

A Guide to Temperature Sensors and Thermowells

*for STT 3000 Smart Temperature Transmitters
and SMV 3000 Smart Multivariable Transmitters*

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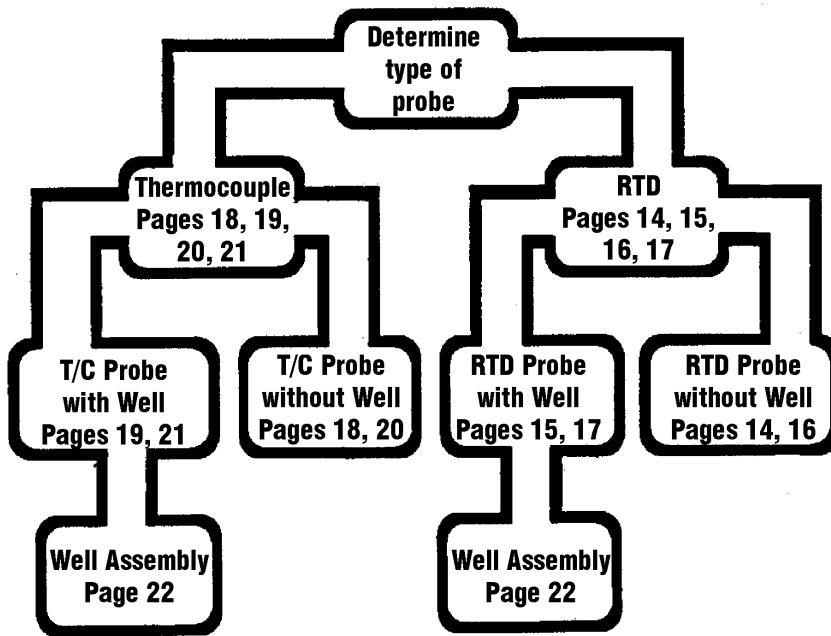
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Introduction

This guide is intended to lead you through the proper specification of thermal probes and thermowell assemblies. Since we couldn't include all of the possible variations, the information in the document is intended to cover the most commonly used probes and thermowells. If you need assistance with the specification of a probe or well, or you want a type of probe or thermowell not included in this document, a Honeywell representative can assist you.

How to Specify a Thermal Probe



- NOTE:
1. Always specify a spring-loaded probe if a thermowell is required for the application.
 2. Rigid probes may be inserted directly, without a thermowell.

How to Specify a Thermal Probe

Thermocouples and RTDs

The two most common types of thermal sensors are thermocouples (T/Cs) and resistance temperature detectors (RTDs). Thermocouples are often selected because of their wide temperature limits (-184°C to +2330°C). Thermocouples are specified on a basis of their temperature profiles and their accuracy within their intended operating ranges.

RTDs are more accurate than thermocouples, although they won't withstand high temperatures as well. The operating range for RTDs is typically -200° to +500°C. RTDs are specified based on their intended applications and required accuracy.

Types of Thermocouple and RTD Probes

Honeywell provides both rigid and spring-loaded probes:

- If you are going to use a thermowell assembly with the probe, specify a spring-loaded probe. Spring-loading applies pressure where the probe tip touches the thermowell, and increases heat transfer.
- If the probe will be inserted directly into the process without a thermowell, specify a rigid probe.

Probe Sheath Material

We offer two materials for probe sheath construction; 316 Stainless Steel and Inconel. For probes used with wells, specify 316 SS. Inconel is often used where a rigid probe is used in direct contact with a corrosive materials, or extreme heat is involved (in excess of 3000°F).

Grounded and Ungrounded Thermocouples

You may specify grounded or ungrounded thermocouples. The STT 3000 and SMV 3000 is optically isolated and can be used with either type. A grounded thermocouple is used to prevent electrical noise, and the tip of the thermocouple is electrically connected to the sheath of the probe. Ungrounded thermocouples use insulation material to keep the thermocouple tip insulated from the probe sheath.

NOTE: Grounded T/Cs have faster response time, and are most commonly specified.

How to Specify a Thermal Probe

Single Element and Dual Element Thermocouples

Thermocouples are available with single or dual elements in a single probe. The single thermocouple is the most common. However, dual thermocouples may be used to provide spare thermocouples in a single probe assembly.

Select single unless otherwise specified.

Probe Lagging (Stand-off)

Spring-loaded thermocouples and RTDs offer a “lagging” option (rigid probes do not). Probe lagging is used to extend the transmitter away from heat outside the insulation jacket. The STT 3000 is rated for a maximum of 85°C, and lagging may be required to get the transmitter electronics physically away from a heat source. The following probe lagging options are available:

- 3/4” Hex - 1/2” NPT nipple (standard connection between probe and transmitter housing)
- 3”, 6”, 9”, 12” lag (length of pipe nipple between probe and transmitter housing - 1/2” NPT)
- 3”, 8”, 10”, 14” nipple/union/nipple

If no probe lagging is specified, select 3/4” Hex.

Thermowell Lagging

Wells are also available with lagging. Well lagging is typically used where the well is installed through an insulating material. This is typically referred to as the “T” dimension.

How to Specify a Thermal Probe

Spring-Loaded Probes

All spring-loaded probes have 1/4" sheath diameters and 1/2" NPT connection threads. Spring-loaded probes should be specified with 3/4" long Hex nipple unless lagging is needed.

Computing probe "stem" length ("A" dimension)

The length of a thermocouple or RTD probe is computed as follows:

1. Determine the required insertion length ("U") dimension of the well.
2. Determine the required lag length ("T") dimension. This is the lagging length specified on the well.
3. Determine the type of well process connection: threaded, flanged or socket.

Choose a stem length greater than 3". The standard length is 6". For FM approved, the stem length plus lag hardware length cannot exceed 24".

For threaded or socket wells, the probe length is the total of the insertion length, the lag length plus a fixed 1-1/2".

$$A=U+T+1.5$$

EXAMPLE: Insertion length (U)	=	6"
Lagging length (T)	=	3" (lagging on the well)
Threaded well	=	<u>1.5"</u> (fixed)
Total probe length (A)	=	10.5"

For flanged wells, the probe length is the total of the insertion length and a fixed 2".

$$A =U+2$$

EXAMPLE: Insertion length (U)	=	9"
Flanged well	=	<u>2"</u>
Total probe length (A)	=	11.0"

NOTE: For rigid probes, lagging occurs at the other end of the probe.

How to Specify a Thermal Probe

Rigid Probes

All rigid probes have 1/4" sheath diameters and utilize a 3/4" long 316SS Hex nipple with 1/2" NPT connection threads.

The probe stem length ("A") dimension for rigid probes is specified as the total length of the probe stem, and does not require further calculation. Choose a stem length between 3 and 24". The standard stem length is 6".

