Technical Information
Prosonic M FMU42

Ultrasonic measuring technology

Compact transmitter for non-contact level measurement
HART

Application

- Two-wire version for non-contact level and flow measurement
- Process connection: thread
- Temperature: −40 to 80 °C (−40 to 176 °F)
- Pressure: 0.7 to 2.5 bar (10.15 to 36.25 psi)
- Maximum measuring range: liquids 10 m (33 ft), bulk solids 5 m (16 ft)
- Blocking distance: liquids and bulk solids 0.4 m (1.3 ft)
- International explosion protection certificates

Your benefits

- Reliable non-contact measurement method
- Simple, menu-guided local operation with 4-line plain text display, choice of 7 languages
- Envelope curves on the local display for straightforward diagnostics
- Hermetically sealed and encapsulated sensor
- Chemically resistant PVDF sensor
- Calibration without filling or emptying
- Integrated temperature sensor for time-of-flight correction, enabling accurate measurements even if temperatures change

Endress+Hauser

People for Process Automation

Table of contents

About this document

Symbols

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.

Electrical symbols
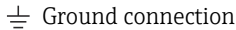
⏚ Ground connection
Grounded clamp, which is grounded via a grounding system.
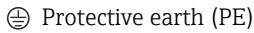
⊕ Protective earth (PE)
Ground terminals, which must be grounded prior to establishing any other connections. The ground terminals are located on the inside and outside of the device.

⊏⊐
Temperature resistance of the connection cables
Minimum value for the temperature resistance of the connection cables

Symbols for certain types of information

✓ Permitted
Procedures, processes or actions that are permitted.
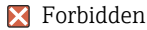
✗ Forbidden
Procedures, processes or actions that are forbidden.

🛈
Tip
Indicates additional information.

📖 Reference to documentation

1., 2., 3. Series of steps

↳ Result of an individual step

Symbols in graphics

1., 2., 3. Series of steps

1, 2, 3 ... Item numbers

Function and system design

Measuring principle

The sensor transmits ultrasonic pulses in the direction of the surface of the liquid. The ultrasonic pulses are reflected by the product surface and are received again by the sensor. The device measures the time t between the transmission and reception of a pulse. The instrument uses the time t (and the velocity of sound c) to calculate the distance D between the sensor membrane and the product surface:

$$D = c \cdot t/2$$

The level L is derived from D. With linearization, the volume V or the mass M is derived from L.

As the device knows the empty distance E from a user entry, it can calculate the level as follows:

$$L = E - D$$

An integrated temperature sensor (NTC) ensures that temperature-related changes in the sonic velocity are compensated for.
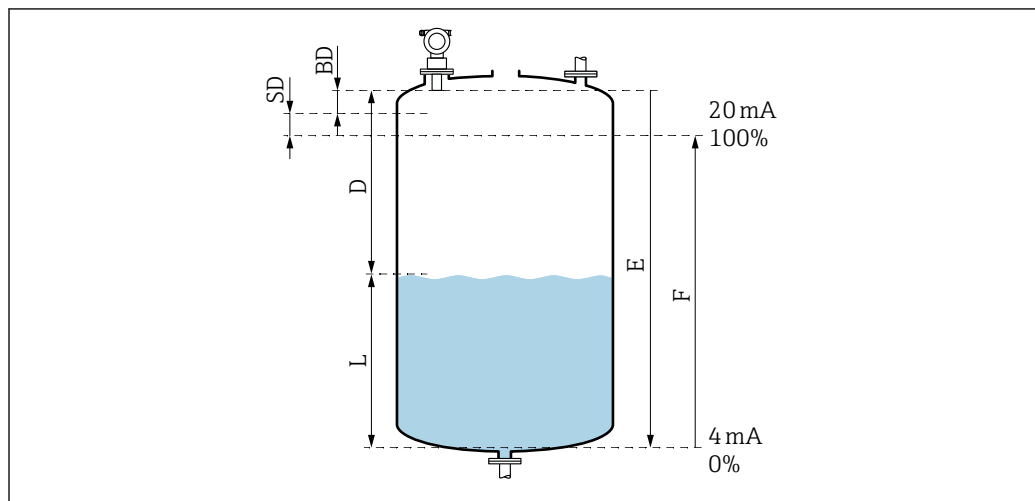
▣ 1   Parameters for the correct operation of the device

SD   Safety distance
BD   Blocking distance
E   Empty distance
L   Level
D   Distance from the sensor membrane to the surface of the product
F   Measuring span (full distance)

Interference echo suppression (mapping)

Interference echoes (e.g. from edges, welds or internal fixtures) are not interpreted as a level echo.

Calibration

The empty distance E and the measuring span F must be specified to adjust the device.

Blocking distance

Span F may not extend into the blocking distance BD. Level echoes within the blocking distance cannot be evaluated due to the transient characteristics of the sensor.

Measuring system	**4 to 20 mA output with HART protocol**

A0038653

☒ *2   Complete measuring system Prosonic M*

1   PLC (programmable logic controller)
2   Commubox FXA195
3   Computer with operating tool (e.g. FieldCare)
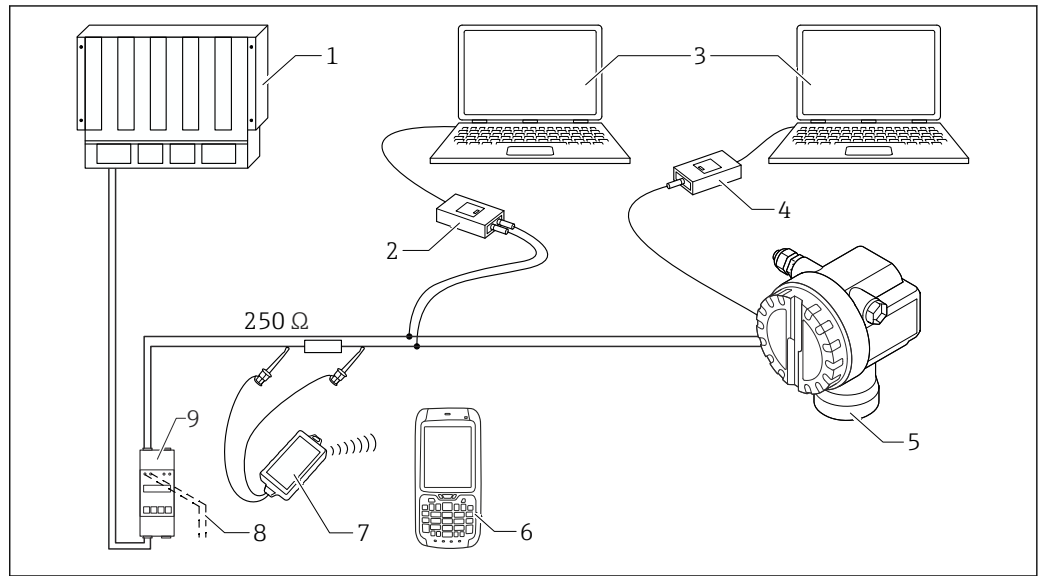*4   Commubox FXA291 with ToF Adapter FXA291*
5   Device, e.g. Prosonic
6   Field Xpert
7   VIATOR Bluetooth modem with connecting cable
8   Connection for Commubox or Field Xpert
9   Transmitter power supply unit with communication resistor

> 🛈   If the HART communication resistor is not integrated in the power supply unit, incorporate a
> 250 Ω resistor into the two-wire cabling.

Local operation

- With display and operating module
- With personal computer, FXA291 with ToF Adapter FXA291 (USB) and "FieldCare" operating program

> 🛈   FieldCare is a graphic operating program for measuring devices, e.g. for use with radars,
> ultrasonic waves and guided micropulses. It can be used to put the device into operation, save
> data, describe a signal analysis and document the measuring point.

Remote operation

- With Field Xpert
- With a personal computer, Commubox FXA195 and the "FieldCare" operating program
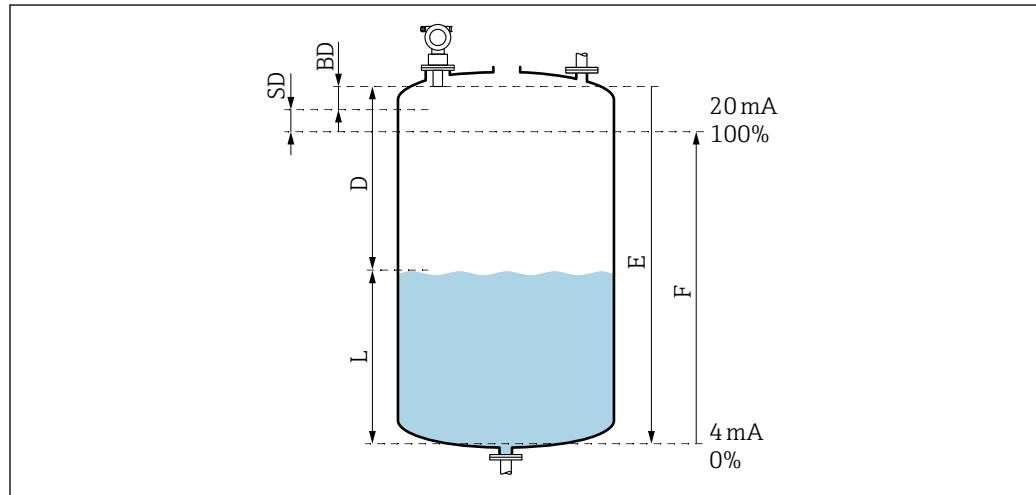
Input

Measured variable	Distance D between sensor membrane and product surface

Using the linearization function, the device uses D to calculate the following in any unit:
- Level L
- Volume V
- Flow Q over measuring weirs or open flumes

⊠ 3   Parameters for the correct operation of the device

BD   Blocking distance
SD   Safety distance
E   Empty distance
L   Level
D   Distance from the sensor membrane to the surface of the product
F   Measuring span (full distance)

Measuring range	**Range**

The range of the sensor depends on the measuring conditions.
- Blocking distance BD: 0.4 m (1.3 ft)
- Maximum range for liquids: 10 m (33 ft)
- Maximum range for bulk solids: 5 m (16 ft)

