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2 V. 4, Rev. 1, 19-03-2018

Endress+Hauser

Safety symbols

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

Symbols for certain types of information

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.
	Protective Earth (PE) A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: ▪ Inner ground terminal: Connects the protective earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system.

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.
	Visual inspection.

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Symbol	Meaning
A-A, B-B, C-C, ...	Sections
	Hazardous area Indicates a hazardous area.
	Safe area (non-hazardous area) Indicates the non-hazardous area.

Symbols at the device

Symbol	Meaning
	Safety instructions Observe the safety instructions contained in the associated Operating Instructions.
	Temperature resistance of the connection cables Specifies the minimum value of the temperature resistance of the connection cables.

Terms and abbreviations

Term/abbreviation	Explanation
BA	Document type "Operating Instructions"
KA	Document type "Brief Operating Instructions"
TI	Document type "Technical Information"
SD	Document type "Special Documentation"
XA	Document type "Safety Instructions"
PN	Nominal pressure
MWP	Maximum Working Pressure The MWP can also be found on the nameplate.
ToF	Time of Flight
FieldCare	Scalable software tool for device configuration and integrated plant asset management solutions
DeviceCare	Universal configuration software for Endress+Hauser HART, PROFIBUS, FOUNDATION Fieldbus and Ethernet field devices
DTM	Device Type Manager
DD	Device Description for HART communication protocol
DC	Relative dielectric constant ϵ_r
Operating tool	The term "operating tool" is used in place of the following operating software: FieldCare / DeviceCare, for operation via HART communication and PC
BD	Blocking Distance; no signals are analyzed within the BD.

HART®

Bluetooth®

Apple®

Android®

KALREZ[®], VITON[®]

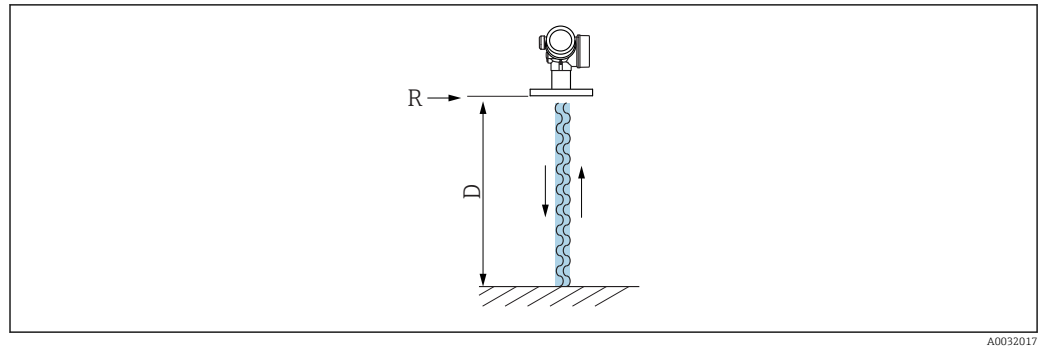
TEFLON®

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Function and system design

Measuring principle

The Micropilot is a "downward-looking" measuring system, operating based on the frequency modulated continuous wave method (FMCW). The antenna emits an electromagnetic wave at a continuously varying frequency. This wave is reflected by the product and received again by the antenna.

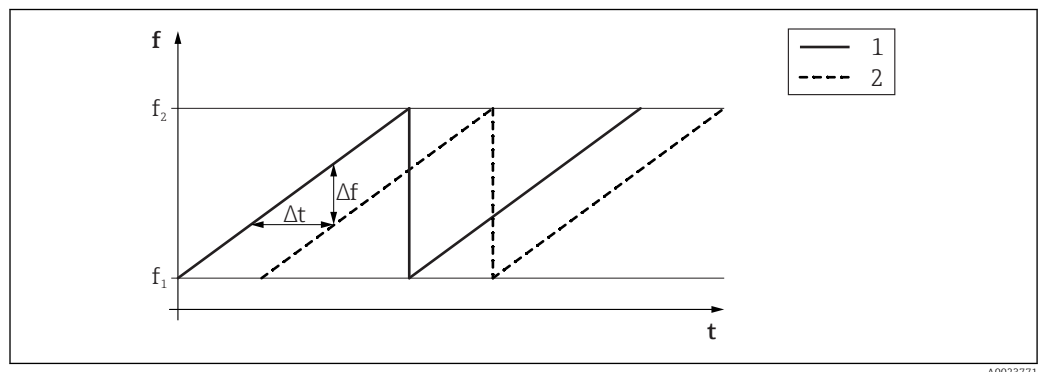


1 FMCW principle: transmission and reflection of the continuous wave

R Reference point of measurement

D Distance between reference point and product surface

The frequency of this wave is modulated in the form of a sawtooth signal between two limit frequencies f_1 and f_2 :



2 FMCW principle: result of frequency modulation

1 Transmitted signal

2 Received signal

This results in the following difference frequency at any time between the transmitted signal and the received signal:

$$\Delta f = k \Delta t$$

where Δt is the run time and k is the specified increase in frequency modulation.

