

Technical Information

iTHERM ModuLine TST434B

Modular 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.

Application areas

The iTHERM ModuLine TST434B RTD thermometer is specially designed for monitoring room temperature in virtually every industry. It is available as a complete unit with Endress+Hauser temperature transmitters, which offer enhanced measurement accuracy and reliability compared to directly wired sensors. They offer easy customizing, with a wide range of simple and advanced outputs and communication protocols.

- 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.)

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
- Optional head transmitter: 4 to 20 mA analog, HART®, PROFIBUS® PA, FOUNDATION Fieldbus™, IO-Link, PROFINET® over Ethernet-APL/SPE

Function and system design

Measuring principle

Resistance thermometers (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 $\alpha = 0.003851 \text{ }^{\circ}\text{C}^{-1}$.

There are generally two different kinds of platinum resistance thermometers:

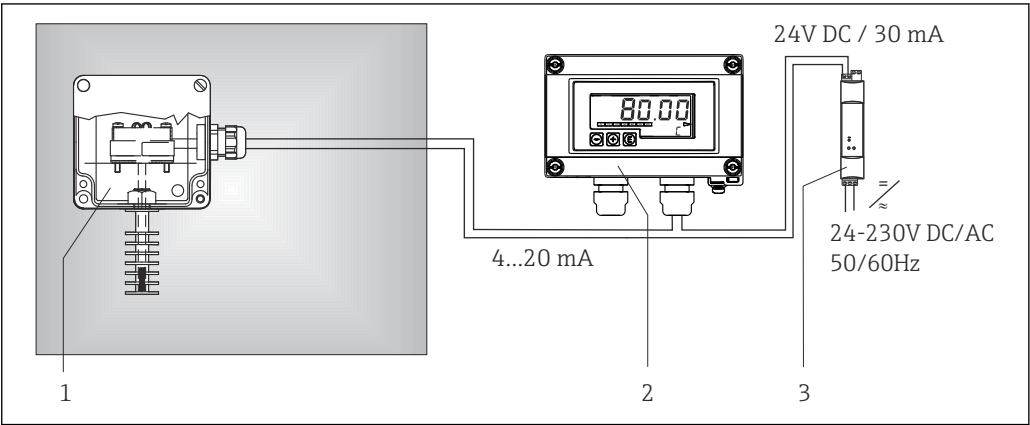
- **Wire-wound (WW):Wire Wound, WW** In these thermometers, a double coil of fine, high-purity platinum wire is accommodated in a ceramic support. This support is then sealed top and bottom with a ceramic protective layer. Such resistance thermometers not only facilitate very reproducible measurements 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 is comparatively sensitive to vibrations.
- **Thin-film platinum resistance thermometers(Thin Film, 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 class A as per IEC 60751 can only be observed with TF sensors at temperatures up to approx. 300 °C (572 °F).

Thermocouples (TC)

Thermocouples are comparatively simple, robust temperature sensors which use the Seebeck effect for temperature measurement: if two electrical conductors made of different materials are connected at a point, a weak electrical voltage can be measured between the two open conductor ends if the conductors are subjected to a thermal gradient. This voltage is called thermoelectric voltage or electromotive force (emf). Its magnitude depends on the type of conducting materials and the temperature difference between the "measuring point" (the junction of the two conductors) and the "cold junction" (the open conductor ends). Accordingly, thermocouples primarily only measure differences in temperature. The absolute temperature at the measuring point can be determined from these if the associated temperature at the cold junction is known or is measured separately and compensated for. The material combinations and associated thermoelectric voltage/temperature characteristics of the most common types of thermocouple are standardized in the IEC 60584 and ASTM E230/ANSI MC96.1 standards.

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 "Supplementary Documentation").
 - 3 Active barriers RN22/RN42 - The RN22/RN42 active barriers (17.5 V_{DC}, 20 mA) have a galvanically isolated output for supplying voltage to 2-wire transmitters. The universal power supply works with an input supply voltage of 24 to 230 V AC/DC, 0/50/60 Hz, which means that it can be used in all international power grids.

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 | <p>Generally, the measured value can be transmitted in one of two ways:</p> <ul style="list-style-type: none">■ 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 | <p>Thermometers fitted with iTEMP transmitters are an installation-ready complete solution to improve temperature measurement by significantly increasing measurement accuracy and reliability, when compared to direct wired sensors, as well as reducing both wiring and maintenance costs.</p> <p>4 to 20 mA head transmitters</p> <p>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.</p> <p>HART® head transmitters</p> <p>The iTEMP 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. Swift and easy operation, visualization and maintenance using universal configuration software like FieldCare, DeviceCare or FieldCommunicator 375/475. Integrated Bluetooth® interface for the wireless display of measured values and configuration via E+H SmartBlue (app), optional.</p> |

PROFIBUS® PA head transmitters

Universally programmable iTEMP transmitter with PROFIBUS® PA communication. Conversion of various input signals into digital output signals. High measurement accuracy over the complete ambient temperature range. PROFIBUS PA functions and device-specific parameters are configured via fieldbus communication.