Operating conditions and attenuation values

Estimating the sensor range

1. Add up all the applicable attenuation values.

2. From the total calculated attenuation, use the range chart below to calculate the range of the sensor.

Liquid surface
- Calm: 0 dB
- With waves: 5 to 10 dB
- Strong turbulence, e.g. stirrers: 10 to 20 dB
- Foaming: contact the Endress+Hauser sales organization

Bulk solids surface
- Hard, rough, e.g. rubble: 40 dB
- Soft, e.g. peat, dust-covered clinker: 40 to 60 dB

Dust
- No dust formation: 0 dB
- Little dust formation: 5 dB
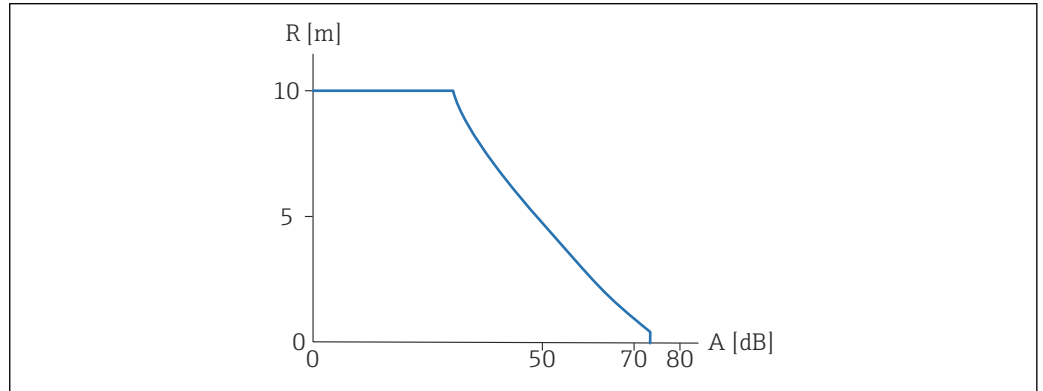- Heavy dust formation: 5 to 20 dB

For typical solid applications, a certain amount of dust coverage is normally present.

Filling curtain in the detection range
- None: 0 dB
- Small quantities: 5 to 10 dB
- Large quantities: 10 to 40 dB

Temperature difference between sensor and product surface
- < 20 ℃ (68 ℉): 0 dB
- < 40 ℃ (104 ℉): 5 to 10 dB
- < 80 ℃ (176 ℉): 10 to 20 dB

☒ 4   *Range chart*

| Operating frequency, sound pressure level | - Operating frequency: approx. 42 kHz
- Maximum sound pressure level, directly in front of the sensor: 149 dB
- Distance of threshold value 110 dB: 2.7 m (8.9 ft) |

Output

Output signal	4 to 20 mA with HART
Signal on alarm	Call up failure information: - Local display (error symbol, error code and plain text description) - Current output, failure mode can be selected, e.g. according to NAMUR Recommendation NE43 - Digital interface
Load	Min. load for HART communication: 250 Ω
Output damping	User-defined, 0 to 255 s
Linearization	The linearization function contains the following - Conversion of the measured value to any unit of length or volume - Flow linearization possible in open flumes or measuring weirs (Conversion of water level to associated flow) - Pre-programmed linearization table for volume calculation in horizontal cylindrical tanks - Enter the information in the tables manually or semi-automatically by gauging the capacity by liters, up to 32 value pairs allowed - FieldCare operating program saves and automatically calculates the table for all forms of tanks, flumes and weirs - Calculate the flow curves for open flumes and upload to the device using the FieldCare operating program

Power supply

Terminal assignment
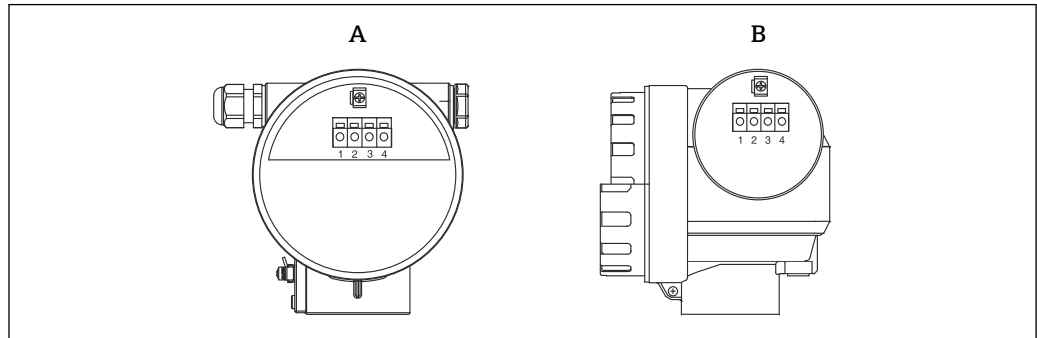
⚏ *5   Position of terminals*

A   F12 housing
B   T12 housing
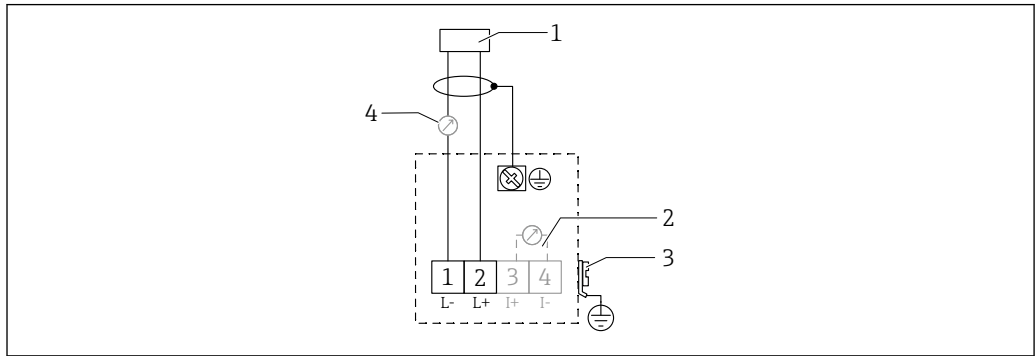
⚏ *6   Terminal assignment for two-wire version*

1   Supply voltage
2   Test terminal to test the signal current
3   PAL (potential equalization)
4   4-20 mA HART

- Connect the connecting line to the screw terminals in the connection compartment
- Use a twisted, shielded twin-core cable
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are integrated (TI00241F/00/EN "EMC test procedures")
- Analog signal: use a standard installation cable
- Communication signal (HART): use a shielded cable

Supply voltage

Two-wire version, HART

Terminal voltage directly at the device

Standard
- Current consumption 4 mA | terminal voltage 14 to 36 V
- Current consumption 20 mA | terminal voltage 8 to 36 V

Ex ia
- Current consumption 4 mA | terminal voltage 14 to 30 V
- Current consumption 20 mA | terminal voltage 8 to 30 V

Ex d
- Current consumption 4 mA | terminal voltage 14 to 30 V
- Current consumption 20 mA | terminal voltage 11 to 30 V

Fixed current, terminal voltage directly at the device

User-configurable, e.g. for solar powered operation (measured value via HART)

Standard

Current consumption 11 mA | terminal voltage 10 to 36 V

Ex ia

Current consumption 11 mA | terminal voltage 10 to 30 V

Fixed current for Multidrop mode

Standard

Current consumption 4 mA | (start-up current: 11 mA), terminal voltage 14 to 36 V

Ex ia

Current consumption 4 mA | (start-up current: 11 mA), terminal voltage 14 to 30 V

Power consumption	Two-wire version: 51 to 800 mW
Current consumption	Two-wire version: 3.6 to 22 mA
Terminals	Wire cross-sections: 0.5 to 2.5 mm^2 (20 ... 14 AWG)

Non-insulated wires or stranded wire
- Maximum length: 7 mm (0.28 in)
- Use wire ferrules for strands

Cable entries	• Thread G ½ or NPT ½ • Cable gland: M20×1.5 (cable diameter 6 to 10 mm (0.24 to 0.39 in)
HART cable specification	• For superimposed communication signals (HART): use a shielded cable • Protective circuits against reverse polarity, HF influences and overvoltage peaks are integrated • For analog signals: use a standard installation cable
HART ripple	47 to 125 Hz: U_{ss} = 200 mV (at 500 Ω)
HART noise	500 Hz to 10 kHz: U_{eff} = 2.2 mV (at 500 Ω)

Performance characteristics

Reference operating conditions	• Temperature: +20 ℃ (+68 ℉)
	• Pressure: 1013 mbar abs. (15 psi abs.)
	• Humidity: 50 %
	• Ideally reflecting surface, e.g. calm, even liquid surface
	• No interference reflections inside the signal beam
	• Configured parameters for applications:
	  • Tank shape = Dome ceiling
	  • Medium property = Liquid
	  • Process cond. = Standard liquid

Measured value resolution	2 mm (0.08 in)
Maximum measured error	According to EN 61298-2; under reference operating conditions ±0.2 % in relation to the maximum sensor span
Measuring error	Better than ±4 mm (±0.16 in)or 0.2 % of the measuring distance, the larger value applies Observe typical measured error under reference operating conditions • Linearity • Reproducibility • Hysteresis
Response time	The response time depends on the configured application parameters. Minimum values: Two-wire version: ≥ 2 s

Pulse frequency	The exact values depend on the device type and the parameter settings. Two-wire version: ≤ 0.5 Hz
Influence of gas phase	The vapor pressure of the medium at 20 ℃ (68 ℉) is an indicator of the accuracy of the ultrasonic level measurement.

Accuracy

Very good accuracy: vapor pressure at 20 ℃ (68 ℉) less than 50 mbar (1 psi). This applies for:
- Water
- Aqueous solutions
- Water/solid solutions
- Diluted acids, e.g. hydrochloric acid, sulfuric acid
- Diluted bases, e.g. sodium hydroxide solution
- Oils, greases, lime water, sludges or pastes

Accuracy impacted: high vapor pressures or outgassing from media, e.g.:
- Ethanol
- Acetone
- Ammonia

Please contact the sales organization if the accuracy is affected.

