



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Omnigrad T TR24

Modular RTD assembly
threaded or weld-in compression fitting



Application

- Universal range of application
- Measuring range: -200...600 °C (-328...1112 °F)
- Pressure range up to 50 bar (725 psi)
- Degree of protection: up to IP 68

Head transmitters

All Endress+Hauser transmitters are available with enhanced accuracy, reliability and cost effectiveness compared to directly wired sensors. Easy customizing by choosing one of the following outputs and protocols:

- Analog output 4...20 mA
- HART®
- PROFIBUS® PA
- FOUNDATION Fieldbus™

Your benefits

- High flexibility due to modular assembly with standard terminal heads and customized immersion length
- Fast response time with reduced tip form
- Types of protection for use in hazardous locations:
Intrinsic Safety (Ex ia)
Non-Sparking (Ex nA)



Function and system design

Measuring principle

The Resistance Temperature Detector (RTD) element has an electrical resistance with a value of $100\ \Omega$ at $0\ ^\circ\text{C}$ ($32\ ^\circ\text{F}$). It is commonly known as Pt100 and complies with IEC 60751. This resistance value increases at higher temperatures according to the characteristics of the resistor material (platinum). These kind of sensors are called Positive Temperature Coefficient elements (PTC).

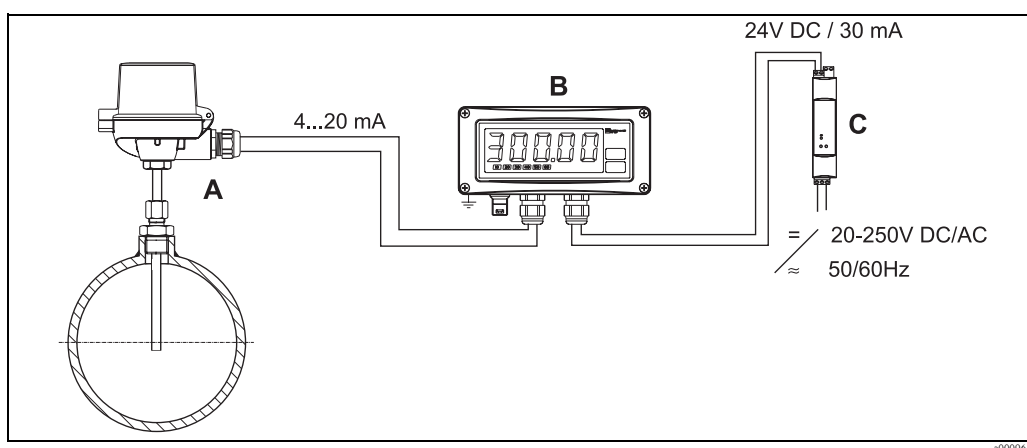
The coefficient is fixed with $\alpha = 0.00385\ ^\circ\text{C}^{-1}$, calculated between 0 and $100\ ^\circ\text{C}$ (32 and $212\ ^\circ\text{F}$), according to ITS90 (International Temperature Scale).

Wire wound platinum resistance thermometers (WW) consist of hair thin highly purified platinum wire double wound inside a ceramic carrier. This is then sealed top and bottom with a ceramic protective layer. The measurements achieved by these resistance thermometers are not only highly reproducible, but also show long term resistance/temperature characteristic stability within temperature ranges up to $600\ ^\circ\text{C}$ ($1112\ ^\circ\text{F}$). This sensor type is relatively large in its dimensions and is also sensitive to vibration.

Thin film platinum resistance thermometers (TF) consist of a precise amount of platinum which is vaporized under vacuum onto a ceramic substrate to a thickness of $1\ \mu\text{m}$. This is then protected by a glass layer. The advantages are: smaller dimensions than wire wound and greatly improved vibration resistance. Thin film resistances (TF) are flat, microscopic versions of the wire wound types (WW) with a measurement relevant difference:

The temperature expansion behavior of the different layers of this structure leads to minimal mechanical stress. Temperature changes in thin film resistances (TF) cause the desired temperature relevant changes of the resistance as well as minimal tension stress related resistance changes. Through this the resistance/temperature characteristic of most thin film platinum resistance thermometers (TF) differs considerably from the standard characteristics at higher temperatures. Thin film resistances are therefore used for temperature measurement in ranges below $500\ ^\circ\text{C}$ ($932\ ^\circ\text{F}$).

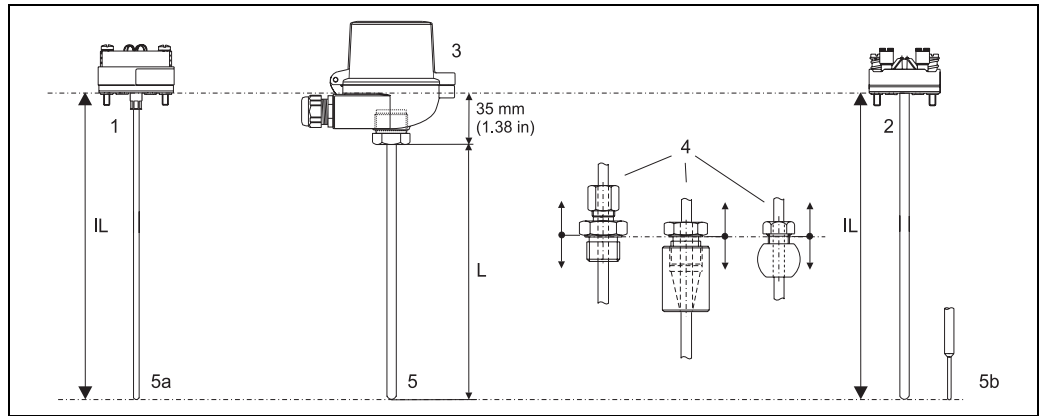
Measuring system



Example of an application

- A Built-in RTD assembly TR24 with head transmitter
- B RIA261 Field display
 - The display measures an analog measurement signal and indicates this on the display. The display is connected in a 4 to 20 mA current loop and also derives its supply from the loop. The voltage drop is almost negligible ($< 2.5\ \text{V}$). The dynamic internal resistance (load) makes sure that independently from the loop current, the maximum voltage drop is never exceeded. The analog signal at the input is digitalized, analyzed, and displayed. For details see Technical Information (see chapter "Documentation").
- C Active barrier RN221N
 - The RN221N active barrier (24 V DC, 30 mA) has a galvanically isolated output for supplying voltage to loop powered transmitters. The power supply has a wide-range input for mains power, 20 to 250 V DC/AC, 50/60 Hz to be used in any electrical circuit. For details see Technical Information (see chapter "Documentation").

