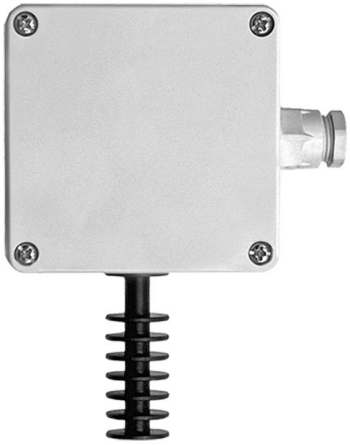
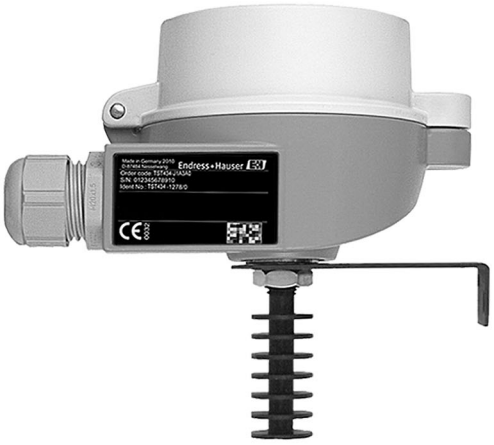
Technical Information
Omnigrad T TST434

Resistance thermometer for outdoor or indoor ambient temperature measurement





Reliable measurement and high accuracy - Best protection of the measuring electronics from extreme ambient conditions. Suitable for wall mounting.

Applications

- Outdoor or indoor ambient temperature measurement
- Maximum measuring range:
  −50 to +150 °C (−58 to +302 °F)
- Degree of protection: IP66/68 (NEMA Type 4x encl.)

Head transmitter

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

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

Your benefits

- Robust terminal heads according to DIN EN 50446 or stable plastic housings offer optimal protection from extreme ambient conditions
- Reliable, long term stable and accurate indoor or outdoor ambient temperature measurement
- Simple and fast wall mounting

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

Resistance thermometer (RTD)

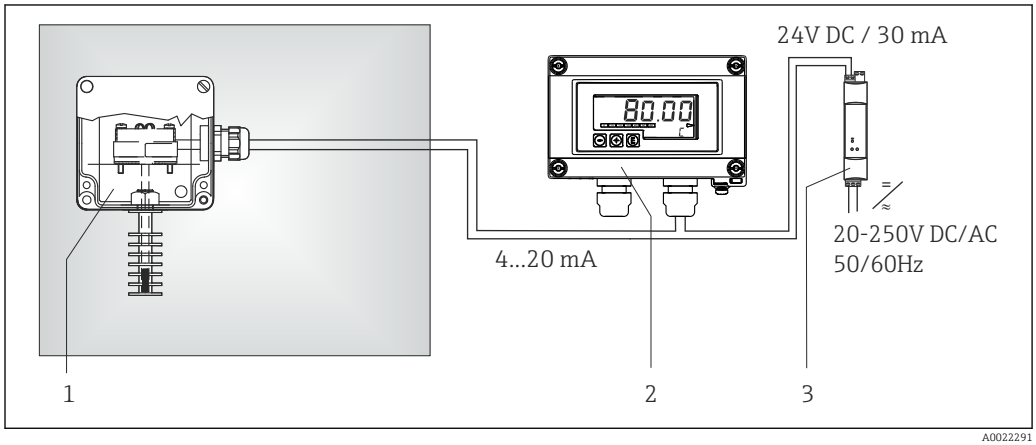
These resistance thermometers use a Pt100 temperature sensor according to IEC 60751. The temperature sensor is a temperature-sensitive platinum resistor with a resistance of 100 Ω at 0 °C (32 °F) and a temperature coefficient α = 0.003851 °C^{-1}.

