



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

RTD T13, T14 and T15

Explosion proof RTD assemblies in Thermowells with spring loaded insert and enclosure for process industry



Areas of application

The T13, T14 and T15 temperature sensors are RTD assemblies installed in Thermowells and designed for use in harsh environments and explosive areas, due to their FM and CSA approvals.

The sensor is made up of a measurement probe with an insulated RTD element, sheath and a thermowell made of bar-stock material.

The sensor assemblies can be used in process industries such as:

- Chemicals
- Petrochemical
- Refineries
- Offshore Platforms

Head transmitters

Instead of directly wiring your temperature sensors to your control system, use transmitters to reduce wiring and maintenance costs while increasing measurement accuracy.

Field transmitters

Temperature field transmitters with HART® or FOUNDATION Fieldbus™ protocol for highest reliability in harsh industrial environments. Blue backlit display with large measured value, bargraph and fault condition indication for ease of reading.

Your benefits

- FM/CSA XP Class I, Div. 1 approved temperature assemblies for maximum safety
- One source shopping for temperature measurement solutions. World class transmitter with integrated sensor offering for heavy process industry applications
- Remove and install straight out of the box!
- Improved galvanic isolation on most devices (2 kV)
- Simplified model structure: Competitively priced, offers great value. Easy to order and reorder. A single model number includes sensor, thermowell and transmitter assembly for a complete point solution
- All iTEMP® transmitters provide long term stability $\leq 0.05\%$ per year



Function and system design

Measuring principle

The RTD (Resistance Temperature Detector) element consists of an electrical resistance with a value of 100 Ω at 0 °C (called Pt100, in compliance with IEC 60751), which increases at higher temperatures according to a coefficient characteristic of resistor material (platinum). In industrial thermometers that comply with the IEC 60751 standard, the value of this coefficient is $\alpha = 0.00385 \text{ }^{\circ}\text{C}^{-1}$, calculated between 0 and 100 °C (32 and 212 °F).

Equipment architecture

The single and duplex element RTDs are designed to measure temperature in a variety of processes and laboratory applications. These RTDs are specifically designed for use in two different process temperature ranges and they will provide accurate and repeatable temperature measurement through a broad temperature range of -328 to 1112 °F (-200 to 600 °C). Low range thin film RTDs -58 to 392 °F (-50 to 200 °C) are constructed using silver plated and copper internal leads, PTFE wire insulations with potting compounds to resist moisture penetration. High range RTDs -328 to 1112 °F (-200 to 600 °C) are constructed with nickel internal leads inside swaged MgO insulated cables to allow higher temperature measurements at the RTD element and to provide higher temperature lead protection along the sheath.

Measurement range

Construction	Model code (class and type of sensor)	max. range
Low temperature range	T13-____ (A/C/E/G/J/L) _____	-58 to 392 °F (-50 to 200 °C)
	T14-____ (A/C/E/G/J/L) _____	
	T15-__ (A/C/E/G/J/L) _____	
High temperature range	T13-____ (B/D/F/H/K/M) _____	-328 to 1112 °F (-200 to 600 °C)
	T14-____ (B/D/F/H/K/M) _____	
	T15-__ (B/D/F/H/K/M) _____	



Note!
Options J, K, L, M are duplex platinum elements of two sensors inside the same sheath.

Calibration specifications

3 point sensor calibration		
-40 to 0 °C	0 to 100 °C	+40 to 215 °C
-40 to 32 °F	32 to 212 °F	104 to 420 °F
Minimum length requirements for calibrated sensors = 6"		



Note!
Use option code 'B' (Block: Test; calibration) for calibration, the three temperature points need to be specified in 5 °C (9 °F) increments.

The manufacturer provides comparison temperature calibrations from -40 to +215 °C (-40 to +420 °F) on the International Temperature Scale of 1990. Calibrations are traceable to standards maintained by the National Institute of Standards and Technology (NIST). Calibration services are in conformance with ASTM E220, IEC 17025 and ANSI/NCSL Z540-1-1994. The report of calibration is referenced to the serial number of the assembly.

Three point calibrations are provided, given that the specified temperatures are within the recommended range and the minimum length requirements are met as specified. The minimum length is based on overall length 'x' of the spring loaded insert.

Electronics

Family of temperature transmitters	Measurement assemblies with iTEMP® transmitters are an installation ready solution to improve the functionality of temperature measurement by increasing accuracy and reliability when compared to direct wired sensors. Overall installation costs are lower than with direct wired sensors, since an inexpensive pair of signal (4 to 20 mA) wires can be run over long distances.
PC programmable devices TMT180 and TMT181	PC programmable head transmitters offer you extreme flexibility and help control costs with the ability to stock one device and program it for your needs. Regardless of your choice of output, all iTEMP® transmitters can be configured quickly and easily with a PC. To help you with this task, Endress+Hauser offers free software ReadWin® 2000 which can be downloaded from our website. Go to www.readwin2000.com to download ReadWin® 2000 today. For details see Technical Information.
HART® TMT182 head transmitter	HART® communication is all about easy, reliable data access and getting better information more inexpensively. iTEMP® transmitters integrate seamlessly into your existing control system and provide painless access to preventative diagnostic information. Configuration with a DXR275 or 375 hand-held or a PC with configuration program (FieldCare, ReadWin® 2000) or configure with AMS or PDM. For details, see Technical Information.
Field transmitter TMT162 - Dual compartment housing	Field transmitter with HART® communication, FOUNDATION Fieldbus™ protocol and blue backlit display. Can be read easily from a distance, in sunlight and at night. Large measurement value, bargraph and fault indication display. Benefits are: dual sensor input, highest reliability in harsh industrial environments, mathematic functions, thermometer drift monitoring, sensor back-up functionality, corrosion detection and sensor transmitter matching by accepting Callendar Van Dusen constants. For details, see Technical Information.
Field transmitter TMT142 - Single compartment housing	Field transmitter with HART® communication. The one channel TMT142 allows for cost effective replacement of smaller transmitters with tiny display and old style analog transmitters. Large and brilliant blue backlit display. Regardless of whether you install the transmitter in a dark location or in direct sunlight, you still get a clear temperature reading. Reliable temperature measurement through advanced diagnostics. For details, see Technical Information.
PROFIBUS® PA TMT184 head transmitter	Universally programmable head transmitter with PROFIBUS®-PA fieldbus communication. Converting various input signals into a digital output signal. High accuracy in the total ambient temperature range. Swift and easy operation, visualization and maintenance using a PC direct from the control panel, e. g. using operating software such as FieldCare, Simatic PDM or AMS. DIP switch for address setting, makes start up and maintenance safe and reliable. For details, see Technical Information.

Performance characteristics

Response time

63% response time per ASTM E644

RTD assembly T15 without thermowell

Construction	RTD insert ø ¼"
High temperature range	3 s
Low temperature range	9 s



Note!
Response time for the sensor assembly without transmitter.

