



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

RTD TH13, TH14 and TH15

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



Areas of application

The TH13, TH14 and TH15 temperature sensors are RTD assemblies installed in Thermowells and designed for use in all types of process industries, including harsh environments, due to their rugged design.

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
- Power plants
- 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

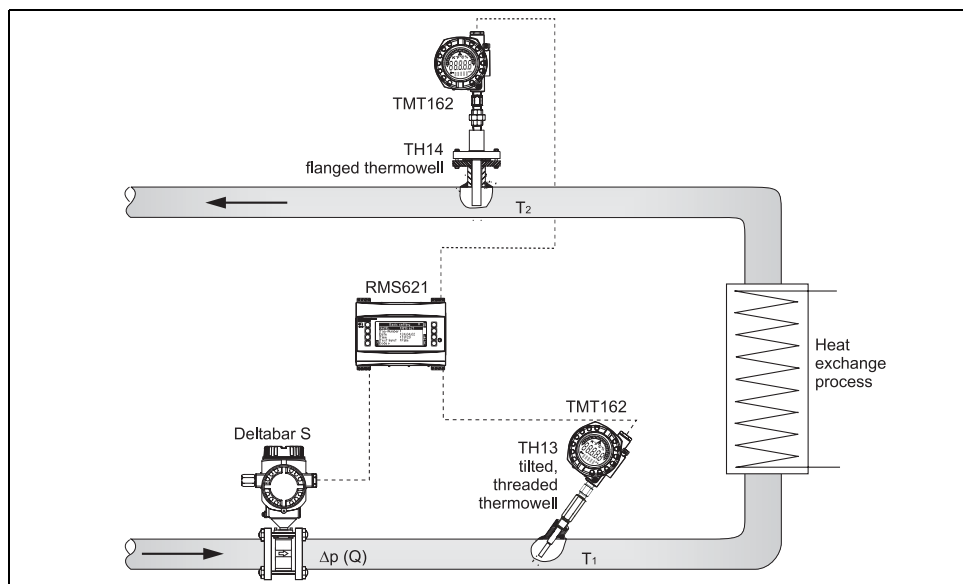
- One source shopping for temperature measurement solutions. World class transmitter with integrated sensor offering for heavy process industry applications.
- Remove and install straight out of the box!
- Improved galvanic isolation on most devices (2 kV)
- Simplified model structure: Competitively 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 ≤ 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 $100\ \Omega$ at $0\ ^\circ\text{C}$ (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 $\alpha = 0.00385\ ^\circ\text{C}^{-1}$, calculated between 0 and $100\ ^\circ\text{C}$ (32 and $212\ ^\circ\text{F}$).

Measuring system



Example of an application of the temperature assemblies

Water - heat Differential

Calculation of heat quantity which is emitted or absorbed by a water flow in a heating or cooling system. The quantity of heat is calculated from the process variable for Δp flow (Q) and the differential from the feed and return temperature ($T_2 - T_1$). Bidirectional energy calculations, such as the calculating systems with changing flow direction (charging/discharging the heat accumulator) are also possible.

Energy manager RMS621

Energy conservation and cost expenditures are significant issues in today's industry. Accurate flow monitoring and calculation is the basis for thorough analysis and billing of energy. This data can serve as a basis to maximize savings potential and help in controlling operational costs on a daily basis. Endress+Hauser's energy managers provide accurate and reliable calculations for the monitoring and control of energy consumption (both produced and consumed) according to international standards, e.g. IAPWS-IF 97, AGA8, ISO 5167 etc. For RMS621 details see Technical Information.

iTEMP® TMT162 Temperature Field Transmitter

Aluminum or stainless steel dual compartment explosion – proof enclosure and compact, fully potted electronics provide the ultimate protection in harshest environments. TMT162 prevents costly plant shutdowns by detecting corrosion on RTDs or thermocouples before it corrupts the measured value. Endress+Hauser's Field Temperature Transmitters with backlit display and sensor backup functionality are designed with safety in mind to keep your plant, equipment and personnel safe. For TMT162 details see Technical Information.