Δt is given by the distance D between the reference point R and the product surface:

$$D = (c \Delta t) / 2$$

where c is the speed of propagation of the wave.

In summary, D can be calculated from the measured difference frequency Δf . D is then used to determine the content of the tank or silo.

Input

Measured variable	The measured variable is the distance between the reference point and the product surface. The level is calculated based on "E", the empty distance entered. Optionally, the level can be converted to other variables (volume, mass) by linearization (32 value pairs).									
Measuring range	Maximum measuring range <table border="1"> <thead> <tr> <th>Device</th><th>Antenna ¹⁾</th><th>Maximum measuring range</th></tr> </thead> <tbody> <tr> <td rowspan="2">FMR67</td><td>GA: Drip-off, PTFE 50 mm / 2"</td><td>50 m (164 ft)</td></tr> <tr> <td>GP: PTFE flush mount 80 mm / 3"</td><td>125 m (410 ft)</td></tr> </tbody> </table> 1) Feature 070 in the product structure Usable measuring range The usable measuring range depends on the antenna size, the medium's reflective properties, the installation position and any possible interference reflections.		Device	Antenna ¹⁾	Maximum measuring range	FMR67	GA: Drip-off, PTFE 50 mm / 2"	50 m (164 ft)	GP: PTFE flush mount 80 mm / 3"	125 m (410 ft)
Device	Antenna ¹⁾	Maximum measuring range								
FMR67	GA: Drip-off, PTFE 50 mm / 2"	50 m (164 ft)								
	GP: PTFE flush mount 80 mm / 3"	125 m (410 ft)								
Operating frequency	Approx. 80 GHz Up to 8 devices can be installed in the same tank without interfering with each other.									
Transmission power	■ Peak power: 6.3 mW ■ Average output power: 63 µW									

Output

Output signal

HART

Signal coding	FSK ± 0.5 mA over current signal
Data transmission rate	1 200 Bit/s
Galvanic isolation	Yes

Bluetooth® wireless technology

Device version	Ordering feature 610 "Accessory mounted", option NF "Bluetooth"
Operation / configuration	By the <i>SmartBlue</i> app.
Range under reference conditions	> 10 m (33 ft)
Encryption	Encrypted communication and password encryption prevent incorrect operation by unauthorized persons.

Switch output

 For HART devices, the switch output is available as an option. See product structure, feature 20: "Power Supply, Output", option B: "2-wire; 4-20mA HART, switch output"

Switch output	
Function	Open collector switching output
Switching behavior	Binary (conductive or non-conductive), switches when the programmable switch point is reached
Failure mode	non-conductive
Electrical connection values	$U = 16$ to 35 V_{DC} , $I = 0$ to 40 mA
Internal resistance	$R_i < 880\ \Omega$ The voltage drop at this internal resistance has to be taken into account on planning the configuration. For example, the resulting voltage at a connected relay must be sufficient to switch the relay.
Insulation voltage	floating, Insulation voltage $1\ 350\text{ V}_{DC}$ to power supply and 500 V_{AC} to ground
Switch point	freely programmable, separately for switch-on and switch-off point
Switching delay	freely programmable from 0 to 100 s, separately for switch-on and switch-off point
Number of switching cycles	corresponds to the measuring cycle
Signal source device variables	▪ Level linearized ▪ Distance ▪ Terminal voltage ▪ Electronic temperature ▪ Relative echo amplitude ▪ Diagnostic values, Advanced diagnostics
Number of switching cycles	unlimited

