TEMPERATURE MEASUREMENT

JMS SOUTHEAST INCORPORATED

JMS-SE.COM

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Temperature Measurement
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WELCOME TO JMS SOUTHEAST!

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

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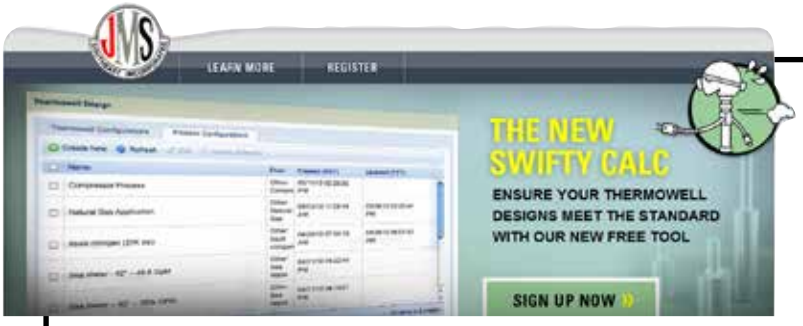


DESIGN THERMOWELLS THAT LAST AND EXTEND THE LIFE OF YOUR TEMPERATURE SENSORS WITH JMS SwiftyCalc!

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). In 2016 the standard was 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.

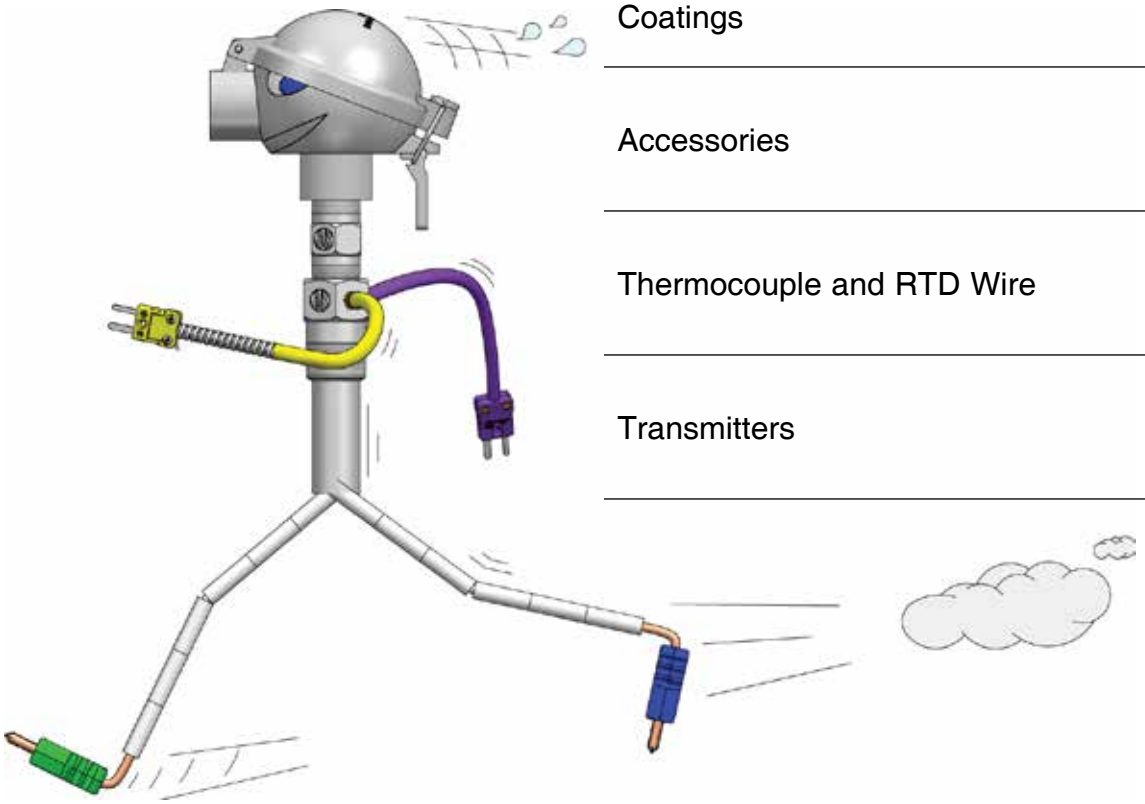
Need to develop a quick budget for your temperature application project? Push a button and get pricing from a friendly and knowledgeable JMS sales engineer.

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

INDUSTRIAL AND MINIATURE THERMOCOUPLES

NEW WEBSITE & ONLINE CONFIGURATOR!
VISIT WWW.JMS-SE.COM

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.

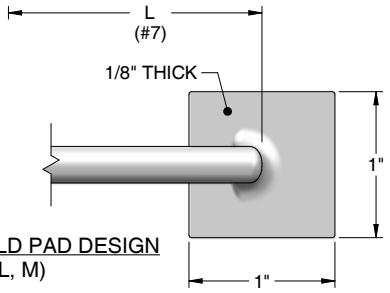
INDUSTRIAL AND MINIATURE THERMOCOUPLES

#1	DESCRIPTION [6, 7]
1	Thermocouple

#2	TYPE [8,9,10]
____	J,T,K,E,N,X (Other, Specify)

Many more options available at JMS-SE.com

#3	LIMITS OF ERROR/ELEMENT CONSTRUCTION			
1	Standard	Single	6	Standard Triple
2	Standard	Dual	X	Other, specify
3	Special	Single		
4	Special	Dual		



WELD PAD DESIGN
#6 (L, M)

#4	OUTSIDE DIAMETER [1-11]			CONDUCTOR SIZE (FOR BASE METALS ONLY) SINGLE (AWG) DUAL (AWG)						
	OD	Single	Dual		OD	Single	Dual		OD	Single	Dual
P	1/2"	10	12	R	6mm	16	18	F	1/25"	32	34
A	3/8"	13	16	C	3/16"	19	20	X*	Other, specify		
Y	5/16"	14	16	D	1/8"	22	24				
B	1/4"	16	18	E	1/16"	28	30				

*JMS now offers sheath as small as 0.010" diameter

Note: For hollow tube sensors or sensors requiring a factory bend, see pages 2-1 and 2-2.

#5	SHEATH MATERIAL [11]	MAX °F	[2-8, 4-17]		MAX °F
H	304 stainless steel	1650	C	Teflon coated stainless steel	400
J	310 stainless steel	2100	S	Titanium	400
V	STABALOY	2220	Q	Hastelloy C-276	800
K	316 stainless steel	1650	P	Pyrosil	2300
M	Inconel 600	2100	X	Other, specify	___

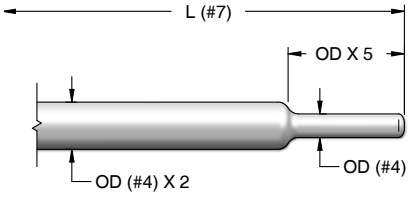
[ ] Brackets indicate page numbers where additional helpful information can be found in technical catalog. Now available online at www.JMS-SE.com/TechnicalCatalog

#6	MEASURING JUNCTION [1-12, 13, 14, 15]		
G	Grounded	P	Reduced tip, grounded
U	Ungrounded	Y	Reduced tip, ungrounded
E	Exposed (isolated on dual/triple)	R	Gas/air, exposed
I	Isolated	S	Gas/air, grounded
J	Pointed tip, grounded 45°	T	Gas/air, ungrounded
K	Pointed tip, ungrounded 45°	V*	Enlarged tip, grounded
L	Weld pad, grounded (Flat)	W*	Enlarged tip, ungrounded
M	Weld pad, ungrounded (Flat)	X	Other, specify
N	Weld pad, removable grounded		
O	Weld pad, removable ungrounded		
NF	Removable, "foot" only, grounded		
OF	Removable, "foot" only, ungrounded		

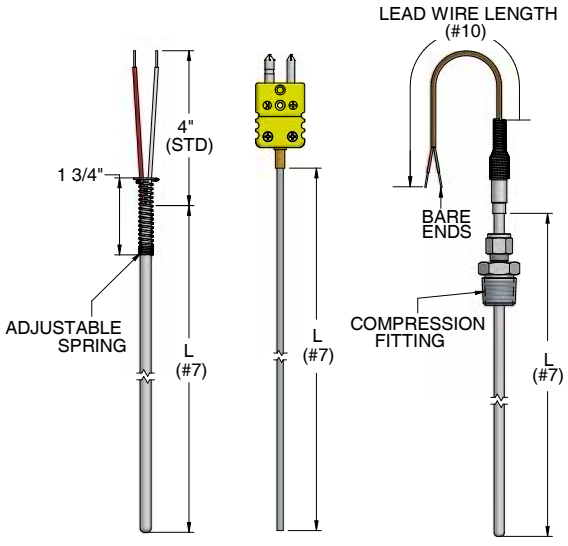
*Provide length and enlarged diameter description when selecting these options.

Note: For options N, NF, O, & OF Fastrax (aka removable weld pad) designs, refer to 4-11.

REDUCED TIP DESIGN
#6 (P,Y)



#7	LENGTH (See illustrations on page 1-1 through 1-3 for lengths)
____"	Length in Inches (Lengths greater than 90" may be coiled for shipment)



Note: L is the overall length of the sensor to the transition, wire, plug, head, or fixed attaching device. L excludes non-fixed attaching devices.

NEW Skip to page 1-3 to complete selection #8 if your sensor requires a nipple and/or union extension.

#8	STANDARD INDUSTRIAL ATTACHING DEVICE [1-3, 6-13]		
X	Other, specify		
Z	N/A	No attaching device	
G	Single thread (process)	Welded design	
F	Single thread (reversed)		
W	Double threaded		
H*	SS w/ SS ferrule	Compression design	
I*	SS w/ Teflon ferrule		
J*	SS w/ Lava ferrule		
K*	SS w/ Nylon ferrule		
L*	Brass w/ Brass ferrule		
D	Single threaded (process)	Spring-loaded design	
C	Double threaded w/ oil seal		
A	Double w/ threaded retainer		
E	Adjustable spring		
S	Double threaded (most common)		
B	Double threaded Bayonet		
BS*	Double threaded Bayonet w/ oil seal		
BD	Single threaded Bayonet		
BDS*	Single threaded Bayonet w/ oil seal		

*For double threaded use a 2 suffix along with your selection. Example: H2

Note: High nickel proprietary spring material is rated to 1000°F (for 1/4" Ø Sensors)

* Not recommended for sensors Ø > 1/4"

1	J	1	B	H	G	12"	S

OR → S { U | N | 6" | H | 1 }

SEE PAGE 1-3

INDUSTRIAL AND MINIATURE THERMOCOUPLES

#9 PROCESS CONNECTION SIZE & TYPE [1-3]

Note: Threaded bushing may be used for sizes larger than 1/2" NPT

L	1/8" NPT	O	3/4" NPT	X	Other, specify
M	1/4" NPT	J	1" NPT	Z	N/A
A	3/8" NPT	T	1 1/4" NPT		
P	1/2" NPT (Standard) w/ symbols W,S,C, & N from selection #8	Y	1 1/2"NPT		

#10 LEAD WIRE TYPE & LENGTH IN INCHES [SEE SECTION 7]

Z	No lead wires	7__"	Bare wire (AWG per #4)
1__"	Fiberglass braid	8__"	PVC coil cord (Relaxed length) (4" standard length for in head bayonet sensors)
2__"	PVC	S9__"	Teflon ultra premium Type T, stranded 22 AWG
3__"	Teflon	X__"	Other, specify
4__"	Hi-temp fiberglass braid		
5__"	Kapton		

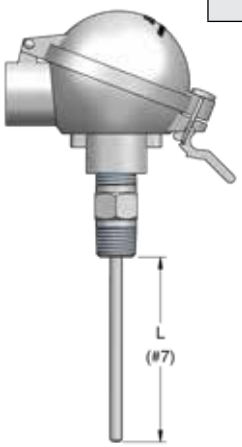
Solid 20 AWG

Note: Add an S prefix to your selection to designate stranded wire. Preferred for high vibration applications with lead wires > 6". Example: S312= 12" stranded Teflon lead wire. 24 AWG or smaller may be used to accommodate some smaller diameters and flex armor extensions.

#11 ARMOR OR HEAT SHRINK [7-7,16]

A special armor adapter is used when flex armor is longer than 60".

A	SS flex armor	J	Aluminum mylar shielded and jacketed to match primary insulation
B	SS flex armor teflon coated white	Z	N/A
C	SS flex armor teflon coated black	K	SS overbraid, drain, & yellow Teflon jacket overall, 20 AWG stranded (Type K only)
D	Small 1/8" ID SS flex armor	X	Other, specify
F	SS overbraid		
G	Heat shrink/sleeving		
H	Jacket to match primary insulation		



#12 TYPE OF TRANSITION [1-16]

H	Heat shrink
S	Size on size
T	3/8" OD (Standard)
R	1/4" OD
X	Other, specify
Z	No transition

Note: For high humidity/moisture environments (≤ 500˚F), put a 2 after your selection. For example, R2.

Note: For high temperatures at the transition area (500°F - 1200°F), put a 3 after your selection. For example, T3.

Note: L is the length of the sensor to the fixed attaching device.

#13 COLD END TERMINATION

Choose as many as applicable (Additional options see Pg. 1-7)
(Visit our online catalog for additional terminations, www.JMS-SE.com/ends)

Connectors

B	Miniature plug
C	Standard plug
F	High temperature plug (< 800˚F)
WM	Microphone style plug (6DA)
D	Miniature jack
E	Standard jack
G	High temperature jack (<800˚F)
WF	Microphone style jack (6DA)

Transmitters

8H	Isolated transmitter
8N	Non-isolated transmitter
8I	Hart protocol
8E	Intrinsically safe
8D	Hart/intrinsically safe
8PS	Indicating with SS Exp. housing
8PA	Indicating with Alum Exp. housing

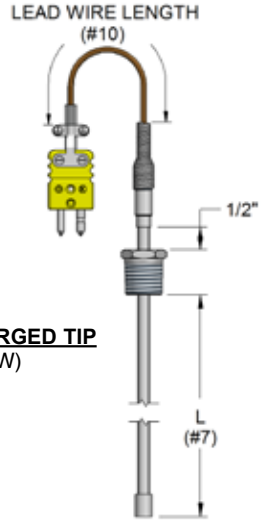
Note: Add span range after transmitter selection. Example: 8H(0-200C). Transmitter output=4-20mA. (See section 8 for other options).

Heads [6–1] visit www.JMS-SE.com/headspecs

Exp. Proof	I	Aluminum, NEMA 4X, FM, CSA, IP68 (6IA)
	J	316 SS, NEMA 4X, FM, CSA, IP68 (6ISS)
	P	Aluminum, NEMA 4X, FM, CSA, ATEX, IECEx, IP68 (6IAIEC)
	SI	Cast Iron, NEMA 4, UL, CSA (6I)
Gen. Purpose	L	Aluminum w/ hinged cover (6L)
	M	Aluminum w/ screw cover & chain (6M)
	R	Aluminum w/ hinged high dome cover (6R)
	N	Cast Iron w/ screw cover (6N)
	Q	Black plastic (6Q)
	SS	316 SS w/ screw cover & chain (6SS)

Other

A	Bare ends
K	Spade lugs (6SL)
O	Open terminal block (6B4)
X	Other, specify



ENLARGED TIP
#6 (V,W)

#14 OPTIONS

Use only if applicable [INTRODUCTION]

Marking / Tagging

1	Stainless steel tag
2	Plastic tag
3	Paper tag
4	Laser etch on probe
7	CE marking [page XV]
T	Calibration Tag

Calibration Options

5	Calibrate at specified point(s). Corrections data provided for each point.
5L*	Standard lot calibration
5M	Material calibration report.
6**	Premium calibration report. Corrections data will be provided for temperatures within the range.
6L	Premium lot calibration report. Corrections data will be provided for temperatures within the range.

Certifications

8***	Guide 17025 calibration certification
M	MTR (sheath / tubing / measuring junction components)

Other Options

B	Head mounting bracket
S	Ship straight (Do not coil)
X	Other, specify

* AMS 2750D/E/F compliant
** Must specify increments & range (Example: 0 to 300°F, 10° increments)
*** Must choose calibration option other than 5M

P	Z	Z	Z	L	1

COMPLETE PART NUMBER EXAMPLES

- With nipple-union-spring-loaded extension assembly: **1J1BHG12"S[UN6H1]PZZZL1**
- Without extension assembly: **1J1BHG12"SPZZZL1**

CUSTOM NIPPLE/UNION EXTENSION CONFIGURATOR

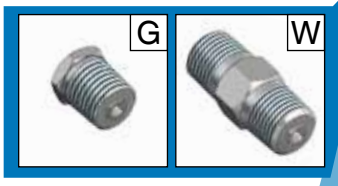
An extension assembly provides extra length extending the sensor head past insulation and away from heat. Standard unions are 1/2" FNPT on both ends. The union joins two nipples in an extension assembly and has a standard pressure rating of 150 PSIG.

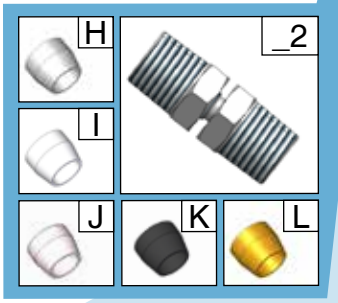
When a nipple-union-nipple assembly is selected and spring-loading of the thermocouple element is required, there are two different methods of spring-loading the sensor. JMS's standard, recommended method is to use the machined 1/2" x 1/2" NPT spring-loaded stainless steel fitting as one of the nipples. With this design, the probe is secured within the fitting and mounted to the head in a rigid manner instead of spring-loading against a terminal block, as is the case with a standard nipple-union-nipple. Due to stress exerted by spring, selection #8, option N "nipple" should never be used with an in-head transmitter. Any of the other options within option #8 are compatible with in-head transmitters.

Notes:

-The standard JMS spring designed specifically for a 1/4" OD sensor is made of high nickel proprietary spring wire which allows users to successfully maintain 1/2" of spring-loading even up to 1000°F.

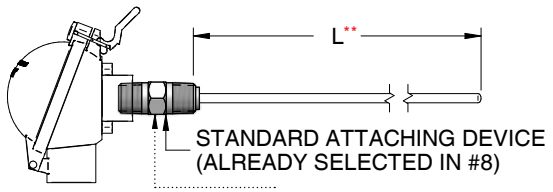
-Spring-loaded extension assemblies should not be used with ceramic protection tubes.





Note: High nickel proprietary spring material is rated to 1000°F. (For 1/4" Ø sensors)

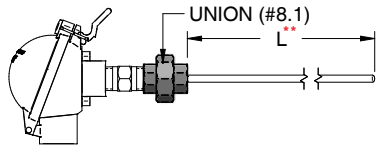
#8	COLD SIDE STANDARD INDUSTRIAL ATTACHING DEVICE [1-3, 6-13]
X	Other, specify
Welded design	
G	Single Thread (Process)
W	Double Threaded
Compression design	
H2	SS w/ SS ferrule
I2	SS w/ Teflon ferrule
J2	SS w/ Lava ferrule
K2	SS w/ Nylon ferrule
L2	Brass w/ Brass ferrule
Spring-loaded design	
D	Single threaded
C	Double threaded w/ oil seal
A	Double w/ threaded retainer
N	Nipple (spring-loaded against terminal block)
S	Double threaded ← MOST COMMON
B	Double threaded Bayonet
BS	Double threaded Bayonet w/ oil seal
BD	Single threaded Bayonet
BDS	Single threaded Bayonet w/ oil seal



** L is the overall length of the sensor to the fixed attaching device. Page 1-1, selection #7 for T/Cs or 3-1, selection #6 for RTDs.

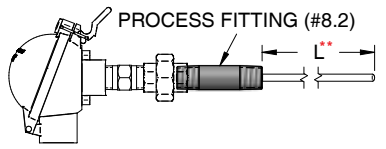
#8.1	UNION
U	Union
O	Coupling
X	Other, specify

Note: Thread adapters may be used when symbol #9 is not 1/2" NPT.

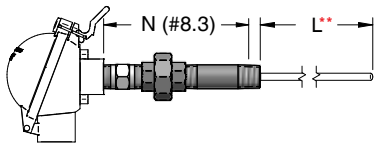


#8.2	PROCESS FITTING (MALE)
N	Nipple
X	Other, specify
Z	N/A (female thread)

Note: Thread adapters may be used when symbol #9 is not 1/2" NPT.



#8.3	N LENGTH
__" Z	Specify (Inches)*
	N/A (female thread)



* ONLY for configurations with nipples (option N for selection #8 or #8.2) ALL other configurations have fixed lengths and this selection is not applicable.

#8.4	UNION and/or NIPPLE MATERIAL		
H	304 stainless steel	X	Other, specify
K	316 stainless steel		
C	Black steel		
G	Galvanized steel		

#8.5	UNION PRESSURE RATING	
1	#150 - A351 spec (Standard)	ASTM
2	#3000 - A182 spec	
3	#6000 - A182 spec	
X	Other, specify	

S	U	N	6"	H	1

Continue on to the "PROCESS NPT" selection to finish creating your sensor part number. Selection #9 on page 1-2 (thermocouples) and 3-2 (RTDs).

BEADED THERMOCOUPLES

Beaded thermocouples are most common in furnace, heat treating and other high temperature applications. Noble Metal Thermocouples (Types R, S, B) and Refractory Thermocouples (Types C & A) incorporate an alumina bead to avoid contamination of the wire. Base Metal Thermocouples (Types J, K, N, E, T and L) are constructed with mullite beads or alumina where the upgrade is more readily available. Smaller AWG thermocouples (20 AWG, 24, AWG, 26 AWG and 30 AWG) are usually built with a single piece insulator. Larger AWG base metal thermocouples (8 AWG, 14 AWG, 20 AWG) are constructed with 1" to 3" long mullite beads that are either oval or rounded. **Heads and attaching devices will be shipped unassembled to the thermocouple unless assembled to a protection tube to avoid breakage in shipment. Must have attaching device and process connection to ship assembled to heads and protection tubes.** See Section 5 for typical protection tube designs. Special designs available by drawing.

#1	DESCRIPTION
1H	Beaded Thermocouple

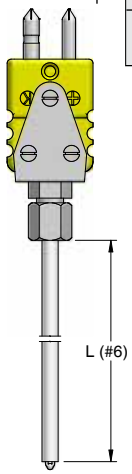
#2	TYPE
___	J, K, N, R, S, B, C, T, E, A, X (Other, specify)

#3	LIMITS OF ERROR / ELEMENT CONSTRUCTION					
1	Standard	Single	3	Special	Single	X	Other, specify
2	Standard	Dual	4	Special	Dual		

#4	MEASURING JUNCTION			
B	Welded (Std)	(Isolated if Dual)	C	Common weld bead (Dual Only)
T	Twisted	(Isolated if Dual)	X	Other, specify

#5	WIRE GAUGE										
	AWG	INSULATOR OD		AWG	INSULATOR OD		AWG	INSULATOR OD		
8	8	7/16" (1/2" DUAL)	20	20	3/16"	26	26	3/16"	X	Other, specify
14	14	1/4"	24	24	3/16"	30	30	1/8"		

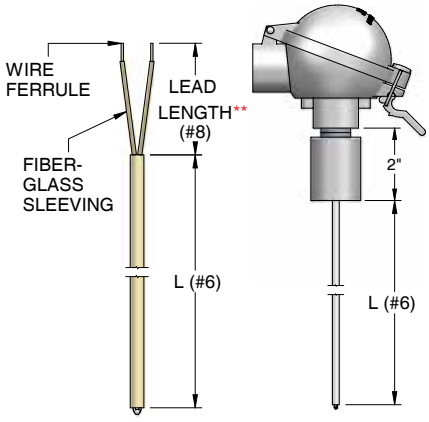
#6	LENGTH ("L" Dimension -- See illustrations on this page for length)*
L__"	Length in inches



#7	ATTACHING DEVICES USED TO CONNECT TO CERAMIC OR METAL PROTECTION TUBE [5-5 TO 5-8]		
Z	N/A	C34	Nipple-Coupling SS 1/2"x3/4" NPTF
U	Short Nipple with 1/2" NPTF 304 SS Union	C10	Nipple-Coupling SS 1/2"x1" NPTF
C18	Nipple-Coupling SS 1/2"x1/8" NPTF	C114	Nipple-Coupling SS 1/2"x1-1/4" NPTF
C14	Nipple-Coupling SS 1/2"x1/4" NPTF	C112	Nipple-Coupling SS 1/2"x1-1/2" NPTF
C	Nipple-Coupling SS 1/2"x1/2" NPTF	X	Other, specify

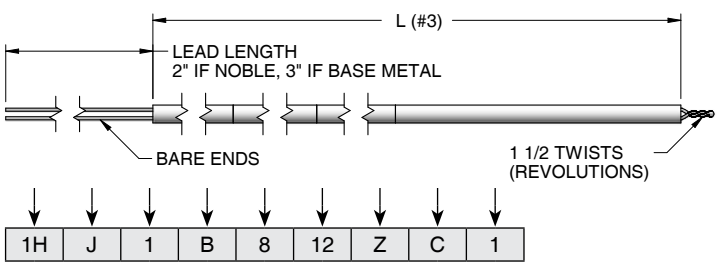
* **Note:** Manufacturing tolerance of one piece construction is ±0.5", one inch and three inch bead construction is +0"/-1".

#8	COLD END TERMINATION (Additional Options see Page 1-7) www.JMS-SE.com/headspecs			
Quick Connectors		HEADS [6-1] std 1/2"x3/4" add prefix of 1 for 3/4"x3/4" head		
C	Standard Plug	General Purpose	L	Aluminum w/ hinged cover (6L)
F	High Temp Plug		M	Aluminum w/ screw cover & chain (6M)
E	Standard Jack		N	Cast Iron w/ screw cover & chain (6N)
G	High Temp Jack		SS	316 SS w/ screw cover & chain (6SS)
Other		Exp. Proof	I	Aluminum, NEMA 4X, FM, CSA, IP66 (6IA)
A	Fiberglass sleeve to bare ends**		J	316 SS NEMA 4X, FM, CSA, IP66 (6ISS)
K	Fiberglass sleeve to spade lugs**		AH	Heat shrink to bare ends**
O	Open terminal block		AF	Mullite fish spine beads to bare ends**
X	Other, specify			

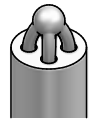


#9	OPTIONS		
1	Stainless Steel Tag	5M	Material Calibration Report
2	Plastic Tag	5L	Standard Lot Calibration
3	Paper Tag	5	Calibrate at specific points
T	Calibration Tag	6	Premium Calibration Report
7	CE Marking	6L	Premium Lot Calibration Report
X	Other, specify.	8	Guide 17025 Calibration

** **Note:** Bare ends will be 2" with wire ferrule if noble (Type R, S, B) 2" if refractory (Type C, A) thermocouples and 3" if base metal (J, K, N, T, E, L) thermocouples. Dual 8 AWG & 14 AWG thermocouples will have the leads shaped to fit a 6G4 terminal block.



WELDED DUAL JUNCTION
(W, Option #4, Standard)

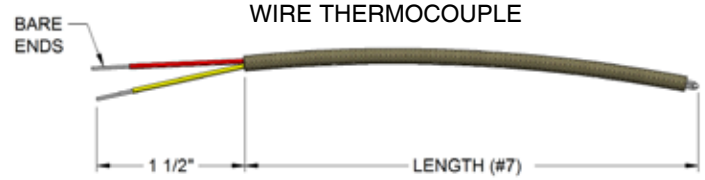


DUAL COMMON JUNCTION
(C, Option #4)

DUAL TWISTED JUNCTION
(T, Option #4)

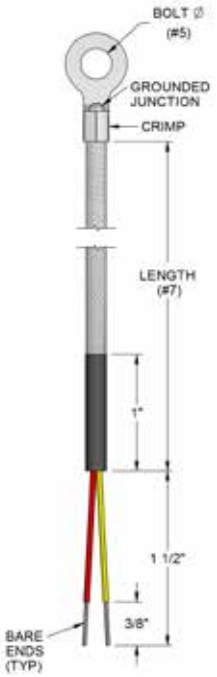
WIRE, GASKET, AND LUG THERMOCOUPLES

WIRE THERMOCOUPLE

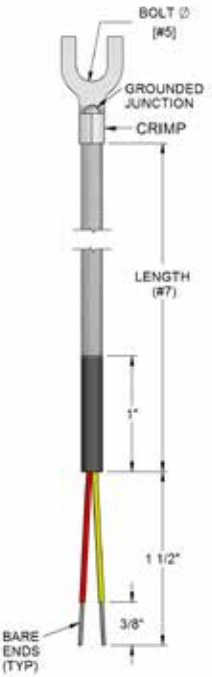


GASKET THERMOCOUPLE

RING TERMINAL THERMOCOUPLE



SPADE LUG THERMOCOUPLE



#1	DESCRIPTION
1D	Wire gasket and lug thermocouples - Grounded

#2	STYLE	
G	Wire thermocouple	* Must select option 8" from selection #6
H	Gasket thermocouple	** See hose clamp dimensional chart below to specify needed clamp size by adding the corresponding # as a suffix. Example C2 = Hose clamp T/C to fit 1/2"- 3/4" pipe
L	Ring terminal thermocouple	
S	Spade lug thermocouple	
M*	Shim thermocouple	
C_**	Hose clamp thermocouple	

#3	TYPE
____	J, K, N, T, E, R, S, B, C, L, A, X (Other, specify)

#4	GASKET MATERIAL	
C	Copper (Standard)	* Standard material for ring/spade lugs is nickel-plated steel. Gasket, shim and hose clamp Stainless Steel.
S*	Steel	
X	Other, specify	
Z	N/A	

#5	BOLT DIAMETER	
A	#10 (13/64" ID)	**Note:** If washer/gasket/ring dimensions are critical, use X and state requirements.
C	1/4" (9/32" ID)	
X	Other, specify bolt size, ID, OD, thickness, and any tolerances as necessary.	
Z	N/A	
P	Spark plug washer	

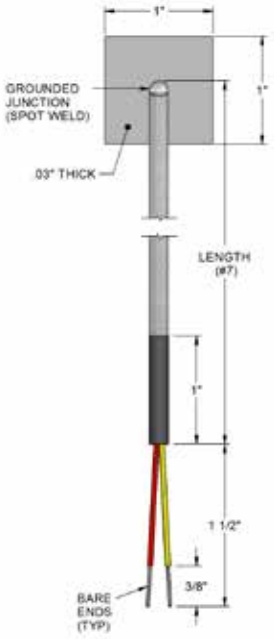
#6	WIRE INSULATION	
1	Fiberglass braid	**Note:** For stranded wire, add an S prefix before symbol designation in this column. 24 AWG or smaller may be used to accommodate some smaller diameters.
3	FEP Teflon	
4	Hi-temp fiberglass braid	
5	Kapton	
8	Fiberglass braid/stainless steel overbraid	
X	Other, specify	

#7	LENGTH
____"	Length in inches

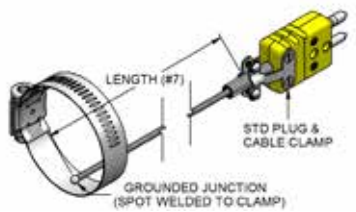
#8	COLD END TERMINATION	
A	Bare ends	[Additional options available. See page 1-7]
B	Miniature plug	
C	Standard plug	
X	Other, specify	

#9	OPTIONS (See page 1-2, Options #14)

SHIM THERMOCOUPLE



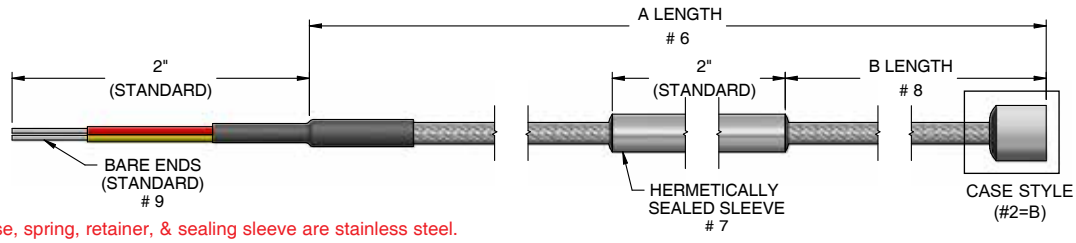
HOSE CLAMP DIMENSIONAL CHART



	STANDARD PIPE SIZE (INCHES)	HOSE CLAMP ID (INCHES) MIN.	HOSE CLAMP ID (INCHES) MAX.
1	1/4 to 3/8	7/16	25/32
2	1/2 to 3/4	11/16	1-1/4
3	1 to 1-1/2	1-1/16	2
4	2 to 2-1/2	2-1/16	3
5	3 to 3-1/2	3-5/16	4-1/4
6	4	3-9/16	4-1/2
7	5	5-1/8	6
8	6	6-1/8	7
X	Other Specify		

1D	G	K	Z	Z	1	36"	C

WIRE STYLE BEARING SENSOR



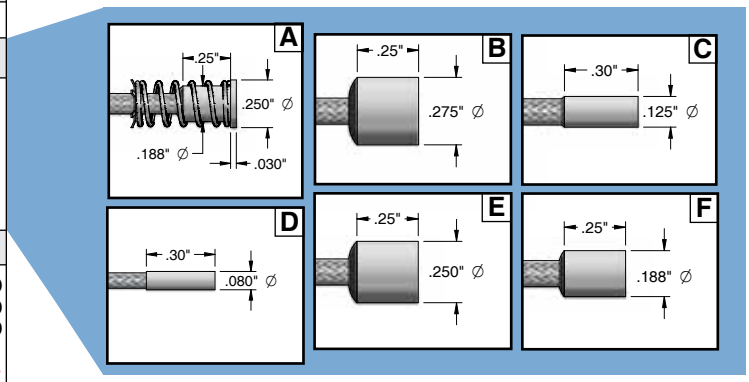
Note: Case, spring, retainer, & sealing sleeve are stainless steel.

#1	DESCRIPTION
1P	Bearing Sensor

#2	CASE STYLE
A	.188" Ø X .250" (spring-loaded)
B	.275" Ø X .250" (fixed)
C*	.125" Ø X .300" (fixed)
D**	.080" Ø X .300" (fixed)
E	.250" Ø X .250" (fixed)
F	.188" Ø X .250" (fixed)
X	Other, specify

* Not available with dual RTDs.