Deltabar S/Cerabar S

The evolution series of Cerabar S/Deltabar S represents a decisive step ahead in making pressure instrumentation better and safer for the process industry. The development of new products thrives especially on the knowledge, commitment and experience of staff members. Permanent high performance can only be achieved if dedicated and enthusiastic people provide their ideas. Endress+Hauser's instruments are not only supposed to distinguish themselves for customers and users by technological novelties but also by the presence of people supporting this progress, be it in service, sales or production. For Deltabar S & Cerabar S details see Technical Information.

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	TH13-____ (A/C/E/G/J/L) _____	-58 to 392 °F (-50 to 200 °C)
	TH14-____ (A/C/E/G/J/L) _____	
	TH15-____ (A/C/E/G/J/L) _____	
High temperature range	TH13-____ (B/D/F/H/K/M) _____	-328 to 1112 °F (-200 to 600 °C)
	TH14-____ (B/D/F/H/K/M) _____	
	TH15-____ (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 RTD 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/NCSS Z540-1-1994. The report of calibration is referenced to the serial number of the RTD 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, visualisation 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 save and reliable. For details, see Technical Information.

FOUNDATION Fieldbus™ TMT85 head transmitter

Universally programmable head transmitter with FOUNDATION 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 ControlCare from Endress+Hauser or the NI Configurator from National Instruments.

Benefits are: dual sensor input, highest reliability in harsh industrial environments, mathematic functions, thermometer drift monitoring, sensor back-up functionality, sensor diagnosis functions and sensor-transmitter matching by accepting Callendar Van Dusen constants. For details, see Technical Information.

Performance characteristics

Response time

63% response time per ASTM E644

RTD assembly TH15 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 TH13 and TH14

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 trans- mitter	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 $\leq 0.05\%$ / year
Data under reference conditions; % relates to the set span. The larger value applies.

Insulation resistance

Insulation resistance between terminals and probe sheath, test voltage 250 V.

- ≥ 100 M Ω at 77 °F (25 °C)
- ≥ 10 M Ω at 572 °F (300 °C)

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

Transmitter type	Sensor current
TMT162 HART®, FF Field transmitter	≤ 0.3 mA
TMT142 HART® Field transmitter	≤ 0.3 mA

Galvanic isolation

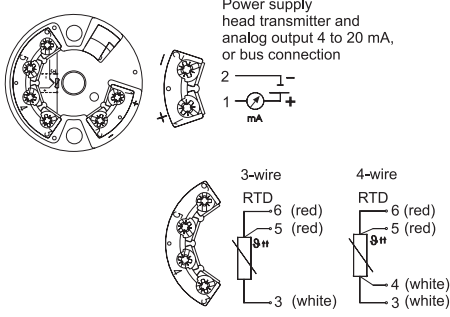
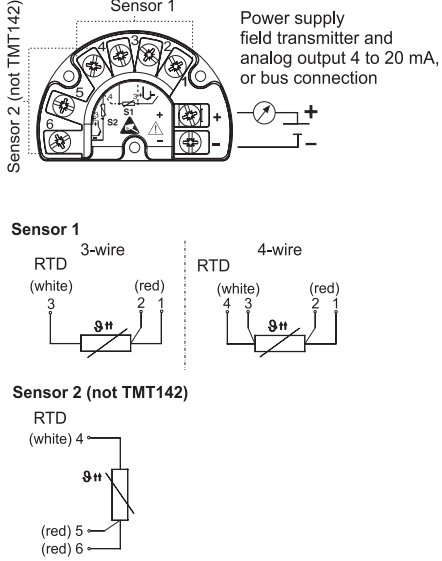
Galvanic isolation of Endress+Hauser iTEMP® transmitters (input/output)

Transmitter type	Galvanic isolation
TMT181 PCP	$\hat{U} = 3.75 \text{ kV AC}$
TMT182 HART®	$U = 2 \text{ kV AC}$
TMT184 PROFIBUS®-PA	
TMT162 HART®, FF Field transmitter	
TMT142 HART® Field transmitter	