Response time examples for RTD assemblies with thermowell T13 and T14

Construction	Stepped thermowell	Tapered thermowell	¾" straight thermowell
High temperature range	20 s	25 s	30 s
Low temperature range	25 s	30 s	35 s



Note!
Response times for RTD assemblies with thermowell are provided for general design guidance without transmitter

When the temperature of a process media changes, the output signal of a RTD assembly follows this change after a certain time delay. The physical cause is the time related to heat transfer from the process media through the thermowell and the insert to the sensor element (RTD). The manner in which the reading follows the change in temperature of the assembly over time is referred to as the response time. Variables that influence or impact the response time are:

- Wall thickness of thermowell
- Spacing between RTD insert and thermowell
- Sensor packaging
- Process parameters such as media, flow velocity, etc.

Maximum measured error

RTD corresponding to IEC 60751

Class	max. Tolerances (°C)
A	$\pm(0.15 + 0.002 \cdot t)$, Temperature range: -100 °C to 450 °C
B	$\pm(0.3 + 0.005 \cdot t)$, Temperature range: -200 °C to 600 °C

1) $|t|$ = absolute value °C



Note!
For measurement errors in °F, calculate using equation above in °C, then multiply the outcome by 1.8.

Measurement accuracy transmitter

TMT180 Pt100 PCP	TMT181 multi-functional PCP	TMT182 HART®	TMT184 PROFIBUS®-PA	TMT162 FF Field transmitter	TMT142 and TMT162 HART® Field transmitter	
					Accuracy	
					Digital	D/A ²
0.36 °F (0.2 °C) or 0.08% ¹	0.36 °F (0.2 °C) or 0.08% ²	0.36 °F (0.2 °C) or 0.08% ²	0.27 °F (0.15 °C)	0.18 °F (0.1 °C)	0.18 °F (0.1 °C)	0.02%

1) % is related to the adjusted measurement range (the larger value applies)

2) % relates to the set span. Accuracy = digital + D/A accuracy

Transmitter long-term stability

≤ 0.18 °F / year (≤ 0.1 °C/year) or ≤ 0.05% / year
Data under reference conditions; % relates to the set span. The larger value applies.

Dielectrical strength

The units are factory tested with 500V_{AC} for one minute between live parts (terminals) and exposed non-current-carrying metal parts (e. g. probe sheath).

Self heating

RTD elements are not self-powered and require a small current be passed through the device to provide a voltage that can be measured. Self-heating is the rise of temperature within the element itself, caused by the current flowing through the element. This self-heating appears as a measurement error and is affected by the thermal conductivity and velocity of the process being measured; it is negligible when an Endress+Hauser iTEMP® temperature transmitter is connected.

Sensor current

Sensor current of Endress+Hauser iTEMP® transmitters

Transmitter type	Sensor current
TMT180 & TMT181 PCP	≤ 0.6 mA
TMT182 HART®	≤ 0.2 mA
TMT184 PROFIBUS®-PA	≤ 0.2 mA
TMT162 HART®, FF Field transmitter	≤ 0.3 mA
TMT142 HART® Field transmitter	≤ 0.3 mA

Galvanic isolation

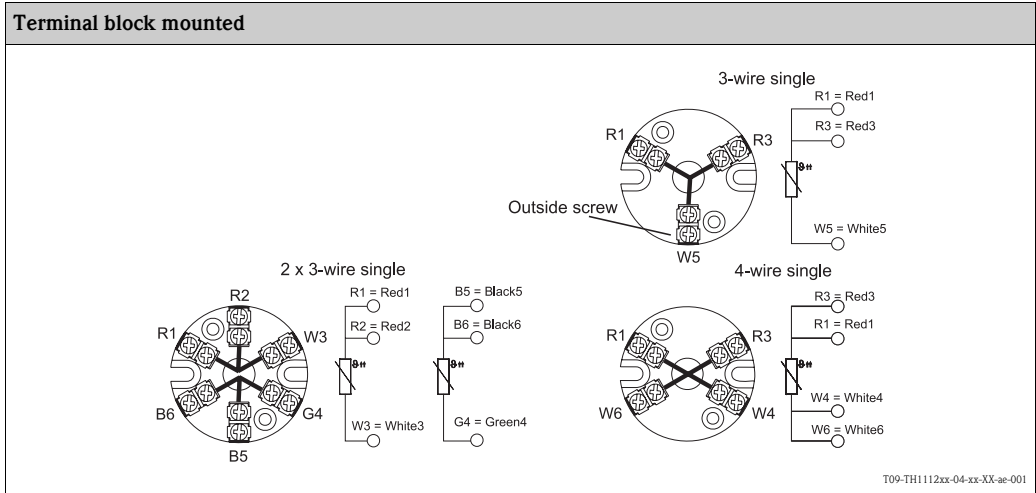
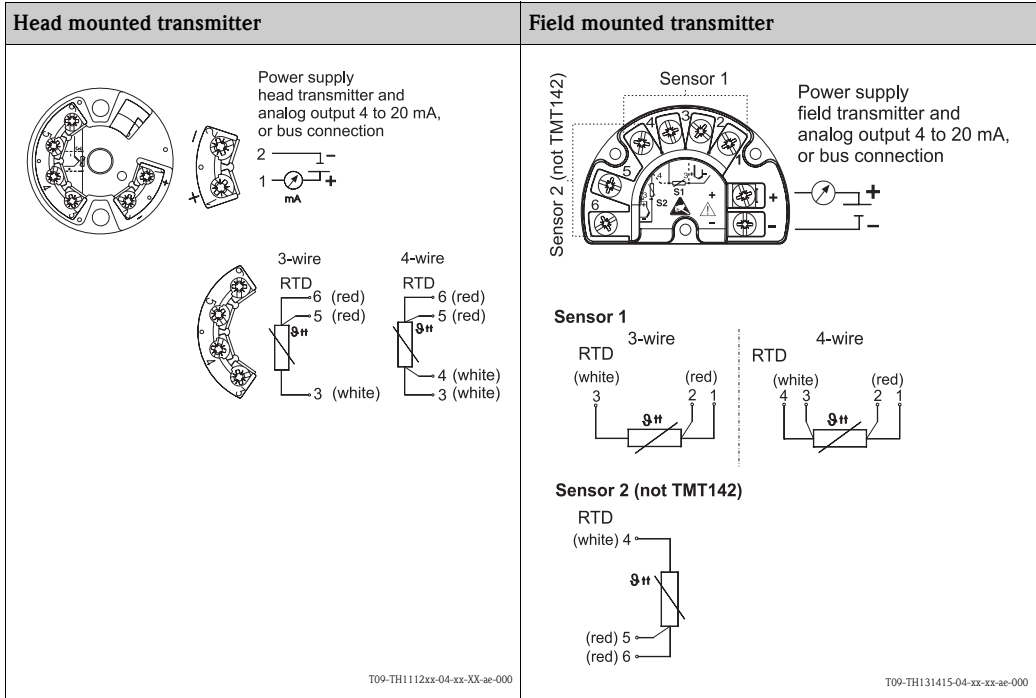
Galvanic isolation of Endress+Hauser iTEMP® transmitters (input/output)

Transmitter type	Galvanic isolation
TMT181 PCP	Û = 3.75 kV AC
TMT182 HART®	U = 2 kV AC
TMT184 PROFIBUS®-PA	
TMT162 HART®, FF Field transmitter	
TMT142 HART® Field transmitter	

Wiring

Wiring diagrams

Type of sensor connection

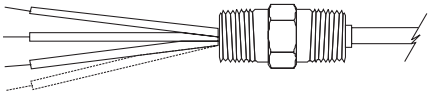


Note!
The blocks and transmitters are shown as they sit inside the heads in reference to the conduit opening.

