

Product Features

- CSA Class I Div. 1 Explosion Proof 
- Available 4-20mA or voltage programmable signal output
- Available fully programmable switch output; relay or transistor
- Field re-programmable with optional PC interface module & software
- Security password and tracking protection for re-programming and re-calibration
- Utilizes self-calibration feature for accurate and stable performance
- Utilizes Pt-100 Ohm RTD Class A element for temperature sensing
- Excellent long term properties
- Standard SS316/SS316L construction
- Type 4X, IP66/IP67 rated environmental protection
- Easy installation with various mounting configurations

Description

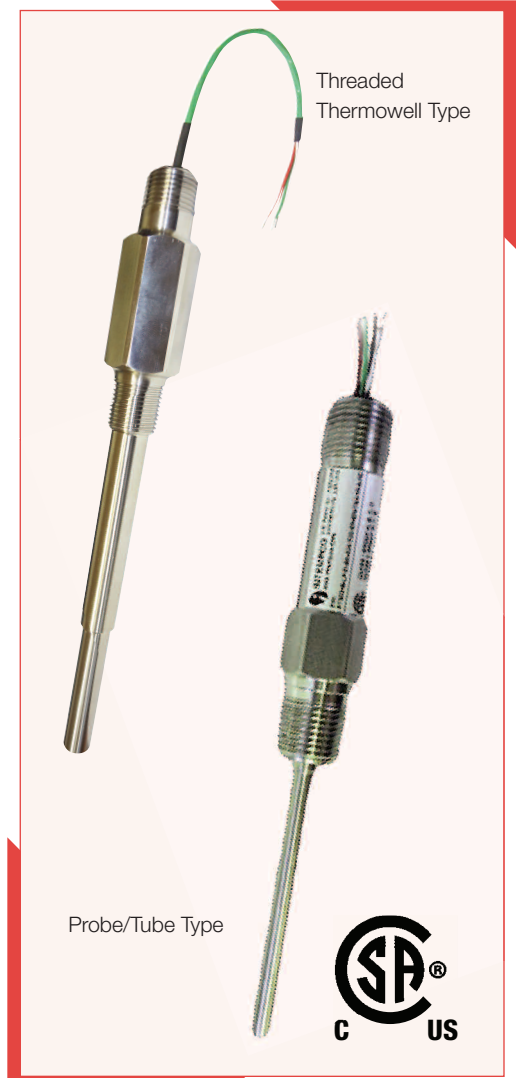
Series PTS02 is a Programmable Temperature Switch & Transmitter offering an analog 4-20mA output, transistor or relay switch output, and an optional RTD output. Utilizing Intempco's patented MIST technology, PTS02 is designed for optimum accuracy and performance. The main areas of applications for this transducer are oil and gas as well as other hazardous areas.

PTS02 is shipped factory calibrated to customer specified temperature ranges. But the unique feature of the PTS02 is that it is re-programmable. Process temperature or alarm change? No problem! Simply use PTS02-PKIT interface module and re-range your PTS without the need to recalibrate and without the loss of accuracy. PTS02 is much more accurate than an RTD and a separate indicator/transmitter or switch. When the PTS02 is re-scaled to a different temperature range, the calibrated default values are not lost. This transducer can be re-calibrated by performing one-point or two-point calibration using known temperature standards. This is where the PTS02 leaves the competition behind. Indicating temperature range, current output, switch set point, switching hysteresis, switch logic, damping and other features are all programmable.

The PTS02 wetted parts, as well as the housing, are fabricated from 316 stainless construction. Other materials, various probe diameters, fitting sizes and thermowell types are available. For electrical connection, a 1/2" NPT conduit with lead wires is standard. The sensing element used is Pt-100 Ohm RTD Class A. PTS02 can be made available with an additional 3-wire RTD output. This feature allows a single process connection to be used for indication of temperature and for remote indication, recording, or controlling. Each PTS02 has the part number, range and serial number marked on the transmitter housing.