** Not available with dual element construction.



#3	TYPE		
T	Copper/Constantan	2*	2 Wire RTD
K	Chromel/Alumel	3*	3 Wire RTD
J	Iron/Constantan	4*	4 Wire RTD
N	Nicrosil/Nisil		
E	Chromel/Constantan		
X	Other, specify		

* 100Ω PT, 0.00385α

#4	ELEMENT CONSTRUCTION
S	Single
D*	Dual
X	Other, specify

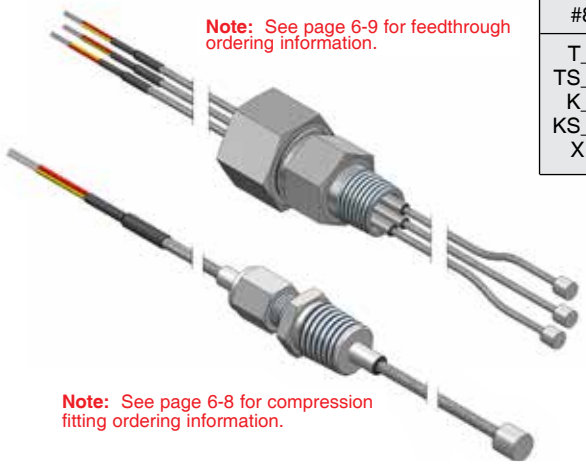
* Some dual sensors may have separate leads due to dual wire availability constraints.

#5	MEASURING JUNCTION
G	Grounded (Standard)
U	Ungrounded (RTDs are always ungrounded)
I	Isolated

#6	A LENGTH
__"	A length (in inches)

#7	SEALING SLEEVE OUTSIDE DIAMETER
C	3/16" Ø (.188")
B	1/4" Ø (.250")
Y	5/16" Ø (.313")
A	3/8" Ø (.375")
X	Other, specify
Z	N/A

Note: See page 6-9 for feedthrough ordering information.



Note: See page 6-8 for compression fitting ordering information.

#8	LEAD WIRE TYPE & B LENGTH
T__"	Teflon
TS__"	Teflon with SSOB overall } Max temp = 392°F
K__"	Kapton
KS__"	Kapton with SSOB overall } Max temp = 500°F
X	Other, specify

Note: 24 AWG or smaller conductor may be used when necessary.

#9	COLD END TERMINATION
A	Bare ends
B	Miniature plug
C	Standard plug
X	Other, specify

[Additional cold end options available. See page 1-7]

#10	OPTIONS
1	Stainless steel tag
2	Plastic tag
3	Paper tag
4	Laser etch on sleeve
X	Other, specify

[Additional options and/or calibration available. See page 1-2]

1P	B	T	S	G	36"	B	TS60"	A	4

ADDITIONAL TERMINATIONS

COLD END TERMINATION [SEE SECTION 6] Choose as many as applicable (JMS part number prefixes are shown in parenthesis)

Connectors

	Plugs		Jacks
B	Miniature plug (6A1B)	D	Miniature jack (6A1D)
BH	Miniature high temperature plug (6A2B) <800°F	DH	Miniature high temperature jack (6A2D) <800°F
C	Standard plug (6A1C)	E	Standard jack (6A1E)
F	Standard high temperature plug (6A2C) <800˚F	G	Standard high temperature jack (6A2E) <800˚F
WM	Microphone style plug (6DA)	WF	Microphone style jack (6DA)
WA	Solid pin plug, heavy duty (6A3C)	WB	Solid pin jack, heavy duty (6A3E)
WC	Jab in plug (6A4C)	WD	Jab in jack (6A4E)
WE	Ultra high temperature plug, glazed (6A5C) <1200°F	WG	Ultra high temperature jack, glazed (6A5E) <1200°F
WH	Ultra high temperature plug, unglazed (6A7C) <1200°F	WI	Ultra high temperature jack, unglazed (6A7E) <1200°F
WJ	Low noise plug (6A6C) <425°F	WK	Low noise jack (6A6E) <425°F
WL	DIN-IEC microphone plug (6DB)	WN	DIN-IEC microphone style jack (6DB)
V	Molded/water resistant plug (6DC)	VF	Molded/water resistant jack (6DC)
Y	M12 Male connector (6DY)	YF	M12 Female connector (6DY)
WQ	Miniature locking plug (6A8B2)	WR	Miniature locking jack (6AIDL2)
WS	Standard plug, locking (6A8C2)	WT	Standard jack, locking (6A8E2)

Heads

[6–1] Visit *www.JMS-SE.com/headspecs*

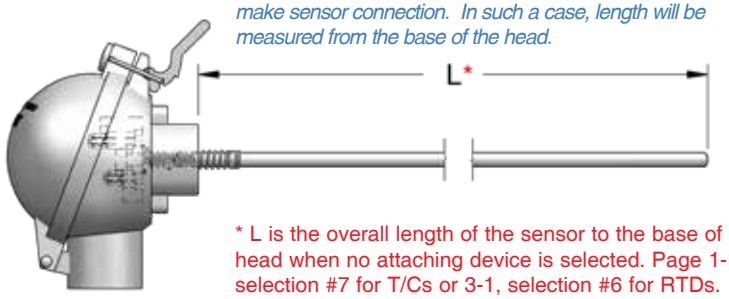
Explosion Proof

I	Aluminum, NEMA 4X, FM, CSA, IP68 (6IA)
J	316 stainless steel, NEMA 4X, FM, CSA, IP68 (6ISS)
P	Aluminum, NEMA 4X, FM, CSA, ATEX, IECEx, IP68 (6IAIEC)
U	316 stainless steel, NEMA 4X, ATEX, IP68 (6ISSATEX)
SI	Cast Iron, NEMA 3, 4, UL, CSA (6I)
GA	Aluminum, screw cover w/ indicating window, NEMA 4X, ATEX, IECEx, FM, CSA, IP68 (688A1)
GS	316SS, screw cover w/ indicating window, NEMA 4X, ATEX, IECEx, FM, CSA, IP68 (688S1)

General Purpose

L	Aluminum w/ hinged cover (6L)
M	Aluminum w/ screw cover & chain (6M)
R	Aluminum w/ hinged high dome cover (6R)
N	Cast Iron w/ screw cover (6N)
Q	Black plastic (6Q)
SS	316 stainless steel w/ screw cover & chain (6SS)
WP	White plastic, screw cover, Sanitary (6WP)
SB	Nickel plated, cylinder style, 1/4" NPT (6S250)
SD	Nickel plated, cylinder style, 1/8" NPT (6S125)
SC	Stainless steel, socket cap style
ST	Molded plastic, mini head, 1/4" NPT, < 350F (6T)
SU	Molded plastic, mini head, 1/4" NPT, < 800F (6U)

Some applications may have pre-existing threaded pipes or protection tubes where no attaching device is needed to make sensor connection. In such a case, length will be measured from the base of the head.



* L is the overall length of the sensor to the base of the head when no attaching device is selected. Page 1-1, selection #7 for T/Cs or 3-1, selection #6 for RTDs.

Transmitters [8-1 to 8-3]

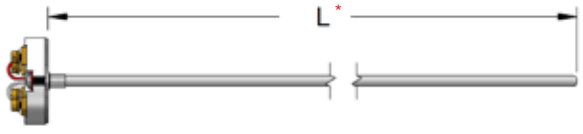
Notes:
- Add span range after transmitter selection. Example: 8H(0-200C).
- Transmitter output = 4 - 20 mA. (See section 8 for other options).

8H	Isolated transmitter
8N	Non-isolated transmitter
8I	Hart Protocol
8E	Intrinsically safe
8D	Hart/Intrinsically safe
8M	Integral transmitter (see page 3-5) RTDs ONLY

8PA	Explosion proof, IP66/IP68, NEMA 4X, ATEX/IECEx, FM/CSA, Aluminum, threaded cap with glass viewing window, touch programmable [8-2]
8PS	Explosion proof, IP66/IP68, NEMA 4X, ATEX/IECEx, FM/CSA, 316 SS, threaded cap with glass viewing window, touch programmable [8-2]

Other

A	Bare ends
K	Spade lugs (6SL)
RL	Ring lugs (6RL)
O	Open ceramic terminal block, brass screw terminal (6B)
OA	Open Bakelite terminal block, nickel plated screw terminal (6BB)
OB	Open ceramic terminal block for sensors with bayonet style connection, brass screw terminal (6B or 6C)
OG	Ceramic terminal block, brass screw terminal (6G)
OP	Pluggable polymide terminal block, nickel plated screw terminal (6PT)
OS	Open ceramic terminal block, nickel plated solder terminal (6C)
CG	Cord connector/grip, aluminum ½" NPT (6CC)
TB	Conduit bushing, ¾" NPT male X ½" NPT female, plated steel (6IRB)
TJ	Junction Box Connector, ½" NPT Zinc (6JBC)
X	Other, specify

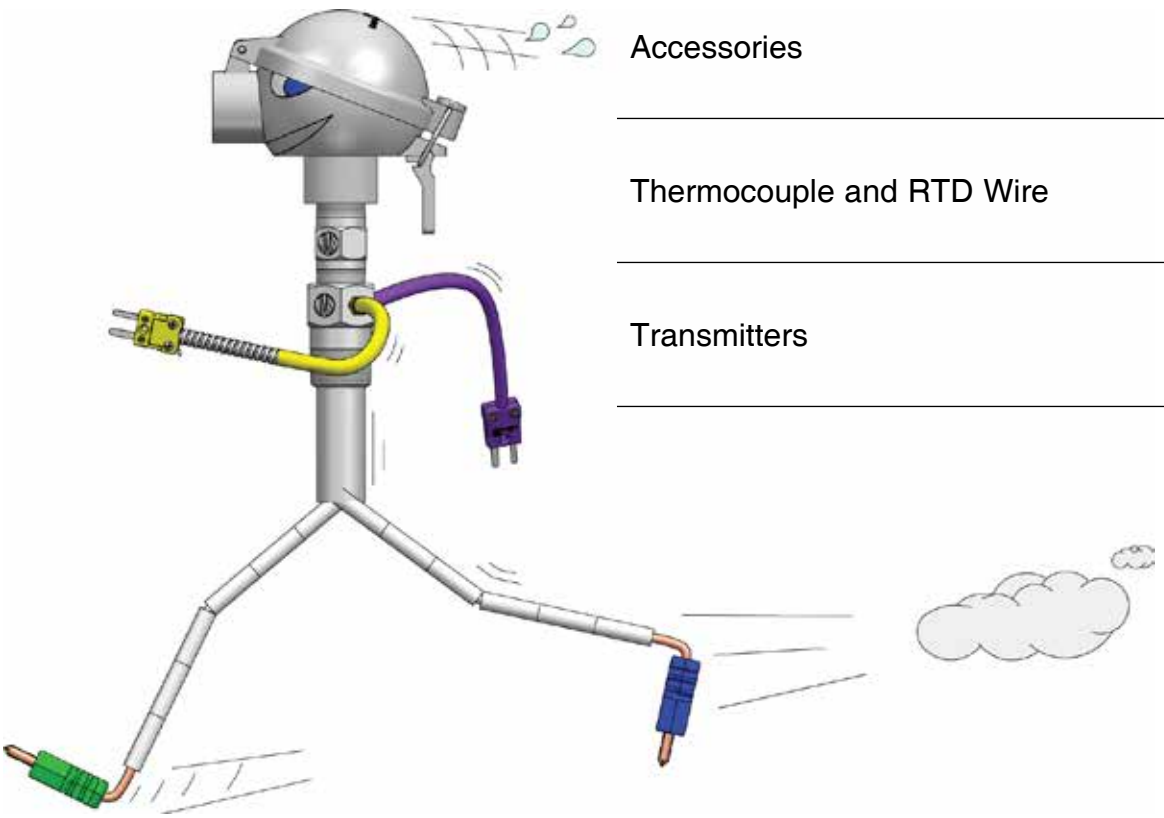


* L is the overall length of the sensor to the base of the terminal block mounting plate when open terminal block cold end termination is selected without a fixed attaching device. Page 1-1, selection #7 for T/Cs or 3-1, selection #6 for RTDs.

PLASTICS SENSORS

NEW WEBSITE & ONLINE CONFIGURATOR!
VISIT WWW.JMS-SE.COM

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.

BAYONET TEMPERATURE SENSORS

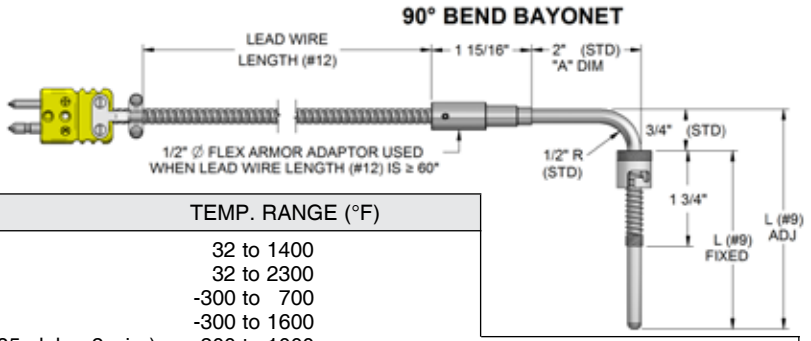
Bayonet style thermocouples are the most common in plastics processing. JMS has adapted this useful and safe design to other industrial sensors to utilize the best features of both.

Our standard design and most commonly used is the Adjustable Bayonet attachment device developed by JMS in 1982. This design incorporates a plated brass cap with a stainless steel spring. The spring fits around the appropriately sized sensor and remains in position until such a time as the user adjusts it. This enables the same sensor to be used for many different applications in the same facility. It also makes for lower inventory levels which your accountant will love.

The other attachment devices we make for your sensors are standard in the industry. For those "Old Dogs" who refuse to try something innovative, we still offer the fixed bayonet design. The length of this sensor cannot be changed and will only go in the hole it was specifically built to fit.

#1	DESCRIPTION
2	Plastics sensors

#2	DESIGN [2-8]
M	MgO insulated (swaged sheath)
H	Hollow tube



#3	TYPE	TEMP. RANGE (°F)
J	Iron/Constantan	32 to 1400
K	Chromel/Alumel	32 to 2300
T	Copper/Constantan	-300 to 700
E	Chromel/Constantan	-300 to 1600
2	100Ω Platinum RTD (0.00385 alpha, 2 wire)	-200 to 1000
3	100Ω Platinum RTD (0.00385 alpha, 3 wire)	-200 to 1000
4	100Ω Platinum RTD (0.00385 alpha, 4 wire)	-200 to 1000
X	Other, specify	

Note: Hollow tube sensors should never be used to measure temperatures above 900°F.

#4	OUTSIDE DIAMETER
C	3/16" (.188")
D	1/8" (.125") **Note:** 1/8" required for nozzle melt style
B	1/4" (.250")
R	6mm (.236")
X	Other, specify
Z	N/A (non-immersion nozzle)

Note: 316 SS standard sheath and tube material.

#5	LIMITS OF ERROR	ELEMENT CONSTRUCTION
1	Standard	Single
2	Standard	Dual
3	Special	Single
4	Special	Dual
X	Other, specify	

Special limits RTDs are JMS Class A tolerance (page 3-1)

#6	CONSTRUCTION
S	Straight
4	45° bend
9	90° bend
X	Specify angle of bend and "A" dimension (see illustrations above)

Note: 1/2" radius bends are standard. Other radii may be specified but they may deform the diameter of the tube at the bend. Larger radii may be required for larger diameters or coated sensors.

#7	MAX TEMPERATURE AT WHICH TIP WILL BE EXPOSED
A	<0°C (32°F) = Kapton*
B	<200°C (392°F) = Teflon*
C	<288°C (550°F) = Kapton*
D	<482°C (900°F) = Fiberglass*
E	<705°C (1300°F)
F	>705°C (1300°F)

*If no transition (Z) is in symbol 13, we recommend these corresponding selections for primary wire insulation on hollow tube sensors.

#8	MEASURING JUNCTION [9]
G	Grounded
U	Ungrounded common (RTDs are always ungrounded)
I	Isolated
E	Exposed
X	Other, specify

#9	LENGTH (L)
__"	Length in inches

Note: See appropriate drawing on page 2-1 & 2-2 before you specify the immersion length. Use 0" for non-immersion nozzle design.

Note: When LENGTH (Option #9) exceeds 90", the probe may be coiled for shipment.

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

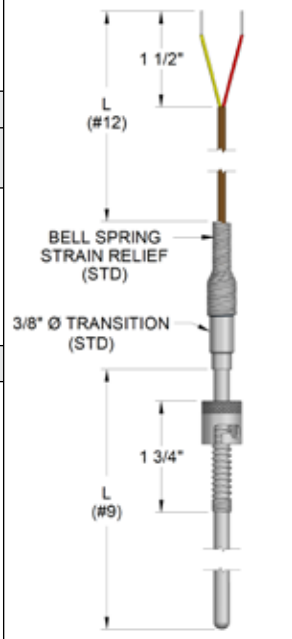
2	M	K	C	1	9	D	G	3"

PLASTICS SENSORS

#10	ATTACHING DEVICES (see illustrations below)
J*	Adjustable bayonet (Standard)
F	Fixed bayonet
P*	Brass compression fitting (1/8" NPT)
N	Non-Immersion nozzle fixed (1/4-28 x 3/8" long thread)
R	Non-immersion nozzle rotating (1/4-28 x 3/8" long thread)
M*	Nozzle melt rotating (3/8-24 x 15/16" long thread)
X	Other, specify
Z	N/A

*Non-fixed fittings do not affect the immersion length(#9).

ADJUSTABLE BAYONET
(Top of cap is usually positioned 3/4" from transition at factory)



#11	ADAPTER TYPE *1/8" NPT & 3/8-24 UNF adapters are used with .125" Ø and .188" Ø sensors.		
1/8" NPT	3/8-24 UNF	NICKEL PLATED STEEL SLOT HEAD MOUNTING ADAPTER (FOR BAYONET ONLY)	
Z	Z	No adapter required	
A	E	7/8" overall length	
B	F	1 1/2" overall length	
C	G	2 1/2" overall length	
D	J	3 1/2" overall length	
X	X	Other, specify	
		K	1/4" NPT X 1 1/4" overall length for 1/4" & 6mm bayonet sensors

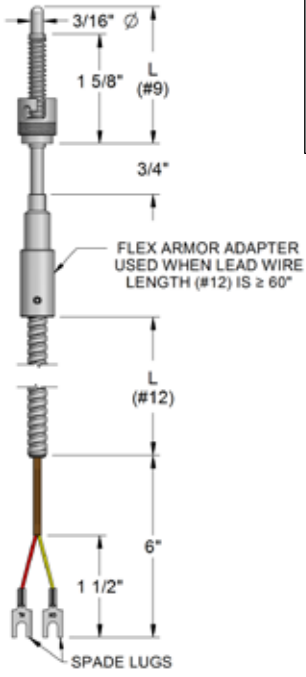
Note: More adapter options on page 2-5.

#12	LEAD WIRE TYPE & LENGTH IN INCHES
Z	No lead wires
1 __"	Fiberglass braid
3 __"	FEP Teflon
5 __"	Kapton
6 __"	Fiberglass braid/flex armor overall
7 __"	Teflon/flex armor overall
8 __"	Fiberglass braid/stainless steel overbraid
S9__"	Teflon ultra-premium, Type T only, 22 AWG, stranded
X __"	Other, specify

Note: 20 AWG solid wire is standard for thermocouples and 24 AWG stranded wire is standard for RTDs.

Note: 24 AWG wire or smaller may be used if necessary.

FIXED BAYONET



#13	TYPE OF TRANSITION [1-16]
H	Heat shrink
S	Size on size
T	3/8" OD (Standard)
R	1/4" OD
X	Other,specify
Z	No transition
Q	Cuttable design (No crimp at end of tube)

Note: For high humidity/moisture environments (≤500˚ F), put a 2 after your selection.

Note: For high temperature at the transition area (>500˚ F), put a 3 after your selection. (May not comply with ASTM Insulation Resistance (IR) test)

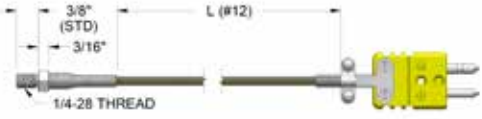
Note: When Z (no transition) is specified for a hollow tube sensor, the extension lead is crimped to the tube.

#14	COLD END TERMINATION [Add'l options see Pg 1-7] CHOOSE AS MANY AS APPLICABLE		
Connectors		Heads	
B	Miniature plug (6A1B2)	I	Explosion proof aluminum, NEMA 4X, FM, CSA, IP68 (6IA)
C	Standard plug (6A1C2)	L	Aluminum w/ hinged cover (6L)
F	High temperature plug (< 800˚ F)	M	Aluminum w/ screw cover & chain(6M)
WM	Microphone style plug (6DA)	N	Cast iron w/ screw cover (6N)
V	Hermetic connector plug (6DC)	Q	Black plastic (6Q)
D	Miniature jack	R	Aluminum high dome, hinged cover (6R)
E	Standard jack	WP	White plastic head, NEMA 4 (WP)
G	High temperature jack (< 800˚ F)	Other	
WF	Microphone style jack (6DA)	A	Bare ends
		K	Spade lugs (6SL)
		O	Open terminal block (6B4)
		X	Other, specify

#15	TAGGING AND CALIBRATION OPTIONS (USE ONLY IF APPLICABLE)
———	See page 1-2 #14 for ordering selections.

NOZZLE MELT

Example part number: 2MKD1SDG12"MZ6(60")TC



NON-IMMERSION NOZZLE

Example part number: 2HKZ1SDU0"NZ1(60")ZC

J	A	6 (72")	T	C	1

PLASTIC MELT EXTRUSION SENSORS

#1	DESCRIPTION
2P	Plastic melt sensors

#2	STYLE [2-6]
4*	Bolt with 1 1/2" bendable metal extension and plug
5	Bolt with direct mount plug
6**	Bolt with 24" of Kapton insulated wire w/flexible armor and plug
X	Other, specify

*Tubular extension between bolt and plug can be formed by hand at application site to desired angle. If longer metal extension from hex to plug connection is required, use X and specify length desired. (Example: 2PXJ13BGP; X=4-6")

**If a length other than 24" of flex armor is required, use X and specify length desired. (Example: 2PXJ13BCP; X=6-36")

#3	SENSOR TYPE [1-1, 3-1] (Hollow tube design)
J	Iron/Constantan
A	100Ω Platinum RTD 0.00385 alpha (3 wire) (Standard)
X	Other, specify

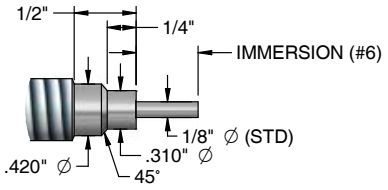
#4	LIMITS OF ERROR/ELEMENT CONSTRUCTION		
1	Standard/Single	4	Special/Dual
2	Standard/Dual	X	Other, specify
3	Special/Single		

Special limits RTDs are JMS Class A tolerance (See page 3-1)

#5	BOLT LENGTH [2-6]				
3	3"	6	6"	X	Other Specify"

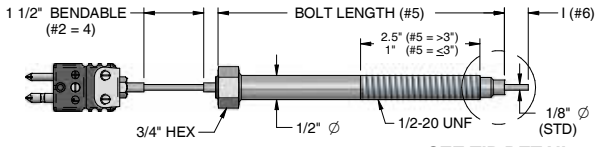
#6	IMMERSION (I) [2-6]		
A	Flush	C	1"
B	1/2"	X	Other, specify

TIP DETAIL



#7	MEASURING JUNCTION [2-9]
G	Grounded
U	Ungrounded common (RTDs are always ungrounded)
E	Exposed
I	Isolated
X	Other, specify

For special wetted parts facing, use X + description. (Example: X=Grounded + Hastelloy C-276 facing)



#8	MAXIMUM SERVICE TEMPERATURE
P	<500°F (Standard)
Q	500°F - 900°F

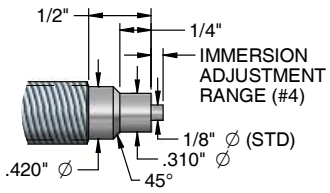
#9	TAGGING/CALIBRATION OPTIONS
____	See page 1-2 #14 for ordering selections.

PLASTIC MELT EXTRUSION ADJUSTABLE SENSORS

#1	DESCRIPTION	#2	SENSOR TYPE [3-1] (Hollow Tube Design)
27	Adjustable plastic melt sensor	J	Iron/Constantan
		3	100 Ω Platinum RTD, 0.00385 alpha (3 wire) Class B
		X	Other, specify

#3	BOLT LENGTH	#4	IMMERSION ADJUSTMENT RANGE [9]
3	3" Bolt	A	1/8" - 1"
5	5" Bolt	B	1/8" - 2 1/2"
7	7" Bolt	X	Other, specify
X	Other, specify		

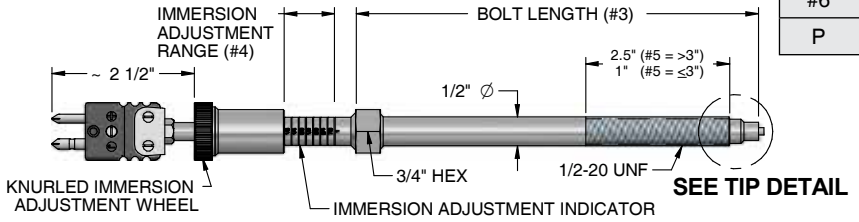
TIP DETAIL



#5	MEASURING JUNCTION		
G	Grounded (Standard)	I	Isolated
U	Ungrounded (RTDs always ungrounded)	X	Other, specify
E	Exposed (Recommended for profiling)		

#6	MAX SERVICE TEMPERATURE		
P	<500°F (Standard)	Q	500°F - 900°F

#7	TAGGING/CALIBRATION OPTIONS
____	See page 1-2 #14 for ordering selections



FLEX ARMOR ADJUSTABLE DEPTH SENSORS

#1	DESCRIPTION
2K	Flexible armor adjustable depth sensor

#2	SENSOR TYPE
J	Iron/Constantan (Standard)
K	Chromel/Alumel
T	Copper/Constantan
E	Chromel/Constantan
3	100Ω Platinum RTD 0.00385 alpha (3 wire) Class B
4	100Ω Platinum RTD 0.00385 alpha (4 wire) Class A
4S	100Ω Platinum RTD 0.00385 alpha (4 wire) 1/10th DIN
X	Other, specify

Note: Add a 2 for dual element. (Example: 2J)

#3	FLEX ARMOR DIMENSIONS
1	.125" ID X .210" OD
2	.188" ID X .270" OD (Standard)

#4	TUBE LENGTH
__"	Length in inches
Z	Flush - no tube (Standard)

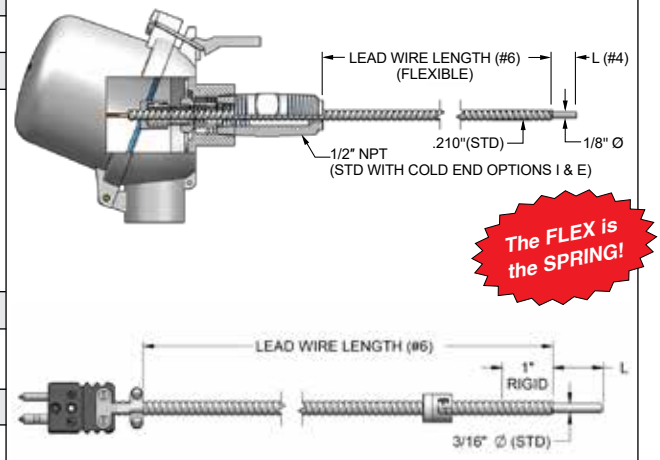
#5	JUNCTION
G	Grounded (Standard)
U	Ungrounded - (RTDs are always ungrounded)

#6	LEAD WIRE LENGTH (Standard Insulation Fiberglass)
__"	Length in inches

#7	COLD END TERMINATION [Additional options see Pg 1-7]
C	Standard plug
E	Standard jack
K	Spade lugs
I*	Explosion proof head, 1/2" x 3/4" NPT connection with fitting
R*	High dome, general purpose head w/ hinged cover, 1/2" x 1/2" NPT fitting
T	Junction box connector
A	Bare ends (Standard)
P**	Single 1/2" NPT thread with bayonet S/L
X	Other, specify

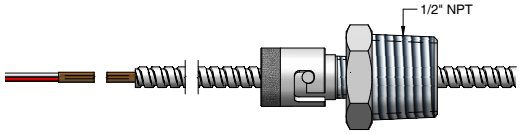
If bayonet adapter is needed for mounting, see page 2-5.

#8	TAGGING AND CALIBRATION OPTIONS (Use only if applicable)
____	See page 1-2 #14 for ordering selections.



* Symbols I & R are not usually used in plastics manufacturing. These options are designed to provide a spring-loaded industrial sensor that can be used through elbows and around corners. Also an excellent solution when spring-loading is needed for a protection tube or thermowell that has become warped or bent. Select symbol #3-1 for .210 OD flex armor to fit thermowells.

** Match with additional code end options.
If none are specified, will be supplied with bare ends.



COLD END OPTION P (Use with .125" Flex Armor Dimension)

SPRING ADJUSTABLE DEPTH SENSORS

#1	DESCRIPTION
2Q	Spring adjustable depth bayonet sensor with SSOB fiberglass leadwire

#2	SENSOR TYPE		
J	Iron/Constantan (Standard)	E	Chromel/Constantan
K	Chromel/Alumel	3	100Ω Platinum RTD 0.00385 alpha (3 wire) Class B
T	Copper/Constantan	X	Other, specify

#3	LEAD WIRE LENGTH
48"	Length in inches
60"	Length in inches
L__"	Length in inches

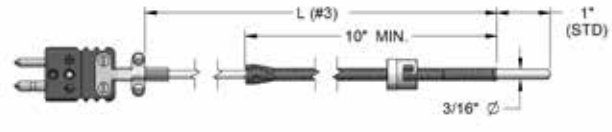
Note: Length measured from front of spring to back of cable clamp.

#4	JUNCTION
G	Grounded (Standard)
U	Ungrounded common (RTDs are always ungrounded)

#5	COLD END TERMINATION [Additional options see Pg 1-7]		
A	Bare ends (Standard)	K	Spade lugs (compensated)
C	Standard plug	T	Junction box connector
E	Standard jack	X	Other, specify

Note: If pipe clamp or bayonet adapter is required, see page 2-5.

#6	TAGGING AND CALIBRATION OPTIONS (use only if applicable)
____	See page 1-2 #14 for ordering selections.



MGO VS HOLLOW TUBE

Bayonet thermocouples can be constructed with Magnesium Oxide sheath material or hollow tube units made with lead wires inserted in tubing. Magnesium Oxide (MgO) insulation is a dry, uncontaminated, compacted ceramic powder. MgO gives the thermocouple high insulation resistance and dielectric strength. Also, it allows excellent insulation of the positive and negative wire conductors in relation to each other and to the outer sheath. Among the outstanding features of sheath material are: (A) flexibility to bend or form to twice the radius of the sheath diameter, (B) its rigidity to maintain size and shape after bending or straightening, (C) vibration or shock has no effect on the material, (D) sheath material withstands pressures upward to 50,000 psi, and (E) sheath material may be used in applications where temperatures may range from -400° to 3000°F depending on requirements and selection of materials.

INSULATOR	PURITY %	MELTING POINT °C	MELTING POINT °F	USABLE TEMP. °C	USABLE TEMP. °F
Magnesium Oxide(MgO)	96.4% (STD) 99.4% (must specify) 99.8% (must specify)	2790	5050	1650	3000

New insulation materials are being developed. Use an X and describe to specify.

The hollow-tube design is used for disposable thermocouples that can be replaced easily. Their life is about half of that of a Magnesium Oxide insulated thermocouple. The advantage of a hollow-tube design is the cost. It is the least expensive design for the short run.

BAYONET ACCESSORIES

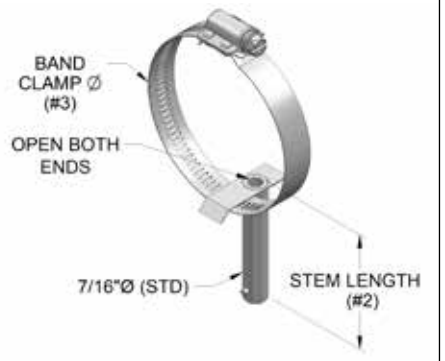
STAINLESS STEEL PIPE CLAMP ADAPTERS

#1	DESCRIPTION
2C	Pipe clamp bayonet adapter (For .125" Ø and .188" Ø sensors)

#2	L (STEM LENGTH IN INCHES)
R	1-3/4"
S	3-3/4"
T	8-3/4"
X	Other, specify
Z	N/A, hose clamp only

#3	STANDARD PIPE SIZE (INCHES)	BAND CLAMP MIN. (INCHES)	DIAMETER MAX. (INCHES)
1	1/4 to 3/8	7/16	25/32
2	1/2 to 3/4	11/16	1-1/4
3	1 to 1-1/2	1-1/16	2
4	2 to 2-1/2	2-1/16	3
5	3 to 3-1/2	3-5/16	4-1/4
6	4	3-9/16	4-1/2
7	5	5-1/8	6
8	6	6-1/8	7
X	Other Specify		

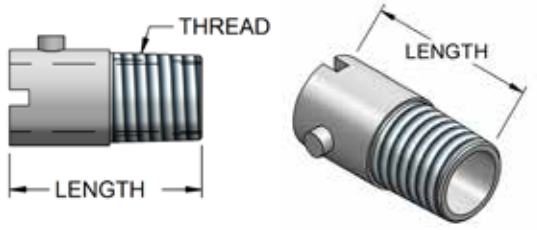
2C	S	3



Note: L = Length of stem. Should be equal to the maximum insulation thickness + 3/4". The bayonet sensor length for adjustable should be L + 1-1/4". For fixed, it should be L + 1/2".