Installation

Mounting requirements   **Installation conditions for the sensor for level measurements**
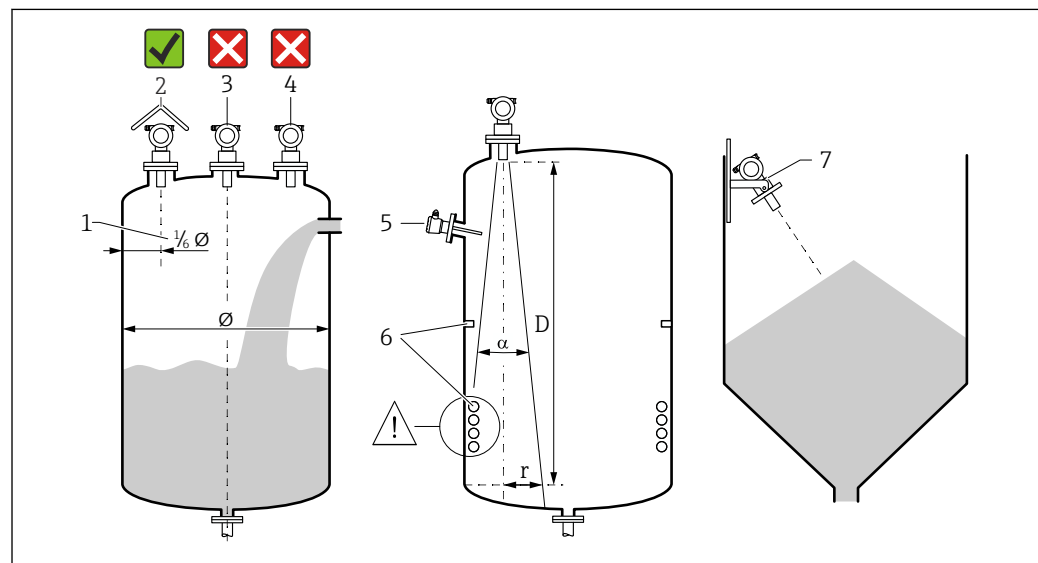
🖼 *7   Installation requirements*

1   Distance to the vessel wall: ⅙ of the vessel diameter
2   Use of a weather protection cover; protection from direct sunlight or rain
3   Do not install the sensor in the middle of the vessel
4   Avoid measurements through the filling curtain
5   Do not install point level switches or temperature sensors within the beam angle
6   Symmetrical internal fixtures, e.g. heating coils and baffles, negatively impact the measurement
7   Align the sensor so that it is perpendicular to the product surface

- Only mount one device per vessel: signals from multiple devices mutually affect one another
- Determine the detection range using the 3-dB beam angle α

Beam angle

$$W = 2 \cdot D \cdot \tan \frac{\alpha}{2}$$
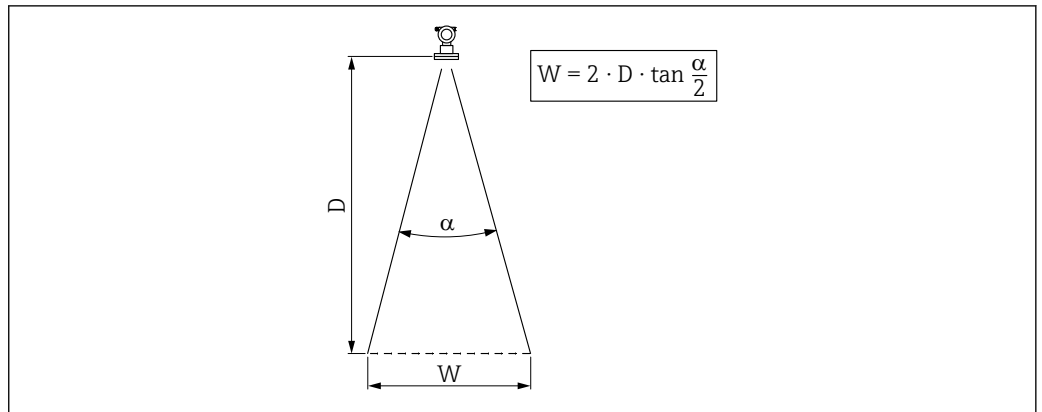
⊡ *8   Relationship between beam angle α, distance D and beamwidth diameter W*

Beamwidth diameter W as a function of beam angle α and distance D.
- α: 9 °
- D_{max}: 10 m (33 ft)
- r_{max}: 0.79 m (2.6 ft)

> The angle α is defined as the beam angle. At α, the energy density of the ultrasonic wave reaches half the value of the maximum energy density. Ultrasonic waves are also emitted outside the signal beam and can be reflected off interfering installations.

Narrow shafts, uneven shaft walls
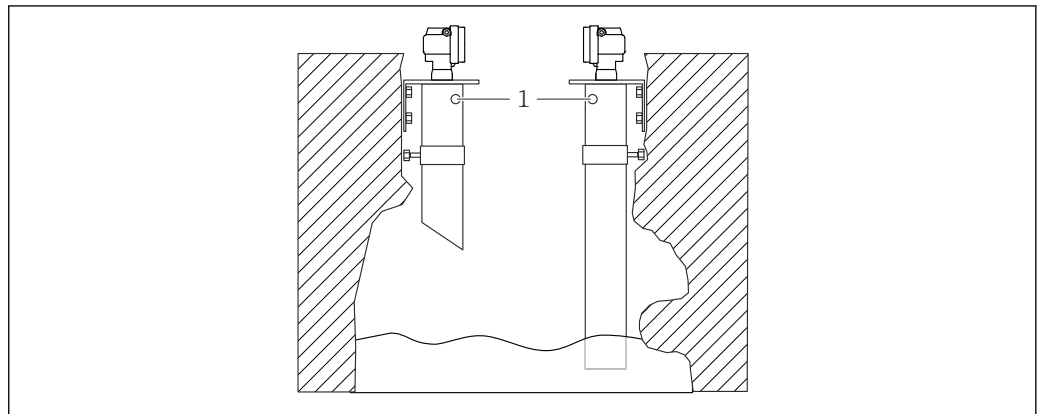
⊡ *9   Installation in narrow shafts with very uneven shaft walls*

1   Venting hole

Strong interference echoes can occur in narrow shafts and in uneven conditions.

▶ Use an ultrasound guide pipe with a minimum diameter of 100 mm (3.94 in), e.g. PE or PVC wastewater pipe

Avoid the accumulation of dirt in the pipe.

▶ Clean the pipe regularly.

Installation conditions for the sensor for flow measurements

- Mount the measuring device on the upstream side immediately above the maximum upper water level H_{max}
- Take the blocking distance into account
- Position the measuring device in the center of the flume or weir

- Align the sensor membrane so that it is parallel to the surface of the water
- Observe the installation clearance of the flume or weir
- Enter the "flow - level" ("Q/h curve") linearization curve via the FieldCare operating program or manually via the local display
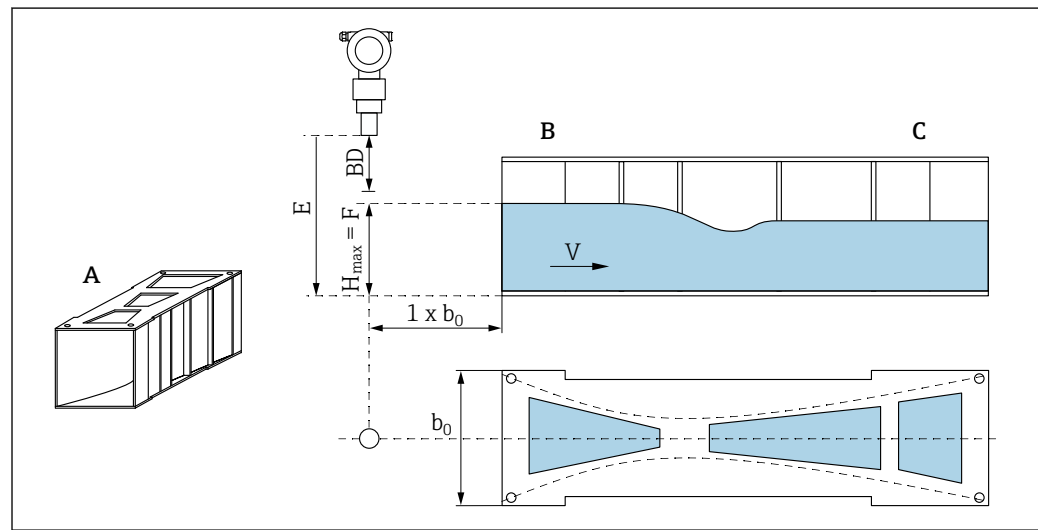
🔲 *10   Khafagi-Venturi flume (example)*

A   Khafagi-Venturi flume
B   Upstream side
C   Downstream side
BD   Blocking distance of the sensor
E   Empty calibration (enter during commissioning)
H_{max} Maximum upstream level
V   Flow
b_0 Width of Khafagi-Venturi flume
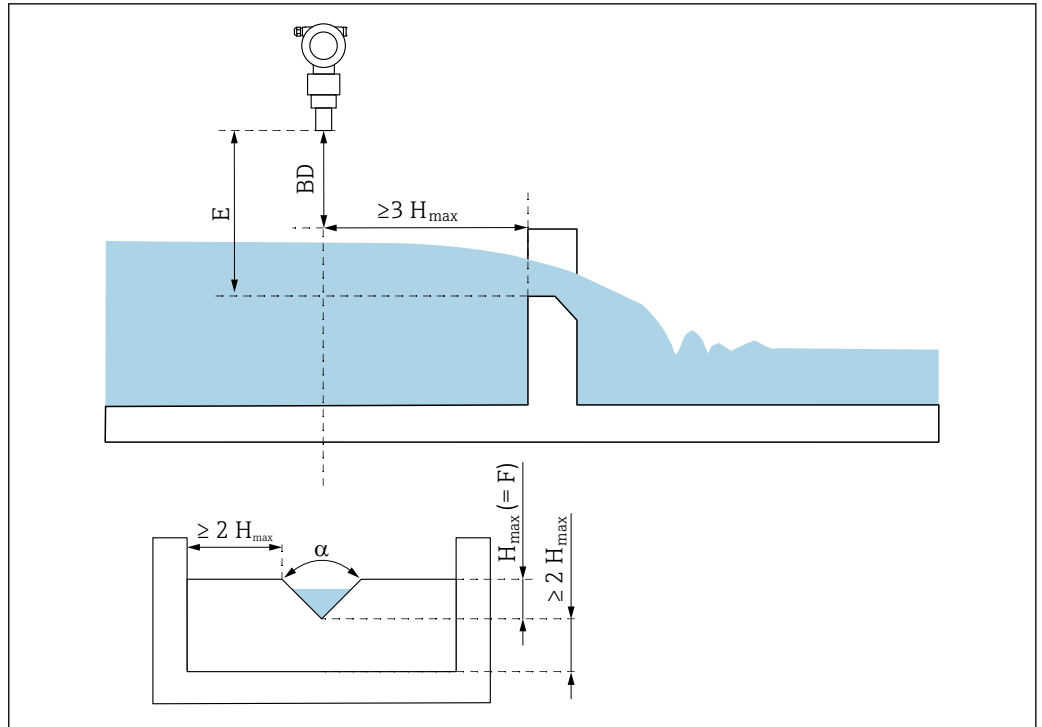
11   Triangular weir (example)

