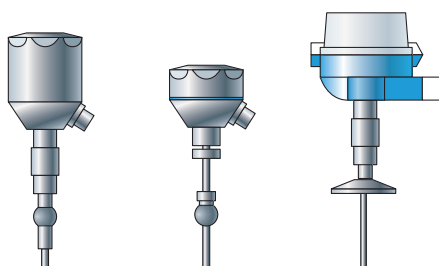
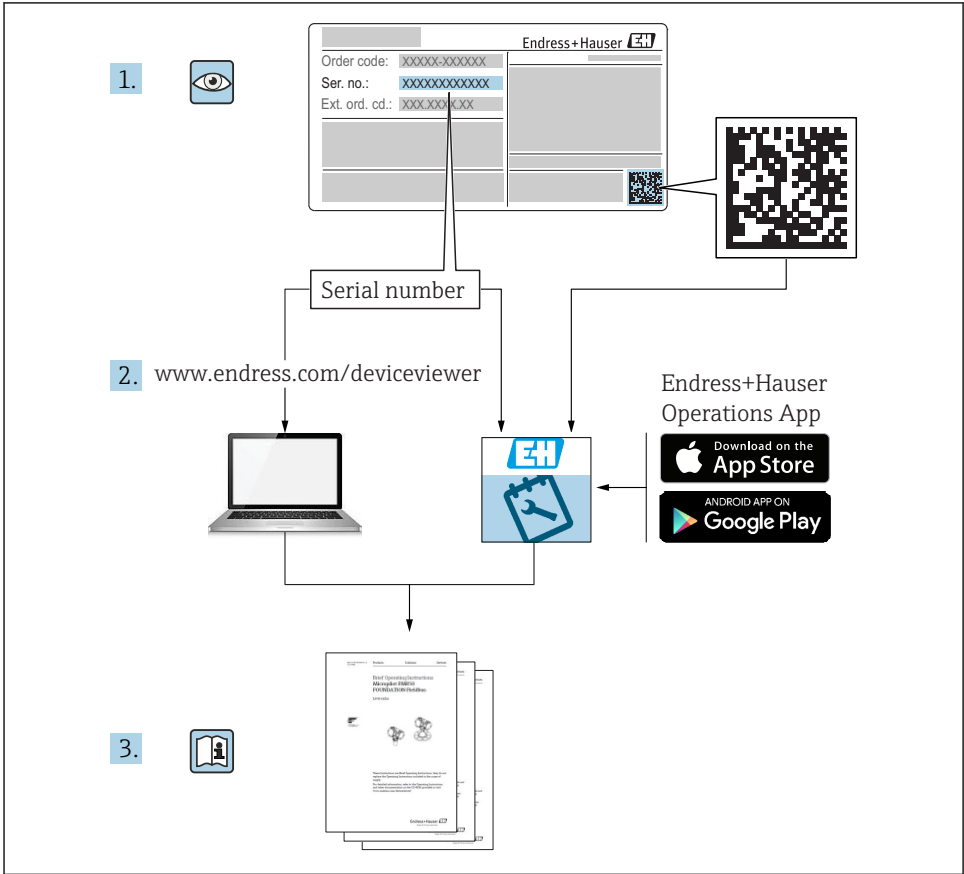


Operating Instructions

Modular hygienic thermometers

Universal modular thermometers with RTD insert
for hygienic applications





A0023555

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1 About this document

1.1 Document function

These Operating Instructions provide all of the information that is required in various phases of the life cycle of the device including:

- Product identification
- Incoming acceptance
- Storage
- Installation
- Connection
- Operation
- Commissioning
- Troubleshooting
- Maintenance
- Disposal

1.2 Symbols used

1.2.1 Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.




CAUTION



This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE













This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2 Electrical symbols




Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current

Symbol	Meaning
	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Protective Earth (PE) A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: <ul style="list-style-type: none"> ▪ Inner ground terminal: Connects the protective earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system.

1.2.3 Symbols for certain types of information

Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.
	Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.
	Tip Indicates additional information.
	Reference to documentation.
	Reference to page.
	Reference to graphic.
	Notice or individual step to be observed.
	Series of steps.
	Result of a step.
	Help in the event of a problem.
	Visual inspection.

1.2.4 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers		Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
	Hazardous area		Safe area (non-hazardous area)

2 Documentation



For an overview of the scope of the associated Technical Documentation, refer to the following:

- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

2.1 Supplementary device-dependent documentation

Additional documents are supplied depending on the device version ordered: Always comply strictly with the instructions in the supplementary documentation. The supplementary documentation is an integral part of the device documentation.

3 Basic safety instructions

3.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
- ▶ Are authorized by the plant owner/operator.
- ▶ Are familiar with federal/national regulations.
- ▶ Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:

- ▶ Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Follow the instructions in this manual.

3.2 Designated use

- The device is a modular thermometer for temperature measurement in hygienic applications.
- The manufacturer is not liable for damage caused by improper or non-designated use.

3.3 Operational safety

Risk of injury.

- ▶ Operate the device in proper technical condition and fail-safe condition only.
- ▶ The operator is responsible for interference-free operation of the device.

Conversions to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.

- ▶ If, despite this, modifications are required, consult with Endress+Hauser.