FOUNDATION Fieldbus™ head transmitters

Universally programmable iTEMP transmitter with FOUNDATION Fieldbus™ communication. Conversion of various input signals into digital output signals. High measurement accuracy over the complete ambient temperature range. All iTEMP transmitters are approved for use in all the main process control systems. The integration tests are performed in Endress+Hauser's 'System World'.

Head transmitter with PROFINET® and Ethernet-APL

The iTEMP transmitter is a 2-wire device with two measurement inputs. The device not only transfers converted signals from resistance thermometers and thermocouples, it also transfers resistance and voltage signals using the PROFINET® protocol. Power is supplied via the 2-wire Ethernet connection according to IEEE 802.3cg 10Base-T1. The iTEMP transmitter can be installed as an intrinsically safe electrical apparatus in Zone 1 hazardous areas. The device can be used for instrumentation purposes in the terminal head form B (flat face) according to DIN EN 50446.

Head transmitter with IO-Link®

The iTEMP transmitter is an IO-Link® device with a measurement input and an IO-Link® interface. It offers a configurable, simple and cost-effective solution thanks to digital communication via IO-Link®. The device is mounted in a terminal head form B (flat face) as per DIN EN 5044.

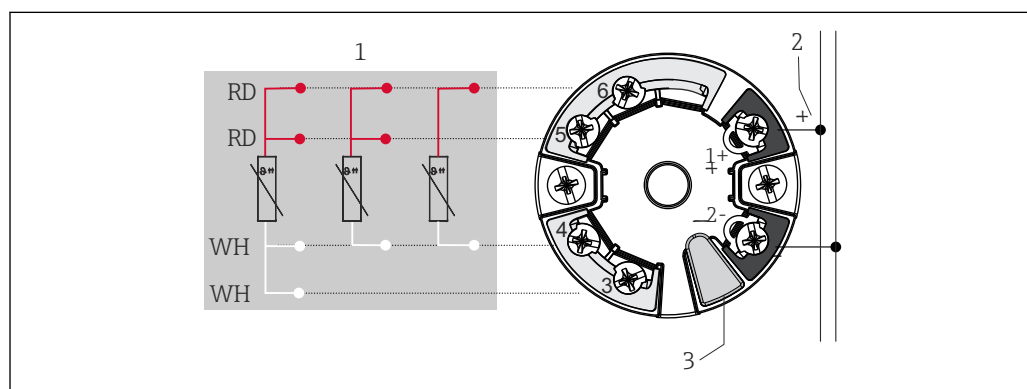
Advantages of the iTEMP transmitters:

- Double or single sensor input (optionally for certain transmitters)
- Attachable 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 based on Callendar van Dusen coefficients (CvD).

Wiring

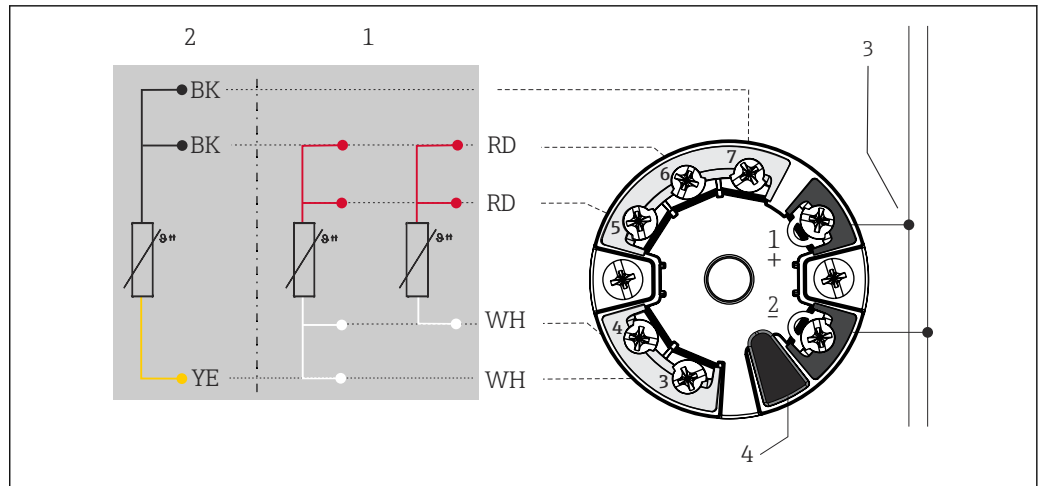
Wiring diagram for RTD

Type of sensor connection



2 Head-mounted transmitter TMT7x or TMT31 (single input)

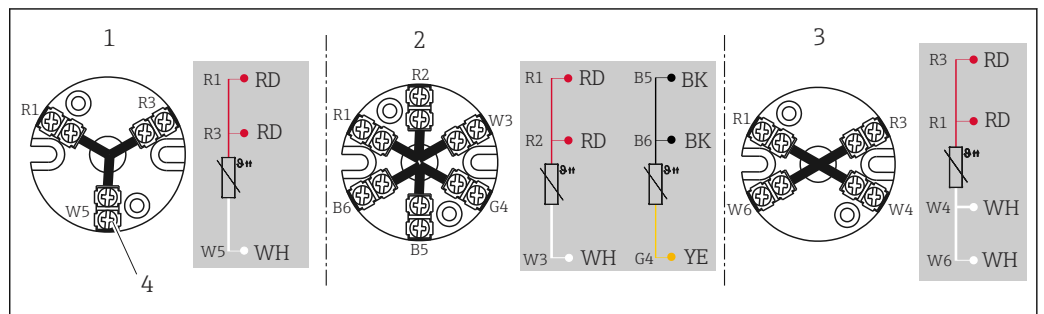
- 1 Sensor input, RTD and Ω : 4-, 3- and 2-wire
- 2 Power supply or fieldbus connection
- 3 Display connection/CDI interface



