

Brief Operating Instructions

Liquiphant FTL43

Vibronic

HART

Level switch for liquids

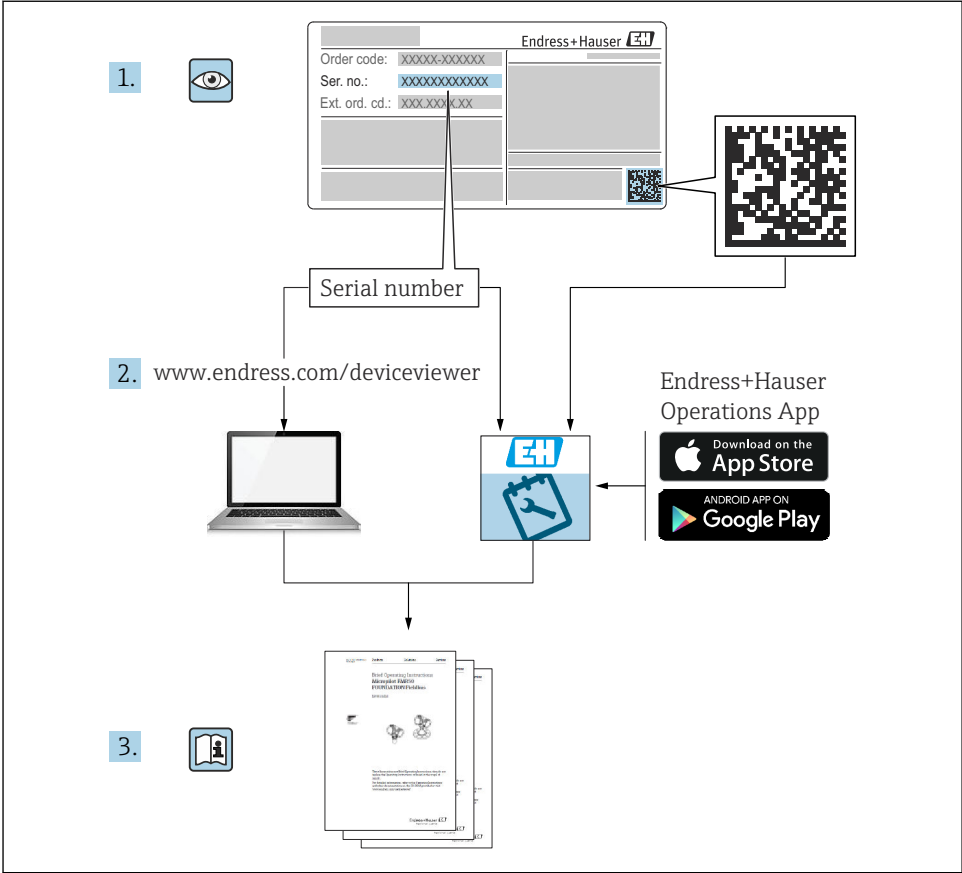


These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information about the device can be found in the Operating Instructions and the other documentation:
Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

1 Associated documentation



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2 About this document

2.1 Document function

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

2.2 Symbols

2.2.1 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.

2.2.2 Tool symbols


 Open-ended wrench

2.2.3 Communication-specific symbols


Bluetooth®: 

Wireless data transmission between devices over a short distance.


2.2.4 Symbols for certain types of Information


Permitted: 


Procedures, processes or actions that are permitted.

Forbidden: 


Procedures, processes or actions that are forbidden.

Additional information: 

Reference to documentation: 

Reference to page: 

Series of steps: 1., 2., 3.

Result of an individual step: 

2.2.5 Symbols in graphics

Item numbers: 1, 2, 3 ...

Series of steps: 1., 2., 3.

Views: A, B, C, ...

2.3 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.

2.4 Registered trademarks

Apple®

Apple, the Apple logo, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

Android®

Android, Google Play and the Google Play logo are trademarks of Google Inc.

Bluetooth®

The *Bluetooth*® word mark and logos are registered trademarks owned by the Bluetooth SIG, Inc. and any use of such marks by Endress+Hauser is under license. Other trademarks and trade names are those of their respective owners.

HART®

Registered trademark of the FieldComm Group, Austin, Texas USA

3 Basic safety instructions

3.1 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.

3.2 Intended use

The device described in this manual is intended only for the level measurement of liquids.

Incorrect use

The manufacturer is not liable for damage caused by improper or unintended use.

Avoid mechanical damage:

- ▶ Do not touch or clean device surfaces with pointed or hard objects.

Clarification for borderline cases:

- ▶ For special media and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability.

Residual risks

Due to the transfer of heat from the process and power dissipation within the electronics, the temperature of the housing may increase to up to 80 °C (176 °F) during operation. When in operation, the sensor can reach a temperature close to the medium temperature.

Danger of burns from contact with surfaces!

- ▶ In the event of elevated fluid temperatures, ensure protection against contact to prevent burns.

3.3 Workplace safety

For work on and with the device:

- ▶ Wear the required personal protective equipment as per national regulations.
- ▶ Switch off the supply voltage before connecting the device.

3.4 Operational safety

Risk of injury!

- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.
- ▶ The operator is responsible for ensuring that the device is in good working order.

Modifications to the device

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

- If modifications are nevertheless required, consult with the manufacturer.

Repair

To ensure continued operational safety and reliability:

- Only use original accessories.

Hazardous area

To eliminate the risk of danger to persons or the facility when the device is used in the approval-related area (e.g. explosion protection, pressure equipment safety):

- Check the nameplate to verify if the device ordered can be put to its intended use in the hazardous area.
- Observe the specifications in the separate supplementary documentation included as an integral part of these instructions.

3.5 Product safety

This state-of-the-art device is designed and tested in accordance with good engineering practice to meet operational safety standards. It left the factory in a condition in which it is safe to operate.

The device fulfills general safety requirements and legal requirements. It also complies with the EU directives listed in the device-specific EU declaration of conformity. Endress+Hauser confirms this fact by affixing the CE mark to the device.

3.6 IT security

The manufacturer 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.

3.7 Device-specific IT security

The device offers specific functions to support protective measures by the operator. These functions can be configured by the user and guarantee greater in-operation safety if used correctly. The user role can be changed with an access code (applies to operation via Bluetooth or FieldCare, DeviceCare or asset management tools (e.g. AMS, PDM)).

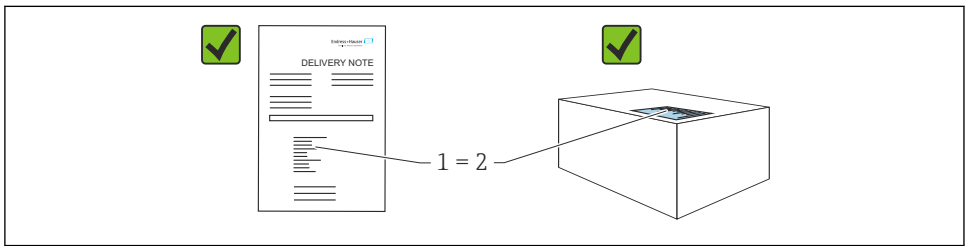
3.7.1 Access via Bluetooth® wireless technology

Secure signal transmission via Bluetooth® wireless technology uses an encryption method tested by the Fraunhofer Institute.

- Without the SmartBlue app, the device is not visible via Bluetooth® wireless technology.
- Only one point-to-point connection is established between the device and a smartphone or tablet.
- The Bluetooth® wireless technology interface can be disabled via onsite operation or via SmartBlue.

4 Incoming acceptance and product identification

4.1 Incoming acceptance



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Check the following during incoming acceptance:

- Is the order code on the delivery note (1) identical to the order code on the product sticker (2)?
- Are the goods undamaged?
- Do the data on the nameplate correspond to the order specifications and the delivery note?
- Is the documentation provided?
- If required (see nameplate), are the Safety Instructions (XA) provided?



If one of these conditions is not met, please contact the manufacturer's sales office.

4.2 Product identification

The following options are available for identification of the device:

- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial numbers from the nameplates in *Device Viewer* (www.endress.com/deviceviewer): all the information about the device is displayed.

4.2.1 Nameplate

The information that is required by law and is relevant to the device is shown on the nameplate, e.g.:

- Manufacturer identification
- Order number, extended order code, serial number
- Technical data, degree of protection

- Firmware version, hardware version
- Approval-specific information
- DataMatrix code (information about the device)

Compare the data on the nameplate with your order.

4.2.2 Manufacturer address

Endress+Hauser SE+Co. KG
 Hauptstraße 1
 79689 Maulburg, Germany
 Place of manufacture: See nameplate.

4.3 Storage and transport

4.3.1 Storage conditions

- Use the original packaging
- Store the device in clean and dry conditions and protect from damage caused by shocks

Storage temperature

-40 to +85 °C (-40 to +185 °F)

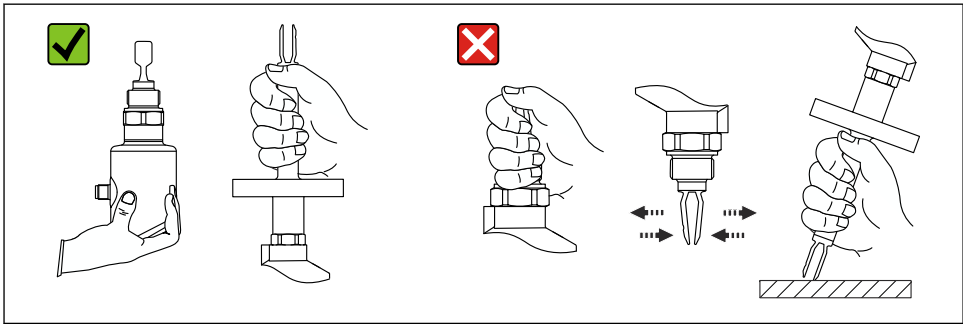
4.3.2 Transporting the product to the measuring point

WARNING

Incorrect transport!

Housing and tuning fork may become damaged, and there is a risk of injury.

- Transport the device to the measuring point in the original packaging.
- Hold the device by the housing, temperature spacer, process connection or extension pipe.
- Do not bend, shorten or extend the tuning fork.

