

Brief Operating Instructions **iTHERM TrustSens TM371**

Compact thermometer with self-calibration
function
HART® communication

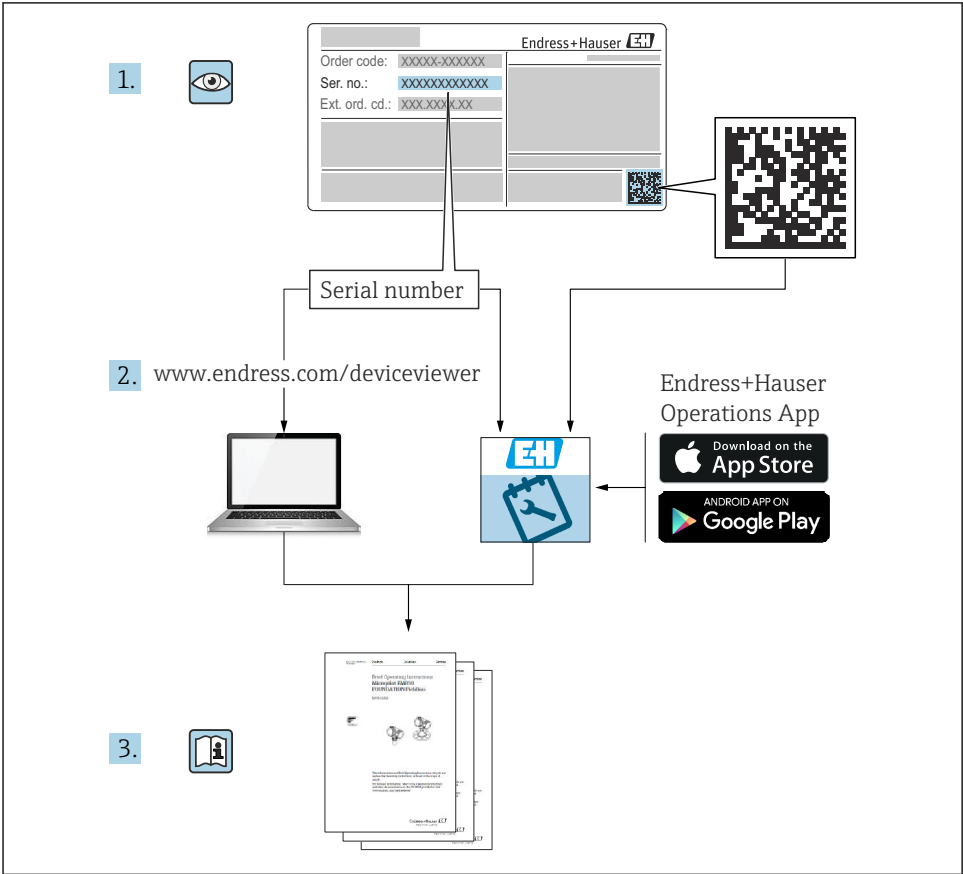


These instructions are brief operating instructions; they are **not** a substitute for the operating instructions pertaining to the device.

For detailed information, refer to the operating instructions and other documentation.

Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smartphone/Tablet: Endress+Hauser Operations App



A0023555

Table of contents

1	About this document	3
1.1	Symbols	3
1.2	Documentation	5
2	Basic safety instructions	6
2.1	Requirements for the personnel	6
2.2	Intended use	6
2.3	Operation safety	6
2.4	Product safety	6
2.5	IT security	6
3	Incoming acceptance and product identification	7
3.1	Incoming acceptance	7
3.2	Product identification	7
3.3	Storage and transport	9
4	Mounting	9
4.1	Mounting requirements	9
4.2	Mounting the measuring device	10
4.3	Post-mounting check	16
5	Electrical connection	16
5.1	Connecting requirements	16
5.2	Connecting the measuring device	16
5.3	Ensuring the degree of protection	17
5.4	Post-connection check	17
6	Operability	18
6.1	Overview of operation options	18
6.2	Configuration of transmitter and HART® protocol	18
7	Commissioning	19
7.1	Function check	19
7.2	Switching on the measuring device	19

1 About this document

1.1 Symbols

1.1.1 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.

1.1.2 Electrical symbols


Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbol	Meaning
	Potential equalization connection (PE: protective earth) Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: <ul style="list-style-type: none"> ■ Interior ground terminal: potential equalization is connected to the supply network. ■ Exterior ground terminal: device is connected to the plant grounding system.