NICKEL PLATED SLOT HEAD ADAPTERS

THREAD			LENGTH
1/8" NPT	3/8"-24	1/4"NPT	
2A	2E	6BA78	7/8" overall length
2A1	—	6BA	1-1/4" overall length
2B	2F	—	1-1/2" overall length
2C	2G	—	2-1/2" overall length
2D	2J	—	3-1/2" overall length

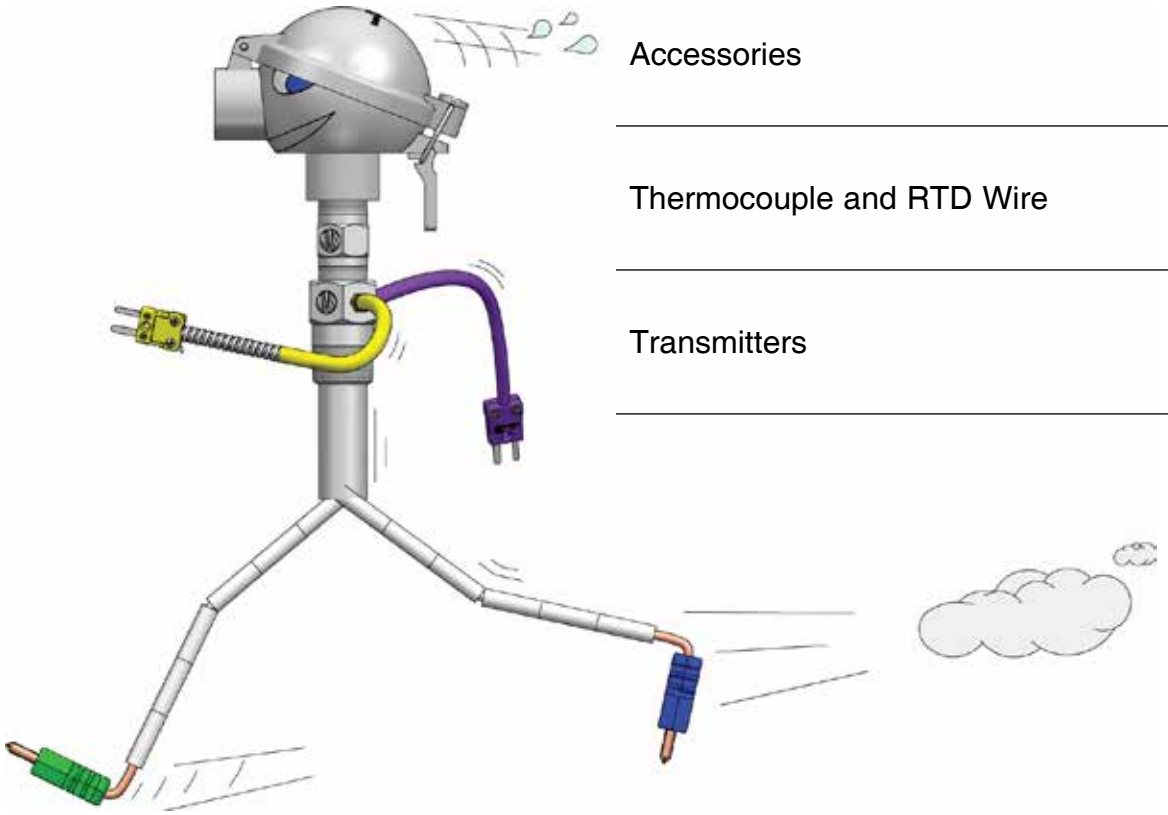


Note: To order adapters of different lengths, use 2A + X for 1/8" NPT and 2E + X for 3/8"-24 threads. You must specify length. Standard slot head adapters are nickel plated brass. Other materials are available upon request.

RESISTANCE TEMPERATURE DEVICES (RTDS)

NEW WEBSITE & ONLINE CONFIGURATOR!
VISIT WWW.JMS-SE.COM

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.

RESISTANCE TEMPERATURE DEVICES (RTDS)

#1	DESCRIPTION
3	RTD

#2 ELEMENT TYPE [3-4, 9, 10, 11, 15, 18, 22, 24] — 100 Ω Platinum 0.00385 alpha (Ω/Ω/°C) unless otherwise stated

	Resistor Accuracy at 0°C	Thermometer Class [pg. 3-18]	Resistor Class [pg. 3-18]
B	± 0.30°C (Competitor's Std)	B	≥ F 0.3
E	± 0.15°C (Standard)	A	≥ F 0.15
P*	± 0.06°C	AA	≥ 1/2 F 0.1
S*	± 0.03°C (Best Accuracy)	1/4 A	≥ 1/10 W 0.3
N	± 0.74°C (120 Ω Nickel α=0.00672)	Non-Standard	Non-Standard
M	± 0.30°C (1000 Ω)	B	≥ F 0.3
X	Other, specify [3-22]	--	--

Note: Wound or film resistors may be used.

* For compliant results, use 4 wire RTD for high accuracy (types P & S).

#3 ELEMENT CONSTRUCTION [4]

S	Single	Standard construction
D	Dual	Standard construction
J	Single	Swaged construction
K	Dual	Swaged construction
X	Other, specify	
SV	Single	High vibration construction
DV	Dual	High vibration construction

Note: Use swaged for high temperature, bendability, and/or longer than 90".

#4 TUBE DIAMETER MUST CHOOSE 1

P	1/2" (.500")	D	1/8" (.125")
A	3/8" (.375")	X	Other, specify
Y	5/16" (.313")	Z	N/A
B	1/4" (.250")		
R	6mm (.236")		
C	3/16" (.188")		

TIP CONSTRUCTION [1-13] MUST CHOOSE 1

N	Normal, closed tip (Standard)
K	Pointed tip, 45°
M	Weld pad
O	Weld pad, removable
R2	Gas/Air, exposed
W*	Enlarged tip
Y2	Reduced tip
X	Other specify

* Provide length and enlarged diameter description when selecting this option.

#5 TUBE MATERIAL [3-11, 3-13]

K	316 stainless steel	C	Teflon coated, stainless steel	X	Other, specify
L	316L stainless steel	S	Titanium		
M	I-600 (Use if symbol #7 >500°F)	Q	Hastelloy C-276		

#6 LENGTH (L) (See illustrations on pages 3–1 and 3–2 for "L" dimension)

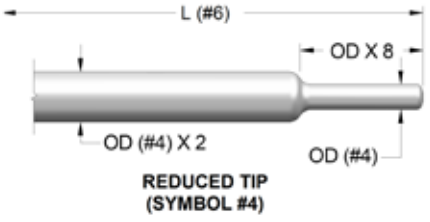
__" Immersion length in inches (lengths greater than 90" may be coiled for shipment)

#7 MAX TEMPERATURE AT WHICH TIP WILL BE EXPOSED

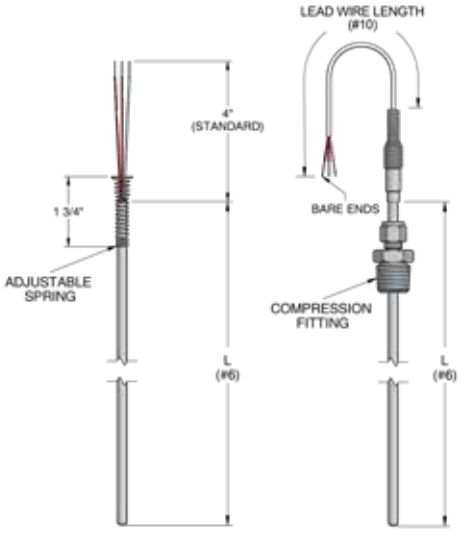
A	<0°C (32°F) Cryogenic = 5 Kapton
B	<200°C (392°F) = 3 Teflon*
C	<288°C (550°F) = 5 Kapton*
D	<350°C (662°F) = 1 Fiberglass*
E	<660°C (1220°F) = 4 High temperature fiberglass*

*If no transition (Z) is in symbol 13, we recommend these corresponding selections for primary wire insulation on hollow tube sensors.

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



REDUCED TIP (SYMBOL #4)



Note: L is the overall length of the sensor to the transition, wire, plug, head, or fixed attaching device. L excludes non-fixed attaching devices.

NEW ***Skip to page 1-3 to complete selection #8 if your sensor requires a nipple and/or union extension.***

#8 STANDARD INDUSTRIAL ATTACHING DEVICE [1-3, 6-13]

X	Other, specify	
Z	N/A	No attaching device
G	Single thread (process)	Welded design
F	Single thread (reversed)	
W	Double threaded	
H*	SS w/ SS ferrule	Compression design
I*	SS w/ Teflon ferrule	
J*	SS w/ Lava ferrule	
K*	SS w/ Nylon ferrule	
L*	Brass w/ Brass ferrule	
D	Single threaded (process)	Spring-loaded design
C	Double threaded w/ oil seal	
A	Double w/ threaded retainer	
E	Adjustable spring	
S	Double threaded (most common)	
B	Double threaded bayonet	
BS	Double threaded bayonet w/ oil seal	
BD	Single threaded bayonet	
BDS	Single threaded bayonet w/ oil seal	

* For double threaded use a 2 suffix along with your selection. Example: H2

Note: High nickel proprietary spring material is rated to 1000°F (for 1/4" Ø sensors)

OR → S { U | N | 6" | H | 1 }

SEE PAGE 1-3

3	E	S	BN	K	12"	B	S

RESISTANCE TEMPERATURE DEVICES (RTDS)

#9 PROCESS CONNECTION SIZE & TYPE [3]

L	1/8" NPT	O	3/4" NPT
M	1/4" NPT	X	Other, specify
A	3/8" NPT	Z	N/A
P	1/2" NPT (Standard)		

Note: Threaded bushing may be used for sizes larger than 1/2"

#10 LEAD WIRE TYPE & LENGTH IN INCHES [see section 7]

1__"	Fiberglass braid	X__"	Other, specify
3__"	Teflon (Standard)	Z	N/A
4__"	High temperature fiberglass braid		
5__"	Kapton (Standard for Cryogenic)		

Note: All wire in tubes > 1/8" OD will be 24 AWG. Smaller tubes will have a max. of 28 AWG. If no transition or armor is specified, wire may be fragile. JMS standard lead wire for RTDs is stranded plated copper.

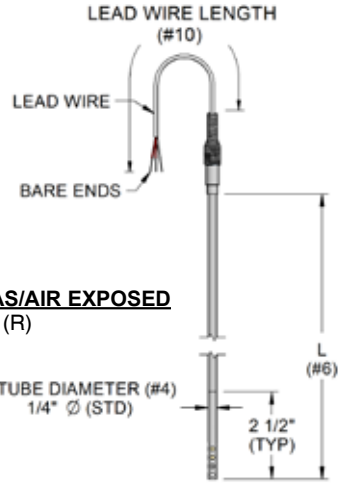
#11 ARMOR OR HEAT SHRINK/JACKET [7-7]

A	SS flex armor (Standard)	G	Heat shrink/sleeving
B	SS flex armor Teflon coated white	H	Jacket to match primary insulation
C	SS flex armor Teflon coated black	J	Aluminum Mylar shielded and jacketed to match primary insulation
D	1/8" ID SS flex armor	Z	N/A
F	SS overbraid	X	Other, specify

#12 WIRE CONFIGURATION [17, 18]

T	2 Wire
Y	3 Wire
W	4 Wire

Note: Use a double symbol for 2 separate multiconductor lead wires, if dual elements. For example, TT.



GAS/AIR EXPOSED
#4 (R)

Note: Immersion shown (#6) is overall length of tube for gas air sensors.

#13 TYPE OF TRANSITION [14]

H	Heat shrink
S	Size on size
T	3/8" OD
R	1/4" OD
Q	Cuttable (Std construction only) [3-12]
X	Other, specify
Z	No transition

Note: For high humidity/moisture environments (≤ 500˚F), put a 2 after your selection. For example, R2.

Note: For high temperatures at the transition area (500°F to 1200°F), put a 3 after your selection. For example, T3.

#14 COLD END TERMINATION [Additional options see Pg 1-7] Choose all that apply

Connectors

B	Miniature plug
C	Standard plug
F	High temp plug (< 800°F)
WM	Microphone style plug
D	Miniature jack
E	Standard jack
G	High temp jack (< 800°F)
WF	Microphone style jack
V	Water resistant plug
Y	M12 Water resistant plug

Heads [6-1] Visit www.JMS-SE.com/headspecs

Exp. Proof	I	Aluminum, NEMA 4X, FM, CSA, IP68 (6IA)
	J	316 SS, NEMA 4X, FM, CSA, IP68 (6ISS)
	P	Aluminum, NEMA 4X, FM, CSA, ATEX, IECEx, IP68 (6IAIEC)
	U	316 SS, NEMA 4X, FM, ATEX, IECEx, IP68 (6ISSATEX)
Gen. Purpose	L	Aluminum w/ hinged cover (6L)
	M	Aluminum w/ screw cover & chain (6M)
	N	Cast Iron w/ screw cover (6N)
	Q	Black plastic (6Q)
	R	Aluminum high dome w/ hinged cover (6R)
	SS	316 SS w/ screw cover & chain (6SS)

Transmitters

8H	Isolated transmitter
8N	Non-isolated transmitter
8I	Hart Protocol
8E	Intrinsically safe
8D	HART / Intrinsically safe
8M	Integral transmitter (see page 3-5)

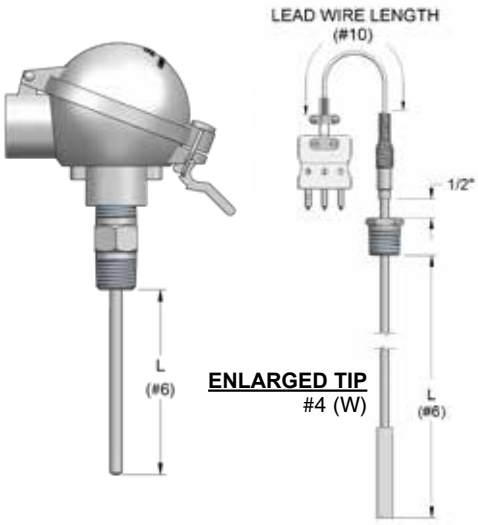
Transmitter & Housing [See Pg. 8-2]

8PS	Indicating with SS housing
8PA	Indicating with aluminum housing

Other

A	Bare ends
X	Other, specify

Note: Add span range after transmitter selection. Example: 8H(0-200C).



#15 OPTIONS (Use only if applicable)

1	Stainless steel tag	6C*	Premium calibration report. Callendar-Van Dusen coefficients will be provided for all
2	Plastic tag	7	CE marking [page XV]
3	Paper tag	8	Guide 17025 calibration
4	Laser etch on probe	M	MTR (Sheath, tubing, tip)
5	Calibrate at specified point(s) Corrections data provided for each point.	T	Calibration tag
6*	Premium calibration report. Corrections data will be provided for all		

*Must specify increments & range (Example: 0 to 300°F, 10° increments)

P	Z	Z	Y	Z	L	1

COMPLETE PART NUMBER EXAMPLES

-with nipple-union-spring-loaded fitting extension assembly:
3ESBNK12"BS[UN6H1]PZZYZL1
-without extension assembly:
3ESBNK12"BSPZZYZL1

AVERAGING RTDS

Continuous averaging resistance temperature detectors are most frequently used in air washing and air handling systems where turbulent and stratified air flow may affect the temperature measurement in a tip sensitive probe. The average temperature of the air in the duct can be measured with this type of sensor.

Any application which requires an averaging of temperature across an area would be suited for this sensor type. The operating temperature range for a continuous averaging RTD is from -148 to 382°F. Lower temperatures and temperatures up to 900°F are handled with a multipoint design (4, 8, or 16 points).

#1	DESCRIPTION
3A	Averaging RTD

#2	ELEMENT TYPE 0.00385, 100Ω @ 0°C, Class B **Note:** For 1000 Ω RTD put a K after your selection. For example, P4K.		
E*	Continuous, -148° to 382°F (-100° to 194°C)	X	Other, specify
P4**	Platinum 4 point, <900°F (<482°C)		
P8**	Platinum 8 point, <900°F (<482°C)		
P16**	Platinum 16 point, <900°F (<482°C)		

* Only available in 1/4" diameter up to 1200" long.
** Maximum probe length is 240"

#3	PROBE DIAMETER		
B	1/4" (.250")	C	3/16" (.188")

#4	SENSING LENGTH
__"	Sensing length in inches **Note:** Sensing length must be at least 4" shorter than the total probe length.

#5	TUBE MATERIAL		
K	316 Stainless steel	U	Copper

#6	TOTAL PROBE LENGTH
__"	Total probe length in inches

#7	STANDARD INDUSTRIAL ATTACHING DEVICE
W	Fixed 1/2" NPT double threaded SS fitting
B	Bayonet spring-loaded assembly for thermowells & heads
F	Reverse mounted single thread SS fitting fixed to sheath for attaching head
G	Fixed single threaded SS fitting
H	Compression fitting SS w/ SS ferrule
I	Compression fitting SS w/ Teflon ferrule
J	Compression fitting SS w/ lava ferrule
K	Compression fitting SS w/ Nylon ferrule
X	Other, specify
Z	N/A

For all compression fittings except fixed, immersion is overall length of the tube.

#8	PROCESS NPT		
L	1/8"	X	Other, specify
M	1/4"	Z	N/A
P	1/2"		

#9	LEAD WIRE TYPE & LENGTH IN INCHES
1 __"	Fiberglass braid
3 __"	Teflon
5 __"	Kapton
6 __"	Fiberglass braid/flex armor overall
7 __"	Teflon/flexible armor overall
8 __"	3 conductor fiberglass braid/SS overbraid
9 __"	3 conductor Teflon with Teflon jacket overall
10__"	3 conductor Teflon/SS overbraid with Teflon jacket overall
11__"	High-temperature Teflon
X __"	Other, specify
Z	N/A

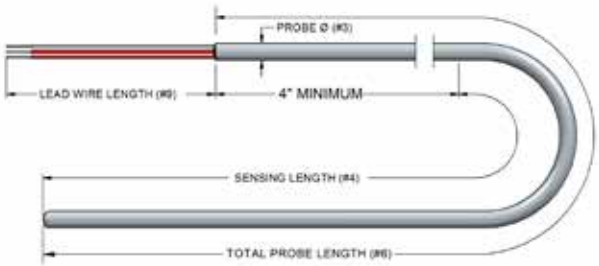
#10	WIRE CONFIGURATION
T	2 Wire
Y	3 Wire
W	4 Wire

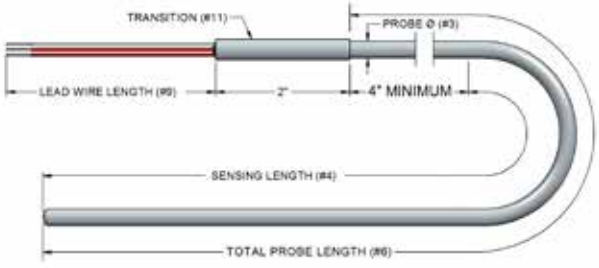
#11	MAX TRANSITION TEMP	
P	< 500°F	* Not valid for continuous element type.
Q*	> 500°F	

Note: Call JMS for information about averaging thermocouples, swamp boxes and special proprietary multipoint designs.

Note: When LENGTH (Option #6) exceeds 90", the probe may be coiled for shipment.

Note: 9" minimum bend radius





3A	E	B	12"	K	18"	I	M	3-36"	Y	P

AVERAGING RTDS

#12	COLD END TERMINATION [Additional options see Page 1-7] (Choose as many as applicable)
A	Bare ends
B	Miniature plug
C	Standard plug
D	Miniature jack
E	Standard jack
F	High temperature plug (< 800°F)
G	High temperature jack (< 800°F)
I	Explosion proof head, NEMA 4X, FM, CSA, IP66 (6IA)
K	Spade lugs (6SL)
L	Aluminum head w/ hinged cover (6L)
M	Aluminum head w/ screw cover & chain (6M)
N	Cast Iron head w/ screw cover (6N)
O	Open terminal block (6B4)
Q	Black plastic head (6Q)
R	High dome head (6R)
V	Molded water resistant plug (6DC)
WM	Microphone style connector (6DA) - Male
WF	Microphone style connector (6DA) - Female
X	Other, specify

Note: For any other cold end termination, use appropriate part numbers from section 6 in place of symbol #12.

#13	TAGGING AND CALIBRATION OPTIONS (use only if applicable)		
1	Stainless steel tag	5	Standard room temp calibration. Due to the limited size of calibration chambers and the potential sensing length of these sensors, we recommend one point at room temperature. Please contact factory for any other calibration options.
2	Plastic tag		
3	Paper tag		
4	Laser etch on probe	7	CE marking [Page XV of online technical catalog]
		M	MTR
		T	Calibration tag

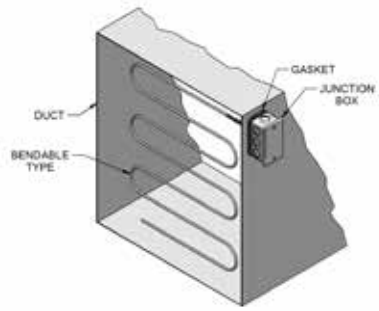
C	1

LOW COST AVERAGING RTDS

Low cost averaging RTDs sense the temperature of air streams in ducts and plenums. This sensor includes a junction box with gasket to prevent leakage and vibration noise.

These thermometers have a continuous element to sense true average temperature along their entire length. They provide accurate composite readings in locations where air may be stratified into hot and cold layers.

Rigid averaging sensors have a brass case. Bendable models have aluminum sheaths (Copper on special order) formable to a radius of 4". Bendable sensors can criss-cross ducts to average temperatures in two dimensions.



Specifications:
Temperature range: -45.5 to 135°C (-50 to 275°F); Gasket: 100°C (212°F); Leadwire: 22AWG, Teflon insulated, 8" long; Sheath diameter: .188" OD.

#1	DESCRIPTION
3L	Platinum, 100Ω @ 0°C, a=0.00385
3LK	Platinum, 1000Ω @ 0°C, a=0.00385

#2	SENSOR TYPE
56	Rigid
57	Bendable

#3	WIRE CONFIGURATION
T	2 Wire
Y	3 Wire

#4	INSERTION LENGTH
_____"	(Standard Lengths for Rigid type (inches): 12", 18", 24", 48", 60", 72" Standard Lengths for Bendable type (inches): 72", 144", 288")

#5	OPTIONS [Additional options see page 1-7]
A	Weatherproof connection box (2.12"W X 4.0"H X 1.75"D)
B	Sensor only, no box
C	Stainless steel tag
X	Other

Note: When INSERTION LENGTH (Option #4) exceeds 90", the probe may be coiled for shipment.

3L	56	T	60"	A

RTD WITH INTEGRAL PC PROGRAMMABLE TRANSMITTER

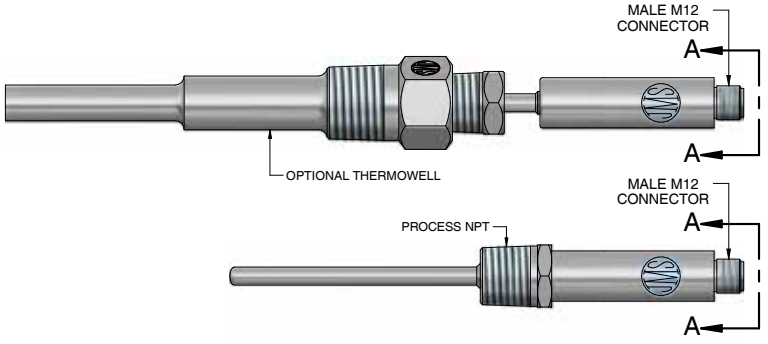
RTD with 4-20 mA INTEGRAL OUTPUT (RTD *in*, 4-20 mA *out*)

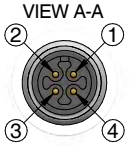
INDUSTRIAL STYLE INTEGRAL TRANSMITTER (Transmitter option see page 3-2, #14, 8M)

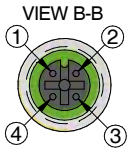
FEATURES:

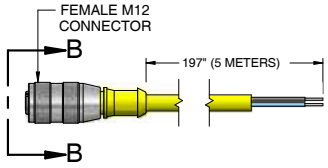
- PC programmable
- Carry a 4-20 mA to your PLC directly from the RTD with no special equipment.
- Available in fixed immersion and spring loaded for thermowells!!
- Quick-n-Clean M12 connection for easy replacement.
- NEMA 6P (IP67) rated with M12 connector.
- Ideal for most applications from -60 to 320°F.
- Ambient temperature limits -40 to 185°F.

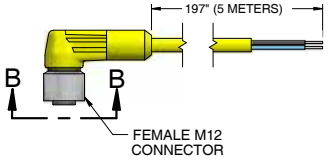
Ideal for high moisture environments!

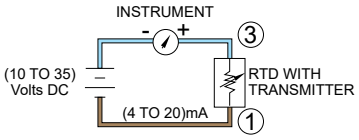




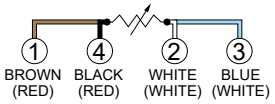








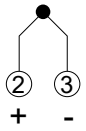
4 WIRE RTD WITH TRANSMITTER



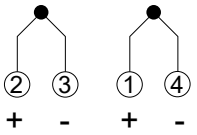
[NON ASTM/IEC COLOR CODE]
4 WIRE RTD WITHOUT TRANSMITTER

JMS PART #	DESCRIPTION
6SKWT*	M12 CORDSET, 4 POLE, FEMALE, STRAIGHT, IP67, 197" (5 METER) LENGTH
6RKWT*	M12 CORDSET, 4 POLE, FEMALE, RIGHT ANGLE, IP67, 197" (5 METER) LENGTH

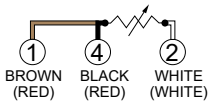
*Add an X to the end of the part # to specify a custom cord length.



SINGLE TC WITHOUT TRANSMITTER



DUAL TC WITHOUT TRANSMITTER



[NON ASTM/IEC COLOR CODE]
3 WIRE RTD WITHOUT TRANSMITTER

ECONOMY HAND HELD INFRARED SENSOR

SPECIFICATIONS

Measurement Range:	-50 to 380°C (-58 to 716°F).
Operating & Storage Temperature:	0 to 50°C (32 to 122°F)
Accuracy:	± 2% of reading or 2°C (4°F) (*whichever is greater*)
Resolution:	0.1°C/0.1°F
Response Time:	≤ 0.8 second.
Emissivity Range:	0.95 fixed.
Spectral Response:	5-14 µM
Distance to Spot Ratio:	12:1
Auto shut off feature:	Yes
Medical Grade:	No

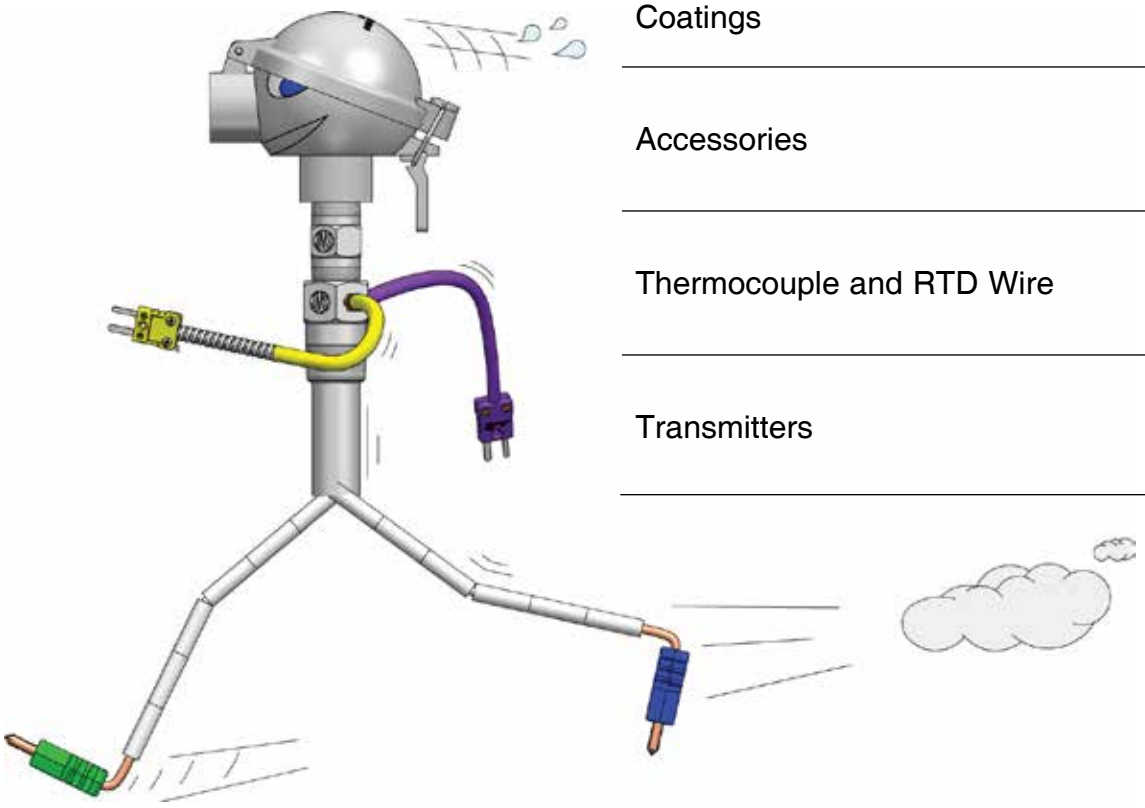
Only! *$35.00*

TO ORDER, USE JMS PART NUMBER: IR20L

SANITARY AND SPECIALTY SENSORS

NEW WEBSITE & ONLINE CONFIGURATOR!
VISIT WWW.JMS-SE.COM

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.

CIP SANITARY RTDS & THERMOCOUPLES

JMS's Clean-in-Place (CIP) Sanitary RTDs and Thermocouples are manufactured to 3-A Standard 74-07 and are specially designed to meet the needs of the food, dairy, beverage, pharmaceutical, chemical, and cosmetic industries. They are ideally suited for a number of applications where corrosion and contamination are factors. They are fabricated from stainless steel or other 3-A accepted material using a method assuring imperfection-free surfaces. All sanitary grade thermocouples are provided to special limits of error. All sanitary RTDs are available in 4 wire construction.

Standard Number 74-07

Direct Immersion sanitary sensors incorporate sanitary caps manufactured per the ASME BPE standard. Removeable sensors for sanitary applications typically incorprate spring loaded fittings and are assembled with sanitary thermowells. Wetted materials are polished to a #4 finish to assure that there are no pits, folds or crevices. The exterior nipple, also stainless steel, can be joined to a connection head, designed to withstand caustic washdown. A typical RTD or Thermocouple (see pages 1-1 and 3-1) may be used with a sanitary thermowell (see pages 4-3 through 4-6).

#1	DESCRIPTION
4S	Sanitary sensors

#2	RTD/THERMOCOUPLE TYPE *(RTD–Platinum 0.00385 alpha (Ω/Ω/°C). Resistor accuracies at 0°C below & [3-1,17,18]*		
B	RTD Options 4 wire ± 0.30°C	Resistor accuracies at 0°C. Add 3 before selection for 3 wire RTD	T Thermocouple Options Copper/Constantan
E	4 wire ± 0.15°C		K Chromel/Alumel
P	4 wire ± 0.06°C		J Iron/Constantan
S	4 wire ± 0.03°C (JMS Standard)		X Other, specify
X	Other, specify		

#3	ELEMENT CONSTRUCTION
1	Single
2	Dual
X	Other, specify

#4	OUTSIDE DIAMETER (OD)			
A	3/8"	E	1/16"	**Note:** For a reduced tip, add R before selection. The shank OD will equal twice the tip OD. See illustration below. (Example RB steps down from 1/2" to 1/4" at the tip)
B	1/4"	X	Other, specify	
C	3/16"	Z	NA	
D	1/8"			

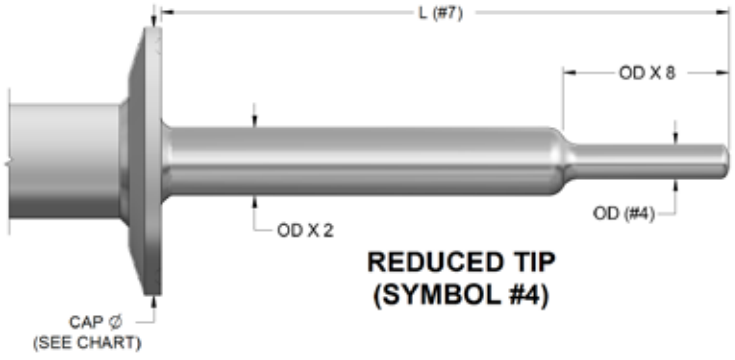
#5	TUBING MATERIAL		
K	316 stainless steel	S	Titanium
L	316 low carbon stainless steel (Standard)		
H	304 stainless steel		
I	304 low carbon stainless steel		
X	Other, specify		

#6	MEASURING JUNCTION	
G	Grounded	
U	Ungrounded (Standard)	**Note:** RTDs are always ungrounded.

#7	IMMERSION LENGTH (L)
___"	Length in inches

[ ] Brackets indicate page numbers where additional helpful information can be found in our technical catalog.

Now available online at www.JMS-SE.com/TechnicalCatalog



REDUCED TIP (SYMBOL #4)

4S	S	1	C	K	U	12

TRI-CLAMP (16 AMP) CAP SIZE CHART

CAP SIZE (#9)	CAP Ø
1/2 or 3/4	.984"
1 or 1 1/2	1.984"
2	2.516"
2 1/2	3.047"
3	3.579"
4	4.682"
6	6.570"
8	8.563"
10	10.563"
12	12.563"

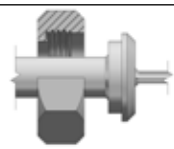
CIP SANITARY RTDS & THERMOCOUPLES

#8	SANITARY CAP OPTIONS [SEE BELOW] **Note:** Standard sanitary thermowells can be found on page 4-4 and 4-5.		
T	Tri-Clamp (16 AMP)	P	PV Gasket (16APV) without 13-H nut
B***	Bevel seat (16 A) without 13-H nut	PH	PV Gasket with 13-H nut
BH***	Bevel seat with 13-H nut	A***	3A4 Adapter
I**	I Clamp (16AI-14I)	X*	Other, specify

* When specifying X, ensure that it meets 3-A standard.
** Not 3-A authorized.
*** Must be cleaned manually.

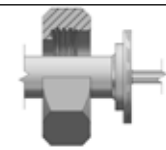

T Tri-Clamp (16 AMP)


B Bevel Seat (16A) without 13-H Nut


BH Bevel Seat(16A) with 13-H Nut


I I Clamp (16IA-14I)


P PV Gasket (16APV) without 13-H Nut


PH PV Gasket (16APV) with 13-H Nut

#9	CAP SIZE	See Tri-Clamp Size Chart on page 4-1	
05	1/2 or 3/4	60	6
15	1 or 1 1/2	80	8
20	2	100	10
25	2 1/2	120	12
30	3	Z	N/A
40	4	X	Other, specify

Note: 05 Cap sizes (1/2 x 3/4) will use 1/4" NPT nipple. Not available for Bevel seat or I-Clamp


A 3A4 Adapter

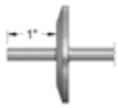
#10	POLISH (Wetted surfaces only)		
H	High polish #4 finish (≤ 32 microinches(µin)) (Standard)	F	Fine polish (≤ 20 microinches(µin))
E	Electropolish after #4 finish (≤ 32 microinches(µin))	V	Ultra polish 8G finish (≤ 8 microinches(µin))
P	Passivate after #4 finish (≤ 32 microinches(µin))	X	Other, specify

#11	LEAD WIRE TYPE AND LENGTH IN INCHES	MAX. TEMP. °C			MAX. TEMP. °C
Z	No lead wire (Teflon will insulate the wires in the head)	200°C	5__"	Kapton	288°C
1__"	Fiberglass braid	350°C	9__"	Kapton & white teflon flex	200°C
3__"	Teflon	200°C	X__"	Other, specify	
7__"	Teflon wire with white Teflon coated flex armor	200°C			

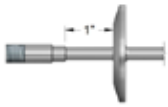
#12	TRANSITION TYPE			
H	Heat shrink	X	Other, specify	**Note:** For extra high humidity/moisture/ washdown environments ≤ 500ºF, please add a 2 suffix to your selection. Example: T2
S	Size on size	Z	No transition	
R	1/4" OD			
T	3/8" OD			
N	Nipple (Standard w/ head)			
B	7/16" OD (Standard for high humidity)			

Note: For high temperature at the transition area (>500°F) please add a 3 suffix to your selection. Example: T3

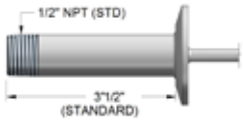
Z No Transition



B, T or R Transition, or M12 Direct Connect Transition



N Threaded Nipple



#13	COLD END TERMINATION	Choose as many as applicable [Additional options see Pg 1-7]	
WP	White plastic head (3-A Standard)	AW	Bare ends, Teflon with nipple
A	Bare ends	SC	Capped socket connection [4-6]
P	Epoxy coated explosion proof rated cast Iron head w/ gasket	8H	Isolated transmitter
IA	Epoxy coated explosion proof rated aluminum head w/ chain	8M	Integral transmitter (see page 4-6 for details)
ISS	Explosion proof stainless steel head	8N	Non-isolated transmitter
SS	General purpose stainless steel head w/ screw cover	8PS	Indicating transmitter w/ SS housing
		8PA	Indicating transmitter w/ aluminum housing
		Y*	M12 watertight male connector
		X	Other, specify

* See page 4-6 for wiring diagram.