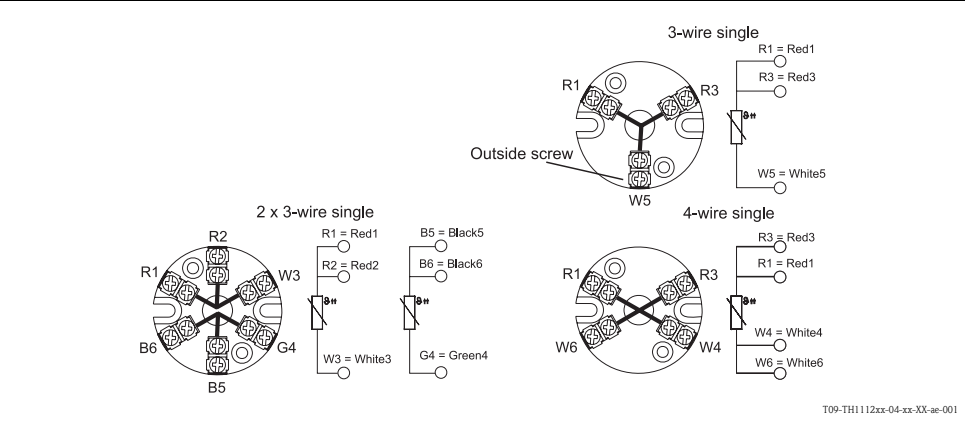
Wiring

Wiring diagrams

Type of sensor connection

Head mounted transmitter	Field mounted transmitter
 <p>Power supply head transmitter and analog output 4 to 20 mA, or bus connection</p> <p>3-wire RTD: 6 (red), 5 (red), 3 (white)</p> <p>4-wire RTD: 6 (red), 5 (red), 4 (white), 3 (white)</p> <p>T09-TH1112xx-04-xx-XX-ae-000</p>	 <p>Sensor 1</p> <p>Sensor 2 (not TMT142)</p> <p>Power supply field transmitter and analog output 4 to 20 mA, or bus connection</p> <p>Sensor 1 3-wire RTD: (white) 3, (red) 2, 1</p> <p>Sensor 1 4-wire RTD: (white) 4, 3, (red) 2, 1</p> <p>Sensor 2 (not TMT142) RTD: (white) 4, (red) 5, (red) 6</p> <p>T09-TH131415-04-xx-xx-ae-000</p>

Terminal block mounted



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.

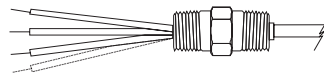
Electrical connection

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

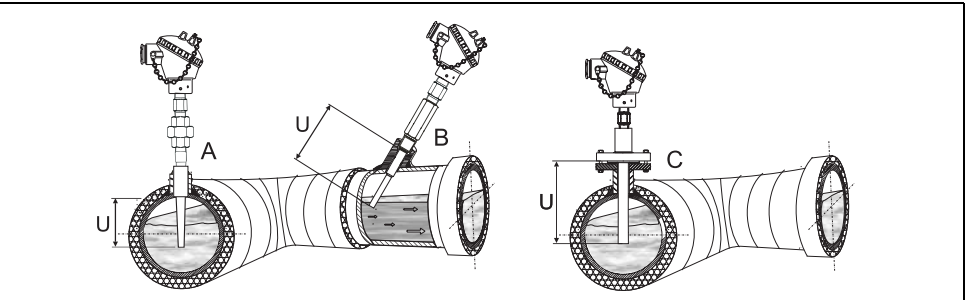


Installation conditions

Orientation

No restrictions for installation orientation.

Installation instructions



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: TH13 assembly socket weld installation
- B: Threaded, tilted installation of TH13 assembly
- C: Flange installation of TH14 assembly

Immersion

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

Immersion RTD assembly TH15 without thermowell

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

For temperature assemblies with thermowell (TH13 and TH14) 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 -40 to 300 $^{\circ}\text{F}$ (-40 to 150 $^{\circ}\text{C}$)
- Plastic housing -40 to 185 $^{\circ}\text{F}$ (-40 to 85 $^{\circ}\text{C}$)
- Deep drawn SS housing without display -40 to 300 $^{\circ}\text{F}$ (-40 to 150 $^{\circ}\text{C}$)