Repair

To ensure continued operational safety and reliability,

- ▶ Carry out repairs on the device only if they are expressly permitted.
- ▶ Observe federal/national regulations pertaining to repair of an electrical device.
- ▶ Use original spare parts and accessories from Endress+Hauser only.

3.4 Product safety

This measuring device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EC directives listed in the device-specific EC Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.


4 Incoming acceptance and product identification

4.1 Incoming acceptance

Proceed as follows on receipt of the device:

1. Check whether the packaging is intact.
2. If damage is discovered:
Report all damage immediately to the manufacturer.
3. Do not install damaged components, as the manufacturer cannot otherwise guarantee the material resistance or compliance with the original safety requirements, and can also not be held responsible for the consequences that may result.
4. Compare the scope of delivery against the contents of your order.

5. Remove all the packaging material used for transportation.
6. Do the data on the nameplate match the ordering information on the delivery note?
7. Are the technical documentation and all other necessary documents provided, e.g. certificates?

 If one of the conditions is not satisfied, contact your Sales Center.

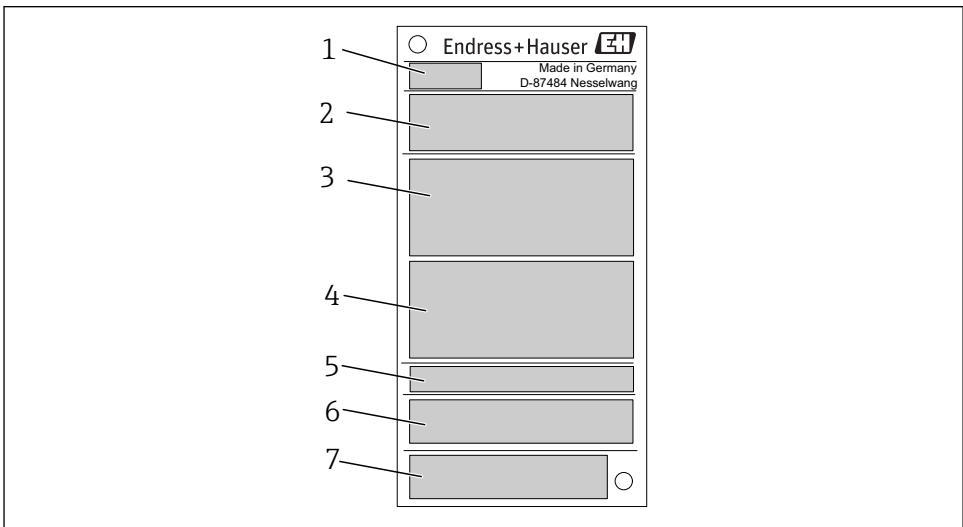
4.2 Product identification

The following options are available for identification of the measuring device:

- The device label
- Order code with breakdown of the device features on the delivery note
- Enter the serial number on the device label in *W@M Device Viewer* (www.endress.com/deviceviewer): all the information about the measuring device is displayed.
- Enter the serial number on the device label into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the measuring device with the *Endress+Hauser Operations App*: all the information about the measuring device is displayed.

4.2.1 Nameplate

Nameplate data: The nameplate shown below helps you to identify specific product information, such as serial number, design, variables, configuration and device approvals:



A0038995

 1 Nameplate (example)

Field no.	Description	Examples
1	Product root, device designation	TM411, TM412
2	Order code, serial number	-
3	Technical values	Ambient temperature, degree of protection
4	Hazardous area classification and Ex logo	-
5	Tag name	-
6	Proof of functional safety	-
7	Approvals with symbols	CE mark, EAC




Check the data on the nameplate of the device, and compare them against the requirements of the measuring point.

4.2.2 Name and address of manufacturer

Name of manufacturer:	Endress+Hauser Wetzler GmbH + Co. KG
Address of manufacturer:	Obere Wank 1, D-87484 Nesselwang or www.endress.com

5 Installation

5.1 Installation conditions

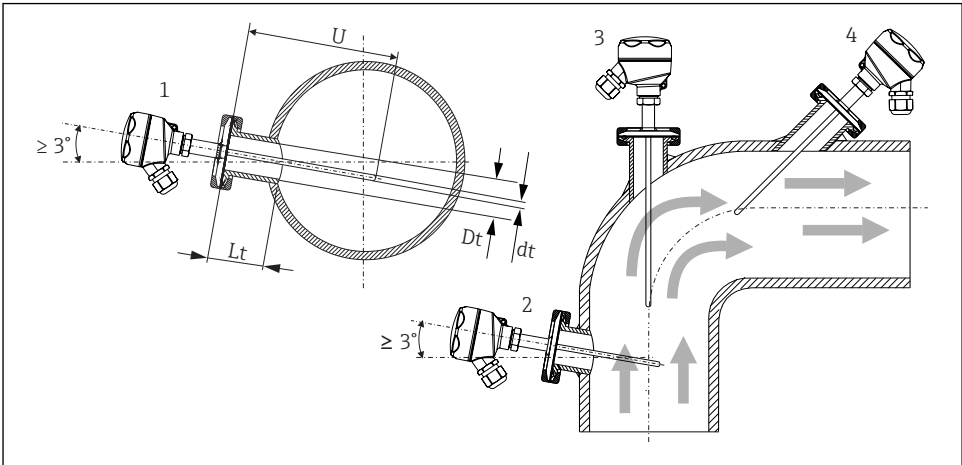
 For information on the conditions that must be present at the installation location in order to ensure designated use (e.g. ambient temperature, degree of protection, climate class etc.), and information on the device dimensions, see the Technical Information.