Wire specifications

24AWG, 19 strand silver plated copper with 0.010" PTFE extruded outer.

Electrical connection
Flying leads, standard 3" for wiring in connection head, head mounted transmitter or terminal block mounted
Flying leads, 5½" for wiring with TMT162 or TMT142 assemblies

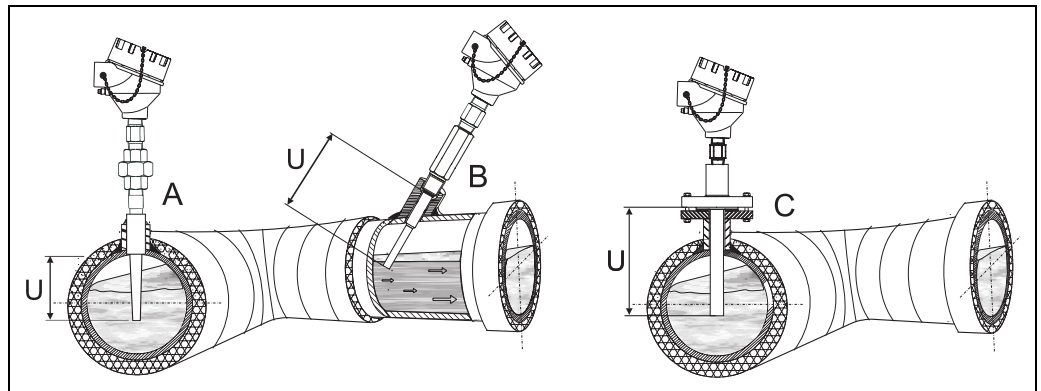
Design of leads	
Flying leads 3" or 5½" with brass crimped sleeves	

Installation conditions

Orientation

No restrictions for installation orientation.

Installation instructions



T09-T131415x-11-xx-xx-ae-000

Examples for pipe installation - In pipes with a small cross section the sensor tip should reach or extend slightly past the center line of the pipe (=U).

- A: T13 assembly socket weld installation*
- B: Threaded, tilted installation of T13 assembly*
- C: Flange installation of T14 assembly*

Immersion

Minimum immersion per ASTM E644, $\Delta T \leq 0.09 \text{ }^\circ\text{F}$ (0.05 $^\circ\text{C}$)

Immersion RTD assembly T15 without thermowell

Construction	RTD Insert $\sigma \frac{1}{4}$ " Minimum Immersion (Inch)
High temperature range	1 $\frac{1}{4}$ "
Low temperature range	$\frac{3}{4}$ "

For temperature assemblies with thermowell (T13 and T14) the minimum immersion is the depth to which the thermowell is immersed in the medium, measured from the tip. To minimize errors from ambient temperature the following minimum immersion lengths are recommended:

Construction	Minimum Immersion (Inch)
Stepped thermowell	2 $\frac{1}{2}$ "
Tapered thermowell	4 $\frac{1}{2}$ "
$\frac{3}{4}$ " straight thermowell	4"
Weld in thermowell	4 $\frac{1}{2}$ "

Environmental conditions

Ambient temperature

Housing without head-mounted transmitter

- Aluminum pressure die-cast housing -58 to 212 $^\circ\text{F}$ (-50 to 100 $^\circ\text{C}$)
- SS housing -58 to 212 $^\circ\text{F}$ (-50 to 100 $^\circ\text{C}$)

Housing with head-mounted transmitter

- -40 to 185 $^\circ\text{F}$ (-40 to 85 $^\circ\text{C}$)

Field transmitter

- -40 to 185 $^\circ\text{F}$ (-40 to 85 $^\circ\text{C}$) without display
- -40 to 158 $^\circ\text{F}$ (-40 to 70 $^\circ\text{C}$) with display



Note!

For detailed information follow the control drawings, which are an integral part of the product documentation.

Shock and vibration resistance 4g / 2 to 150 Hz as per IEC 60 068-2-6

Process conditions

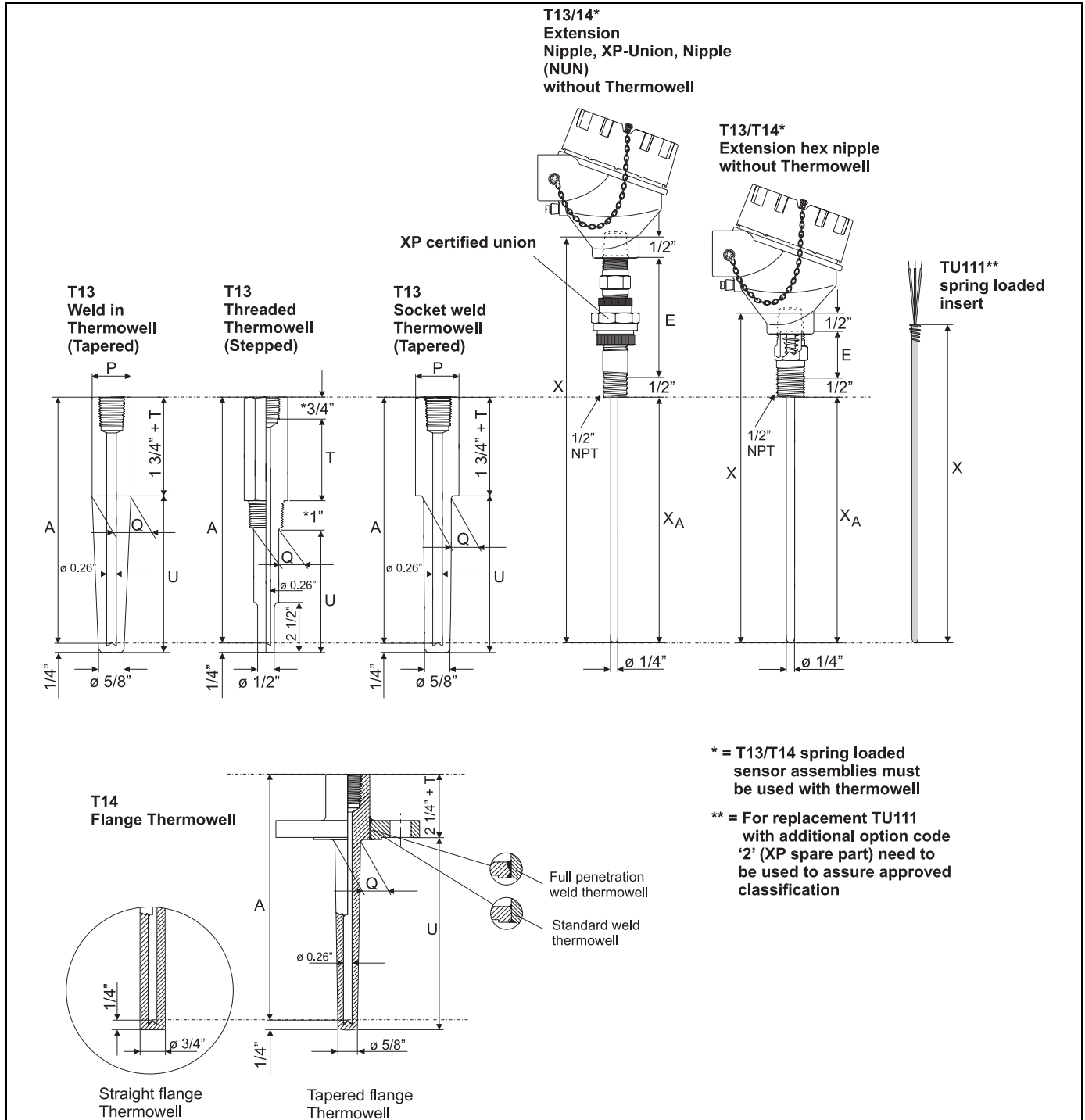
Thermowells are used in measuring the temperature of a moving fluid in a conduit, where the stream exerts an appreciable force. The limiting value for the thermowells is governed by the temperature, the pressure and the speed of the medium, the immersion length, the materials of the thermowells and the medium, etc.

