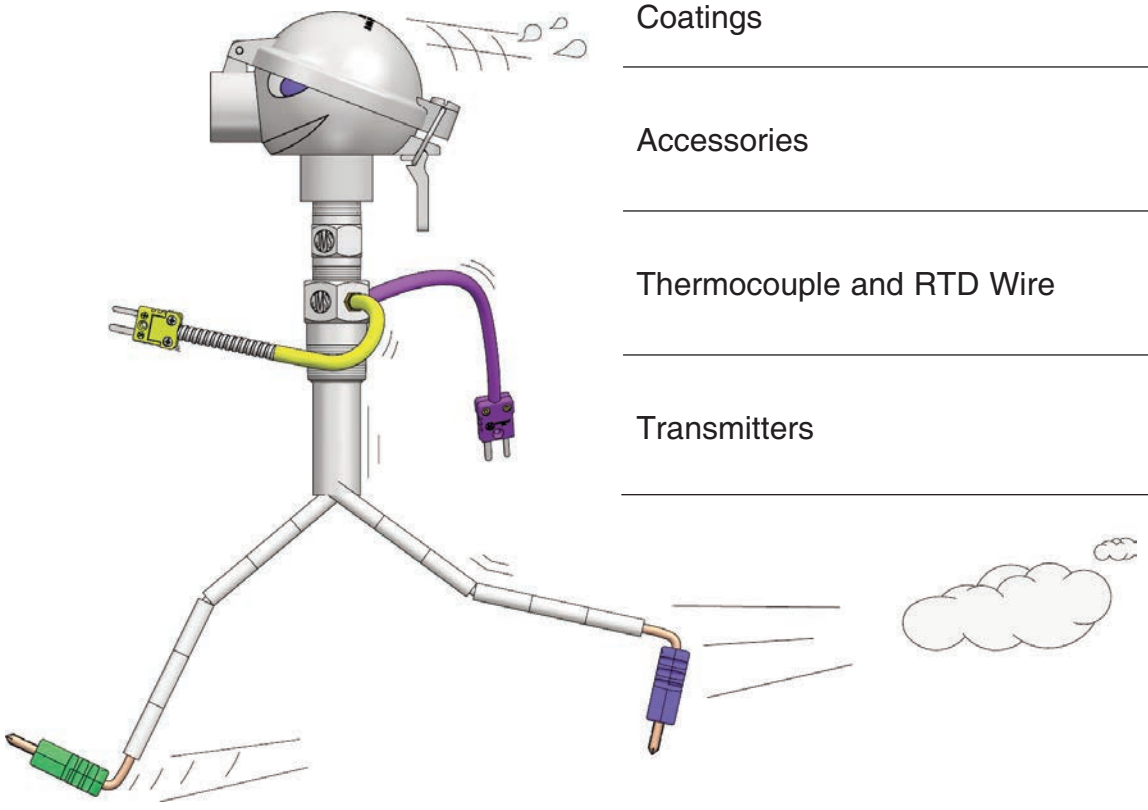
SANITARY AND SPECIALTY SENSORS

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.

3-A APPROVED SANITARY SENSORS

CIP (Clean-In-Place) line of 3-A certified sanitary thermocouples and RTDs from JMS 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 approved 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.

Units may be supplied utilizing sanitary caps from Alloy Products, Cherry-Burrell or Lapish Tri-Clover, or spring loaded fittings in sanitary thermowells. Each design is 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 page 4-5).

www.3-A.org

#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 ± 0.3°C	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		

Resistor accuracies at 0˚C. Add 3 before selection for 3 wire RTD

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

#4	OUTSIDE DIAMETER (OD)		
A	3/8”	E	1/16”
B	1/4”	X	Other, specify
C	3/16”	Z	NA
D	1/8”		

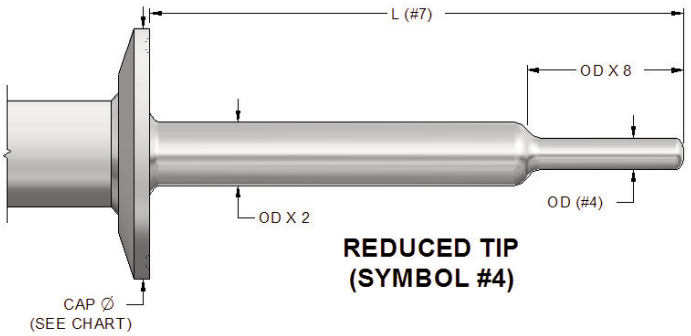
Note: For a reduced tip, add R before selection. The shank OD will equal twice the tip OD. See illustration below. (Example RB steps down from 1/2" to 1/4" at the tip)

#5	TUBING MATERIAL
K	316 stainless steel
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: RTD’s are always ungrounded.

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

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



REDUCED TIP (SYMBOL #4)

4S	S	1	B	K	U	12”

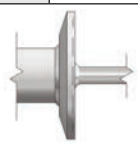
TRI-CLOVER (16 AMP) CAP SIZE CHART

CAP SIZE (#9)	CAP Ø
1/2 X 3/4	1"
1	2"
1 1/2	2"
2	2 17/32"
2 1/2	3 1/16"
3	3 9/16"
4	4 11/16"
6	6 9/16"
8	8 9/16"
10	10 9/16"
12	12 9/16"

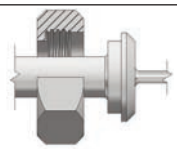
3-A APPROVED SANITARY SENSORS

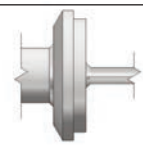
#8	SANITARY CAP OPTIONS [SEE BELOW] **Note:** Standard sanitary thermowells can be found on page 4-4 and 4-5.		
T	Tri-Clover (16 AMP)	P	PV Gasket (16APV) without 13-H nut
B***	Bevel seat (16 A) without 13-H nut	PH	PV Gasket with 13-H nut
BH***	Bevel seat with 13-H nut	A***	3A4 Adapter
I**	I Clamp (16AI-14I)	X*	Other, specify
S**	1/2" x 1/2" Spring-loaded fitting for assembly with sanitary thermowell.		