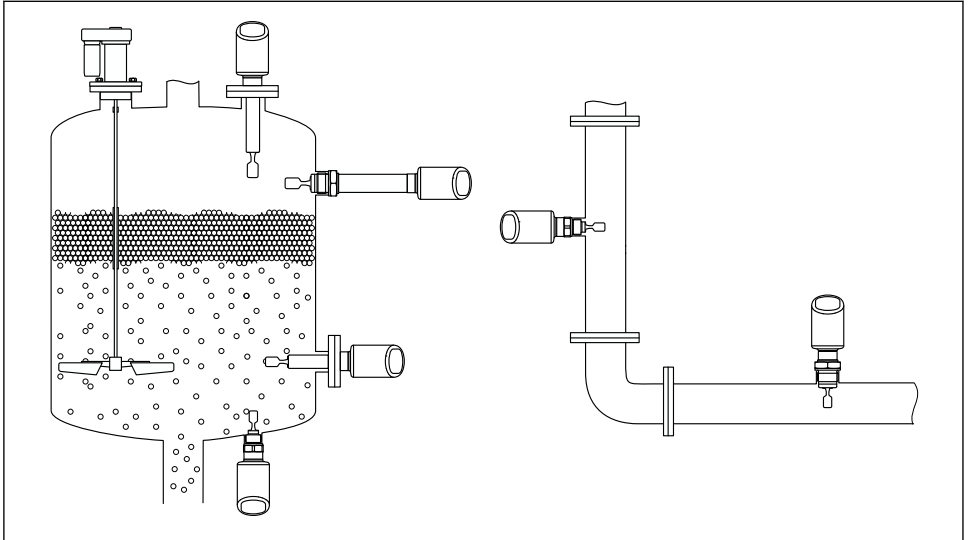


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1 Handling the device

5 Installation

- Any orientation for compact version or version with a pipe length up to approx. 500 mm (19.7 in)
- Vertical orientation from above for device with long pipe
- Minimum distance between the vibrating fork and the tank wall or pipe wall: 10 mm (0.39 in)



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2 Installation examples for a vessel, tank or pipe

5.1 Installation requirements

i During installation, it is important to ensure that the sealing element used has a permanent operating temperature that corresponds to the maximum temperature of the process.

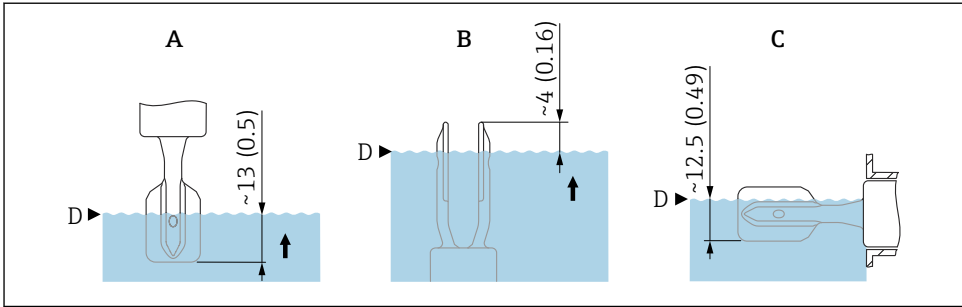
- Devices in North America are intended for indoor use
Devices are suitable for use in wet environments in accordance with IEC 61010-1
- Protect the housing against impact

5.1.1 Take switch point into consideration

The following are typical switch points, depending on the orientation of the level switch.

Water +23 °C (+73 °F)

i Minimum distance between the tuning fork and the tank wall or pipe wall:
10 mm (0.39 in)



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3 Typical switch points. Unit of measurement mm (in)

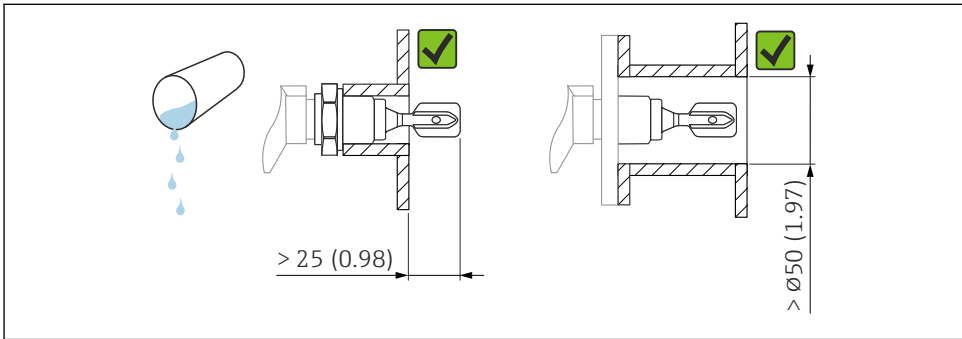
- A Installation from above
- B Installation from below
- C Installation from the side
- D Switch point

5.1.2 Take viscosity into consideration

- i** Viscosity values
- Low viscosity: < 2 000 mPa·s
 - High viscosity: > 2 000 to 10 000 mPa·s

Low viscosity

- i** Low viscosity, e.g. water: < 2 000 mPa·s
- It is permitted to position the tuning fork within the installation socket.