Remote Connection Heads

You may order a probe assembly with either a local or remote connection head. The local connection head specifies that the probe will be mounted directly to a STT 3000 housing. A remote head specifies a separate head mounted to the probe, and wired to a remote transmitter. A remote connection head should be used where the ambient temperature surrounding the probe is higher than the STT 3000 or SMV 3000 can withstand even with appropriate lagging.

Additionally, remote heads can be ordered for explosion-proof and non-explosion-proof environments. Explosion-proof heads are made of cast aluminum, while the non-explosion-proof heads are available in either plastic or polypropylene versions.

Note: The probe model numbers for STT 3000 assembled (local) and remote connection heads are different due to the need for a specific model number convention required for FM/CSA approval for probes connected directly to the STT 3000 housing. Connection heads are generally used as protection for sensor leadwire and as a junction point for leadwires going to other instrumentation. Connection heads have either screwed on or hinged/latched covers, internal terminal boards, and 1/2" NPT female pipe threads for process connections.

How to Specify a Thermal Probe

All Honeywell remote mounted connection heads are now available in three types:

Cast Aluminum Head (Standard)

Explosion-proof design for use in areas with explosive or combustible materials, for use in environments up to 500°F ambient, meets NEMA 4 standards for dust and moisture resistance, 1/2" NPT sensor and conduit connection standard. FM approved versions are available. Measures approximately 2.75" x 2.75".

Polypropylene Head

Non-explosion-proof design, for use in environments up to 200°F ambient, meets NEMA 4 standards for dust and moisture resistance, 3/4" NPT conduit connection with 1/2" NPT sensor connection standard. Measures approximately 3.75" x 3.75".

Plastic Head (PVC)

Non-explosion-proof design for use near corrosive processes, for use in environments up to 250°F ambient, meets NEMA 4 standards for dust and moisture resistance, 3/4" NPT conduit connection with 1/2" NPT sensor connection standard. Measures approximately 4.00" x 4.00".

Process Connection (Rigid Probes)

A rigid probe inserted directly into the process will have a standard process connection of 1/2" NPT (also available in 3/4" and 1").

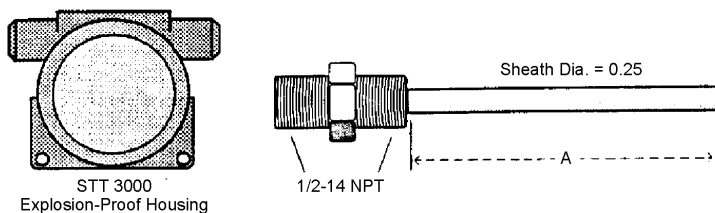
Probe Service Parameter

The RTD probe is available with standard and heavy duty parameters. The standard service parameter probe is built to handle up to 25 g's of vibration. The heavy duty probe is built to handle up to 50 g's. Select standard duty unless otherwise specified.

Probe Lead Length

The standard length of the wire leads coming out of the probe is 3 to 6".

Type 2B Rigid RTD Probe



Type 2B Rigid RTD Probe Assemblies with Hex Fitting

Operating Temperature: -40 to +185°F

Vibration: 25 g's maximum standard, 50 g's optional

Sheath: 1/4" dia. 316 SS or Inconel 600

Lead Wire: AWG #22 nickel plated copper, stranded, Teflon insulated.

Lead Configurations 2, 3 wire (also 2 wire with comp. loop)

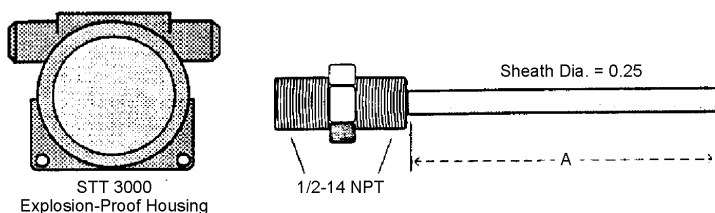
Resistance - Temperature Coefficient: Ref. (0.003923 ohm / ohm / C);

DIN (0.003850 ohm / ohm / C)

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B,C,D, Class II Div. 1 Groups E, F, G and Class III Hazardous Locations.

Not available with thermowell.

Type 7B Rigid Thermocouple Probe



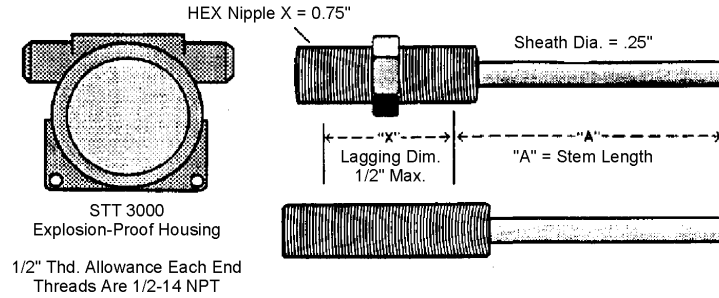
Type 7B Rigid Thermocouple Probe Assemblies with Hex Fitting

This probe is usually used in applications requiring direct immersion. It is available in 316 SS or Inconel 600 (1/4" dia.).

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G and Class III Hazardous Locations.

Not available with thermowell.

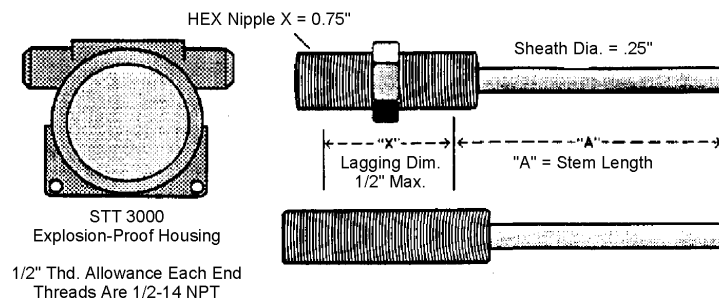
Type 2D Spring-Loaded RTD Probe



Type 2D Spring-Loaded RTD Probe Assemblies with Hex Fitting or Straight Nipple

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G and Class III Hazardous Locations.

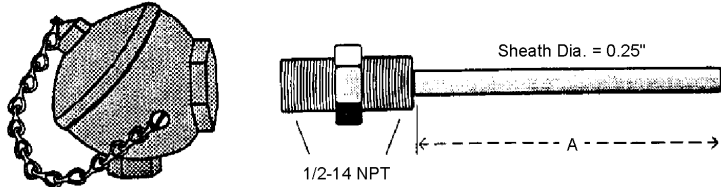
Type 7D Spring-Loaded Thermocouple Probe



Type 7D Spring-Loaded Thermocouple Probe Assemblies with Hex Fitting or Straight Nipple

Explosion-Proof. Factory mutual approval pending. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G and Class III Hazardous Locations.