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3 Head-mounted transmitter TMT8x (dual sensor input)

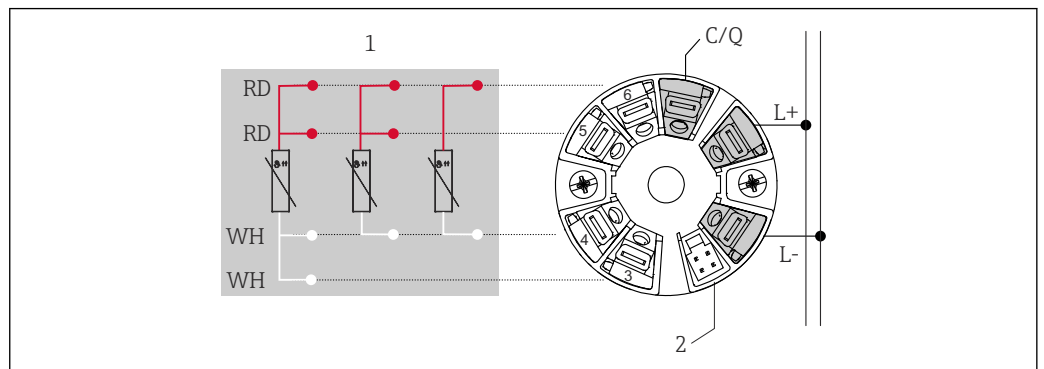
- 1 Sensor input 1, RTD: 4- and 3-wire
- 2 Sensor input 2, RTD: 3-wire
- 3 Power supply or fieldbus connection
- 4 Display connection



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4 Terminal block mounted

- 1 3-wire single
- 2 2 x 3-wire single
- 3 4-wire single
- 4 Outside screw



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5 Head-mounted transmitter TMT36 (single input)

- 1 RTD sensor input: 4-, 3- and 2-wire
- 2 Display connection
- L+ 18 to 30 V_{DC} power supply
- L- 0 V_{DC} power supply
- C/Q IO-Link or switch output

Terminals

iTEMP head transmitters fitted with push-in terminals unless screw terminals are explicitly selected, the second process seal is chosen or a double sensor is installed.


Cable entries

See "Terminal heads" section.

The cable entries must be selected during configuration of the device. Different terminal heads offer different possibilities with regard to threads and the number of available entries.

Connectors

Endress+Hauser offers a wide variety of connectors for the simple and fast integration of the thermometer into a process control system. The following tables show the PIN assignments of the various plug connector combinations.





 We do not recommend connecting thermocouples directly to connectors. The direct connection to the pins of the plug might generate a new 'thermocouple' which influences the accuracy of the measurement. Therefore we do not connect thermocouples directly to connectors. The thermocouples are connected in conjunction with an iTEMP transmitter.

Abbreviations

| #1 | Order: first transmitter/insert | #2 | Order: second transmitter/insert |
|------|--------------------------------------------------------------------------------------------------|----|----------------------------------|
| i | Insulated. Wires marked 'i' are not connected and are insulated with heat shrink tubes. | YE | Yellow |
| GND | Grounded. Wires marked 'GND' are connected to the internal grounding screw in the terminal head. | RD | Red |
| BN | Brown | WH | White |
| GNYE | Green-yellow | PK | Pink |
| BU | Blue | GN | Green |
| GY | Gray | BK | Black |


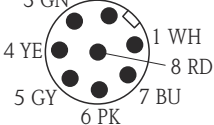
Terminal head with one cable entry ¹⁾

| Connector | 1x PROFIBUS® PA | | | | | | | | 1x FOUNDATION™ Fieldbus (FF) | | | | 1x PROFINET® and Ethernet-APL | | | |
|-------------------------------------------------------------------|-------------------------------|---------|---------|-------------------|---------|---------|---------|-------------------|------------------------------|---------|---------|-------|-------------------------------|-------|---------|-------|
| Plug thread | M12 | | | | 7/8" | | | | 7/8" | | | | M12 | | | |
| PIN number | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Electrical connection (terminal head) | | | | | | | | | | | | | | | | |
| Flying leads and TC | Not connected (not insulated) | | | | | | | | | | | | | | | |
| 3-wire terminal block (1x Pt100) | RD | RD | WH | | RD | RD | WH | | RD | RD | WH | | RD | RD | WH | |
| 4-wire terminal block (1x Pt100) | | | WH | WH | | | WH | WH | | | WH | WH | | | WH | WH |
| 6-wire terminal block (2x Pt100) | RD (#1) ² | RD (#1) | WH (#1) | | RD (#1) | RD (#1) | WH (#1) | | RD (#1) | RD (#1) | WH (#1) | | RD | RD | WH (#1) | |
| 1x TMT 4 to 20 mA or HART® | + | i | - | i | + | i | - | i | + | i | - | i | | | - | i |
| 2x TMT 4 to 20 mA or HART® in the terminal head with a high cover | +(#1) | +(#2) | -(#1) | -(#2) | +(#1) | +(#2) | -(#1) | -(#2) | +(#1) | +(#2) | -(#1) | -(#2) | +(#1) | +(#2) | -(#1) | -(#2) |
| 1x TMT PROFIBUS® PA | + | i | - | GND ₃₎ | + | i | - | GND ₃₎ | Cannot be combined | | | | | | | |