5.1.1 Orientation

No restrictions. However, self-draining in the process must be guaranteed. If there is an opening to detect leaks at the process connection, this opening must be at the lowest possible point.

5.1.2 Installation instructions

The immersion length of the device can considerably influence the accuracy. If the immersion length is too short, measurement errors can occur as a result of heat conduction via the process connection and the vessel wall. If installing in a pipe, the immersion length should ideally correspond to half of the pipe diameter. Installation possibilities: pipes, tanks or other plant components.



A0041703

2 Installation examples

- 1, 2 Perpendicular to flow direction, installed at a min. angle of 3° to ensure self-draining
- 3 On elbows
- 4 Inclined installation in pipes with a small nominal diameter
- U Immersion length



In the case of pipes with a small nominal diameter, it is advisable for the tip of the thermometer to project well into the process so that it extends past the pipe axis. Installation at an angle (4) could be another solution. When determining the immersion length or installation depth all the parameters of the thermometer and of the medium to be measured must be taken into account (e.g. flow velocity, process pressure).



The requirements of the EHEDG and the 3-A Sanitary Standard must be adhered to.

Installation instructions EHEDG/cleanability: $Lt \leq (Dt-dt)$

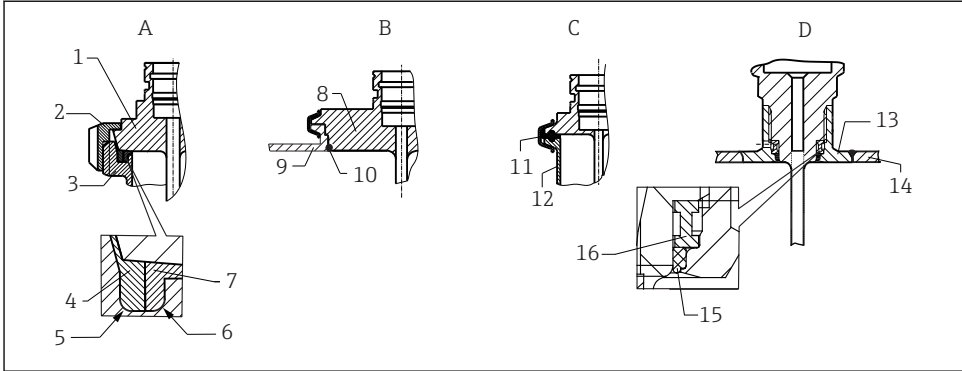
Installation instructions 3-A/cleanability: $Lt \leq 2(Dt-dt)$

In the case of weld-in connections, exercise the necessary degree of care when performing the welding work on the process side:

1. Use suitable welding material.
2. Flush-weld or weld with welding radius ≥ 3.2 mm (0.13 in).
3. Avoid crevices, folds or gaps.
4. Ensure the surface is honed and polished, $Ra \leq 0.76$ μm (30 μin).

Pay attention to the following when installing the thermometer to ensure that the cleanability is not affected:

1. The installed sensor is suitable for CIP (cleaning in place). Cleaning is performed together with the pipe or tank. In the case of internal tank fixtures using process connection nozzles, it is important to ensure that the cleaning assembly directly sprays this area so that it is cleaned properly.
2. The Varivent® connections enable flush-mount installation.



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3 Detailed installation instructions for hygiene-compliant installation

A Milk pipe connection according to DIN 11851, only in conjunction with EHEDG certified and self-centering sealing ring

1 Sensor with milk pipe connection

2 Groove slip-on nut

3 Counterpart connection

4 Centering ring

5 RO.4

6 RO.4

7 Sealing ring

B Varivent® process connection for VARINLINE® housing

8 Sensor with Varivent connection

9 Counterpart connection

10 O-ring

C Clamp according to ISO 2852 only in conjunction with seal in accordance with the EHEDG position paper

11 Molded seal

12 Counterpart connection

D Process connection Liquiphant-M G1", horizontal installation

13 Weld-in adapter

14 Vessel wall

15 O-ring

16 Thrust collar

i The counterpieces for the process connections and the seals or sealing rings are not included in the scope of delivery for the thermometer. Liquiphant M weld-in adapters with associated seal kits are available as accessories.

i When using the measuring device in a hazardous area, the relevant national standards and regulations as well as the safety instructions or installation regulations must be observed.

i Other types of installation are possible. Endress+Hauser will advise on the correct design of the measuring point.

NOTICE

The following action must be taken if a sealing ring (O-ring) or seal fails:

- ▶ The thermometer must be removed.
- ▶ The thread and the O-ring joint/sealing surface must be cleaned.
- ▶ The sealing ring or seal must be replaced.
- ▶ CIP must be performed after installation.