Type 22B Rigid RTD Probe



Connection head is required for approved installations

Type 22B Rigid RTD Probe Assemblies with Hex Fitting

Operating Temperature: -320° to 900° F

Vibration: 25 g's maximum standard, 50 g's optional

Maximum Lead Exit Temperature: 500°F

Sheath: 1/4" dia. 316 SS or Inconel 600

Lead Wire: AWG #22 nickel plated copper, stranded, Teflon insulated.

Lead Configurations: 2, 3 (also 2 wire with comp. loop)

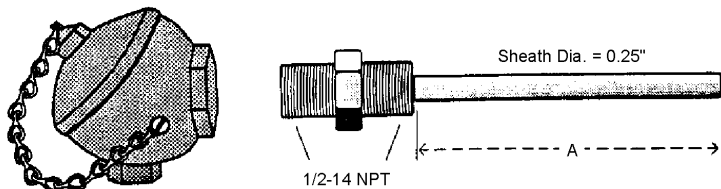
Resistance - Temperature Coefficient: Ref. (0.003923 ohm / ohm / C);

DIN (0.003850 ohm / ohm / C)

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G and Class III Hazardous Locations.

Not available with thermowell.

Type 78B Rigid Thermocouple Probe



Connection head is required for approved installations.

Type 78B Rigid Thermocouple Probe Assemblies with Hex Fitting

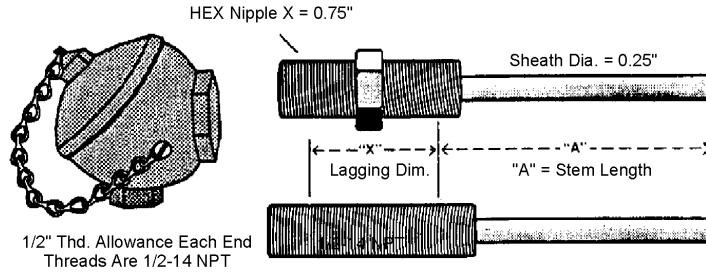
MGO Insulated Thermocouple

This probe is usually used in applications requiring direct immersion. It is available in 316 SS or Inconel 600 (1/4" dia.).

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G and Class III Hazardous Locations.

Not available with thermowell.

Type 22D Spring-Loaded RTD Probe

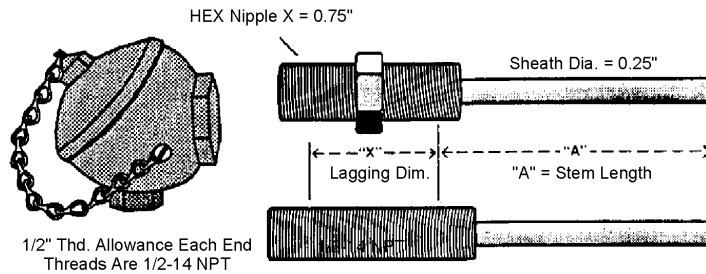


Thermowell and connection head are required for approved installations.

Type 22D Spring-Loaded RTD Probe Assemblies with Hex Fitting or Straight Nipple

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G,
and Class III Hazardous Locations.

Type 78D Spring-Loaded Thermocouple Probe



Thermowell and connection head are required for approved installations.

Thermocouple Type 78D Spring-Loaded RTD Probe Assemblies with Hex Fitting or Straight Nipple

Explosion-Proof. Factory Mutual approved. Class I Div. 1 Groups B, C, D, Class II Div. 1 Groups E, F, G,
and Class III Hazardous Locations.

Probe and Thermowell Assemblies

Models 2B, 22B, 7B and 78B4 - Rigid Probe

316 SS HEX NIPPLE

Sheath dia. = 0.25"

1/2" NPT

6" Long Leadwire

"X" 0.75"

"A" Stem Length

All Rigid Probes have 1/4" sheath diameters and utilize a 3/4" long 316SS Hex nipple with 1/2" NPT connection threads.

Standard Stem Length (A) is 6".

$3" \leq A \leq 24"$

[Dimensions in inches]

Models 2D, 22D, 7D and 78D4 Spring-Loaded Probe

1/2" NPT

316SS HEX NIPPLE

"X" 0.75"

"A" Stem Length

1/2" NPT

STRAIGHT NIPPLE

"X" Lag Where X = 3", 6" or 9"

"A" Stem Length

1/2" NPT

UNION AND NIPPLES

"X" Lag Where X = 3", 8", 10" or 14"

"A" Stem Length

Spring loading assy.

0.25" Sheath dia.

All Spring-Loaded Probes have 1/4" sheath diameters and 1/2" NPT connection threads. Spring-Loaded Probes should be specified with 3/4" long Hex nipple unless lagging is needed. Standard Stem Length (A) is 6".

$3" \leq A \leq 24"$

$A + X \leq 24"$ for FM approval

[Dimensions in inches]

Model SX - Standard Threaded Well; No Lag Extension - Stepped

1.75

"U" Insertion Length

1.00 Thread Allowance

1/2 NPT

.75 dia.

.260 +/- .002 dia. Bore

.25

.50 dia.