Calculations for stress and vibration of thermowells can be done according to ASME PTC 19.3-1974 standard, please consult Endress+Hauser.

Mechanical construction

Design, dimensions

All dimensions in inches. For the values related to the graphics please refer to the tables and equations below.



*For T13 thermowells with 1/2" NPT - 1" Process thread length and 3/4" Hex length dimensions are reversed.

Pos. E: Extension length ('nom.' dimension)

Pos. P: Pipe size

Pos. Q: Thermowell diameter

Pos. T: Lag dimension (see product structure)

Pos. U: Thermowell immersion length

Pos. X_A, A: Immersion length RTD sensor; Thermowell drilled length

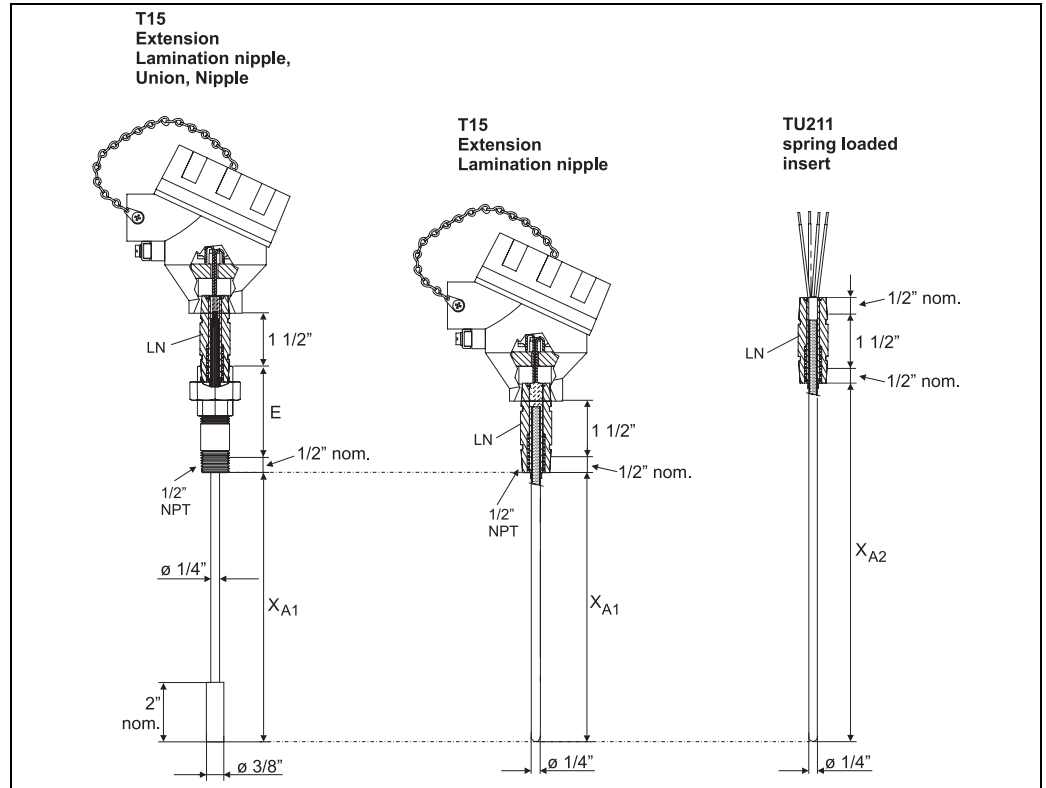
Pos. X: Insert overall length

All thermowells are marked with:

- Material I.D.
- CRN# (Canadian Registration Number)
- Heat No.

Dimensions of T13					
U	E (Nominal dimension)	T	Process connection	Shape of Thermowell	ø Q
2½", 4½", 7½", 10½" specified length 2" to 18" in ½" increments	Hex nipple = 1" or Nipple Union Nipple (NUN) = 4" or 7" Material: Steel or 316SS	3" or specified length 1" to 6" in ½" increments	½" NPT	Stepped (Standard duty) Tapered (Heavy duty)	5/8" 1 1/16"
			¾" NPT	Stepped (Standard duty) Tapered (Heavy duty)	¾" 7/8"
			1" NPT	Stepped (Standard duty) Tapered (Heavy duty)	7/8" 1 1/16"
			¾" Socket weld	Stepped (Standard duty) Tapered (Heavy duty)	¾" ¾"
			1" Socket weld	Stepped (Standard duty) Tapered (Heavy duty)	7/8" 1"
			¾" weld in	Tapered (Heavy duty)	1.050"
			1" weld in	Tapered (Heavy duty)	1.315"
Immersion length RTD sensor = Thermowell drilled length $X_A = A = U + 1\frac{1}{2}" + T$ Insert overall length $X = A + E + 1"$					
P = Pipe size <ul style="list-style-type: none"> ■ Nom. ¾"; Dia. = 1.050" ■ Nom. 1"; Dia. = 1.315" 					