If you require an accurate, stable and dependable temperature transducer, look no further. Model PTS02 is your solution.

This product is protected under US patent 7,223,014 and CDN patent 2,561,570.



Applications

- Oil and Gas
- Refineries
- Chemical and Petrochemical Plants
- Paper Mills
- Hydraulics
- Mining

PTS02 Series

Programmable Temperature Switch & Transmitter

Custom Builder : Probe/Tube Type Design

MODEL 1 2 3 4 5 6 7 8 9 10 11 12

PTS02 - - - - - - - - - - - -

BOX1 CODE	Model Range
B	Very Low Temp. -50 to 100°C (-58/212°F)
L	Low Temp. -50 to 200°C (-58/392°F)

* Code **L** selection determines that Box6 length "T" is 1.00" min. (**T10**).

BOX2 CODE	Output
LP	4-20mA loop, upscale burnout (std.)
LD	4-20mA loop, downscale burnout
CA	4-20mA, source 3-wire
CB	0-20mA, source 3-wire
CR	4-20mA 3-wire + Relay SPDT
CN*	4-20mA 3-wire + NPN Transistor
CP*	4-20mA 3-wire + PNP Transistor
VA	0-5 Vdc, 3-wire
AR*	0-5 Vdc, 3-wire + Relay SPDT
AN*	0-5 Vdc, 3-wire + NPN Transistor
AP*	0-5 Vdc, 3-wire + PNP Transistor
VB	1-5 Vdc, 3-wire
BR*	1-5 Vdc, 3-wire + Relay SPDT
BN*	1-5 Vdc, 3-wire + NPN Transistor
BP*	1-5 Vdc, 3-wire + PNP Transistor
VD	0-10 Vdc, 3-wire
DR*	0-10 Vdc, 3-wire + Relay SPDT
DN*	0-10 Vdc, 3-wire + NPN Transistor
DP*	0-10 Vdc, 3-wire + PNP Transistor
RA	Relay SPDT, only
NA*	NPN Transistor, only
PA*	PNP Transistor, only
RB*	2 Relay SPDT, only*
NB*	2 NPN Transistor, only
PB*	2 PNP Transistor, only

Notes:

- PTS02's are factory calibrated to an accuracy of $\pm 0.25\%$ of span or better.
- Add suffix A3 for Pt 100 Ohm @ 0°C ($\pm 0.15^\circ\text{C}$) = 0.00385 DIN EN 60751 Class A ($\pm 0.06\%$), 3-wire additional output. Ex.: **LPA3**
- Order **PTS02-PKIT-2** to set-up, re-program and re-calibrate in the field.
- For 4-20mA output temperature ranges, control/ alarm setpoints, type heating/cooling, indicate desired value in °C or °F (display units) after the completed p/n. See web site www.intempco.com.
Ex. PTS02-B-CR-D-SA-060-T10-EN-EN-TF-072-A-N0
Range 4-20mA = 0/100°C
Set point = 75°C Reset = 55°C
Type = Heating

* For non hazardous areas, BOX11 option X

BOX3 CODE	Probe Diameter "D"
C	3/16" (4.8mm)
60	0.236" (6.0mm)
D	1/4" (6.4mm)
80	0.315" (8.0mm)
F	3/8" (9.5mm)
10	0.394" (10.0mm)
12	0.472" (12.0mm)
H	1/2" (12.7mm)

BOX4 CODE	Probe/Fitting Material
SA	Stainless steel 316/316L (std.)
LA	Inconel® 600
HA	Hastelloy® C-276
MA	Monel® 400

Other materials available. See Table Mat-1 or consult factory.

BOX5 CODE	Immersion Length "U"
---	In 0.1" increments (max. 40") Ex.: 065 = 6.5" long

BOX6 CODE	Lag Extension Length "T"
T ---	In 0.1" increments (1.0" Std.) Ex.: T10 = 1.0" long

Select T=1.0" or longer for process temperatures above 100°C or consult factory. Enter T00 for no lag.