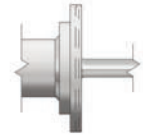
* When specifying X, ensure that it meets 3-A standard.
** Not 3-A authorized.
*** Must be cleaned manually.

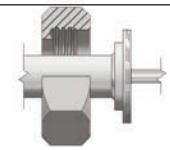

T Tri-Clover (16 AMP)


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 Triclover Size Chart on page 4-1
05	1/2 or 3/4	60	6	**Note:** 05 Cap sizes (1/2 x 3/4) will use 1/4" NPT nipple. Not available for Bevel seat or I-Clamp
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	


A 3A4 Adapter

#10	FINISH		
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. °F		
Z	No lead wire (Teflon will insulate the wires in the head)	392°F	X	Other, specify
1__"	Fiberglass braid	662°F		
3__"	Teflon	392°F		
7__"	Teflon wire with white Teflon covered flex armor	392°F		

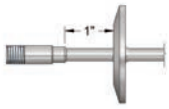
#12	TRANSITION TYPE		
H	Heat shrink	X	Other, specify
S	Size on size	Z	No transition
R	1/4" OD		
T	3/8" OD (Standard w/out head)		
N	Nipple (Standard w/ head)		
B	7/16" OD (Standard for high humidity)		

Note: For extra high humidity/moisture/ washdown environments ≤ 500ºF, please add a 2 suffix to your selection. Example: T2

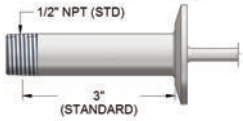
Note: For high temperature at the transition area (>500°F) please add a 3 suffix to your selection. Example: T3

"Z" No Transition

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



"N" Threaded Nipple



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

* See page 4-16 for wiring diagram.

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

#14	OPTIONS—USE ONLY IF APPLICABLE [INTRODUCTION]		
1*	Stainless steel tag	6**	Premium calibration report Corrections data will be provided for all temperatures within the range.
2*	Plastic tag		
3*	Paper tag		
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
		M	MTR (wetted parts)

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

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.

T	15	H	3-36"	T	WP

3-A CERTIFIED SANITARY 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	.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)

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

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

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

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

#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)
D	Dye penetrant testing
P	Internal hydrostatic pressure test
U	X-Ray examination
W	Premium SwiftyCalc, ASME 19.3TW-2010 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

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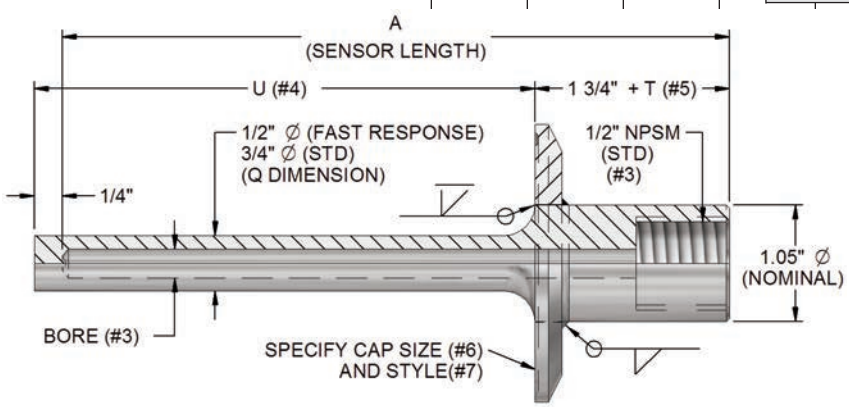


Note:
-Matching sensor length for sensors with a spring-loaded fitting
A = U length(#4) + 1 1/2” + T length(#5)

-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

3-A 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 is NPSM. See drawing below.
C	3/16” Ø (fits 1/8” Ø sensor)
B	1/4” Ø (fits 3/16” Ø sensor)
Y	5/16” Ø (fits 1/4” Ø sensor)
X	Other, specify Add “N” for FNPT (Example: BN=FNPT)

Note: Standard (sensor) connections are 1/4" FNPSM (female straight) to match 1/4" MNPT (male tapered)

#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

#5	CAP SIZE							
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

See Triclover Size Chart on page 4-1

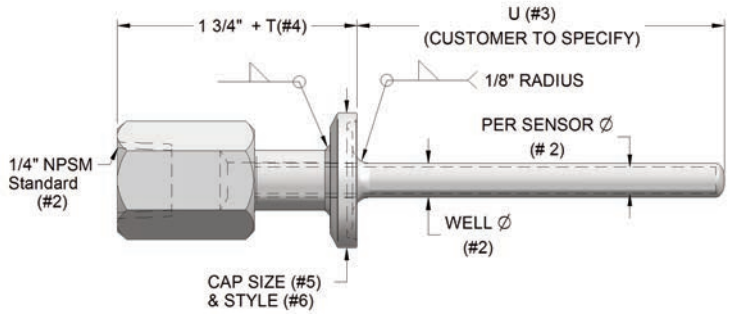
#6	CAP STYLE [see 4-2, selection #8 for illustrations]				
T	Tri-Clover (16 AMP)	P	PV Gasket (16APV) w/o 13-H nut	A***	3A4 Adapter
B***	Bevel seat w/o 13Hnut	PH	PV Gasket (16APV) w/ 13-H nut	X*	Other,specify
BH***	Bevel seat w/ 13H nut				
I**	I Clamp (16AI-14I)				

#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)
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



Note:
-Matching sensor length for sensors with a spring-loaded fitting
= U length(#3) + 1 5/8” + T length(#4)

-Matching sensor length for sensors with a welded fitting
= U length(#3) + 1 1/8” + 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

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3-A CERTIFIED SANITARY WELD-IN THERMOWELLS

JMS Southeast, Inc. is proud to be a US manufacturer of a full line of sanitary RTDs, thermocouples and thermowells (3-A Authorization #1482).

JMS Southeast's 3-A certified weld-in thermowells are designed to be used with either sanitary 3-A certified probes* or non-certified probes.** Sanitary thermowells should be welded to a tank or a vat with a full 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.***

In addition to weld-in thermowells, JMS also offers a full line of 3-A certified sanitary cap thermowells. Illustrations of the most commonly selected cap styles can be found on page 4-4, row 7 of this catalog.