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4 Installation example for low-viscosity liquids. Unit of measurement mm (in)

High viscosity

NOTICE

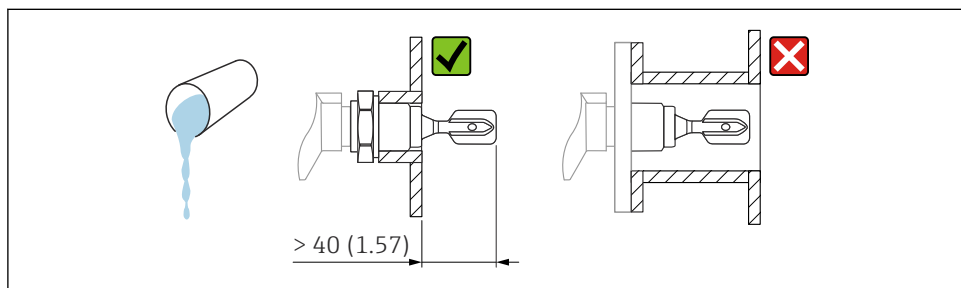
Highly viscous liquids may cause switching delays.

- ▶ Make sure that the liquid can run off the tuning fork easily.
- ▶ Deburr the socket surface.



High viscosity, e.g. viscous oils: $\leq 10\,000\text{ mPa}\cdot\text{s}$

The tuning fork must be located outside the installation socket!



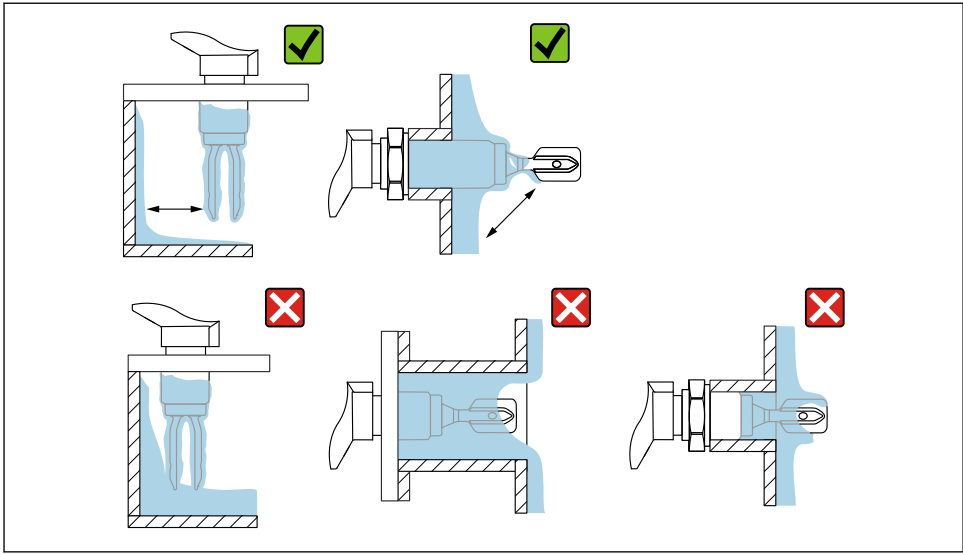
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5 Installation example for a highly viscous liquid. Unit of measurement mm (in)

5.1.3 Avoid buildup

- Use short installation sockets to ensure that the tuning fork projects freely into the vessel
- Leave sufficient distance between the buildup expected on the tank wall and the tuning fork

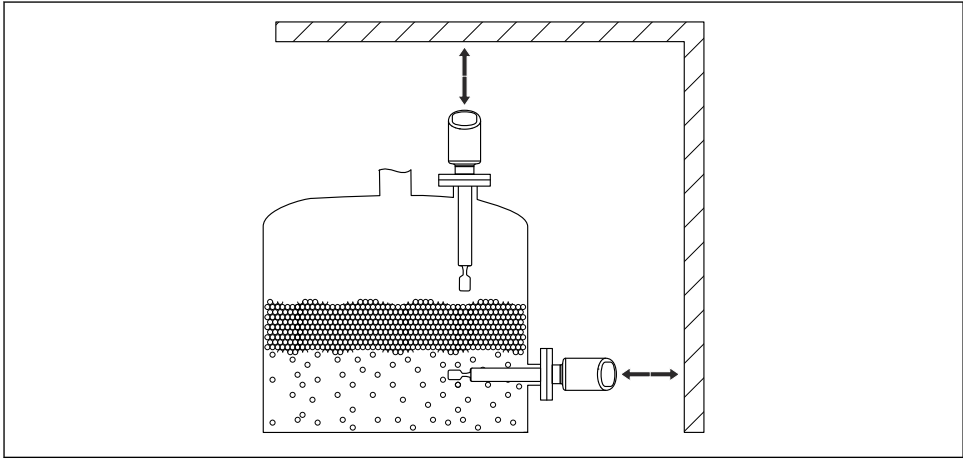


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6 Installation examples for a highly viscous process medium

5.1.4 Take clearance into consideration

Allow sufficient clearance outside the tank for mounting and electrical connection.