Equipment architecture



Equipment architecture of the Omnigrad T TR24

- | | | | |
|---|---|----|--|
| 1 | Insert (∅ 3 mm, 0.12 in) with mounted head transmitter, for example | 5 | Various tip shapes - detailed information see chapter 'tip shape': |
| 2 | Insert (∅ 6 mm, 0.24 in) with mounted ceramic terminal block, for example | 5a | Straight for inserts with ∅ 3 mm (0.12 in) |
| 3 | Terminal head | 5b | Straight or reduced for inserts with ∅ 6 mm (0.24 in) |
| 4 | Compression fittings TA50, TA56, TA70 as process connection | L | Immersion length |
| | | IL | Insertion length = L + 35 mm (1.38 in) |

The Omnigrad T TR24 RTD assemblies are modular. The terminal head serves as a connection module for the mechanical and electrical connection of the measuring insert. The actual RTD sensor element is fitted in and mechanically protected within the insert. The insert can be exchanged and calibrated even during the process. Either ceramic terminal blocks or transmitters can be fitted to the internal base washer. The TR24 can be fitted onto a pipe or tank through the use of a compression fitting, which can be chosen from the most common models (see → 11).

Measurement range

-200 ... 600 °C (-328...1112 °F) according to IEC 60751

Performance characteristics

Operating conditions

Ambient temperature

Terminal head	Temperature in °C (°F)
Without mounted head transmitter	<ul style="list-style-type: none"> ■ Housing, material aluminum -40 to 100 °C (-40 to 212 °F) ■ Housing, material polyamide -40 to 85 °C (-40 to 185 °F)
With mounted head transmitter	-40 to 85 °C (-40 to 185 °F)
With mounted head transmitter and display	-20 to 70 °C (-4 to 158 °F)

Process pressure

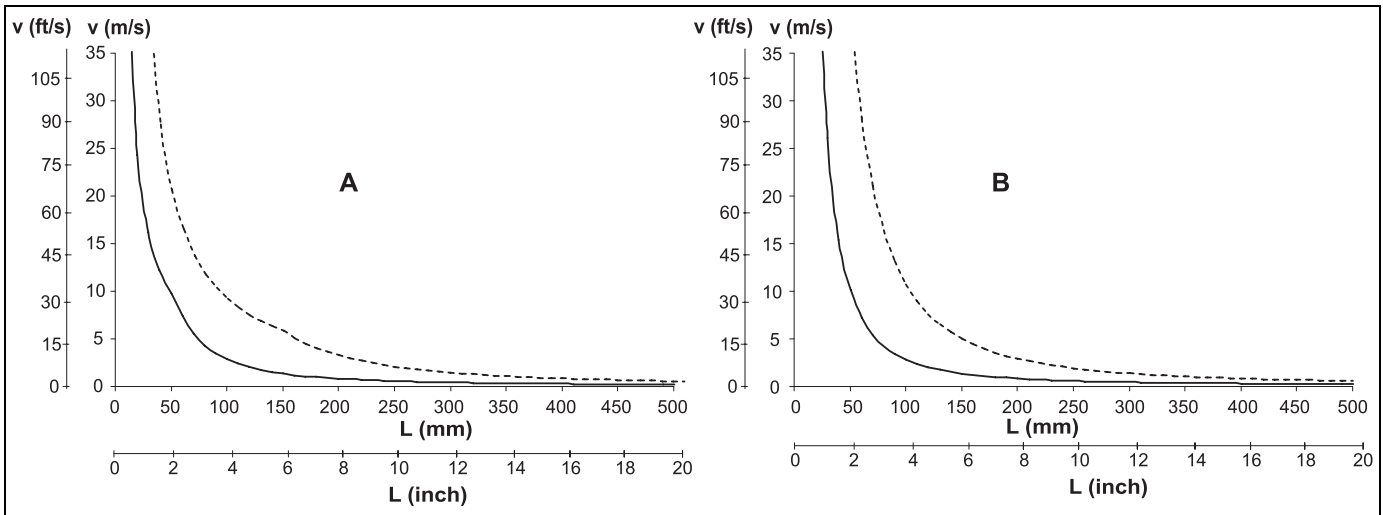


Note!

Maximum process temperature and pressure for using the compression fitting (TA50) or weld in adapter (TA56, TA70) see chapter 'process connection', → 11.

Permitted flow velocity depending on the immersion length

The highest flow velocity tolerated by the thermometer diminishes with increasing immersion length exposed to the stream of the fluid. In addition it is dependent on the diameter of the thermometer tip, on the kind of measuring medium, on the process temperature and on the process pressure. The following figures exemplify the maximum permitted flow velocities in water and superheated steam at a process pressure of 1 MPa (10 bar = 145 PSI).



Permitted flow velocity

- Insert diameter 3 mm (0.12 in) ———
- Insert diameter 6 mm (0.24 in) - - - - -

A Medium water at T = 50 °C (122 °F) L Immersion length
 B Medium superheated steam at T = 400 °C (752 °F) v Flow velocity

Shock and vibration resistance

4g / 2 to 150 Hz as per IEC 60068-2-6

Accuracy

RTD corresponding to IEC 60751

Class	max. Tolerances (°C)	Temperature range	Characteristics
RTD max. error type TF - range: -50 to +400 °C			
F0.15 (Cl. A)	$0.15 \pm 0.002 \cdot t ^{1.1}$	-50 °C to +250 °C	
F0.1 (Cl. AA, former 1/3 Cl. B)	$0.10 \pm 0.0017 \cdot t ^{1.1}$	0 °C to +150 °C	
F0.3 (Cl. B)	$0.3 \pm 0.005 \cdot t ^{1.1}$	-50 °C to +400 °C	
RTD max. error type WW - range: -200 to +600 °C			
W0.15 (Cl. A)	$0.15 \pm 0.002 \cdot t ^{1.1}$	-200 °C to +600 °C	
W0.1 (Cl. AA, former 1/3 Cl. B)	$0.10 \pm 0.0017 \cdot t ^{1.1}$	0 °C to +250 °C	
W0.3 (Cl. B)	$0.3 \pm 0.005 \cdot t ^{1.1}$	-200 °C to +600 °C	

1) |t| = absolute value °C



Note!