* For ordering and additional information, see pages 4-1 through 4-3 of this catalog.
** For thermocouples, please refer to section 1 of this catalog. For RTDs, please refer to section 3.
*** Other finishes available upon request to meet customer requirements.

www.3-A.org

#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 5-11 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

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

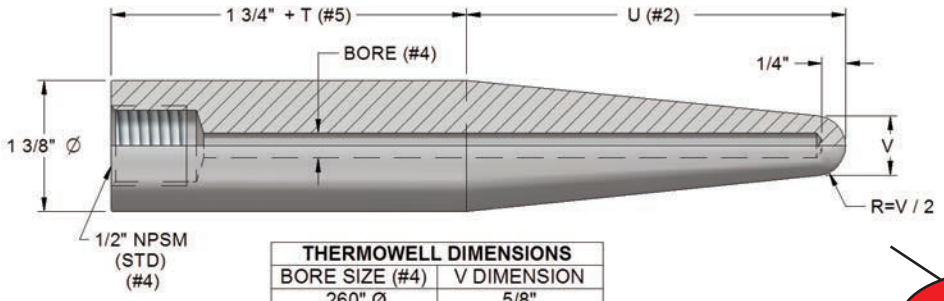
#4	BORE SIZE & SENSOR CONNECTION Standard is NPSM.					
2	.260" ID	3	.385" ID	X	Other, specify	Add "N" for FNPT (Example: 2N=FNPT)

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

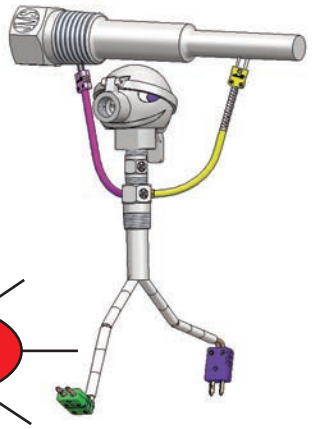
#6	TAGGING OPTIONS
1	Stamped on well (Standard)
X	Other
Z	N/A

#7	DOCUMENTATION & CERTIFICATIONS -- use all that apply (Example: "DU" requests dye penetrant test & X-Ray examination)		
M	Material Test Reports (MTRs)	S	Surface finish certificate
D	Dye penetrant testing	E	Certificate of electropolish
P	Internal hydrostatic pressure test	A	Certificate of No Animal Derived Material (ADM)
U	X-Ray examination	N	Certificate of no polishing compounds
W	Premium SwiftyCalc ASME 19.3TW-2010 calculation	O	Certificate of cleaned for Oxygen service

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!

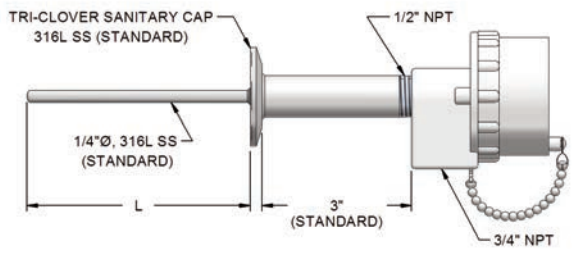
FREE Wake Frequency Calculations to ASME PTC 19.3 TW, ***SwiftyCalc!*** Visit JMS-SE.com to sign up today!
www.JMS-SE.com/SwiftyCalc

5C	10	H	2	Z	1	M

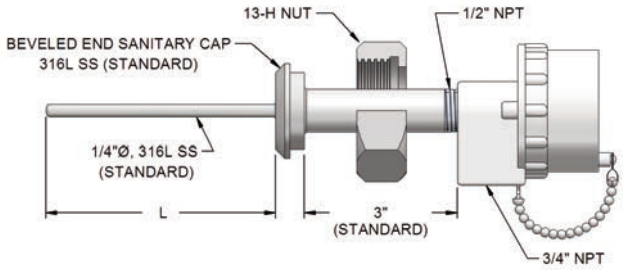
3-A APPROVED COMPLETE SENSORS

SANITARY CAP TYPICAL DESIGNS

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

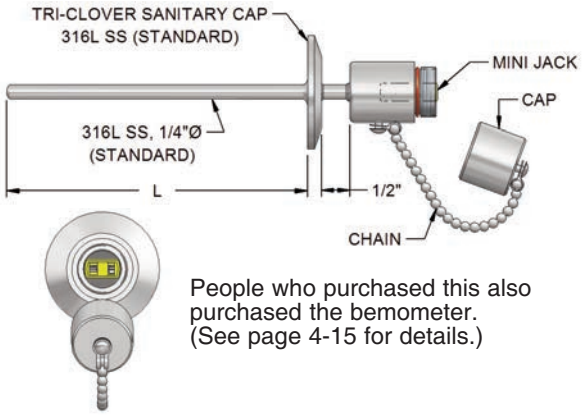


BEVEL SEAT WITH 13-H NUT (16 AMP) (CAP OPTION "BH")



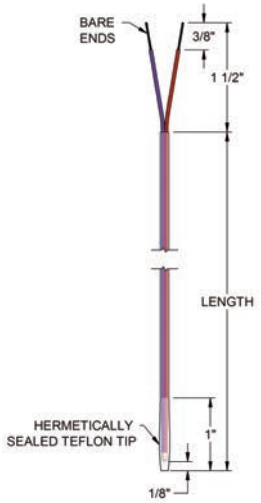
SPECIAL DESIGNS

SOCKET CAP COLD END TERMINATION (OPTION "SC")



People who purchased this also purchased the bemometer. (See page 4-15 for details.)

ULTRA HIGH ACCURACY TYPE T WIRE THERMOCOUPLE



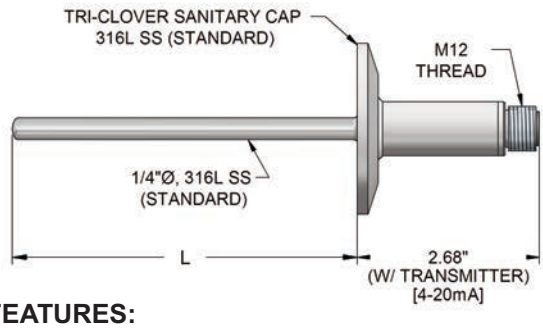
Moisture, rough handling and severe conditions all pose grave threats to the functionality of Type T thermocouple measurements - measurements which are a critical component of many high accuracy laboratory and pharmaceutical applications.