Wireless HART data

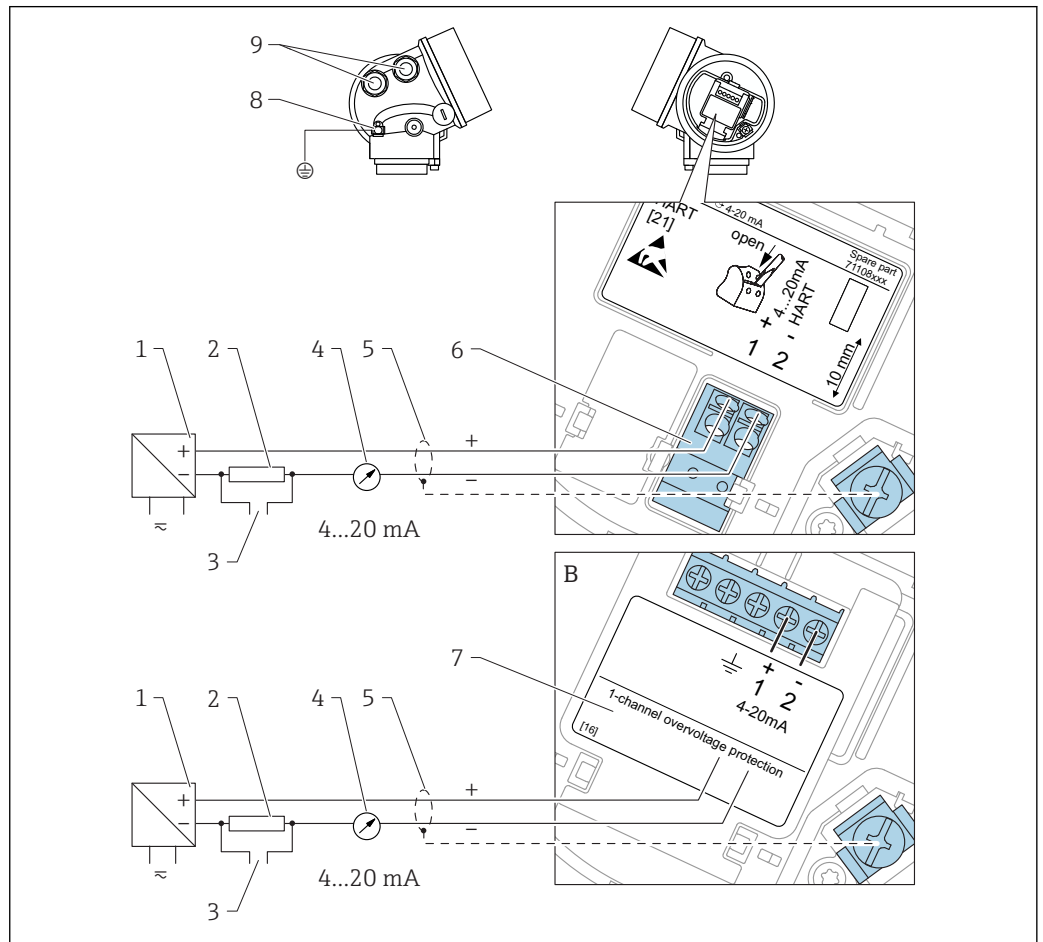
Minimum start-up voltage	16 V
Start-up current	3.6 mA
Start-up time	65 s
Minimum operating voltage	14.0 V