BOX7 CODE	Instrument Connection
EN	1/2" NPT male
FN	3/4" NPT male
EE*	1/2" NPS male
FE*	3/4" NPS male
ER*	R 1/2" male (BSPT)
FR*	R 3/4" male (BSPT)
EG*	G 1/2" male (BSPP)
FG*	G 3/4" male (BSPP)
M20	M20x1.5
M27	M27x2

BOX8 CODE	Process Fitting Type "P"
CN	1/4" NPT, male ("D" 0.315" max.)
EN	1/2" NPT, male
FN	3/4" NPT, male
CS	SAE 4, male ("D" 0.250" max.)
ES	SAE 6, male ("D" 0.394" max.)
FS	SAE 8, male
CR	R 1/4" male (BSPT) ("D" 0.315" max.)
ER	R 1/2" male (BSPT)
FR	R 3/4" male (BSPT)

Other process fitting connection available. See Table PFT-1 or consult factory.

BOX9 CODE	Extension Cable Type
SN	Silicone insulation, flying leads 180°C (356°F) max.
SL	Silicone jacketed cable 180°C (356°F) max.
TN	Teflon® insulation, flying leads 200°C (392°F) max.
TF	Teflon® jacketed cable 200°C (392°F) max.
TS	Teflon® cable with SS overbraid, 200°C (392°F) max.
TA	Teflon® cable with SS armor, 200°C (392°F) max.

BOX10 CODE	Extension Cable Length "F"
---	In inches (max. 1200 inches) Ex.: 060 = 60" long
Note : Extension wires 12" long and less are single stranded leads, 22 AWG	

BOX11 CODE	Approvals
X	None, for non-hazardous areas
A	CSA (c/us) Ex. Proof (no seal required) Class I Group A,B,C,D Class II Group E,F,G, Class III, Type 4X

BOX12 CODE	Options
N0	None
C1	CoC @ 0°C
C2	CoC @ 0°C & 100°C
CX	CoC, specify points
H1	Full Hex option for Box 1 "B" Code
H2	Hex option for Box 1 "L" Code