There are generally two different kinds of platinum resistance thermometers:

- Wire wound (WW): Here, a double coil of fine, high-purity platinum wire is located in a ceramic support. This is then sealed top and bottom with a ceramic protective layer. Such resistance thermometers not only facilitate very reproducible measurements but also offer good long-term stability of the resistance/temperature characteristic within temperature ranges up to 600 °C (1 112 °F). This type of sensor is relatively large in size and it is comparatively sensitive to vibrations.
- **Thin film platinum resistance thermometers (TF):** A very thin, ultrapure platinum layer, approx. 1 µm thick, is vaporized in a vacuum on a ceramic substrate and then structured photolithographically. The platinum conductor paths formed in this way create the measuring resistance. Additional covering and passivation layers are applied and reliably protect the thin platinum layer from contamination and oxidation, even at high temperatures.

The primary advantages of thin film temperature sensors over wire wound versions are their smaller sizes and better vibration resistance. A relatively low principle-based deviation of the resistance/temperature characteristic from the standard characteristic of IEC 60751 can frequently be observed among TF sensors at high temperatures. As a result, the tight limit values of tolerance category A as per IEC 60751 can only be observed with TF sensors at temperatures up to approx. 300 °C (572 °F).

Measuring system



1 Application example: indoor ambient temperature monitoring with 4 to 20 mA analog output signal

1 Wall-mounted thermometer with head transmitter installed.
2 RIA15 process indicator - The process indicator records the analog measuring signal from the head transmitter and shows this on the display. The LC display shows the current measured value in digital form and as a bar graph indicating a limit value violation. The indicator is integrated into the 4 to 20 mA or HART® loop and draws the energy it needs from the loop. Optionally up to 4 HART® process variables of a sensor can be displayed. More information on this can be found in the Technical Information (see "Documentation").
3 Active barrier RN221N - The RN221N (24 V DC, 30 mA) active barrier has a galvanically isolated output for supplying voltage to loop-powered transmitters. The universal power supply works with an input supply voltage of 20 to 250 V DC/AC, 50/60 Hz, which means that it can be used in all international power grids. More information on this can be found in the Technical Information (see "Documentation").

Input

Measured variable

Temperature (temperature-linear transmission behavior)

Measuring range

Maximum −50 to +150 °C (−58 to +302 °F) according to IEC 60751, depending on the configuration

Output

Output signal

Generally, the measured value can be transmitted in one of two ways:

- Directly-wired sensors - sensor measured values forwarded without a transmitter.
- Via all common protocols by selecting an appropriate Endress+Hauser iTEMP® temperature transmitter. All the transmitters listed below are mounted directly in the terminal head and wired with the sensory mechanism.

Family of temperature transmitters

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

PC programmable head transmitters
They offer a high degree of flexibility, thereby supporting universal application with low inventory storage. The iTEMP transmitters can be configured quickly and easily at a PC. Endress+Hauser offers free configuration software which can be downloaded from the Endress+Hauser Website. More information can be found in the Technical Information.

HART® programmable head transmitters
The transmitter is a 2-wire device with one or two measuring inputs and one analog output. The device not only transfers converted signals from resistance thermometers and thermocouples, it also transfers resistance and voltage signals using HART® communication. It can be installed as an intrinsically safe apparatus in Zone 1 hazardous areas and is used for instrumentation in the terminal head (flat face) as per DIN EN 50446. Swift and easy operation, visualization and maintenance using universal device configuration tools like FieldCare, DeviceCare or FieldCommunicator 375/475. For more information, see the Technical Information.

PROFIBUS® PA head transmitters
Universally programmable head transmitter with PROFIBUS® PA communication. Conversion of various input signals into digital output signals. High accuracy over the complete ambient temperature range. The configuration of PROFIBUS PA functions and of device-specific parameters is performed via fieldbus communication. For more information, see the Technical Information.

FOUNDATION Fieldbus™ head transmitters
Universally programmable head transmitter with FOUNDATION Fieldbus™ communication. Conversion of various input signals into digital output signals. High accuracy over the complete ambient temperature range. All transmitters are released for use in all important process control systems. The integration tests are performed in Endress+Hauser's "System World". For more information, see the Technical Information.