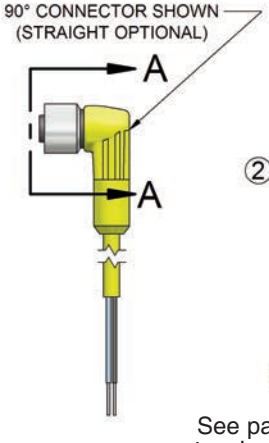
JMS presents its rugged, fast response, multi-strand Type T sensor. These sensors are manufactured from premium Type T thermocouple wire, which is accurate to ± 0.22˚C at 121˚C, and with hermetically sealed tips perfect for environments with high humidity. These sensors represent the cutting edge in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

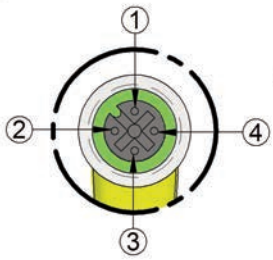
To order, simply specify JMS part #: DWG16238- followed by the length. Example: DWG16238-120 for an Ultra High Accuracy Type T sensor 120 inches in length.

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

TOOL FREE RTD TEMPERATURE MEASUREMENT

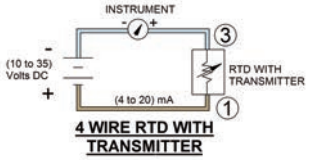


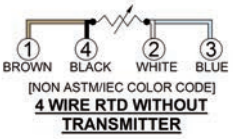


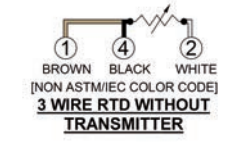


VIEW A-A
(M12 CONNECTOR)

See page 3-5 for extension assemblies.







FEATURES:

- PC programmable,
- NEMA 6P (IP67) rated with M12 connector.
- Ideal for most applications from -60 to 320°F
- Ambient temperature limits -40 to 185°F
- Quick-n-Clean M12 connection for easy replacement.
- Available in 3-A certified and standard industrial designs (see page 3-5)

Ideal for high moisture environments!

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
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

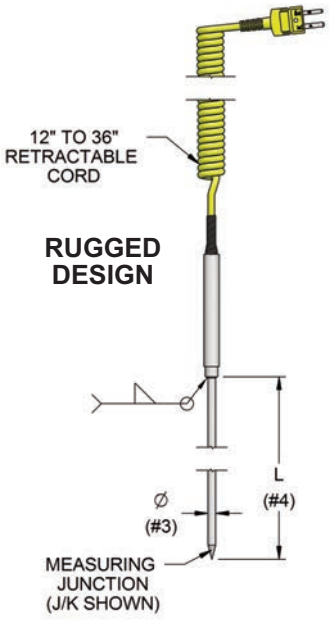
NOTE: Standard material is 316 stainless steel.

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

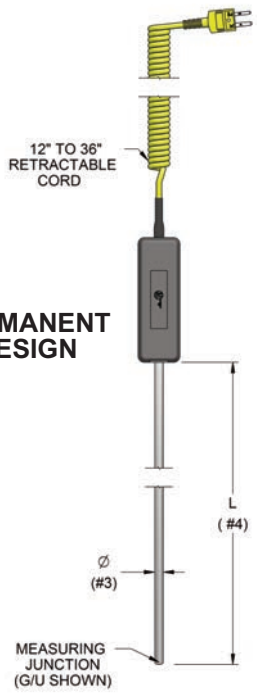
Note: See ordering symbols on page 1-1, row 6 for special junctions such as pointed tip and gas/air.

* Provide dimensions when selecting these options.

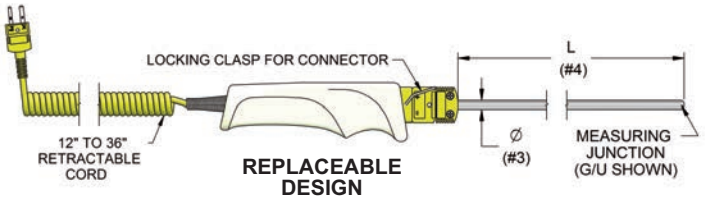
#6	HANDLE STYLE (See illustrations below and to the left)
H	Handle for replaceable probe
R	Permanent handle for non-replaceable probe
S	Rugged, stainless steel handle for non-replaceable probe
X	Other, specify
Z	N/A



#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.

4H	K	B	6"	G	H	S	B

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

B	1/4" (Standard)	F	1/25"
C	3/16"	X	Other, specify
D	1/8"	Z	N/A
E	1/16"		

#4 TUBE MATERIAL

A	Platinum - 10% Rhodium	R*	Molybdenum
B	Platinum - 20% Rhodium	S*	Tantalum
M	Inconel 600	T*	Titanium
X	Other, specify	RL*	Molybdenum-LX

*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

#5 THERMOCOUPLE JUNCTION

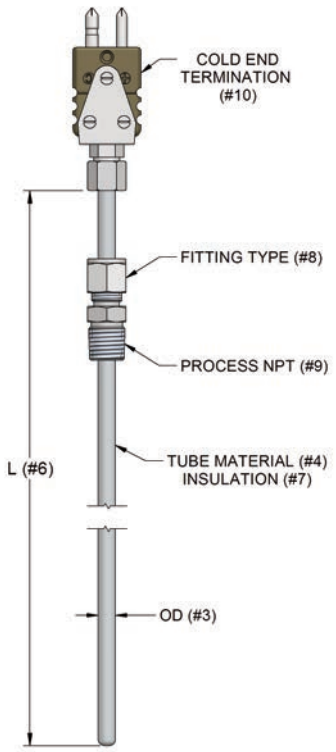
G	Grounded
U	Ungrounded (Standard) Required for Type C

#6 IMMERSION LENGTH

__"	Length in inches

#7 INSULATION

M	MgO (Magnesium Oxide)
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
G	Fixed SS to sheath
H	Compression fitting SS w/ SS ferrule
X	Other, specify