Dimensions of T14 Flange rating: ASME B16.5				
U	E (Nominal dimension)	T	Flange size	ø Q, Tapered version
2", 4", 7", 10" specified length 2" to 18" in ½" increments	Hex nipple = 1" or Nipple Union Nipple (NUN) = 4" or 7" Material: Steel or 316SS	specified length 1" to 10" in ½" increments	1"	7/8"
			1½"	1 1/16"
			2"	1 1/16"
Immersion length RTD sensor - Thermowell drilled length $X_A = A = U + 2" + T$ Insert overall length $X = A + E + 1"$				



T09-T131415x-06-xx-xx-ae-003

Design and dimensions of T15 (without Thermowell)

Pos. LN: Lamination nipple (flamepath nipple)

Pos. E: Extension length ('nom.' dimension)

Pos. X_{A1} : Insert immersion length

Pos. X_{A2} : Insert immersion length TU211

Dimensions of T15 (without Thermowell)	
Immersion length RTD sensor X_{A1}	Extension E
4", 6", 9", 12", 14" specified length 4" to 100" in 1/2" increments	Lamination Nipple Union Nipple (LUN) = 3" or 6"
Immersion length RTD sensor X_{A2} for spring loaded insert TU211 as spare part insert for Lamination nipple Union Nipple (LUN) version¹	Extension E
Calculate X_{A2} as follows: $X_{A2} = X_{A1} + E$	Lamination Nipple Union Nipple (LUN) = 3" or 6"

1) Order code for spring loaded insert TU211 (TU211-__ 5 __)

Weight

From 1 to 10 lbs

Material

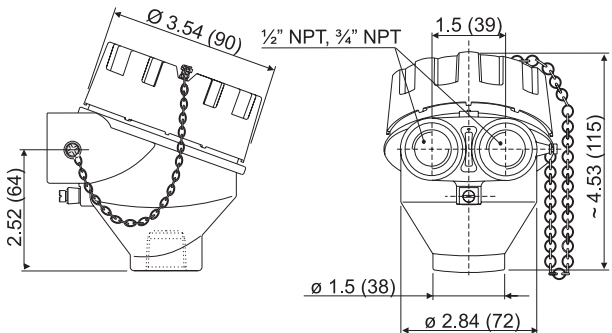
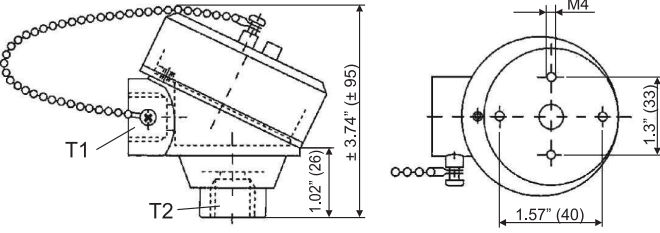
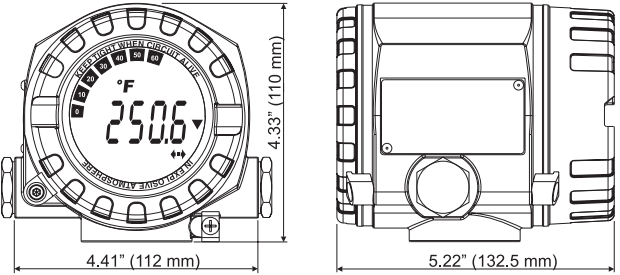
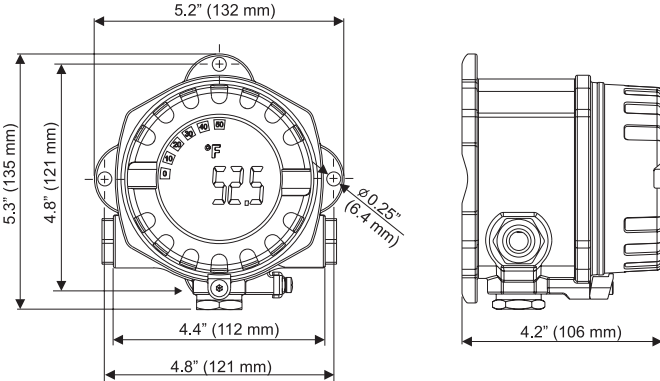
Wetted parts 316SS

Thermowell material

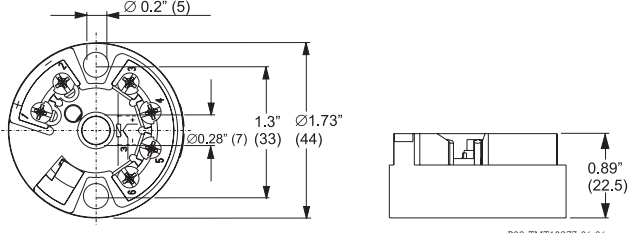
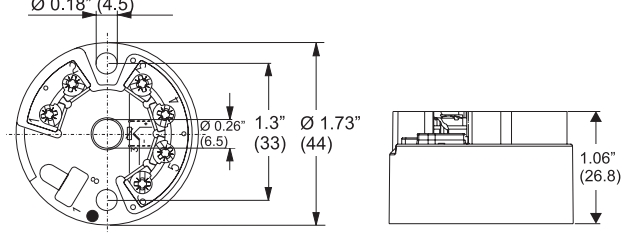
Wetted parts 316SS for usage up to 1700 °F (927 °C). 316SS has good oxidation and corrosion resistance in a wide range of industrial environments with improved resistance to mild acid and pitting corrosion. Exposure to carbide precipitation, reduces corrosion resistance in the 800 to 1000 °F (427 to 538 °C) temperature range. Good mechanical properties for -300 to 1450 °F (-184 to 788 °C) temperature range. Generally regarded as standard protection tube material, other materials are available upon request.

System components

Housing

Type of housing	Specification
<p>Connection head Aluminum</p>  <p>T09-T131415x-06-xx-xx-ae-001</p>	<ul style="list-style-type: none"> ■ Material: Die-cast Aluminum head ■ Sensor connection: 1/2" NPT Female ■ Cable entry: 1/2" NPT or 3/4" NPT Female. 1/2" NPT has a Al reducer bushing ■ Body paint: Spray SPU, RAL5012 Cover paint: Spray SPU, RAL7035 ■ Coating thread (body-cover), lubricant acc. E+H standard, MgO coating; benefits include ease of opening/closing cover and improved thread engagement. Improves lifetime of the connection head. ■ Degree of protection NEMA 4X (IP 66)
<p>XP connection head SS/AL (FM/CSA certification only valid for Grp. B-G)</p>  <p>T09-T131415x-06-xx-xx-ae-000</p>	<ul style="list-style-type: none"> ■ Material: Aluminum or 316SS ■ Degree of protection NEMA 4X (IP 67) ■ Cable entry: 1/2" NPT or 3/4" NPT Female (Pos. T1) ■ Sensor connection: 1/2" NPT Female (Pos. T2) ■ Stainless steel connection head only available with nipple union nipple (NUN) 316 SS ■ The aluminum, grey and 316SS connection heads with cover are not available with Hex nipple
<p>Temperature field transmitter iTEMP® TMT162</p>  <p>T09-TMT162ZZ-06-00-xx-ae-001</p>	<ul style="list-style-type: none"> ■ Material: Die-cast aluminum housing AlSi10Mg with powder coating on polyester base ■ Separate electronics compartment and connection compartment ■ Display rotatable in 90° increments ■ Cable entry: 2 x 1/2" NPT ■ Degree of protection NEMA 4X (IP 67) ■ Brilliant blue backlit display with ease of visibility in bright sunshine or pitch darkness ■ Gold plated terminals to avoid corrosion and additional measurement errors <p>Details see Technical Information (see 'Documentation')</p>
<p>Temperature field transmitter iTEMP® HART® TMT142</p>  <p>T09-TMT142ZZ-06-00-06-ae-001</p>	<ul style="list-style-type: none"> ■ Material: Die-cast aluminum housing AlSi10Mg with powder coating on polyester base ■ Display rotatable in 90° increments ■ Cable entry: 3 x 1/2" NPT ■ Degree of protection NEMA 4X (IP 67) ■ Brilliant blue backlit display with ease of visibility in bright sunshine or pitch darkness ■ Gold plated terminals to avoid corrosion and additional measurement errors <p>Details see Technical Information (see 'Documentation')</p>