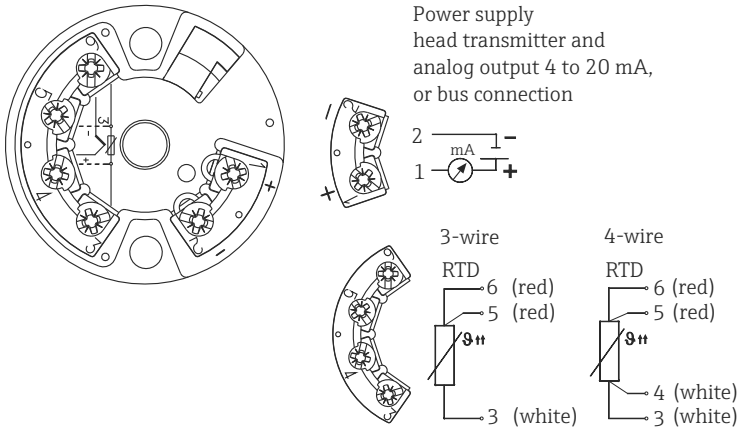
Advantages of the iTEMP transmitters:
- Dual or single sensor input (optionally for certain transmitters)
- Pluggable display (optionally for certain transmitters)
- Unsurpassed reliability, accuracy and long-term stability in critical processes
- Mathematical functions
- Monitoring of the thermometer drift, sensor backup functionality, sensor diagnostic functions
- Sensor-transmitter matching for dual sensor input transmitters, based on Callendar/Van Dusen coefficients