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

Response time

Tests in water at 0.4 m/s (1.3 ft/s), according to IEC 60751; 10 K temperature step changes:

Insert diameter	Response time	
6 mm (0.24 in)	t ₅₀ t ₉₀	3.5 s 8 s
3 mm (0.12 in)	t ₅₀ t ₉₀	2 s 5 s
6 mm (0.24 in) / 3 mm (0.12 in)	t ₅₀ t ₉₀	



Note!

Response time for the sensor assembly without transmitter.

Insulation resistance

Insulation resistance $\geq 100 \text{ M}\Omega$ at ambient temperature.

Insulation resistance between each terminal and the sheath is tested with a voltage of 100 V DC.

Self heating

RTD elements are passive resistances that are measured using an external current. This measurement current causes a self heating in the RTD element itself which in turn creates an additional measurement error. In addition to the measurement current the size of the measurement error is also affected by the thermal conductivity and flow velocity of the process. This self heating error is negligible when an Endress+Hauser iTEMP® temperature transmitter (very small measurement current) is connected.

Calibration specifications

The manufacturer provides comparison temperature calibration from -80 to +600 °C (-110 °F to 1112 °F) based on the International Temperature Scale (ITS90). Calibrations are traceable to national and international standards. The calibration report is referenced to the serial number of the thermometer.

\varnothing 6 mm (0.24), \varnothing 3 mm (0.12 in) or reduced tip shape	Minimum immersion length L in mm (inch)
Temperature range	With or without head transmitter
-80 °C to -40 °C (-110 °F to -40 °F)	200 (7.87)
-40 °C to 0 °C (-40 °F to 32 °F)	160 (6.3)
0 °C to 250 °C (32 °F to 480 °F)	120 (4.72)
250 °C to 550 °C (480 °F to 1020 °F)	300 (11.81)

Material

Material	Short description	max. application temperature	Characteristics
SS 316L/1.4404	X2CrNiMo 17 13 2	800 °C (1472 °F)	<ul style="list-style-type: none"> ■ Austenitic, stainless steel ■ High corrosion resistance ■ High resistance at low temperatures ■ Optimal corrosion resistance in an acid, non oxidizing environment (e.g. phosphorous and sulphuric acids in low concentration and at low temperatures) – Not resistant to chloride at high temperatures

Transmitter specifications

	TMT180 PCP Pt100	TMT181 PCP Pt100, TC, Ω , mV	TMT182 HART® Pt100, TC, Ω , mV	TMT84 PA / TMT85 FF Pt100, TC, Ω , mV
Measurement accuracy	0.2 °C (0.36 °F), optional 0.1 °C (0.18 °F) or 0.08% % is related to the adjusted measurement range (the larger value applies)	0.2 °C (0.36 °F) or 0.08%		0.1 °C (0.18 °F)
Sensor current	$I \leq 0.6$ mA		$I \leq 0.2$ mA	$I \leq 0.3$ mA
Galvanic isolation (input/output)	-		$\hat{U} = 2$ kV AC	

Transmitter long-term stability

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

System components

Family of temperature transmitters

Thermometers fitted with iTEMP® transmitters are an installation ready complete solution to improve temperature measurement by increasing accuracy and reliability, when compared to direct wired sensors, as well as reducing both wiring and maintenance costs.

PC programmable head transmitter TMT180 and TMT181

They offer you extreme flexibility and help control costs with the ability to stock devices and program them 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 the website www.readwin2000.com. Details see Technical Information (see chapter 'Documentation').

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. Details see Technical Information (see chapter 'Documentation').

Type of transmitter	Specification
iTEMP® TMT18x 	<ul style="list-style-type: none"> ■ Material: Housing (PC), Potting (PUR) ■ Terminals: Cable up to max. max. ≤ 2.5 mm² / 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 terminal head) Details see Technical Information (see chapter 'Documentation')

PROFIBUS® PA TMT84 head transmitter

Universally programmable head transmitter with PROFIBUS® PA communication. Converting various input signals into a digital output signal. High accuracy over the complete ambient temperature range. Swift and easy operation, visualization and maintenance using a PC directly from the control panel, e. g. using operating software such as FieldCare, Simatic PDM or AMS.

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 using Callendar-Van Dusen coefficients. Details see Technical Information (see chapter 'Documentation').



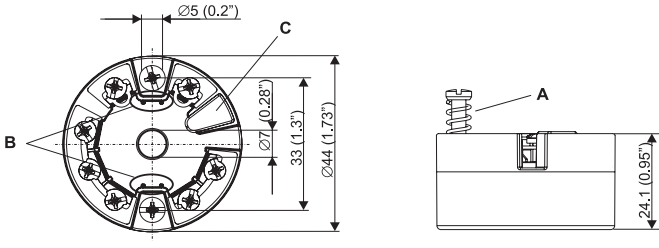
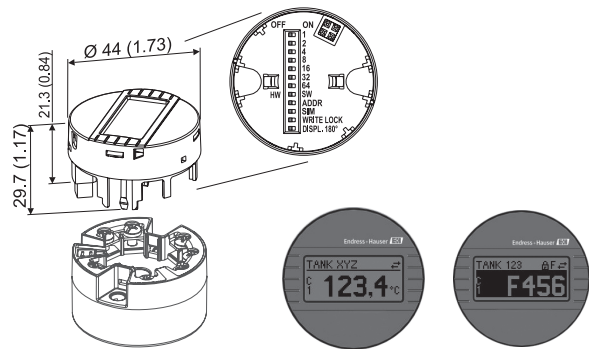
Note!

The previous model PROFIBUS® PA TMT184 head transmitter will be available for a transition time.

FOUNDATION Fieldbus™ TMT85 head transmitter

Universally programmable head transmitter with FOUNDATION fieldbus™ communication. Converting various input signals into a digital output signal. High accuracy over the complete ambient temperature range. Swift and easy operation, visualization and maintenance using a PC directly 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 using Callendar-Van Dusen coefficients. Details see Technical Information (see chapter 'Documentation').