BD   Blocking distance of the sensor
E   Empty calibration (enter during commissioning)
F   Full calibration
H_{max} Maximum upstream level

Mounting examples

12   Mounting examples

A   Mounting with universal flange (e.g. hazardous area, Zone 20)
B   Mounting with mounting bracket (non-hazardous area, Zone 20)

Turning the housing
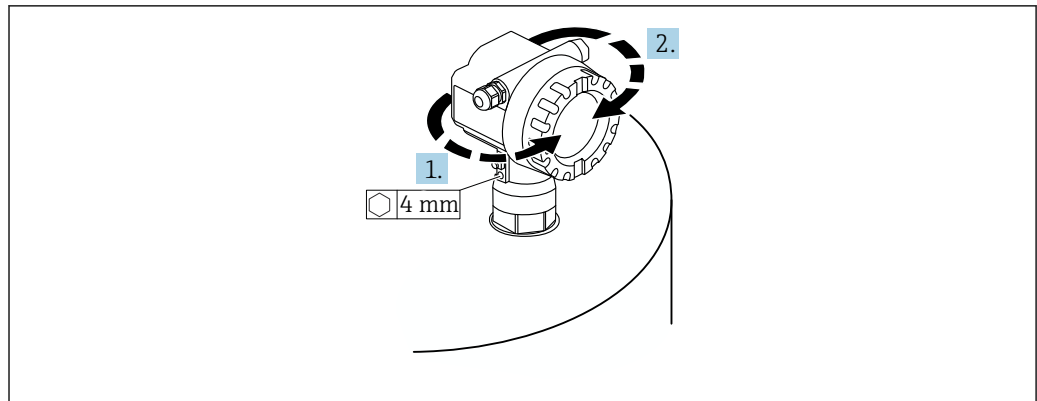
⊡ 13   Turning the F12 or T12 housing, (F12 housing in example)

1. Loosen the securing screw.

2. Rotate the housing in the desired direction, maximum 350 ˚.

3. Tighten the securing screw, maximum torque 0.5 Nm (0.36 lbf ft).

4. Lock the securing screw; use a glue specifically for metal.

Blocking distance

NOTICE

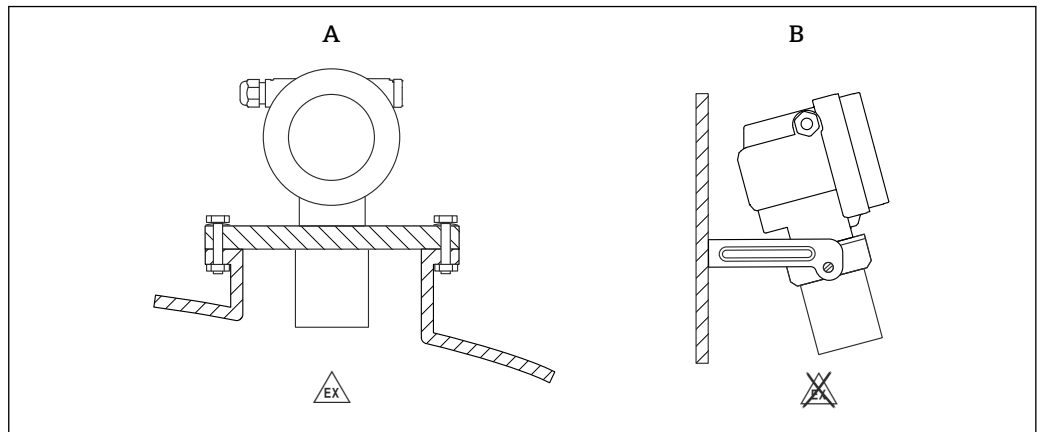**If the blocking distance is undershot, this may cause a device malfunction.**

▸ Mount the measuring device high enough that the blocking distance is not reached at the maximum fill level.

▸ Define the safety distance (SD).

▸ If the level enters the safety distance SD, the device generates a warning or alarm.

▸ The measuring span F may not project into the blocking distance BD. Level echoes within the blocking distance cannot be evaluated due to the transient response of the sensor.
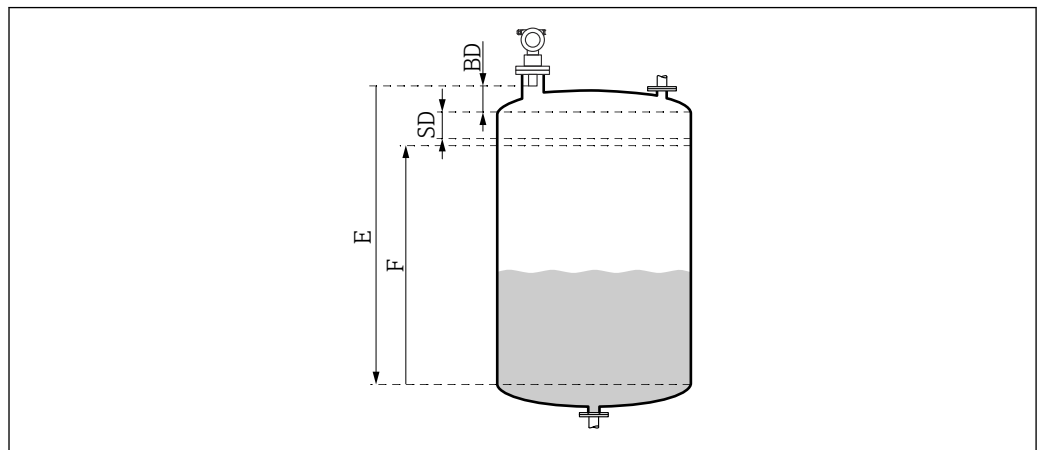
⊡ 14   Parameter for the correct operation of the device

BD   Blocking distance
SD   Safety distance
E   Empty calibration
F   Measuring span

Mounting nozzle
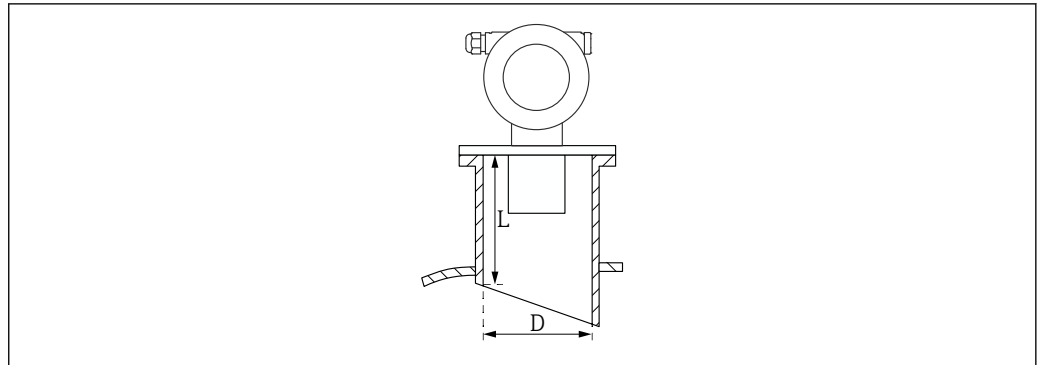
⊡ 15   Definition of nozzle length L and nozzle diameter D

D   Nozzle diameter
L   Nozzle length

Conditions
- Smooth interior surfaces in pipe nozzle
  Remove any edges or welded joints and burr on the inside of the tank side nozzle end
- To minimize disturbing factors: nozzle with an angled socket edge (ideally 45 °)
- Observe maximum nozzle length

Maximum nozzle length

Diameter specifications with maximum nozzle length

- DN80/3": 250 mm (9.84 in)
- DN100/4": 300 mm (11.8 in)
- DN150/6": 400 mm (15.7 in)
- DN200/8": 400 mm (15.7 in)
- DN250/10": 400 mm (15.7 in)
- DN300/12": 400 mm (15.7 in)

Environment

|	
Ambient temperature range	−40 to +80 °C (−40 to +176 °F) The functionality of the LCD display is limited at Tu < −20 °C (−4 °F) and Tu > 60 °C (140 °F) ℹ️ If operating outdoors in strong sunlight, use a weather protection cover. Can be ordered as an accessory.
Storage temperature	−40 to +80 °C (−40 to +176 °F)
Thermal shock resistance	According to DIN EN 60068-2-14; test Nb: +80 to −40 °C (+176 to −40 °F), 1 K/min, 100 cycles
Climate class	• DIN EN 60068-2-38 (Test Z/AD) • DIN/IEC 68 T2-30Db
Degree of protection	When housing is closed, tested according to • IP68, NEMA 6P (24 h at 1.83 m (6 ft) under water) • IP66, NEMA 4X When housing is open, tested according to IP20, NEMA 1 (also degree of protection of the display)
Vibration resistance	DIN EN 60068-2-64/IEC 68-2-64: 20 to 2 000 Hz, 1 $(m/s^2)^2$/Hz; 3 x 100 min

Electromagnetic compatibility	Electromagnetic compatibility in accordance with all of the relevant requirements outlined in EN 61326 series and NAMUR Recommendation EMC (NE 21)

More information is provided in the Declaration of Conformity.

- Superimposed communication signal (HART): use a shielded cable
- Analog signal: use a standard installation cable

Process

Process temperature range	–40 to +80 °C (–40 to +176 °F)

The temperature sensor integrated in the sensor corrects the temperature-dependent sound time-of-flight.