Dimensions

Probe/Tube Type Design

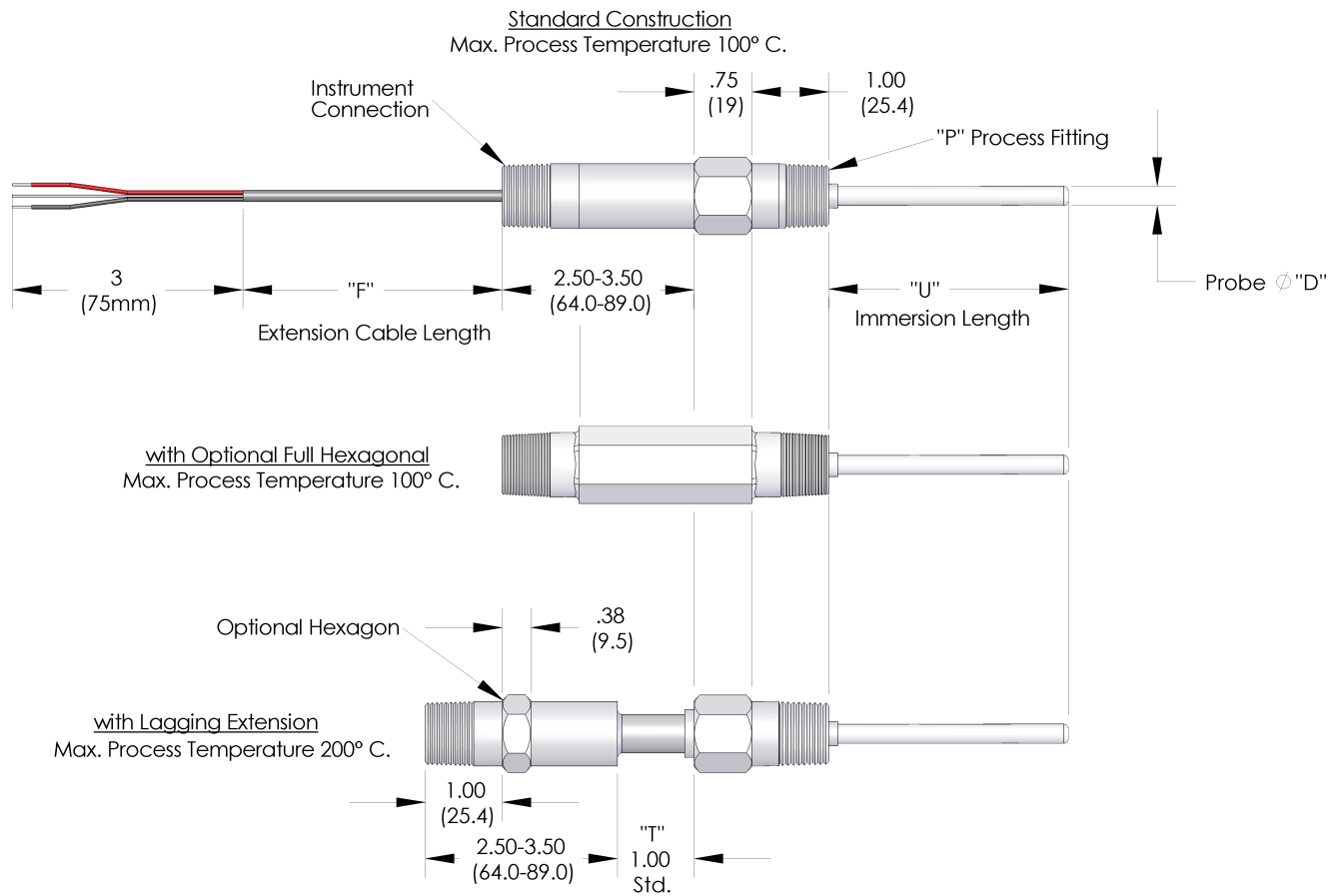


Table Mat-1

BOX4 CODE	Material
SA	Stainless steel 316/316L std.
SC	Stainless steel 304/304L
SE	Stainless steel 310
SF	Stainless steel 321
SG	Stainless steel 347
SB	Stainless steel 316H
SD	Stainless steel 304H
SH	Stainless steel 410
SJ	Stainless steel 446
SK	Stainless steel duplex (1.4462)
SL	Stainless steel 1.4571
CA**	Carbon steel F11
CB**	Carbon steel F22

BOX4 CODE	Material (continued)
CC**	Carbon steel F5
CD**	Carbon steel F9
CE**	Carbon steel F91
CF**	Carbon steel A105
CG**	Carbon steel 1.7335 (13CrMo44)
CH**	Carbon steel 1.5415 (15Mo3/16Mo3)
CJ**	Carbon steel 1.7380 (10CrMo910)
CK**	Carbon steel 1.0460 (C22.8)
CL**	Carbon steel 1018
LA	Inconel® 600
LB	Inconel® 601
LC	Inconel® 625

BOX4 CODE	Material (continued)
LM	Incoloy® 800H/HT
LN	Incoloy® 825
HA	Hastelloy® C-276
HB	Hastelloy® B-2
HC	Hastelloy® C-4
HD	Hastelloy® C-22
TA	Titanium Grade II
MA	Monel® 400
NA	Nickel 200
NB	Nickel 201
AA*	Aluminum 6061-T6
BA*	Brass C-360

* For non hazardous areas, BOX11 option X
** Type 4, IP66/IP67 rated environmental protection

Table PFT-1 for Probe/Tube Type Design

BOX8 CODE	Process Fitting Type " P "
CN	1/4" NPT, male ("D" 0.315" max.)
EN	1/2" NPT, male
FN	3/4" NPT, male
CE	1/4" NPS male
EE	1/2" NPS male
FE	3/4" NPS male
CS	SAE 4, male ("D" 0.250" max.)
ES	SAE 6, male ("D" 0.394" max.)
FS	SAE 8, male
CR	R 1/4" male (BSPT) ("D" 0.315" max.)
ER	R 1/2" male (BSPT)
FR	R 3/4" male (BSPT)
CG	G 1/4" male (BSPP)
EG	G 1/2" male (BSPP)
FG	G 3/4" male (BSPP)
M20	M20x1.5
M27	M27x2