| Connector | 1x PROFIBUS® PA | | | | | | | 1x FOUNDATION™ Fieldbus (FF) | | | | 1x PROFINET® and Ethernet-APL | | | | | | | |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------|------------------------------|-------|-----|---|-------------------------------|--|--|--|-------------------|-------------------|-----|---|
| 2x TMT PROFIBUS® PA | +(#1) | | -(#1) | | + | | - | | | | | | | | | | | | |
| 1x TMT FF | Cannot be combined | | | | Cannot be combined | | | - | + | GND | i | Cannot be combined | | | | | | | |
| 2x TMT FF | | | | | | | | -(#1) | +(#1) | | | | | | | | | | |
| 1x TMT PROFINET® | | | | | | | | Cannot be combined | | | | Cannot be combined | | | | APL signal - | APL signal + | GND | - |
| 2x TMT PROFINET® | | | | | | | | | | | | | | | | APL signal - (#1) | APL signal + (#1) | | |
| PIN position and color code |  1 BN 2 GNYE 3 BU 4 GY A0018929 | |  1 BN 2 GNYE 3 BU 4 GY A0018930 | |  1 BU 2 BN 3 GY 4 GNYE A0018931 | |  1 RD 2 GN A0052119 | | | | | | | | | | | | |


- 1) Options depend on product and configuration
 2) Second Pt100 is not connected
 3) If a head is used without grounding screw, e.g. plastic housing TA30S or TA30P, insulated 'i' instead of grounded GND

Terminal head with one cable entry ¹⁾

| Connector | 4-pin / 8-pin | | | | | | | |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------|---|
| Plug thread | M12 | | | | | | | |
| PIN number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Electrical connection (terminal head) | | | | | | | | |
| Flying leads and TC | Not connected (not insulated) | | | | | | | |
| 3-wire terminal block (1x Pt100) | RD | RD | WH | | i | | | |
| 4-wire terminal block (1x Pt100) | | | WH | WH | | | | |
| 6-wire terminal block (2x Pt100) | | | WH | | BK | BK | YE | |
| 1x TMT 4 to 20 mA or HART® | +(#1) | i | -(#1) | i | i | | | |
| 2x TMT 4 to 20 mA or HART® in the terminal head with a high cover | | | | | +(#2) | i | -(#2) | i |
| 1x TMT PROFIBUS® PA | Cannot be combined | | | | | | | |
| 2x TMT PROFIBUS® PA | | | | | | | | |
| 1x TMT FF | Cannot be combined | | | | | | | |
| 2x TMT FF | | | | | | | | |
| 1x TMT PROFINET® | Cannot be combined | | | | | | | |
| 2x TMT PROFINET® | Cannot be combined | | | | | | | |
| PIN position and color code | <div></div> <div>1 BN 2 GNYE 3 BU 4 GY</div> <div>A0018929</div> | | | | <div></div> <div>1 WH 2 BN 3 GN 4 YE 5 GY 6 PK 7 BU 8 RD</div> <div>A0018927</div> | | | |

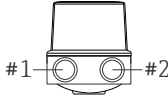
- 1) Options depend on product and configuration

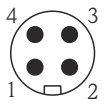



Terminal head with one cable entry

| Plug | 1x IO-Link®, 4-pin | | | |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|---|---------|-----|
| Plug thread | M12 | | | |
| PIN number | 1 | 2 | 3 | 4 |
| Electrical connection (terminal head) | | | | |
| Flying leads | Not connected (not insulated) | | | |
| 3-wire terminal block (1x Pt100) | RD | i | RD | WH |
| 4-wire terminal block (1x Pt100) | Cannot be combined | | | |
| 6-wire terminal block (2x Pt100) | | | | |
| 1x TMT 4 to 20 mA or HART® | Cannot be combined | | | |
| 2x TMT 4 to 20 mA or HART® in the terminal head with a high cover | | | | |
| 1x TMT PROFIBUS® PA | Cannot be combined | | | |
| 2x TMT PROFIBUS® PA | | | | |
| 1x TMT FF | Cannot be combined | | | |
| 2x TMT FF | | | | |
| 1x TMT PROFINET® | Cannot be combined | | | |
| 2x TMT PROFINET® | | | | |
| 1x TMT IO-Link® | L+ | - | L- | C/Q |
| 2x TMT IO-Link® | L+ (#1) | - | L- (#1) | C/Q |
| PIN position and color code |  | | | |