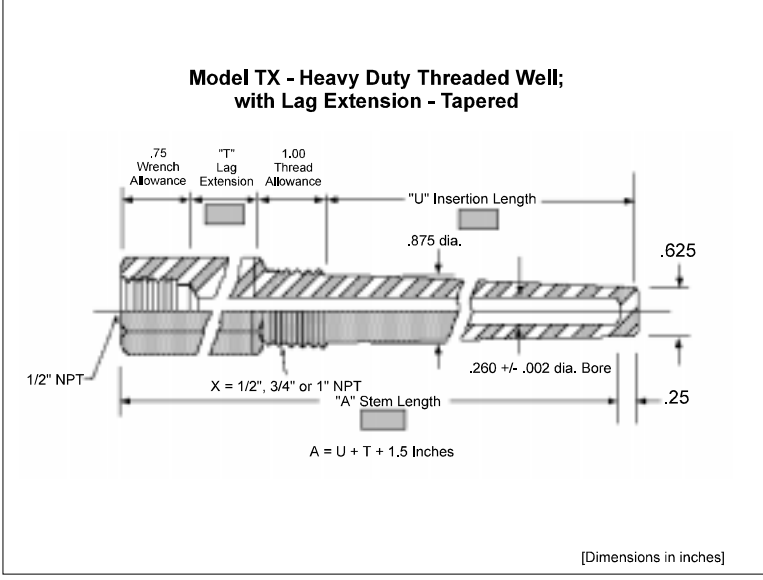
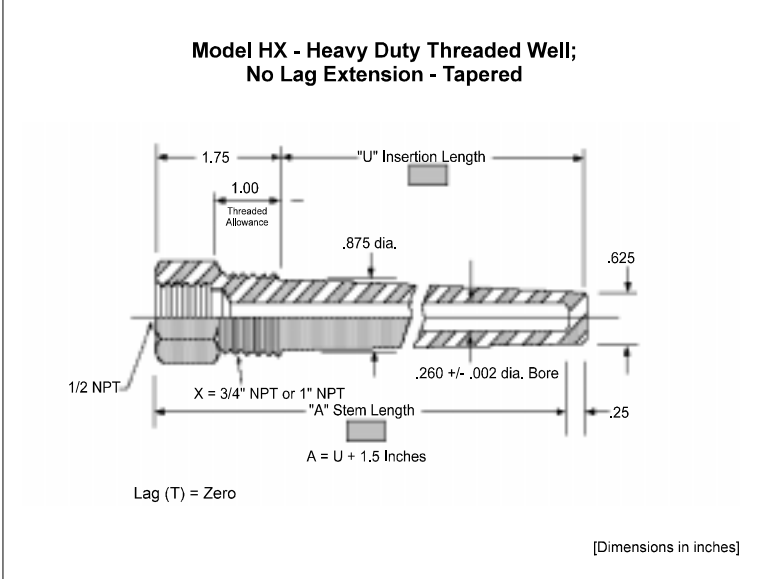
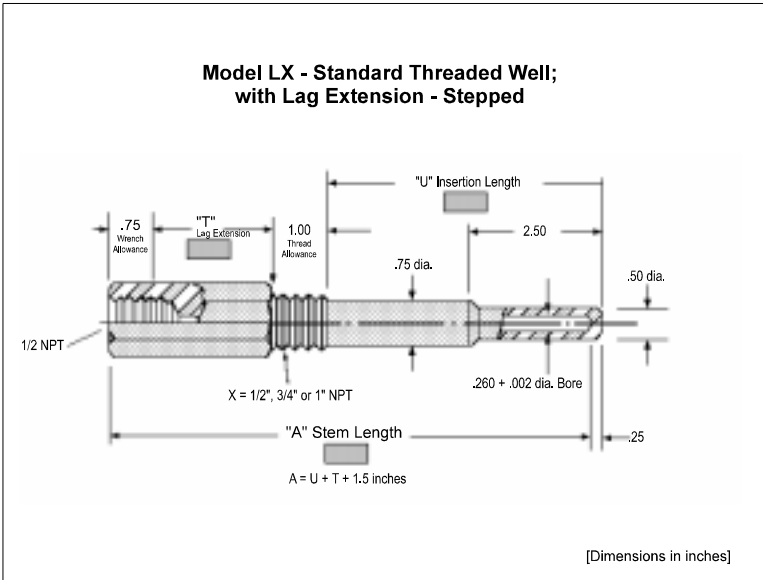
"A" Stem Length

Lag (T) = Zero

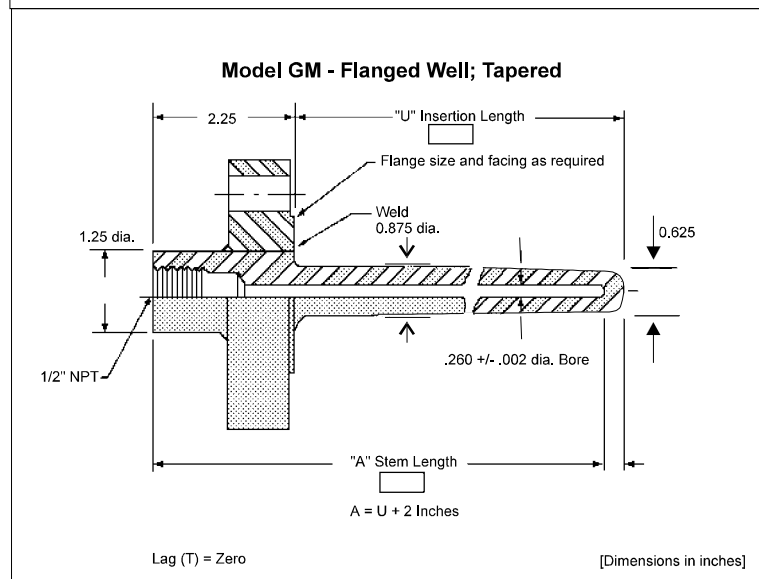
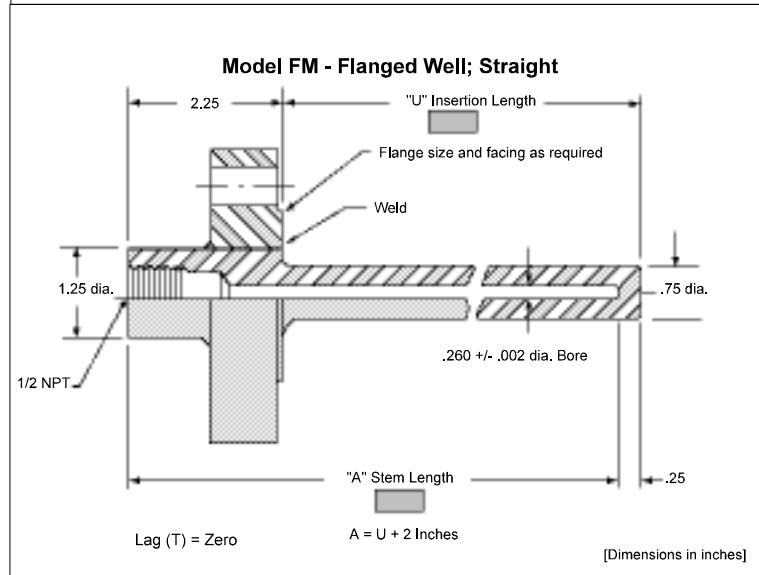
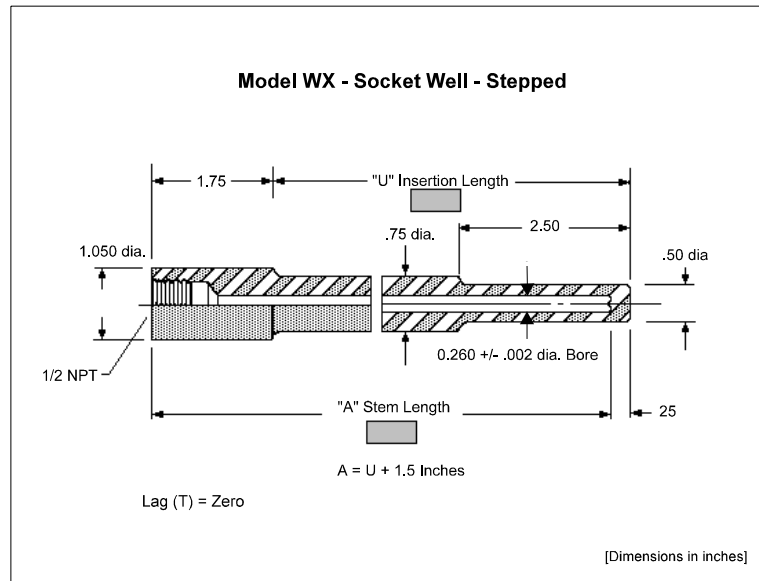
$A = U + 1.5$ inches