1.1.3 Symbols for certain types of information

Symbol	Meaning	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		Series of steps
	Result of a step		Visual inspection

1.1.4 Tool symbols

Symbol	Meaning
 A0011222	Open-ended wrench

1.2 Documentation




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

- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

1.2.1 Document function

The following documentation may be available depending on the version ordered:

Document type	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 The Operating Instructions contain all the information that is required in the various phases of the life cycle 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)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. The Safety Instructions are an integral part of the Operating Instructions.  Information on the Safety Instructions (XA) relevant to the device is provided on the nameplate.
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.

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

- ▶ 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.

2.2 Intended use

- The device is a hygienic compact thermometer, which features an automatic self-calibration function. It is applied for the acquisition and conversion of temperature input signals for industrial temperature measurement.
- The manufacturer is not liable for damage caused by improper or non-intended use.

2.3 Operation safety

NOTICE

Operation safety

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

Repair

Due to its design, the device cannot be repaired.

- ▶ However, it is possible to send the device in for examination.
- ▶ To ensure continued operational safety and reliability, use original spare parts and accessories from Endress+Hauser only.

2.4 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 EU directives listed in the device-specific EU Declaration of Conformity. The manufacturer confirms this by affixing the CE mark to the device.

2.5 IT security

Our warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

3 Incoming acceptance and product identification

3.1 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.

3.2 Product identification

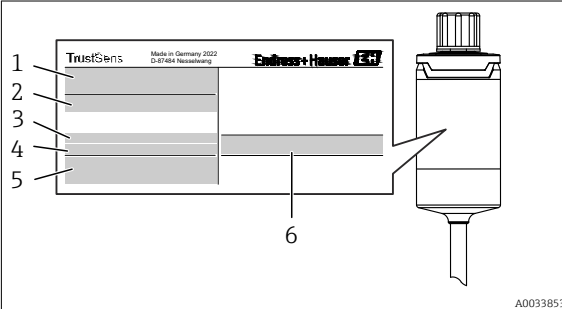
The following options are available for identification of the device:

- Nameplate specifications
- Enter the serial number from the nameplate in the *Device Viewer* (www.endress.com/deviceviewer): All data relating to the device and an overview of the Technical Documentation supplied with the device are displayed.

3.2.1 Nameplate

Is this the correct device?

Compare and check the data on the nameplate of the device against the requirements of the measuring point:



A0033853



1 Nameplate of the compact thermometer (example)

1	Order code, serial number
2	Supply voltage and current consumption
3	Device revision and firmware version
4	Ambient temperature
5	Approvals with symbols
6	Device TAG name

3.2.2 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

3.2.3 Certificates and approvals

-  For certificates and approvals valid for the device: see the data on the nameplate
-  Approval-related data and documents: www.endress.com/deviceviewer → (enter the serial number)

Hygiene standard

- EHEDG certification, type EL - CLASS I. EHEDG certified/tested process connections see Operating instructions accordingly.
- 3-A authorization no. 1144, 3-A Sanitary standard 74-07. Listed process connections see Operating instructions accordingly.
- ASME BPE, certificate of conformity can be ordered for indicated options
- FDA-compliant
- All surfaces in contact with the medium are free of animal derived ingredients (ADI/TSE) and do not contain any materials derived from bovine or animal sources.

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.
- (EU) No. 10/2011 on plastic materials and articles intended to come into contact with food.

3.3 Storage and transport

Storage temperature: -40 to +85 °C (-40 to +185 °F)




Pack the device for storage and transportation in such a way that it is reliably protected against impact and external influences. The original packaging provides optimum protection.

Avoid the following environmental influences during storage and transport:

- Direct sunlight
- Vibration
- Aggressive media

4 Mounting

4.1 Mounting requirements

The immersion length of the thermometer can influence the accuracy. If the immersion length is too small then errors in the measurement are caused by heat conduction via the process connection. If installing into a pipe then the immersion length should ideally be half of the pipe diameter. →  10

- Installation possibilities: Pipes, tanks or other plant components
- 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.

4.1.1 Ambient temperature range

Ambient temperature T _a	-40 to +60 °C (-40 to +140 °F)
Maximum device temperature T	-40 to +85 °C (-40 to +185 °F)

4.1.2 Climate class

As per IEC 60654-1, Class Dx

4.1.3 Degree of protection

- IP65/67 for housing with LED status indication
- IP69 for housing without LED status indication and with connecting cable with M12x1 coupling

4.1.4 Shock and vibration resistance

Endress+Hauser temperature sensors meet the requirements of IEC 60751 which specify shock and vibration resistance of 3g in the range from 10 to 500 Hz. This also applies for the quick-fastening iTHERM QuickNeck.