Multidrop current	4.0 mA
Set-up time	15 s

Power supply

Terminal assignment

2-wire: 4-20mA HART

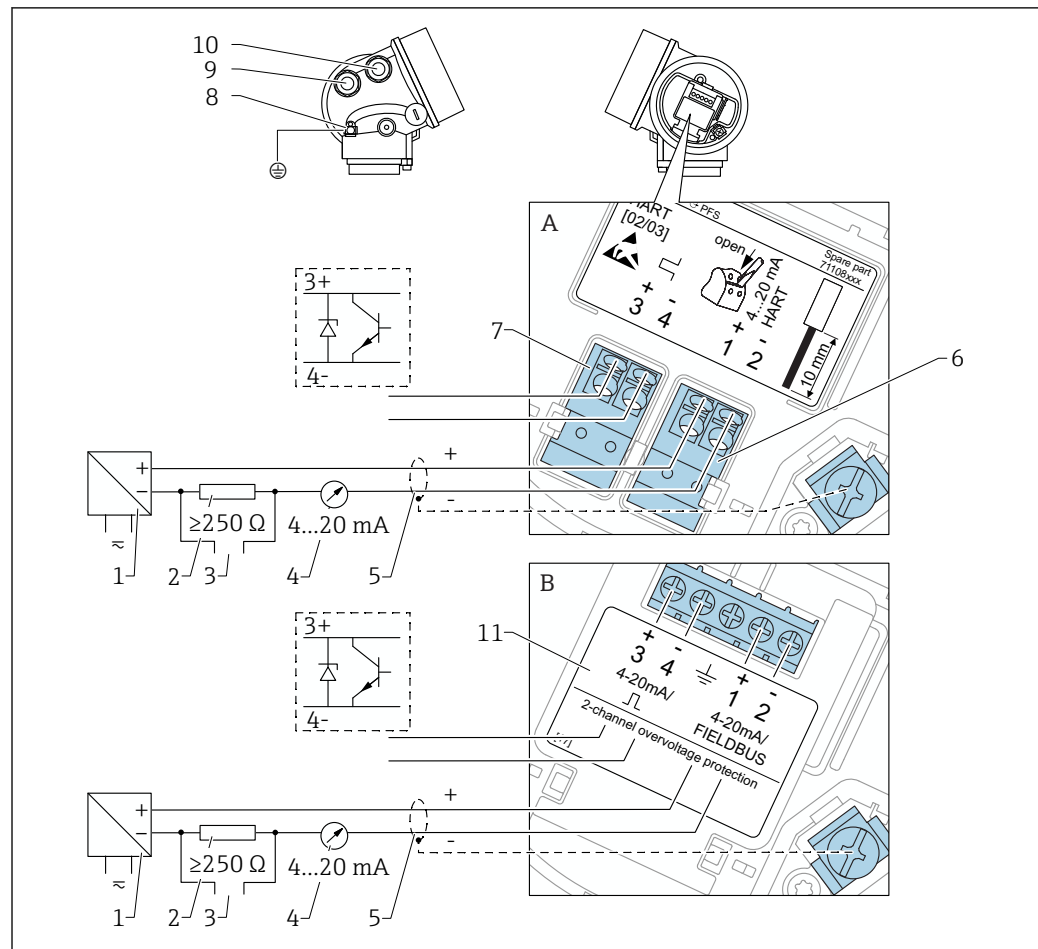


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3 Terminal assignment 2-wire; 4-20mA HART

- A Without integrated overvoltage protection
- B With integrated overvoltage protection
- 1 Active barrier with power supply (e.g. RN221N): Observe terminal voltage
- 2 HART communication resistor ($\geq 250 \Omega$): Observe maximum load
- 3 Connection for Commubox FXA195 or FieldXpert SFX350/SFX370 (via VIATOR Bluetooth modem)
- 4 Analog display device: Observe maximum load
- 5 Cable screen; observe cable specification
- 6 4-20mA HART (passive): Terminals 1 and 2
- 7 Overvoltage protection module
- 8 Terminal for potential equalization line
- 9 Cable entry

2-wire: 4-20mA HART, switch output

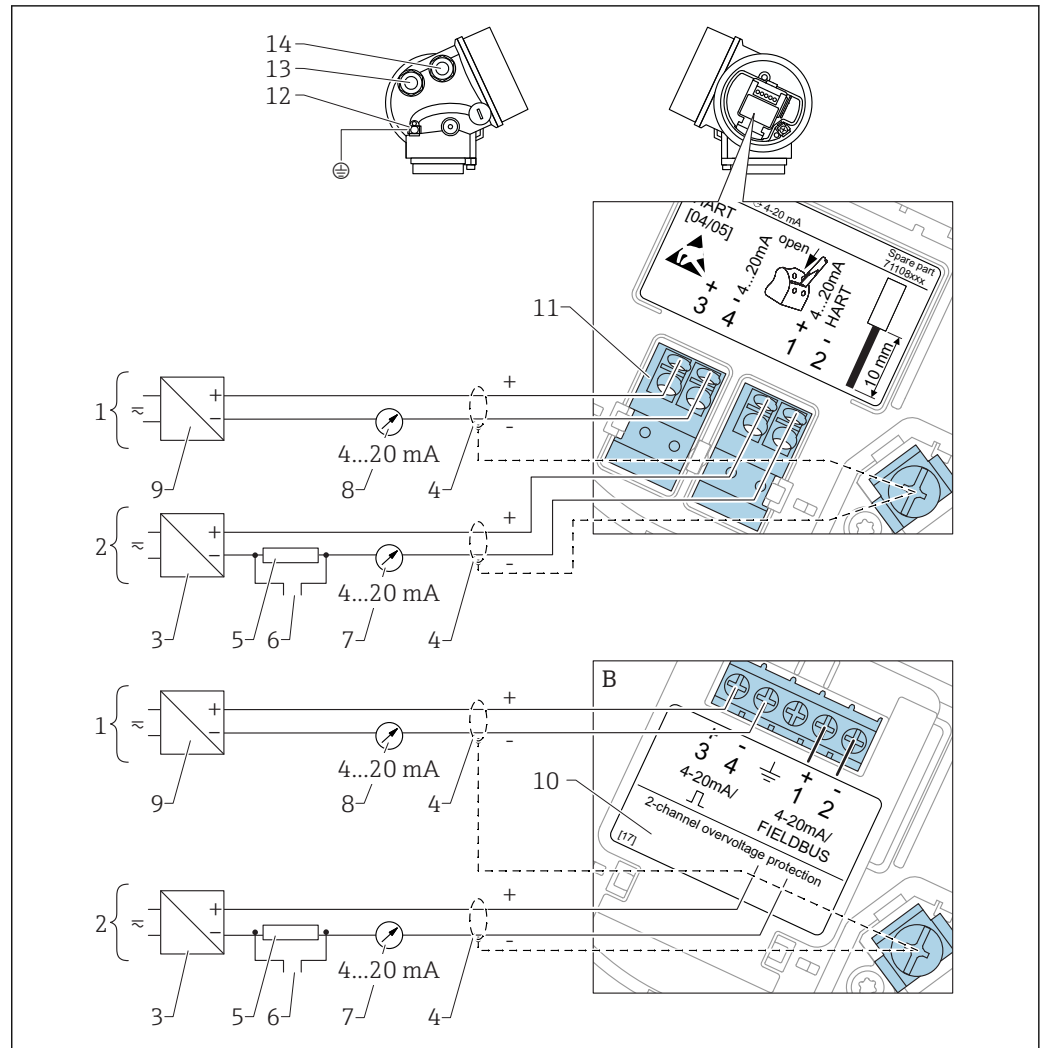


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4 Terminal assignment 2-wire; 4-20mA HART, switch output