#9 PROCESS NPT

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

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

C	Standard temp plug
F	Hi temp std plug (Standard)
I	Explosion proof NEMA 4X head
L	Aluminum head w/ hinged cover
M	Aluminum head w/ screw cover & chain
N	Cast Iron head w/ screw cover
X	Other, specify

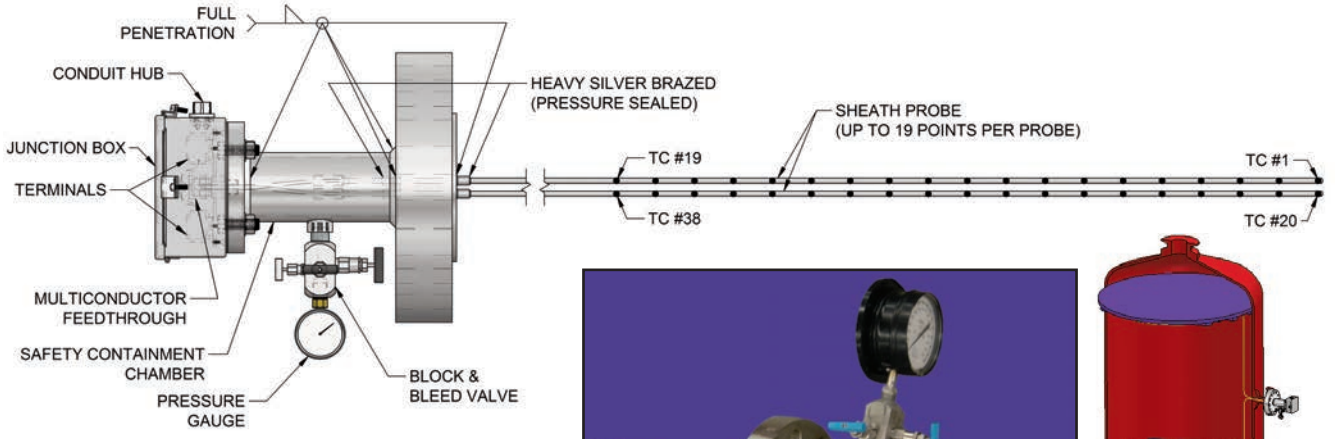
NOTE: For detailed specifications and ratings, see JMS-SE.com/headspecs

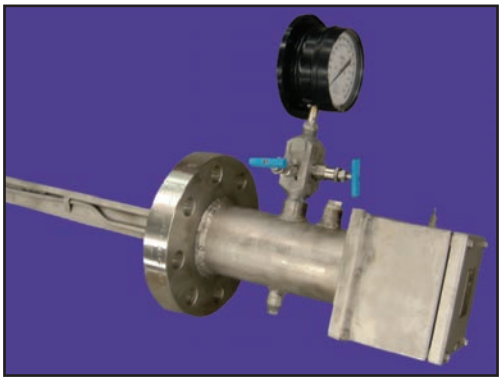
#11 TAGGING AND CALIBRATION USE ONLY IF APPLICABLE

___	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*

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

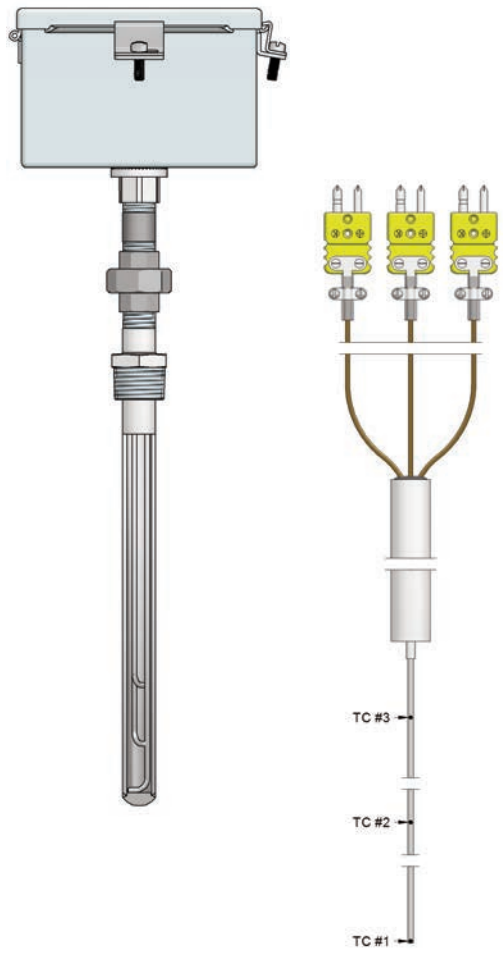
SAFETY BENEFITS

- *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.

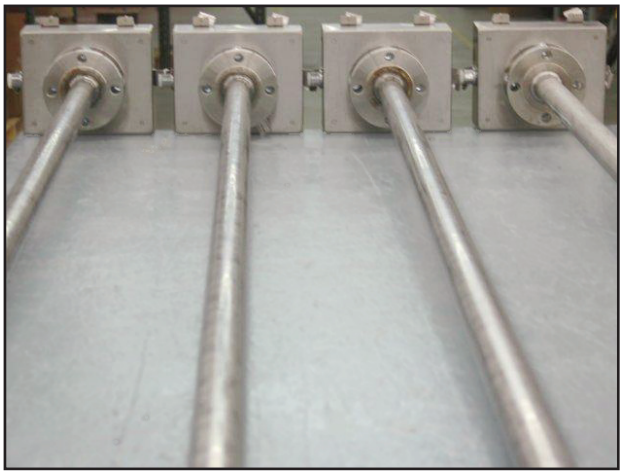


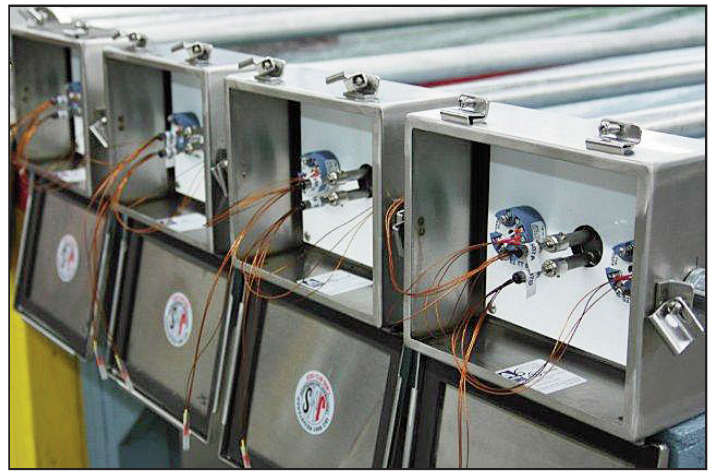
A multipoint sensor allows the measurement of a temperature profile across a large area. Thermocouples or RTDs are arranged with measuring junctions at various points along a pipe, allowing the measurement of various points from a complete assembly. Many elements can be spaced along a probe.