4.1.5 Electromagnetic compatibility (EMC)

EMC to all relevant requirements of the IEC/EN 61326 - series and NAMUR Recommendation EMC (NE21). For details, refer to the Declaration of Conformity. All tests were passed both with and without ongoing digital HART® communication.

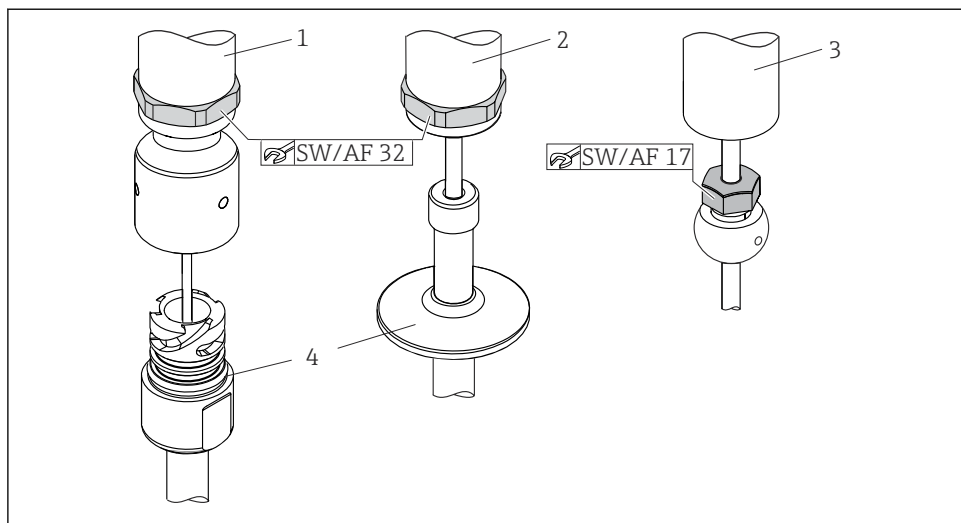
All EMC measurements were performed with a turn down (TD) = 5:1. Maximum fluctuations during EMC- tests: < 1% of measuring span.

Interference immunity to IEC/EN 61326 - series, requirements for industrial areas.

Interference emission to IEC/EN 61326 - series, electrical equipment Class B.

4.2 Mounting the measuring device

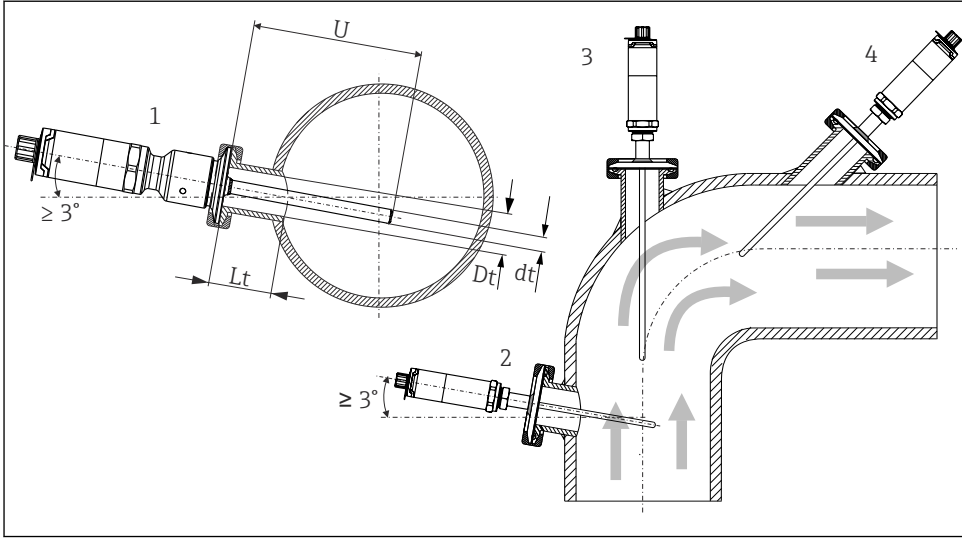
Required tools for mounting in an existing protection tube: Open-end wrench or mounting socket wrench SW/AF 32