Process pressure range	0.7 to 2.5 bar abs. (10.15 to 36.25 psi)

Mechanical construction

For the dimensions, see the Product Configurator: www.endress.com

Search for product → click "Configuration" to the right of the product image → after configuration click "CAD"

The following dimensions are rounded values. For this reason, they may deviate slightly from the dimensions given on www.endress.com.

Design, dimensions	**Types of housing**

- F12 connection compartment sealed for standard or Ex ia applications
- T12 connection compartment separated and with flameproof enclosure

Cover types

- Version without local display made of aluminum
- Version with local display and window, without ATEX II 1/2 D certificate

Dimensions
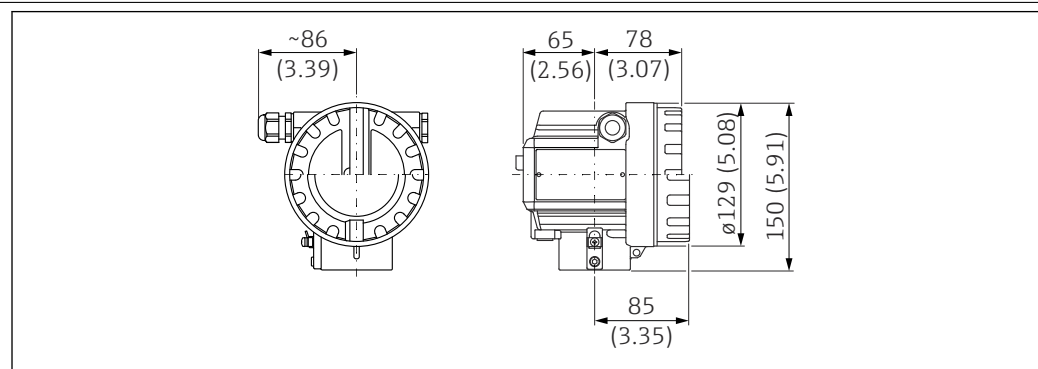
🖼 *16   Dimensions of F12 housing. Unit of measurement mm (in)*

A0031402
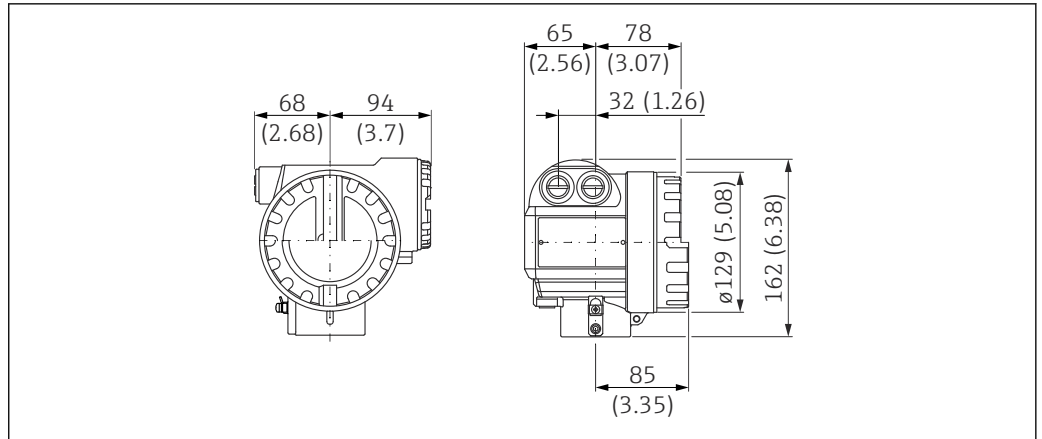
⊠ 17   Dimensions of T12 housing. Unit of measurement mm (in)
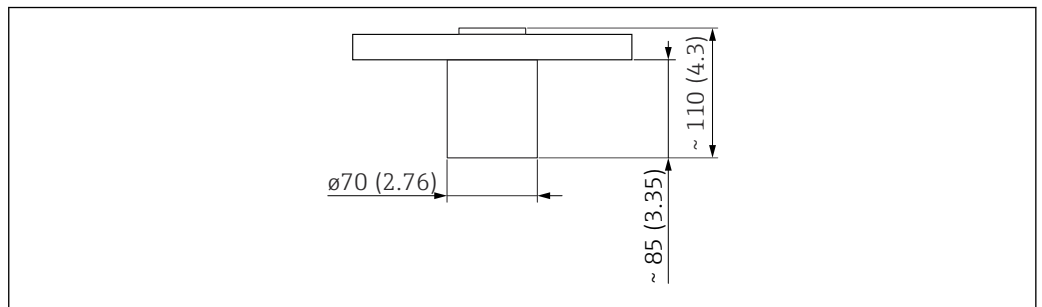
⊠ 18   Dimensions of sensor . Unit of measurement mm (in)
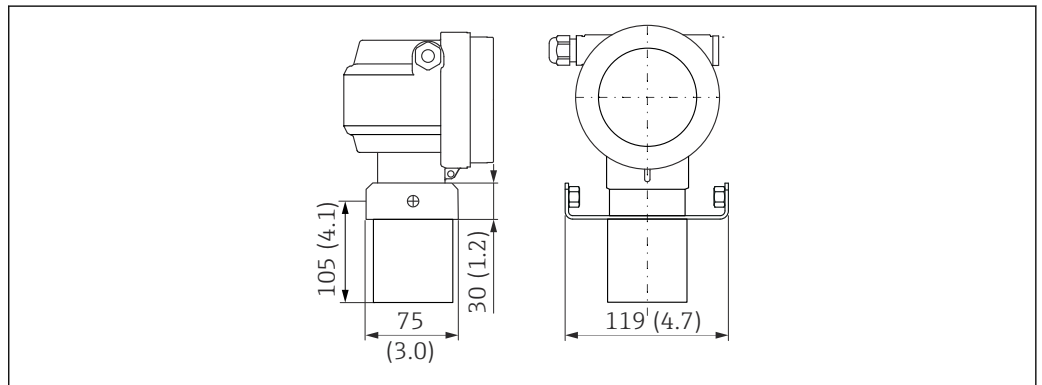
⊠ 19   Dimensions with mounting bracket . Unit of measurement mm (in)

Mounting bracket
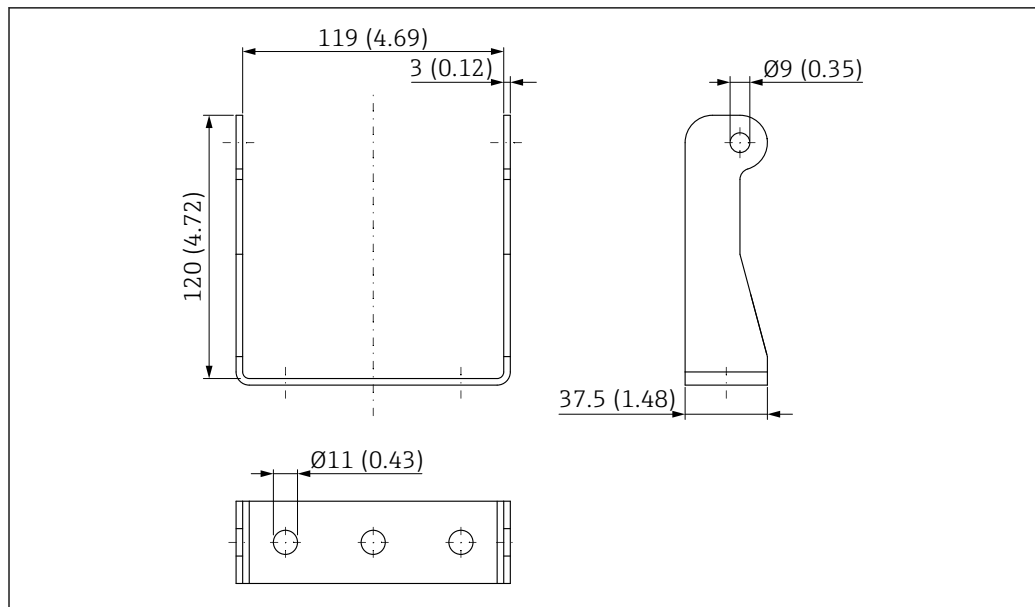
20   Mounting bracket. Unit of measurement mm (in)

Flange
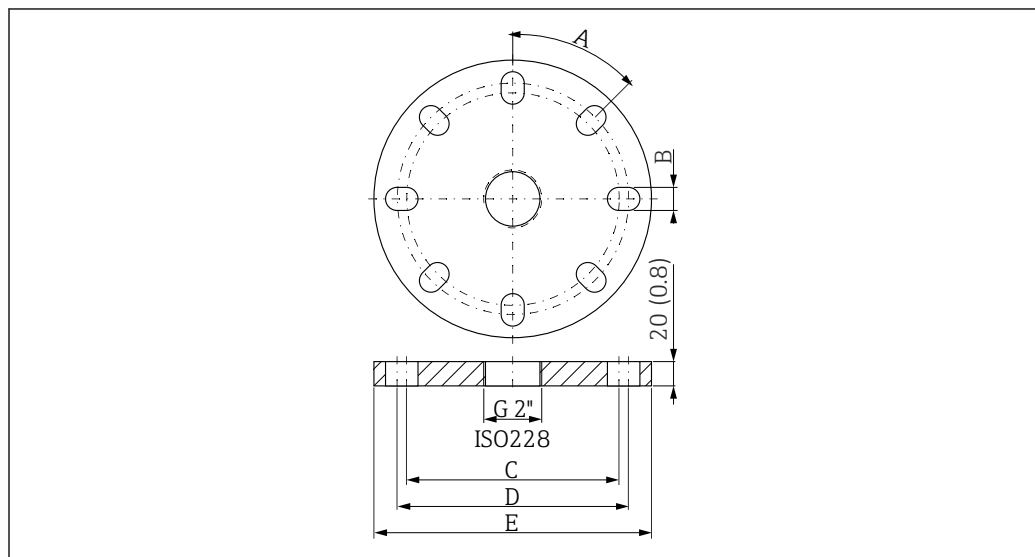
21   Flange. Unit of measurement mm (in)

3" 150 lbs / DN80 PN16 / 10K 80
- 8 boreholes
- A: 45 °
- B: 19 mm (0.75 in)
- C: 150 mm (5.91 in)
- D: 160 mm (6.30 in)
- E: 200 mm (7.87 in)

4" 150 lbs / DN100 PN16 / 10K 100
- 8 boreholes
- A: 45 °
- B: 19 mm (0.75 in)
- C: 175 mm (6.90 in)
- D: 190.5 mm (7.50 in)
- E: 228.6 mm (9.00 in)

Weight	Approx. 3 kg (6.62 lb)
Materials	**Materials in contact with process**

Endress+Hauser supplies DIN/EN flanges made of stainless steel AISI 316L with the material number 1.4435 or 1.4404. With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13E0 in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.