Custom Builder : Threaded Thermowell Design

MODEL 1 2 3 4 5 6 7 8 9 10 11 12

PTS02 - - - - - - - - - - - -

BOX1 CODE	Model Range
B	Very Low Temp. -50 to 100°C (-58/212°F)
L	Low Temp. 50 to 200°C (-58/392°F)

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BOX2 CODE	Output
LP	4-20mA loop, upscale burnout (std.)
LD	4-20mA loop, downscale burnout
CA	4-20mA, source 3-wire
CB	0-20mA, source 3-wire
CR	4-20mA 3-wire + Relay SPDT
CN*	4-20mA 3-wire + NPN Transistor
CP*	4-20mA 3-wire + PNP Transistor
VA	0-5 Vdc, 3-wire
AR*	0-5 Vdc, 3-wire + Relay SPDT
AN*	0-5 Vdc, 3-wire + NPN Transistor
AP*	0-5 Vdc, 3-wire + PNP Transistor
VB	1-5 Vdc, 3-wire
BR*	1-5 Vdc, 3-wire + Relay SPDT
BN*	1-5 Vdc, 3-wire + NPN Transistor
BP*	1-5 Vdc, 3-wire + PNP Transistor
VD	0-10 Vdc, 3-wire
DR*	0-10 Vdc, 3-wire + Relay SPDT
DN*	0-10 Vdc, 3-wire + NPN Transistor
DP*	0-10 Vdc, 3-wire + PNP Transistor
RA	Relay SPDT, only
NA*	NPN Transistor, only
PA*	PNP Transistor, only
RB*	2 Relay SPDT, only*
NB*	2 NPN Transistor, only
PB*	2 PNP Transistor, only

Notes:

- PTS02's are factory calibrated to an accuracy of $\pm 0.25\%$ of span or better.
- Add suffix A3 for Pt 100 Ohm @ 0°C ($\pm 0.15^\circ\text{C}$)
= 0.00385 DIN EN 60751 Class A ($\pm 0.06\%$),
3-wire additional output. Ex.: **LPA3**
- Order **PTS02-PKIT-2** to set-up, re-program and re-calibrate in the field.
- For 4-20mA output temperature ranges, control/ alarm setpoints, type heating/cooling, indicate desired value in °C or °F (display units) after the completed p/n. See web site www.intempco.com.
Ex. PTS02-B-CR-BA-SA-060-T10-EN-EN-TF-072-A-N0
Range 4-20mA = 0/100°C
Set point = 75°C Reset = 55°C
Type = Heating

* For non hazardous areas, BOX11 option X

BOX3 CODE	Straight Shank Threaded Thermowell		
	"P"	Root "Q"	Tip "V"
AA	1/2", M20	--	0.500"
AB	1/2", M20	--	0.625"
AF	3/4", M27	--	0.625"
AG	3/4", M27	--	0.750"

BOX3 CODE	Stepped Shank Threaded Thermowell		
	"P"	Root "Q"	Tip "V"
BA	1/2", M20	0.625"	0.500"
BF	3/4", M27	0.750"	0.500"

BOX3 CODE	Tapered Shank Threaded Thermowell		
	"P"	Root "Q"	Tip "V"
CA	1/2", M20	0.625"	0.500"
CB	1/2", M20	0.687"	0.625"
CF	3/4", M27	0.875"	0.500"
CG	3/4", M27	0.875"	0.625"

BOX4 CODE	Probe / Fitting Material
SA	Stainless steel 316/316L (std.)
LA	Inconel® 600
HA	Hastelloy® C-276
MA	Monel® 400

Other materials available. See Table Mat-1 or consult factory.