[Dimensions in inches]

Thermowell Assemblies



Thermowell Assemblies



Model Selection Guides

(Probe factory assembled to STT 3000 Smart Temperature Transmitter)

2B RIGID RTD PROBE (ASSEMBLED TO STT 3000)

CODE - SHEATH MATERIAL
S Stainless Steel
I Inconel
O Other

CODE - PROBE TYPE		Compatible w	STT35x	STT25x
10	100 ohm JIS (0.00392) Platinum		Y	Y
102	100 ohm JIS (0.00392) Platinum (Dual Element)		Y	Y
11	100 ohm DIN (0.00385) Platinum		Y	Y
112	100 ohm DIN (0.00385) Platinum (Dual Element)		Y	Y
21	200 ohm DIN (0.00385) Platinum		Y	Y
51	500 ohm DIN (0.00385) Platinum		Y	-
CU10	10 Ohm Copper		Y	-
CU25	25 Ohm Copper		Y	-
SP	Other special requests		Y	Y

CODE - NUMBER OF LEADWIRES
A 2-Wire Sensor
B 3-Wire Sensor
C 4-Wire Sensor

CODE - SERVICE PARAMETER
S Standard (25 gS)
H Heavy Duty (50 gS)

CODE - STEM LENGTH "A" DIMENSION
A Stem Length; where A is in inches (3" minimum, 24" maximum)

CODE - CONNECTION HEAD
S Assembled to STT 3000 Housing via 3/4" long 316 SS Hex nipple

CODE - LEAD LENGTH
6 Standard 6" Length

CODE - OPTIONS
SST3 Small wired-on SS Tag (3 lines of 10 digits)
SST6 Large wired-on SS Tag (6 lines of 20 digits)
CCxx Certificate of Probe Calibration (2-point) ⁽²⁾
CCxx Certificate of Probe Calibration (3-point) ⁽²⁾
CCxx Certificate of Probe Calibration (4-point) ⁽²⁾
APD Assembly Performance Data Certificate ⁽³⁾
 (Probe with STT 3000)

2B	S	11	B	S	6	S	6	SST6 - CC2F
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(2) Select Calibration Schedule (xx) from Table 1.
 (3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.
 See Table 2 for Drawings, Manuals and Certificates.

Model Selection Guides

(Probe factory assembled to STT 3000 Smart Temperature Transmitter)

2D SPRING-LOADED RTD PROBE (ASSEMBLED TO STT 3000)

CODE - SHEATH MATERIAL

S Stainless Steel
I Inconel
O Other

CODE - PROBE TYPE	Compatible w	STT35x	STT25x
10 100 ohm JIS (0.00392) Platinum		Y	Y
102 100 ohm JIS (0.00392) Platinum (Dual Element)		Y	Y
11 100 ohm DIN (0.00385) Platinum		Y	Y
112 100 ohm DIN (0.00385) Platinum (Dual Element)		Y	Y
21 200 ohm DIN (0.00385) Platinum		Y	Y
51 500 ohm DIN (0.00385) Platinum		Y	-
CU10 10 Ohm Copper		Y	-
CU25 25 Ohm Copper		Y	-
SP Other special requests		Y	Y

CODE - NUMBER OF LEADWIRES

A 2-Wire Sensor
B 3-Wire Sensor
C 4-Wire Sensor

CODE - SERVICE PARAMETER

S Standard (25 gS)
H Heavy Duty (50 gS)

CODE - STEM LENGTH "A" DIMENSION

A Stem Length; where A is in inches (3" minimum, 24" maximum) ⁽⁴⁾

CODE - PROBE LAG HARDWARE with 1/2"NPT SS FITTINGS

A HEX Nipple as 3/4" long standard 316 SS. (Specify as "A")

BX Specify straight nipple as "BX"; where X = 3", 6" or 9" lengths

CX Specify double carbon steel lags and aluminum union as "CX", where:
X = mated lengths of 3", 8", 10" or 14"

DX Specify double SS lags and SS union as "DX", where:
X = mated lengths of 3", 8", 10" or 14"

*(4) Note: Stem Length plus Probe Lag Length exceeding 24" total violates FM approval.
Contact F.I. Marketing Applications for lengths > 24".*

CODE - CONNECTION HEAD

S Assembled to STT 3000 Housing via 3/4" long Hex nipple

CODE - LEAD LENGTH

6 Standard 6" Length

CODE - OPTIONS

SST3 Small wired-on SS Tag (3 lines of 10 digits)
SST6 Large wired-on SS Tag (6 lines of 20 digits)
CCxx Certificate of Probe Calibration (2-point) ⁽²⁾
CCxx Certificate of Probe Calibration (3-point) ⁽²⁾
CCxx Certificate of Probe Calibration (4-point) ⁽²⁾
APD Assembly Performance Data Certificate ⁽³⁾
(Probe with STT 3000)

2D	S	11	B	S	6	B3	S	6	SST6 - CC2F
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(2) Select Calibration Schedule (xx) from Table 1.

(3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.

See Table 2 for Drawings, Manuals and Certificates.

Model Selection Guides

(Probe is NOT factory assembled to STT 3000 or SMV 3000 transmitter)