Note: For detailed specifications and ratings see JMS-SE.com/headspecs

#14	OPTIONS—USE ONLY IF APPLICABLE [INTRODUCTION]		
M	MTR (wetted parts)	6**	Premium calibration report Corrections data will be provided for all temperatures within the range.
T	Calibration tag		
1*	Stainless steel tag		
2*	Plastic tag		
3*	Paper tag	6C	Premium calibration report. Callendar-Van Dusen coefficients will be provided.(RTD only)
4*	Laser etch on probe		
5	Calibrate at specified point(s). Corrections data will be provided for each point.	7	CE marking [page XV]
		8	Guide 17025 calibration
		9*	Bar code on paper tag

* Must specify information required on tag/probe
** Must specify increments & range.(Example: 0 to 300°F, 10° increments)

T	15	H	3-36"	T	WP

Note: When specifying X, be sure to observe requirements and restrictions as imposed by the 3-A Sanitary standards for sensors and sensor fittings and connections, Number 74-03.

SANITARY CAP THERMOWELLS

#1	DESCRIPTION
5F	Sanitary thermowells - Add "W" here for a plug with a chain attached to well. (Example. 5FW)

#2	STYLE [25-27]						
A	Step shank	F	Fast response straight shank (1/2" Q)	S	Straight shank (3/4" Q)	T	Tapered shank

#3	BORE SIZE & SENSOR CONNECTION Standard is NPSM. See drawing below.		
2 3	.260" ID .385" ID	X	Other, specify Add "N" for FNPT (Example: 2N=FNPT)

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

#4	U (INSERTION) DEPTH [15]
B C D E U__"	2-1/2" 4-1/2" 6" 7-1/2" Other, specify

Note: See illustration and sensor length equations below to calculate your mating sensor's Immersion length.

#5	T (LAG) EXTENSION		
T__"	Lag length in inches	Z	No lag

Note: Ingold socket and threaded fittings are readily available. Because of the diversity of sizes, materials and other options, please consult JMS directly.

#6	CAP SIZE See Tri-Clamp Size Chart on page 4-1							
15 20 25	1 x 1-1/2 2 2-1/2	30 40 60	3 4 6	80 100 120	8 10 12	X* Z	Other, specify N/A

#7	CAP STYLE [see 4-9, Row 9 for illustrations]					
T B*** BH*** I**	Tri-Clamp (16 AMP) Bevel seat w/o 13H nut Bevel seat w/ 13H nut I clamp (16AI-14I)	P PH	PV gasket (16APV) w/o 13-H nut PV gasket (16APV) w/ 13-H nut	A*** X*	3A4 adapter Other,specify

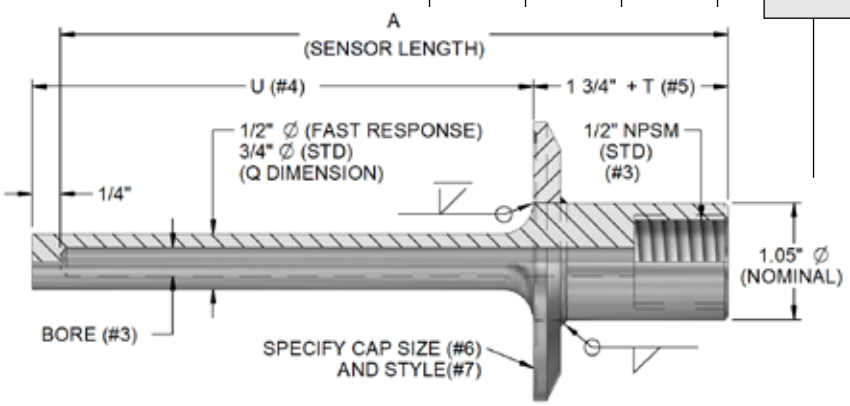
#8	MATERIAL		
H I K	304 SS 304L SS 316 SS	L X	316L SS Other, specify

#9	POLISH
H	High polish #4 finish (≤ 32 microinches(µin))(Standard)
E	Electropolish after #4 finish (≤ 32 microinches(µin))
P	Passivate after #4 finish (≤ 32 microinches(µin))
F	Fine polish (≤ 20 microinches(µin))
V	Ultra polish 8G finish (≤ 8 microinches(µin))
X	Other, specify

#10	TAGGING OPTIONS
1	Laser etched or stamped on well (Standard)
X	Other
Z	N/A

#11	DOCUMENTATION / CERTIFICATION Choose as many as applicable (Example: "DU" requests dye penetrant test and X-Ray examination)
M	Material Test Report (MTR) for wetted parts
D	Dye penetrant testing
P	Internal hydrostatic pressure test
U	X-Ray examination
W	Premium SwiftyCalc, ASME 19.3TW calculation
S	Surface finish certificate
E	Certificate of electropolish
A	Certificate of no Animal Derived Material (ADM)
N	Certificate of no polishing compounds
O	Certificate of cleaned for oxygen service

Standard Number 74-07



Note:
-Matching sensor length for sensors with a spring-loaded fitting
A = U length(#4) + 1 1/2" + T length(#5)

-Matching sensor length for sensors with a welded fitting
A = U length(#4) + 3/4" + T length(#5)

* When specifying X, ensure that it meets 3-A standard.
** Not 3-A authorized.
*** Must be cleaned manually.

5F	A	2	D	2"	15	T	K	H	1	M

SANITARY "SLIM-WELL" PROTECTION TUBES

#1	DESCRIPTION
5SL	Sanitary Slim-well - Add "W" here for a plug with a chain attached to well. (Example. 5SLW)

#2	WELL DIAMETER & SENSOR CONNECTION -- Standard Sensor Connection is NPTF. See drawing below.		
C2	3/16" Ø with 1/2" Sensor Conn. (fits 1/8" Ø sensor)	C	3/16" Ø with 1/4" Sensor Conn. (fits 1/8" Ø sensor)
B2	1/4" Ø with 1/2" Sensor Conn. (fits 3/16" Ø sensor)	B	1/4" Ø with 1/4" Sensor Conn. (fits 3/16" Ø sensor)
Y2	5/16" Ø with 1/2" Sensor Conn. (fits 1/4" Ø sensor)	Y	5/16" Ø with 1/4" Sensor Conn. (fits 1/4" Ø sensor)
X	Other, specify		

#3	U (INSERTION) DEPTH [15]	
U__"	"U" length in inches	**Note:** See illustration and sensor length equations below to calculate your mating sensor's Immersion length.

#4	T (LAG) EXTENSION		
T__"	Lag length in inches	Z	No lag

#5	CAP SIZE	See Tri-Clamp Size Chart on page 4-1							
05	1/2 x 3/4	25	2-1/2	60	6	120	12
15	1 x 1-1/2	30	3	80	8	X*	Other, specify
20	2	40	4	100	10	Z	N/A

#6	CAP STYLE [see 4-2, selection #8 for illustrations]				
T	Tri-Clamp (16 AMP)	P	PV gasket (16APV) w/o 13-H nut	A***	3A4 adapter
B***	Bevel seat w/o 13H nut	PH	PV gasket (16APV) w/ 13-H nut	X*	Other,specify
BH***	Bevel seat w/ 13H nut				
I**	I clamp (16AI-14I)				

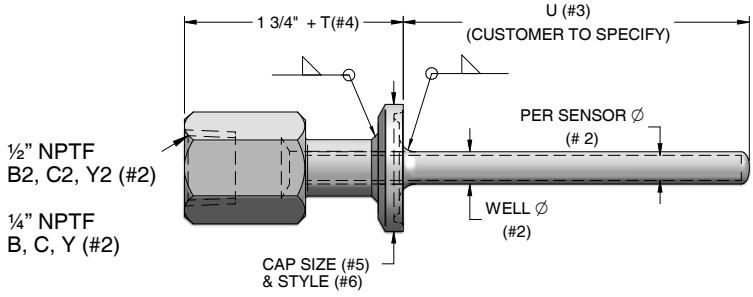
#7	MATERIAL		
H	304 SS	L	316L SS
I	304L SS	X	Other, specify
K	316 SS		

#8	POLISH
H	High polish #4 finish (≤ 32 microinches(µin)) (Standard)
E	Electropolish after #4 finish (≤ 32 microinches(µin))
P	Passivate after #4 finish (≤ 32 microinches(µin))
F	Fine polish (≤ 20 microinches(µin))
V	Ultra polish 8G finish (≤ 8 microinches(µin))
X	Other, specify

#9	TAGGING OPTIONS
1	Laser etched or stamped on well (Standard)
X	Other
Z	N/A

#10	DOCUMENTATION / CERTIFICATION Choose as many as applicable (Example: "DU" requests dye penetrant test and X-Ray examination)
M	Material Test Report (MTR) for wetted parts
D	Dye penetrant testing
P	Internal hydrostatic pressure test
U	X-Ray examination
S	Surface finish certificate
E	Certificate of electropolish
A	Certificate of no Animal Derived Material (ADM)
N	Certificate of no polishing compounds
O	Certificate of cleaned for oxygen service

Standard Number 74-07



Note:
-Matching sensor length for sensors with a spring-loaded fitting
= U length(#3) + 1 1/2" + T length(#4)

-Matching sensor length for sensors with a welded fitting
= U length(#3) + 1" + T length(#4)

* When specifying X, ensure that it meets 3-A standard.

** Not 3-A authorized.
*** Must be cleaned manually.

5SL	B	10"	2"	05	T	K	H	1	M

SANITARY WELD-IN THERMOWELLS

JMS Southeast, Inc. is proud to be a certified US manufacturer of a full line of sanitary RTDs, Thermocouples, and Thermowells (3-A Standard 74-07).

JMS Southeast's sanitary weld-in thermowell designs are manufactured to exacting 3-A Standard 74-07 requirements, enabling you to maintain a clean in place manufacturing process incorporating easy to calibrate, removable and replaceable temperature sensors. Sanitary weld-in thermowells should be welded to a tank or a vat with a full penetration crevice-free fillet weld to avoid cracks and crevices. Standard sanitary weld-in wells are fabricated from stainless steel and then polished to a #4 finish or better depending on the customer specification. If desired, wake frequency calculations per ASME/ANSI PTC 19.3TW can be performed on these products using JMS's free SwiftyCalc software.

3-A® Standard Number 74-07

In addition to sanitary weld-in thermowells, JMS also offers a full line of Sanitary Cap Thermowells that also meet 3-A Standard 74-07.

#1	DESCRIPTION
5C	3-A Certified sanitary thermowells - Add "W" here for a plug with a chain attached to well. (Example. 5CW)

#2	U (INSERTION) DEPTH [15]
U__"	Specify length in inches. **Note:** When specifying spring-loaded replacement sensor, customer should specify immersion length 1/4" shorter than the overall weld-in thermowell length

#3	MATERIAL					**Note:** see page 5-1 for more options.
H I	304 SS 304L SS	K L	316 SS 316L SS	X	Other, specify	**Note:** When specifying an X, material selected must comply with 3-A standard, 74-03

#4	BORE SIZE & SENSOR CONNECTION insert 1/2" NPSM.					
2	.260" ID	3	.385" ID	X	Other, specify	Add "N" for FNPT (Example: 2N=FNPT)

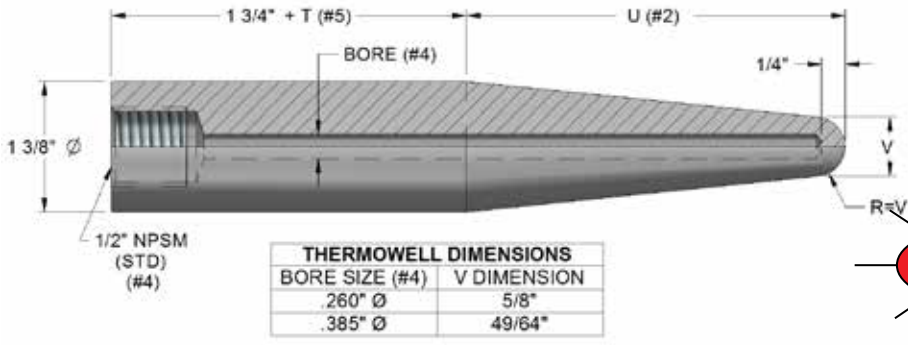
Note: Standard (sensor) connections are 1/2" FNPSM (female straight) to match 1/2" MNPT (male tapered)

#5	T (LAG) EXTENSION [5-15]		
Z	N/A (No Lag)	T__"	Specify length in inches

#6	TAGGING OPTIONS
1	Stamped on well (Standard)
X	Other
Z	N/A

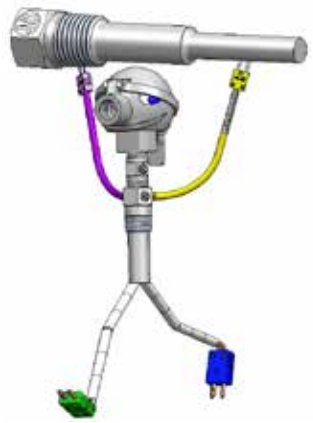
#7	DOCUMENTATION & CERTIFICATIONS -- use all that apply (Example: "DU" requests dye penetrant test & X-Ray examination)		
M	Material Test Reports (MTR)	E	Certificate of electropolish
D	Dye penetrant testing	A	Certificate of No Animal Derived Material (ADM)
P	Internal hydrostatic pressure test	N	Certificate of no polishing compounds
U	X-Ray examination	O	Certificate of cleaned for Oxygen service
W	Premium SwiftyCalc ASME 19.3TW calculation		
S	Surface finish certificate		

Note: Does not include head and nipple. These parts may be ordered separately.



THERMOWELL DIMENSIONS	
BORE SIZE (#4)	V DIMENSION
.260" Ø	5/8"
.385" Ø	49/64"

NEW!



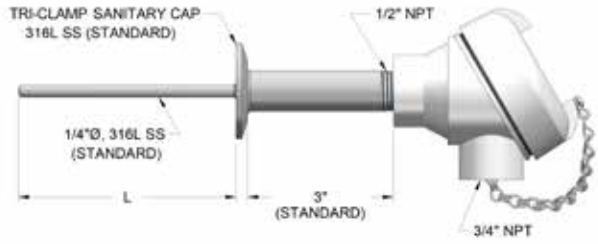
5C	10	H	2	Z	1	M

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

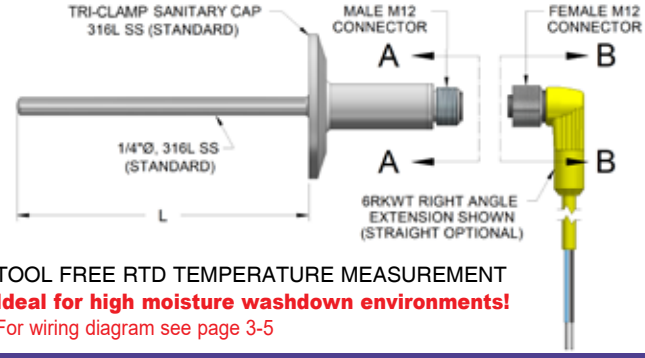
TYPICAL COMPLETE SANITARY SENSORS

SANITARY CAP TYPICAL DESIGNS

TRI-CLAMP (16 AMP) (CAP OPTION "T")



3-A RTD with 4-20 mA INTEGRAL OUTPUT (RTD *in*, 4-20 mA *OUT!!*)



TOOL FREE RTD TEMPERATURE MEASUREMENT

Ideal for high moisture washdown environments!

For wiring diagram see page 3-5

ULTRA ACCURATE VALIDATION THERMOCOUPLE

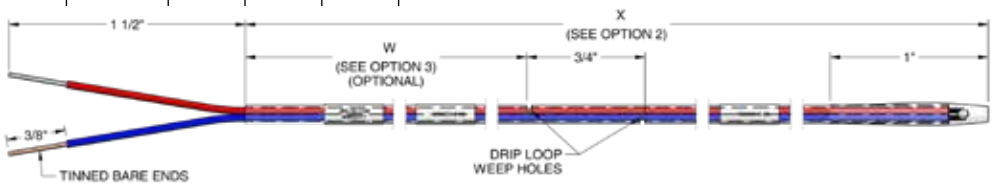
#1	DESCRIPTION
4V	Special wire thermocouple

#2	COLD END TERMINATION & JUNCTION TYPE
A	Bare ends & sealed junction (shown)
B	Standard plug & cable clamp & sealed junction
C	Miniature plug & cable clamp & sealed junction
D	Bare ends & unsealed junction
E	Standard plug & cable clamp & unsealed junction
F	Miniature plug & cable clamp & unsealed junction

#3	X DIMENSION (INCHES)
___"	Customer to specify

#4	WIRE TYPE & W DIMENSION (INCHES)
W__"	Clear jacketed wire (with weep holes)
A	Autobond wire (no outer jacket or weep holes)
Z	Clear jacketed wire (no weep holes)

#5	LABEL
L	Label probe # on each end
Z	Without label



4V	A	120	W36	L

Ultra High Accuracy Type T Wire Thermocouple

Moisture, rough handling and severe conditions all pose grave threats to the functionality of Type T thermocouple measurements - measurements which are a critical component of many high accuracy laboratory and pharmaceutical applications.

JMS presents its rugged, fast response, multi-strand Type T sensor. These sensors are manufactured from premium Type T 22 AWG thermocouple wire, which is accurate to ± 0.22˚C at 121˚C, and with hermetically sealed tips perfect for environments with high humidity. These sensors represent the cutting edge in thermocouple technology.

To order, simply specify JMS part # followed by options shown at left.

Example: 4VA120"W36L for an Ultra High Accuracy Type T thermocouple sensor 120 inches in length, clear jacket, weep holes, and label.

SANITARY ELBOW THERMOWELL

Welded directly into the process line as an elbow, sanitary elbow thermowells offer unbeatable immersion depths with reduced stress on the probe stem to ensure accurate and reliable temperature measurements in all types of pharmaceutical and food grade applications. For line sizes ranging from 1" to 6", this integral thermowell design provides the convenient ability to remove and replace the sensor for calibration or maintenance without having to open up the process line, or turning your thermowell into a plug in the line. FNPT and Sanitary Cap connections available as best meets your requirements. Elbows comply with ASME BPE DT-4-1, MJ-8.5-1, SF-2.2-1, SF-2.2-2 (when electropolished), and SF-2.6-1.

HAND HELD SENSORS

#1	DESCRIPTION
4H	Hand held sensor

#2	TYPE
J	Iron/Constantan, standard limits of error
K	Chromel/Alumel, standard limits of error
T	Copper/Constantan, standard limits of error
E	Chromel/Constantan, standard limits of error
3	RTD 100Ω Platinum .00385 alpha, 3 wire, Class B
X	Other, specify

#3	OUTSIDE DIAMETER (OD)
A	3/8" (.375")
B	1/4" (.250")
C	3/16" (.188")
D	1/8" (.125")
E	1/16" (.063")
X	Other, specify

#4	LENGTH (L)
__"	Immersion length in inches **Note:** Standard material is 316 stainless steel.

#5	MEASURING JUNCTION
G	Grounded
U	Ungrounded (RTDs are always ungrounded)
J*	Pointed tip, grounded
K*	Pointed tip, ungrounded
X*	Other, specify

Note: See ordering symbols on page 1-1, row 6 for special junctions such as pointed tip and gas/air.

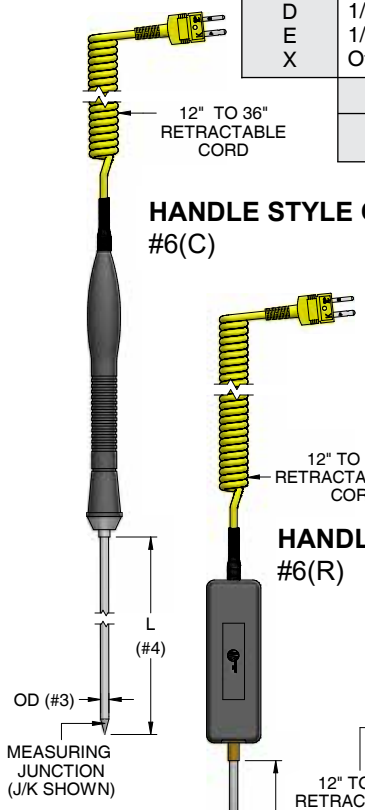
*Provide dimensions when selecting these options.

#6	HANDLE STYLE (See illustrations below and to the left)
H	Handle for replaceable probe
R	Rectangular permanent handle for non-replaceable probe
S	Rugged, stainless steel handle for non-replaceable probe
C	Contoured permanent handle for non-replaceable probe
X	Other, specify
Z	N/A

#7	LEAD WIRE INSULATION AND LENGTH IN INCHES
S	Coil-cord. Length will stretch from 12" to 36" (Standard)
2__"	20 AWG PVC
3__"	20 AWG Teflon
5__"	20 AWG Kapton
6__"	20 AWG fiberglass braid/flexible armor overall
7__"	20 AWG Teflon/flexible armor overall
8__"	20 AWG fiberglass braid/stainless steel overbraid
9__"	3 conductor Teflon with overall jacket of Teflon (RTD only)
10__"	3 conductor Teflon/stainless steel overbraid w/ overall jacket of Teflon. (RTD only)
Z	N/A
X	Other, specify

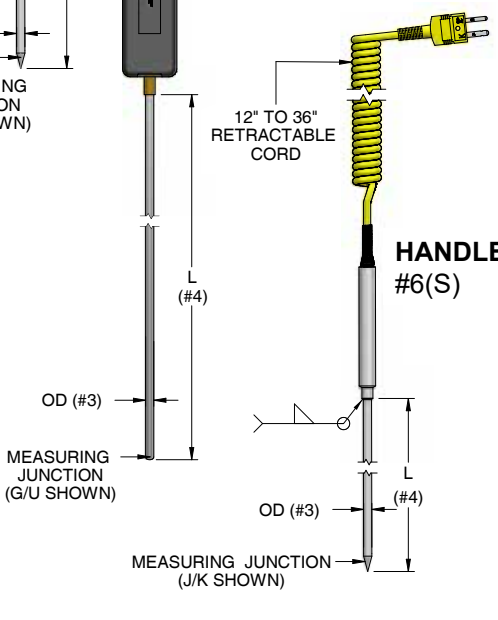
#8	COLD END TERMINATION [Additional options see Pg 1-7]
A	Bare ends
B	Miniature plug (Standard)
C	Standard plug
D	Replacement sensor
X	Other, specify

Other styles of hand-held sensors are available. See page 4-13 or contact JMS Southeast, Inc. for your custom design.

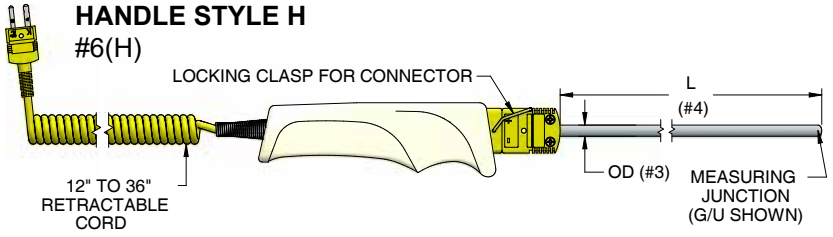


HANDLE STYLE C
#6(C)

HANDLE STYLE R
#6(R)



HANDLE STYLE S
#6(S)



HANDLE STYLE H
#6(H)

4H	K	B	6"	G	H	S	B

See page 4-13 for hand held surface sensors.

SINTERING, FURNACE & GLASS THERMOCOUPLES

#1	DESCRIPTION
4G	Sintering, furnace & glass thermocouple

#2 TYPE [Add a "2" before the letter to indicate dual element construction (Example: Dual type S would be coded "2S")]

S	Platinum/Platinum 10% Rhodium	C	Tungsten 5% Rhenium/Tungsten 26% Rhenium
R	Platinum/Platinum 13% Rhodium	A*	Tungsten 5% Rhenium/Tungsten 20% Rhenium
B	Platinum 6% Rhodium/Platinum 30% Rhodium	X	Other, specify

*Rated 1000°C to 2500°C

#3 OUTSIDE DIAMETER

A	3/8" (.375")		F*	1/25" (.040")
B	1/4" (.250") (Standard)		X	Other, specify
C	3/16" (.188")		Z	N/A
D	1/8" (.125")			
E*	1/16" (.063")			

*Not available in dual element

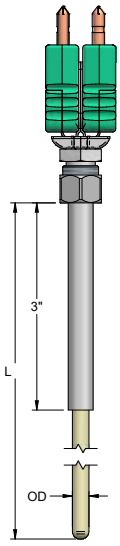
#4 TUBE MATERIAL

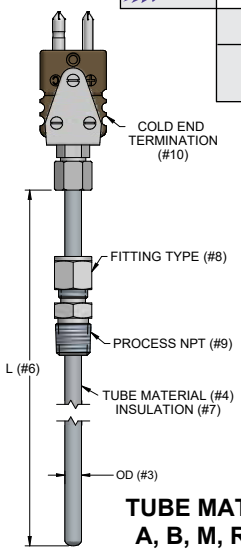
A	Platinum - 10% Rhodium	R*	Molybdenum
B	Platinum - 20% Rhodium	S*	Tantalum
M	Inconel 600	T*	Titanium
P	Alumina w 3" I600 sleeve	RL*	Molybdenum-LX
X	Other, specify	RT*	Tungsten coated molybdenum

*Purged and filled with high temperature inert gas

NEW **ASK ABOUT OUR SMALL DIAMETER (.01" to .063") SWAGED TANTALUM AND PLATINUM OPTIONS!**
Call Now (800)-873-1835

TUBE MATERIAL STYLE P





TUBE MATERIAL STYLE A, B, M, R, S, T, RL, RT

#5 THERMOCOUPLE JUNCTION

G	Grounded
U	Ungrounded (Standard) required for Type C

#6 IMMERSION LENGTH

__"	Length in inches

#7 INSULATION

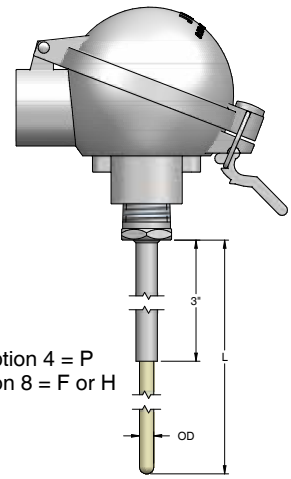
A	Al_2O_3 (Standard - Aluminum Oxide)
H	HfO_2 (Hafnia)
X	Other, specify

#8 FITTINGS

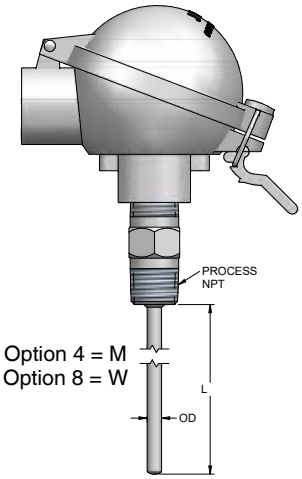
Z	No fitting (Standard)
F	Reverse mounted SS plug fixed for attaching head
H	Compression fitting SS w/ SS ferrule
W	Welded fitting, double threaded, 1/2" x 1/2" NPT
X	Other, specify

#9 PROCESS NPT

A	1/2"
B	1/4"
C	1/8"
X	Other, specify
Z	N/A (Standard)



Option 4 = P
Option 8 = F or H



Option 4 = M
Option 8 = W

#10 COLD END TERMINATION [Additional options see Pg 1-7]

C	Standard temperature plug
F	Hi-temperature std plug (Standard)
WE	Ultra high temp plug glazed <1200F
WH	Ultra high temp plug unglazed <1200F
I	Aluminum Exp. Proof NEMA 4x, FM, CSA, IP68 (6IA)
L	Aluminum w/ hinged cover (6L)
M	Aluminum w/ screw cover (6M)
X	Other, specify

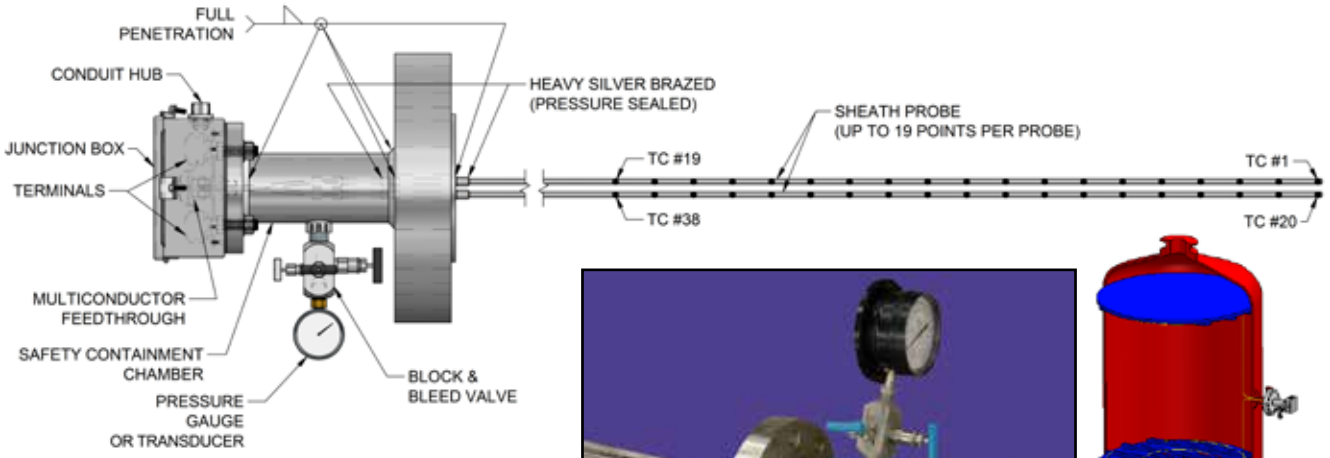
Note: For detailed specifications and ratings, see JMS-SE.com/headspecs

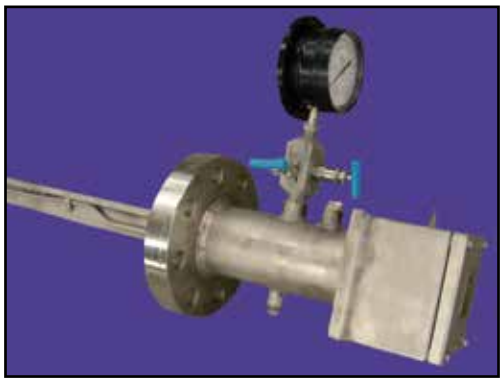
#11 TAGGING AND CALIBRATION USE ONLY IF APPLICABLE

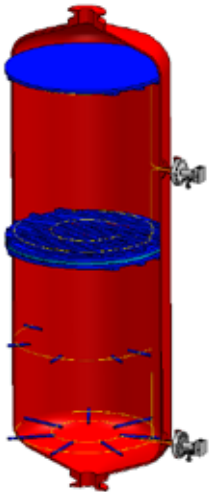
___	See page 1-2 #14 for ordering selections.

4G	S	B	R	U	14"	A	Z	A	F	

CENTERPOINT







MI CABLE DESIGN AND CONSTRUCTION

DESIGN

- *CenterPoint MI cables are 0.070" thick, double-wall design with a 5/16" sheath O.D.*
- *First wall is 0.035" overlapping second wall of 0.035"*
- *Second wall acts as a flexible protective thermowell wrapped around a flexible, heavy-walled thermocouple*
- *Single CenterPoint MI cable can house 19 points of temperature indication, greatest in the industry*
- *CenterPoint sheath materials are available in any metallurgy*
- *Thermocouples are available in any calibration*
- *A single CenterPoint assembly can be designed for complete coverage of a single catalyst bed*

Each CenterPoint assembly is custom designed to meet the specification of the Process Licensor, Engineering Company and End User

CONSTRUCTION

- *Double wall construction allows the MI cable to be welded to the flange face without damage to the cable caused by localized heat buildup during the welding procedure*
- *Drawing and Annealing sheath material provides a flexible housing for the thermocouples*
- *Restricting process flow (should the sheath integrity become breached) is tightly packed Magnesium Oxide insulation*
- *No special tools necessary for making long bends*
- *Tubing benders required for tight radius bends*

COLD END DESIGN

- *Pressure gauge directly tied to flange penetration creating secondary safety system*
- *Eliminates the need for additional welded or flanged safety chamber*
- *Reduced flange face penetrations maintains flange integrity*
- *Double block and bleed valve designed to bleed off trapped hydrogen or process fluids*
- *Each junction is equipped with a 10,000 psi pressure fitting,*
- *All welds are full penetration welds*
- *Bare wire feedthrough seal ensures no tunnel through safety containment chamber*

CenterPoint provides optional secondary containment chambers available to meet the design needs and specifications of the customer

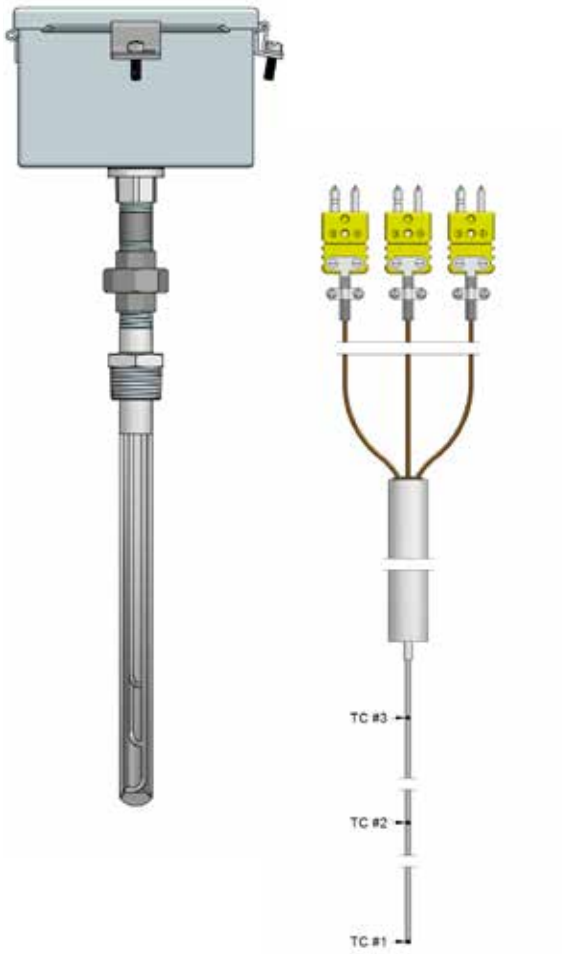
SAFETY BENEFITS

- *Rapid speed of response time: Real time temperature measurements*
- *96% of a 100 degree step change in 3 to 8 seconds*
- *Eliminate temperature excursions on high temperature, high pressure*
- *Radial spread determines "hotspot" locations near reactor walls*
- *Reduce/replace many reactor skin thermocouples*
- *Can be tied into the EMS system*

MULTIPOINT

PERMANENT & REPLACEABLE MULTIPOINT SENSOR DESIGNS AVAILABLE

Note: For flexible high temperature reactor design, see next two pages.

