-resistant Chromium and Aluminum Oxide material. It has good strength at temperatures where many high-temperature metals melt. This "hybrid" composition is slightly less resistant to thermal and mechanical shock than metal protection tubes, but much greater than that of ceramic protection tubes.

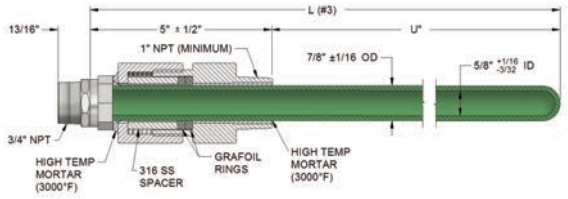
The MCPT exhibits good wear resistance and abrasion resistance. It has a hardness of Rockwell C37, which indicates the crushing strength of the material rather than the true hardness of the entire body.

JMS Southeast, Inc. offers the special optional fitting pictured below for mounting the metal ceramic protection tube in high temperature sealed environments. The minimum "U" length available is 2.35".

#1	DESCRIPTION
5G	Metal Ceramic Protection Tube (MCPT) 5/8" ID x 7/8" OD, 3/4" NPT conduit connector - Add a W here for a Brass cap and stainless steel chain attached to protection tube (Example: 5GW)

#2	FITTING SELECTION (See pages 5-7 through 5-9 for details)
Z	N/A
J	Standard design
G	Graduated seal design
X	Other, specify

#3	LENGTH (L)	Standard Design (U Length)	Graduated Seal (U Length)
1	9"	4"	N/A
2	12"	7"	N/A
3	18" (Standard)	13"	N/A
4	30" (Standard)	25"	5-1/4"
5	36"	31"	11-1/4"
6	48" (Standard)	43"	23-1/4"
X	Other, specify		



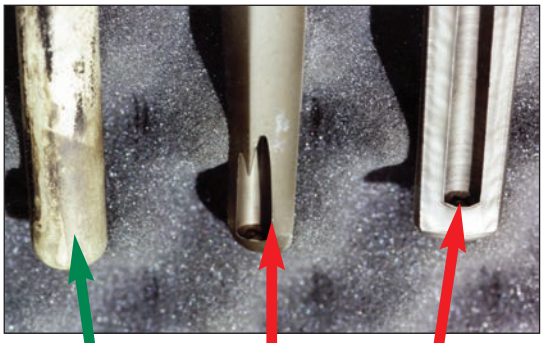
Standard Design

5G	J	3

COAL PULVERIZING THERMOWELL

This well is ideal for coal pulverizers, fluidized beds and any place where contact instrumentation might be subjected to Small Particle Erosion (SPE). JMS found that in many SPE applications customers were using OEM supplied hard faced thermowells with a variety of coatings. These thermowells were expensive to replace and could not withstand the harsh erosive environment of pulverized coal. The wear to these OEM supplied wells resulted in loss of reliability, change in response time and significant energy costs.

In response to these concerns, JMS developed a pressure sealed dependable alternative and has had some wells in place for more than 6 years without appreciable wear. A side by side comparison of durability is pictured on the right.



#1	DESCRIPTION
5V	Coal pulverizing thermowell - Add a W here for a Brass plug and stainless steel chain attached to well (Example: 5VW)

#2	U (INSERTION) DEPTH
__"	Length in inches (see illustration below)

#3	PROCESS CONNECTION
A	3/4" NPT (Standard)
B	1" NPT
C	1-1/4" NPT
X	Other, specify

#4	LAG LENGTH (T)
T	Standard (See chart on page 5-1, option #6)
Z	N/A
X	Other, specify

5V	3	A	Z