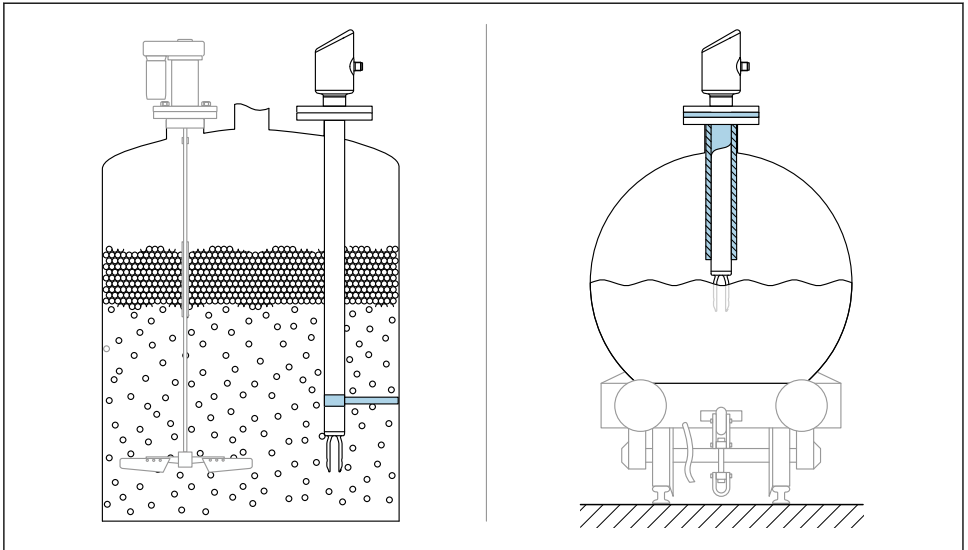


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7 Take clearance into consideration

5.1.5 Support the device

Support the device in the event of severe dynamic load. Maximum lateral loading capacity of the pipe extensions and sensors: 75 Nm (55 lbf ft).

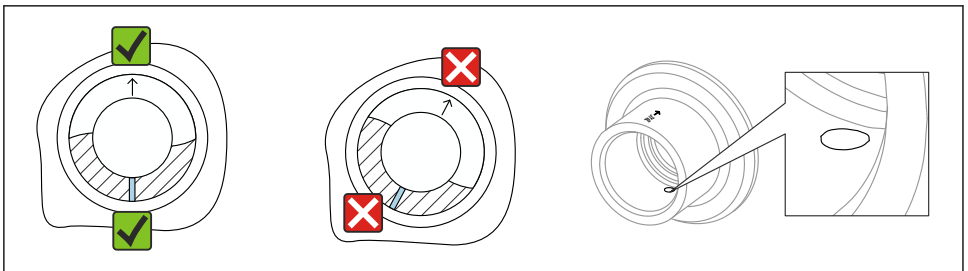


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8 Examples of support in the event of dynamic load

5.1.6 Weld-in adapter with leakage hole

Weld in the weld-in adapter in such a way that the leakage hole is pointing downwards. This enables any leaks to be detected quickly.



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9 Weld-in adapter with leakage hole


5.2 Installing the device

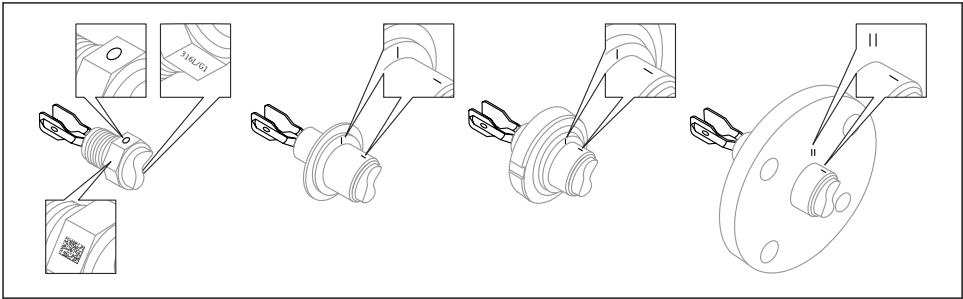
5.2.1 Installation procedure

Align the vibrating fork using the marking

The vibrating fork can be aligned using the marking in such a way that the medium drains off easily and buildup is avoided.

- Markings for threaded connections: Circle (material specification/thread designation opposite)
- Markings for flange or clamp connections: Line or double line

 In addition, the threaded connections have a matrix code that is **not** used for alignment.



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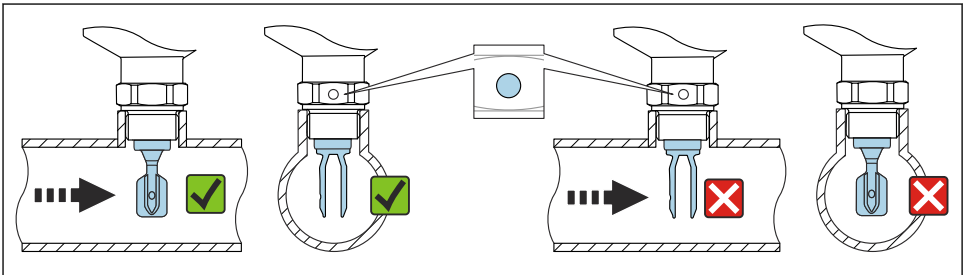
 10 Position of the vibrating fork when installed horizontally in the vessel using the marking

Installing the device in piping


- Flow velocity up to 5 m/s with a viscosity of 1 mPa·s and density of 1 g/cm³ (62.4 lb/ft³) (SGU).