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



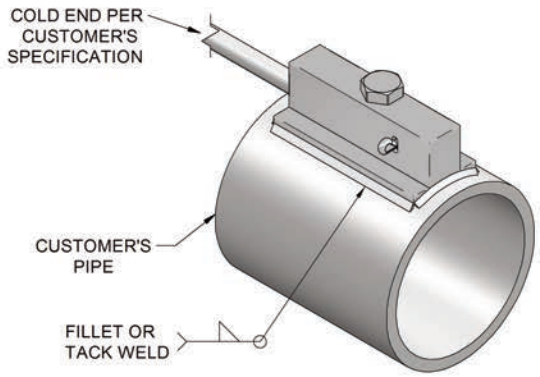


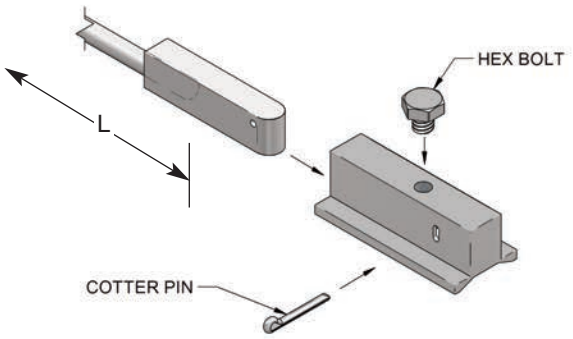
Averaging or discrete point measurement available upon request.

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*
- *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

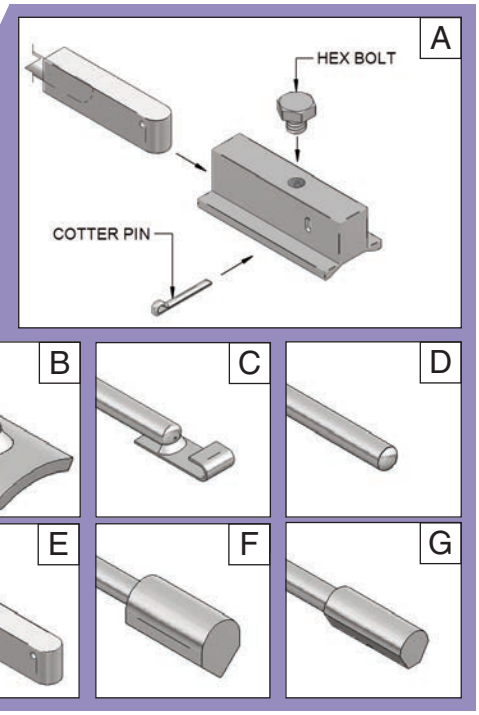
#2	SENSOR TYPE				
	THERMOCOUPLE		*RTD (class A, Pt100)*		
E	Type E	N	Type N	2	2-wire
J	Type J	T	Type T	3	3-wire
K	Type K			4	4-wire
X	Other, specify				

#3	PROBE DIAMETER		
B	1/4" Ø	D	1/8" Ø
C	3/16" Ø	X	Other, specify

#4	PAD / SHEATH MATERIAL		
K	316 SS	M	Inconel 600
H	304 SS	X	Other, specify

#5	TIP / WELD PAD DESIGN
A	JMS Fastrax weld pad assembly, replaceable
B	Weld pad, standard 1" x 1"
C	Clamp hook pad
D	Standard round tip
E	Fastrax replacement "foot" only
F	Universal weld pad
G	Contoured weld pad
X	Other, specify

#6	N LENGTH *SEE ILLUSTRATION*
__"	Specify (in inches)



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

#8	CUSTOMER PIPE DIAMETER				
	Standard Pipe size	Actual Ø		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	___"			

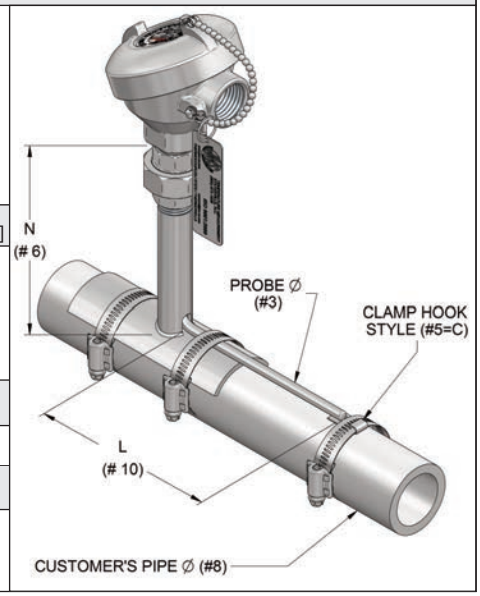
*Weld pads are not curved to fit customer's pipe for diameters 12" and larger due to the minimal tangency gap.