BOX5 CODE	Immersion Length "U"
---	In 0.1" increments (max. 24") Ex.: 065 = 6.5" long

BOX6 CODE	Lag Extension Length "T"
T ---	In 0.1" increments (1.0" Std.) Ex.: T10 = 1.0" long

Select T=1.0" or longer for process temperatures above 100°C or consult factory. Enter T00 for no lag.

BOX7 CODE	Instrument Connection
EN	1/2" NPT male
FN	3/4" NPT male
EE*	1/2" NPS male
FE*	3/4" NPS male
ER*	R 1/2" male (BSPT)
FR*	R 3/4" male (BSPT)
EG*	G 1/2" male (BSPP)
FG*	G 3/4" male (BSPP)
M20	M20x1.5
M27	M27x2

BOX8 CODE	Process Fitting Type "P"
EN	1/2" NPT male
FN	3/4" NPT male
EE	1/2" NPS male
FE	3/4" NPS male
ER	R 1/2" male (BSPT)
FR	R 3/4" male (BSPT)
EG	G 1/2" male (BSPP)
FG	G 3/4" male (BSPP)
M20	M20x1.5
M27	M27x2

BOX9 CODE	Extension Cable Type
SN	Silicone insulation, flying leads 180°C (356°F) max.
SL	Silicone jacketed cable 180°C (356°F) max.
TN	Teflon® insulation, flying leads 200°C (392°F) max.
TF	Teflon® jacketed cable 200°C (392°F) max.
TS	Teflon® cable with SS overbraid, 200°C (392°F) max.
TA	Teflon® cable with SS armor, 200°C (392°F) max.

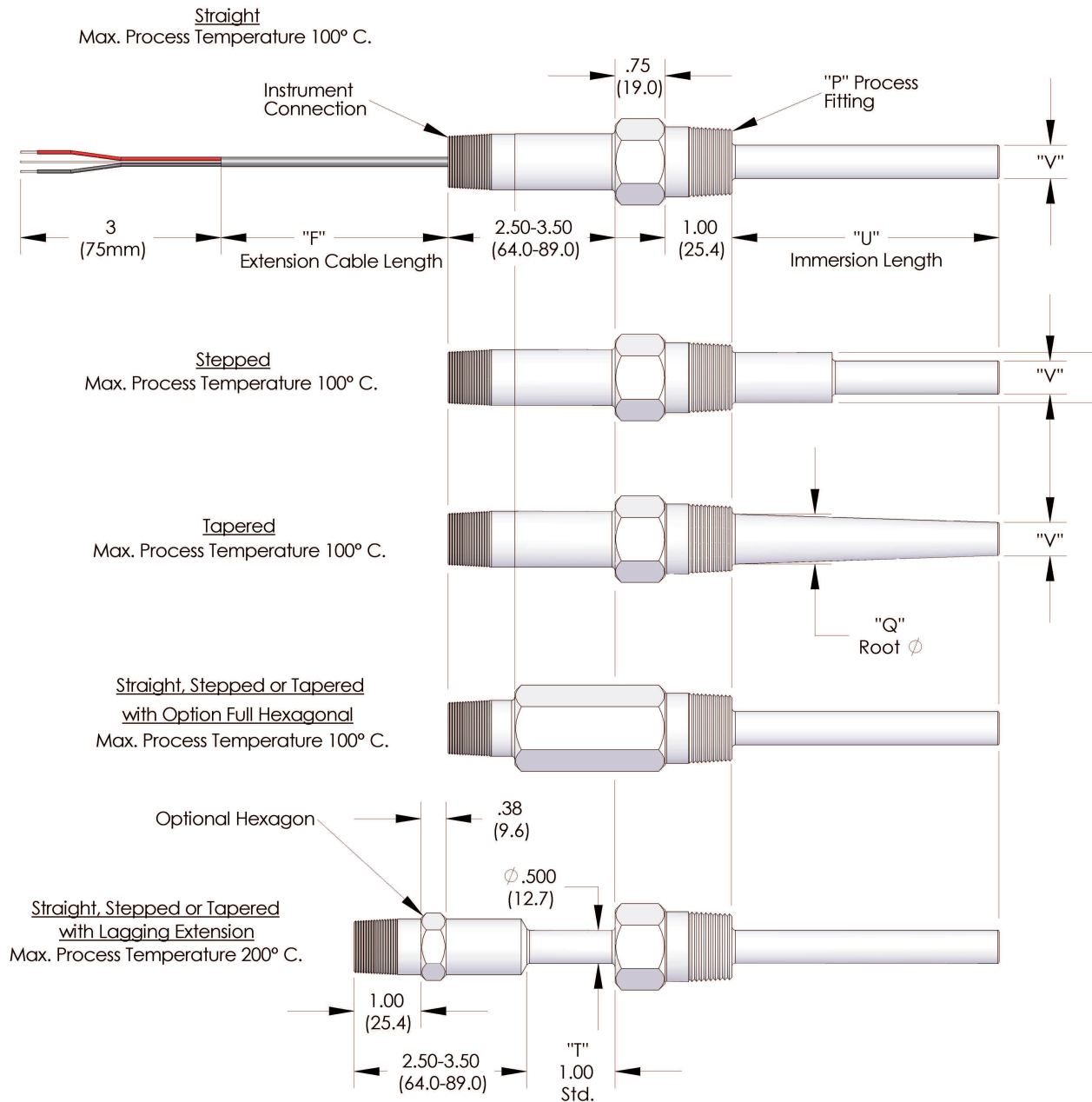
BOX10 CODE	Extension Cable Length "F"
---	In inches (max. 1200 inches) Ex.: 060 = 60" long
Note : Extension wires 12" long and less are single stranded leads, 22 AWG	