Type of transmitter	Specification
<p>iTEMP® TMT84 and TMT85</p>  <p style="text-align: right; font-size: small;">a0007301-en</p>	<ul style="list-style-type: none"> ■ Spring range $L \geq 5 \text{ mm (0.2\"}$), see Pos. A ■ Fixing elements for pluggable measured value display, see Pos. B ■ Interface for contacting measured value display, see Pos. C ■ Material (RoHS-compliant) Housing: PC Potting: PU ■ Terminals: <ul style="list-style-type: none"> • Screw terminals (cable up to max. $\leq 2.5 \text{ mm}^2 / 16 \text{ AWG}$) • or spring terminals (e. g. from 0.25 mm^2 to $0.75 \text{ mm}^2 / 24 \text{ AWG}$ to 18 AWG for flexible wires with wire-end ferrules with plastic ferrule) ■ Degree of protection NEMA 4 (see also type of terminal head) <p>Details see Technical Information (see chapter 'Documentation')</p>
<p>Pluggable display TID10 as option</p>  <p style="text-align: right; font-size: small;">a0009955</p>	<ul style="list-style-type: none"> ■ Displays the actual measured value and the measurement point identification ■ Displays fault events in inverse color with channel ident and diagnostics code ■ DIP-switches on the rear for hardware set-up, e. g. PROFIBUS® PA bus address

Terminal heads

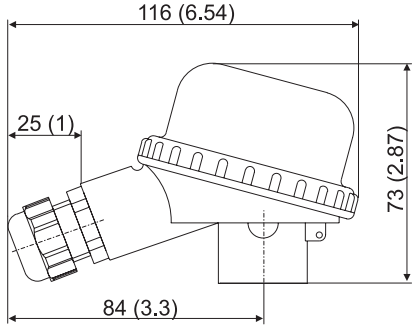
All terminal heads have internal geometry according to DIN 43729, form B and thermometer connection M24x1.5.

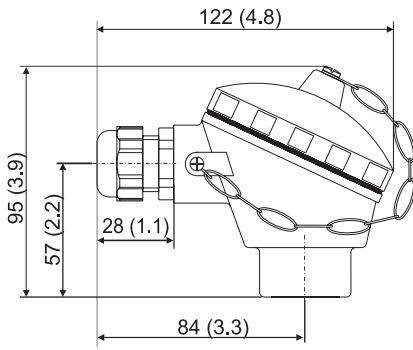
All dimensions in mm (inch). All cable gland dimensions in the graphics are based on SKINTOP ST M20x1.5

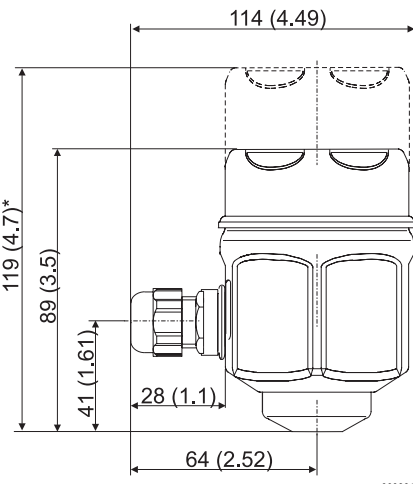
TA30A	Specification
<p style="text-align: right; font-size: small;">a0009820</p>	<ul style="list-style-type: none"> ■ Degree of protection: IP66/68 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Max. temperature: 150 °C (300 °F) ■ Material: aluminum, polyester powder coated ■ Seals: EPDM-70 ■ Cable entry incl. glands: ½" NPT and M20x1.5, only thread: G ½", plugs: M12x1 PA, 7/8" FF ■ Protection armature connection: M24x1.5 ■ Head color: blue RAL 5012 ■ Cap color: grey RAL 7035 ■ Weight: 330 g (11.64 oz) ■ LABS - free

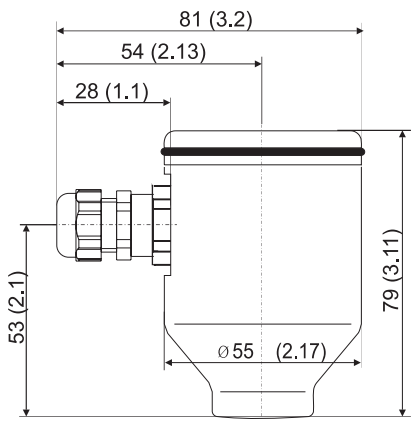
TA30A with display window	Specification
<p style="text-align: right; font-size: small;">a0009821</p>	<ul style="list-style-type: none"> ■ Degree of protection: IP66/68 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Max. temperature: 150 °C (300 °F) ■ Material: aluminum, polyester powder coated ■ Seals: EPDM-70 ■ Cable entry incl. glands: ½" NPT and M20x1.5, only thread: G ½", plugs: M12x1 PA, 7/8" FF ■ Protection armature connection: M24x1.5 ■ Head color: blue RAL 5012 ■ Cap color: grey RAL 7035 ■ Weight: 420 g (14.81 oz) ■ Head transmitter optional with TID10 display

TA30D	Specification
<p style="text-align: right; font-size: small;">a0009822</p>	<ul style="list-style-type: none"> ■ Degree of protection: IP66/68 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Max. temperature: 150 °C (300 °F) ■ Material: aluminum, polyester powder coated ■ Seals: EPDM-70 ■ Cable entry incl. glands: ½" NPT and M20x1.5, only thread: G ½", plugs: M12x1 PA, 7/8" FF ■ Protection armature connection: M24x1.5 ■ Two head transmitters can be mounted ■ Head color: blue RAL 5012 ■ Cap color: grey RAL 7035 ■ Weight: 390 g (13.75 oz) ■ LABS - free

TA20B	Specification
 <p style="text-align: right; font-size: small;">a0008663</p>	<ul style="list-style-type: none"> ■ Degree of protection: IP65 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Max. temperature: 80 °C (176 °F) ■ Material: polyamide (PA) ■ Cable entry: M20x1.5 ■ Head and cap color: black ■ Weight: 80 g (2.82 oz)