Wiring

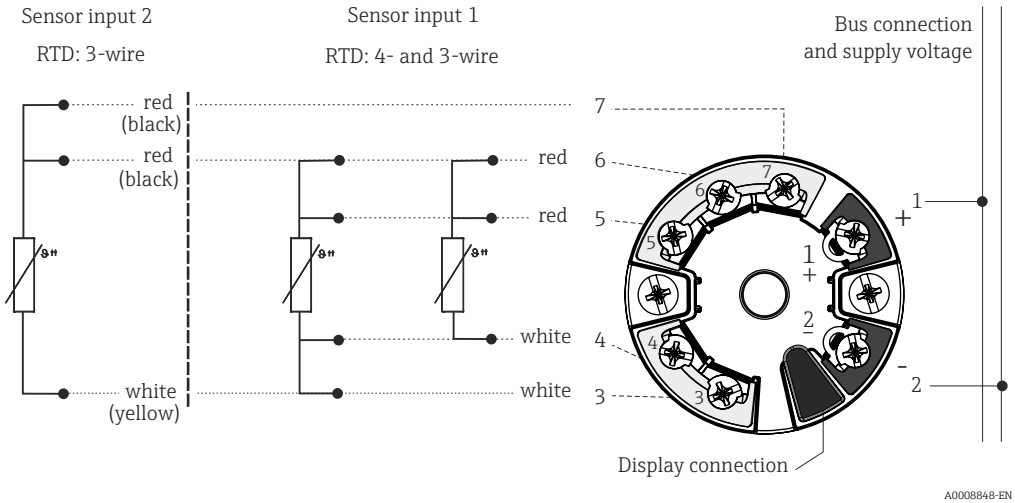
Wiring diagrams for RTD

Type of sensor connection

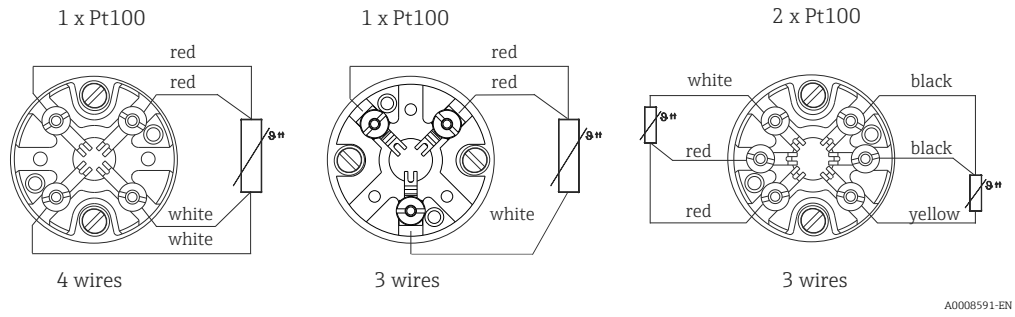
Head mounted transmitter TMT18x (single input)



Head mounted transmitter TMT8x (dual input)



Terminal block mounted



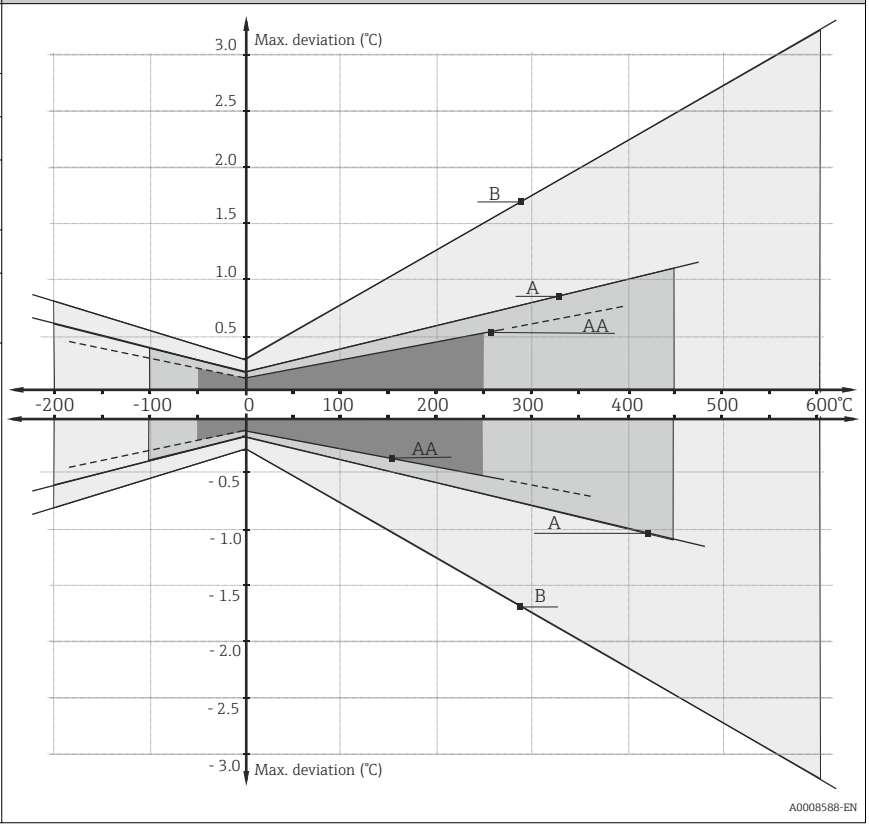
Performance characteristics

Reference operating conditions

These data are relevant for determining the accuracy of the temperature transmitters used. More information on this can be found in the Technical Information of the iTEMP® temperature transmitters. → 11

Accuracy

RTD resistance thermometer as per IEC 60751

Class	max. tolerances (°C)		Characteristics
Cl. AA, former 1/3 Cl. B	± (0.1 + 0.0017 · |t| [1])		
Cl. A	± (0.15 + 0.002 · |t| [1])		
Cl. B	± (0.3 + 0.005 · |t| [1])		
Temperature ranges for compliance with the tolerance classes			
Wire wound sensor (WW):	Cl. A	Cl. AA	
	– 100 to +450 °C	−50 to +250 °C	
Thin-film version (TF): ▪ Standard ▪ iTHERM StrongSens	Cl. A −30 to +300 °C −30 to +300 °C	Cl. AA 0 to +150 °C 0 to +150 °C	

1) |t| = absolute value °C

In order to obtain the maximum tolerances in °F, the results in °C must be multiplied by a factor of 1.8.