#9	COLD END TERMINATION [Additional options see Pg 1-7]		
GS*	SS 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, IP66		
SS	316 SS w/ screw cover & chain		

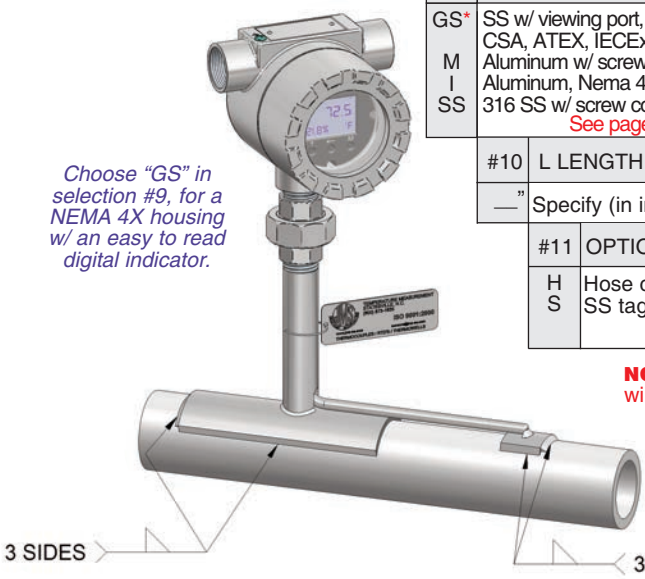
*Must be paired with a transmitter.
See page 8-1 for transmitter ordering information.

#10	L LENGTH
__"	Specify (in inches)

#11	OPTIONS		
H	Hose clamps(QTY3)	M	MTR
S	SS tag	X	Other, specify



Choose "GS" in selection #9, for a NEMA 4X housing w/ an easy to read digital indicator.



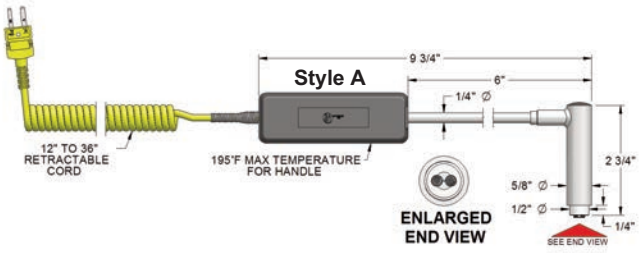
NOTE: Sensor weld pad styles A & D (#5) along with nipple stand weld pads will be curved to fit customer's pipe diameter (#8).

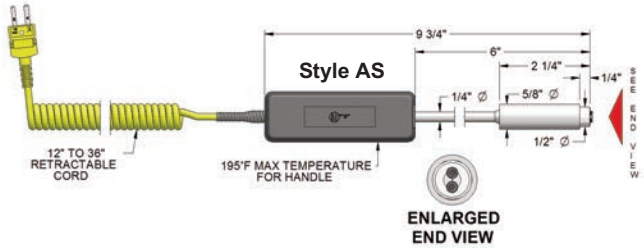
SURFACE SENSORS

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.





TEMPERATURE RATING IS BASED ON T/C TYPE

#1	STYLE *Not available as RTD		(See illustrations above & to the right)
4AS*	Hand held (straight design)	4PADT	Large pad
4A*	Hand held (90° design)	4PADL	Small pad surface
4BK*	Specialty brush sensor		
4B*	Permanent mount		

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

#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		
S	Coil-cord (Standard)	Z	N/A
3__"	Teflon		
5__"	Kapton w/ SS overbraid		
X	Other, specify		

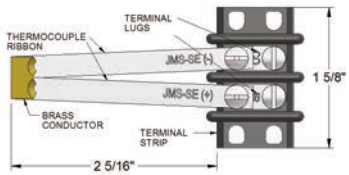
#5	# OF REPLACEMENT TIPS		
0	No sets	Z*	N/A
1 +	Number of sets		

*Standard for styles B, L, T.

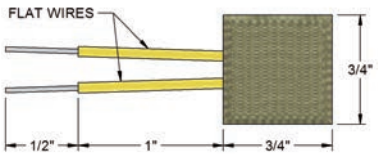
Note: Thermocouple wire is 24 AWG solid conductors. RTD wire is 24 AWG stranded conductors.

Style BK

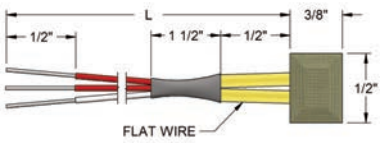
Style B



Style T



Style L



The JMS pad RTD is a specialty sensor which provides a fast response surface measurement. It is a 100Ω platinum RTD with an alpha of .00385 Ω/Ω/°C. Pad material is PTFE (Teflon) impregnated glass fibre. The pad RTD has an effective operating range from -80°C to 200°C and its tolerance is 0.1Ω (± 0.26˚ C at 0˚ C). Additional Teflon leadwire is configured as a 3 wire RTD. High temperature configurations can be designed.

MAGNETIC SURFACE PROBES

#2	STYLE
4M	Magnet surface probe

#2	STYLE	lb pull @ 70°F
C	Crown (1-1/4"Ø) (Standard)	25
R	Round (1"Ø)	24
U	Horseshoe (1-1/8" depth)	19
H	Heavy-load (3"Ø)	100

#3	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				

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

#5	LEADWIRE TYPE & LENGTH
C__"	Coil-cord
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

#6	COLD END TERMINATION
A	Bare ends
B	Miniature plug
C	Standard plug
X	Other, specify
Z	N/A

[Additional options see Pg 1-7]

4M	C	K	G	TS36"	A

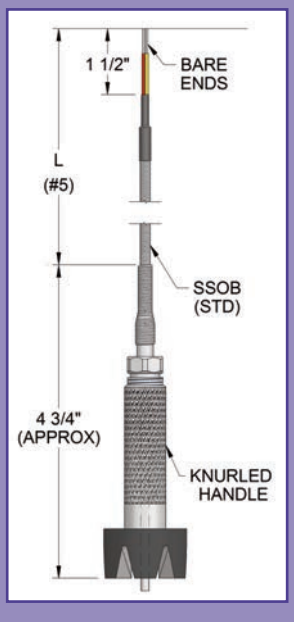
Maximum temperature rating shown in red.