- A Without integrated overvoltage protection
- B With integrated overvoltage protection
- 1 Active barrier with power supply (e.g. RN221N): Observe terminal voltage
- 2 HART communication resistor ($\geq 250 \Omega$): Observe maximum load
- 3 Connection for Commubox FXA195 or FieldXpert SFX350/SFX370 (via VIATOR Bluetooth modem)
- 4 Analog display device: Observe maximum load
- 5 Cable screen; observe cable specification
- 6 4-20mA HART (passive): Terminals 1 and 2
- 7 Switch output (open collector): Terminals 3 and 4
- 8 Terminal for potential equalization line
- 9 Cable entry for 4-20mA HART line
- 10 Cable entry for switch output line
- 11 Overvoltage protection module

2-wire: 4-20mA HART, 4-20mA



5 Terminal assignment 2-wire, 4-20 mA HART, 4...20mA

A Without integrated overvoltage protection

B With integrated overvoltage protection

1 Connection current output 2

2 Connection current output 1

3 Supply voltage for current output 1 (e.g. RN221N); Observe terminal voltage

4 Cable screen; observe cable specification

5 HART communication resistor ($\geq 250 \Omega$); Observe maximum load

6 Connection for Commubox FXA195 or FieldXpert SFX350/SFX370 (via VIATOR Bluetooth modem)

7 Analog display device ; observe maximum load

8 Analog display device ; observe maximum load

9 Supply voltage for current output 2 (e.g. RN221N); Observe terminal voltage

10 Overvoltage protection module

11 Current output 2: Terminals 3 and 4

12 Terminal for the potential equalization line

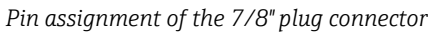
13 Cable entry for current output 1

14 Cable entry for current output 2

i This version is also suited for single-channel operation. In this case, current output 1 (terminals 1 and 2) must be used.



Pin assignment of the M12 plug connector



Supply voltage

An external power supply is necessary.



Various power supply units can be ordered as an accessory from Endress+Hauser.

2-wire, 4-20mA HART, passive

"Power supply, output" ¹⁾	"Approval" ²⁾	Terminal voltage U at device	Maximum load R, depending on the supply voltage U ₀ of the power supply unit
A: 2-wire; 4-20mA HART	- Non-hazardous - Ex nA - Ex ic - CSA GP	14 to 35 V ³⁾	A0031745
	Ex ia / IS	14 to 30 V ³⁾	
	- Ex d(ia) / XP - Ex ic(ia) - Ex nA(ia) - Ex ta / DIP	14 to 35 V ^{3) 4)}	
	Ex ia + Ex d(ia) / IS + XP	14 to 30 V ³⁾	

- 1) Feature 020 in the product structure
- 2) Feature 010 in the product structure
- 3) If the Bluetooth modem is used, the minimum supply voltage increases by 2 V.
- 4) At ambient temperatures $TT_a \leq -20^\circ\text{C}$, a terminal voltage $U \geq 16\text{ V}$ is required to start the device with the min. error current (3.6 mA).

"Power supply, output" ¹⁾	"Approval" ²⁾	Terminal voltage U at device	Maximum load R, depending on the supply voltage U ₀ of the power supply unit
B: 2-wire; 4-20 mA HART, switch output	- Non-hazardous - Ex nA - Ex nA(ia) - Ex ic - Ex ic(ia) - Ex d(ia) / XP - Ex ta / DIP - CSA GP	16 to 35 V ³⁾	A0031746
	- Ex ia / IS - Ex ia + Ex d(ia) / IS + XP	16 to 30 V ³⁾	

- 1) Feature 020 in the product structure
- 2) Feature 010 in the product structure
- 3) If the Bluetooth modem is used, the minimum supply voltage increases by 2 V.

- 1) Feature 020 in the product structure
- 2) Feature 010 in the product structure
- 3) If the Bluetooth modem is used, the minimum supply voltage increases by 2 V.