Housing with head-mounted transmitter

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

Field transmitter without display

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

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

Process conditions

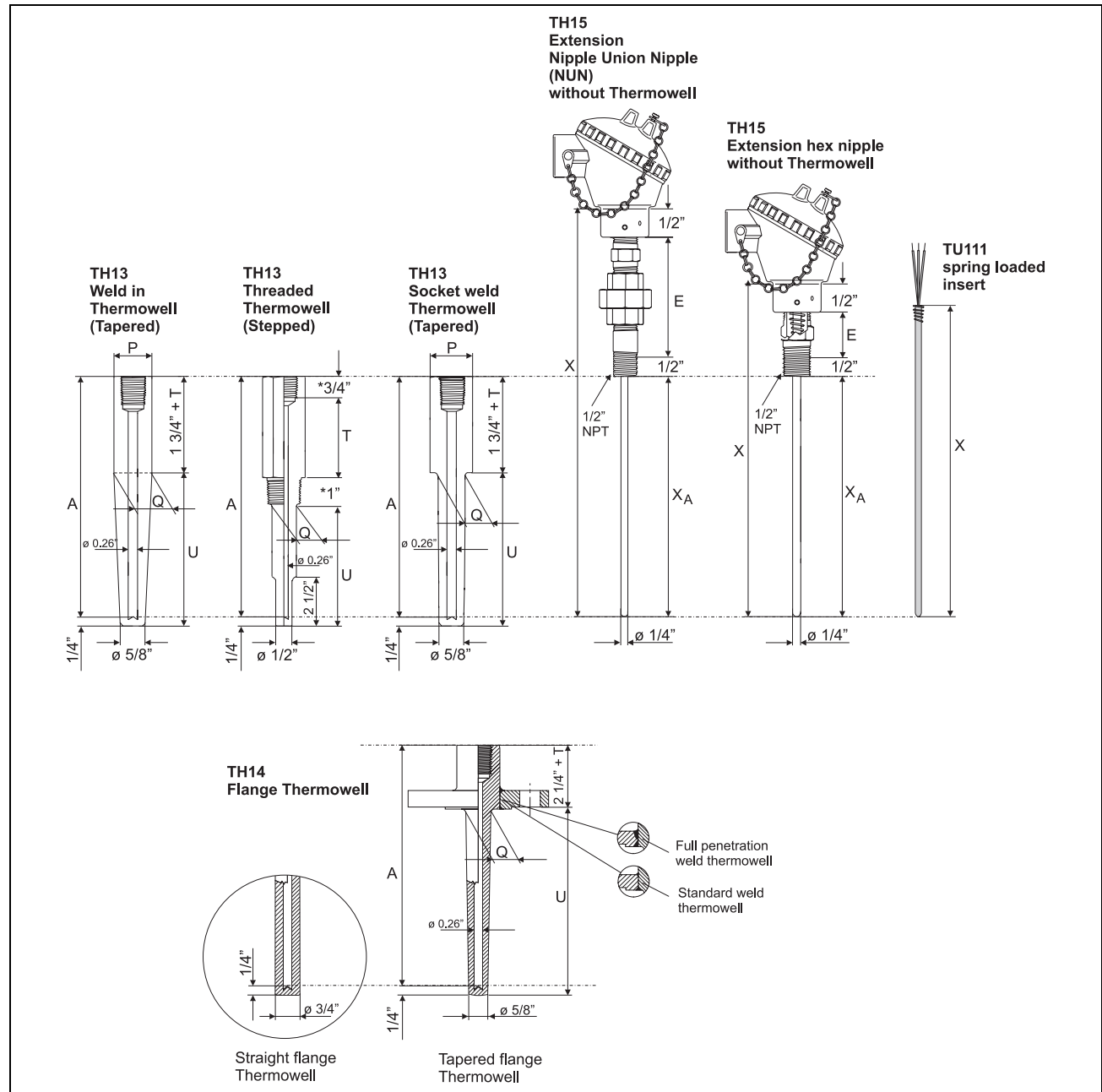
Thermowells are used in measuring the temperature of a moving fluid in a conduit, where the stream exerts an appreciable force. The limiting value for the thermowells is governed by the temperature, the pressure and the speed of the medium, the immersion length, the materials of the thermowells and the 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 this graphic please refer to the tables and equations below.