A0028639

2 Mounting process of the compact thermometer

- 1 Mounting of iTHERM QuickNeck connection to the existing protection tube with iTHERM QuickNeck bottom part - no tools required
- 2 Hexagonal head SW/AF 32 for the mounting in an existing protection tube for M24-, G3/8"-thread
- 3 Adjustable compression fitting TK40 - mounting of the hexagonal screw with open-end wrench SW/AF 17 only
- 4 Protection tube



A0031007

3 Mounting possibilities in the process

- 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

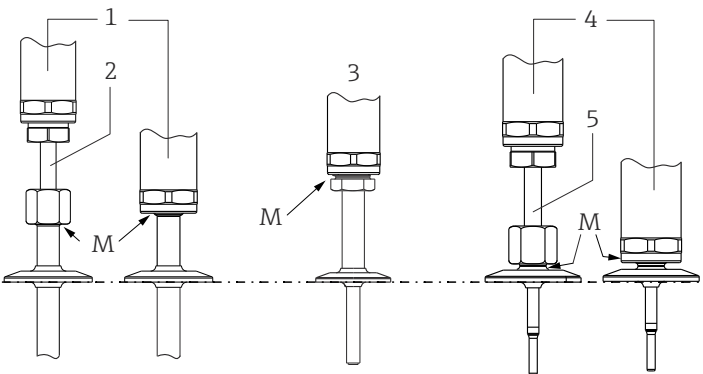
i The requirements of the EHEDG and the 3-A Sanitary Standard must be adhered to.

Installation instructions EHEDG/cleanability: $L_t \leq (D_t - d_t)$

Installation instructions 3-A/cleanability: $L_t \leq 2(D_t - d_t)$

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).

Maximum torque			
			
Protection tube version	TT411, $\phi 6$ mm (0.24 in) (1) TT411, $\phi 6$ mm (0.24 in) and Necktube TE411 (2)	TT411, $\phi 9$ mm (0.35 in) (3)	TT411, $\phi 12.7$ mm ($\frac{1}{2}$ in) (4) TT411, $\phi 12.7$ mm ($\frac{1}{2}$ in) and Necktube TE411 (5)
Torque M	3 to 5 Nm (2.2 to 3.7 lbf ft)	10 Nm (7.4 lbf ft)	3 to 5 Nm (2.2 to 3.7 lbf ft)

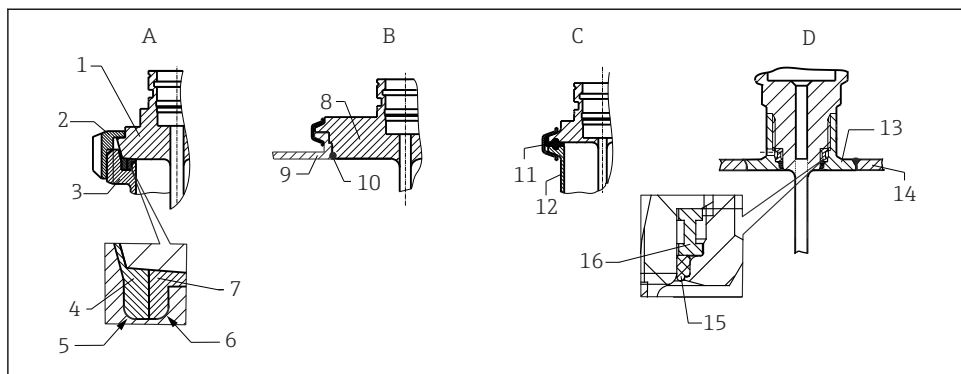
 When connecting the device with the protection tube: only turn the hexagonal spanner flat on the bottom of the housing.



A0048430

 4 *Process connections for thermometer installation in pipes with small nominal diameters*

1 *Elbow thermowell for weld-in as per DIN 11865 / ASME BPE 2012*



A0040345

■ 5 Detailed installation instructions for hygiene-compliant installation (depends on the version ordered)

- A Milk pipe connection according to DIN 11851, only in connection 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 R0.4
 - 6 R0.4
 - 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
- 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

NOTICE

The following actions 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.

The counterpieces for the process connections and the seals or sealing rings are not included in the scope of supply for the thermometer. Liquiphant M weld-in adapters with associated seal kits are available as accessories, see corresponding operating instructions .

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 $\geq 3.2\text{ mm}$ (0.13 in).
3.