Before use, check the resistance of the sensors to chemicals. Pay attention to applicable chemical resistance tables.

A0047172

🖼 22   A: Flange; B: Mounting bracket

1   Sensor: PVDF
2   Seal: EPDM or FKM
3   Flange: PP, PVDF or stainless steel 316L (1.4435 or 1.4404)
4   Mounting bracket, screws: 316 Ti (1.4571), V2A
5   Mounting bracket, screws: 316 Ti (1.4571), V4A

Materials not in contact with process

A0019273

🖼 23   A: T12 housing; B: F12 housing

1   Housing
2   Cover
3   Coupling
4   Cover
5   Process connection
6   Lug for wired-on tag plate
7   Nameplate
8   Ground terminal
9   Screw

Housing, cover
- T12 and F12 housing: AlSi10Mg powder-coated
- Cover (display, connection compartment): AlSi10Mg
- Window: ESG-K glass
- Clamp: CuZn nickel-plated
  - Screw: A4
  - Spring washer: A4

- Ground terminal
  - Screw: A2
  - Spring washer: A4
  - Clamp: 304 (1.4301)
  - Bracket: 301 (1.4310)
- Screw: A2-70
- Seals
  - O-ring: EPDM
  - Window seal: silicone sealing compound Gomastit 402

Cable
- Cable gland: polyamide (PA), CuZn nickel-plated
- Plug: PBT-GF30 or 1.0718 galvanized; PE or 3.1655
- Adapter: 316L (1.4435) or AlMgSiPb (anodized)
- O-ring: EPDM
- Cable: VA
- Crimp sleeve: aluminum

Plates
- Wired-on tag plate: 304 (1.4301)
- Nameplate: 316L (1.4404)
  Groove pin: A4 (1.4571)

ℹ️ Seawater-resistant parts please order on request (completely in 316L (1.4404)).

|	
Process connections	- Universal flange DN 80 PN16 / ANSI 3" 150 lbs / JIS 10K 80 - Universal flange DN 100 PN16 / ANSI 4" 150 lbs / JIS 16K 100 - Mounting bracket

Operability

Languages	7 languages - de: German - en: English - es: Spanish - fr: French; - ja: Japanese - it: Italian - nl: Dutch
Local operation	**LCD module VU331** - Module is located under the housing cover - Read the measured value through the glass of the cover - Open the cover for operation
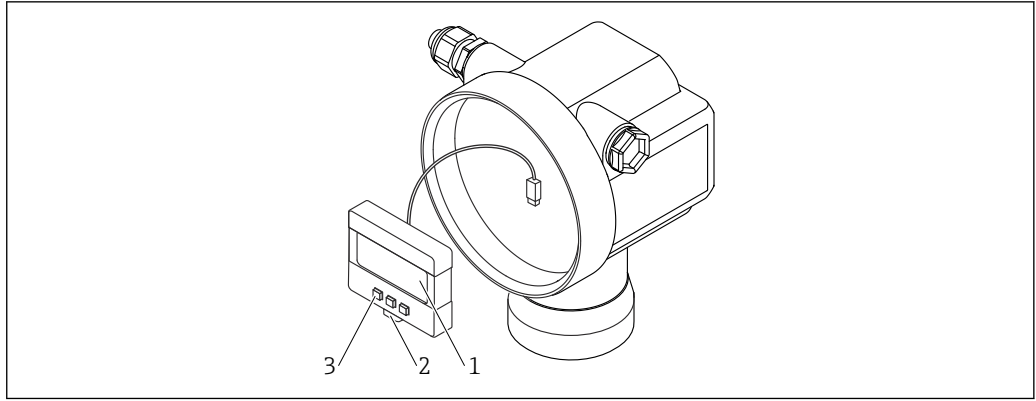
A0038871

⊡ 24   *LCD module in housing*

1   Liquid crystal display
2   Retaining catch
3   Keys

Operation with LCD module VU331

The menu consists of function groups and functions. The user is guided through the entire commissioning process.
• Configure using 3 keys directly on the device
• Configure all the device functions via the menu operation
• Read or configure the application parameters

Operation via Field Xpert

Compact, flexible and robust industrial handheld terminal for remote parameterization and for obtaining measured values via the HART current output or FOUNDATION Fieldbus. For more information, see the Operating Instructions BA00060S/04.

Remote operation   **Operation with FieldCare**

FieldCare is an Endress+Hauser asset management tool based on FDT technology. FieldCare can configure all Endress+Hauser devices and devices from other manufacturers that support the FDT standard.

ℹ️   Hardware and software requirements: www.endress.com - search: FieldCare

FieldCare supports the following functions:
• Configuration of the transmitter in online mode
• Signal analysis with envelope curve
• Tank linearization
• Loading and saving of device data (upload/download)
• Documentation of the measuring point

Connection options:
• HART via Commubox FXA195 and the USB port on a computer
• Commubox FXA291 with ToF Adapter FXA291 via service interface

System integration   Endress+Hauser Rackbus
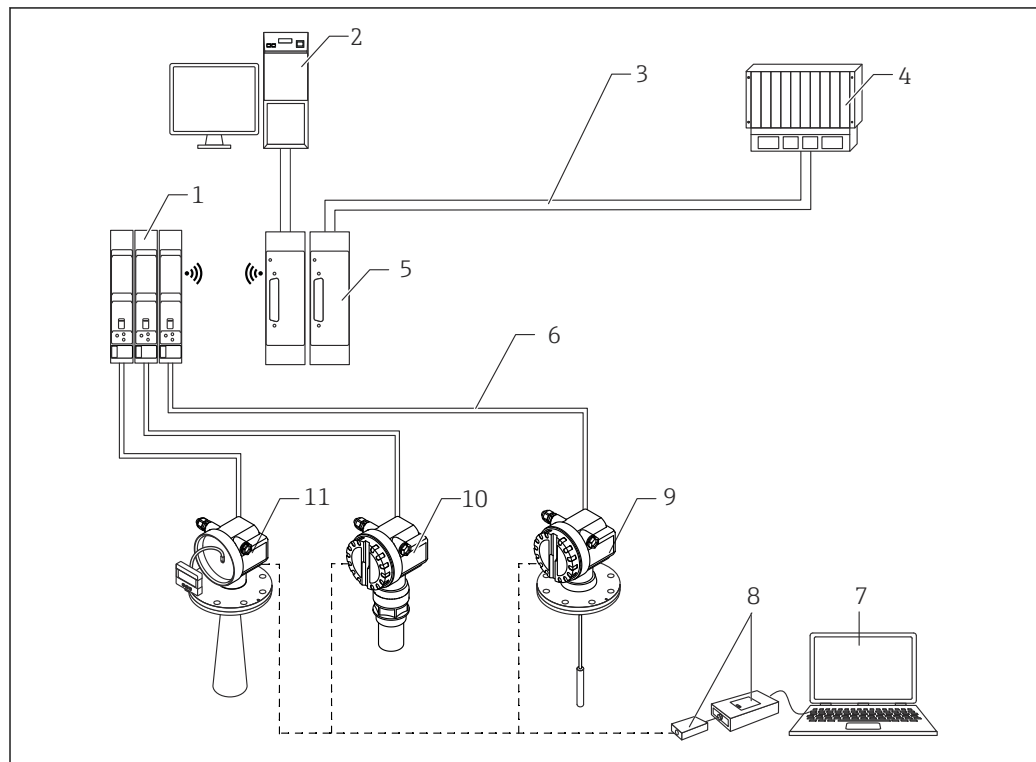
⊡ *25   System integration via Endress+Hauser Rackbus*

1   Interface module
2   Personal computer with communication software
3   Bus
4   PLC
5   Gateway for MODBUS, FIP, PROFIBUS, INTERBUS etc.
6   4-20 mA HART
7   FieldCare
8   Commubox FXA291 with ToF Adapter FXA291
9   Levelflex M
10   Prosonic M
11   Micropilot M with display and operating module

Connect measuring devices to a Rackbus
• Maximum 64 two-wire measuring devices with HART protocol
• Via one interface module in each case
• Integrate into a higher-level bus system via the gateway

SupplyCare inventory management software

SupplyCare is a web-based operating program for coordinating the flow of material and information along the supply chain. SupplyCare provides a comprehensive overview of the levels of geographically distributed tanks and silos, for instance, providing complete transparency over the current inventory situation, regardless of time and location.

Based on the measuring and transmission technology installed onsite, the current inventory data are collected and sent to SupplyCare. Critical levels are clearly indicated and calculated forecasts provide additional security for material requirements planning.

The main functions of SupplyCare:

Inventory visualization

SupplyCare determines the inventory levels in tanks and silos at regular intervals. It displays current and historical inventory data and calculated forecasts of future demand. The overview page can be configured to suit the user's preferences.

Master data management

With SupplyCare you can create and manage the master data for locations, companies, tanks, products and users, as well as user authorization.

Report Configurator

The Report Configurator can be used to create personalized reports quickly and easily. The reports can be saved in a variety of formats, such as Excel, PDF, CSV and XML. The reports can be transmitted in many ways, such as by http, ftp or e-mail.

Event management

Events, such as when levels drop below the safety stock level or plan points, are indicated by the software. In addition, SupplyCare can also notify pre-defined users by e-mail.

Alarms

If technical problems occur, e.g. connection issues, alarms are triggered and alarm e-mails are sent to the System Administrator and the Local System Administrator.

Delivery planning

The integrated delivery planning function automatically generates an order proposal if a pre-set minimum inventory level is undershot. Scheduled deliveries and disposals are monitored continuously by SupplyCare. SupplyCare notifies the user if scheduled deliveries and disposals are not going to be met as planned.