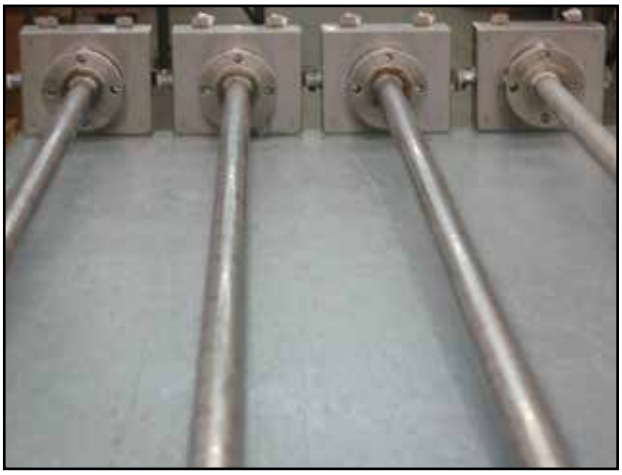


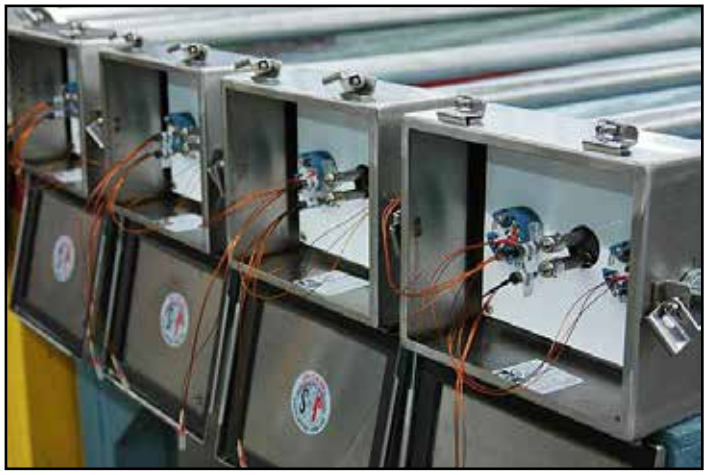
A multipoint sensor allows the measurement of a temperature profile across a large area. Thermocouples or RTDs are arranged with measuring junctions at various points along a pipe, allowing the measurement of various points from a complete assembly. Many elements can be spaced along a probe.

This opens up possibilities for improved profiling in reactors, for example, where flow interference prevents inserting large numbers of individual probes. Multipoint probes can also be used to give a temperature profile where stratification of a tanks contents may be of concern. JMS will custom design your assembly to give you the most accurate temperature measurement for your process.

The following information and/or drawing is needed to properly design your assembly:

- Thermocouple calibration or RTD element type
- Outside diameter of pipe and pipe material
- Junction style of thermocouple
- Sensor material (bare wire, 316 SS tubing, or sheath material)
- Overall length of the entire assembly
- Process connection
- Accuracy required
- Cold-end termination
- Maximum operating temperature



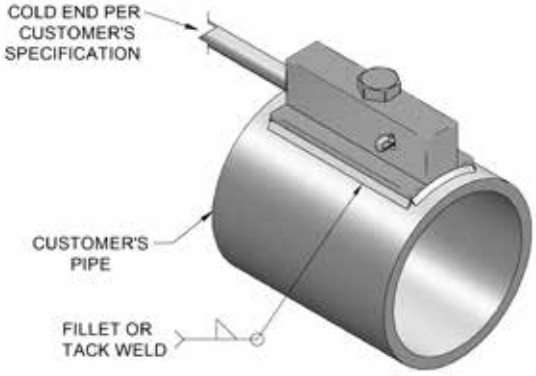


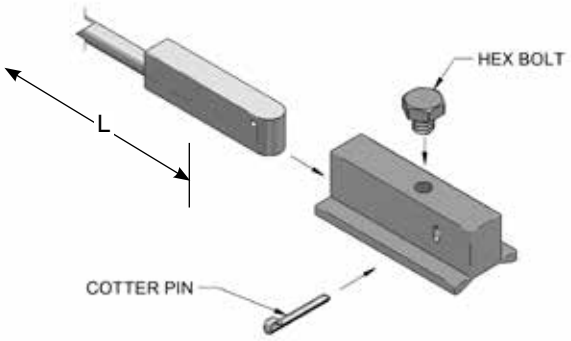
Averaging or discrete point measurement available upon request.

JMS will generate a drawing for your assembly.

FASTTRAX

(Also referred to as the Removable Weld Pad design)





Note: To order this style as a thermocouple, see page 1-1, selection #6, options N and O in the JMS Ordering Catalog. For an RTD, see page 3-1, selection #4, option O.

APPLICATIONS

- *Single or dual fired furnace tubes*
- *Top, side, or bottom fired furnace tubes*
- *Boiler tubes in power plants*
- *Catalyst tubes/tube sheath reactors (example: steam methane reformers, polygas units, acrylic acid units)*
- *Steam tracing lines*
- *Coker units*
- *External skin temperature for hydroprocessing units (example: hydrocracking, hydrotreating reactor)*

INSTALLATION

- Installation or supervision available
- *Supervision recommended*
- *Never burn up a thermocouple on install again*
- *E&I Tech can replace Fasttrax probe using only a ladder and a pair of pliers*

LOW-COST REPLACEMENT

- *Install hardware ONE TIME*
- *No need to scaffold furnace*
- *No grinding off existing TSTC*
- *No grinding down to base metal for welding (causes additional tube thinning)*
- *No welders necessary*
- *No moving Tubeskin TC out of the initial zone you want to measure because you cannot weld near last Tubeskin TC*
- *Re-order ONLY the replaceable probe*

DESIGN

- *Anti-slip cotter pin design*
- *Low profile heat shield*
- *Heavy-walled sheath*
- *Available in wrap-around design & parallel designs*
- *Available with S-Loops or expansion coils*

HIGH RELIABILITY

- *Fully protected probe*
- *S-Loops keep thermocouple sheath hidden and out of flame*
- *Clips placed on tube help hold thermocouple in place while process acts as a heat sink*
- *Wire contact WON'T slip from contact point due to JMS cotter pin design*
- *Safety*
- *Measure tube temperature, not process temperature*
- *Recognize tube wear and tube thinning*
- *Error set to high side of tube temperature-added safety*
- *Small offset allows you to push process furnace without sacrificing safety*
- *Highly accurate for safety*
- *Ceramic-filled heat shields may lead to low tube skin reading and compromise safety*
- *Large metal heat shields can absorb large amounts of radiant heat*

HIGH ACCURACY

- *High accuracy bare wire contact with tube surface*
- *Bare wire is the standard by which all tube skin thermocouples are tested for accuracy*
- *Low heat transfer from heat shield/lowest profile heat shield in the industry*
- *Reduces effects of radiant heat on thermocouple*

PIPE STAND SKIN SENSORS

#1	SUPPORT STRUCTURE
4W	Weld pad support structure

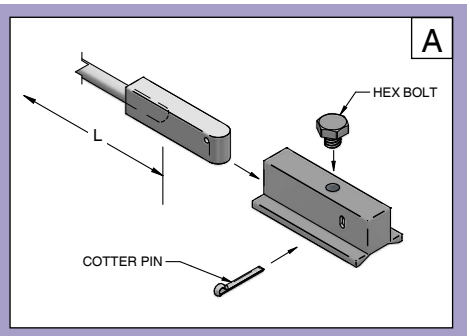
#2	SENSOR TYPE					
	THERMOCOUPLE			*RTD (class A, Pt100)*		
E	Type E	N	Type N	2	2-wire	**Note:** Add 2 prefix for dual element. (example: 2K)
J	Type J	T	Type T	3	3-wire	
K	Type K			4	4-wire	
X	Other, specify					

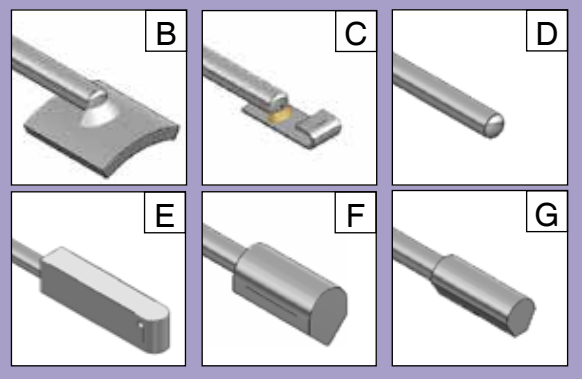
#3	PROBE DIAMETER		
B	1/4" Ø (0.250")	D	1/8" Ø (0.125")
C	3/16" Ø (0.188")	X	Other, specify

#4	PAD / SHEATH MATERIAL		
K	316 SS	M	Inconel 600
H	304 SS	X	Other, specify pad & sheath*
J	310 SS		

* Carbon steel pads usually welded to 316 SS sheath. F grade pads (ex: F11, F91) to I600 sheath.

#5	TIP / WELD PAD DESIGN
A	JMS Fastrax weld pad assembly, replaceable
B	Weld pad, standard 1" x 1"
C	Clamp hook pad (High temp Inconel 600 not available)
D	Standard round tip
E	Fastrax replacement "foot" only
F	UniVersal weld pad
G	Contoured weld pad (Contour matches #8 pipe diameter)
X	Other, specify





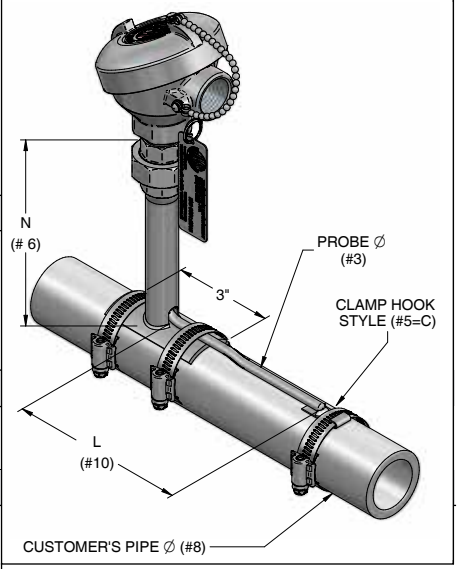
#6	N LENGTH	*SEE ILLUSTRATION*
__"	Specify (in inches)	3 1/2" minimum

Note: Standard mounting base pad material is 316LSS. Add "1" prefix for matching mounting base pad material.

#7	JUNCTION STYLE	GROUNDED	UNGROUNDED	ISOLATED
G	Grounded			
U	Ungrounded (RTDs always ungrounded)			
I	Isolated			

#8	CUSTOMER PIPE DIAMETER				
	Standard Pipe size	Actual Ø		Standard Pipe size	Actual Ø
075	3/4" (MIN)	1.05"	50	5"	5.56"
10	1"	1.32"	60	6"	6.63"
15	1 1/2"	1.90"	80	8"	8.63"
20	2"	2.38"	100	10"	10.75"
25	2 1/2"	2.88"	120*	12"	12.75"
30	3"	3.50"			
40	4"	4.50"			
X*	Other, specify	___"			

*Weld pads are not curved to fit customer's pipe for diameters 12" and larger due to the minimal tangency gap.



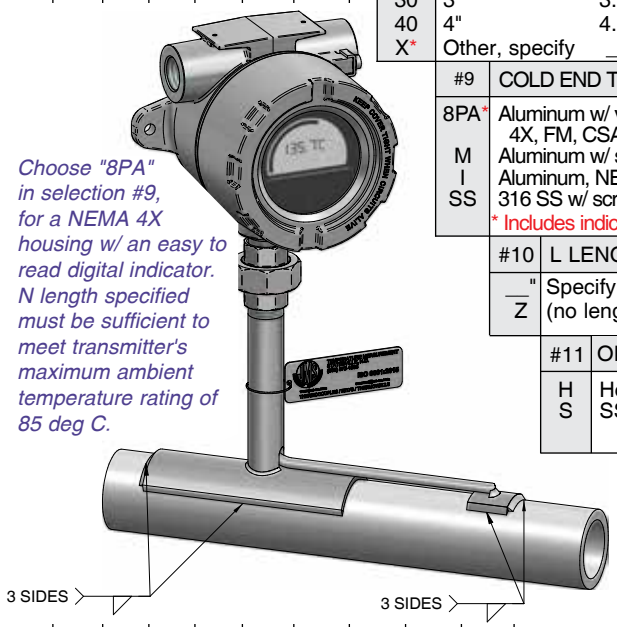
#9	COLD END TERMINATION [Additional options see Pg 1-7]		
8PA*	Aluminum w/ viewing port, NEMA 4X, FM, CSA, ATEX, IECEx	A	Bare ends
M	Aluminum w/ screw cover & chain	X	Other, specify
I	Aluminum, NEMA 4X, FM, CSA, IP68		
SS	316 SS w/ screw cover & chain		

* Includes indicating transmitter. See 8-2 for details

#10	L LENGTH	SEE ILLUSTRATION
__"	Specify (in inches)	4" minimum
Z	(no length) Spring loaded to pipe inside nipple	

#11	OPTIONS		
H	Hose clamps(QTY 3)	M	MTR (Welded parts)
S	SS tag	X	Other, specify

Choose "8PA" in selection #9, for a NEMA 4X housing w/ an easy to read digital indicator. N length specified must be sufficient to meet transmitter's maximum ambient temperature rating of 85 deg C.



4W	E	B	K	A	4"	G	075	8PA	4"	H

Note: Sensor weld pad styles A & D (#5) along with nipple stand weld pads will be curved to fit customer's pipe diameter (#8).

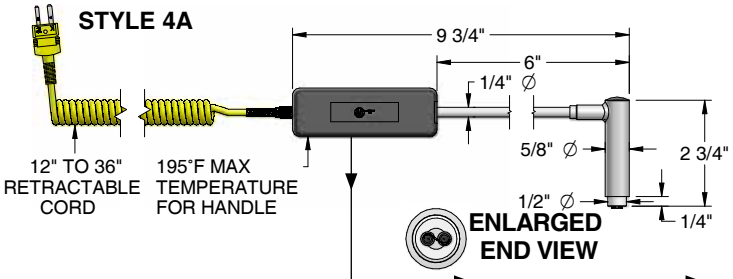
SURFACE SENSORS

The JMS Brush Thermocouple can be used in applications in which a surface temperature of a stationary or moving electrically conducting surface is needed.

True temperature measurement of a surface is very hard to obtain. Previous designs called for the probe to fully contact with as small a junction as possible, spring load with as even pressure as possible, insulate around the surface to be measured, or combinations of all these methods.

All of the above methods have proven to have their own particular faults. When compared to an infrared sensor, which does accurately measure surface temperature (unit must have correct emissivity adjustment), most of the above mentioned sensors either read much hotter or colder than the infrared. However, even the infrared style exhibits problems when emissivity levels fall beneath 0.4 or less (most metallic surfaces). JMS has applied for a patent on this brush sensor because of its unique design and widespread application. The JMS brush probe eliminates emissivity, surface contact and heat wicking considerations.

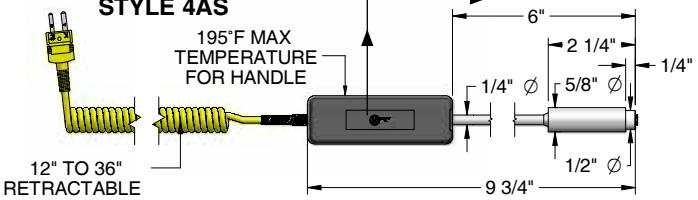
STYLE 4A



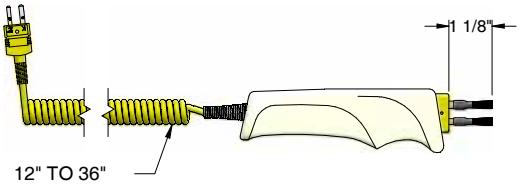
ENLARGED END VIEW

For optional contoured handle, add C after 4A / 4AS

STYLE 4AS



ENLARGED END VIEW



TEMPERATURE RATING IS BASED ON T/C TYPE

#1	STYLE	(See illustrations above & to the right)	
4A*	Hand held (90° design) with square handle -- 4AC for contoured	4BK*	Specialty brush sensor
		4B*	Permanent mount
		4PADT**	Large pad
		4PADL**	Small pad surface
4AS*	Hand held (straight design) with square handle -- 4ASC for contoured	4SA	Surface adhesive

*Not available as RTD
**Not available as Thermocouple

#2	COLD END TERMINATION [Additional options see Pg 1-7]		
A	Bare ends	X	Other, specify
B	Miniature plug	Z	N/A
C	Standard plug		

#3	SURFACE SENSOR		
J	J thermocouple	X	Other, specify
K	K thermocouple		
2*	2 wire RTD		
3*	3 wire RTD		
4*	4 wire RTD		

*Not available as brush

#4	LEADWIRE TYPE & LENGTH		
F__"*	Flat Silicone Ribbon Wire	Z	N/A
S	Coil-cord (Standard)		
3__"	Teflon		
5__"	Kapton w/ SS overbraid		
X	Other, specify		

*Used for 4PADT and 4PADL pad RTDs only

#5	# OF REPLACEMENT TIPS		
0	No sets	Z*	N/A
1 +	Number of sets		

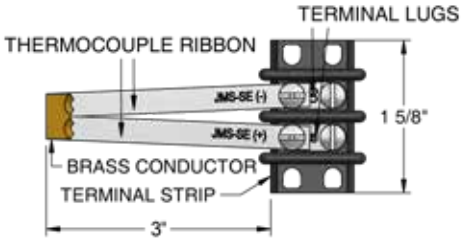
*Standard for styles 4B, 4PADL,4PADT, 4SA

Note: Thermocouple wire is 24 AWG solid conductors. RTD wire is 28 AWG stranded conductors.

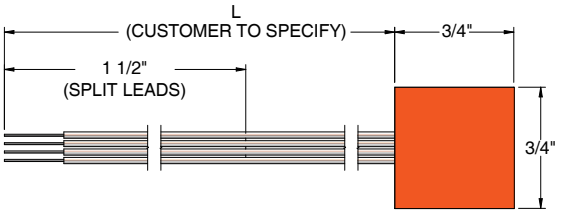
The JMS pad RTD is a 100 Ohm platinum RTD with an alpha of 0.00385 Ω/Ω/°C. Pad material is a high temperature silicone material. The pad style RTD has an effective operating range from -80C to 200C and its tolerance is 0.15 F(+/-0.15C at 0°C). Additional silicone leadwire is configured as a 3 or 4 wire RTD. Higher temperature configurations can be designed.

4A*	A	J	S	0

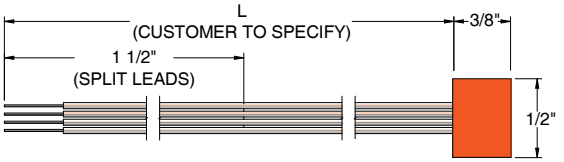
STYLE 4B



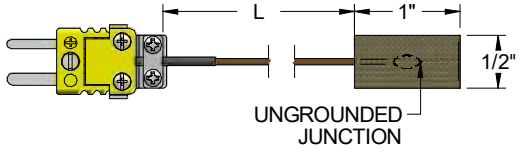
STYLE 4PADT



STYLE 4PADL



STYLE 4SA



MAGNETIC SURFACE PROBES

#1	MAGNET SURFACE PROBE STYLE	lb pull @ 70°F
4MC	Crown (1-1/4"Ø) (Standard)	25
4MR	Round (1"Ø)	24
4MU	Horseshoe (1-1/8" depth)	19
4MH	Heavy-load (3"Ø)	100

#2	SENSOR TYPE				
	THERMOCOUPLE			*RTD (class B, Pt100)*	
E	Type E	N	Type N	2	2-wire
J	Type J	T	Type T	3	3-wire
K	Type K			4	4-wire
X	Other, specify	**Note:** Add 2 prefix for dual element			

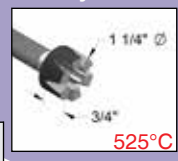
#3	JUNCTION TYPE
G	Grounded (Standard for T/Cs)
U	Ungrounded (RTDs are always ungrounded)

#4	LEADWIRE TYPE & LENGTH
C__"	Coil-cord **Note:** See 3-1 for temperature ratings
T__"	Teflon
TS__"	Teflon w/ SS overbraid (Standard)
K__"	Kapton
KS__"	Kapton w/ SS overbraid
F__"	Fiberglass
FS__"	Fiberglass w/ SS overbraid
X__"	Other, specify

#5	COLD END TERMINATION
A	Bare ends
B	Miniature plug
C	Standard plug
X	Other, specify
Z	N/A [Additional options see Page 1-7]

4MC	K	G	TS36"	A

Style C



525°C

Style R

300°C

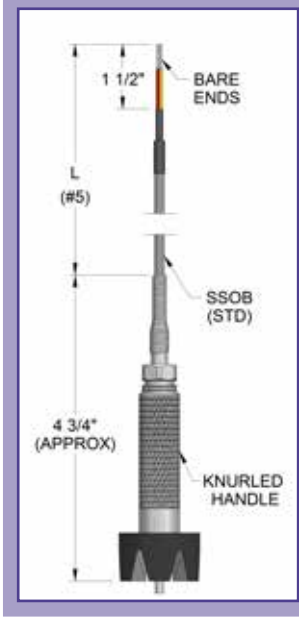
Style U

525°C

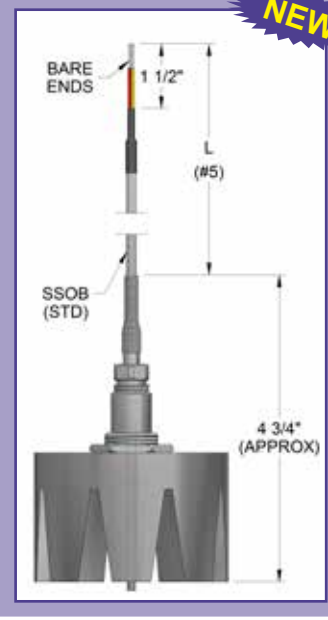
Style H

525°C

Maximum temperature rating of each magnet shown in red.



NEW



JMS ROOM AIR SENSOR

#1	DESCRIPTION
4D	ROOM AIR SENSOR

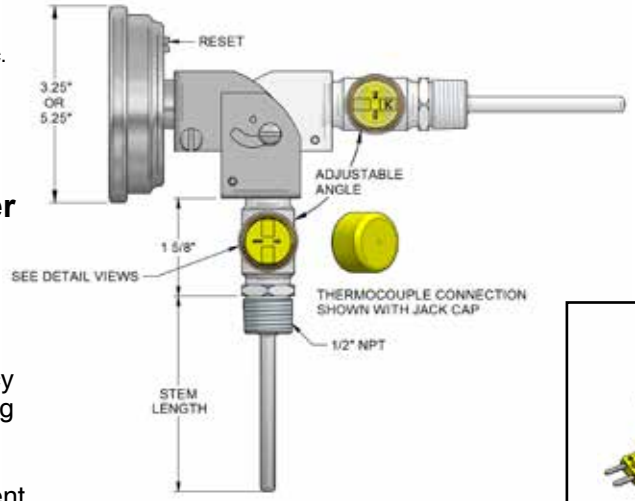
#2	SENSOR TYPE			**Note:** Rectangular hole for customer wiring to single gang junction box.
2	RTD 2 wire	E	Thermocouple type E	
3	RTD 3 wire	J	Thermocouple type J	
4	RTD 4 wire	K	Thermocouple type K	
		N	Thermocouple type N	
	RTDs are 100 Ohm .00385 Ω / Ω/ °C, Class A.	T	Thermocouple type T	
		X	Other, specify	

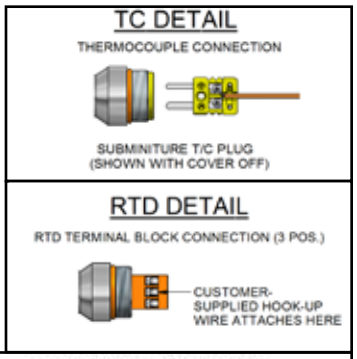
#3	TRANSMITTER OPTIONS	
8H	Isolated transmitter	**Note:** Add span range after transmitter selection. Example: 8H(0-200C).
8N	Non-isolated transmitter	**Note:** Transmitter output=4-20mA. (See section 8 for other options).
8I	Hart protocol	
8E	Intrinsically safe	
8D	Hart/intrinsically safe	
Z	Terminal block (no transmitter)	

4D	3	8H (0-100F)

ANALOG BEMOMETER SENSORS

BE•MORE•METER!!
Originally developed by JMS Southeast, Inc.





Unites Bimetal with either Thermocouple or RTD Technology!

- Bimetal Dependability
- Thermocouple / RTD Accuracy
- Direct AND Electronic Reading
- Easy To Use
- Easy To Calibrate
- Two Sensors in One Instrument

This thermometer combines the convenience, simplicity, and self-powered actuation of a bimetal thermometer with the digital accuracy and data acquisition capabilities of a thermocouple or RTD. With standards traceable to the NIST, this new instrument offers simplified calibration for ISO 9000 compliance and other statistical process control requirements. It is also ideal in applications requiring easy and quick readability while still affording a means of electronic data acquisition. There is no need to add additional access points or thermowells to your existing process in order to gain different types or readings.

This is available with a 3" or 5" dial, in a Back Connected or Adjustable angle case, 1/4" stem diameter in lengths to 12", 1/2" NPT connection, in ranges from -100°F (-70°C) to 500°F (260°C), with Fahrenheit, Celsius and Dual Scale Dials available. Thermocouple output may be accessed via a plug-in connector; RTD output is accessed by a terminal block. Both have 1/2" conduit threaded mounting (PWK option) and a plastic cap standard. Optional weatherproof housing is available. Construction is of type 304 series stainless steel with a glass crystal. It is hermetically sealed per ASME B40.3 standard. It also comes with a one-year warranty.

How To Order Your Adjustable Angle Bemometer:

JMS PART NUMBER: ***ANA 30 060 0 01 K PWK***

Table 1: Basic Model
Table 2: Stem Length
Table 3: Scale Type (F, C or F&C)
Table 4: Range
Table 5: Sensor Type
Table 6: Options

TABLE 1 - Model	
KEY	DESCRIPTION
30	3" Back connection
32	3" Adjustable angle
50	5" Back connection
52	5" Adjustable angle

TABLE 2 - Stem Length	
KEY	DESCRIPTION
040	4 inches
060	6 inches
090	9 inches
120	12 inches
X	Other, specify

TABLE 3 - Scale Type	
KEY	DESCRIPTION
0	Dual scale °F / °C
1	Celsius only
2	Fahrenheit only

TABLE 4 - Standard Ranges			
KEY	DESCRIPTION		
	Dual scale F/C	Celsius only	Fahrenheit only
01	-100/150°F & -70/70°C	-70/70°C	-100/150°F
02	-40/120°F & -40/50°C	-40/50°C	-40/120°F
03	25/125°F & -5/50°C	0/50°C	25/125°F
04	0/140°F & -20/60°C		0/140°F
05	0/200°F & -15/90°C	0/100°C	0/200°F
06	0/250°F & -20/120°C	-20/120°C	0/250°F
07	20/240°F & -5/115°C		20/240°F
08	50/300°F & 10/150°C	0/150°C	50/300°F
09	50/400°F & 10/200°C	0/200°C	50/400°F
10	50/500°F & 10/260°C	0/250°C	50/500°F

TABLE 5 - Sensor Type	
KEY	DESCRIPTION
J	Thermocouple output, Type J
K	Thermocouple output, Type K
E	Thermocouple output, Type E
T	Thermocouple output, Type T
3	100Ω RTD output, 3 wire

TABLE 6 - Options Choose as many as applicable	
KEY	DESCRIPTION
1	SS Tag
5	Calibration Certificate

BIMETAL TEMPERATURE GAUGES

JMS, the highest quality thermocouple & RTD manufacturer, now brings you the highest quality bimetal gauge. Great for clear local indication without the need for a power source, the JMS Bimetal Thermometer features an hermetically sealed NEMA 4X 304 SS case and stem with external adjustment capability (upgradeable to 316SS by option for All Angle 5" dials). Manufactured to ASME B40.200 Grade A standards with Accuracy meeting or exceeding ± 1% of full scale, you will not find a better bimetal on the market. Capable of customization to your liking. Just ask or use an "X" in the part # to describe your requirement!!

#1	DESCRIPTION
9B	External Adjustable Bimetal Thermometer

#2	DIAL MOUNT STYLE
A	All angle (std)
L	Right angle mount
R	Rear Mount
X	Other, specify

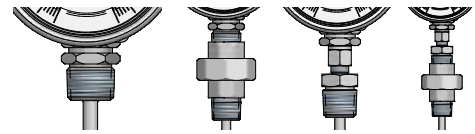

Style A


Style L


Style R

#3	DIAL SIZE
3	3 inch dial
5	5 inch dial
x	Other, specify

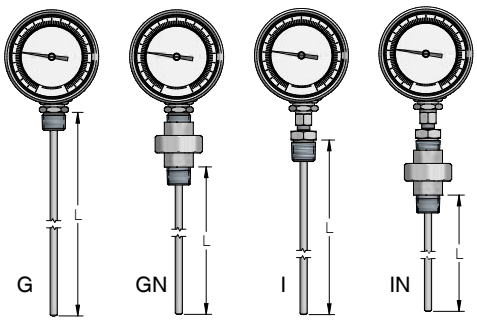
#4	ATTACHMENT STYLES (ALL 1/2" MNPT -- USE 'X' IF OTHER THREAD REQUIRED)
G	Fixed (std)
GN	Fixed w/ union & short nipple
I	Adjustable with teflon ferrule
IN	Adjustable (teflon ferrule) with union & short nipple
Z	Not Applicable
X	Other, Specify


G GN I IN

#5	STEM LENGTH (TO MATCH THERMOWELL, USE SAME LENGTH AS S/L SENSOR PER CHARTS ON 5-1 (#6) AND 5-3 (#4))
L___"	Length in Inches (specify in 1/2" increments) 24" = max L if silicone liquid filled

#6	SPECIAL OPTIONS (PICK ALL THAT APPLY)		
D	Dual Scale	K	316 SS
M	Dial Marking (your logo here!)	5	Individual Calibration
1	SS Tag	C*	Silicone Free
P	Acrylic Window	A	3/8" st em
S	Safety Glass (preferred)	L*	Silicone Liquid Filled
X	Other, Specify	Z	None

* Can only pick C OR L, not both.



9B	A	5	G	L9	D	(0-300F)

#7	TEMPERATURE RANGES (STATE IN PARENTHESES PER NOTE 1 BELOW) - OTHER RANGES AVAILABLE, JUST ASK!!

°F Only		°C Only		Combined - °F Inner / °C Outer				Combined - °C Inner / °F Outer			
-100/100*	0/500	-50/50*	0/120	°F (large)	°C (small)	°F (large)	°C (small)	°C (large)	°F (small)	°C (large)	°F (small)
-80/120*	20/120**	-50/180*	0/150	-100/100*	-70/40	0/500	-20/260	-50/50*	-50/120	0/120	30/250
-50/200*	30/130**	-40/100	0/200	-80/120*	-60/50	20/120**	-5/50	-50/180*	-50/350	0/150	30/300
-50/250*	30/240	-40/160	0/250	-50/200*	-40/93	30/130**	0/55	-40/100	-40/210	0/200	30/400
-40/120	50/300	-30/70	0/300	-50/250*	-40/120	30/240	0/115	-40/160	-40/320	0/250	30/480
-40/160	50/400	-20/180	10/150	-40/160	-40/70	50/300	10/150	-30/70	-20/160	0/300	30/570
-20/120**	50/550	-10/50	0/400***	-20/120	-30/50	50/400	10/200	-20/180	0/350	10/150	50/300
0/100	0/700***	-10/110	0/500***	0/100	-20/40	50/550	10/290	-20/120	0/250	0/400***	30/750
0/150	100/800***	0/50**	50/450***	0/150	-20/65	0/700***	-20/370	-10/50	20/120	0/500***	30/930
0/200	150/750***	0/60	100/500***	0/200	-20/93	100/800***	50/430	-10/110	20/230	50/450***	120/840
0/250	200/700***	0/100		0/250	-20/120	150/750***	65/395	0/60	30/140	100/500***	220/930
0/300	200/1000***			0/300	-20/150	200/700***	100/370	0/100	30/210		
				0/350	-20/170	200/1000***	100/550				

* Liquid filled option not available for these temperature ranges.
** All Angle and Right Angle Mounts must be 5" dial size for these temperature ranges
*** Dial size must be 5"

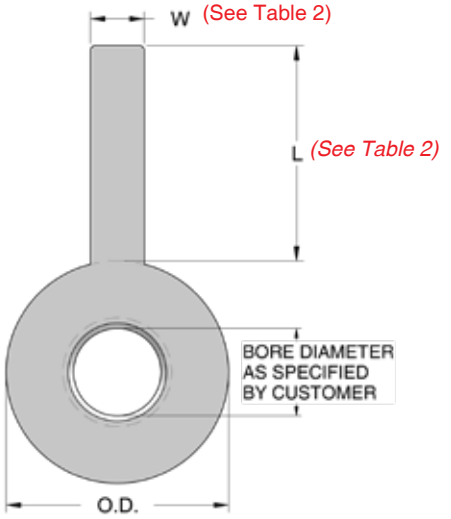
Note: If Dual Scale, state only the larger print inner temperature range (ex: if #6 is "D" and #7 is (0-300F) dial will be 0/300F Inner & -20/150C Outer). Continuous Operation at or above 800F (425C) not recommended. Where Temperature Range maximum value exceeds this temperature then intermittent service to maximum value is possible.