Insulation resistance

Insulation resistance ≥ 100 MΩ at ambient temperature.

Insulation resistance between the terminals and the outer jacket is measured with a minimum voltage of 100 V DC.

Self heating

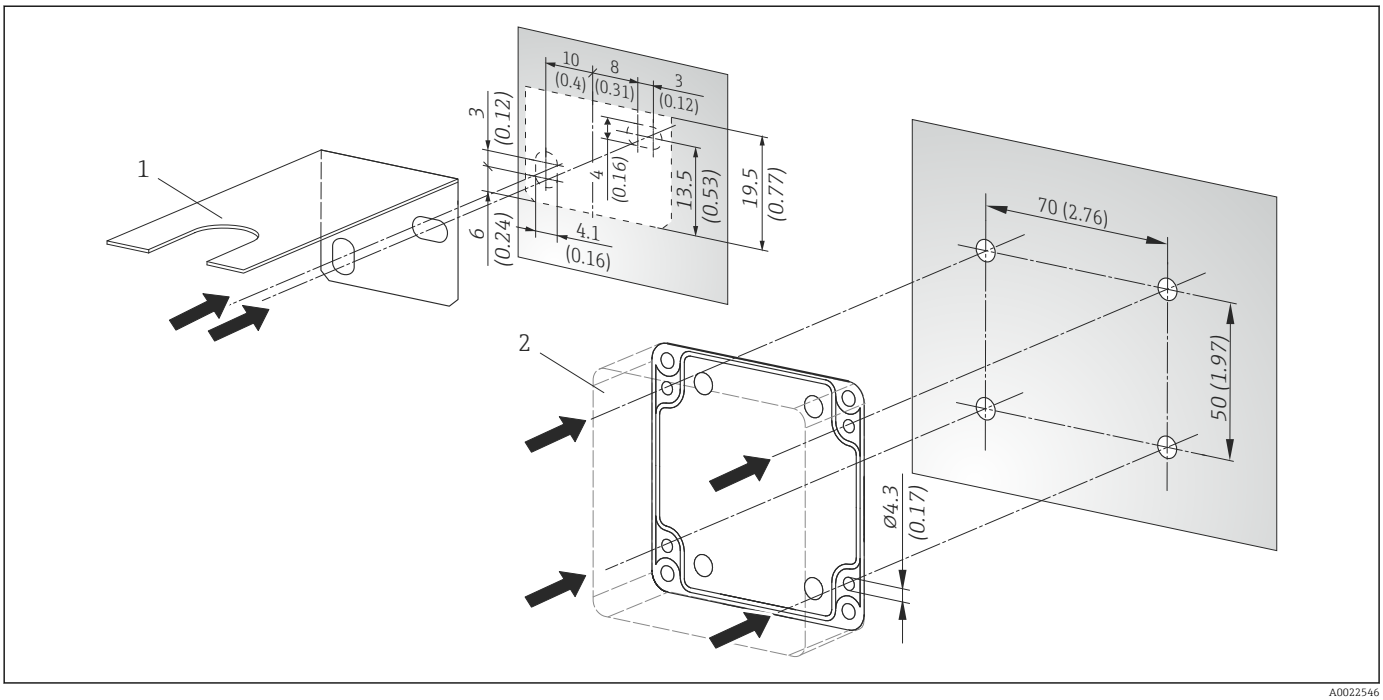
RTD elements are passive resistances that are measured using an external current. This measurement current causes a self-heating effect in the RTD element itself which in turn creates an additional measurement error. In addition to the measurement current, the size of the measurement error is also affected by the temperature 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.

Installation

Orientation

No restrictions.