Power consumption	"Power supply; Output" ¹⁾	Power consumption
	A: 2-wire; 4-20mA HART	< 0.9 W
	B: 2-wire; 4-20mA HART, switch output	< 0.9 W
	C: 2-wire; 4-20mA HART, 4-20mA	< 2 x 0.7 W

- | Current consumption | |
|-------------------------------|---|
| HART | |
| Nominal current | 3.6 to 22 mA the start-up current for multidrop mode can be parametrized (is set to 3.6 mA on delivery) |
| Breakdown signal (NAMUR NE43) | adjustable: 3.59 to 22.5 mA |

- | | |
|-------------------------------|---|
| Potential equalization | No special measures for potential equalization are required. |
| |  If the device is designed for hazardous areas, observe the information in the documentation "Safety Instructions" (XA). |

Cable entries**Connection of power supply and signal line**

To be selected in feature 050 "Electrical connection"

- Gland M20; Material dependent on the approval:
 - For Non-Ex, ATEX, IECEx, NEPSI Ex ia/ic:
 - Plastics M20x1.5 for cable Ø5 to 10 mm (0.2 to 0.39 in)
 - For Dust-Ex, FM IS, CSA IS, CSA GP, Ex nA:
 - Metal M20x1.5 for cable Ø7 to 10 mm (0.28 to 0.39 in) ¹⁾
 - For Ex d:
 - No gland available
- Thread
 - ½" NPT
 - G ½"
 - M20 × 1.5
- Plug M12 / Plug 7/8"
 - Only available for Non-Ex, Ex ic, Ex ia

Connection of remote display FHX50

Dependent on feature 030: "Display, Operation":

- "Prepared for display FHX50 + M12 connection":
 - M12 socket
- "Prepared for display FHX50 + custom connection":
 - M16 cable gland

Cable specification

- **Devices without integrated overvoltage protection**
 - Pluggable spring-force terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- **Devices with integrated overvoltage protection**
 - Screw terminals for wire cross-sections 0.2 to 2.5 mm² (24 to 14 AWG)
- For ambient temperature $T_U \geq 60^\circ\text{C}$ (140 °F): use cable for temperature $T_U + 20\text{ K}$.

HART

- A normal device cable suffices if only the analog signal is used.
- A shielded cable is recommended if using the HART protocol. Observe grounding concept of the plant.

Overvoltage protection

If the measuring device is used for level measurement in flammable liquids which requires the use of overvoltage protection according to DIN EN 60079-14, standard for test procedures 60060-1 (10 kA, pulse 8/20 µs), an overvoltage protection module has to be installed.

Integrated overvoltage protection module

An integrated overvoltage protection module is available for 2-wire HART devices.

Product structure: Feature 610 "Accessory mounted", option NA "Overvoltage protection".

Technical data	
Resistance per channel	2 × 0.5 Ω max.
Threshold DC voltage	400 to 700 V
Threshold impulse voltage	< 800 V
Capacitance at 1 MHz	< 1.5 pF
Nominal arrest impulse voltage (8/20 µs)	10 kA

External overvoltage protection module

HAW562 or HAW569 from Endress+Hauser are suited as external overvoltage protection.

1) The material of the gland is dependent on the housing type; GT18 (stainless steel housing): 316L (1.4404); GT19 (plastic housing) and GT20 (aluminum housing): nickel-coated brass (CuZn).

- Temperature = +24 °C (+75 °F) ±5 °C (±9 °F)
- Pressure = 960 mbar abs. (14 psia) ±100 mbar (±1.45 psi)
- Humidity = 60 % ±15 %
- Reflector: metal plate with diameter ≥ 1 m (40 in)
- No major interference reflections inside the signal beam

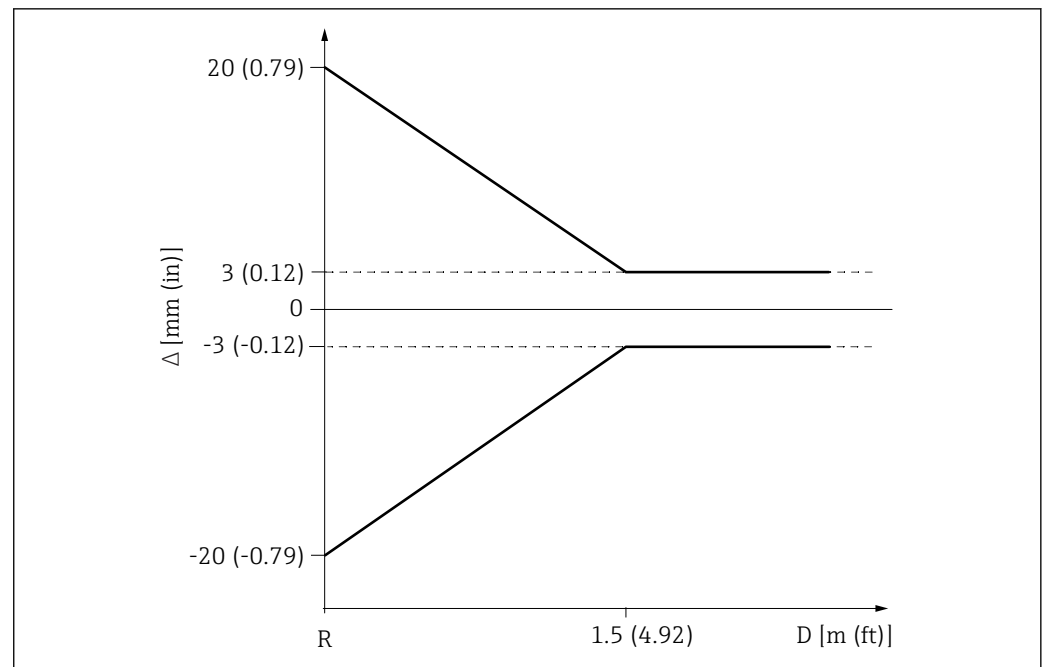
Typical data under reference operating conditions: DIN EN IEC 61298-2 / DIN EN IEC 60770-1;
percentage values in relation to the span.