ORIFICE PLATES

#1	DESCRIPTION
8P	PADDLE ORIFICE PLATES

#2	PLATE STYLE (See Figure 1)
R	Restriction (No Bevel)
F	Beveled Bore
Q	Quadrant Edge Bore
O	Orifice Seal (No Bore)

#3	MATERIAL
G	Carbon Steel A516Gr70
X	Duplex F51/2205 SS
I	304/304L SS
L	316/316L SS
X	321 SS
M	Alloy 600
N	Alloy 400
X	Alloy 20
S	Titanium Gr. 2
Q	Alloy / Hastelloy C-276
X	Other, specify



#4	LINE SIZE (See Tables 1 & 2)		
05	1/2”	12	12”
075	3/4”	14	14”
1	1”	16	16”
15	1-1/2”	18	18”
2	2”	20	20”
25	2-1/2”	24	24”
3	3”	26	26”
4	4”	28	28”
6	6”	30	30”
8	8”	X	Other, Specify
10	10”		

Tables referenced can be found at www.jms-se.com/orificeplates

Not enough options?
Custom designs also available by drawing!

#5	BORE LOCATION (See Figure 2)
C	Concentric
E	Eccentric*
S	Segmental*
X	Other, specify
Z	Not Applicable (Standard for Orifice Seal)

*Bevel not standard for these options. Call out with “X” if Bevel required.

#6	BORE DIAMETER (See Table 3)
____”	Specify

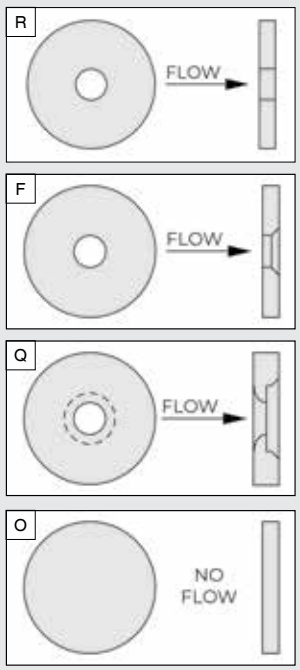
#7	RATING & FACE STYLE (See Table 2)
A	150#
B	300#
D	600#
E	900#
F	1500#
G	2500#
X	Other, specify

Note: If RTJ style needed add R suffix. (example: GR = 2500# Ring Joint Style)

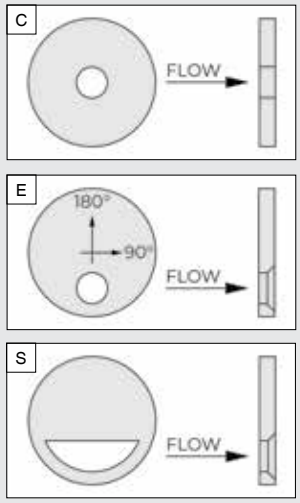
#8	PLATE THICKNESS (T) in inches
T	Standard T (from Table 2)
T_”	Other, specify

#9	OPTIONS Use only if applicable.
V	Vent (from Table 4)
D	Drain (from Table 4)
C	CRN
W	Calculation
M	MTR
Z	No Paddle
A	Tag # Stamped

(Figure 1) PLATE STYLE



(Figure 2) BORE LOCATION

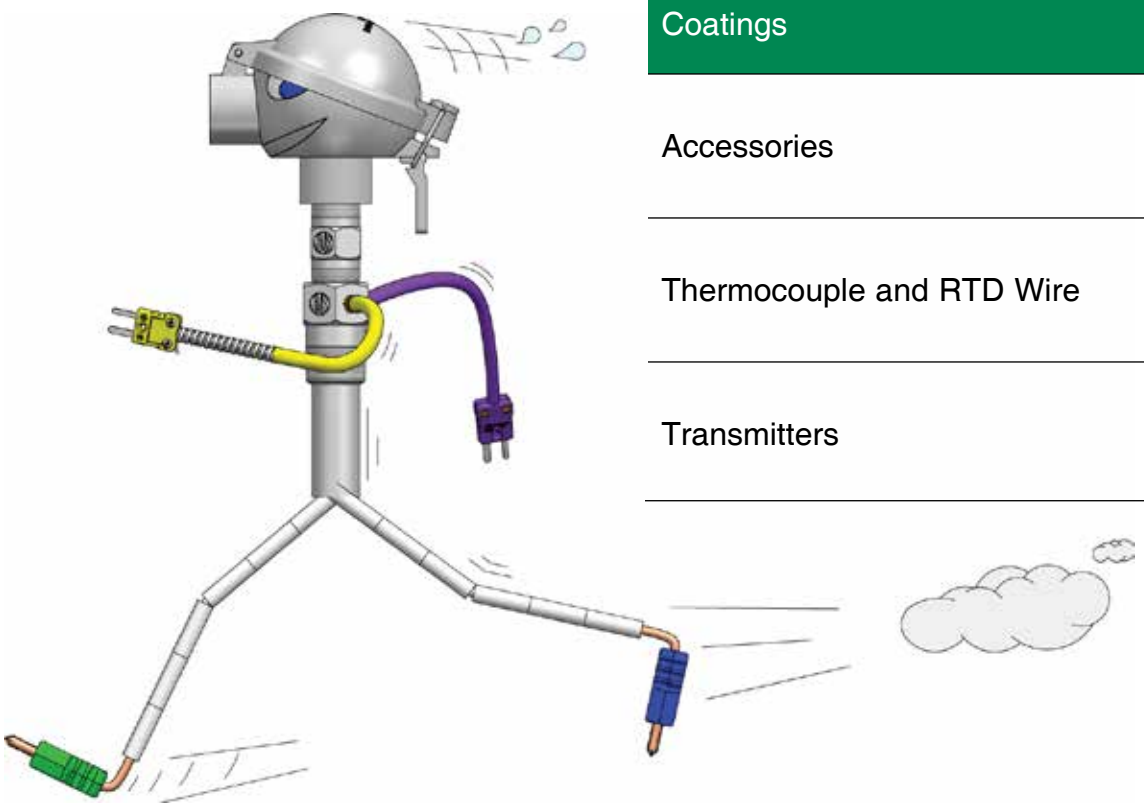


8P	F	L	6	C	1”	B	T	VM

THERMOWELLS

NEW WEBSITE & ONLINE CONFIGURATOR!
VISIT WWW.JMS-SE.COM

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.

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	BUILT-UP Pipe size
1	1/2"	1/2" NPT	N/A	N/A	N/A	1/4" Sch 40 pipe
2	3/4"	3/4" NPT (Standard)	3/4" pipe	1.050"Ø (Standard)	N/A	1/2" Sch 40 pipe
3	1"	1" NPT	1" pipe	1.315"Ø	1.00"Ø	1/2" Sch 40 pipe
4	1-1/2"	1-1/2" NPT	1-1/2" pipe	1.900"Ø	1.50"Ø (Standard)	1/2" Sch 40 pipe
5	1-1/4"	1-1/4" NPT	1-1/4" pipe	1.660"Ø	1.25"Ø	1/2" Sch 40 pipe
X	Other, specify					

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

#3	SHANK STYLE [15]
A	Step (Standard)
S	Straight
T	Tapered
B*	Built-up (see page 5-2)
X	Other, specify

Note: Standard shank geometry fits 3000# rated sockolet/threadolet fittings. Use X to specify alternate geometry if needed.

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

#4	PROCESS ENGAGEMENT		
T	Threaded well design	W*	Weld In design *Tapered shank standard
S	Socket weld well design	X	Other, specify Not available as Built-up

Note: Standard sensor connections are 1/2" FNPSM (female straight) to match 1/2" MNPT (male tapered) per ASME B40.200-2008 (B40.9) 1/4" female thread required for 1" weld in thermowell.

#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			

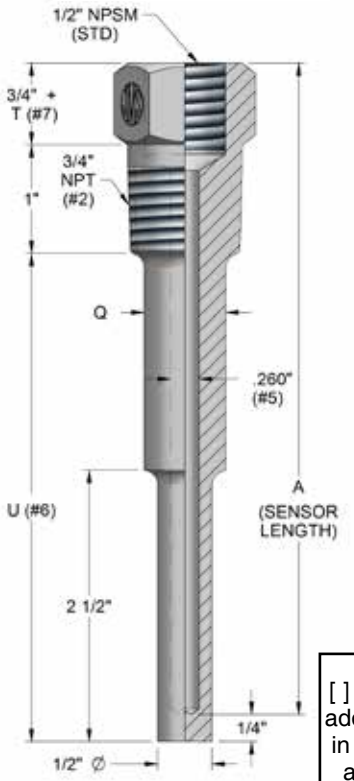
*If overall length of thermowell is 40" or greater, JMS recommends the use of our "Built-up" shank style (option # 3) (see illustration on page 5-2)

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

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

Note: Use T_ selection in place of X in legacy part numbers. (example: legacy part # 52AT2CXK1 X=4", is equivalent to 52AT2CT4K1)

THREADED STEP SHANK THERMOWELL DESIGN



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	WELD MATERIAL [31-34]		
A	Alloy 800H/HT	M	Inconel 600
B	F5	N	Monel A400
C	F9	Q	Hastelloy C-276
D	F91 Type 2	S	Titanium Grade 2
E	F22 Class 3	X*	Other, specify
F	F11 Class 2		
G	Carbon steel A105		
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	OPTIONS
1	Stamped on well (Standard)
X*	Other, specify
M	MTR
W	Premium SwiftyCalc ASME 19.3TW calculation
N	NACE MRO175 Certification

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

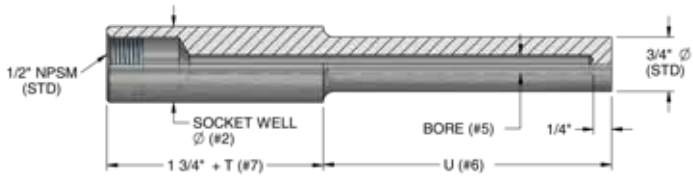
5	1	A	T	2	B	T	A	1

THREADED, SOCKET WELD & WELD-IN THERMOWELLS

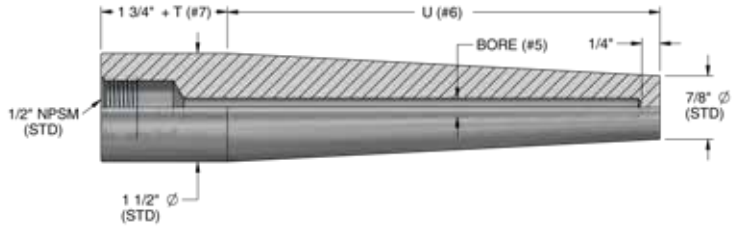
NEW ***FREE*** Wake Frequency Calculations to ASME PTC 19.3 TW, ***SwiftyCalc!***
Visit JMS-SE.com to sign up today! www.JMS-SE.com/SwiftyCalc

(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.)

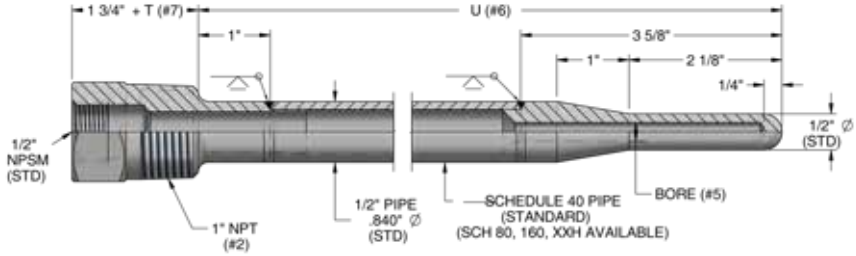
SOCKET WELD WELL DESIGN (SERIES 52SS2)



WELD IN THERMOWELL (SERIES 54TW2)



BUILT UP THERMOWELL* (SERIES 53BT2)



LIMITED SPACE THERMOWELLS

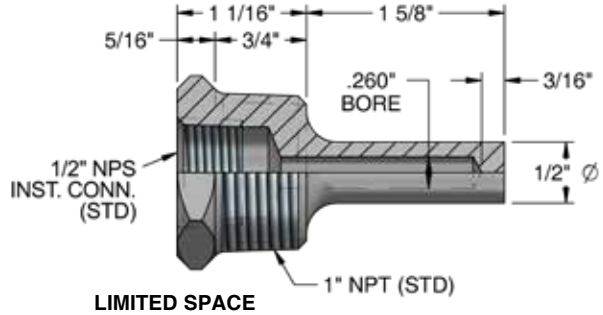
#1	DESCRIPTION	
5L	Limited space thermowells - Add a W here for a Brass plug and stainless steel chain attached to well (Example: 5LW)	
	#2	WELL MATERIAL & PROCESS CONNECTION SIZE
	H K M X	304 stainless steel 316 stainless steel Inconel 600 Other, specify

Standard process connection is 1" NPT. Add a 1 prefix for a 1/2" NPT or a 2 prefix for a 3/4" NPT (Example: 1H = 304 SS with 1/2" NPT process connection) Add an N as a suffix for a NPT Instrument Connection.

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

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

5L	M	1



LIMITED SPACE THERMOWELL

FLANGED THERMOWELLS

#1	DESCRIPTION [See pages 5-20 through 5-30 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		*Consider if overall length of thermowell is 40" or greater

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

#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

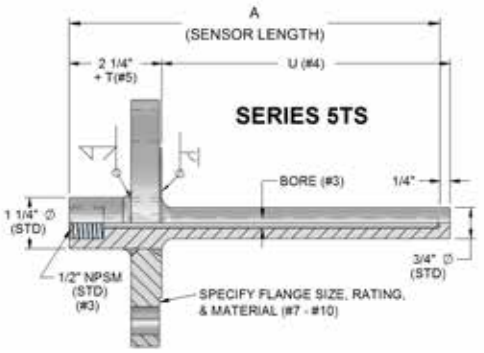
Note: Add N suffix for FNPT. (Example: 2N = .260" ID with 1/2" FNPT sensor connection)

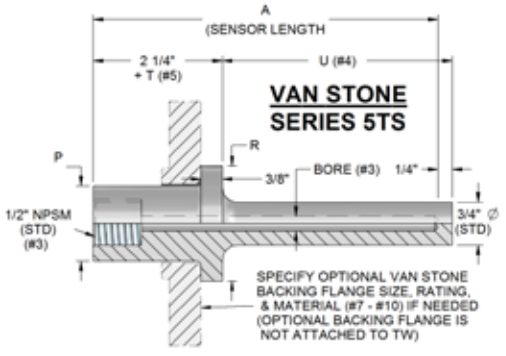
#4	U (INSERTION) DEPTH [15]	U DIMENSION	S/L SENSOR LENGTH
A	2"	2"	4"
B	4"	4"	6"
C	7"	7"	9"
D	10"	10"	12"
E	13"	13"	15"
F	16"	16"	18"
G	22"	22"	24"
U__"*	Other, specify		

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

#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".





#6	WELD MATERIAL [31-34]		
G	Carbon steel A105	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 Grade 2
K	316 stainless steel	X*	Other, specify
L	Low Carbon 316 stainless steel	T	446 stainless steel
M	Inconel 600		
N	Monel A400		

Special jackets & coatings are available for thermowells. *Call JMS for more information or www.JMS-SE.com.*

*For more options and unique material requirements consult your sales representative 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 per ASME B-16.5		
A	150#	E	900#*
B	300#	F	1500#*
C	400#	G	2500#*
D	600#	X	Other, specify

* Consider 1.5" lag

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

#10	FLANGE MATERIAL [31-34]		
G	Carbon steel A105	M	Inconel 600
H	304 stainless steel	N	Monel A400
I	Low Carbon 304 stainless steel	A	Alloy 800H/HT
J	310 stainless steel	P	Hastelloy B-3
K	316 stainless steel	Q	Hastelloy C-276
L	Low Carbon 316 stainless steel	S	Titanium Grade 2
T	446 stainless steel	X*	Other, specify

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

#11	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(#4) + 2" + T length(#5)

-All Welded designs
A = U length(#4) + 1 1/4" + T length(#5)

-All Compression designs without a nipple/union extension
A = U length(#4) + 4 1/4" + T length(#5)

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

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

Note: You must always specify information required on tag.

Van Stone Dimensions Chart			
Flange Size	P (Stem Ø)	R (Sealing Face Ø)	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"

SWIFT WELL (PATENT PENDING)

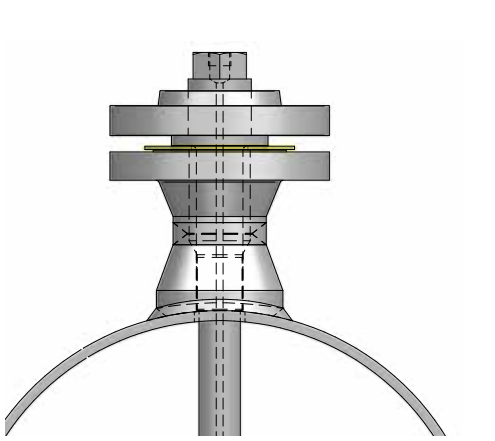
MEET THE NEW SWIFTWELL CALCKILLER

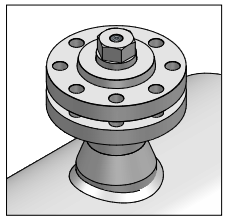
FROM JMS SOUTHEAST, INC.

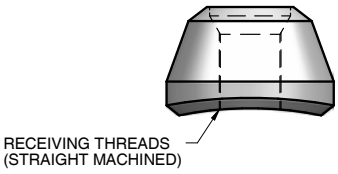
Developed with Bechtel Engineering, this flanged thermowell enables longer, skinnier immersions into a pipe resulting in faster, more accurate temperature measurements. The flange holds pressure just like a normal van stone thermowell with pressure ratings per ASME B16.5. The machined thread fixes the thermowell with an established foundation compliance factor so that calculations can be run per the ASME / ANSI PTC 19.3TW Thermowells code!

Having trouble getting your flanged thermowell to pass muster under the ASME 19.3TW calculation? Call JMS today! Excellent for new installations.

JMS will generate a drawing specific to your requirement.







CAROLINA TWIST

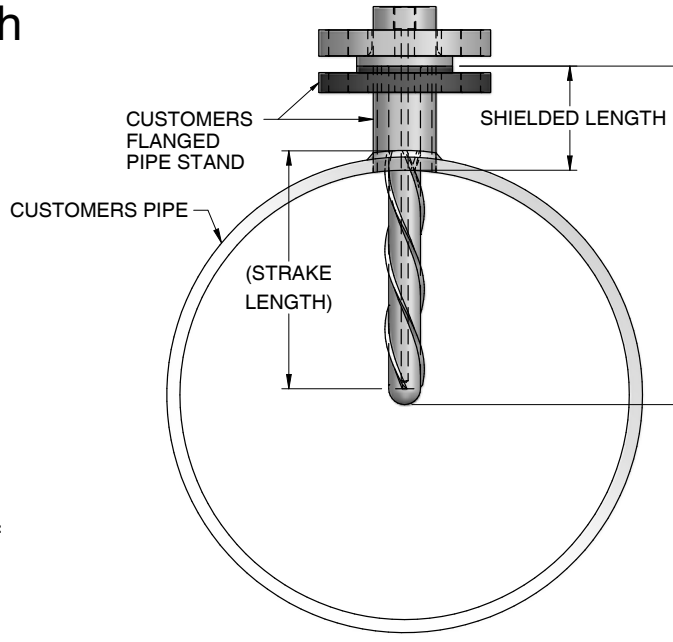
Thermowell Immersion Length Limited by Wake Frequency Calculation Results?

Although outside the scope of ASME 19.3TW, straked thermowells can increase the velocity at which resonance occurs while diminishing wake frequency induced vibration. Best suited for clean, non-erosive, non-corrosive gas applications where the design constraint is a projected failure due to wake frequency.

Carolina Twist designs are typically provided with a rounded tip and do not require any reconfiguration of the thermowell nozzle to install. Steady state stress and pressure calculations can be provided to help guide your design judgment.

JMS will generate a drawing specific to your requirement.

Call JMS today. We can help!



Also Available for Sample Probes!

METAL PROTECTION TUBES

#1	DESCRIPTION
5P	Metal Protection Tube -- Add a W here for a Brass Cap and stainless steel chain attached to the well (Example 5PW)

#2	RESPONSE TYPE (see illustrations below)
1	Fast Response Tip
2	Standard Response Tip

#3	ATTACHING DEVICE		
K	Stainless steel bushing	F	Fixed flange
Z	None	T	Threaded flange
J	Adjustable floor flange	X	Other, specify

NEW for Fixed Flanges and Bushings!

Complete selection #s 3.1 through 3.4 below as applicable if your protection tube requires a bushing, fixed flange or threaded flange. Otherwise skip to selection #4.

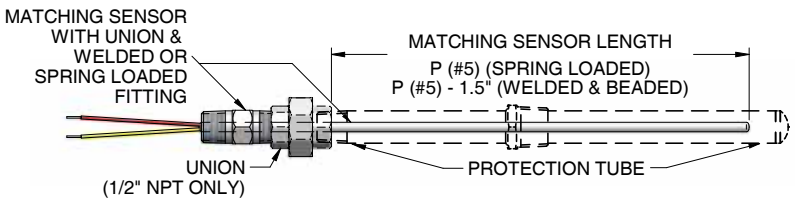
#3.1	Attaching Device Size	Bushing External Thread	Flange ASME B16.5		Attaching Device Size	Bushing External Thread	Flange ASME B16.5
1	1/2"	1/2" NPT	1/2" NPS	6	3"	3" NPT	3" NPS
2	3/4"	3/4" NPT	3/4" NPS	7	1 1/4"	1 1/4" NPT	1 1/4" NPS
3	1"	1" NPT	1" NPS	8	1/4"	1/4" NPT	N/A
4	1 1/2"	1-1/2" NPT	1 1/2" NPS				
5	2"	2"NPT	2" NPS	X	Other, specify. *Bushing specified? Proceed to #4*		

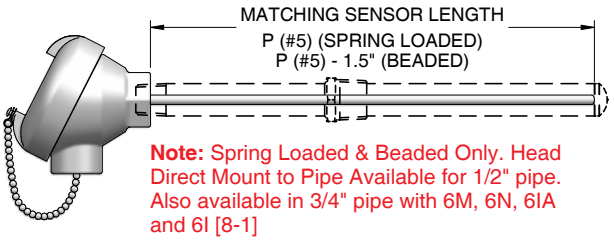
#3.2	FLANGE PRESSURE CLASS PER ASME B16.5 (If bushing, leave this option blank)				
A	150#	D	600#	G	2500#
B	300#	E	900#	X	Other, specify
C	400#	F	1500#	[blank]	Bushing

#3.3	FLANGE FACING (If bushing, leave this option blank)		
1	Raised	X	Other, Specify
2	Flat	[blank]	Bushing

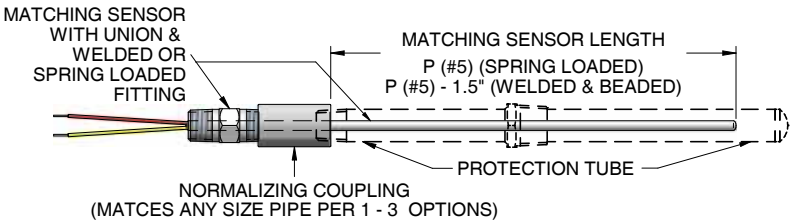
#3.4	FLANGE MATERIAL (If bushing, leave this option blank)				
K	316 SS	J	310 SS	X	Other, specify
H	304 SS	Q	Hast. C-276	[blank]	Bushing
G	Carbon Steel	T	446 SS		
M	I600	X	Other, Specify		

PROCEED TO SELECTION #4, PAGE 5-6 TO COMPLETE YOUR PART NUMBER





Note: Spring Loaded & Beaded Only. Head Direct Mount to Pipe Available for 1/2" pipe. Also available in 3/4" pipe with 6M, 6N, 6IA and 6I [8-1]



5P 2 T { 4 A 1 K } *PROCEED TO SELECTION #4, PAGE 5-6*

OR

5P 2 K { 4 } *PROCEED TO SELECTION #4, PAGE 5-6*

OR

5P 2 J *PROCEED TO SELECTION #4, PAGE 5-6*

METAL PROTECTION TUBES

#4	PIPE SIZE (NOMINAL) add "S" for SCH80 add "SS" for SCH160	Is Bushing Size Compatible with Pipe Size? Bushing Size 1/4" NPT	1/2" NPT	3/4" NPT	1" NPT	1 1/4" NPT
18	1/8"	Yes	Yes	Yes	Yes	Yes
14	1/4"	No	Yes	Yes	Yes	Yes
12	1/2" (std)	No	No	Yes	Yes	Yes
34	3/4"	No	No	No	Yes	Yes
10	1"	No	No	No	No	Yes

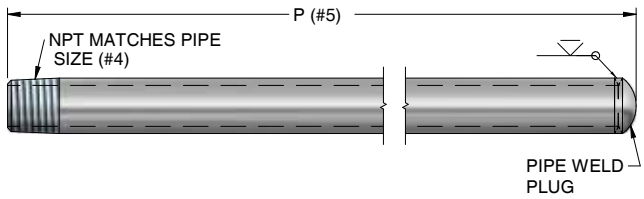
#5	OVERALL LENGTH (P) (see illustrations below)		
P__"	State overall length (P) in inches	D	30"
A	12"	E	36"
B	18"	F	48"
C	24"	G	60"

#6	FIXED OR ADJUSTABLE MOUNTING METHOD & U LENGTH		
U__"	State U dimension in inches. (Only if using a permanently fixed mounting device)	Z	N/A Attaching device will be adjustable

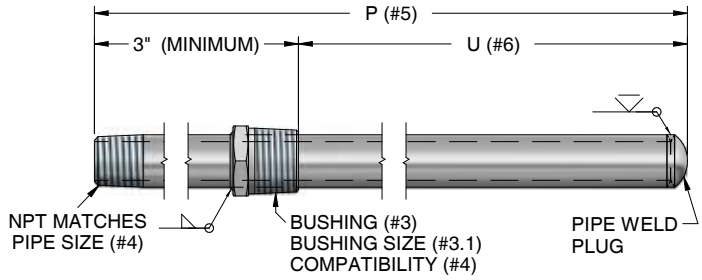
#7	PROTECTION TUBE MATERIAL					
K	316 SS	J	310 SS	M	Inconel 600	For more material options, consult your sales representative directly.
H	304 SS	Q	Hastelloy C-276	X	Other Specify	
G	Carbon Steel	T	446 SS			

#8	OPTIONS & TAGGING (Select as many as applicable)		
1	Tag # stamped on protection tube	X	Other, Specify.
M	MTR		

STYLE 5P2Z

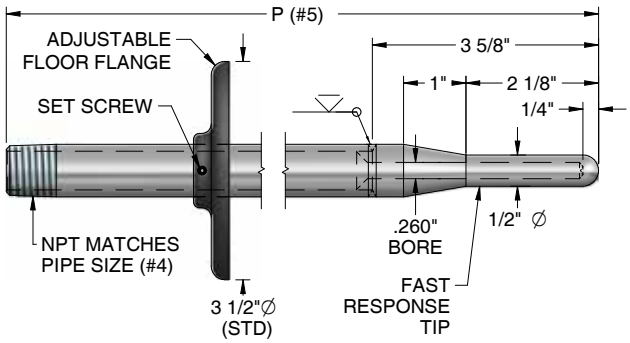


STYLE 5P2K



STYLE 5P1J

FAST RESPONSE TIP WITH ADJUSTABLE FLOOR FLANGE



12	P36	Z	K	M1

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% Al2O3). "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. Alumina and Mullite 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. It is not gas tight.

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

#3	ATTACHING DEVICE (See illustrations to the right and below)
O	No fitting
P	Open both ends, no fitting
C	Collar (See collar OD 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

#4	TUBE SIZE					
	Tube ID x OD		NPT*		Collar OD	
	Alumina Mullite	Hexoloy	Hex Bushing	CS Sleeve	Alumina Mullite	Hexoloy
14**	1/4" x 3/8"	1/4" x 3/8"	**3/4"**	1/2"	5/8"	5/8"
38**	3/8" x 1/2"	3/8" x 5/8"	**3/4"**	1/2"	3/4"	1"
76	7/16" x 11/16"	N/A	**3/4"**	3/4"	1"	N/A
12	1/2" x 3/4"	1/2" x 3/4"	**3/4"**	3/4"	1-1/8"	1-1/8"
34***	3/4" x 1"	3/4" x 1-1/4"	1"	**1"**	1-3/8"	1-3/4"
10***	1" x 1-1/4"	1" x 1-1/2"	1-1/4"	**1-1/4"**	1-3/4"	2"
X	Other, Specify					

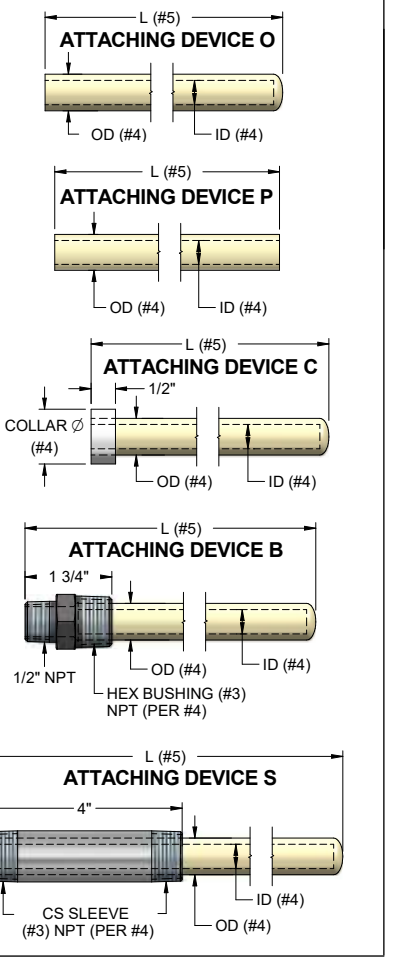
* NPT process connection thread sizes are shown in option #4 and can be used to attach to process equipment, flanges, and/or threaded bushings. (Use X in symbol number 3 and describe flanges and nonstandard bushings).

** Standard Attaching Device selection in #3 is Hex Bushing (B).

*** Standard Attaching Device selection in #3 is Carbon Steel Sleeve (S).

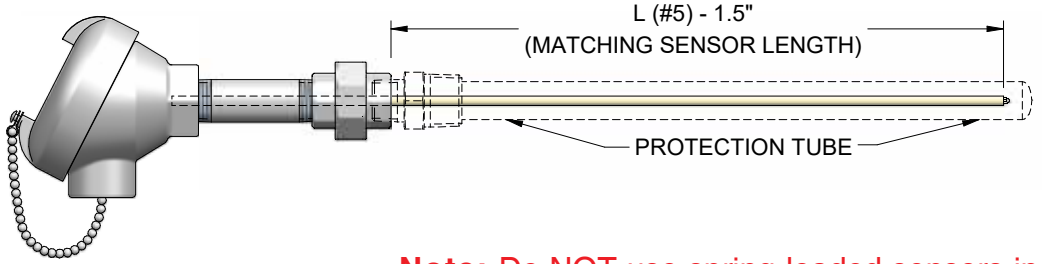
#5	OVERALL LENGTH (L)
A	6"
B	12" (Standard)
C	18"
D	24" (Standard)
E	30"
F	36"
L__"	Other, specify

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



MATCHING SENSOR LENGTHS

ATTACHING DEVICE B



5D	A	B	12	B	1

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

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.

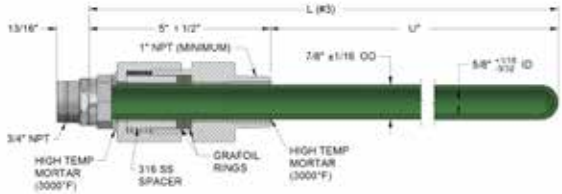
The MCPT exhibits good wear resistance and corrosion resistance. It has a hardness of Rockwell C37, which indicates the crushing strength of the material rather than the true hardness of the entire body. Great solution for sulfur burner and many other sulfuric environments.

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 5-9 through 5-10 for details)
Z	N/A -- 3/4" MNPT Instrument Connection only	
J	Standard design	
G__"	Graduated seal design (see p. 5-9 for detail)	
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"
L__"	Other, Specify		



Standard Design

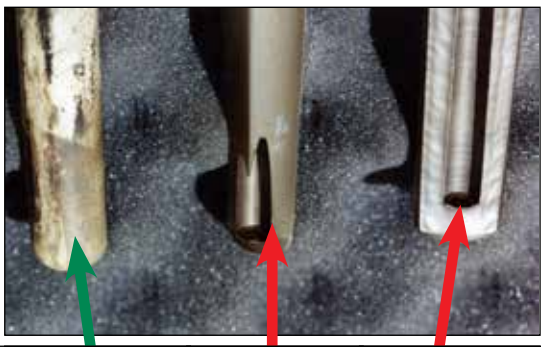
5G	J	3

See pages 5-9 and 5-10 for details!

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.



JMS Coal Pulverizing Design	Typical Design w/ Stellite Coating	Typical Design Uncoated Steel

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

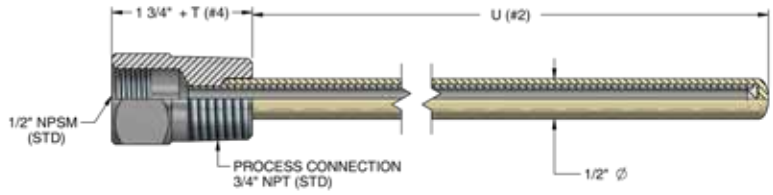
#2	U (INSERTION) DEPTH
__"	Length in inches (see illustration below)

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

Note: Immersion length of matching spring loaded sensor is per table on 5-1, selection 6, and YES, you can spring load your sensor!

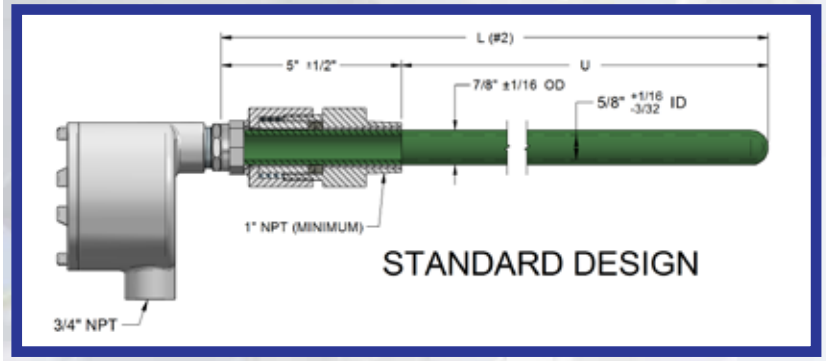
#4	LAG LENGTH (T)
T__"	Standard (See chart on page 5-1, option #6)
Z	N/A
X	Other, specify

5V	3	A	Z

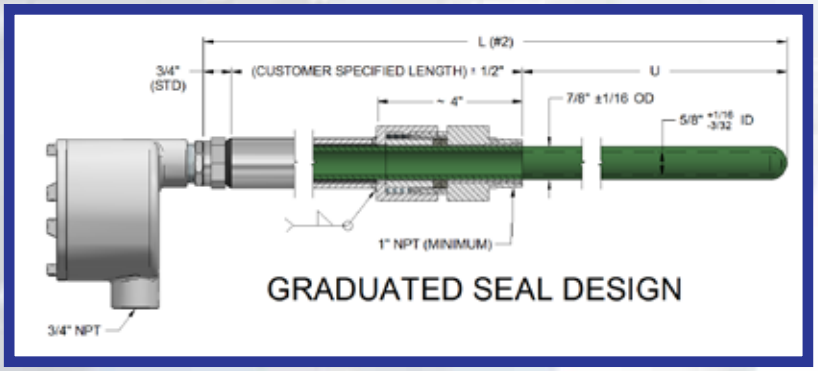


SULFUR PROTECTION TUBE

DESIGN ASPECTS



STANDARD DESIGN



GRADUATED SEAL DESIGN

See page 5-8 (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 5-8 (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 and other sulfuric environment applications 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.**

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APPLICATIONS

Sulfuric acid plants

H_2SO_4

Corrosive SO_2 and SO_3 gas to 2500°F at tip

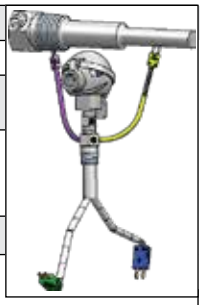
Corrosive SO_3 and HF gas to 2000°F

Boiling H_2SO_4 – 97%

Many additional applications.