22B RIGID RTD REMOTE MOUNTED PROBE ASSEMBLY

CODE - SHEATH MATERIAL				
S	Stainless Steel			
I	Inconel			
O	Other			
CODE - PROBE TYPE				
	Compatible w	STT35x	STT25x	SMV
10	100 ohm JIS (0.00392) Platinum	Y	Y	-
102	100 ohm JIS (0.00392) Platinum (Dual Element)	Y	Y	-
11	100 ohm DIN (0.00385) Platinum	Y	Y	Y
112	100 ohm DIN (0.00385) Platinum (Dual Element)	Y	Y	-
21	200 ohm DIN (0.00385) Platinum	Y	Y	-
51	500 ohm DIN (0.00385) Platinum	Y	-	-
CU10	10 Ohm Copper	Y	-	-
CU25	25 Ohm Copper	Y	-	-
SP	Other special requests	Y	Y	-
CODE - NUMBER OF LEADWIRES				
A	2-Wire Sensor			
B	3-Wire Sensor			
C	4-Wire Sensor			
CODE - SERVICE PARAMETER				
S	Standard (25 gS)			
H	Heavy Duty (50 gS)			
CODE - STEM LENGTH "A" DIMENSION				
A	Stem Length; where A is in inches (3" minimum, 24" maximum)			
CODE - REMOTE CONNECTION HEAD via 3/4" long 316 SS Hex nipple				
R	Explosion-proof, standard cast aluminum			
PL	Plastic (not explosion-proof)			
PO	Polypropylene (not explosion-proof)			
CODE - LEAD LENGTH ⁽¹⁾				
A	Minimum lead length, as required, 3 - 6 inches average length			
Y	Lead length, as specified, greater than 6 inches where Y is in inches			
CODE - OPTIONS				
SST3	Small wired-on SS Tag (3 lines of 10 digits)			
SST6	Large wired-on SS Tag (6 lines of 20 digits)			
CCxx	Certificate of Probe Calibration (2-point) ⁽²⁾			
CCxx	Certificate of Probe Calibration (3-point) ⁽²⁾			
CCxx	Certificate of Probe Calibration (4-point) ⁽²⁾			
APD	Assembly Performance Data Certificate ⁽³⁾ (Probe with STT 3000)			

22B	S	11	B	S	6	R	A	SST6 - CC2F
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(1) Caution: Excessive lead lengths may result in lead wire damage due to space limitations within the remote head.
 (2) Select Calibration Schedule (xx) from Table 1.
 (3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.
 See Table 2 for Drawings, Manuals and Certificates.

Model Selection Guides

(Probe is NOT factory assembled to STT 3000 or SMV 3000 transmitter)

22D SPRING-LOADED RTD REMOTE MOUNTED PROBE ASSEMBLY

CODE - SHEATH MATERIAL									
S Stainless Steel I Inconel O Other									
CODE - PROBE TYPE									
						Compatible with:			
						STT35x	STT25x	SMV	
10	100 ohm JIS (0.00392) Platinum					Y	Y	-	
102	100 ohm JIS (0.00392) Platinum (Dual Element)					Y	Y	-	
11	100 ohm DIN (0.00385) Platinum					Y	Y	Y	
112	100 ohm DIN (0.00385) Platinum (Dual Element)					Y	Y	-	
21	200 ohm DIN (0.00385) Platinum					Y	Y	-	
51	500 ohm DIN (0.00385) Platinum					Y	-	-	
CU10	10 Ohm Copper					Y	-	-	
CU25	25 Ohm Copper					Y	-	-	
SP	Other special requests					Y	Y	-	
CODE - NUMBER OF LEADWIRES									
A 2-Wire Sensor B 3-Wire Sensor C 4-Wire Sensor									
CODE - SERVICE PARAMETER									
S Standard (25 gS) H Heavy Duty (50 gS)									
CODE - STEM LENGTH "A" DIMENSION									
A Stem Length; where A is in inches (3" minimum. 24" maximum) ⁽⁴⁾									
CODE - PROBE LAG HARDWARE with 1/2"NPT SST FITTINGS									
A HEX Nipple as 3/4" long standard 316 SS. (Specify as "A")									
BX Specify straight nipple as "BX"; where X = 3", 6" or 9" lengths									
CX Specify double carbon steel lags and aluminum union as "CX", where: X = mated lengths of 3", 8", 10" or 14"									
DX Specify double SS lags and SS union as "DX", where: X = mated lengths of 3", 8", 10" or 14"									
<i>(4) Note: Stem Length plus Probe Lag Length exceeding 24" total violates FM approval. Contact F.I. Marketing Applications for lengths > 24".</i>									
CODE - REMOTE CONNECTION HEAD via 3/4" long 316 SS Hex nipple									
R Explosion-proof, standard cast aluminum									
PL Plastic (not explosion-proof)									
PO Polypropylene (not explosion-proof)									
CODE - LEAD LENGTH ⁽¹⁾									
A Minimum lead length. as required. 3 - 6 inches avd.									
Y Lead length, as specified, greater than 6 inches where Y is in inches									
CODE - OPTIONS									
SST3 Small wired-on SS Tag (3 lines of 10 digits)									
SST6 Large wired-on SS Tag (6 lines of 20 digits)									
CCxx Certificate of Probe Calibration (2-point) ⁽²⁾									
CCxx Certificate of Probe Calibration (3-point) ⁽²⁾									
CCxx Certificate of Probe Calibration (4-point) ⁽²⁾									
APD Assembly Performance Data Certificate ⁽³⁾ (Probe with STT 3000)									
22D	S	11	B	S	6	B3	R	A	SST6 - CC2F

(1) Caution: Excessive lead lengths may result in lead wire damage due to space limitations within the remote head.

(2) Select Calibration Schedule (xx) from Table 1.

(3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.

See Table 2 in Drawings, Manuals and Certificates.

Model Selection Guides

(Probe factory assembled to STT 3000 Smart Temperature Transmitter)

7B RIGID T/C PROBE (ASSEMBLED TO STT 3000)

CODE - SHEATH MATERIAL

S Stainless Steel
I Inconel
O Other

CODE - TYPE T/C	Compatible with:	STT35x	STT25x
B		Y	Y
C		Y	-
D		Y	-
E		Y	Y
J		Y	Y
K		Y	Y
N		Y	Y
R		Y	Y
S		Y	Y
T		Y	Y
NiNiMOLY		Y	-
SP Other special requests (for special high accuracy T/Cs, etc		Y	Y

CODE - NUMBER OF ELEMENTS

S Single element
D Dual element

CODE - TYPE JUNCTION

G Grounded
U Ungrounded

CODE - PROBE STEM LENGTH

A Stem length, where A is in inches (3" minimum, 24" maximum)

CODE - CONNECTION HEAD

S Assembled to STT 3000 Housing via 3/4" long 316 SS Hex nipple

CODE - LEAD LENGTH

6 Standard 6" Length

CODE - OPTIONS

SST3 Small wired-on SS Tag (3 lines of 10 digits)
SST6 Large wired-on SS Tag (6 lines of 20 digits)
CCxx Certificate of Probe Calibration (2-point)⁽²⁾
CCxx Certificate of Probe Calibration (3-point)⁽²⁾
CCxx Certificate of Probe Calibration (4-point)⁽²⁾
APD Assembly Performance Data Certificate⁽³⁾
 (Probe with STT 3000)

7B	S	J	S	G	6	S	6	SST6 - CC2F
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(2) Select Calibration Schedule (xx) from Table 1.
 (3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.
 See Table 2 in Drawings, Manuals and Certificates.