Ambient temperature range

T_a	-40 to +85 °C (-40 to +185 °F)
-------	--------------------------------

Process temperature range

Depends on the type of sensor used, maximum:

T_a	-200 to +600 °C (-328 to +1 112 °F)
-------	-------------------------------------

5.2 Installing the thermometer

Prior to installation:

1. Inspect the device for any damage caused during transportation.
2. Obvious damage must be reported immediately.
3. Pay attention to whether the thermometer may be installed directly in the process or whether a thermowell must be used.



For detailed information, see the Technical Information

Proceed as follows to install the device:

1. The permitted loading capacity of the process connections can be found in the relevant standards.
2. The process connection and compression fitting must comply with the maximum specified process pressure.
3. Make sure that the device is installed and secured before applying the process pressure.
4. Adjust the loading capacity of the thermowell to the process conditions.
5. It may be necessary to calculate the static and dynamic loading capacity.



It is possible to verify the mechanical loading capacity as a function of the installation and process conditions using the online TW Sizing Module for thermowells in the Endress+Hauser Applicator software. See "Accessories" section.

5.2.1 Removable process connections

Seals and sealing rings are not included in the scope of delivery.

5.2.2 Weld-in thermowells

Weld-in thermowells can be welded directly into the pipe or vessel wall, or secured using a welding socket. The specifications on the relevant material data sheets and the applicable guidelines and standards regarding welding procedures, heat treatment, welding fillers, etc. must be observed.

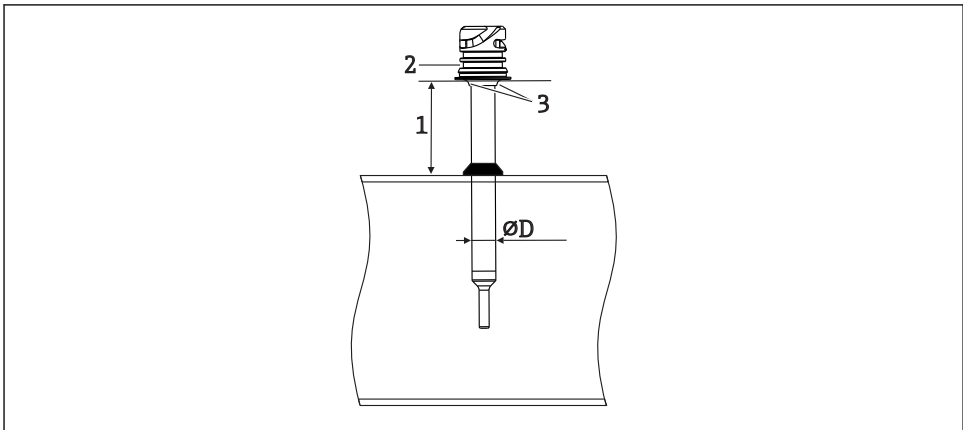
5.2.3 Weld-in compression fittings

The operator must check if a seal is required.

CAUTION

Incorrectly designed, faulty or leaking welded seams can lead to uncontrolled discharge of the process medium.

- ▶ Welding activities must be performed by qualified technical personnel only.
- ▶ When designing the welded seam, the requirements arising from the process conditions must be taken into account.



A0041547

4 Detailed instructions for welding work on thermowell $\varnothing D: 12.7 \text{ mm}$ (0.5 in) and 9 mm (0.35 in)

- 1 Minimum distance of 65 mm (2.56 in) to welded seam
- 2 If the minimum distance of 65 mm (2.56 in) to the welded seam cannot be met, remove the sealing rings during welding.
- 3 Welded (not secured with Loctite).

5.3 Post-installation check

<input type="checkbox"/>	Is the device undamaged (visual inspection)?
<input type="checkbox"/>	Is the device correctly secured?
<input type="checkbox"/>	Does the device correspond to the specifications at the measuring point, e.g. ambient temperature, measuring range etc.?

6 Electrical connection

NOTICE

Risk of short-circuit - may cause the device to malfunction.

- ▶ Check for damage to cables, wires and connection points.

Terminal assignment

⚠ WARNING

Risk of injury from the uncontrolled activation of processes!

- ▶ The supply voltage must be switched off before connecting the device.
- ▶ Make sure that downstream processes are not started unintentionally.

⚠ WARNING

There is a risk of explosion if the supply voltage is connected!

- ▶ The supply voltage must be switched off before connecting the device.

⚠ WARNING

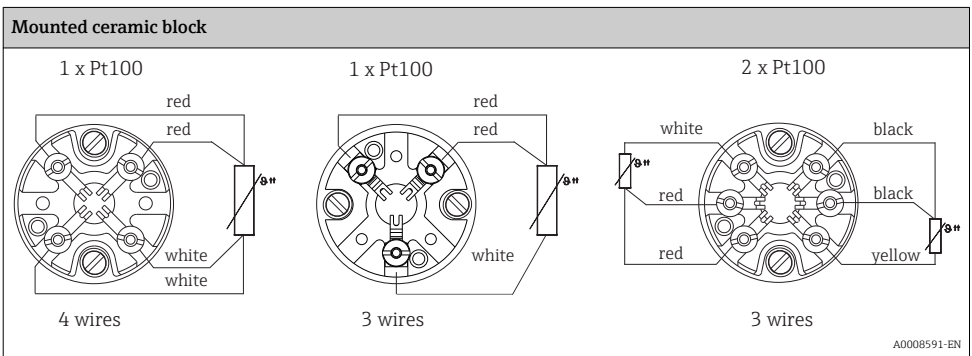
Limitation of electrical safety due to incorrect connection!