Installation instructions



2 Drilling templates for wall mounting. Dimensions in mm (in)

1 Mounting bracket for mounting with terminal head
2 Plastic housing

Environment

Ambient temperature range

Housing	Temperature in °C (°F)
TA30A without mounted head transmitter	Depends on the use of the cable gland, ▪ W/o: −50 to +150 °C (−58 to +302 °F) ▪ With: −50 to +100 °C (−58 to +212 °F)
TA30 PCB without mounted head transmitter	−40 to +100 °C (−40 to +212 °F)
Terminal head with mounted head transmitter	−40 to +85 °C (−40 to +185 °F)
Plastic housing	−50 to +80 °C (−58 to +176 °F)

Storage temperature

See "Ambient temperature range"

Degree of protection

Terminal head	Degree of protection: IP66/68 (NEMA Type 4x encl.)
Plastic housing	Degree of protection: IP65

Shock and vibration resistance

4G / 2 to 150 Hz in accordance with IEC 60068-2-6

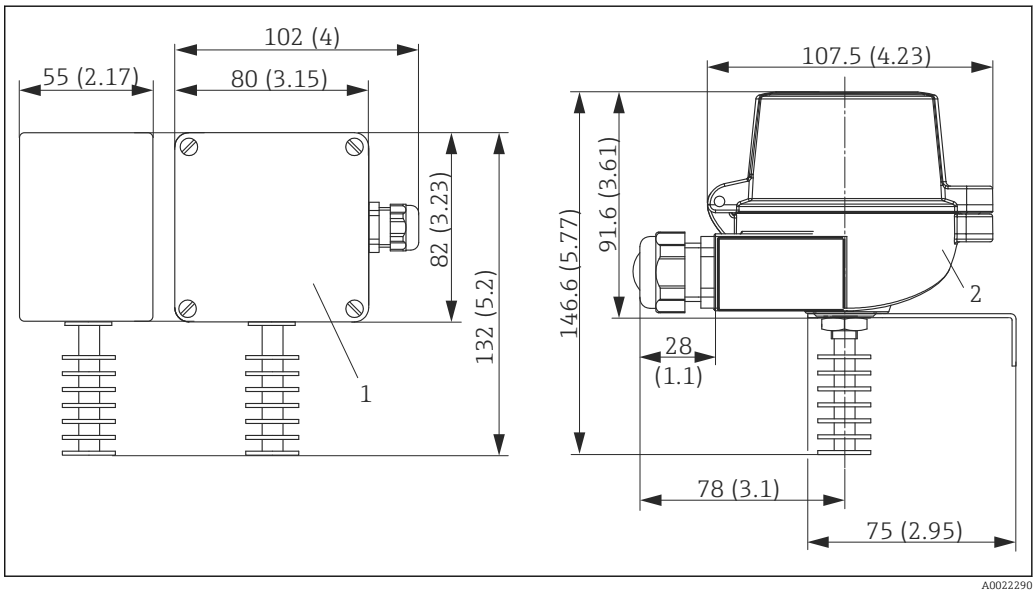
Process

Process pressure range

Maximum static process pressure: 1 bar (14.5 PSI) at an ambient temperature of 20 °C (68 °F).

Mechanical construction

All dimensions in mm (in). Specifications without head transmitter installed.



3 Dimensions of the thermometer

1 With plastic housing
2 With terminal head

Plastic housing specifications
Color: gray, RAL 7035

Terminal head specifications
▪ Color of head: blue, RAL 5012 ▪ Color of cap: gray, RAL 7035 ▪ Ground terminal, internal and external

Weight

200 to 500 g (7.05 to 17.64 oz), depends on the configuration.