BOX11 CODE	Approvals
X	None, for non-hazardous areas
A	CSA (c/us) Ex. Proof (no seal required) Class I Group A,B,C,D Class II Group E,F,G, Class III, Type 4X

BOX12 CODE	Options
N0	None
C1	CoC @ 0°C
C2	CoC @ 0°C & 100°C
CX	CoC, specify points
H1	Full Hex option for Box 1 "B" Code
H2	Hex option for Box 1 "L" Code

Dimensions

Threaded Thermowell Design



Technical Specifications - 3-wire outputs & switching

Electrical Properties

Sensing Element :	RTD, Type Pt100 DIN EN6075, Class A
Sensor Current :	<0.25 mA
Temperature Ranges :	Customer re-scalable between -50°C to 200°C depending on model. No re-calibration required.
Switching Ranges :	Customer programmable between -50°C to 200°C depending on model.
Hysteresis :	Customer programmable, 1% of range by factory setting.
Accuracy :	$\pm (.25^{\circ}\text{C} + 0.40\% \text{ of span})$ with one-point calibration ¹ . $\pm (.10^{\circ}\text{C} + 0.10\% \text{ of calibrated span})$ with two-point calibration ² .
Open circuit detection :	Upscale (22 mA) or Downscale (2.5 mA) current output.
Warm-up :	30 seconds.
Response Time :	0.5 sec to 30 sec (software selectable)
RFI effect :	1 % or less typical
Temp. Effect :	$\pm 0.001\%$ of span / °C deviation from 25°C
Power Supply :	12-32 VDC, polarity protected
Supply effect :	0.005 % / V
Power consumption :	15 mA @ 24 VDC + output current – 950 mW max. 20 mA @ 24 VDC for NPN output – 500 mW max. 20 mA @ 24 VDC + sourcing current for PNP output 50 mA @ 24 VDC for Relay Output – 1200 mW max.
Current Output:	4-20 mA (3 wires configuration) linear to temperature.
Max load on current output :	$[(V_{\text{supply}} - 7V) / 20 \text{ mA}] \text{ ohms}$
Switching Output :	Transistor NPN - max. 50 mA @ 24 VDC sink current Transistor PNP - max. 50 mA @ 24 VDC source current Relay SPDT 0.5A @ 120 VAC
Switching Logic :	N.C. or N.O. software selectable.
Isolation :	500 VDC Input/Output (between probe and output signal)
Electrical Connection :	Multi-conductor cable or single conductors, potted and sealed, minimum conductor size 22 ga