Head transmitter

Type of transmitter	Specification
<p>iTEMP® TMT18x</p>  <p>Ø 0.2" (5) 1.3" Ø 1.73" (44) Ø 0.28" (7) (33) 0.89" (22.5) R09-TMT18ZZ-06-06-xx-ae-001</p>	<ul style="list-style-type: none"> ■ Material Housing: PC Potting: PUR ■ Terminals: Cable up to max. 16 AWG (secure screws) or with wire end ferrules ■ Eyelets for easy connection of a HART®-handheld terminal with alligator clips ■ Degree of protection NEMA 4 (see also type of connection head) <p>Details see Technical Information (see 'Documentation')</p>
<p>iTEMP® PA TMT184</p>  <p>Ø 0.18" (4.5) 1.3" Ø 1.73" (44) Ø 0.26" (6.5) (33) 1.06" (26.8) T09-TMT184ZZ-06-06-xx-ae-001</p>	

Certificates and approvals

CE Mark	The iTEMP® Series of temperature transmitters complies with the legal requirements laid out within the EU regulations.
Other standards and guidelines	<ul style="list-style-type: none"> ■ IEC 60529: Degrees of protection by housing (IP-Code). ■ IEC 61010: Safety requirements for electrical measurement, control and laboratory instrumentation. ■ ASTM E644: American society for testing and materials, standard test methods for testing industrial resistance thermometers. ■ NEMA - ANSI / NEMA 250 Standardization association for the electrical industry. ■ IEC 60751 Industrial platinum resistance thermometer ■ ASME PTC 19.3 - 1974 Performance test codes ■ CSA Std. C22.2 (No. 25, No. 30, No. 157, No. 213, No. 1010.1) Requirements for hazardous locations & safety requirements for electrical equipment for measurement, control and laboratory use ■ FM Standards (Class No. 3600, 3610, 3615, 3810) Requirements for hazardous locations & electrical and electronic test, measuring and process control equipment
UL	Temperature transmitters are recognized components to UL 3111-1 (iTEMP® Series) except for TMT184 PROFIBUS®-PA.

CSA / FM

T13/14 with E+H blue head or Field Housing	
FM XP DIP IS NI Class I,II,III Div. 1+2, Grp. A-G	pending, please consult your local representative
CSA XP DIP IS NI Class I,II,III Div. 1+2, Grp. A-G	
FM XP DIP Class I,II,III Div. 1+2, Grp. A-G	
FM XP NI DIP Class I,II,III Div. 1+2, Grp. A-G	pending, please consult your local representative
CSA XP DIP Class I,II,III Div. 1+2, Grp. A-G	
CSA XP NI DIP Class I,II,III Div. 1+2, Grp. A-G	
FM/CSA XP DIP Class I,II,III Div. 1+2, Grp. A-G	
FM/CSA XP NI DIP Class I,II,III Div. 1+2, Grp. A-G	pending, please consult your local representative

T13/14 with Al grey and 316SS connection head	
FM XP DIP IS NI Class I,II,III Div. 1+2, IS Grp. A-D, XP DIP Grp. B-G	pending, please consult your local representative
CSA XP DIP IS NI Class I,II,III Div. 1+2, IS Grp. A-D, XP DIP Grp. B-G	
FM XP DIP Class I,II,III Div. 1+2, Grp. B-G	
FM XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	pending, please consult your local representative
CSA XP DIP Class I,II,III Div. 1+2, Grp. B-G	
CSA XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	
FM/CSA XP DIP Class I,II,III Div. 1+2, Grp. B-G	
FM/CSA XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	pending, please consult your local representative

T15 with E+H blue head or Field Housing	
FM XP DIP IS NI Class I,II,III Div. 1+2, Grp. A-G	pending, please consult your local representative
CSA XP DIP IS NI Class I,II,III Div. 1+2, IS Grp. A-D, XP DIP Grp. B-G	
FM XP DIP Class I,II,III Div. 1+2, Grp. A-G	
FM XP NI DIP Class I,II,III Div. 1+2, Grp. A-G	pending, please consult your local representative
CSA XP DIP Class I,II,III Div. 1+2, Grp. B-G	
CSA XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	
FM/CSA XP DIP Class I,II,III Div. 1+2, FM Grp. A-G, CSA Grp. B-G	
FM/CSA XP NI DIP Class I,II,III Div. 1+2, FM Grp. A-G, CSA Grp. B-G	pending, please consult your local representative

T15 with Al grey and 316SS connection head	
FM XP DIP IS NI Class I,II,III Div. 1+2, IS Grp. A-D, XP DIP Grp. B-G	pending, please consult your local representative
CSA XP DIP IS NI Class I,II,III Div. 1+2, IS Grp. A-D, XP DIP Grp. B-G	
FM XP DIP Class I,II,III Div. 1+2, Grp. B-G	
FM XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	pending, please consult your local representative
CSA XP DIP Class I,II,III Div. 1+2, Grp. B-G	
CSA XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	
FM/CSA XP DIP Class I,II,III Div. 1+2, Grp. B-G	
FM/CSA XP NI DIP Class I,II,III Div. 1+2, Grp. B-G	pending, please consult your local representative

FM/CSA certification for Al grey and 316SS connection head are only valid for Grp. B-G.