Materials

Temperature sensor, housing

Temperature sensor	Anodized aluminum
Housing	Plastic housing made of polycarbonate (PC) or terminal head made of aluminum with polyester powder coating

Spare parts

Spare part	Material No.
Fixing kit cpl.TMT82/85/84 (European) 2x screws, 2x springs, 2x lock washers, 1x seal, CDI connector	71044061

Certificates and approvals

CE mark

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

Other standards and guidelines

- IEC 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use
- IEC 60751: Industrial platinum resistance thermometers
- IEC 61326-1: Electromagnetic compatibility (electrical equipment for measurement, control and laboratory use - EMC requirements)

Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Accessories

Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Communication-specific accessories

Configuration kit TXU10	Configuration kit for PC-programmable transmitter with setup software and interface cable for PC with USB port Order code: TXU10-xx
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface. For details, see "Technical Information" TI00404F
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop. For details, see "Technical Information" TI00405C
WirelessHART adapter	Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks with minimum cabling complexity. For details, see Operating Instructions BA061S
Field Xpert SMT70	Universal, high-performance tablet PC for device configuration The tablet PC enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as a comprehensive, all-in-one solution. With a pre-installed driver library, it is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle. For details, see Technical Information TI01342S/04

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: ▪ Calculation of all the necessary data for identifying the optimum measuring device: e.g. pressure loss, accuracy or process connections. ▪ Graphic illustration of the calculation results Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project. Applicator is available: Via the Internet: https://portal.endress.com/webapp/applicator
Configurator	Product Configurator - the tool for individual product configuration ▪ Up-to-the-minute configuration data ▪ Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language ▪ Automatic verification of exclusion criteria ▪ Automatic creation of the order code and its breakdown in PDF or Excel output format ▪ Ability to order directly in the Endress+Hauser Online Shop The Configurator is available on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and the search field -> Open the product page -> The "Configure" button to the right of the product image opens the Product Configurator.

W@M	Life cycle management for your plant W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle. The application already contains the data of your Endress+Hauser device. Endress +Hauser also takes care of maintaining and updating the data records. W@M is available: Via the Internet: www.endress.com/lifecyclemanagement
FieldCare SFE500	FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition. For details, see Operating Instructions BA00027S and BA00065S
DeviceCare SFE100	Configuration tool for devices via fieldbus protocols and Endress+Hauser service protocols. DeviceCare is the tool developed by Endress+Hauser for the configuration of Endress+Hauser devices. All smart devices in a plant can be configured via a point-to-point or point-to-bus connection. The user-friendly menus enable transparent and intuitive access to the field devices. For details, see Operating Instructions BA00027S

System components

Accessories	Description
Process indicator RIA15	Compact process indicator with very low voltage drop for universal use to display 4 to 20 mA/HART® signals. The process indicator does not require an external power supply. It is powered directly from the current loop. For details, see "Technical Information" TI01043K
RN221N	Active barrier with power supply for safe separation of 4 to 20 mA standard signal circuits. Offers bidirectional HART transmission. For details, see "Technical Information" TI00073R and Operating Instructions BA00202R
RNS221	Supply unit for powering two 2-wire measuring devices solely in the non-Ex area. Bidirectional communication is possible via the HART communication jacks. For details, see "Technical Information" TI00081R and Brief Operating Instructions KA00110R

Supplementary documentation

Technical Information

- iTEMP temperature head transmitter
  - TMT180, PC-programmable, single-channel, Pt100 (TI088R/09/en)
  - TMT181, PC-programmable, single-channel, RTD, TC, Ω, mV (TI00070R/09/en)
  - HART® TMT182, single-channel, RTD, TC, Ω, mV (TI078R/09/en)
  - HART® TMT82, two-channel, RTD, TC, Ω, mV (TI01010T/09/en)
  - PROFIBUS® PA TMT84, two-channel, RTD, TC, Ω, mV (TI00138R/09/en)
  - FOUNDATION Fieldbus™ TMT85, two-channel, RTD, TC, Ω, mV (TI00134R/09/en)
- Application example:
  - RN221N Active barrier, for supplying loop-powered transmitters (TI073R/09/en)
  - RIA15 Process indicator, loop-powered with optional HART® communication (TI01043K/09/en)

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