*For TH13 thermowells with $\frac{1}{2}''$ NPT - 1" Process thread length and $\frac{3}{4}''$ Hex length dimensions are reversed.

- 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 TH13					
U	E	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 (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" 11/16"
			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 $X = A + E$					
P = Pipe size ■ Nom. ¾"; Dia. = 1.050" ■ Nom. 1"; Dia. = 1.315"					

Dimensions of TH14 Flange rating: ASME B16.5				
U	E	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				

Dimensions of TH15 (without Thermowell)	
Immersion length RTD sensor X_A	E
4", 6", 9", 12", 14" specified length 4" to 30" in ½" increments	Hex nipple = 1" or Nipple Union Nipple (NUN) = 4" or 7"

Weight

From 1 to 10 lbs

Material

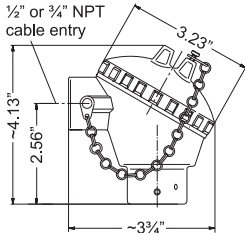
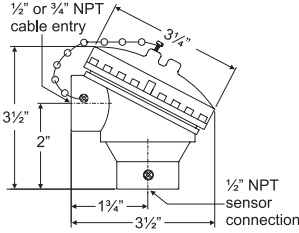
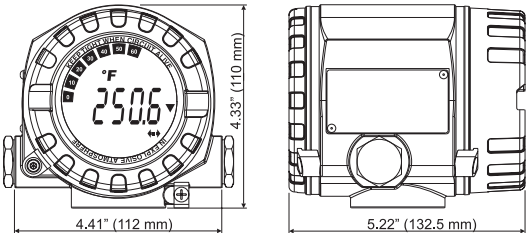
Wetted parts 316SS

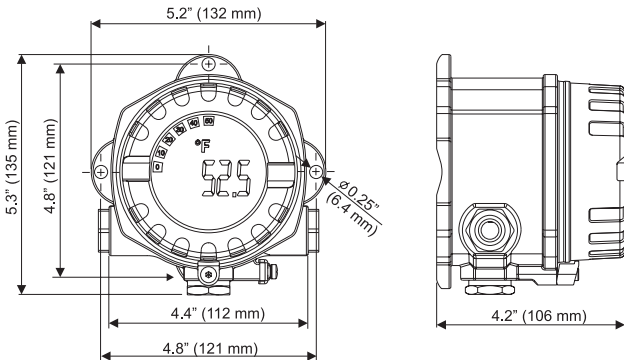
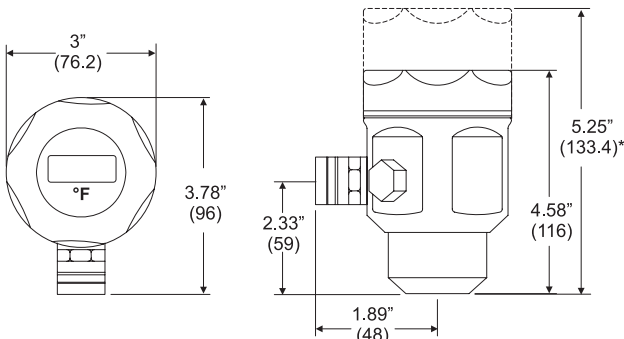
Thermowell material

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.

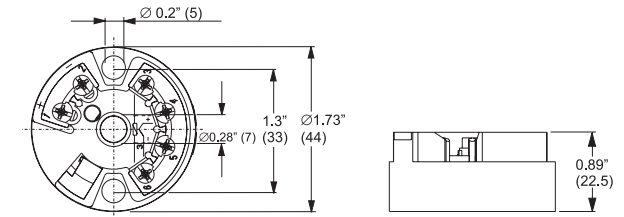
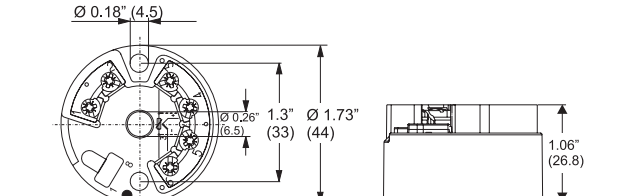
System components