- ▶ When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- ▶ All data relating to explosion protection is contained in the separate Ex documentation. The Ex documentation is supplied as standard with all Ex-systems.



Pay attention to the Technical Information when connecting the transmitter electrically!

6.1 Wiring diagram for RTD

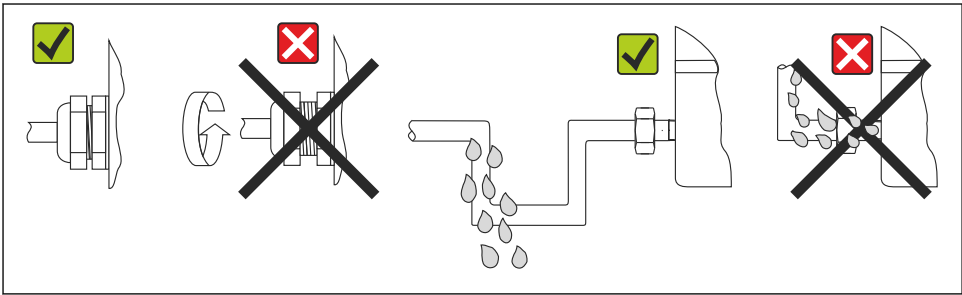


6.1.1 Ensuring the degree of protection

The device meets all of the requirements in accordance with the degree of protection indicated on the nameplate. To ensure that the degree of protection of the housing is maintained

following installation in the field or after servicing, compliance with the following points is mandatory:

- The housing seals must be clean and undamaged when inserted into their grooves. The seals must be dried, cleaned or replaced if necessary.
- All housing screws and screw caps must be firmly tightened.
- The cables used for connection must be of the specified outside diameter (e.g. M20x1.5, cable diameter 8 to 12 mm).
- Firmly tighten the cable gland, and use it only in the specified clamping area (the cable diameter must be appropriate to the cable gland).
- The cables must loop down before they enter the cable gland ("water trap"). This means that any moisture that may form cannot enter the gland. The device must be installed so that the cable glands are not facing upwards.
- Do not twist the cables, and use only round cables.
- Replace unused cable glands with a dummy plug (included in the scope of delivery).
- Do not remove the grommet from the cable gland.
- Repeated opening/closing of the device is possible but has a negative impact on the degree of protection.



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5 Connection instructions for compliance with the degree of protection

6.2 Post-connection check

<input type="checkbox"/>	Are the device and cable undamaged (visual check)?
<input type="checkbox"/>	Do the mounted cables have suitable strain relief?
<input type="checkbox"/>	Does the supply voltage match the information on the nameplate?

7 Maintenance

No special maintenance work is required.

7.1 Cleaning

The device must be cleaned whenever necessary. Cleaning can also be done when the device is installed (e.g. CIP Cleaning in Place / SIP Sterilization in Place). When cleaning the device, care must be taken to ensure that it is not damaged.

NOTICE

Avoid damage to the device and the system

- ▶ Pay attention to the specific IP code when cleaning.

7.2 Services

Service	Description
Calibration	RTD inserts may drift depending on the application. Regular recalibration to verify accuracy is recommended. The calibration can be performed by the manufacturer or by qualified technical staff using calibration devices onsite.

8 Repair

8.1 Spare parts



Information on accessories and spare parts that are currently available for the product can be found online at: www.endress.com/spareparts_consumables → **access to specific device information** → enter serial number.

The spare parts for hygienic thermometers are:

- Terminal heads
- Temperature transmitter
- Temperature inserts
- Thermowells

8.2 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the website for more information:
<http://www.endress.com/support/return-material>
2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

8.3 Disposal

The device contains electronic components and must, therefore, be disposed of as electronic waste in the event of disposal. Please pay particular attention to the local regulations governing waste disposal in your country. Ensure proper separation and reuse of the device components where possible.

9 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.

Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> ▪ 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 <p>Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.</p> <p>Applicator is available: Via the Internet: https://portal.endress.com/webapp/applicator</p>
Configurator	<p>Product Configurator - the tool for individual product configuration</p> <ul style="list-style-type: none"> ▪ 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 <p>The Configurator is available on the Endress+Hauser website at: 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.</p>
W@M	<p>Life cycle management for your plant</p> <p>W@M offers assistance 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 information is available for every measuring device over the entire life cycle, such as the device status, device-specific documentation, spare parts etc.</p> <p>The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available: Via the Internet: www.endress.com/lifecyclemanagement</p>

10 Technical data

10.1 Input

10.1.1 Measured variable

Temperature (temperature-linear transmission behavior)

10.2 Output

10.2.1 Output signal



See Technical Information for the corresponding, mounted transmitter.

10.3 Power supply

10.3.1 Supply voltage



See Technical Information for the corresponding, mounted transmitter.