Ordering information

Product structure, RTD assembly in thermowell T13

T13-	RTD assembly in thermowell, T13			
Certification:				
B	FM XP DIP IS NI, Class I, II, III Div. 1+2			
C	CSA XP DIP IS NI, Class I, II, III Div. 1+2			
D	FM XP DIP Class I, II, III Div. 1+2			
E	FM XP NI DIP Class I, II, III Div. 1+2			
F	CSA XP DIP Class I, II, III Div. 1+2			
G	CSA XP NI DIP Class I, II, III Div. 1+2			
J	FM/CSA XP DIP Class I, II, III Div. 1+2			
K	FM/CSA XP NI DIP Class I, II, III Div. 1+2			
Shape of TW:				
2	Stepped, Standard Duty			
3	Tapered, Heavy Duty			
9	Special			
Process connection, TW Material:				
A1	½" NPT 316SS			
A2	¾" NPT 316SS			
A3	1" NPT 316SS			
B1	Socket weld ¾" 316SS			
B2	Socket weld 1" inch 316SS			
C1	Weld in ¾" 316SS			
C2	Weld in 1" inch 316SS			
YY	Special			
TW Immersion length U:				
1	2½ inch			
2	4½ inch			
3	7½ inch			
4	10½ inch			
8 inch (0.5" increments)			
Y	special			
Lag of TW T:				
A	None			
E	3 inch			
X	... inch (0.5" increments)			
Y	Special			
Extension:				
1	Hex nipple steel, E=1"			
2	Hex nipple 316SS, E=1"			
3	Nipple Union Nipple, steel, E=4"			
4	Nipple Union Nipple, 316SS, E=4"			
5	Nipple Union Nipple, steel, E=7"			
6	Nipple Union Nipple, 316SS, E=7"			
9	Special			
Class; Type Sensor IEC751; Connection:				
A	1 Pt100 class B, 3 wire low, -50 to 200 °C (-58 to 392 °F)			
B	1 Pt100 class B, 3 wire high, -200 to 600 °C (-328 to 1112 °F)			
C	1 Pt100 class A, 3 wire low, -50 to 200 °C (-58 to 392 °F)			
D	1 Pt100 class A, 3 wire high, -200 to 600 °C (-328 to 1112 °F)			
E	1 Pt100 class B, 4 wire low, -50 to 200 °C (-58 to 392 °F)			
F	1 Pt100 class B, 4 wire high, -200 to 600 °C (-328 to 1112 °F)			
G	1 Pt100 class A, 4 wire low, -50 to 200 °C (-58 to 392 °F)			
H	1 Pt100 class A, 4 wire high, -200 to 600 °C (-328 to 1112 °F)			
J	2 Pt100 class B, 3 wire low, -50 to 200 °C (-58 to 392 °F)			
K	2 Pt100 class B, 3 wire high, -200 to 600 °C (-328 to 1112 °F)			
L	2 Pt100 class A, 3 wire low, -50 to 200 °C (-58 to 392 °F)			
M	2 Pt100 class A, 3 wire high, -200 to 600 °C (-328 to 1112 °F)			
Y	Special			
T13-				← Order code (Part 1)

												Enclosure:				
												A	E+H blue Al + cover, 1/2" NPT, Group A-G			
												B	E+H blue Al + cover, 3/4" NPT, Group A-G			
												C	Al, grey + cover, 1/2" NPT, Group B-G			
												D	Al, grey + cover, 3/4" NPT, Group B-G			
												E	SS316 + cover, 1/2" NPT, Group B-G			
												F	SS316 + cover, 3/4" NPT, Group B-G			
												G	AL Field Housing, 1/2" NPT, Group A-G			
												H	AL Field Housing, Display, 1/2" NPT, Group A-G			
												I	316L Field Housing, 1/2" NPT, Group A-G			
												J	316L Field Housing, Display, 1/2" NPT, Group A-G			
												Y	Special			
												Electrical connection:				
												A	Programmable RTD TMT180			
												B	Programmable TMT181			
												C	HART TMT182			
												D	HART TMT182 Advanced Electronic			
												E	Profibus PA TMT184			
												F	HART TMT162, 1 Input, Dual Compartment			
												G	HART TMT162, 2 Input, Dual Compartment			
												H	FF TMT162, 2 Input, Dual Compartment			
												I	HART TMT142, 1 Input, Single Compartment			
												Y	Special			
												2	Flying Leads			
												3	Terminal block			
												Model:				
												K	None			
												Y	special version			
												Test; Calibration:				
												A	None			
												B	Sensor calibration certificate			
												C	Material traceability certificate			
												Y	Special version			
T13-																← Order code (complete)

**Product structure, RTD
assembly in flanged
thermowell T14**

T14-	RTD assembly in flanged thermowell, T14						
Certification:							
	B	FM XP DIP IS NI, Class I, II, III Div. 1+2					
	C	FM XP DIP IS NI, Class I, II, III Div. 1+2					
	D	FM XP DIP Class I, II, III Div. 1+2					
	E	FM XP NI DIP Class I, II, III Div. 1+2					
	F	CSA XP DIP Class I, II, III Div. 1+2					
	G	CSA XP NI DIP Class I, II, III Div. 1+2					
	J	FM/CSA XP DIP Class I, II, III Div. 1+2					
	K	FM/CSA XP NI DIP Class I, II, III Div. 1+2					
Shape of TW; Welding:							
	1	Straight; standard					
	2	Tapered; standard					
	3	Straight; full penetration					
	4	Tapered; full penetration					
	9	Special					
Flange size; TW Material:							
	A	1 inch 316SS					
	B	1½ inch 316SS					
	C	2 inch 316SS					
	Y	Special					
Rating; Type:							
	1	150 psi; RF					
	2	300 psi; RF					
	3	600 psi; RF					
	9	Special					
TW Immersion length U							
	1	2 inch					
	2	4 inch					
	3	7 inch					
	4	10 inch					
	8 inch (0.5" increments)					
	9	Special version					
Lag of TW, T:							
	A	None					
	X inch (0.5" increments)					
	Y	Special					
Extension:							
	1	Hex nipple steel, E=1"					
	2	Hex nipple 316SS, E=1"					
	3	Nipple Union Nipple, steel, E=4"					
	4	Nipple Union Nipple, 316SS, E=4"					
	5	Nipple Union Nipple, steel, E=7"					
	6	Nipple Union Nipple, 316SS, E=7"					
	9	Special					
Class; Type Sensor IEC751; Connection:							
	A	1 Pt100 class B, 3 wire low, -50 to 200 °C (-58 to 392 °F)					
	B	1 Pt100 class B, 3 wire high, -200 to 600 °C (-328 to 1112 °F)					
	C	1 Pt100 class A, 3 wire low, -50 to 200 °C (-58 to 392 °F)					
	D	1 Pt100 class A, 3 wire high, -200 to 600 °C (-328 to 1112 °F)					
	E	1 Pt100 class B, 4 wire low, -50 to 200 °C (-58 to 392 °F)					
	F	1 Pt100 class B, 4 wire high, -200 to 600 °C (-328 to 1112 °F)					
	G	1 Pt100 class A, 4 wire low, -50 to 200 °C (-58 to 392 °F)					
	H	1 Pt100 class A, 4 wire high, -200 to 600 °C (-328 to 1112 °F)					
	J	2 Pt100 class B, 3 wire low, -50 to 200 °C (-58 to 392 °F)					
	K	2 Pt100 class B, 3 wire high, -200 to 600 °C (-328 to 1112 °F)					
	L	2 Pt100 class A, 3 wire low, -50 to 200 °C (-58 to 392 °F)					
	M	2 Pt100 class A, 3 wire high, -200 to 600 °C (-328 to 1112 °F)					
	Y	Special					
T14-							← Order code (Part 1)