Avoid crevices, folds or gaps.
4.

Ensure the surface is honed and polished, $Ra \leq 0.76\text{ }\mu\text{m}$ (30 μin).
1.

As a general rule, the thermometers should be installed in such a way that does not impact their ability to be cleaned (the requirements of the 3-A Sanitary Standard must be observed).
2.


The Varivent® and Liquiphant-M weld-in adapter and Ingold (+ weld-in adapter) connections enable flush-mounted installation.

4.3 Post-mounting check

<input type="checkbox"/>	Is the device undamaged (visual inspection)?
<input type="checkbox"/>	Is the device fixed appropriately?
<input type="checkbox"/>	Does the device comply to the measurement point specifications, such as ambient temperature, etc.?

5 Electrical connection

5.1 Connecting requirements

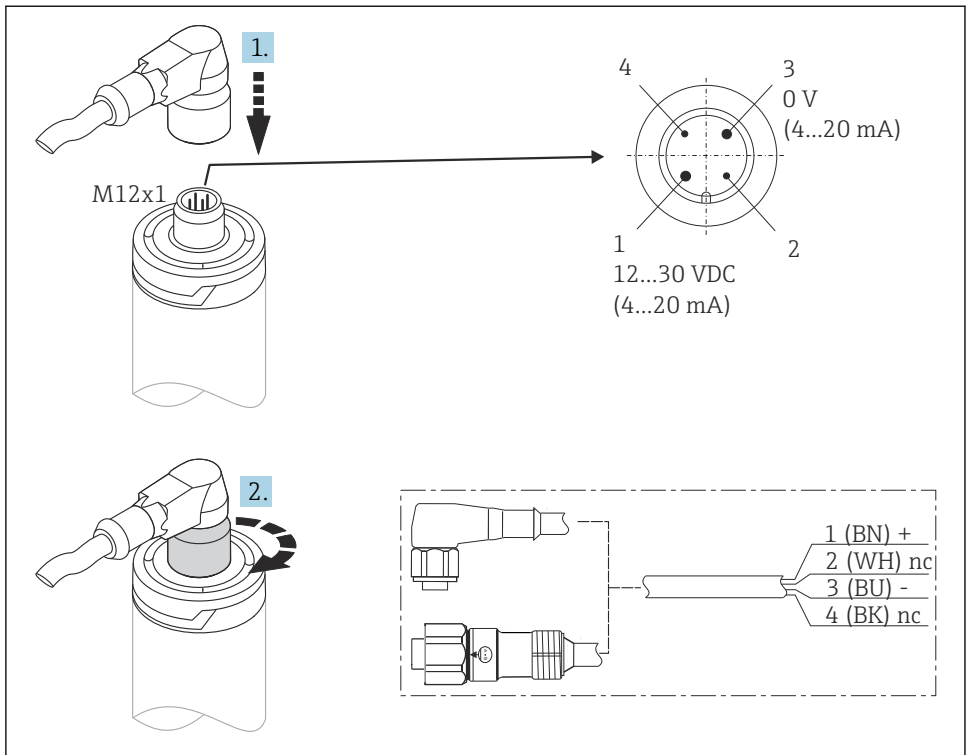
 According to the 3-A Sanitary Standard and EHEDG electrical connecting cables must be smooth, corrosion-resistant and easy to clean.

5.2 Connecting the measuring device


NOTICE

To prevent damage to the device

- ▶ To prevent any kind of damage from the device electronics, leave the pins 2 and 4 unconnected. They are reserved for the connection of the configuration cable.
- ▶ Do not tighten the M12 plug too much, in order to prevent damage to the device.



A0028623

 6 Cable plug M12x1 and PIN assignment of the connection socket at the device

If voltage supply is connected correctly and the measuring device is operational, the LED is illuminated green.