Check for correct functioning in the event of other process medium conditions.

- The flow will not be significantly impeded if the tuning fork is correctly aligned and the marking is pointing in the direction of flow.
- The marking is visible when installed.

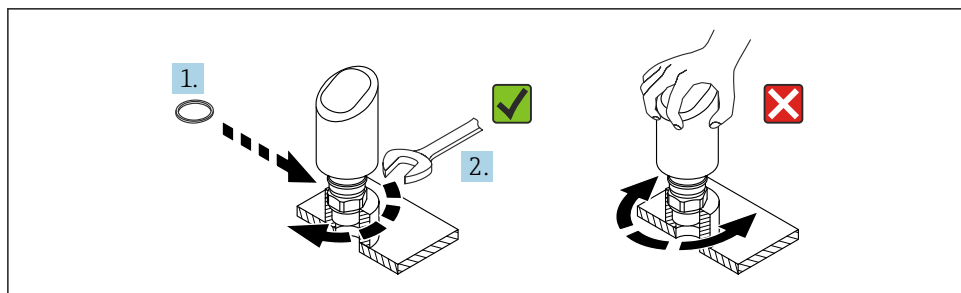


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 11 Installation in pipes (take fork position and marking into consideration)

Screwing in the device (for process connections with thread)

- Turn by the hex bolt only, 15 to 30 Nm (11 to 22 lbf ft)
- Do not turn at the housing!



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12 Screwing in the device

5.3 Post-mounting check

- ☐ Is the device undamaged (visual inspection)?
- ☐ Are the measuring point identification and labeling correct (visual inspection)?
- ☐ Is the device properly secured?
- ☐ Does the device comply with the measuring point specifications?

For example:

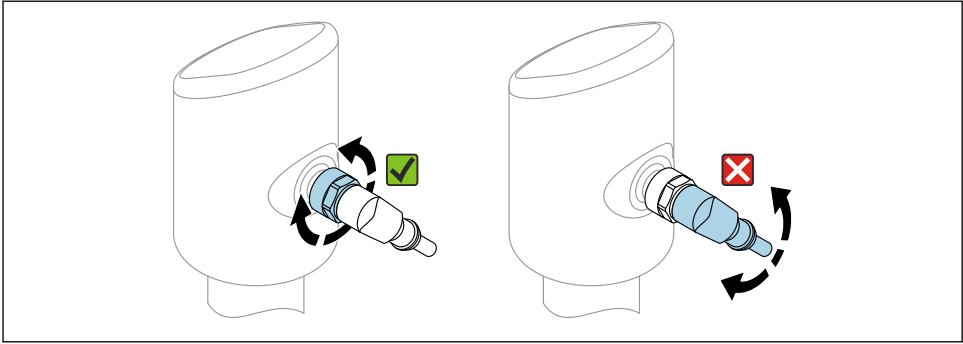
- Process temperature
- Process pressure
- Ambient temperature
- Measuring range

6 Electrical connection


6.1 Connecting the device

6.1.1 Notes for M12 plug

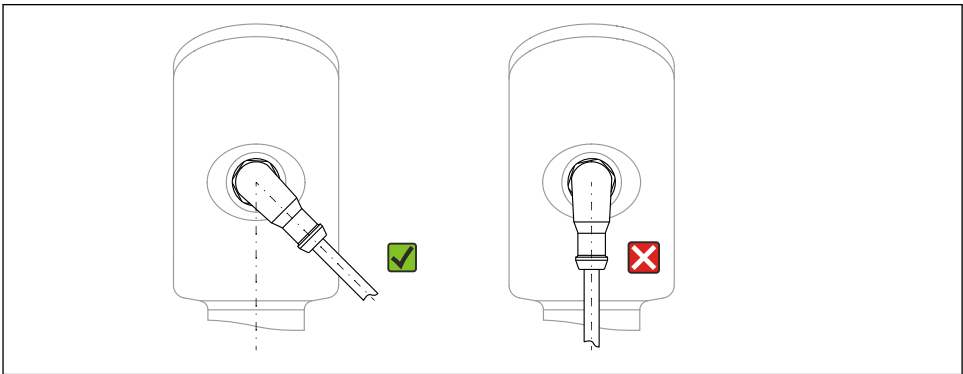
Turn the plug by the nut only, maximum torque 0.6 Nm (0.44 lbf ft).



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 13 M12 plug connection

Correct alignment of the M12 plug: Approx. 45° to the vertical axis.



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 14 Alignment of M12 plug

6.1.2 Potential equalization

If necessary, establish potential equalization using the process connection or the grounding clamp supplied by the customer.