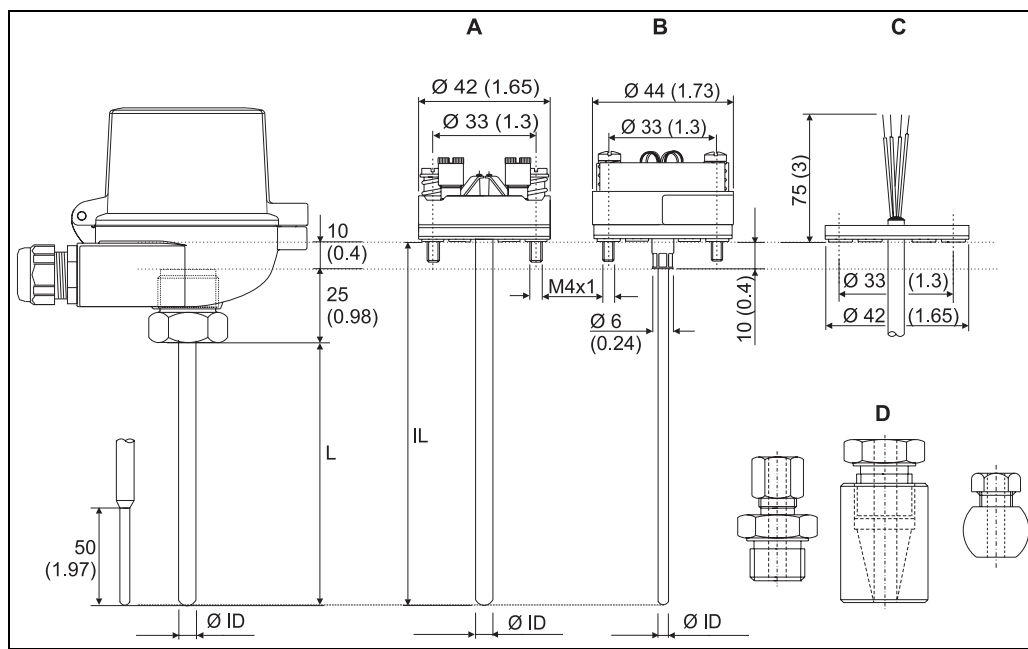
TA21E	Specification
 <p style="text-align: right; font-size: small;">a0008669</p>	<ul style="list-style-type: none"> ■ Degree of protection: IP65 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Max. temperature: 130 °C (266 °F) silicone, 100 °C (212 °F) rubber (observe max. permitted temperature of the cable gland!) ■ Material: aluminum alloy with polyester or epoxy coating; rubber or silicone seal under the cover ■ Cable entry: M20x1.5 or plug M12x1 PA ■ Protection armature connection: M24x1.5, G 1/2" or NPT 1/2" ■ Head color: blue RAL 5012 ■ Cap color: grey RAL 7035 ■ Weight: 300 g (10.58 oz)

TA20J	Specification
 <p style="text-align: right; font-size: small;">a0008866</p> <p><i>* dimensions with optional display</i></p>	<ul style="list-style-type: none"> ■ Degree of protection: IP66/IP67 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Material: 316L (1.4404) stainless steel, rubber seal under the cover (hygienic design) ■ 4 digits 7-segments LC display (loop powered) ■ Cable entry: 1/2" NPT, M20x1.5 or plug M12x1 PA ■ Protection armature connection: M24x1.5 or 1/2" NPT ■ Head and cap color: stainless steel, polished ■ Weight: 650 g (22.93 oz) with display ■ Humidity: 25 to 95%, no condensation <p>The programming is executed through 3 keys at the bottom of the display.</p>

TA20R	Specification
	<ul style="list-style-type: none"> ■ Degree of protection: IP66/67 ■ Tapped hole spacing: 33 mm (1.30") for the measuring insert ■ Max. temperature: 100 °C (212 °F) ■ Material: SS 316L (1.4404) stainless steel ■ Cable entry: ½" NPT, M20x1.5 or plug M12x1 PA ■ Head and cap color: stainless steel ■ Weight: 550 g (19.4 oz) ■ LABS - free

Assembly

All dimensions in mm (inches).



Dimensions of the Omnigrad T TR24

A	Model with terminal block mounted	Ø ID	Insert diameter 6 mm (0.24 in) or 3 mm (0.12 in)
B	Model with head transmitter mounted	IL	Insertion length = L + 35 mm (1.38 in)
C	Model with flying leads	L	Immersion length
D	Compression fittings (see 'Process connection')		

Tip shape

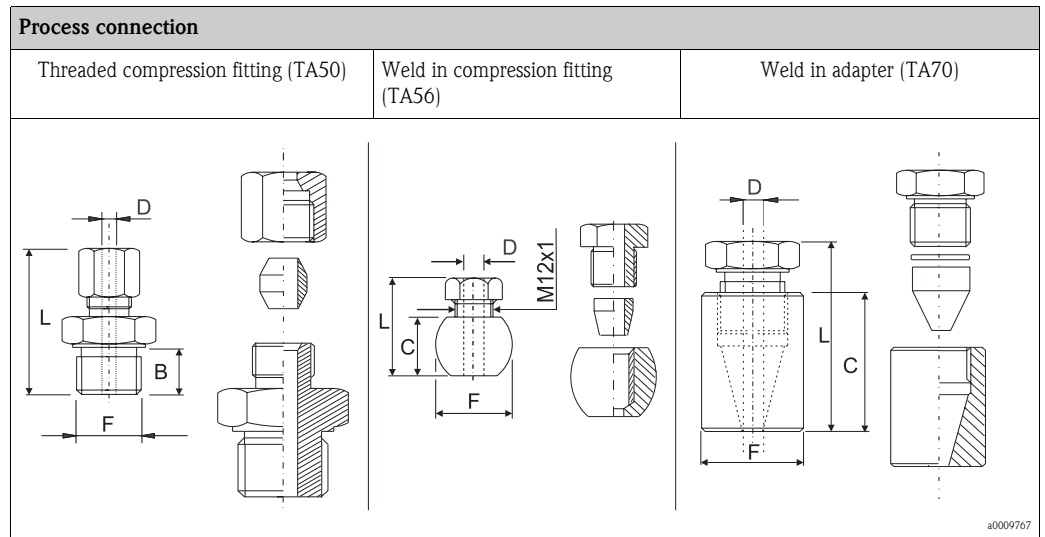
Tip shape	Insert Diameter
Reduced	Ø 6 mm (0.24 in) / Ø 3 mm (0.12 in) x 50 mm (1.97 in)
Straight	Ø 6 mm (0.24 in) or Ø 3 mm (0.12 in)

Weight

From 0.5 to 2.5 kg (1 to 5.5 lbs) for standard options.

Process connection

The process connection is the connection between the process and the thermometer. When using a compression fitting the thermometer is pushed through a gland and fixed using a compression ferrule (can be loosened) or a metal ferrule (cannot be loosened). The gland is either screwed or welded in the tank or pipe.