															Enclosure:		
															A	E+H blue Al + cover, 1/2" NPT, Group A-G	
															B	E+H blue Al + cover, 3/4" NPT, Group A-G	
															C	Al, grey + cover, 1/2" NPT, Group B-G	
															D	Al, grey + cover, 3/4" NPT, Group B-G	
															E	SS316 + cover, 1/2" NPT, Group B-G	
															F	SS316 + cover, 3/4" NPT, Group B-G	
															G	AL Field Housing, 1/2" NPT, Group A-G	
															H	AL Field Housing, Display, 1/2" NPT, Group A-G	
															I	316L Field Housing, 1/2" NPT, Group A-G	
															J	316L Field Housing, Display, 1/2" NPT, Group A-G	
															Y	Special	
															Electrical connection:		
															A	Programmable RTD TMT180	
															B	Programmable TMT181	
															C	HART TMT182	
															D	HART TMT182 Advanced Electronic	
															E	Profibus PA TMT184	
															F	HART TMT162, 1 Input, Dual Compartment	
															G	HART TMT162, 2 Input, Dual Compartment	
															H	FF TMT162, 2 Input, Dual Compartment	
															I	HART TMT142, 1 Input, Single Compartment	
															Y	Special	
															2	Flying Leads	
															3	Terminal block	
															Model:		
															K	Standard model, North American region	
															Y	special version	
															Test; Calibration:		
															A	None	
															B	Sensor calibration certificate	
															C	Material traceability certificate	
															Y	Special version	
T14-																	← Order code (complete)

**Product structure, RTD
assembly T15**

T15-	RTD assembly, T15			
Certification:				
	B	FM XP DIP IS NI, Class I, II, III Div. 1+2, Grp. A-G		
	C	CSA XP DIP IS NI, Class I, II, III Div. 1+2, IS Grp. A-D, XP DIP Grp. B-G		
	D	FM XP DIP Class I, II, III Div. 1+2, Grp. A-G		
	E	FM XP NI DIP Class I, II, III Div. 1+2, Grp. A-G		
	F	CSA XP DIP Class I, II, III Div. 1+2, Grp. B-G		
	G	CSA XP NI DIP Class I, II, III Div. 1+2, Grp. B-G		
	J	FM/CSA XP DIP Class I, II, III Div. 1+2, FM Grp. A-G, CSA Grp. B-G		
	K	FM/CSA XP NI DIP Class I, II, III Div. 1+2, FM Grp. A-G, CSA Grp. B-G		
Immersion length X_A				
	1	4 inch		
	2	6 inch		
	3	9 inch		
	4	12 inch		
	8 inch (0.5" increments)		
	9	Special version		
Sheath diameter:				
	A	¼ inch 316SS		
	C	3/8 inch 316SS		
	Y	Special		
Extension:				
	5	Lamination Nipple 316SS		
	6	Lam. Nipple Union Nipple, 316SS, E=3"		
	7	Lam. Nipple Union Nipple, 316SS, E=6"		
	9	Special		
Class; Type Sensor IEC751; Connection:				
	A	1 Pt100 class B, 3 wire low, -50 to 200 °C (-58 to 392 °F)		
	B	1 Pt100 class B, 3 wire high, -200 to 600 °C (-328 to 1112 °F)		
	C	1 Pt100 class A, 3 wire low, -50 to 200 °C (-58 to 392 °F)		
	D	1 Pt100 class A, 3 wire high, -200 to 600 °C (-328 to 1112 °F)		
	E	1 Pt100 class B, 4 wire low, -50 to 200 °C (-58 to 392 °F)		
	F	1 Pt100 class B, 4 wire high, -200 to 600 °C (-328 to 1112 °F)		
	G	1 Pt100 class A, 4 wire low, -50 to 200 °C (-58 to 392 °F)		
	H	1 Pt100 class A, 4 wire high, -200 to 600 °C (-328 to 1112 °F)		
	J	2 Pt100 class B, 3 wire low, -50 to 200 °C (-58 to 392 °F)		
	K	2 Pt100 class B, 3 wire high, -200 to 600 °C (-328 to 1112 °F)		
	L	2 Pt100 class A, 3 wire low, -50 to 200 °C (-58 to 392 °F)		
	M	2 Pt100 class A, 3 wire high, -200 to 600 °C (-328 to 1112 °F)		
	Y	Special		
Enclosure:				
	A	E+H blue Al + cover, ½" NPT		
	B	E+H blue Al + cover, ¾" NPT		
	C	Al, grey + cover, ½" NPT		
	D	Al, grey + cover, ¾" NPT		
	E	SS316 + cover, ½" NPT		
	F	SS316 + cover, ¾" NPT		
	G	AL Field Housing, ½" NPT		
	H	AL Field Housing, Display, ½" NPT		
	I	316L Field Housing, ½" NPT		
	J	316L Field Housing, Display, ½" NPT		
	Y	Special		
T15-				← Order code (part 1)

										Electrical connection:	
										A	Programmable RTD TMT180
										B	Programmable TMT181
										C	HART TMT182
										D	HART TMT182 Advanced Electronic
										E	Profibus PA TMT184
										F	HART TMT162, 1 Input, Dual Compartment
										G	HART TMT162, 2 Input, Dual Compartment
										H	FF TMT162, 2 Input, Dual Compartment
										I	HART TMT142, 1 Input, Single Compartment
										Y	Special
										2	Flying Leads
										3	Terminal block
										Model:	
										K	Standard model, North American region
										Y	Special
										Test; Calibration:	
										A	None
										B	Sensor calibration certificate
										Y	Special
T15-											← Order code (complete)

Documentation

- Compact instructions T13 Explosion proof RTD assembly in thermowell (KA236r/24/ae)
- Compact instructions T14 Explosion proof RTD assembly in flanged thermowell (KA237r/24/ae)
- Compact instructions T15 Explosion proof RTD assembly – spring loaded (KA238r/24/ae)
- Technical information Temperature field transmitter iTEMP® TMT162 (TI086r/24/ae)
- Technical information Temperature field transmitter iTEMP® HART® TMT142 (TI107r/24/ae)
- Technical information Temperature head transmitter iTEMP® Pt TMT180 (TI088r/24/ae)
- Technical information Temperature head transmitter iTEMP® PCP TMT181 (TI070r/24/ae)
- Technical information Temperature head transmitter iTEMP® HART® TMT182 (TI078r/24/ae)
- Technical information Temperature head transmitter iTEMP® PA® TMT184 (TI079r/24/ae)

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