10.3.2 Current consumption



See Technical Information for the corresponding, mounted transmitter.

10.4 Environment

10.4.1 Ambient temperature range

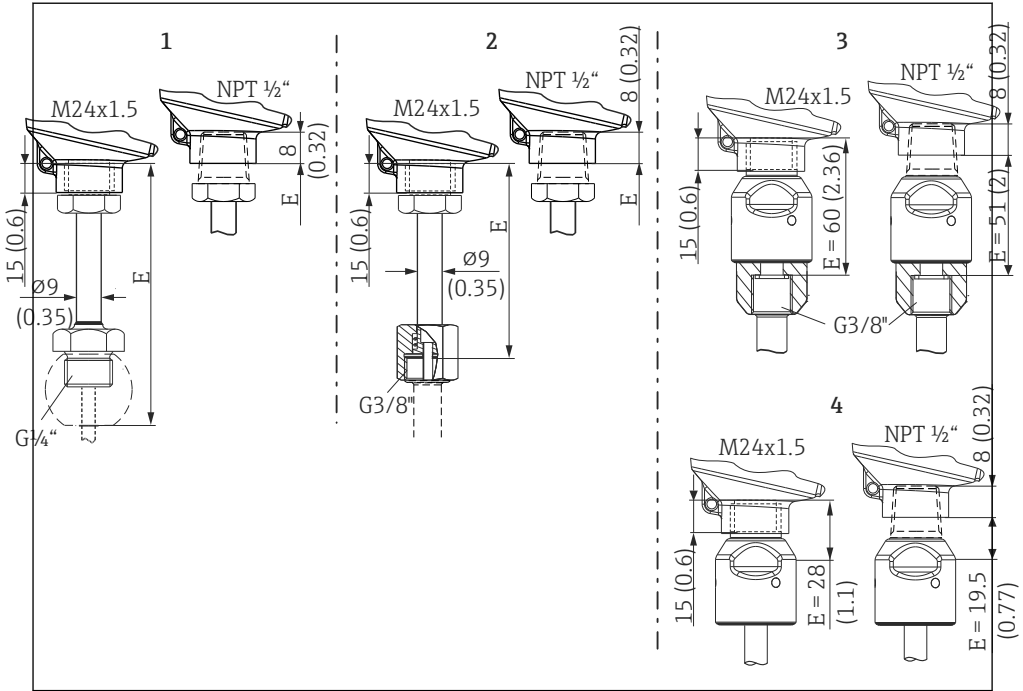
Terminal head	Temperature in °C (°F)
Without mounted head transmitter	Depends on the terminal head used and the cable gland or fieldbus connector See the Technical Information of the relevant thermometer, "Terminal heads" section
With mounted head transmitter	-40 to 85 °C (-40 to 185 °F)
With mounted head transmitter and display	-20 to 70 °C (-4 to 158 °F)

Extension neck	Temperature in °C (°F)
iTHERM QuickNeck quick-release fastener	-50 to +140 °C (-58 to +284 °F)

10.4.2 Extension neck

Standard version of extension neck, or optionally with quick-fastening iTHERM QuickNeck.

- Tool-free removal of the insert:
 - Saves time/costs on frequently calibrated measuring points
 - Wiring mistakes avoided
- IP69K protection class



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6 Dimensions of extension neck type TE411, different versions, each with M24x1.5 or NPT 1/2" thread to the terminal head

- 1 With G1/4" external thread for compression fitting TK40, with 3-A® symbol
- 2 With G3/8" thread adapter nut for thermowell version: Ø6 mm (1/4 in), Ø12.7 mm (0.5 in) and T-piece and elbow piece thermowell versions
- 3 Quick-fastening iTHERM QuickNeck for thermowell version: Ø6 mm (1/4 in), Ø12.7 mm (0.5 in) and T-piece and elbow piece thermowell versions
- 4 Quick-fastening iTHERM QuickNeck - top part, for installation in an existing protective tube with iTHERM QuickNeck

10.4.3 Storage temperature

-40 to +80 °C (-40 to +176 °F)

10.4.4 Altitude

Up to 2 000 m (6 561 ft) above sea level in accordance with IEC 61010-1

10.4.5 Climate class

See Technical Information for the corresponding, mounted transmitter.

10.4.6 Degree of protection

Max. IP69, depending on the design (terminal head, connector, etc.).

10.4.7 Shock- and vibration-resistance



See Technical Information of the relevant thermometer.

10.4.8 Electromagnetic compatibility (EMC)

Depends on the head transmitter used. See Technical Information for the corresponding, mounted transmitter.