Model	F in mm (inch)	L in mm (inch)	C in mm (inch)	B in mm (inch)	Material ferrule	Max. process temperature	Max. process pressure
TA50	G½"	47 (1.85)	-	15 (0.6)	SS316 ¹⁾	800 °C (1472 °F)	40 bar at 20 °C (580 psi at 68 °F)
					PTFE ²⁾	200 °C (392 °F)	10 bar at 20 °C (145 psi at 68 °F)
	½" NPT	50 (1.97)	-	20 (0.8)	SS316 ¹⁾	800 °C (1472 °F)	40 bar at 20 °C (580 psi at 68 °F)
					PTFE ²⁾	200 °C (392 °F)	10 bar at 20 °C (145 psi at 68 °F)
TA56	Weld-in 25 (0.98)	30 (1.18)	18 (0.71)	-	PEEK ²⁾	200 °C (392 °F)	140 bar at 20 °C (2030 psi at 68 °F)
TA70	Weld-in 30 (1.18)	76 (3)	34 (1.34)	-	Viton® ²⁾	180 °C (356 °F)	20 bar at 20 °C (290 psi at 68 °F)

- 1) SS316 compression ferrule: Can only be used once, the compression fitting cannot be repositioned on the protection tube after loosening. Fully adjustable immersion length on initial installation.
- 2) PTFE/PEEK/Viton® compression ferrule: Can be reused, after loosening the fitting can be moved up and down the protection tube. With fully adjustable immersion length.

More available versions see Technical information 'TA fittings & sockets' (TI091t/02/en) and on request.

Spare parts

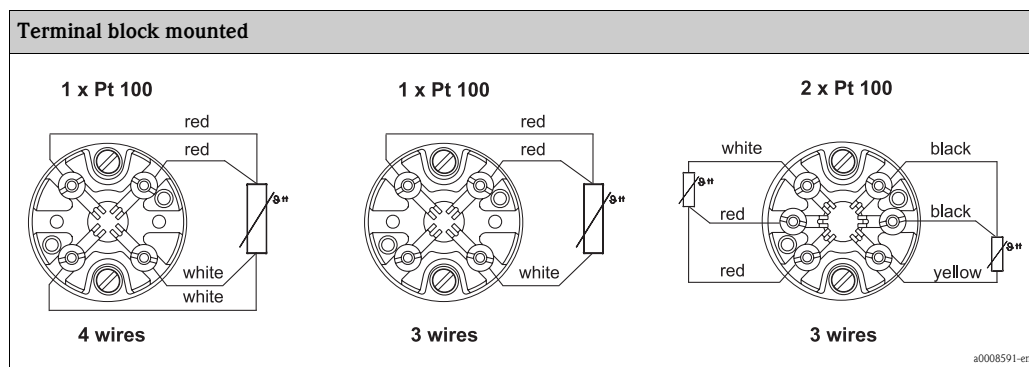
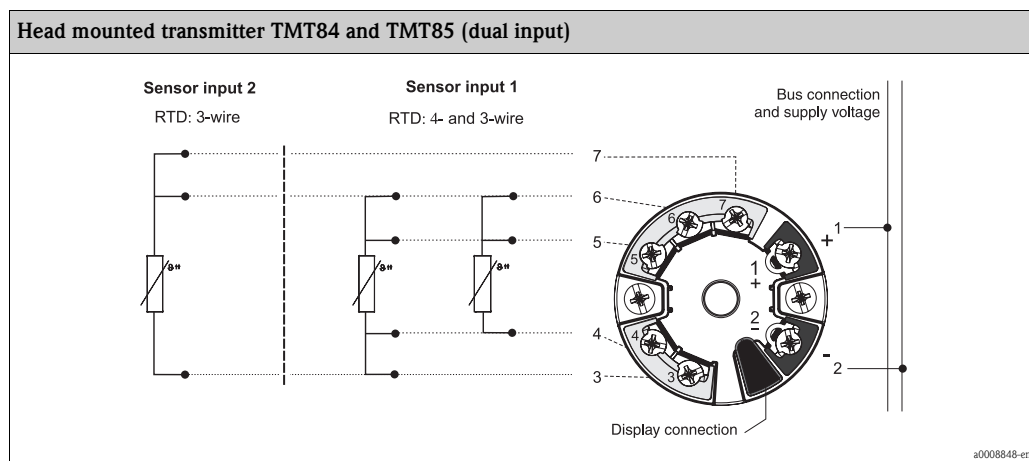
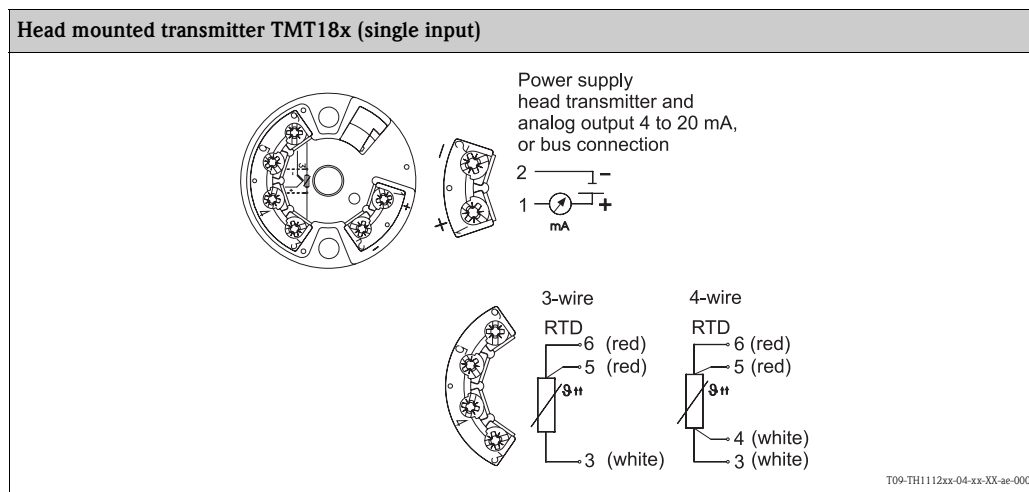
The RTD insert is available as spare part TPR100 (see Technical Information in chapter 'Documentation'). If spare parts are required, refer to the following equation: **Insertion length IL = L + 35 mm (1.38 in)**