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

SAMPLE PROBES



#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 [5-15]
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 [5-15]
U__"*	Specify insertion length

#7	T (LAG) EXTENSION [5-15]
T__"	Specify lag length

#8	MATERIAL [5-31,34]
H	304 stainless steel
K	316 stainless steel
X	Other, specify

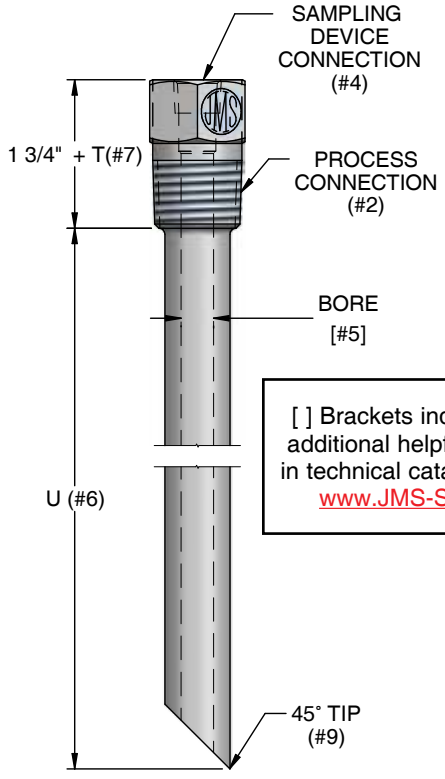
*For more options and unique material requirements see jms-se.com/metals, or consult your sales representative directly.

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

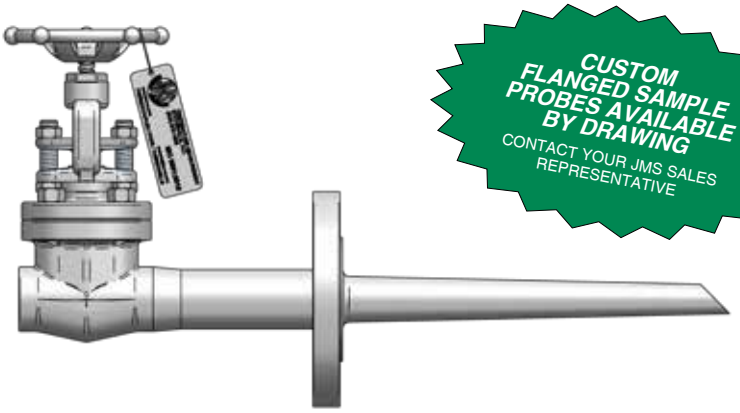
#10	OPTIONS
1	Stamped on well (Standard)
X*	Other, specify
M	MTR

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



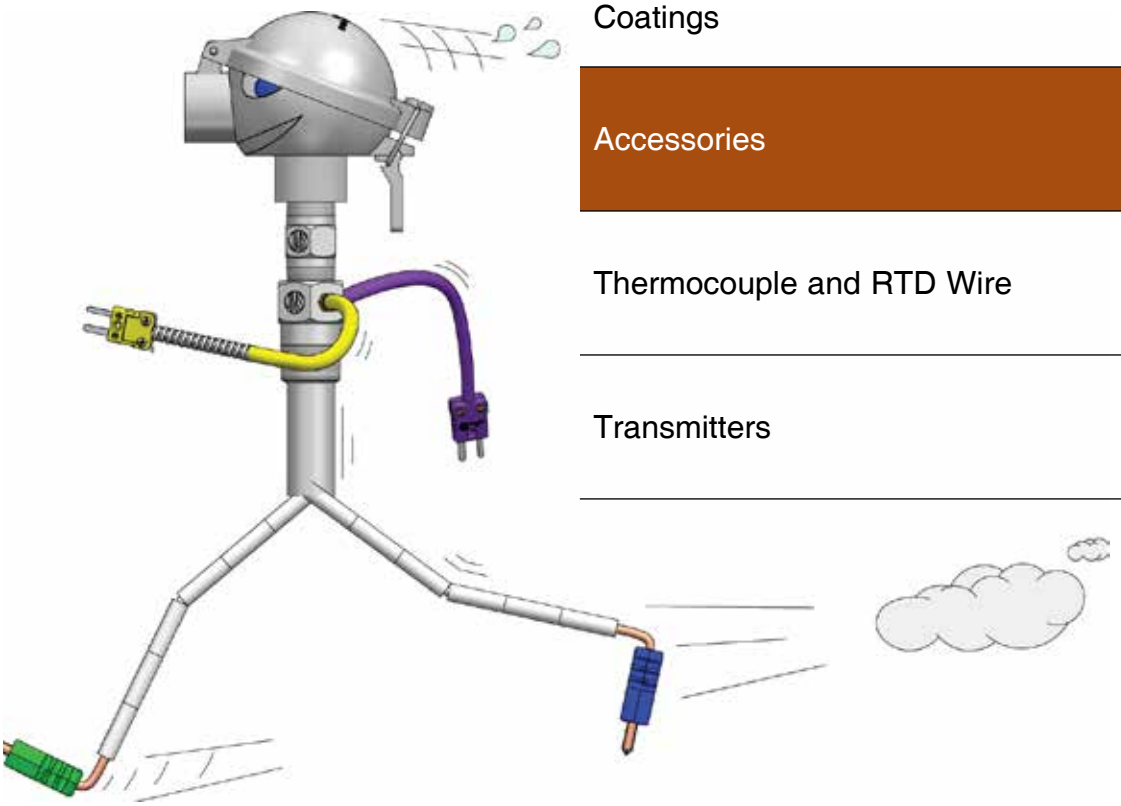
CUSTOM FLANGED SAMPLE PROBES AVAILABLE BY DRAWING
CONTACT YOUR JMS SALES REPRESENTATIVE

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

ACCESSORIES

NEW WEBSITE & ONLINE CONFIGURATOR!
VISIT WWW.JMS-SE.COM

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.

CONNECTION HEADS

JMS part numbers are shown in black. (Ordering codes are shown in parenthesis) (Max temp ratings shown in red text on the right)

6L (L)
General purpose aluminum head with hinged cover 1/2" x 1/2" connection (Standard)

Features:
*Corrosion resistant *Moisture resistant
*Dust resistant *Durable
*NEMA 4

150°C

6M (M)
General purpose aluminum head with cap and chain, 1/2" x 3/4" connection

Features:
*Corrosion resistant *Moisture resistant
*Dust resistant *Durable
*NEMA 4

150°C

6N (N)
General purpose cast iron head with cap and chain, 1/2" x 3/4" connection

Features:
*Corrosion resistant *Moisture resistant
*Dust resistant *Durable
*NEMA 4

150°C

6SS (SS)
General purpose 316 stainless steel head with cap and chain, 1/2" x 3/4" connection

Features:
*Corrosion resistant *Moisture resistant
*Dust resistant *Durable
*NEMA 4X

150°C

6I (SI)
Explosion proof cast iron head 3/4" x 3/4" connection

Features:
*UL, CSA explosion proof rated for Class I, Div. I, Groups B, C, D, Class II, III Div. I, Groups E, F, G, *NEMA 3 & 4 rated. *Moisture resistant, *Dust resistant. *Cast iron with aluminum cover.

85°C

6ISS (J)
Explosion proof stainless steel head 1/2" x 3/4" connection

Features:
FM, CSA explosion proof rated for Class I, Div. I, Groups B, C, D, Class II, Div. I, Groups E, F, G, Class III. *NEMA 4X rated. IP68.

85°C

6ISSATEX (U)
Explosion proof stainless steel head 1/2" x 3/4". IP68

Features:
ATEX explosion proof rated for II 2G Ex d IIC

85°C

6IAIEC (P)
Explosion proof aluminum head 1/2" x 3/4" connection

Features:
FM, CSA ATEX & IEC Ex explosion proof rated for Class I, Div. I, Groups, B, C, D, Class II, III, Div. I, Groups E, F, G. ATEX II 2GD Ex d IIC Gb Ex tb IIIC Db, IEC Ex SIR 09.0006U, NEMA 4X, IP68.

85°C

6IA (I)
Explosion proof aluminum head 1/2" x 3/4" connection

Features:
FM, CSA. Explosion proof rated for Class I, Div. I, Groups B, C, D. Class II, III, Div. I, Groups E, F, G. NEMA 4X, IP68

85°C

6R (R)
High dome, general purpose head with hinged cover, 1/2" x 1/2" connection

Features:
*Corrosion resistant *Moisture resistant
*Dust resistant *Durable
*NEMA 4

150°C

6WP (WP)
White plastic screw-top head (polypropylene) 1/2" x 3/4" connection

Features:
*Moisture resistant *Dust resistant
*Very light weight *Corrosion resistant
*NEMA 4X

90°C

6Q (Q)
Black plastic (polyamide 6) head 1/2" x 1/2" connection

Features:
*Moisture resistant *Dust resistant
*Corrosion resistance *Very light weight

130°C

6S250 (SB)
Cylinder style head, 1/4" NPT
Small & light weight

100°C

6S125 (SD)
Cylinder style head, 1/8" NPT
Small & light weight

100°C

6T (ST)
Miniature molded head, 1/4" x 1/4" connection

175°C

6U (SU)
Hi temp miniature head, 1/4" x 1/4" connection

425°C

6G2Z (2 Terminals)
6G4Z (4 Terminals)
6G6Z (6 Terminals)
Ceramic block with brass terminals for type 6M and 6N connection heads.

Dimensions:
H=1.50", W=1.95", D=1.50"

(OG)

200°C

688S1 (GS)
Explosion proof head, 316SS 1/2" x 3/4" x 3/4" connection, threaded cap with glass viewing window.

Features:
ATEX/IECEx, FM/CSA, NEMA 4X rated.

85°C

688A1 (GA)
Explosion proof head, coated Aluminum 1/2" x 3/4" x 3/4" connection, threaded cap with glass viewing window.

85°C

6G2 (OG)
Ceramic block with brass terminals for type 6M and 6N connection heads.
For use with 8 to 14 AWG wires. (See pg. 1-4).

Dimensions:
6G2: H=0.79", W=2.00", D=1.54"

6G4 (OG)
6G4: H=1.15", W=2.00", D=1.54 "

200°C

6B4 (O)
Ceramic block with brass terminal plates for type 6L, 6M, 6N, 6Q, and 6R connection heads. For use with maximum 16 AWG wire. (See pg. 1-4)

Dimensions:
Diameter=1.62", Depth=0.6"

200°C

6B6 (O)
Ceramic block with brass terminal plates for type 6L, 6M, 6N, 6Q, and 6R connection heads. For use with maximum 16 AWG wire. (See pg. 1-4) Temperature rating of 200°C.

Dimensions:
Diameter=1.62", Depth=0.6"

200°C

6C4
6C6
6C8 (OS)
Ceramic block with 304SS terminal posts for type 6L and 6Q connection heads. The terminal posts provide easy access to the wires. For use with max.18 AWG wire.

Dimensions:
Diameter=1.662", Depth=0.995"

200°C

6BB4 (OA)
Bakelite terminal block with nickel plated brass terminal posts for type 6IA and 6ISS connection heads. For use with max. 20 AWG wire. Temperature rating of 130°C.

6BB6 (OA)
Dimensions:
Diameter=1.96", Depth=0.905"

130°C

6PT2
6PT3
6PT4
6PT6
6PT8 (OP)
Unpluggable terminal blocks for easy calibration and removal of sensors. Terminal body is made of 6.6 Polyimide material, with corrosion proof screw clamp parts. For use with 18 AWG to 24 AWG wires. It is standard with 6R and 6I connection heads.

100°C

For more information and details on connection heads and accessories,
visit www.JMS-SE.com/headspecs

PLUGS AND JACKS

Connector bodies are molded of glass-filled thermoset compounds (will not melt) for high strength and dependability. The standard connectors will withstand ambient temperatures to 400°F continuous and 500°F intermittent. High temperature connectors will withstand ambient temperatures to 800°F continuous and 1000°F intermittent. Standard plugs are color coded per ANSI standards. High temperature plugs are color coded rust. High temperature connectors have nickel plated prongs; and therefore, are good for use in corrosive environments. Other high temperature plugs and jacks are made of ceramic material and can be color coded.

Alloys of prongs match ANSI calibrations to maintain sensing accuracy. Alloys and polarity are identified by symbols molded into the body.

#1	DESCRIPTION [6-18, 6-19]	
6A	Accessories plugs and jacks	**Note:** Call JMS for high temp. vacuum applications and multi-pin connectors. Thermocouple plugs are normally two pin and RTD plugs are three pin. See page 6-4 for preferred RTD quick connectors.

#2	CONNECTOR DESIGN	
1*	Standard	<425°F
2	High temperature	<800°F
3*	Heavy duty (solid pin)	<425°F
4*	Heavy duty (jab-in & solid pin)	<425°F (Std size only)
4H	Heavy duty (jab-in & hollow pin)	<425°F (Std size only)
5	Ultra high temperature (glazed)	<1200°F
6*	Low noise	<425°F
7	Ultra high temperature (unglazed)	<1200°F
8	High temperature jab in	< 800 F
9	Locking	< 425°F.

*Add a W suffix to symbol #2 for a write-on window connector. (Example: 1W=Standard connector with write-on window.)

Locking Standard Size

Locking Mini Size

#3	STYLE
B	Mini plug
D	Mini jack
C	Standard plug
E	Standard jack

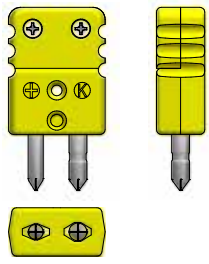
#4	# OF CIRCUITS	
2	2 pole	*For thermocouples, 3 pole design will include a copper ground pin. (see 6A1C3J illustration below)
3*	3 pole	

#5	TYPE	COLOR CODE
J	Iron/Constantan	Black
T	Copper/Constantan	Blue
K	Chromel/Alumel	Yellow
E	Chromel/Constantan	Purple
S	Copper/#11 Alloy	Green
R	Copper/#11 Alloy	Green
N	Nicrosil/Nisil	Orange
C	405/A426	Brown
A*	Copper/Copper (for type B and RTDs)	White

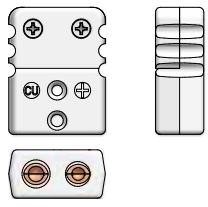
***Note:** 2 pole will be Copper/Copper for type B TCs. 3 pole will be plated copper for RTDs.

Note: See page 6-17 and 6-19 on the web for plug wiring standards.

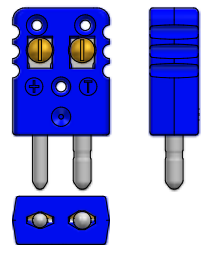
6A1C (MALE-PLUG)



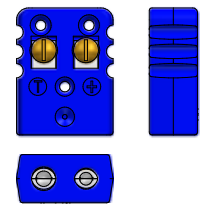
6A1E2A (FEMALE-JACK)



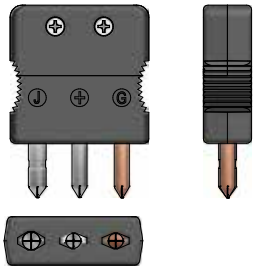
6A4C2T (MALE-PLUG)



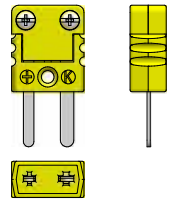
6A4E2T (FEMALE-JACK)



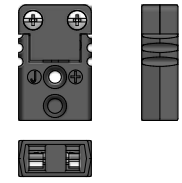
6A1C3J (MALE-PLUG)



6A1B2K (MALE- MINI PLUG)



6A1D2J (FEMALE-MINI JACK)



6A	1W	C	2	J

SUPPORT ACCESSORIES FOR PLUGS AND JACKS

TUBE ADAPTER FOR USE WITH PLUG OR JACK ON SHEATH
Nickel plated steel construction compression fitting. Always used with high temp. connectors and dual connectors mounted to sheath, may be specified on standard plugs and jacks.

SINGLE	DUAL	OUTSIDE TUBE DIAMETER
6V063SC	6V063D	1/16" (.063")
6V125SC	6V125D	1/8" (.125")
6V188SC	6V188D	3/16" (.188")
6V250SC	6V250D	1/4" (.250")

ROUND SINGLE CIRCUIT PANEL JACK
Designed for mounting into an instrument case or control panel from the front. Standard fits in a 1.125"Ø cutout and mini fits in a 0.750 Ø cutout. Polarity marked and color coded for identification.

6RSC (Standard)
6RMCR (Mini)

MAX. TEMP. 400°F
JACK NOT INCLUDED

CABLE CLAMP FOR USE W/ PLUG & JACK WITH LEAD WIRE
Nickel plated steel. For cable up to 3/8" diameter. Always used to support plug mounted on wire lead.

6H Cable Clamp

PANEL ADAPTER

6ACL Panel adapter
JACK NOT INCLUDED

WATER RESISTANT NEOPRENE BOOT FOR USE WITH PLUG AND JACK
MAX. TEMP. 212°F

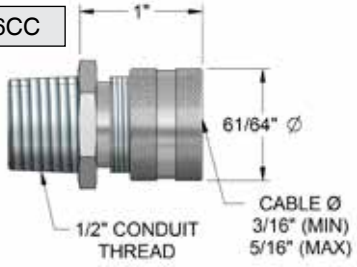
6WPBM Mini plugs & jacks

6WPB Standard sized plugs & jack
Flexible moisture proof boot for connector and wire connection.

SUPPORT ACCESSORIES

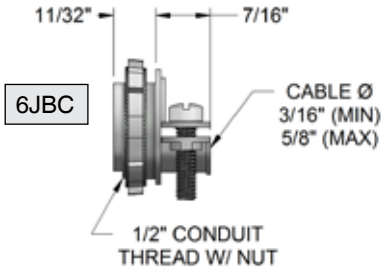
CORD CONNECTOR FOR USE WITH ATTACHING HEAD ASSEMBLIES & FLEX ARMOR

6CC



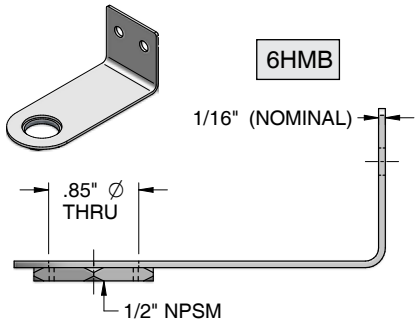
JUNCTION BOX CONNECTOR

6JBC



HEAD MOUNTING BRACKET

6HMB

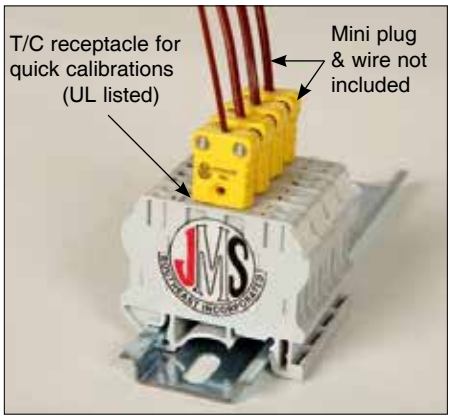


Note: Standard cord connectors are aluminum. Other sizes and materials are available.

THERMOCOUPLE DIN RAIL CONNECTOR

#1	DESCRIPTION		
6DR	Din rail mountable thermocouple connections		
#2	TYPE OF EXTENSION WIRE		
J T K	Iron/Constantan Copper/Constantan Chromel/Alumel	E	Chromel/Constantan
#3	QUANTITY OF SENSOR INPUTS		
____	Desired number of plugs (total per individual rail)		
#4	INCLUDES MINI T/C RECEPTACLE?		
N	No **Note:** If yes, leave blank (Example: 6DRK2)		

6DR	J	4	4



QUICK CONNECTORS

#1	DESCRIPTION
6D	Quick connectors

#2	TYPE OF CONNECTOR		
A	US microphone style connector (Standard)	C	Molded/water resistant connector
B	DIN-IEC style connector	Y	M12 water resistant connector
M	Mini microphone style connector		

#3	DESCRIPTION [6-17] Visit JMS-SE.com/CONNECTORS for pin connections details.		
2	2 wire RTD or thermocouple	4	4 wire RTD
3	3 wire RTD	X	Other, specify

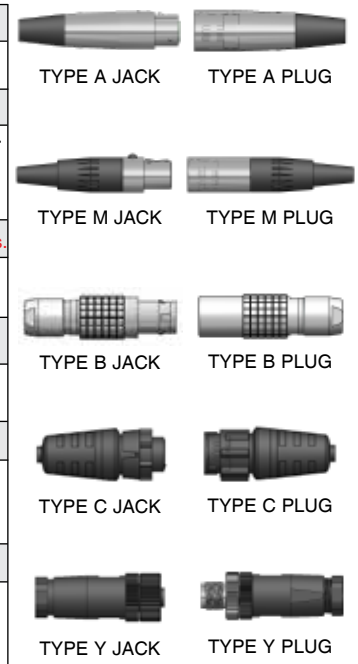
#4	TERMINATION **Note:** If you can see the pins it is a male (plug)				
C	Plug	P	Panel mounted jack	X	Other,
E	Jack	M	Panel mounted plug		specify

#5	# OF CIRCUITS
S	Single
D	Dual
X	Other, specify

#6	INSERT ALLOY
J*	Iron/Constantan
T*	Copper/Constantan
K*	Chromel/Alumel
E*	Chromel/Constantan
S	Gold Plated - Standard for Type B, C & Y
C	Silver Plated - Standard for Type A
X	Other, specify
	* Only available in B Type Connectors

See [6-17] JMS Technical Catalog for plug wiring standards.

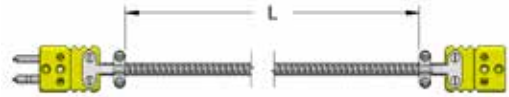
6D	B	2	C	S	J



EXTENSION ASSEMBLIES

#1	DESCRIPTION
6E	Extension assembly (Extension grade wire is used per ASTM E230)

Single Extension with Plug & Jack

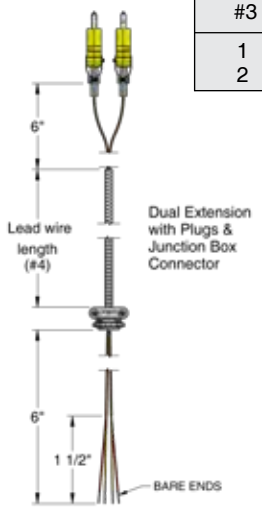


#2	TYPE	
_____	J, T, K, E, N, R*, S*, 2, 3, 4 wire RTD, X (Other, specify)	*Available in fiberglass braid, Teflon, and PVC only.

#3	ELEMENT CONSTRUCTION		
1	Single	3	Triple
2	Dual	X	Other, specify

#4	LEAD WIRE TYPE & LENGTH IN INCHES		
1 __"	20/24 AWG fiberglass braid	6 __"	20/24 AWG fiberglass braid/flex armor overall
2 __"	20/24 AWG PVC	7 __"	20/24 AWG Teflon w/ flex armor
3 __"	20/24 AWG FEP Teflon	8 __"	1/8" OD bendable SS sheath (MIMS cable)
4 __"	20/24 AWG high temp fiberglass braid	X__"	Other, specify
5 __"	20/24 AWG Kapton		

Notes: -20 AWG standard for T/C ext. & 24 AWG for RTD ext.
-Dual & triple element will be bundled via flex armor.



#5	FIRST END TERMINATIONS [Additional options see page1-7]				
A	Bare ends	G	High temp std jack	K	Spade lugs
B	Miniature plug	L	Dual molded plug	Y	M12 water resistant
D	Miniature jack	M	Dual molded jack		connector (plug)
C	Standard plug	W	Type A plug (6DA) [See page 6-17]		
E	Standard jack	V	Type A jack	X	Other, specify
F	High temp std plug	T	Junction box connector		

Note: All plugs and jacks will be mounted with a cable clamp for mechanical strength unless otherwise specified.

#6	SECOND END TERMINATIONS [Additional options see page 1-7]

6E	J	1	6-36"	C	TA

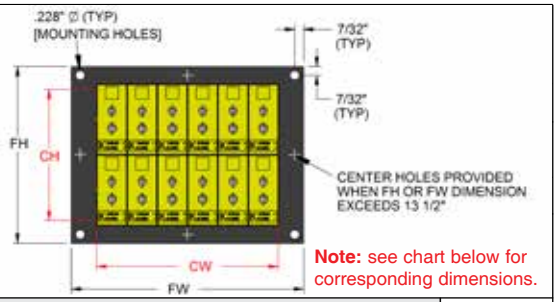
MULTICIRCUIT PANEL WITH MOUNTING FRAME

Multicircuit panels are molded of glass-filled thermoset compounds for high strength and dependability. Panels will withstand continuous exposure to temperatures of 425°F and intermittent exposure to 500°F. One-piece mounting frame is made of 3/32" thick rigid steel with flat black finish. Horizontal mounting style is standard.

#1	DESCRIPTION
6PM	Multicircuit panel

#2	FRAME STYLE
1	Standard Frame (Maximum number of jacks per row is 24)
2	19" Rack (Maximum number of jacks per row is 22)

#3	TYPE
S	Standard
M	Mini
U	Universal



Note: see chart below for corresponding dimensions.

#4	NUMBER OF ROWS REQUIRED
1	1
2	2
3	3
4	4
X	Other, specify

19" RACK NUMBER OF ROWS	STANDARD HEIGHT
1	3 1/2"
2	3 1/2"
3	5 1/4"
4	7"

#5	DESCRIPTION
———	Total number of sensor inputs
X	Other, specify

Note: We assume an even number of circuits per row.

#6	TYPE	COLOR CODE
J	Iron/Constantan	Black
T	Copper/Constantan	Blue
K	Chromel/Alumel	Yellow
E	Chromel/Constantan	Purple
R	Platinum/Platinum 13% Rhodium	Green
S	Platinum/Platinum 10% Rhodium	Green
A	Copper/Copper	White
N	Nicrosil/Nisil	Orange

#7	# OF POLES
2	2 poles
3	3 poles

Typical arrangement layout for standard or universal. Contact our engineering department for specific drawings.

NUMBER OF ROWS / TOTAL CIRCUITS		CIRCUITS PER ROW																							
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Fw= 2 3/4" Cw= 1 1/2"	Fw= 3 1/2" Cw= 2 1/4"	Fw= 4 1/4" Cw= 3"	Fw= 5" Cw= 3 3/4"	Fw= 5 3/4" Cw= 4 1/2"	Fw= 6 1/2" Cw= 5 1/4"	Fw= 7 1/4" Cw= 6"	Fw= 8" Cw= 6 3/4"	Fw= 8 3/4" Cw= 7 1/2"	Fw= 9 1/2" Cw= 8 1/4"	Fw= 10 1/4" Cw= 9"	Fw= 11" Cw= 9 3/4"	Fw= 11 3/4" Cw= 10 1/2"	Fw= 12 1/2" Cw= 11 1/4"	Fw= 13 1/4" Cw= 12"	Fw= 14" Cw= 12 3/4"	Fw= 14 3/4" Cw= 13 1/2"	Fw= 15 1/2" Cw= 14 1/4"	Fw= 16 1/4" Cw= 15"	Fw= 17" Cw= 15 3/4"	Fw= 17 3/4" Cw= 16 1/2"	Fw= 18 1/2" Cw= 17 1/4"	Fw= 19 1/4" Cw= 18"
1	FH= 2 5/8" CH= 1 1/2"	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
2	FH= 4 3/8" CH= 3 1/4"	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
3	FH= 6 1/8" CH= 5"	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72
4	FH= 7 7/8" CH= 6 3/4"	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96
5	FH= 9 5/8" CH= 8 1/2"	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
6	FH= 11 3/8" CH= 10 1/4'	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144
7	FH= 13 1/8" CH= 12"	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168
8	FH= 14 7/8" CH= 13 3/4"	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192
9	FH= 16 5/8" CH= 15 1/2"	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216
10	FH= 18 3/8" CH= 17 1/4"	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240

6PM	1	S	3	12	K	2

JACK PANEL OR PLUG PANEL CONDUIT BOXES

Style C

Style J

Style L

#1	DESCRIPTION
6PB	Jack panel or plug panel conduit boxes

#2	TYPE	COLOR CODE
J	Iron/Constantan	Black
T	Copper/Constantan	Blue
K	Chromel/Alumel	Yellow
E	Chromel/Constantan	Purple
R	Platinum/Platinum 13% Rhodium	Green
S	Platinum/Platinum 10% Rhodium	Green
2	2 Pole Copper/Copper (for type B thermocouples)	White
3	3 Pole Copper/Copper (for RTDs)	White

#3	DESCRIPTION
1 2 3 4 5 6	} Number of circuits

Note: Wire hubs are opposing when mates are connected. Male is left handed and the Female is ALWAYS right!

#4	BOX STYLE
C	Conduit box cast aluminum (1-5 circuits)
D	Junction box fiberglass impregnated Nylon (1-6 circuits)
E	Junction box cast aluminum (1-5 circuits)
J	Junction box - standard mini flat pin connectors (1-6 circuits)
L	Molded panel (1 piece)
X	Other, specify
Z	No Box

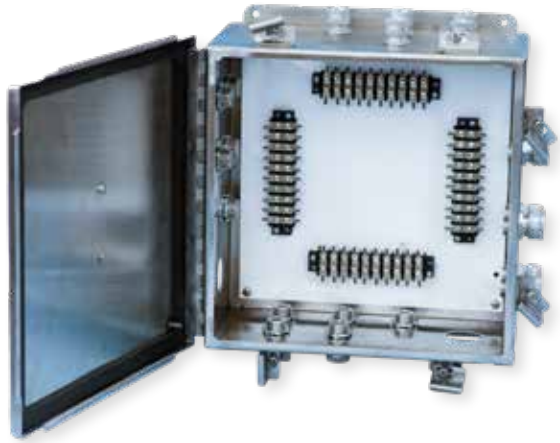
#5	CONNECTION TYPE
M	Plug (male)
F	Jack (female)

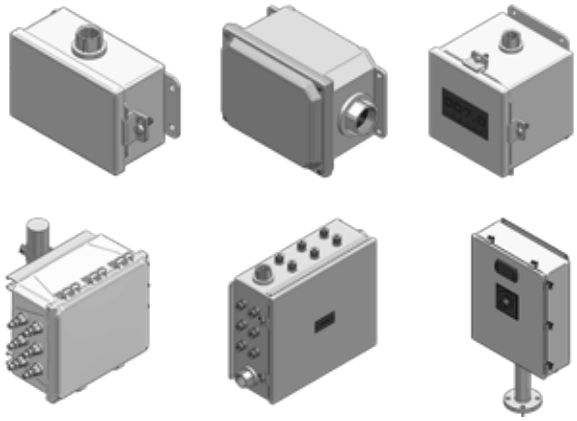
6PB	K	6	J	M

STYLE D

STYLE E

CUSTOM ENCLOSURE ASSEMBLIES





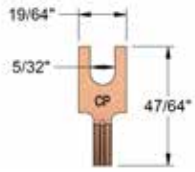
Custom enclosures are available. JMS will generate a drawing for your assembly including transmitters or compensated terminal strips. Contact JMS Southeast, Inc. for your custom design.

SPADE LUGS

Spade lugs are offered in compensating alloys. Spade lugs accept 18 gauge wire or smaller for crimp connections. Each lug has stamped-in designation of thermocouple alloy type.

#1	DESCRIPTION
6SL	Spade lug

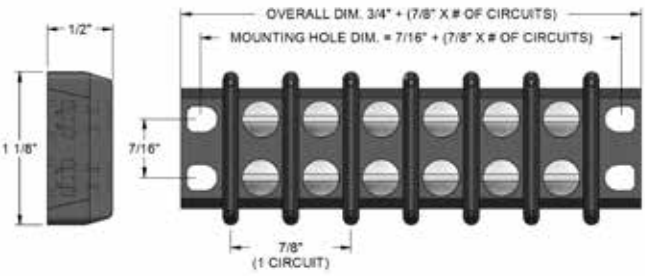
#2	THERMOCOUPLE ALLOY		
AL	Alumel	NN	Nisil
CH	Chromel	NP	Nicrosil
CO	Constantan	X	Other, specify
CP	Copper		
IR	Iron		



TERMINAL STRIPS

JMS terminal strips are manufactured of general purpose glass-filled Nylon and will withstand temperatures from 40°F to 400°F. Fasteners are nickel-plated brass. JMS recommends that thermocouple terminal lugs be ordered with this item.

#1	DESCRIPTION		
6TS	Terminal strip		
	#2	# OF CIRCUITS	
	#	Number of circuits (4 screws = 1 circuit)	
		#3	TYPE (Leave blank to omit terminals)
		____	J,T,K,E,N,R (use R for RTDs & PT T/Cs)



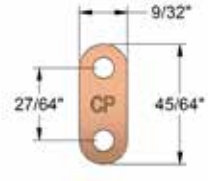
Note: There is a maximum of 10 circuits per strip.

TERMINAL LUGS

Terminal lugs are available in thermocouple compensating alloys. They are intended for use with JMS Southeast terminal strips. Each lug is marked with thermocouple alloy.