10.4.9 Process temperature range

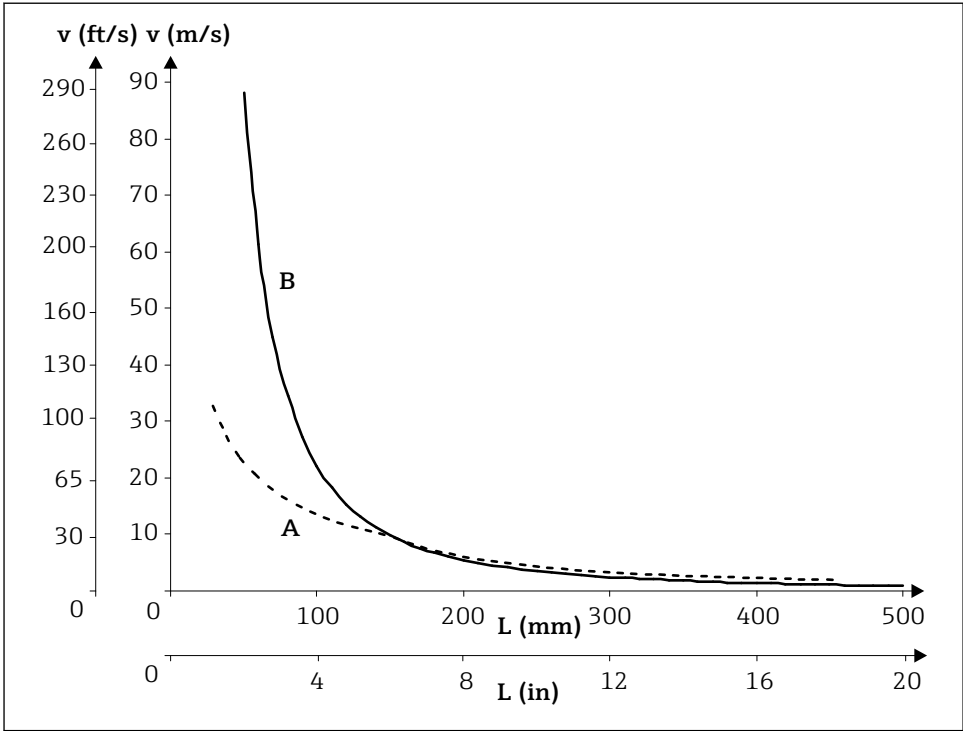
The maximum possible process pressure depends on various influencing factors, such as the design, process connection and process temperature.



See Technical Information for the relevant thermometer, "Process connection" section.



It is possible to verify the mechanical loading capacity as a function of the installation and process conditions using the online TW Sizing Module for thermowells in the Endress+Hauser Applicator software. See "Accessories" section.



A0008967

7 Permitted flow velocities, protection tube diameter 9 mm (0.35 in)

- A Medium water at $T = 50\text{ }^{\circ}\text{C}$ ($122\text{ }^{\circ}\text{F}$)
- B Medium superheated steam at $T = 400\text{ }^{\circ}\text{C}$ ($752\text{ }^{\circ}\text{F}$)
- L Immersion length exposed to flow
- v Flow velocity

Example of the dependency of the permitted flow velocity on the immersion length and process medium

The maximum flow velocity tolerated by the thermometer diminishes with increasing immersion of the insert in the flow of the medium being measured. The flow velocity is also dependent on the diameter of the thermometer tip, the type of medium being measured, the process temperature and the process pressure. The following diagrams exemplify the maximum permitted flow velocities in water and superheated steam at a process pressure of 40 bar (580 PSI).

10.4.10 Electrical safety

- Protection class III
- Overvoltage category II
- Pollution level 2

10.5 Performance characteristics

10.5.1 Reference 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.

10.5.2 Accuracy

RTD resistance thermometer as per IEC 60751



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

10.5.3 Influence of ambient temperature

Depends on the head transmitter used. For details, see Technical Information.

10.5.4 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 low measured current) is used.

10.5.5 Calibration

Calibration of thermometers

Calibration involves comparing the measured values of a device under test (DUT) with those of a more precise calibration standard using a defined and reproducible measurement method. The aim is to determine the deviation of the DUT's measured values from the true value of the measured variable. Two different methods are used for thermometers:

- Calibration at fixed-point temperatures, e.g. at the freezing point of water at 0 °C,
- Calibration compared against a precise reference thermometer.

The thermometer to be calibrated must display the fixed point temperature or the temperature of the reference thermometer as accurately as possible. Temperature-controlled calibration baths with very homogeneous thermal values, or special calibration furnaces are typically used for thermometer calibrations. The measuring uncertainty may increase due to heat conduction errors and short immersion lengths. The existing measuring uncertainty is recorded on the individual certificate of calibration. For accredited calibrations in accordance with ISO17025, a measuring uncertainty that is twice as high as the accredited measuring uncertainty is not permitted. If this limit is exceeded, only a factory calibration is possible.

10.5.6 Insulation resistance

Insulation resistance $\geq 100 \text{ M}\Omega$ at ambient temperature, measured between the terminals and the outer jacket with a minimum voltage of $100 \text{ V}_{\text{DC}}$.

10.6 Certificates and approvals

10.6.1 Ex approvals

More information on the hazardous area versions currently available (ATEX, FM, CSA, etc.) is available from your Endress+Hauser sales center. Separate Ex documentation contain all the data relevant for explosion protection.

10.6.2 CE mark

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.

10.6.3 RoHS

The measuring system complies with the substance restrictions of the Restriction on Hazardous Substances Directive 2011/65/EU (RoHS 2).

10.6.4 EAC mark

The product meets the legal requirements of the EEU guidelines. The manufacturer confirms the successful testing of the product by affixing the EAC mark.