Analysis

In the Analysis module, the most important indicators for the inflow and outflow of the individual tanks are calculated and displayed as data and charts. Key indicators of material management are automatically calculated and form the basis for optimizing the delivery and storage process.

Geographical visualization

All the tanks and the tank inventories are represented graphically on a map (based on Google Maps). The tanks and inventory situations can be filtered by tank group, product, supplier or location.

Multi-language support

The multi-language user interface supports 9 languages, thereby enabling global collaboration on a single platform. The language and settings are recognized automatically using the browser settings.

SupplyCare Enterprise

SupplyCare Enterprise runs by default as a service under Microsoft Windows on an application server in an Apache Tomcat environment. The operators and administrators operate the application via a Web browser from their workstations.
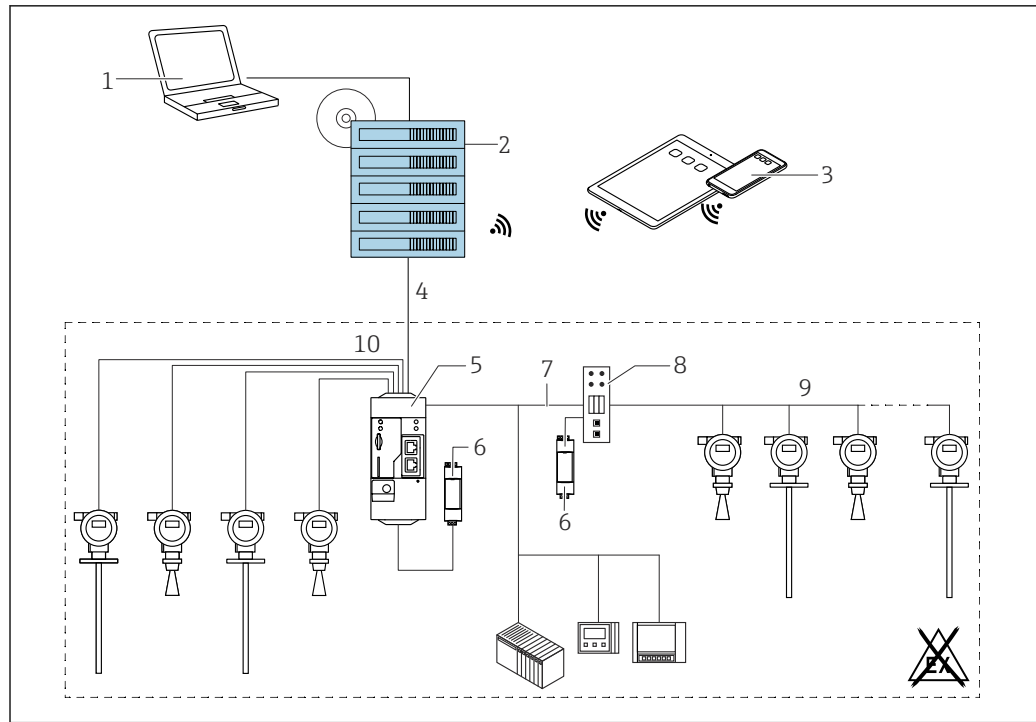
26   *Example of inventory management platform with SupplyCare Enterprise SCE30B*

1   SupplyCare Enterprise (via Web browser)
2   SupplyCare Enterprise installation
3   SupplyCare Enterprise on mobile devices (via Web browser)
4   Ethernet/WLAN/UMTS
5   Fieldgate FXA42
6   Power supply 24 V DC
7   Modbus TCP via Ethernet as server/client
8   Converter from Modbus to HART Multidrop
9   HART Multidrop
10   4 x 4 to 20 mA analog input (2-wire/4-wire)

Cloud-based application: SupplyCare Hosting

SupplyCare Hosting is offered as a hosting service (software as a service). Here, the software is installed within the Endress+Hauser IT infrastructure and made available to the user in the Endress+Hauser portal.

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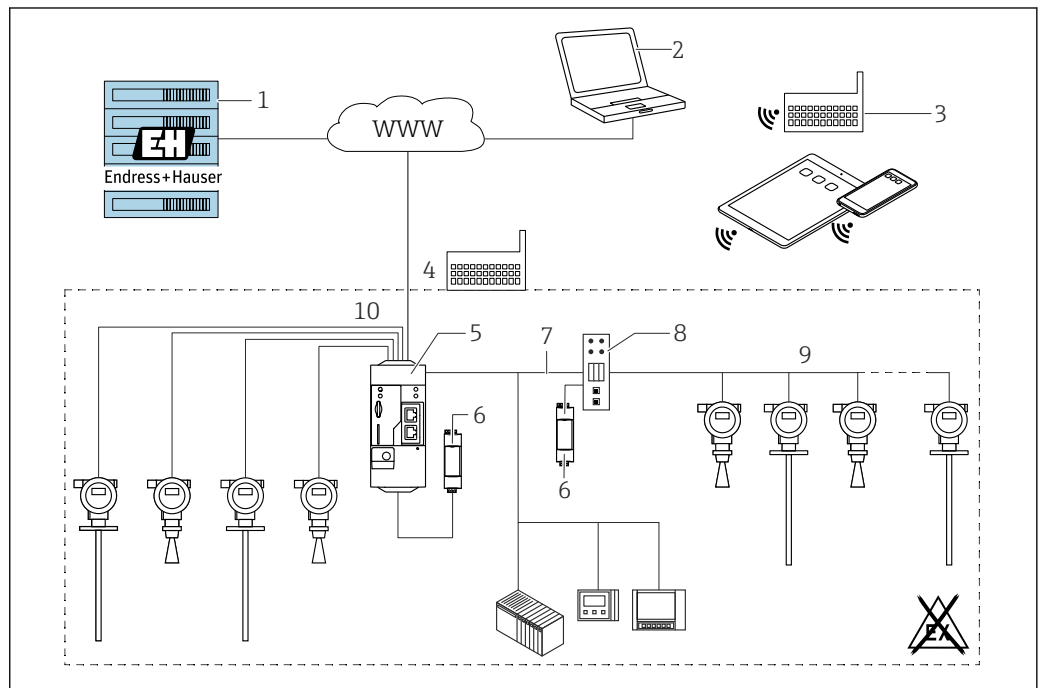
⊞ *27 Example of inventory management platform with SupplyCare Hosting SCH30*

1   SupplyCare Hosting installation in Endress+Hauser data center
2   PC workstation with Internet connection
3   Warehouse locations with Internet connection via 2G/3G with FXA42 or FXA30
4   Warehouse locations with Internet connection with FXA42
5   Fieldgate FXA42
6   Power supply 24 V DC
7   Modbus TCP via Ethernet as server/client
8   Converter from Modbus to HART Multidrop
9   HART Multidrop
10 4 x 4 to 20 mA analog input (2-wire/4-wire)

With SupplyCare Hosting, users do not need to make the initial software purchase or install and run the IT infrastructure needed. Endress+Hauser constantly update SupplyCare Hosting and enhance the capability of the software in conjunction with the customer. The hosted version of SupplyCare is thus always up-to-date and can be customized to meet different customer requirements. Other services are also offered in addition to the IT infrastructure and the software that is installed in a secure, redundant Endress+Hauser data center. These services include defined availability of the global Endress+Hauser Service and Support Organization and defined response times in a service event.

Certificates and approvals

Current certificates and approvals that are available for the product can be selected via 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**.

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

3-point linearity protocol
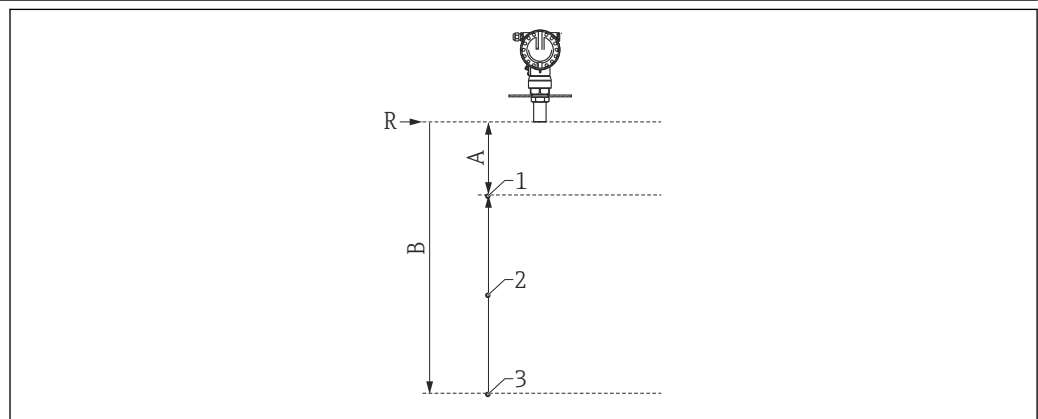
A0023651

 28   Example of 3-point linearity protocol

A   1 000 mm (39 in) = distance from the reference point R to the first measuring point
B   6 000 mm (236 in) = distance from the reference point R to the third measuring point
R   Reference point of measurement
1   First measuring point
2   Second measuring point
3   Third measuring point

3 measuring points of the linearity protocol are predefined depending on the selected sensor. The positions of the measuring points may vary by ±1 cm (±0.04 in).

The linearity check is performed under reference operating conditions.