Housing

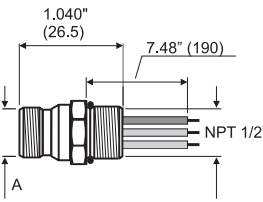
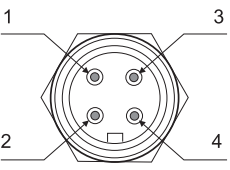
Type of housing	Specification
<p>Connection head Aluminum</p>  <p style="text-align: right; font-size: small;">T09-TH11xxxx-06-xx-xx-ae-001</p>	<ul style="list-style-type: none"> Material: Die-cast Aluminum head Sensor connection: 1/2" NPT Female Cable entry: 1/2" NPT or 3/4" NPT Female. 1/2" NPT has 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>Connection head plastic</p>  <p style="text-align: right; font-size: small;">T09-TH11xxxx-06-xx-xx-ae-000</p>	<ul style="list-style-type: none"> Polypropylene, FDA compliant Sensor connection: 1/2" NPT Female Cable entry: 1/2" NPT or 3/4" NPT Female. 1/2" NPT with nylon reducer bushing (FDA compliant) Degree of protection NEMA 4X
<p>Temperature field transmitter iTEMP® TMT162</p>  <p style="text-align: right; font-size: small;">T09-TMT16ZZZ-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>

Type of housing	Specification
<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 ½" 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>Connection head deep drawn stainless steel, TA20J style</p>  <p>* dimensions with optional display</p> <p>a0005938</p>	<ul style="list-style-type: none"> Material: Deep drawn stainless steel AISI 316L SS (hygienic design) Optional with display and/or head transmitter Sensor connection: ½" NPT female Cable entry: ½" NPT female Degree of protection NEMA 4X (IP 66) <p>Display:</p> <ul style="list-style-type: none"> 4 digits 7-segments LC display (loop powered) Maximum error: 0.1% of programmed range Loop drop: 2.5 V at 22 mA Max. ambient temperature: -4 to 160 °F (-20 to 70 °C) <p>The programming is executed through 3 keys mounted on the bottom of the display.</p>

Head transmitter

Type of transmitter)	Specification
<p>iTEMP® TMT18x</p>  <p>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>T09-TMT184ZZ-06-06-xx-ae-001</p>	

Fieldbus connector

Type (dimensions in inches [mm])	Specification	
<p>Fieldbus connector to PROFIBUS® -PA or FOUNDATION Fieldbus™</p>  <p style="text-align: right; font-size: small;">T09-FFCONNEC-06-xx-xx-ae-000</p> <p>Pos. A: M12 on PROFIBUS® -PA connector 7/8-16 UNC on FOUNDATION Fieldbus™ connector</p>	<p>■ Ambient temperature: -40 to 300 °F (-40 to 150 °C) ■ Degree of protection IP 67</p> <p>Wiring diagram:</p>  <p style="text-align: right; font-size: small;">a0006023</p>	
	<p>PROFIBUS® -PA Pos 1: grey (shield) Pos 2: brown (+) Pos 3: blue (-) Pos 4: not connected</p>	<p>FOUNDATION Fieldbus™ Pos 1: blue (-) Pos 2: brown (+) Pos 3: not connected Pos 4: ground (green/yellow)</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

- 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 60571
Industrial platinum resistance thermometer
- ASME PTC 19.3 - 1974
Performance test codes

UL

Temperature transmitters are recognized components to UL 3111-1 (iTEMP® Series) except for TMT184 PROFIBUS®-PA.