Spare part	Material-No.
Gasket set M24x1.5, aramid+NBR (10 pieces)	60001329
Ferrules set for TA50, Ø 3 mm (0.12 in), G1/8" and G¼", SS 316 (5 pieces)	60011575
Ferrules set for TA50, Ø 3 mm (0.12 in), G1/8" and G¼", PTFE (5 pieces)	60011598
Ferrules set for TA50, Ø 6 mm (0.24 in), G¼", G3/8", G½" and G¾", SS 316 (5 pieces)	60011599

Wiring

Wiring diagrams

Type of sensor connection

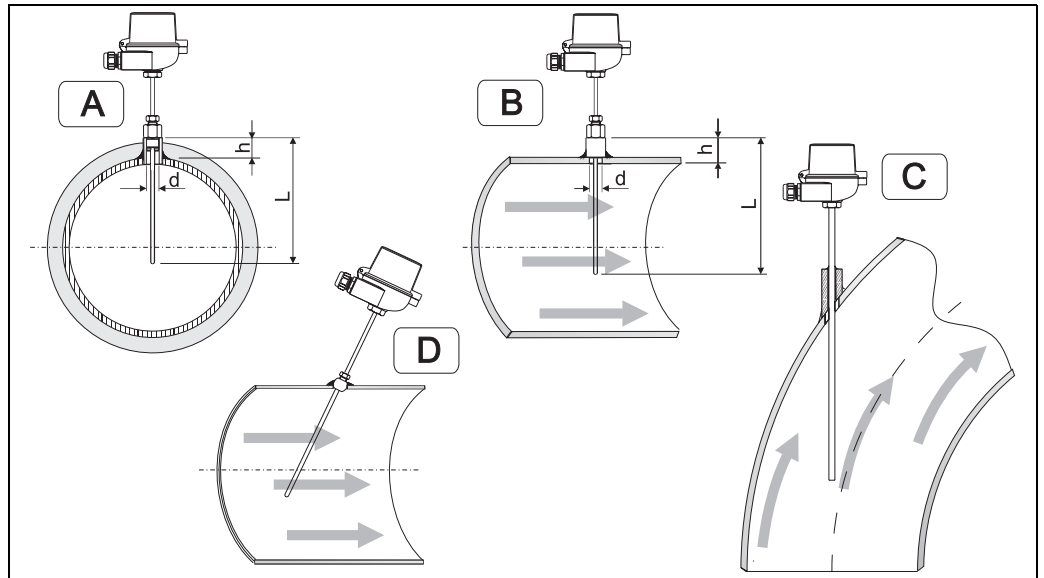


Installation conditions

Orientation

No restrictions.

Installation instructions



Installation examples

A - B: In small nominal bore pipes the tip should reach or extend slightly past the center line of the pipe (= L).
C - D: Angled installation.

The immersion length of the thermometer influences the accuracy. If the immersion length is too small then errors in the measurement are caused by heat conduction via the process connection and the container wall. If installing into a pipe then the immersion length must be at least half of the pipe diameter.

- Installation possibilities: Pipes, tanks or other plant components
- Minimum immersion length = 80 to 100 mm (3.15 to 3.94 in)
The immersion length must be at least 8 times the protection tube diameter. Example: Protection tube diameter 12 mm (0.47 in) x 8 = 96 mm (3.8 in). Recommended standard immersion length according to DIN 43772: 120 mm (4.72 in)
- ATEX certification: Always take note of the installation regulations!



Note!

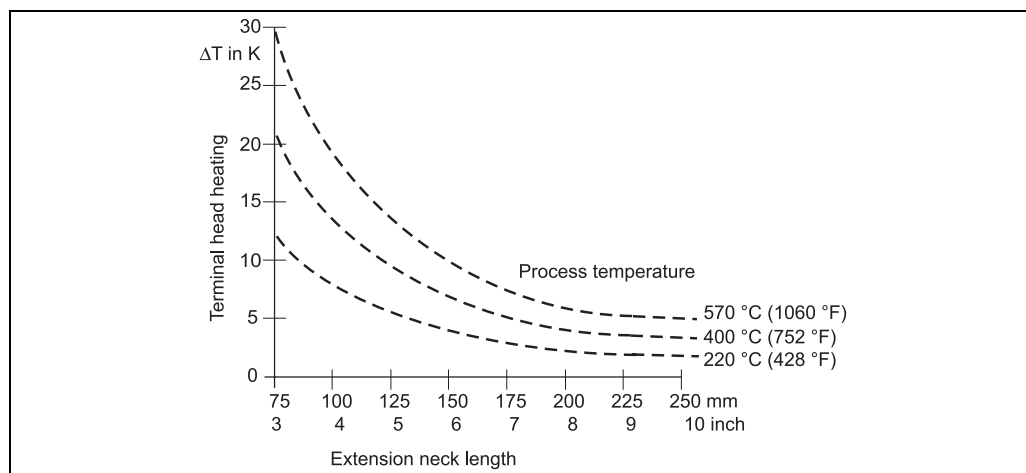
When operating in small nominal bore pipes it must be guaranteed that the protection tube tip is long enough to extend past the pipe center line (see Pos. A and B). A further solution could be an angled (tilted) installation (see Pos. C and D). When determining the immersion length all thermometer parameters and the process to be measured must be taken into account (e.g. flow velocity, process pressure).

Neck tube length

The neck tube is the part between the process connection and the housing. It is normally made of a tube with dimensional and physical characteristics (diameter and material) which are the same as of the tube in contact with the medium.

The connection situated in the upper part of the neck allows for orientation of the terminal head.

As illustrated in the following figure, the neck tube length may influence the temperature in the terminal head. It is necessary that this temperature is kept within the limit values defined in the chapter "Operating conditions".



Heating of the terminal head consequent to the process temperature

a0008623-en

Certificates and approvals

CE Mark

The device meets the legal requirements of the EC directives if applicable. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

Hazardous area approvals

For further details on the available Ex versions (ATEX, CSA, FM, etc.), please contact your Endress+Hauser sales organization. All relevant data for hazardous areas can be found in separate Ex documentation.

Other standards and guidelines

- IEC 60529:
Degrees of protection by housing (IP-Code).
- IEC 61010-1:
Safety requirements for electrical measurement, control and laboratory instrumentation.
- IEC 60751:
Industrial platinum resistance thermometer
- DIN43772:
Protection tubes
- EN 50014/18, DIN 47229:
Terminal heads
- IEC 61326-1:
Electromagnetic compatibility (EMC requirements)

PED approval

The thermometer complies with paragraph 3.3 of the Pressure Equipment Directive (97/23/CE) and is not marked separately.