#1	DESCRIPTION
6TL	Terminal lug

#2	THERMOCOUPLE ALLOY		
AL	Alumel	NN	Nisil
CH	Chromel	NP	Nicrosil
CO	Constantan	X	Other, specify
CP	Copper		
IR	Iron		

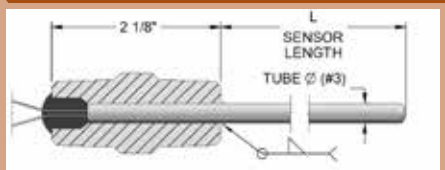


ATTACHING DEVICES

#1	DESCRIPTION
6F	Attaching device (fittings)

NEW! Double threaded compression fitting (Just add a "2" suffix)

#2	TYPE	
H I J K L	Stainless steel ferrule Teflon ferrule Lava ferrule Nylon ferrule Brass ferrule	COMPRESSION
W	Double threaded	WELDED
S A C B D E BD	Double threaded Double threaded w/ plug Double threaded stainless steel with oil seal Double threaded bayonet Double threaded bayonet with oil seal Adjustable stainless steel spring Single threaded bayonet	SPRING-LOADED

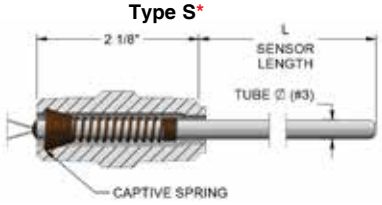


#3	OUTSIDE DIAMETER OF TUBE				
P A Y B	1/2" (.500") 3/8" (.375") 5/16" (.313") 1/4" (.250")	R C D	6mm (.236") 3/16" (.188") 1/8" (.125")	E F X	1/16" (.063") 1/25" (0.040") Other, specify

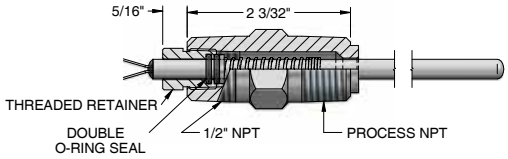
#4	PROCESS CONNECTION
L	1/8" NPT
M	1/4" NPT
P	1/2" NPT
X	Other, specify
Z	N/A

#5	FITTING MATERIAL
K	Stainless steel (Standard)
B	Brass
T	Teflon
X	Other, specify

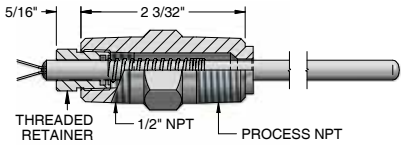
Type S*



Type C

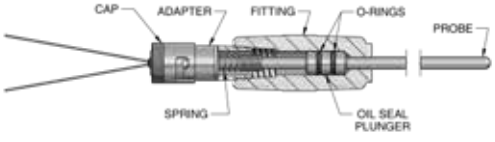


Type A



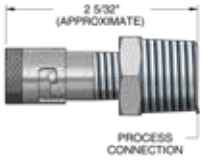
Type B**

Type D**



Type E

Type BD



*JMS springs for .250" O.D. sensors are made from a special material and undergo unique heat treating processes to maintain a loaded compression of at least 1 pound up to 1000° F. Standard stainless steel springs lose 100% of their compression at elevated temperatures.

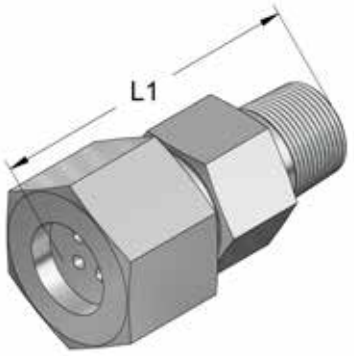
**Typically used with type 6R & 6P heads. (See page 6-1)

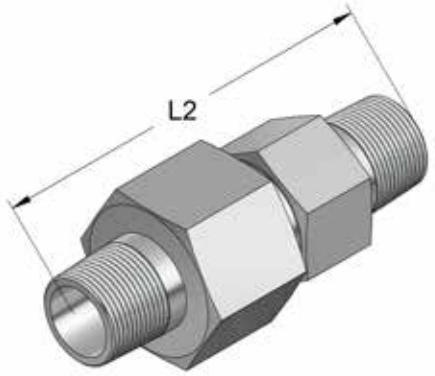
6F	H	B	M	K

MULTICONDUCTOR FEEDTHROUGHS

Model number includes:

L1 (CAP) OR L2 (CAP) +
TEFLON FERRULE (T) OR
STAINLESS STEEL FERRULE (S)





TO ORDER (Specify model number) Example: 6FT144L1T

SHEATH DIAMETER	MODEL NUMBER	DIAMETER OF PROBE	NUMBER OF PROBES	THREAD NPT	LENGTH		ACROSS FLATS	
					L1	L2	HOUSING	CAP
1/25"	6FT0403 (L1 OR L2) (T OR S)	.040"	3	1/4"	2"	2 1/2"	3/4"	7/8"
	6FT0405 (L1 OR L2) (T OR S)	.040"	5	1/4"	2"	2 1/2"	3/4"	7/8"
	6FT0406 (L1 OR L2) (T OR S)	.040"	6	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT0408 (L1 OR L2) (T OR S)	.040"	8	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT04010 (L1 OR L2) (T OR S)	.040"	10	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
	6FT04012 (L1 OR L2) (T OR S)	.040"	12	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
	6FT04016 (L1 OR L2) (T OR S)	.040"	16	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
1/16"	6FT1163 (L1 OR L2) (T OR S)	.062"	3	1/4"	2"	2 1/2"	3/4"	7/8"
	6FT1165 (L1 OR L2) (T OR S)	.062"	5	1/4"	2"	2 1/2"	3/4"	7/8"
	6FT1166 (L1 OR L2) (T OR S)	.062"	6	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT1168 (L1 OR L2) (T OR S)	.062"	8	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT11610 (L1 OR L2) (T OR S)	.062"	10	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
	6FT11612 (L1 OR L2) (T OR S)	.062"	12	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
	6FT11616 (L1 OR L2) (T OR S)	.062"	16	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
1/8"	6FT183 (L1 OR L2) (T OR S)	.125"	3	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT184 (L1 OR L2) (T OR S)	.125"	4	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT186 (L1 OR L2) (T OR S)	.125"	6	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
	6FT188 (L1 OR L2) (T OR S)	.125"	8	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
3/16"	6FT3163 (L1 OR L2) (T OR S)	.188"	3	1/2"	2 5/8"	3 3/8"	1 1/8"	1 3/8"
	6FT3165 (L1 OR L2) (T OR S)	.188"	5	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"
1/4"	6FT143 (L1 OR L2) (T OR S)	.250"	3	3/4"	2 13/16"	3 1/2"	1 1/4"	1 1/2"

Many other size and style options available!

Call JMS for more information or visit JMS-SE.com

THERMOCOUPLE AND RTD WIRE

NEW WEBSITE & ONLINE CONFIGURATOR!
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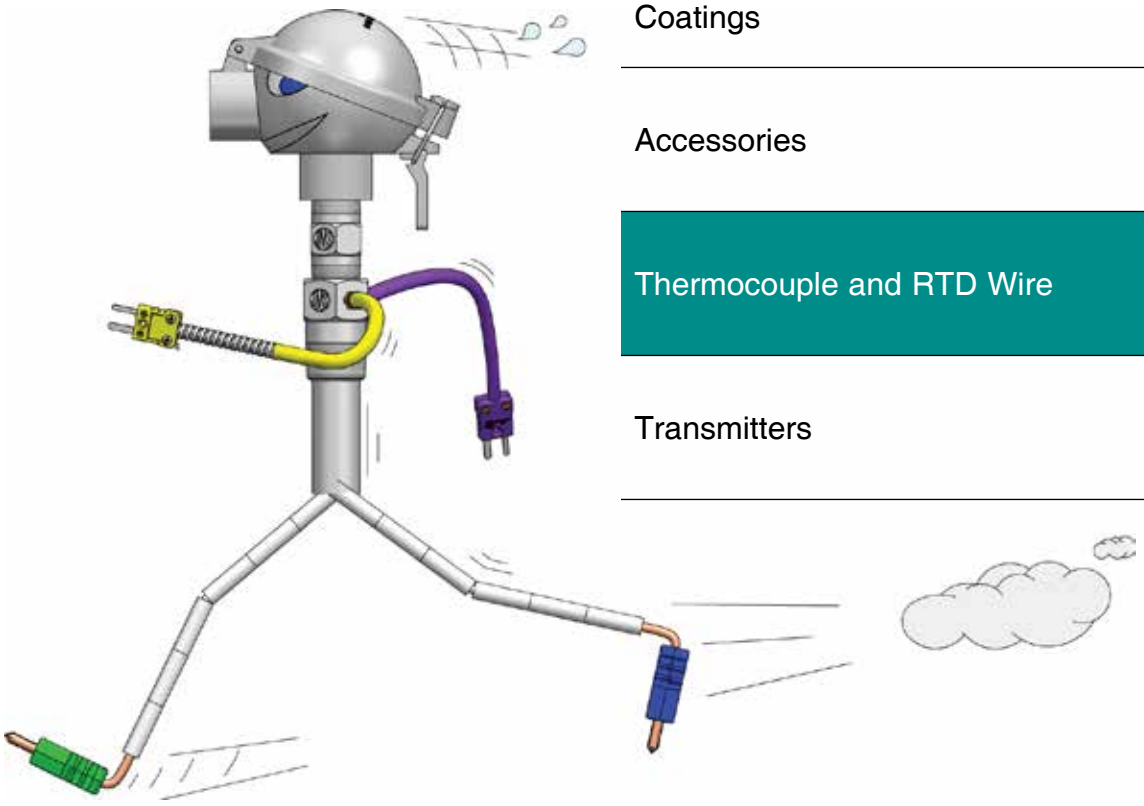
Swifty Sensor



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.

THERMOCOUPLE WIRE

#1	DESCRIPTION [7-5 through 7-17]
7	Thermocouple wire (measured in feet)

#2	TYPE		
EXTENSION GRADE [10]	THERMOCOUPLE GRADE [9]	TYPE	
JX	J	Iron/Constantan	
KX	K	Chromel/Alumel	
TX	T	Copper/Constantan	
EX	E	Chromel/Constantan	
NX	N	Nicrosil/Nisil	
RX	--	Copper/#11 Alloy	
SX	--	Copper/#11 Alloy	
BX	–	PCLW 630/Copper (special order only)	
2X	–	Copper/Copper	
CX	–	A405/A426	

Note: For special limits of error thermocouple wire, use a double calibration symbol. (Example: JJ for Type J special limits). Polyvinyl Chloride (PVC) wire and type R,S, B, and C fiberglass wire are ordinarily manufactured in extension grade. Kapton, Nylon, Teflon, fiberglass braid, Refrasil, and Nextel are ordinarily manufactured in thermocouple grade.

} It is common practice to use plain Copper wire for type "B" extension. Use 2X from this selection or 2 conductor RTD wire. (Ex. 7RTT2242N)

Extension Grade Only

#3	INSULATION [7-5] [7-6]	Temperature Range (°C)			Temperature Range (°C)
PP*	Polyvinyl Chloride(PVC)	-29 to 105	GG*	Fiberglass braid	25 - 482
PC	Polyvinyl Chloride(PVC) rip cord	-29 to 105	GS*	Fiberglass braid with SS overbraid	25 - 482
PA*	Polyvinyl Chloride(PVC) w/ twisted conductors Aluminum Mylar shield & drain wire	-29 to 80	HG*	High temperature fiberglass braid	25 - 705
			HS*	High temperature fiberglass braid with SS overbraid	25 - 705
KK*	Kapton	-200 to 288			
NN	Nylon	-200 to 177	RR	Refrasil	25 - 871
TF*	Fused Teflon	-200 to 260	SI	Siloflex	25 - 982
TT*	Extruded Teflon	-200 to 200	NE*	Nextel - Heavy weave (for light weave, use X and specify lower weave #)	25 - 1204
HT	Hi-temp Teflon	-200 to 285			
			X	Other, specify	

*Standard stock items in 20 AWG. Other insulation and sizes available.

#4	WIRE SIZE		
16	16 AWG	28	28 AWG
20	20 AWG (Standard)	30	30 AWG
24	24 AWG	X	Other, specify

#5	WIRE CONSTRUCTION
1	Solid (Standard)
2	Stranded

7	J	TT	20	1

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

NON-INSULATED SINGLE CONDUCTOR THERMOCOUPLE WIRE

#1	DESCRIPTION [7-11]
7N	Non-Insulated thermocouple wire

#2	TYPE				
JP	Iron	NN	Nisil	BP*	Platinum 30% Rhodium
JN	Constantan	TP	Copper	BN*	Platinum 6% Rhodium
KP	Chromel	TN	Constantan	CP*	Tungsten 5% Rhenium
KN	Alumel	SP*	Platinum 10% Rhodium	CN*	Tungsten 26% Rhenium
EP	Chromel	SN*	Platinum	AP*	Tungsten 5% Rhenium
EN	Constantan	RP*	Platinum 13% Rhodium	AN*	Tungsten 20% Rhenium
NP	Nicrosil	RN*	Platinum		

*Unit of Measure = inches

#3	WIRE SIZE			
8	8 AWG	24	24 AWG	(JMS standard for CP, CN, SP, SN, RP, RN, BP, & BN)
14	14 AWG	26	26 AWG	
16	16 AWG	28	28 AWG	
20	20 AWG	30	30 AWG	
		X	Other, specify	

Note: See www.JMS-SE.com for weight per unit of measure

MULTI-CONDUCTOR EXTENSION CABLE

Each conductor is insulated with Polyvinyl Chloride (PVC) or Teflon. An aluminum backed Mylar™ tape serves as an electrostatic shield. A solid 20 gauge tinned-copper drain wire is over the bundle in direct contact with the aluminum/mylar shield, thus minimizing any stray EMFs. Conductors are color coded and numbered for identification. All conductors are insulated with an outer jacket of polyvinyl chloride or Teflon insulation approximately .0245" thick. Multipair extension cable can be manufactured with various quantities of pairs and insulation types. Contact JMS Southeast sales office for any requirements you may have.

#1	DESCRIPTION [7-5 through 7-17]
7M	Multi-conductor extension cable

#2	TYPE	Unit of Measure = Feet
J	Iron/Constantan	
K	Chromel/Alumel	
T	Copper/Constantan	
E	Chromel/Constantan	
R	Copper/#11 Alloy	
S	Copper/#11 Alloy	
B	PCLW 630/Copper	
2	2 wire RTD (commonly used for type B thermocouples)	
3	3 wire RTD	
4	4 wire RTD	
X	Other, specify	

Note: Standard thermocouple conductors are solid 20 AWG, standard RTD conductors are stranded 24 AWG.

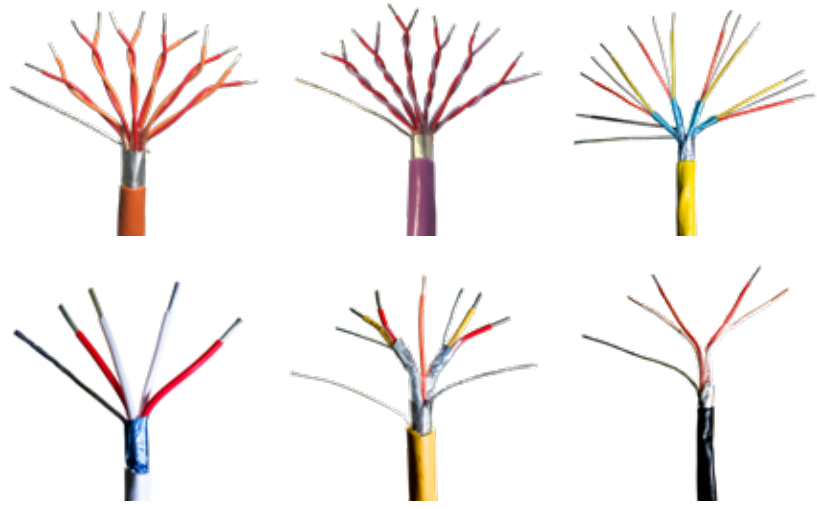
#3	# OF PAIRS	NOMINAL OD	EST. SHIPPING WT. LBS. PER 1000 FEET
2	2	.370	53
4	4	.390	80
8	8	.480	131
12	12	.580	198
16	16	.650	245
20	20	.680	285
24	24	.770	338
X	Other, specify		

Note: Add an "S" suffix for stranded conductors

#4	INSULATION
P	Polyvinyl Chloride(PVC) (Standard)
T	Extruded Teflon
X	Other, specify

#5	ALUMINUM MYLAR SHIELD
I	Individual pair and overall
O	Overall only
Z	No shield/not applicable

7M	J	4	P	I



RTD WIRE

#1	DESCRIPTION
7R	RTD wire

#2	INSULATION *Conductors are color coded per ASTM E1137 & IEC 60751
PP	Polyvinyl Chloride(PVC)
GG	Fiberglass braid
GS	Fiberglass braid with stainless steel overbraid (available in 3, 4 or 6 conductor, 24 AWG)
KK	Kapton insulated
TT*	Extruded Teflon singles, Teflon wrap overall (Standard)
TS*	Extruded Teflon singles, Teflon wrap overall, with stainless steel overbraid
X	Other, specify

#3	NUMBER OF CONDUCTORS
2	Two conductors
3	Three conductors
4	Four conductors
X	Other, specify

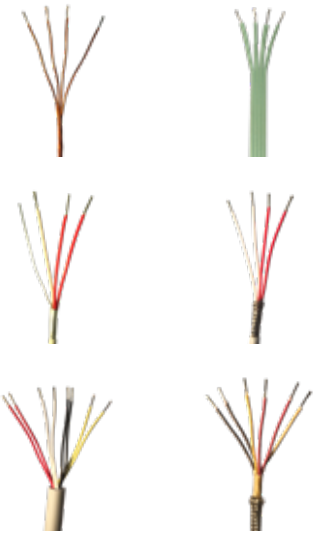
#4	WIRE SIZE
16	16 AWG
20	20 AWG
24	24 AWG (Standard)
28	28 AWG
30	30 AWG
X	Other, specify

#5	WIRE CONSTRUCTION
1	Solid
2	Stranded (Standard)

#6	SHIELD
N	No shield/not applicable
A	Aluminum Mylar shield and drain

7R	TT	3	24	2	N

Special color coding available by request.



RTD WIRING CONFIGURATION AND COLOR CODE

(Reference ASTM 1137 and IEC 60751)

	2-wire-configuration	3-wire-configuration	4-wire-configuration
One resistor	RED WHITE	RED RED WHITE	RED RED WHITE WHITE
Two resistor	RED WHITE BLACK (GREY) YELLOW	RED RED WHITE BLACK (GREY) BLACK (GREY) YELLOW	RED RED WHITE WHITE BLACK (GREY) BLACK (GREY) YELLOW YELLOW

TRANSMITTERS

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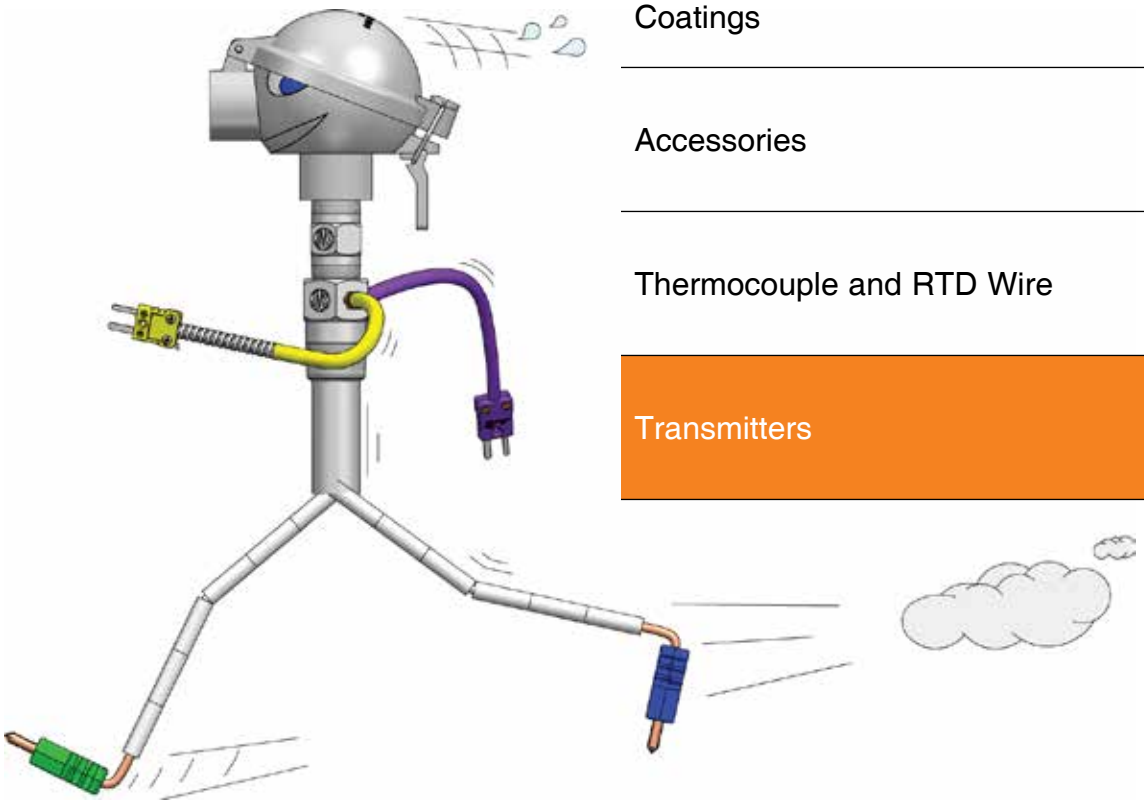
Swifty Sensor



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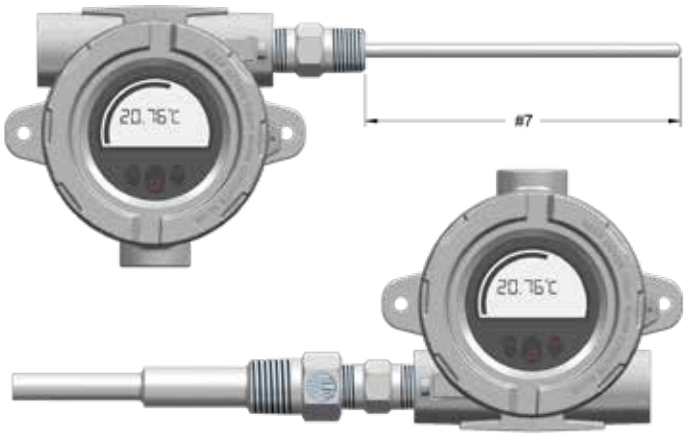
INDICATING TRANSMITTER ASSEMBLIES

JMS offers transmitters of all makes & models (JMS, Rosemount, Honeywell, ABB, Siemens, E+H & More!). Here are just a few of the transmitters JMS has to offer:



SERIES 8PA

(See section 5 for thermowell ordering specifications)

The 88 series specified with these ordering symbols includes a single element temperature sensor assembly with a JMS indicating transmitter that is isolated, intrinsically safe, Hart Programmable and Ex rated to FM, CSA, IECEx, ATEX standards and more, or another transmitter of your choosing. Sensors have a .250" diameter and stainless steel jacket. Thermocouples have ungrounded junctions. RTD sensors are rated up to 662°F (350°C) and thermocouples are rated to as high as 899°C (1650°F) depending on thermocouple type. The most popular assembly features a spring-loaded fitting with a thermowell as shown above.

#1	DESCRIPTION [18]		
88	Transmitter (Includes sensor, housing, and digital indicator).		
#2	TYPE OF TRANSMITTER [8-18]		
PA	JMS Transmitter, Aluminum Housing	GA	ABB TTH300 (FM certified) w/ indicator & AL Ex Proof windowed housing
PS	JMS Transmitter, Stainless Steel Housing	GS	ABB TTH300 (FM certified) w/ indicator & SS Ex Proof windowed housing
X	Non-JMS Transmitter (state make and model)		

#3	SENSOR TYPE (SINGLE INPUT) 3= 3 WIRE 100 Ω RTD 4= 4 WIRE 100 Ω RTD
___	J, T , K, E, S, R, B, N, C, 3, 4, X (Other, specify), Z (N/A, without sensor - transmitter & housing only)

#4	TEMPERATURE RANGE
_ to _°C	List desired temperature span
_ to _°F	List desired temperature span
Z	N/A
X	Other, specify

#5	SIGNAL OUTPUT		
4	HART 4 to 20 mA (Standard)	1	1 to 5 VDC
F	Fieldbus	X	Other, specify
P	Profibus		

#6	FITTING TYPE [6-13] *See page 1-3 for spring loaded union-nipple options		
S	Spring-loaded 1/2"x1/2" NPT	Z	N/A
W	Welded 1/2"x1/2" NPT	X*	Other, specify

#7	IMMERSION LENGTH IN INCHES (L)		
___"	State length in inches	Z	N/A transmitter & housing only

#8	OPTIONS Leave blank if options not required
B	Pipe mount bracket stainless steel - suitable for 2" pipe (8PY2)
C	Calibrate Transmitter and Calibrate Sensor at 3 points

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

Note: Many other transmitter options are available.
(see pages 1-1 & 1-2 for TC)
(see pages 3-1 & 3-2 for RTD)
(see page 8-3 for stand alone transmitters)

TRANSMITTER COMPARISON

	JMS	EMERSON ROSEMOUNT	
	 8PA & 8PS	 644	 3144P
Dimensions	Ø 110mm	Ø 90,9mm	Ø 112mm
Dimensions (W x H x D)	110 X 145 X 125,5 mm	108 X 102,2 X 102,6 mm	112 X 112 X 132 mm
Dot matrix display 64 X 96 pixels	Yes	No (14 digit, 2 line)	No (5 digit LCD display)
Scrolling text message / advanced diagnostic	Yes	No	Yes
HART revision	5 & 7	5	7
Temperature range / silicone O-ring	-40…+85°C	-40…+85°C (Buna-N O-ring)	
Protection degree	IP54 / IP66 / 68	IP66 /IP68/NEMA Type 4X	
HART 5 polling address	Up to 15 transmitters	Up to 15 transmitters	
HART 7 polling address	Up to 63 transmitters	Up to 63 transmitters	
Display Diameter	60 mm diameter		
0, 90, 180 & 270 degree position adjustment	✅ Yes	No	
Radial bar graph	✅ Yes	Yes	
"Trend" arrow indicates	✅ Yes	No	
Selectable white/red backlight.	✅ Yes	No	
Optical pushbuttons, Guided menu structure	✅ Yes	No	
INPUT			
RTD	Pt50, Pt100, Pt200, Pt500, Pt1000	Pt50, Pt100, Pt200, Pt500, Pt1000	
Ni	Ni50, Ni100, Ni120,Ni1000	Ni120	
TC	B, E, J, K, N, R, S, T, U, W3, W5	✅ B, E, J, K, L, N, R, S, T, U, W5, L(Gost)	
LinR	0…5 kOhm	0.....2 kOhm	
mV	-800…800 mV	-10....100 mV	
Special RTD / TC custom curve	✅ Yes	No	
Accuracy	✅ ± <0,05 % of selected range	± <0,1 % of selected range ± <0,05 % of selected range (enhanced), ± <0,1 % of selected range	
Output:	4…20mA	4...20mA	
NE 43 (sensor error / out of range)	Yes	Yes	
Response Time	✅ 440 ms	500 ms	
Damping	1s…60s programmable	1s... 60 s programmable	
Configuration	✅ LOI Software and HART modem	Depending on display type (No /Yes) No, No No	
Ex ia IS	10 (12 with backlight)....30 VDC	12....42,4 VDC	
Other	10 (12 with backlight)..... 35VDC		
ISOLATION			
Input to output (test/operation)	1.5 kV AC / 50 VAC	600V RMS / ? / 707 V peak / ?	
EN 61326-1	<+/- 0,1 % of span	Yes, %?	
Namur NE21 A criteria burst	<+/- 1 % of span	Yes, %?	
Warranty	✅ 5 years	3/5 years	
APPROVALS			
ATEX, IECEx, FM, CSA	Yes	By option only, Yes	
EAC TR-CU 020/2011	EN 61326-1	By option only, Yes	
EAC Ex TR-CU 012/2011 , INMETRO, NEPSI, DNV Marine, GL	Yes	By option only, Yes	
SIL	FMEDA report	By option only, IEC 61508 certified	

All Transmitter Options Compared Available Directly From JMS!!

TRANSMITTERS

#1	DESCRIPTION [8-14 through 8-17]
8	Transmitter (Add "R" for DIN rail style for transmitter)

#2	TYPE OF TRANSMITTER	I/O ISOLATION	SUPPLY VOLTAGE
H	Standard	1000 VAC	12 to 35 VDC
I	Hart Protocol	2500 VAC	11 to 30 VDC
E	Intrinsically safe	2500 VAC	11 to 30 VDC
D	Intrinsically safe/Hart Protocol	2500 VAC	11 to 30 VDC
N	Non-isolated		
X	Other, specify		

#3	INPUT		
J	Iron/Constantan thermocouple	N	Nicrosil/Nisil thermocouple
T	Copper/Constantan thermocouple	C	Tungsten 5% Rhenium/Tungsten 26% Rhenium T/C
K	Chromel/Alumel thermocouple	2	100Ω, Platinum, a=0.00385, RTD, 2 Wire
E	Chromel/Constantan thermocouple	3	100Ω, Platinum, a=0.00385, RTD, 3 Wire
S	Platinum 10% Rhodium/Pure Platinum thermocouple	4	100Ω, Platinum, a=0.00385, RTD, 4 Wire
R	Platinum 13% Rhodium/Pure Platinum thermocouple	X	Other, specify
B	Platinum 6% Rhodium/Platinum 30% Rhodium T/C	Z	N/A

#4	TEMPERATURE RANGE		
_ to _°C	List desired temperature span	X	Other, specify
_ to _°F	List desired temperature span	Z	N/A (customer to span)

Note: DIN rail style(8R) available for all isolated transmitter types.

#5	OUTPUT		
1	1 to 5 VDC	F	Fieldbus
4	4 to 20 mA	X	Other, specify
P	Profibus		

#6	SOFTWARE & CABLES INCLUDED?
A	Yes
Z*	No

*Standard for I, E, & D type transmitters.

#7	PLUG IN INDICATION		
P*	Yes	Z	No

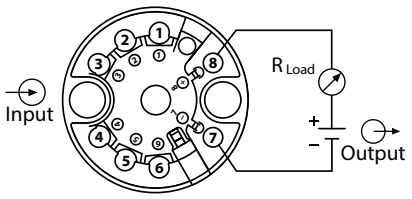
* Only available with "puck" style models I, E, or D in selection #2.

#8	OPTIONS & HOUSINGS (Leave blank if none)
L	Aluminum with hinged cover NEMA 4 (6L)
I	Aluminum, NEMA 4X, FM, CSA, IP66 (6IA)
M	Aluminum with screw cover and chain NEMA 4 (6M)
C	Calibration at 3 points

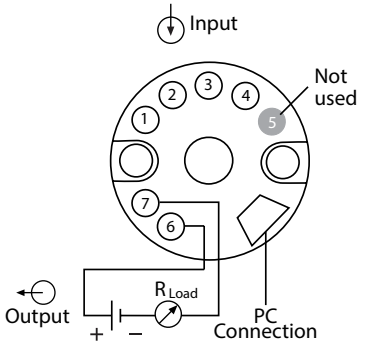
See Heads section on page 1-7 for additional options

TRANSMITTER WIRING DIAGRAMS

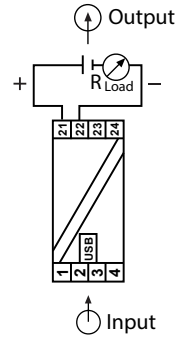
8I & 8E & 8D



8N & 8H



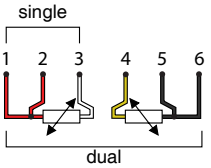
8R



Notes:

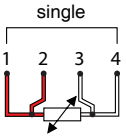
- Dual RTD input is not available for all transmitters.
- Some terminals will not be used as shown.
- Contact JMS for additional wiring diagrams not shown.

RTD 3-WIRE CONNECTION

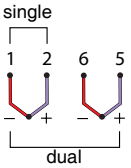


(Dual input not available for 8H, 8N or 8R)

RTD 4-WIRE CONNECTION



THERMOCOUPLE



(Dual input not available for 8H, 8N or 8R)

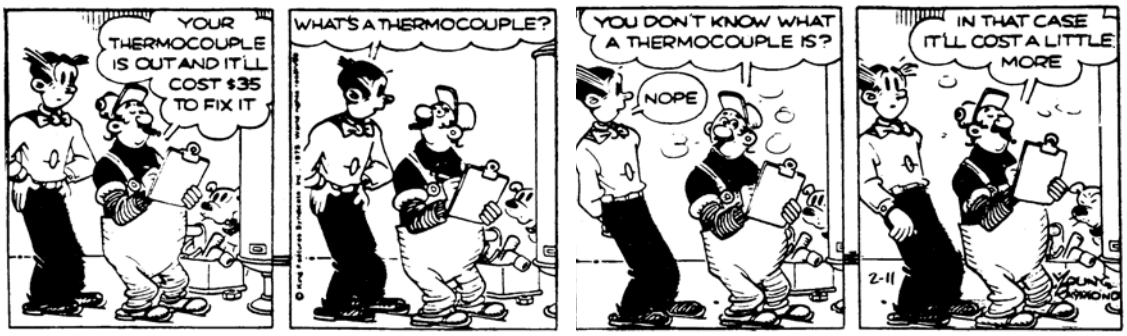
JMS NOW OFFERING TURNAROUND SERVICES

You pull or point us to them. We Check, Spec and Req(uisition) them.

Many plants go into a turnaround and have to pull temperature sensors that may not have been replaced in years. What is in the field may or may not meet the latest standards. The data sheet may offer little more information than "type K thermocouple with steel thermowell". Wire colors may have long ago faded or been covered with gunk and gathering the details necessary to order a matching sensor in a timely manner that is going to have you up and running before the deadline arrives can be challenging to a crew that is already pressed for time.

In such cases JMS has sent personnel on site to "check, spec and req" the temperature sensors and thermowells pulled from the field. This means that a JMS temperature expert examines the sensor and thermowell you pull out, takes pictures, and compares it to the latest ASME and ASTM requirements. In other cases it means we climb towers and perform on site PMI testing, wall thickness testing, wake frequency calculations and create a JMS part number so that the perfect part can be shipped to your site on an expedited basis. A drawing is generated for your records so that the next time you turn around that item you have no question as to what has been installed -- you can order by drawing number and have every possible detail you need to make working with that sensor as easy as pie.

Could **JMS Turnaround Services** be the perfect cure for a common turnaround headache?
Call JMS today at **800-873-1835** to learn more.



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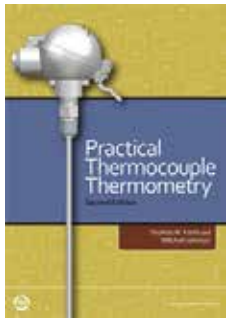

JMS Southeast Inc. is producing its 30th annual course on Industrial Temperature Measurement. Hundreds of Technicians, Engineers, Designers, Salesmen, and Integrators have attended and complimented this one day course. It is designed to familiarize the attendee with the basics and details of temperature measurement as practiced in industry today. It covers calibrations, accuracy, tolerances, standards, specifications, and response times. Through a proper circuit and application analysis, you will be able to troubleshoot any problem with either contact and/or non-contact sensors. The course is based on the books "Industrial Temperature Measurement" written by T.W. Kerlin, Ph.D. and R. L. Shepard who were the original instructors of this course and "Practical Thermocouple Thermometry (2nd Ed.)" by T.W. Kerlin, Ph.D. and Mitchell Johnson.

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