5-point linearity protocol
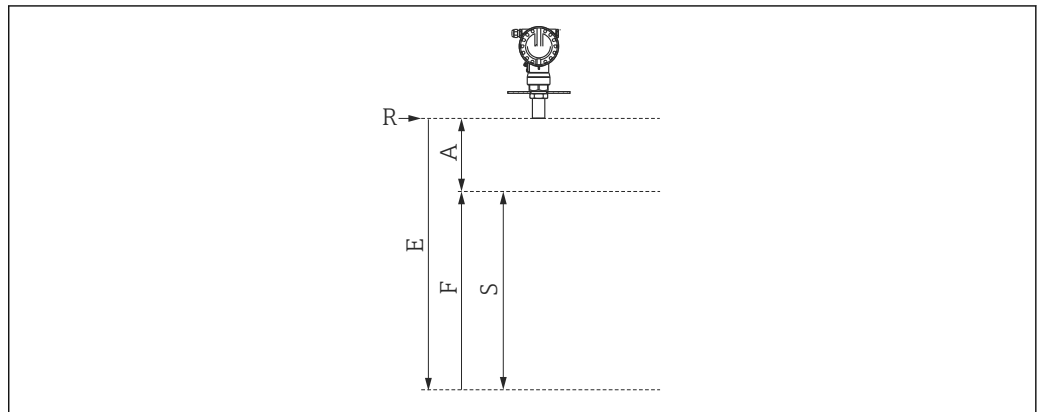
A0019522

⊡ *29   Example of 5-point linearity protocol*

R   Reference point of measurement
E   Maximum value for empty calibration 10 000 mm (394 in)
A   Minimum distance between reference point R of the sensor and 100 % level 400 mm (15.7 in)
F   Maximum value for full calibration 9 600 mm (378 in)
S   Minimum span E - A = S 100 mm (3.94 in)

ℹ️ The 5 points of the linearity protocol are distributed evenly over the measuring range (0 % - 100 %). The empty calibration (E) and full calibration (F) must be specified to define the measuring range.

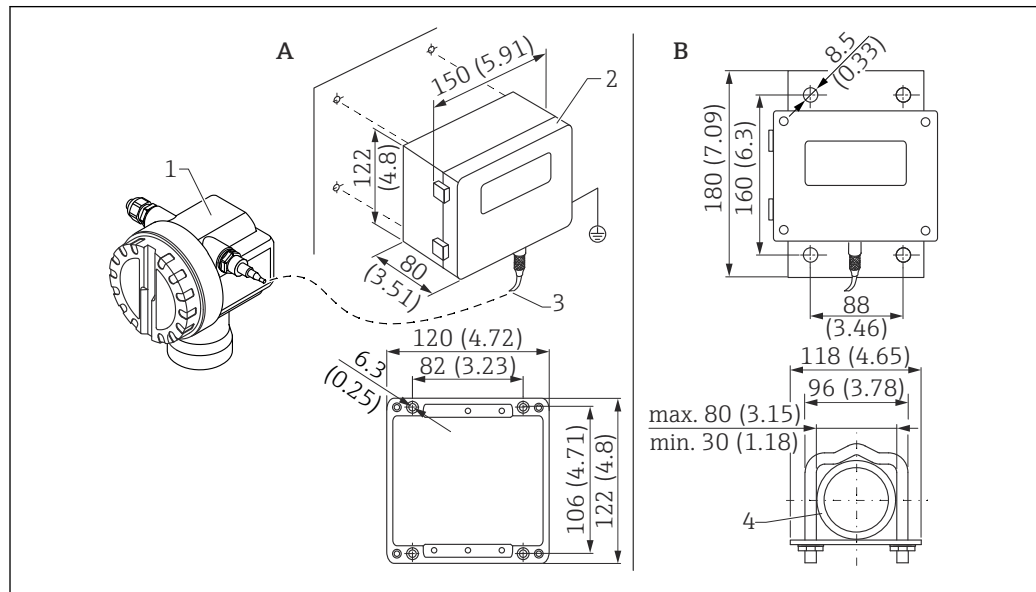The linearity check is performed under reference operating conditions.

Check the device with the maximum values if
• Values are missing for full and empty calibration
• Values are outside the specified area

Accessories

Device-specific accessories

Remote display and operating unit FHX40

🖼 *30 Remote display. Unit of measurement mm (in)*

A   Wall mounting without mounting bracket
B   Pipe mounting, mounting bracket and mounting plate are optional
1   Device, e.g. Prosonic
2   Separate housing FHX40, IP 65
3   Cable
4   Pipe

Technical data
- Cable length: 20 m (66 ft), fixed length with cast-on connectors
- Temperature range T6: −40 to +60 ℃ (−40 to +140 ℉)
  Temperature range T5: −40 to +75 ℃ (−40 to +167 ℉)
- Degree of protection: IP65/67 (housing); IP68 (cable) according to IEC 60529
- Dimensions [mm (in)]: 122 x 150 x 80 (4.8 x 5.91 x 3.15)

Materials
- Housing, cover: AlSi12,
  Screw: V2A
- Ground terminal: CuZn nickel-plated
  Screw: V2A
- Display: glass
- Cable gland: CuZn nickel-plated
- Cable: PVC
- Mounting bracket: 316 Ti (1.4571) or 316 L (1.4435) or 316 (1.4401)
- Nut: V4A
- Plate: 316 Ti (1.4571)
- Screw set (M5)
  Spring washer: 301 (1.431) or V2A
  Screw: V4A
  Nut: V4A
- Additional information: Brief Operating Instructions KA00202F

Weather protection cover
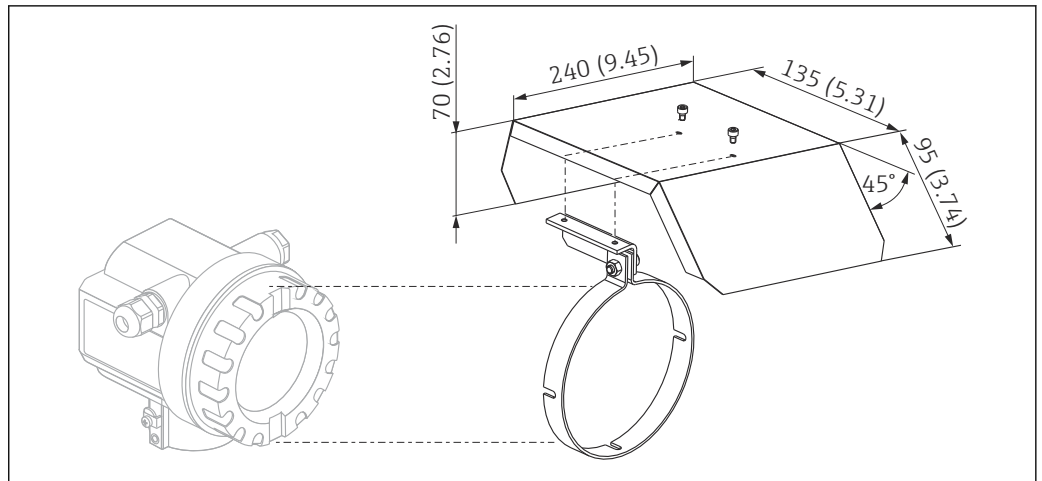
🖼 31 Weather protection cover for F12 or T12 housing . Unit of measurement mm (in)

Materials
- Protection cap, tension clamp: stainless steel 304 (1.4301)
- Screw, nut, washer: A2

Order number: 543199-0001

| Communication-specific accessories | **Commubox FXA195 HART** |

- Function: Intrinsically safe HART communication with FieldCare or DeviceCare via the USB port
- Order number: 52027505
- Additional information: Technical Information TI00404F

Commubox FXA291

- Function: Connects the CDI interface (Common Data Interface) of Endress+Hauser devices to the USB port of a computer
- Order number: 51516983
- Accessory: ToF Adapter FXA291
- Additional information: Technical Information TI00405C

ToF Adapter FXA291

- Function: Connects the Commubox FXA291 via the USB port of a computer or laptop
- Order number: 71007843
- Additional information: Brief Operating Instructions KA00271F

SupplyCare Hosting SCH30

Inventory management software that visualizes levels, volumes, masses, temperatures, pressures, densities or other tank parameters. The parameters are recorded and transmitted using Fieldgate FXA42, FXA30 and FXA30B gateway types. SupplyCare Hosting is offered as a hosting service (Software as a Service, SaaS). In the Endress+Hauser portal, the user is provided with the data over the Internet.

Order number: 71214483

📖 For details, see "Technical Information" TI01229S and Operating Instructions BA00050S.

SupplyCare Enterprise SCE30B

Inventory management software that visualizes levels, volumes, masses, temperatures, pressures, densities or other tank parameters. The parameters are recorded and transmitted using the Fieldgate FXA42 gateway type.

This Web-based software is installed on a local server and can also be visualized and operated with mobile terminals such as a smartphone or tablet.

Order number : 71214488

For details, see "Technical Information" TI01228S and Operating Instructions BA00055S

Connect Sensor FXA30/FXA30B

Fully integrated, battery-powered gateway for simple applications with SupplyCare Hosting. It is possible to connect up to 4 field devices with 4 to 20 mA communication (FXA30 / FXA30B), serial Modbus (FXA30B) or HART (FXA30B). With its robust design and ability to run for years on the battery, it is ideal for remote monitoring in isolated locations. Version with LTE (USA, Canada and Mexico only) or 3G mobile transmission for worldwide communication.

Order number: 71367395

For details, see "Technical Information" TI01356S and Operating Instructions BA01710S.

Fieldgate FXA42

Fieldgates enable communication between connected 4 to 20 mA, Modbus RS485 and Modbus TCP devices and SupplyCare Hosting or SupplyCare Enterprise. The signals are transmitted either via Ethernet TCP/IP, WLAN or mobile communications (UMTS). Advanced automation capabilities are available, such as an integrated Web-PLC, OpenVPN and other functions.

Order number: 71274336

For details, see "Technical Information" TI01297S and Operating Instructions BA01778S.

Supplementary 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 serial number from nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate.

Standard documentation	**Technical Information (TI)** Planning aid – contains technical data for planning and ordering information. **Operating Instructions (BA)** Installation and initial commissioning – contains all the functions in the operating menu that are needed for a normal measuring task. Functions beyond this scope are not included. **Brief Operating Instructions (KA)** Quick guide to obtaining the first measured value – includes all essential information from incoming acceptance to electrical connection. Another "Brief Operating Instructions" document is located under the housing cover of the device. The most important functions of the menu are summarized in this document. **Description of Device Parameters (BA)** Reference manual for parameters – contains a detailed explanation of each individual parameter in the operating menu. The description helps individuals who perform specific configurations throughout the entire operating life of the device.
Supplementary device-dependent documentation	Depending on the device version ordered, additional documentation or documents are provided. Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation. Examples: ATEX, NEPSI, INMETRO, Control or Installation Drawings for FM-, CSA- and TIIS-certified device versions. The relevant safety instructions are included with all certified device versions. If using the device in a hazardous area, all the specifications contained in the safety instructions must be complied with.

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