Test report and calibration

The "Factory calibration" is carried out in an EA (European Accreditation) authorized laboratory of Endress+Hauser according to an internal procedure. A calibration may be requested separately according to an EA accredited procedure (SIT calibration). Calibration is carried out on the thermometer insert.

Ordering information

Product structure

RTD thermometer TR24	
Approval:	
A	Non-hazardous area
B	ATEX II 1 GD EEx ia IIC
E	ATEX II 1/2 GD EEx ia IIC
G	ATEX II 1 G EEx ia IIC
H	ATEX II 3 GD EEx nA II
Head; Cable Entry:	
B	TA30A Alu, IP66/IP68; M20
C	TA30A Alu, IP66/IP68; NPT 1/2"
D	TA30A Alu, IP66/IP67; M12 plug PA
E	TA21E Alu, screw cap IP65; M20
F	TA30A Alu+display, IP66/IP68; M20
G	TA30A Alu+display, IP66/IP68; NPT 1/2"
H	TA30A Alu+display, IP66/IP67; M12 plug PA
J	TA20J 316L, IP66/IP67; M20
K	TA20J 316L, + display, IP66/IP67; M20
M	TA20J 316L, IP66/IP67; M12 plug PA
N	TA20R 316L, screw cap IP66/IP67; M20 silicone free
O	TA30D Alu, high cover, IP66/IP68; M20
P	TA30D Alu, high cover, IP66/IP68; NPT 1/2"
Q	TA30D Alu, IP66/IP67; M12 plug PA
R	TA20R 316L screw cap IP66/IP67; M20
S	TA20R 316L screw cap IP66; M12 plug
T	TA30A Alu, IP66/IP67; 7/8" plug FF
U	TA30A Alu+display, IP66/IP67; 7/8" plug FF
V	TA30D Alu, IP66/IP67; 7/8" plug FF
7	TA20B PA black, IP65; M20
Insert Diameter:	
1	3 mm; 316L
2	6 mm; 316L
5	6 mm; 316L, reduced 3x50 mm
Compression fitting; Ferrule:	
A	Not needed
B	Threaded TA50, G1/2" 316; 316, max. 800 °C
C	Threaded TA50, G1/2" 316; PTFE max. 200 °C
D	Threaded TA50, NPT 1/2" 316; 316
E	Threaded TA50, NPT 1/2" 316; PTFE
F	Weld-in spheric TA56, D=25 mm 316L; PEEK 200 °C
G	Weld-in cylindric, D=30 mm 316L; Silopren
Immersion Length L:	
B	80 mm
D	120 mm
F	175 mm
H	235 mm
K	275 mm
L	335 mm
M	365 mm
N	425 mm
X mm
Y mm, as specified
Head Transmitter; Range:	
B	TMT84 PA
C	Terminal block
D	TMT85 FF
F	Flying leads
G	TMT181 (PCP); temp. range to be specified
H	TMT182 (HART); temp. range to be specified
2	TMT180-A21 fix; 0.2 K, temp. range to be specified, Span limit -200/650 °C
3	TMT180-A22 fix; 0.1 K, temp. range to be specified, Span limit -50/250 °C
4	TMT180-A11 PCP; 0.2 K, temp. range to be specified, Span limit -200/650 °C
5	TMT180-A12 PCP; 0.1 K, temp. range to be specified, Span limit -50/250 °C

										RTD; wire; meas. range; class; validity:	
										A	1x Pt100 WW; 3; -200/600 °C; A: -200/600 °C
										B	2x Pt100 WW; 3; -200/600 °C; A: -200/600 °C
										C	1x Pt100 WW; 4; -200/600 °C; A: -200/600 °C
										F	2x Pt100 WW; 3; -200/600 °C; 1/3B; 0/250 °C
										G	1x Pt100 WW; 3; -200/600 °C; 1/3B; 0/250 °C
										Y	Special version, to be specified
										2	1x Pt100 TF; 3; -50/400 °C; A; -50/250 °C increas. vibr. resistance
										3	1x Pt100 TF; 4; -50/400 °C; A; -50/250 °C increas. vibr. resistance
										6	1x Pt100 TF; 3; -50/400 °C; 1/3B; 0/150 °C increas. vibr. resistance
										7	1x Pt100 TF; 4; -50/400 °C; 1/3B; 0/150 °C increas. vibr. resistance
										Material Certificate:	
										0	Not needed
										9	Special version, to be specified
										Test/Calibration:	
										A	0, 100 °C, RTD-Signal
										B	0, 100 °C, 4-20 mA/loop
										C	0, 100 °C, RTD-Signal, 2 Sensors
										E	0, 100, 150 °C, RTD-Signal
										F	0, 100, 150 °C, RTD-Signal, 4-20 mA/loop
										G	0, 100, 150 °C, RTD-Signal, 2 Sensors
										0	Not needed
										Additional option:	
										0	Not needed
										9	Special version, to be specified
TR24-										← Order code (complete)	

This ordering information can give an overview about the available order options. The Endress+Hauser sales organization can provide detailed ordering information and information on the order code.

Documentation

Technical information:

- RTD Insert for Temperature Sensor Omniset TPR100 (TI268t/02/en)
- TA fittings and sockets Omnigrad TA50, TA55, TA60, TA70, TA75 (TI091t/02/en)
- Temperature head transmitter iTEMP® PCP TMT181 (TI070r/09/en)
- Technical information Temperature head transmitter iTEMP® Pt TMT180 (TI088r/09/en)
- Technical information Temperature head transmitter iTEMP® HART® TMT182 (TI078r/09/en)
- Technical information Temperature head transmitter iTEMP® TMT84 PA (TI138r/09/en)
- Technical information Temperature head transmitter iTEMP® TMT85 FF (TI134r/09/en)

Hazardous area supplementary documentation:

- Omnigrad TRxx RTD Thermometer ATEX II 1GD or II 1/2GD (XA072r/09/a3)
- Omnigrad TRxx/TCxx RTD/TC Thermometer ATEX II 3GD (XA044r/09/a3)

Application example

Technical Information:

- Field display RIA261 (TI083r/09/en)
- Active barrier with power supply RN221N (TI073R/09/en)

Instruments International

Endress+Hauser
Instruments International AG
Kaegenstrasse 2
4153 Reinach
Switzerland

Tel. +41 61 715 81 00
Fax +41 61 715 25 00
www.endress.com
info@ii.endress.com

Endress+Hauser 
People for Process Automation