Style C

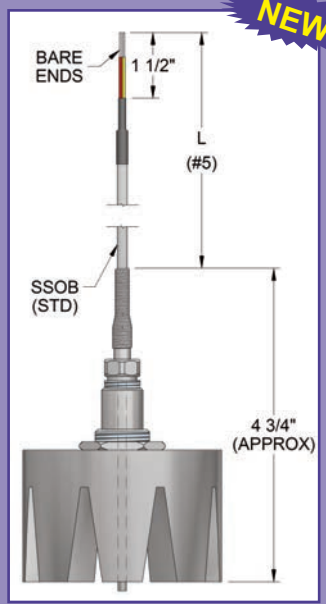
Style R

Style U

Style H



NEW

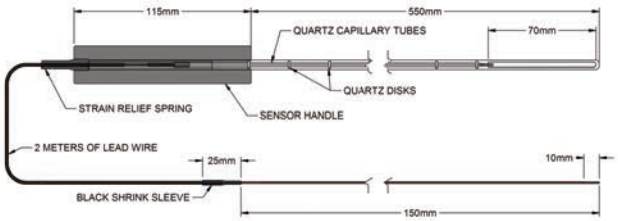


Note: Thermocouple wire is 24 AWG solid conductors. RTD wire is 24 AWG stranded conductors.

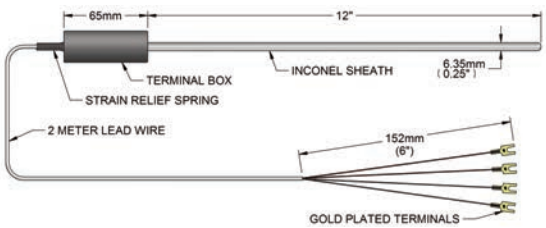
LABORATORY THERMOMETERS

For detailed descriptions and ordering information, visit www.JMS-SE.com

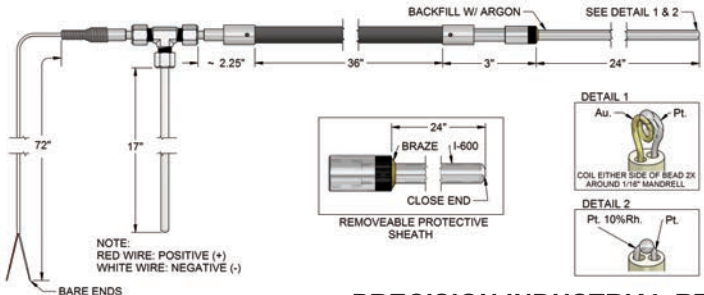
STANDARD PLATINUM RESISTANCE THERMOMETERS



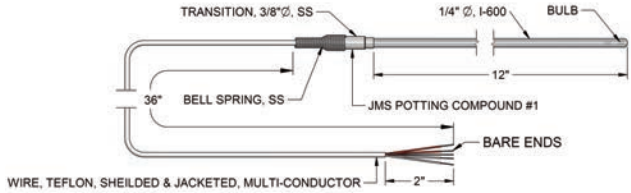
SECONDARY STANDARD RTDS



JMS STANDARDS THERMOCOUPLE



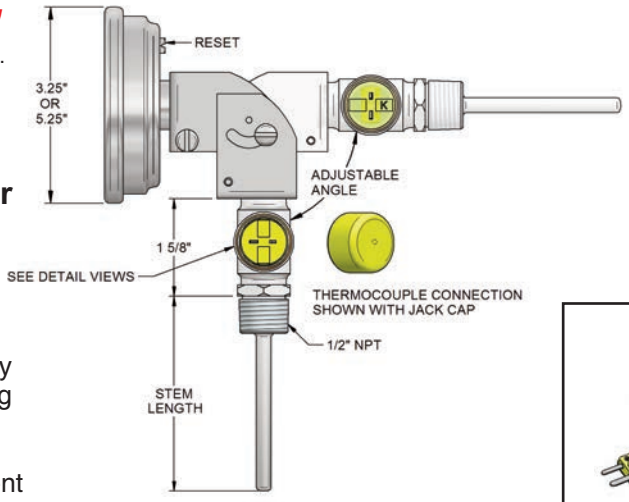
PRECISION INDUSTRIAL RTD

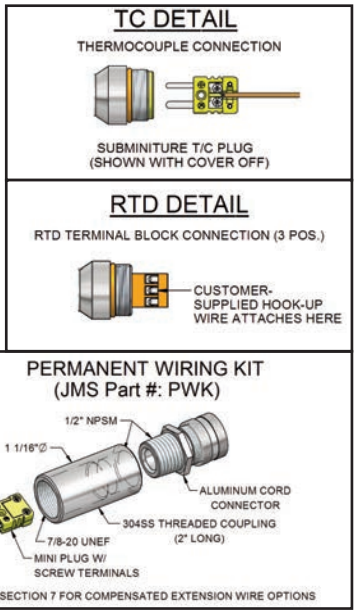


ANALOG BEMOMETER

BE•MORE•METER!!

Originally developed by JMS Southeast, Inc.



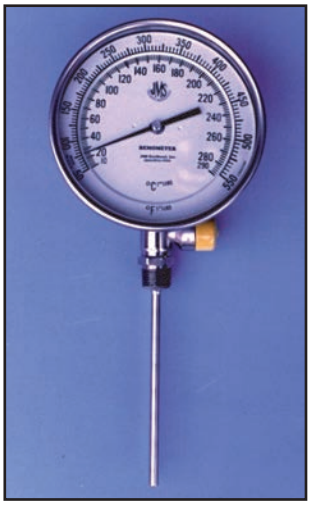


Unites Bimetal with either Thermocouple or RTD Technology!

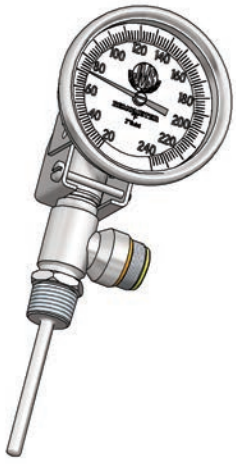
- Bimetal Dependability
- Thermocouple / RTD Accuracy
- Direct AND Electronic Reading
- Easy To Use
- Easy To Calibrate
- Two Sensors in One Instrument

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.



People who purchased this also purchased socket cap sensors.
(See page 4-3 for details.)



How To Order Your Adjustable Angle Bemometer:

JMS PART NUMBER: ***ANA 30 060 0 01 K - PWK*** *(Optional)*

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

Permanent Wiring Kit

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	-50/50°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