6.1.3 Supply voltage

DC 12 to 30 V on a DC power unit

 The power unit must be safety-approved (e.g. PELV, SELV, Class 2) and must comply with the relevant protocol specifications.

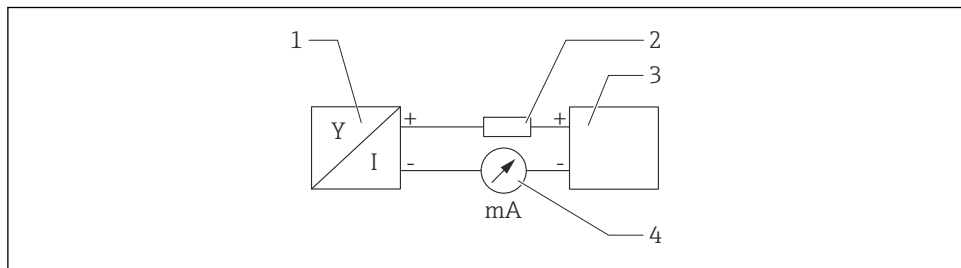
For 4 to 20 mA, the same requirements apply as for HART. A galvanically isolated active barrier must be used for devices approved for use in explosion hazardous areas.

Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

6.1.4 Power consumption

- Non-hazardous area: To meet device safety specifications according to the IEC 61010 standard, the installation must ensure that the maximum current is limited to 500 mA.
- Hazardous area: The maximum current is restricted to $I_i = 100$ mA by the transmitter power supply unit when the measuring instrument is used in an intrinsically safe circuit (Ex ia).

6.1.5 4 to 20 mA HART



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15 Block diagram of HART connection

- 1 Device with HART communication
- 2 HART communication resistor
- 3 Power supply
- 4 Multimeter or ammeter

i The HART communication resistor of $250\ \Omega$ in the signal line is always necessary in the case of a low-impedance power supply.

Take the voltage drop into consideration:

Maximum 6 V for a communication resistor of $250\ \Omega$

6.1.6 Overvoltage protection

The device satisfies the IEC 61326-1 product standard (Table 2 Industrial environment). Depending on the type of connection (DC power supply, input line, output line), different test levels are used to prevent transient overvoltages (IEC 61000-4-5 Surge) in accordance with IEC EN 61326-1: Test level for DC power supply lines and IO lines: 1 000 V wire to ground.

Overvoltage category

In accordance with IEC 61010-1, the device is intended for use in networks with overvoltage protection category II.

6.1.7 Terminal assignment

⚠ WARNING

Supply voltage might be connected!

Risk of electric shock and/or explosion

- ▶ Ensure that no supply voltage is applied when connecting.
- ▶ The supply voltage must match the specifications on the nameplate.
- ▶ A suitable circuit breaker should be provided for the device in accordance with IEC 61010.
- ▶ The cables must be adequately insulated, with due consideration given to the supply voltage and the overvoltage category.
- ▶ The connecting cables must offer adequate temperature stability, with due consideration given to the ambient temperature.
- ▶ Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

⚠ WARNING

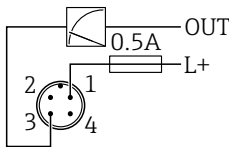
An incorrect connection compromises the electrical safety!

- ▶ Non-hazardous area: To meet device safety specifications according to the IEC 61010 standard, the installation must ensure that the maximum current is limited to 500 mA.
- ▶ Hazardous area: The maximum current is restricted to $I_i = 100 \text{ mA}$ by the transmitter power supply unit when the measuring instrument is used in an intrinsically safe circuit (Ex ia).
- ▶ When using the device in hazardous areas, comply with the corresponding national standards and the information in the Safety Instructions (XAs).
- ▶ All explosion-protection information is provided in separate explosion-protection (Ex) documentation. This Ex documentation can be requested. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.

Connect the device in the following order:

1. Check that the supply voltage corresponds to the supply voltage indicated on the nameplate.
2. Connect the device as indicated in the following diagram.
3. Switch on the supply voltage.

2-wire



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- 1 Supply voltage L+, brown wire (BN)
- 3 OUT (L-), blue wire (BU)

6.2 Ensuring the degree of protection

For mounted M12 connecting cable: IP66/68/69, NEMA type 4X/6P

NOTICE

Loss of IP protection class due to incorrect installation!

- ▶ The degree of protection only applies if the connecting cable used is plugged in and screwed tight.
- ▶ The degree of protection only applies if the connecting cable used is specified according to the intended protection class.

6.3 Post-connection check

- ☐ Is the device or cable undamaged (visual check)?
- ☐ Does the cable used comply with the requirements?
- ☐ Is the mounted cable strain-relieved?
- ☐ Is the screw connection properly mounted?
- ☐ Does the supply voltage match the specifications on the nameplate?
- ☐ No reverse polarity, terminal assignment correct?
- ☐ If power is supplied: Is the device ready for operation and is the operating status LED lit?

7 Operation options

See Operating Instructions.

8 Commissioning

8.1 Preliminaries


WARNING

Settings on the current output can result in a safety-related condition (e.g., product overflow)!

- ▶ Check current output settings.
- ▶ The setting of the current output depends on the setting in the **Assign PV** parameter.