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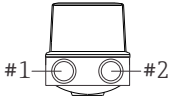
Terminal head with two cable entries ¹⁾

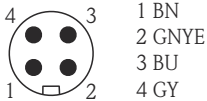
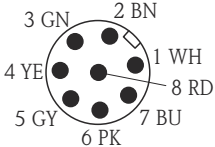
| Connector | 2x PROFIBUS® PA | | | | | | | | 2x FOUNDATION™ Fieldbus (FF) | | | | 2x PROFINET® and Ethernet-APL | | | |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------|---------------------|------|-------------------------|-----------|---------------------|------|---------------------------------|-----------|---------------------|------|----------------------------------|-----------|---------------------|------|
| Plug thread  <small>A0021706</small> | M12(#1)/M12(#2) | | | | 7/8" (#1) / 7/8" (#2) | | | | 7/8" (#1) / 7/8" (#2) | | | | M12 (#1)/M12 (#2) | | | |
| PIN number | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Electrical connection (terminal head) | | | | | | | | | | | | | | | | |
| Flying leads and TC | Not connected (not insulated) | | | | | | | | | | | | | | | |
| 3-wire terminal block (1x Pt100) | RD/i | RD/i | WH/i | | RD/i | RD/i | WH/i | | RD/i | RD/i | WH/i | | RD/i | RD/i | WH/i | |
| 4-wire terminal block (1x Pt100) | | | WH/i | WH/i | | | WH/i | WH/i | | | WH/i | WH/i | | | WH/i | WH/i |
| 6-wire terminal block (2x Pt100) | RD/B K | RD/B K | WH/YE | | RD/B K | RD/B K | WH/YE | | RD/B K | RD/B K | WH/YE | | RD/B K | RD/B K | WH/YE | |
| 1x TMT 4 to 20 mA or HART® | +/i | i/i | -/i | i/i | +/i | i/i | -/i | i/i | +/i | i/i | -/i | i/i | +/i | i/i | -/i | i/i |
| 2x TMT 4 to 20 mA or HART® in the terminal head with a high cover | + (#1)/ + (#2) | | - (#1)/ -(#2) | | + (#1)/ + (#2) | | - (#1)/ -(#2) | | + (#1)/ + (#2) | | - (#1)/ -(#2) | | + (#1)/ + (#2) | | - (#1)/ -(#2) | |

| Connector | 2x PROFIBUS® PA | | | | | | | | 2x FOUNDATION™ Fieldbus (FF) | | | | 2x PROFINET® and Ethernet-APL | | | |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|-------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----|---|
| 1x TMT PROFIBUS® PA | +/i | | -/i | | +/i | | -/i | | Cannot be combined | | | | | | | |
| 2x TMT PROFIBUS® PA | + (#1)/ + (#2) | | - (#1)/ - (#2) | GND/ GND | + (#1)/ + (#2) | | - (#1)/ - (#2) | GND/ GND | | | | | | | | |
| 1x TMT FF | Cannot be combined | | | | Cannot be combined | | | | -/i | +/i | i/i | GND/ GND | Cannot be combined | | | |
| 2x TMT FF | | | | | | | | | - (#1)/ - (#2) | + (#1)/ + (#2) | | | | | | |
| 1x TMT PROFINET® | Cannot be combined | | | | Cannot be combined | | | | Cannot be combined | | | | APL signal - | APL signa l + | GND | i |
| 2x TMT PROFINET® | Cannot be combined | | | | Cannot be combined | | | | Cannot be combined | | | | APL signal - (#1) and (#2) | APL signa l + (#1) and (#2) | | |
| PIN position and color code |  1 BN 2 GNYE 3 BU 4 GY A0018929 | | | |  1 BN 2 GNYE 3 BU 4 GY A0018930 | | | |  1 BU 2 BN 3 GY 4 GNYE A0018931 | | | |  1 RD 2 GN A0052119 | | | |

1) Options depend on product and configuration

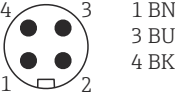
Terminal head with two cable entries ¹⁾

| Connector | 4-pin / 8-pin | | | | | | | | | | | |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------|-------|-------------|------|-----|---|---|---|--|--|--|--|
| Plug thread  A0021706 | M12 (#1)/M12 (#2) | | | | | | | | | | | |
| PIN number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Electrical connection (terminal head) | | | | | | | | | | | | |
| Flying leads and TC | Not connected (not insulated) | | | | | | | | | | | |
| 3-wire terminal block (1x Pt100) | RD/i | RD/i | WH/i | | i/i | | | | | | | |
| 4-wire terminal block (1x Pt100) | | | WH/i | WH/i | | | | | | | | |
| 6-wire terminal block (2x Pt100) | RD/BK | RD/BK | WH/YE | | | | | | | | | |
| 1x TMT 4 to 20 mA or HART® | +/i | i/i | -/i | i/i | | | | | | | | |
| 2x TMT 4 to 20 mA or HART® in the terminal head with a high cover | +(#1)/+(#2) | | -(#1)/-(#2) | | | | | | | | | |
| 1x TMT PROFIBUS® PA | Cannot be combined | | | | | | | | | | | |
| 2x TMT PROFIBUS® PA | | | | | | | | | | | | |
| 1x TMT FF | Cannot be combined | | | | | | | | | | | |
| 2x TMT FF | | | | | | | | | | | | |

| Connector | 4-pin / 8-pin | |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 1x TMT PROFINET® | Cannot be combined | |
| 2x TMT PROFINET® | Cannot be combined | |
| PIN position and color code |  <p>1 BN 2 GNYE 3 BU 4 GY</p> <p>A0018929</p> |  <p>A0018927</p> |