CSA GP

The installed and assembled transmitters (iTEMP® Series) are CSA GP approved, except TMT184 PROFIBUS® PA

Ordering information

Product structure, RTD assembly in thermowell TH13

TH13-	RTD assembly in thermowell, TH13				
					TW Immersion length U:
				1	2½ inch
				2	4½ inch
				3	7½ inch
				4	10½ inch
				8 inch (0.5" increments)
				Y	special
					Process connection, TW Material, 1 inch:
				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
					Shape of TW:
				2	Stepped, Standard Duty
				3	Tapered, Heavy Duty
				9	Special
					Lag of TW T:
				A	None
				E	3 inch
				X	... inch (0.5" increments)
				Y	Special
					Extension:
				1	Hex nipple 316SS, E=1"
				2	Nipple Union Nipple 316SS, E=4"
				3	Hex nipple steel, E=1"
				4	Nipple Union Nipple, steel, 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
TH13-					← Order code (Part 1)

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**Product structure, RTD
assembly TH15**

TH15-	RTD assembly, TH15			
	Immersion length X _A			
	1	4 inch		
	2	6 inch		
	3	9 inch		
	4	12 inch		
	5	14 inch		
	8 inch (0.5" increments)		
	Y	Special version		
	Sheath diameter price per 2 inch:			
	A	¼ inch 316SS		
	Y	Special		
	Extension:			
	1	Hex nipple 316SS, E=1"		
	2	Nipple Union Nipple 316SS, E=4"		
	3	Hex nipple steel, E=1"		
	4	Nipple Union Nipple, steel, 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		
	Enclosure; communication:			
	A	None		
	B	E+H blue Al + cover, ½" NPT cable entry		
	C	E+H blue Al + cover, ¾" NPT cable entry		
	D	Plastic PP white ½" NPT cable entry		
	E	Plastic PP white ¾" NPT cable entry		
	F	SS316L (TA20J), ½" NPT		
	G	SS316L (TA20J), LCD, ½" NPT		
	H	AL Field Housing, 1 Input, ½" NPT, HART		
	I	AL Field Housing, 1 Input, Display, HART, ½" NPT		
	J	AL Field Housing, 2 Input, ½" NPT, HART		
	K	AL Field Housing, 2 Input, Display, HART, ½" NPT		
	L	AL Field Housing, 2 Input, ½" NPT, FF		
	M	AL Field Housing, 2 Input, Display, FF, ½" NPT		
	Y	Special		
TH15-				← Order code (part 1)

										Electrical connection:	
										A	Programmable RTD TMT180
										C	Programmable TMT181 NON Ex
										D	Programmable TMT181 FM IS
										E	Programmable TMT181 CSA IS
										F	Profibus PA TMT184, non Ex
										G	Profibus PA TMT184, FM IS
										H	Profibus PA TMT184, CSA IS
										I	TMT162, non Ex, Dual Compartment
										J	TMT162, FM IS, Dual Compartment
										K	TMT162, CSA IS, Dual Compartment
										L	HART TMT142 non Ex, Single Compartment
										M	HART TMT142, FM IS, Single Compartment
										N	HART TMT142, CSA IS, Single Compartment
										O	HART TMT182, FM IS Advanced Diagnostic
										P	HART TMT182 NON Ex
										R	HART TMT182 FM IS
										T	HART TMT182 CSA IS
										U	FOUNDATION Fieldbus head transmitter, GP
										V	FOUNDATION Fieldbus head transmitter, FM/CSA IS
										Y	Special
										2	Flying Leads
										3	Terminal block
										Documentation Requirement:	
										1	Standard
										9	Other
										Test; Calibration:	
										A	None
										B	Sensor calibration certificate
										Y	Other
										Model:	
										K	Standard model, North American region
										Y	Other
										Additional option:	
										1	None
										2	Profibus PA Plug M12
										3	Foundation Fieldbus Plug 7/8"
										9	special version
TH15-										← Order code (complete)	

Documentation

- Compact instructions TH13 RTD assembly in thermowell (KA190r/24/ae)
- Compact instructions TH14 RTD assembly in flanged thermowell (KA192r/24/ae)
- Compact instructions TH15 RTD assembly - spring loaded (KA195r/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)

Application example:

- Technical information Energy manager RMS621 (TI092r/24/ae)
- Technical information Cerabar S (TI383r/24/ae)
- Technical information Deltabar S (TI384r/24/ae)

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