8.2 Installation and function check

Before commissioning the measuring point, check that the post-installation and post-connection checks have been performed:

-  "Post-mounting check" section
-  "Post-connection check" section

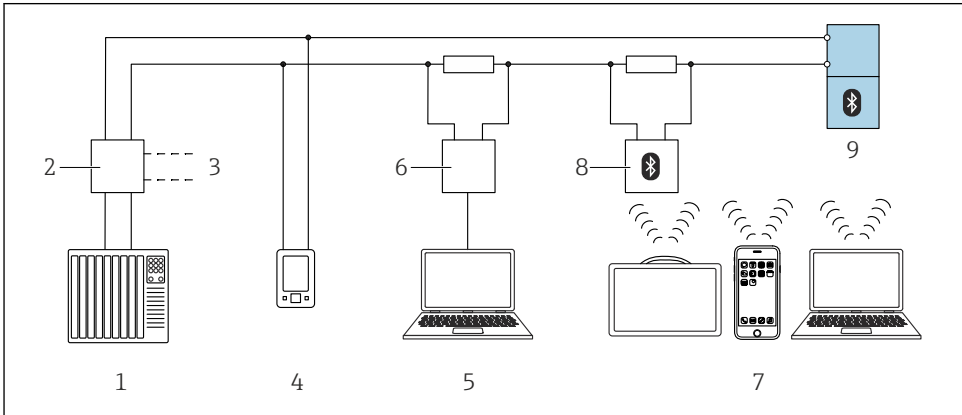
8.3 Overview of commissioning options

- Commissioning with the SmartBlue app
- Commissioning via FieldCare/DeviceCare/Field Xpert
- Commissioning via additional operating tools (AMS, PDM, etc.)

8.4 Commissioning via FieldCare/DeviceCare

1. Download the DTM: <http://www.endress.com/download> -> Device Driver -> Device Type Manager (DTM)
2. Update the catalog.
3. Click the **Guidance** menu and start the **Commissioning** wizard.

8.4.1 Connecting via FieldCare, DeviceCare and FieldXpert



16 Options for remote operation via HART protocol

- 1 PLC (programmable logic controller)
- 2 Transmitter power supply unit, e.g. RN42
- 3 Connection for Commubox FXA195 and AMS TrexTM device communicator
- 4 AMS TrexTM device communicator
- 5 Computer with operating tool (e.g. DeviceCare/FieldCare, AMS Device View, SIMATIC PDM)
- 6 Commubox FXA195 (USB)
- 7 Field Xpert SMT70/SMT77, smartphone or computer with operating tool (e.g. DeviceCare)
- 8 Bluetooth modem with connecting cable (e.g. VIATOR)
- 9 Transmitter

8.4.2 Operating

See Operating Instructions.

8.5 Commissioning via additional operating tools (AMS, PDM, etc.)

Download the device-specific drivers: <https://www.endress.com/en/downloads>

For more details, see the help for the relevant operating tool.

8.6 Configuring the device address via software

See "HART address" parameter

Enter the address to exchange data via the HART protocol.

- Guidance → Commissioning → HART address
- Application → HART output → Configuration → HART address
- Default HART address: 0

8.7 Simulation

8.7.1 "Simulation" submenu

Process variables and diagnostic events can be simulated with the **Simulation** submenu.

Navigation: Diagnostics → Simulation

During simulation of the switch output or current output, the device issues a warning message for the duration of the simulation.

8.8 Advanced sensor monitoring

The Advanced sensor monitoring function is enabled by default.

This diagnostic function detects if the oscillation of the sensor is disturbed by external influences, for example:

- Strong vibrations from the outside. (e.g. from pumps)
- Turbulence around the vibrating fork if the sensor is installed incorrectly
- Very high flow velocity in pipes

The device issues a warning if these conditions could affect the oscillation of the sensor. The warning is displayed via the available communication interfaces. The switch output and the current output remain unchanged.

If this warning is already in place when performing a function test (proof test), the warning is converted to a fault. In this case, the device enters the safe state. The fault is not reset until the device is restarted.

The function can be activated or deactivated via the SmartBlue app for example:

Navigation: Diagnostics → Diagnostic settings → Properties → 946 Advanced sensor monitoring

8.9 Protecting settings from unauthorized access

8.9.1 Software locking or unlocking

Locking via password in FieldCare/DeviceCare/SmartBlue app

Access to parameter configuration of the device can be locked by assigning a password. When the device is delivered from the factory, the user role is set to **Maintenance** option. The device parameters can be fully configured with the **Maintenance** option user role. Afterwards, access to the configuration can be locked by assigning a password. The **Maintenance** option

switches to the **Operator** option as a result of this locking. The configuration can be accessed by entering the password.

The password is defined under:

System menu **User management** submenu

The user role is changed from the **Maintenance** option to **Operator** option under:

System → User management

Deactivating the lock via FieldCare/DeviceCare/SmartBlue app

After entering the password, you can enable parameter configuration of the device as an **Operator** option with the password. The user role then changes to **Maintenance** option.

If necessary, the password can be deleted in User management: System → User management



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www.addresses.endress.com