Model Selection Guides

(Probe factory assembled to STT 3000 Smart Temperature Transmitter)

7D SPRING-LOADED T/C PROBE (ASSEMBLED TO STT 3000)

CODE - SHEATH MATERIAL									
S Stainless Steel									
I Inconel									
O Other									
CODE - TYPE T/C						Compatible w		STT35x	STT25x
B	.....					Y	Y		
C	.....					Y	-		
D	.....					Y	-		
E	.....					Y	Y		
J	.....					Y	Y		
K	.....					Y	Y		
N	.....					Y	Y		
R	.....					Y	Y		
S	.....					Y	Y		
T	.....					Y	Y		
NiNiMOLY						Y	-		
SP Other special requests (for special high accuracy T/Cs, etc						Y	Y		
CODE - NUMBER OF ELEMENTS									
S Single element									
D Dual element									
CODE - TYPE JUNCTION									
G Grounded									
U Ungrounded									
CODE - PROBE STEM LENGTH									
A Stem length, where A is in inches (3" minimum, 24" maximum) ⁽⁴⁾									
CODE - PROBE LAG HARDWARE with 1/2"NPT SST FITTINGS									
A HEX Nipple as 3/4" long standard 316 SS. (Specify as "A")									
BX Specify straight nipple as "BX"; where X = 3", 6" or 9" lengths									
CX Specify double carbon steel lags and aluminum union as "CX", where: X = mated lengths of 3", 8", 10" or 14"									
DX Specify double SS lags and SS union as "DX", where: X = mated lengths of 3", 8", 10" or 14"									
<i>(4) Note: Stem Length plus Probe Lag Length exceeding 24" total violates FM approval. Contact F.I. Marketing Applications for lengths > 24".</i>									
CODE - CONNECTION HEAD									
S Assembled to STT 3000 Housing via 3/4" long Hex nipple									
CODE - LEAD LENGTH									
6 Standard 6" Length									
CODE - OPTIONS									
SST3 Small wired-on SS Tag (3 lines of 10 digits)									
SST6 Large wired-on SS Tag (6 lines of 20 digits)									
CCxx Certificate of Probe Calibration (2-point) ⁽²⁾									
CCxx Certificate of Probe Calibration (3-point) ⁽²⁾									
CCxx Certificate of Probe Calibration (4-point) ⁽²⁾									
APD Assembly Performance Data Certificate ⁽³⁾ (Probe with STT 3000)									
7D	S	J	S	G	6	B3	S	6	SST6 - CC2F

(2) Select Calibration Schedule (xx) from Table 1.

(3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.

See Table 2 for Drawings, Manuals and Certificates.

Model Selection Guides

(Probe NOT assembled to STT 3000 or SMV 3000 transmitter)

78B4 RIGID T/C REMOTE MOUNTED PROBE ASSEMBLY

CODE - SHEATH MATERIAL

S Stainless Steel
I Inconel
O Other

CODE - TYPE T/C	Compatible w	STT35x	STT25x	SMV
B		Y	Y	-
C		Y	-	-
D		Y	-	-
E		Y	Y	Y
J		Y	Y	Y
K		Y	Y	Y
N		Y	Y	-
R		Y	Y	-
S		Y	Y	-
T		Y	Y	Y
NiNiMOLY		Y	-	-
SP Other special requests (for special high accuracy T/Cs, etc		Y	Y	-

CODE - NUMBER OF ELEMENTS

S Single element
D Dual element

CODE - TYPE JUNCTION

G Grounded
U Ungrounded

CODE - PROBE STEM LENGTH

A Stem length, where A is in inches (3" minimum, 24" maximum)

CODE - REMOTE CONNECTION HEAD via 3/4" long 316 SS Hex nipple

R Explosion-proof, standard cast aluminum
PL Plastic (not explosion-proof)
PO Polypropylene (not explosion-proof)

CODE - LEAD LENGTH ⁽¹⁾

A Minimum lead length, as required, 3 - 6 inches average length
Y Lead length, as specified, greater than 6 inches
 where Y is in inches

CODE - OPTIONS

SST3 Small wired-on SS Tag (3 lines of 10 digits)
SST6 Large wired-on SS Tag (6 lines of 20 digits)
CCxx Certificate of Probe Calibration (2-point) ⁽²⁾
CCxx Certificate of Probe Calibration (3-point) ⁽²⁾
CCxx Certificate of Probe Calibration (4-point) ⁽²⁾
APD Assembly Performance Data Certificate ⁽³⁾
 (Probe with STT 3000)

78B4	S	J	S	G	6	R	A	SST6 - CC2F
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(1) Caution: Excessive lead lengths may result in lead wire damage due to space limitations within the remote head.
 (2) Select Calibration Schedule (xx) from Table 1.
 (3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.
 See Table 2 for Drawings, Manuals and Certificates.

Model Selection Guides

(Probe NOT assembled to STT 3000 or SMV 3000 Transmitters)

78D4 SPRING-LOADED T/C REMOTE MOUNTED PROBE ASSEMBLY

CODE - SHEATH MATERIAL
S Stainless Steel
I Inconel
O Other

CODE - TYPE T/C	Compatible w	STT35x	STT25x	SMV
B		Y	Y	-
C		Y	-	-
D		Y	-	-
E		Y	Y	Y
J		Y	Y	Y
K		Y	Y	Y
N		Y	Y	-
R		Y	Y	-
S		Y	Y	-
T		Y	Y	Y
NiNiMOly		Y	-	-
SP Other special requests (for special high accuracy T/Cs, etc		Y	Y	-

CODE - NUMBER OF ELEMENTS
S Single element
D Dual element

CODE - TYPE JUNCTION
G Grounded
U Ungrounded

CODE - PROBE STEM LENGTH
A Stem length, where A is in inches (3" minimum, 24" maximum) ⁽⁴⁾

CODE - PROBE LAG HARDWARE with 1/2"NPT SST FITTINGS
A HEX Nipple as 3/4" long standard 316 SS. (Specify as "A")
BX Specify straight nipple as "BX"; where X = 3", 6" or 9" lengths
CX Specify double carbon steel lags and aluminum union as "CX", where:
X = mated lengths of 3", 8", 10" or 14"
DX Specify double SS lags and SS union as "DX", where:
X = mated lengths of 3", 8", 10" or 14"

(4) Note: Stem Length plus Probe Lag Length exceeding 24" total violates FM approval. Contact F.I. Marketing Applications for lengths > 24".

CODE - REMOTE CONNECTION HEAD via 3/4" long 316 SS Hex nipple
R Explosion-proof, standard cast aluminum
PL Plastic (not explosion-proof)
PO Polypropylene (not explosion-proof)

CODE - LEAD LENGTH *
A Minimum lead length, as required, 3 - 6 inches avg.
Y Lead length, as specified, greater than 6 inches
where Y is in inches

CODE - OPTIONS
SST3 Small wired-on SS Tag (3 lines of 10 digits)
SST6 Large wired-on SS Tag (6 lines of 20 digits)
CCxx Certificate of Probe Calibration (2-point) ⁽²⁾
CCxx Certificate of Probe Calibration (3-point) ⁽²⁾
CCxx Certificate of Probe Calibration (4-point) ⁽²⁾
APD Assembly Performance Data Certificate ⁽³⁾
(Probe with STT 3000)

78D4	S	J	S	G	6	B3	R	A	SST6 - CC2F
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(1) Caution: Excessive lead lengths may result in lead wire damage due to space limitations within the remote head.