Mechanical Properties

Ambient Temp. Range :	-40°C to 80°C (-40°F to 176°F)
Storage Temp. Range :	-50°C to 85°C (-58°F to 185°F)
Max. Pressure :	Thermowell design : 6000 PSI Probe/Tube type design : Up to 3000 PSI, depending on tube diameter. Consult factory for application. (applies to sensor portion only)
Housing Material :	Stainless steel 316/316L standard, others available
Probe Material :	Stainless steel 316/316L standard, others available
Cable Materials :	Silicone, Teflon®, SS armor or SS overbraid over Teflon®
Cable Length :	Maximum supplied cable length on sensor is 1200 inches.
Environmental Protection :	Type 4X, IP66/IP67. Potted electronics.

Teflon® is a registered trademark of E.I. du Pont de Nemours and Company.

¹. Max. error on complete span. Error at calibration point $\leq 0.1\%$ of Span.

². Max. error on complete calibrated span. Error at calibration points $\leq 0.1\%$ of Span.

- Information furnished by Intempco is believed to be accurate and reliable. However, no responsibility is assumed by Intempco for its use.
- Specifications subject to change without notice.

Installation Considerations

Installation requirements of the PTS are similar to those of the temperature sensor assemblies with head mounted hockey puck transmitter. If the temperature of the electronics in the housing exceeds 80°C, permanent damage to the PTS may occur. In all applications, especially those close to 200°C, careful attention must be placed on correct installation. It is the installer's, customer's and/or end user's responsibility to make sure that this over exposure to temperature does not occur due to improper installation.

Technical Specifications : 2-wire and 3-wire voltage outputs

Electrical Properties

Sensing Element :	RTD, Type Pt100 DIN EN6075, Class A
Sensor Current :	< 0.25 mA
Sensor Temperature Ranges :	See Box1 code for standard ranges. Field re-scalable between or -50°C to 200°C
Outputs :	4-20 mA loop powered, 2-wire, linear to temperature 0-5 VDC, 1-5 VDC, 0-10 VDC all 3-wire, linear to temperature
Minimum Input Impedance :	1000 Ohm (of measuring device, for voltage output)
Power Supply :	12-32 VDC, polarity protected
Supply Effect :	0.001 %/V
Accuracy :	$\pm (.25^{\circ}\text{C} + 0.40\% \text{ of span})$ with one-point calibration ¹ . $\pm (.10^{\circ}\text{C} + 0.10\% \text{ of calibrated span})$ with two-point calibration ² .
Maximum Loop Resistance :	$[(V_{\text{supply}} - 7V) / 20 \text{ mA}]$ ohms (for 4-20 mA output only)
Sensor Open Circuit :	Upscale 24 mA or Downscale 2.5 mA (for 4-20 mA output only)
Warmup :	30 seconds
RFI Effect :	1 % or less typical
Isolation :	500 VDC Input / Output
Temp. Effects :	$\pm 0.001\% \text{ of Span}/^{\circ}\text{C}$ deviation from 25°C
Long Term Drift :	$\leq 0.1\% \text{ FS/Year}$

Mechanical Properties

Ambient Temp. Range :	-40°C to 80°C (-40°F to 176°F)
Storage Temp. Range :	-50°C to 85°C (-58°F to 185°F)
Max. Pressure :	Thermowell design : 6000 PSI Probe/Tube type design : Up to 3000 PSI, depending on tube diameter. Consult factory for application. (applies to sensor portion only)
Housing Material :	Stainless steel 316/316L standard, others available.
Probe Material :	Stainless steel 316/316L standard, others available.
Cable Materials :	Silicone, Teflon®, SS armor or SS overbraid over Teflon®
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