Output:	digital	analog ¹⁾
Accuracy (Sum of non-linearity, nonrepeatability and hysteresis) ²⁾	Measuring distance up to 1.5 m (4.92 ft): max. ±20 mm (±0.79 in)	±0.02 %
	Measuring distance > 1.5 m (4.92 ft): ±3 mm (±0.12 in)	±0.02 %
Non-repeatability ³⁾	≤ 1 mm (0.04 in)	

- 1) Add error of the analogous value to the digital value.
- 2) If the reference conditions are not met, the offset/zero point arising from the mounting conditions may be up to ± 4 mm (0.16 in). This additional offset/zero point can be compensated for by entering a correction (parameter "level correction") during commissioning.
- 3) The non-repeatability is already considered in the accuracy.

 The devices are optimized for bulk solid applications on delivery. An additional reference condition for the accuracy specifications of bulk solid applications is **Bin type = Workbench test**

Differing values in near-range applications



8 *Maximum measured error in near-range applications*

Δ	Maximum measured error
R	Reference point of the distance measurement
D	Distance from reference point of antenna

Dead band according to DIN EN IEC 61298-2 / DIN EN IEC 60770-1:

- Digital: 1 mm
- Analog: 1 μ A

The response time can be configured. The following step response times (in accordance with DIN EN IEC 61298-2 / DIN EN IEC 60770-1)²⁾ are when damping is switched off:

Sampling rate	$\geq 1.3 \text{ s}^{-1}$ at $U \geq 24 \text{ V}$
Response time	$< 3.6 \text{ s}$

The measurements are performed according to DIN EN IEC 61298-3 / DIN EN IEC 60770-1

- Digital (HART): average $T_K = 3 \text{ mm}/10 \text{ K}$
- Analog (current output):
 - Zero point (4 mA): average $T_K = 0.02 \text{ } \%/10 \text{ K}$
 - Span (20 mA): average $T_K = 0.05 \text{ } \%/10 \text{ K}$

2) According to DIN EN IEC 61298-2 / DIN EN IEC 60770-1, the step response time is the time that elapses after an abrupt change in the input signal until the change in the output signal has adopted 90% of the steady-state value for the first time.