(2) Select Calibration Schedule (xx) from Table 1.

(3) Specify LRV, URV and input type of transmitter on OP16-CC screen and select CCxx option.

See Table 2 for Drawings, Manuals and Certificates.

Model Selection Guides

THERMOWELLS									
SX Standard threaded well; no lag extension - stepped LX Standard threaded well; with lag extension - stepped HX Heavy duty threaded well; no lag extension - tapered TX Heavy duty threaded well; with lag extension - tapered WX Socket wells - stepped					where X = Well Process Thread/Pipe (extern 1 = mates with 1/2" NPT Pipe (not available with S 2 = mates with 3/4" NPT 3 = mates with 1" NPT				
FM Flanged well - straight GM Flanged well - tapered					where M = Flange Material A = Carbon Steel F = Inconel 600 B = SS 304 G = SS 446 C = SS 316 H = Monel D = SS 316L K = Hastelloy B E = Hastelloy C O = Other				
All thermowells have 0.260" bore and 1/2" NPT internal threads to mate with spring-loaded probe.									
STEM (A) LENGTH OF WELL (IN INCHES)									
A Stem (A) Length of well (in inches) (A) must match probe stem length. Flanged (A) = U + 2; Threaded or Socket (A) = U + T + 1.5									
INSERTION (U) LENGTH (IN INCHES)									
U Insertion (U) length (in inches)									
LAG (T) LENGTH (IN INCHES)									
T Lag (T) length (in inches) For FM, GM, SX, HX and WX, lag (T) = 0									
THERMOWELL MATERIAL									
A Carbon Steel B SS 304 C SS 316 D SS 316L E Hastelloy C F Inconel 600 G SS 446 H Monel K Hastelloy B O Other									
FLANGE FACE TYPE									
R Raised Face F Flat Faced RTJ Ring-Type Joint X Not applicable (choose with SX, LX, HX, TX and WX)									
FLANGE RATING									
150 ANSI 150 Flange Rating 300 ANSI 300 Flange Rating 600 ANSI 400 to ANSI 600 Flange Rating 1500 ANSI 900 to ANSI 1500 Flange Rating X Not applicable (choose with SX, LX, HX, TX and WX)									
FLANGE SIZE (1", 1- 1/2", 2" or 3" flanges available)									
n" Flange size (where n is in inches) X Not applicable (choose with SX, LX, HX, TX and WX)									
MAXIMUM OPERATING PRESSURE (psi)									
CODE - OPTIONS									
SST3 Small wired-on SS Tag (3 lines of 10 digits) SST6 Large wired-on SS Tag (6 lines of 20 digits)									
FC	6	4	0	C	R	150	1"	200	SST3

See Table 2 for Drawings, Manuals and Certificates.
 Note: Do not use rigid probes with thermowells. Only spring-loaded probes are compatible with thermowells.

Table 1

SENSOR/PROBE CALIBRATION CERTIFICATE SELECTION SCHEDULE

(For use with Probe Calibration Certificate Option CCxx)

When option CCxx is selected with a sensor/probe assembly, a calibration schedule must be selected and indicated with each assembly ordered. Replace xx with the desired calibration schedule.

For example, choose CC5C for 3-point calibration at 0, 100 and 500 degrees C.

xx = Schedule	Available for:	Temperature Range	Actual Calibration Points
1C	3-point	-196 to 0 deg C	-196, 0 & 100 deg C
2C	4-point	-196 to 500 deg C	-196, 0, 100 & 500 deg C
3C	2-point	0 to 100 deg C	0 & 100 deg C
4C	3-point	0 to 200 deg C	0, 100 & 200 deg C
5C	3-point	0 to 500 deg C	0, 100 & 500 deg C
6C	3-point	0 to 660 deg C	0, 100 & 419.58 deg C
XC	2-, 3-, or 4-point Specify (Consult Phoenix FMPM for price) (Within the range of -196 to 419.58 deg C)		
1F	3-point	-320 to 32 deg F	-320, 32 & 212 deg F
2F	4-point	-320 to 932 deg F	-320, 32, 212 & 932 deg F
3F	2-point	32 to 212 deg F	32 & 212 deg F
4F	3-point	32 to 392 deg F	32, 212 & 392 deg F
5F	3-point	32 to 932 deg F	32, 212 & 932 deg F
6F	3-point	32 to 1220 deg F	32, 212 & 787.24 deg F
XF	2-, 3-, or 4-point Specify (Consult Phoenix FMPM for price) (Within the range of -320 to 932 deg F)		

Table 2

Documentation Price List

(For use with any Probe and/or Thermowell Combination Above)

Probe or Thermowell Assembly Drawings	on Sales Order
Reproducible (Specify certified or non-certified)	Order in "Drawings" (DR) text area
Blueprint (Specify certified or non-certified)	
Extra Copies	
CAD drawing (on disk) - Specify format. (each drawing requested is one file)	
Installation & Maintenance Manuals	Order in Probe Model Number
Certificate of Conformance	
Material Traceability Report	
Certificate of Probe Calibration (2-point)	
Certificate of Probe Calibration (3-point)	
Certificate of Probe Calibration (4-point)	
Assembly Performance Data Certificate (Probe with STT 3000)	

- Required documentation must be specified at the time of order.

- Standard leadtime is 5 days for quantities less than 10.

- For Drawings, on Sales Order,

- Specify quantity, name/"Attn. to", address where drawings are to be shipped to, and whether reproducible (specify certified or non-certified), blueprint (specify certified or non-certified), copy or CAD drawings in "Drawings" (DR) text area.

- Additional/Alternate addresses should be included in the standard Ship SPINS (SP). If address is not provided, drawings will be shipped along with the unit to the Ship To address listed on the sales order.

- For Drawings on Disk,

- Specify drawing format in "Drawings" (DR) text area. Available formats are: *.dwg AutoCad (Specify R12 or R13), *.3ds, *.bmp, *.dxf, *.dxx, *.eps, *.pft, *.sat and *.wmf.

Table 3

Assembly Performance Data Certificate

(For use with any Probe and/or Thermowell Combination Above)

Assembly Performance Data Certificate Option

Based on the options previously selected for each individual sensor/probe assembly, the Assembly Performance Data Certificate (APDC) will be generated. Select CCxx option (See Table 1).

- Individual data obtained with CCxx will be used in simulated inputs to the transmitter to generate

Honeywell

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