5.3 Ensuring the degree of protection

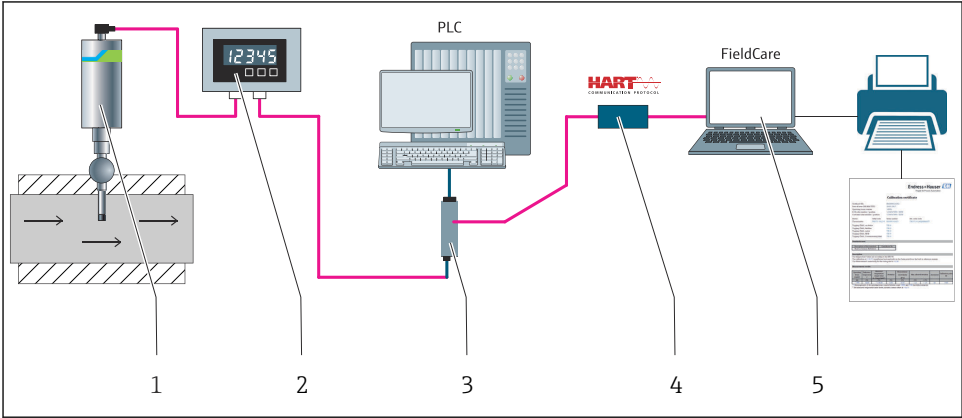
The specified degree of protection is ensured when the M12x1 cable plug is tightened. In order to reach IP69 degree of protection, appropriate cord sets with straight or angle plugs are available as accessories.

5.4 Post-connection check

<input type="checkbox"/>	Is the device or cable undamaged (visual check)?
<input type="checkbox"/>	Do the cables have adequate strain relief?
<input type="checkbox"/>	Does the supply voltage match the specifications on the nameplate?

6 Operability

6.1 Overview of operation options



A0031089

7 Operating options of the device


- 1 Installed iTHERM compact thermometer with HART communication protocol
- 2 RIA15 loop powered process display - It is integrated in the current loop and displays the measuring signal or HART process variables in digital form. The process display unit does not require an external power supply. It is powered directly from the current loop.
- 3 Active barrier RN42 – The active barrier is used for transmission and galvanic isolation of 4 to 20 mA/HART signals and supplying loop powered transmitters. The universal power supply works with an input supply voltage of 19.20 to 253 V DC/AC, 50/60 Hz, which means that it can be used in all international power grids.
- 4 Commubox FXA195 for intrinsically safe HART communication with FieldCare via the USB interface.
- 5 FieldCare is a FDT-based plant asset management tool from Endress+Hauser, more details see section 'accessories'. The acquired self-calibration data is stored in the device (1) and can be read using FieldCare. This also enables an auditable calibration certificate to be created and printed.

6.2 Configuration of transmitter and HART® protocol

The compact thermometer is configured via the HART® protocol, CDI (= Endress+Hauser Common Data Interface). The following operating tools are available for this purpose:

Operating tools

FieldCare, DeviceCare, Field Xpert (Endress+Hauser)	SIMATIC PDM (Siemens)
AMS Device Manager (Emerson Process Management)	Field Communicator 375, 475 (Emerson Process Management)

 The configuration of device-specific parameters is described in detail in the corresponding Operating Instructions.

7 Commissioning

7.1 Function check

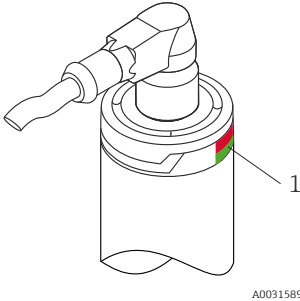
Before commissioning the device make sure that all final checks have been carried out:

- Checklist "Post-mounting check", →  16
- Checklist "Post-connection check", →  17

7.2 Switching on the measuring device

Once the final checks have been successfully completed, it is time to switch on the supply voltage. The device performs a number of internal test functions after power-up. This is indicated by red LED-flashing. The device is operational after approx. 10 seconds in normal operating mode. The LED on the device is illuminated green.

7.2.1 Display elements

Position	LEDs	Function description
 <p>1 LED signals indicate different functions</p> <p>A0031589</p>	LED green (gn) is illuminated	Voltage supply is correct. The measuring device is operational and the set limit values are met.
	LED green (gn) is flashing	With a frequency 1 Hz: The device starts the self-calibration until detection has ended. With a frequency 5 Hz for 5 s: Status OK, calibration point status OK detected.
	LED red (rd) and green (gn) are flashing alternating	With a frequency 5 Hz: Status OK, calibration point status BAD detected.
	LED red (rd) is flashing	With a frequency 1 Hz: It signals a diagnostic event (Warning). The device continues to measure. A diagnostic message is generated for the monitoring system.
	LED red (rd) is illuminated	It signals a diagnostic event (Alarm). Measurement is interrupted. The signal outputs assume the defined alarm condition. A diagnostic message is generated for the monitoring system.



For detailed information, refer to the corresponding operation instructions BA01581T.



71598397

www.addresses.endress.com