1) Options depend on product and configuration

Terminal head with two cable entries

| Plug | 2x IO-Link®, 4-pin | | | |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---|------------------|-------|
| Plug thread | M12 (#1)/M12 (#2) | | | |
| PIN number | 1 | 2 | 3 | 4 |
| Electrical connection (terminal head) | | | | |
| Flying leads | Not connected (not insulated) | | | |
| 3-wire terminal block (1x Pt100) | RD | i | RD | WH |
| 4-wire terminal block (1x Pt100) | Cannot be combined | | | |
| 6-wire terminal block (2x Pt100) | RD/BK | i | RD/BK | WH/YE |
| 1x TMT 4 to 20 mA or HART® | Cannot be combined | | | |
| 2x TMT 4 to 20 mA or HART® in the terminal head with a high cover | | | | |
| 1x TMT PROFIBUS® PA | Cannot be combined | | | |
| 2x TMT PROFIBUS® PA | | | | |
| 1x TMT FF | Cannot be combined | | | |
| 2x TMT FF | | | | |
| 1x TMT PROFINET® | Cannot be combined | | | |
| 2x TMT PROFINET® | | | | |
| 1x TMT IO-Link® | L+ | - | L- | C/Q |
| 2x TMT IO-Link® | L+ (#1) and (#2) | - | L- (#1) and (#2) | C/Q |
| PIN position and color code |  <p>1 BN 3 BU 4 BK</p> <p>A0055383</p> | | | |

Insert - transmitter connection combination ¹⁾

| Insert | Transmitter connection ²⁾ | | | |
|---------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| | TMT31/TMT7x | | TMT8x | |
| | 1x 1-channel | 2x 1-channel | 1x 2-channel | 2x 2-channel |
| 1x sensor (Pt100 or TC), flying leads | Sensor (#1): transmitter (#1) | Sensor (#1): transmitter (#1) (Transmitter (#2) not connected) | Sensor (#1): transmitter (#1) | Sensor (#1): transmitter (#1) Transmitter (#2) not connected |
| 2x sensor (2x Pt100 or 2x TC), flying leads | Sensor (#1): transmitter (#1) Sensor (#2) insulated | Sensor (#1): transmitter (#1) Sensor (#2): transmitter (#2) | Sensor (#1): transmitter (#1) Sensor (#2): transmitter (#1) | Sensor (#1): transmitter (#1) Sensor (#2): transmitter (#1) (Transmitter (#2) not connected) |

| Insert | Transmitter connection ²⁾ | | | |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| | TMT31/TMT7x | | TMT8x | |
| | 1x 1-channel | 2x 1-channel | 1x 2-channel | 2x 2-channel |
| 1x sensor (Pt100 or TC), with terminal block ³⁾ | Sensor (#1): transmitter in cover | Cannot be combined | Sensor (#1): transmitter in cover | Cannot be combined |
| 2x sensor (2x Pt100 or 2x TC) with terminal block | Sensor (#1): transmitter in cover Sensor (#2) not connected | | Sensor (#1): transmitter in cover Sensor (#2): transmitter in cover | |
| 2x sensor (2x Pt100 or 2x TC) in conjunction with feature 600, option MG ⁴⁾ | Cannot be combined | Sensor (#1): transmitter (#1) Sensor (#2): transmitter (#2) | Cannot be combined | Sensor (#1): transmitter (#1) - channel 1 Sensor (#2): transmitter (#2) - channel 1 |

1) Options depend on product and configuration

2) If 2 transmitters are selected in a terminal head, transmitter (#1) is installed directly on the insert. Transmitter (#2) is installed in the high cover. A TAG cannot be ordered for the 2nd transmitter as standard. The bus address is set to the default value and, if necessary, must be changed manually before commissioning.

3) Only in the terminal head with a high cover, only 1 transmitter possible. A ceramic terminal block is automatically fitted on the insert.