10.6.5 cCSAus

The product meets the requirements for electrical safety according to CAN/CSA-C22.2 No. 61010-1-12 or UL 61010-1.

10.6.6 RCM-Tick marking

The supplied product or measuring system meets the ACMA (Australian Communications and Media Authority) requirements for network integrity, interoperability, performance characteristics as well as health and safety regulations. Here, especially the regulatory arrangements for electromagnetic compatibility are met. The products are labelled with the RCM- Tick marking on the name plate.



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10.6.7 Hygiene standard

- EHEDG certification, type EL CLASS I. Permitted process connections in accordance with EHEDG.
- 3-A Authorization No. 1144, 3-A Sanitary Standard 74-07. Permitted process connections in accordance with 3-A.
- ASME BPE, certificate of conformity can be ordered for indicated options.
- FDA-compliant.
- All surfaces in contact with the medium are free from materials derived from bovine animals or other livestock (TSE compliant).

10.6.8 Materials in contact with food/product (FCM)

The materials of the thermometer in contact with food/product (FCM) comply with the following European regulations:

- (EC) No. 1935/2004, Article 3, paragraph 1, Articles 5 and 17 on materials and articles intended to come into contact with food.
- (EC) No. 2023/2006 on good manufacturing practice for materials and articles intended to come into contact with food.
- (EC) No. 10/2011 on plastic materials and articles intended to come into contact with food.

10.6.9 CRN approval

The CRN approval is only available for certain thermowell versions. These versions are identified and displayed accordingly during the configuration of the device.

Detailed ordering information is available for your nearest sales organization www.addresses.endress.com or in the Download Area under www.endress.com :

1. Select the country
2. Select Downloads
3. In the search area: select Approvals/approval type
4. Enter the product code or device
5. Start the search

10.6.10 Other standards and guidelines

- Degree of protection provided by enclosures (IP code) according to IEC 60529
- Safety requirements for electrical equipment for measurement, control and laboratory use according to IEC 61010-1
- Industrial platinum resistance thermometers in accordance with IEC 60751
- Electromagnetic compatibility (EMC requirements) IEC/EN 61326 series
- NAMUR International user association of automation technology in process industries (www.namur.de)
 - NE21 - Electromagnetic Compatibility (EMC) of Industrial Process and Laboratory Control Equipment.
 - NE43 - Standardization of the Signal Level for the Failure Information of Digital Transmitters.
- Electromagnetic compatibility (EMC) according to IO-Link Specification IEC 61131-09

10.6.11 Surface roughness

Free from oil and grease for O₂ applications, optional

10.6.12 Material resistance

Material resistance - including resistance of housing - to the following Ecolab cleaning/disinfection agents:

- P3-topax 66
- P3-topactive 200
- P3-topactive 500
- P3-topactive OKTO
- And demineralized water

10.6.13 Material certification

The material certificate 3.1 (according to EN 10204) can be requested separately. The short form certificate includes a simplified declaration with no enclosures of documents related to the materials used in the design of the individual sensor, but guarantees the traceability of the materials through the identification number of the thermometer. The data regarding the origin of the materials can subsequently be requested by the client if necessary.

10.6.14 Calibration

The factory calibration is performed according to an internal procedure in a laboratory that is accredited by the European Accreditation Organization (EA) according to ISO/IEC 17025. A calibration which is performed according to EA guidelines (SIT/Accredia or DKD/DAkkS) can be requested separately.

The analog current output of the device is calibrated.

10.6.15 Thermowell testing and load capacity calculation

Thermowell pressure testing and thermowell load capacity calculation are performed according to the specifications of DIN 43772. With regard to thermowells with tapered or reduced tips that do not comply with this standard, these are tested using the pressure of corresponding straight thermowells. Tests according to other specifications can be carried out on request.



It is possible to verify the mechanical loading capacity as a function of the installation and process conditions using the online TW Sizing Module for thermowells in the Endress+Hauser Applicator software. See "Accessories" section.

10.7 Supplementary documentation

Technical Information

- **iTEMP temperature head transmitter:**
 - TMT71, PC-programmable, single-channel, RTD and TC, Ω , mV (TI01393T)
 - HART[®] TMT72, PC-programmable, single-channel, RTD, TC, Ω , mV (TI01392T)
 - TMT180, PC-programmable, single-channel, Pt100 (TI00088R)
 - HART[®] TMT82, 2-channel, RTD, TC, Ω , mV (TI01010T)
 - PROFIBUS[®] PA TMT84, 2-channel, RTD, TC, Ω , mV (TI00138R)
 - HART[®], FOUNDATION Fieldbus[™], PROFIBUS[®] TMT162, 2-channel, RTD, TC, Ω , mV (TI00086R)
- **iTHERM thermometer:**
 - iTHERM TM401 (TI01058T)
 - iTHERM TM411 (TI01038T)
 - iTHERM TM402 (TI01349T)
 - iTHERM TM412 (TI01348T)
- **Thermowell:**
 - Welded thermowell iTHERM TT411 (TI01099T)
 - Welded thermowell iTHERM TT412 (TI01350T)
- **Insert:**
 - iTHERM TS111 (TI01014T)



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