4) Individual sensors each connected to channel 1 of a transmitter

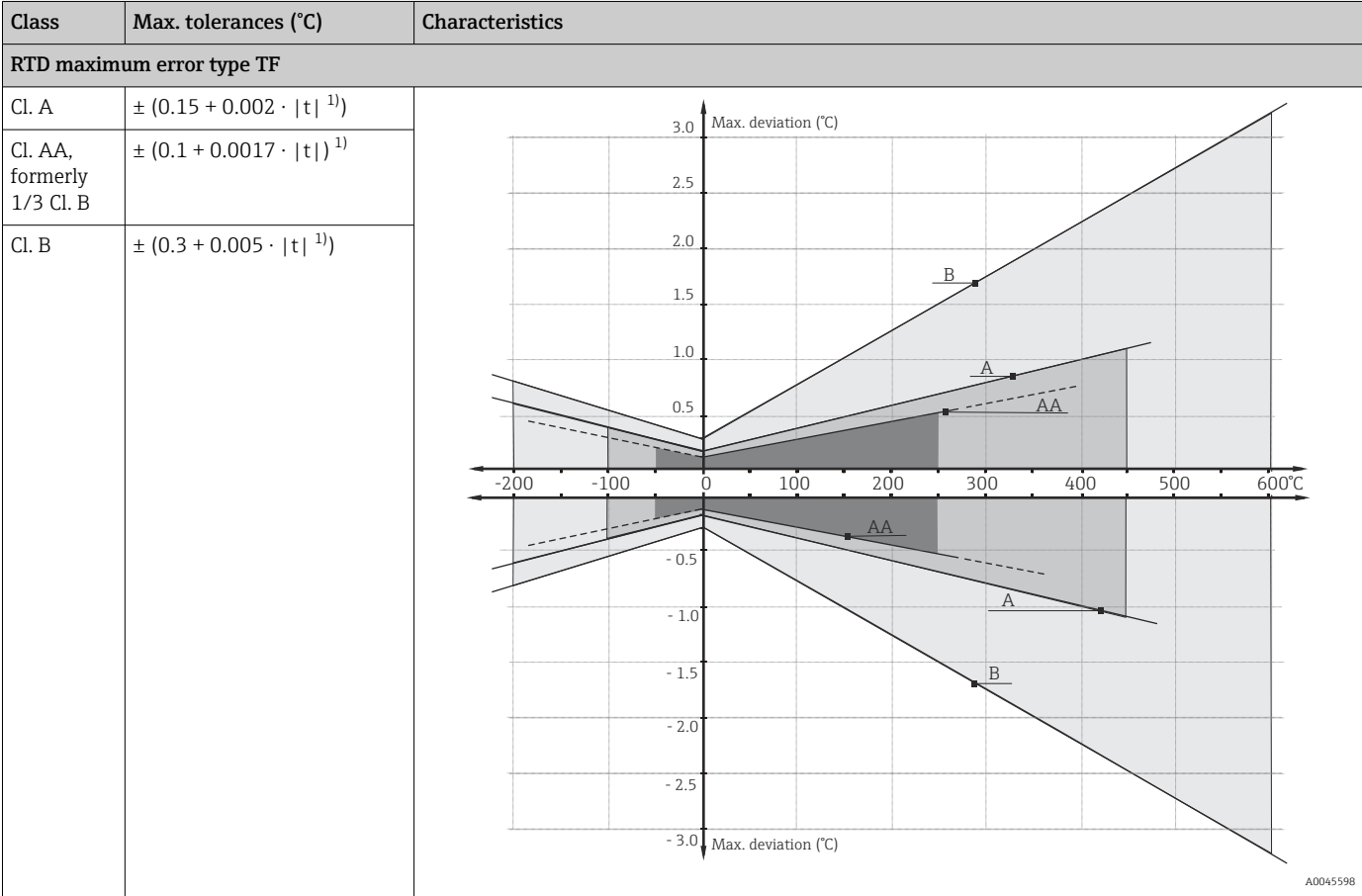
Performance characteristics

Reference operating conditions

These data are relevant for determining the measurement accuracy of the temperature transmitters used. More information on this can be found in the Technical Information of the iTEMP® temperature transmitters. → 17

Accuracy

RTD resistance thermometer as per IEC 60751



1) |t| = absolute temperature value in °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, measured between the terminals and the outer jacket with a minimum voltage of 100 V_{DC}.

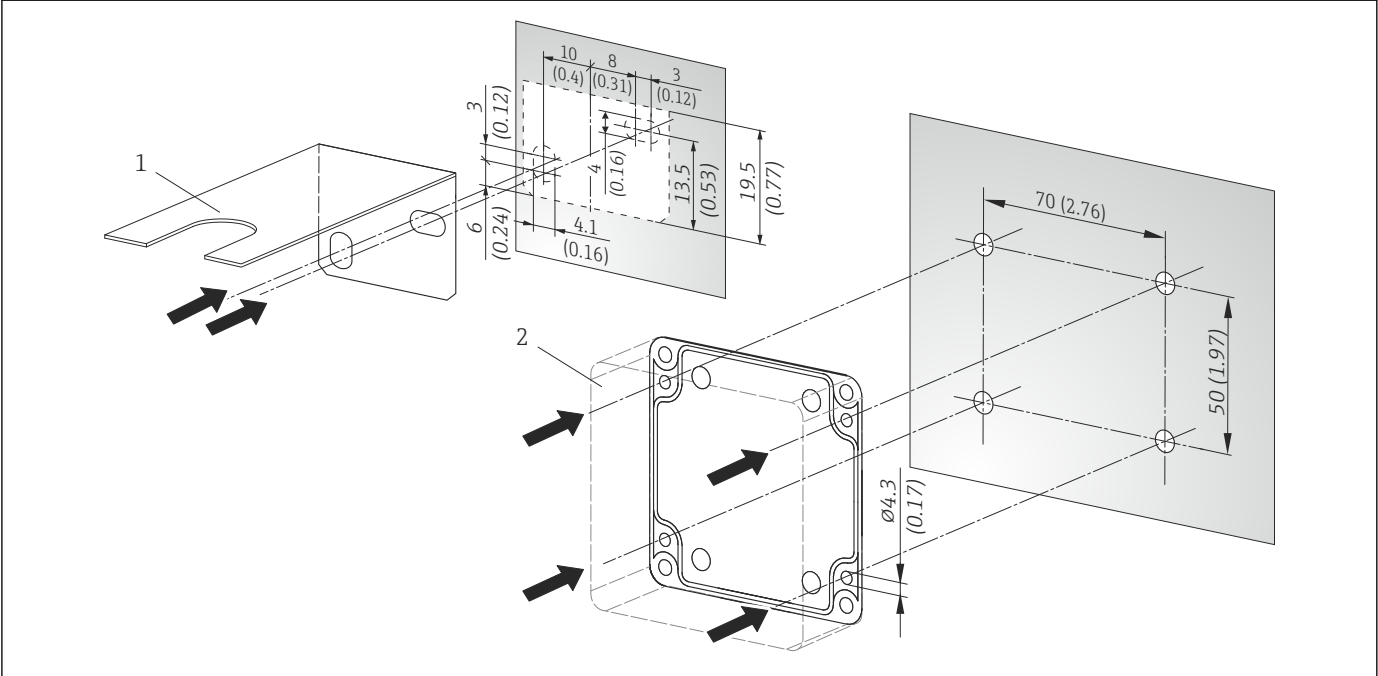
Self heating

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.

Mounting

Orientation No restrictions.

Installation instructions



A0022546

6 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 terminal head 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 plastic housing 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) |
| 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 | | | |

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

The technical drawing consists of two views of the device:

- Front View (Left):** Shows the device's footprint. The total width is 102 mm (4 inches). The distance from the left edge to the center of the mounting holes is 55 mm (2.17 inches). The distance between the centers of the mounting holes is 80 mm (3.15 inches). The height of the main body is 82 mm (3.23 inches), and the total height including the base is 132 mm (5.2 inches). Two springs are shown at the bottom.
- Side View (Right):** Shows the profile of the device. The total width is 107.5 mm (4.23 inches). The height of the main body is 91.6 mm (3.61 inches), and the total height including the base is 146.6 mm (5.77 inches). The distance from the left edge to the center of the mounting hole is 28 mm (1.1 inches). The distance from the center of the mounting hole to the right edge is 78 mm (3.1 inches). The distance from the center of the mounting hole to the right edge of the base is 75 mm (2.95 inches). A label '2' points to the main body.

- 1 With plastic housing
- 2 With terminal head

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

Temperature sensor, housing



Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

MID

Test certificate (only in SIL mode). In compliance with:

- WELMEC 8.8, "Guide on the General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring Instruments."
- OIML R117-1 Edition 2007 (E) "Dynamic measuring systems for liquids other than water"
- EN 12405-1/A2 Edition 2010 "Gas meters - Conversion devices - Part 1: Volume conversion"
- OIML R140-1 Edition 2007 (E) "Measuring systems for gaseous fuel"

Ordering information

Detailed ordering information is available from your nearest sales organization www.addresses.endress.com or in the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.



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

The accessories currently available for the product can be selected at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Spare parts & Accessories**.

Service-specific accessories

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:

<https://portal.endress.com/webapp/applicator>

Configurator

Product Configurator - the tool for individual product configuration

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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.

DeviceCare SFE100

Configuration tool for HART, PROFIBUS and FOUNDATION Fieldbus field devices

DeviceCare is available for download at www.software-products.endress.com. You need to register in the Endress+Hauser software portal to download the application.



Technical Information TI01134S

FieldCare SFE500

FDT-based plant asset management tool

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.



Technical Information TI00028S

Netilion

IIoT ecosystem: Unlock knowledge


With the Netilion IIoT ecosystem, Endress+Hauser enables you to optimize plant performance, digitize workflows, share knowledge, and enhance collaboration. Drawing on decades of experience in process automation, Endress+Hauser provides the process industry with an IIoT ecosystem that unlocks valuable insights from data. These insights allow process optimization, leading to increased plant availability, efficiency, and reliability - ultimately resulting in a more profitable plant.



www.netilion.endress.com

Documentation

The following types of documentation are available on the product pages and in the Download Area of the Endress+Hauser website (www.endress.com/downloads) (depending on the selected device version):

| Document | Purpose and content of the document |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Technical Information (TI) | Planning aid for your device The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device. |
| Brief Operating Instructions (KA) | Guide that takes you quickly to the 1st measured value The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning. |
| Operating Instructions (BA) | Your reference document These Operating Instructions contain all the information that is required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning, through to troubleshooting, maintenance and disposal. |
| Description of Device Parameters (GP) | Reference for your parameters The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations. |
| Safety instructions (XA) | Safety Instructions (XA) are supplied with the device, depending on the approval. These are an integral part of the Operating Instructions.  The nameplate indicates which Safety Instructions (XA) apply to the device. |
| Supplementary device-dependent documentation (SD/FY) | Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation. |



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