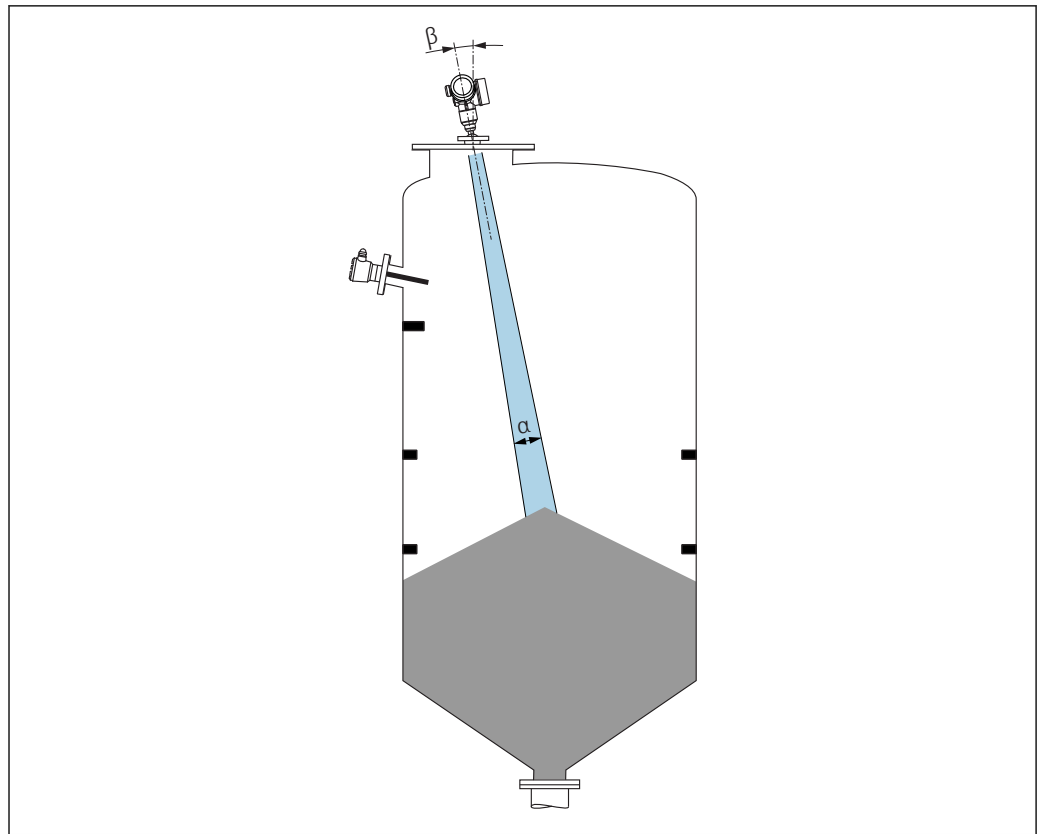
Mounting position

Mounting position



- 23

Internal container fittings



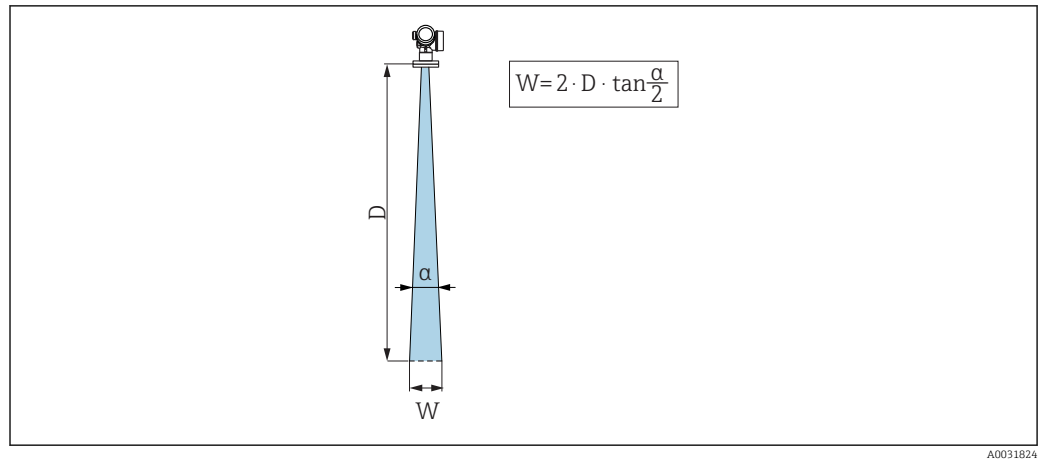
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Avoid the location of internal fittings (limit switches, temperature sensors, struts etc.) inside the signal beam. Pay attention to the beam angle → 26.

The diagram illustrates a tank with a laser level sensor at the top. The sensor is tilted at an angle β from the vertical. A blue laser beam is emitted from the sensor, reflecting off a horizontal surface at the bottom of the tank. The angle between the laser beam and the vertical is labeled α . The tank has a conical bottom, and the material inside is shown in grey. A cross-section of the tank shows the sensor's position and the laser beam's path.

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Beam angle



9 Relationship between beam angle α , distance D and beamwidth diameter W

The beam angle is defined as the angle α where the energy density of the radar waves reaches half the value of the maximum energy density (3dB width). Microwaves are also emitted outside the signal beam and can be reflected off interfering installations.

1) Feature 070 in the product structure

- Dielectric constant of the medium: $\epsilon_r \geq 10$
- The distance from the lower edge of the antenna to the tank ceiling or window should be about 100 mm (4 in).
- If possible, avoid mounting locations where condensation or build-up might occur.
- In case of outdoor mounting, the space between antenna and vessel has to be protected from the elements.
- Do not mount any potential reflectors (e.g. pipes) outside the tank in the signal beam.

Suitable thickness of the tank ceiling or dielectric window

Material	PE	PTFE	PP	Perspex
DK (= ϵ_r)	2.3	2.1	2.3	3.1
Optimum thickness	1.25 mm (0.049 in) ¹⁾	1.3 mm (0.051) ¹⁾	1.25 mm (0.049 in) ¹⁾	1.07 mm (0.042 in) ¹⁾

- 1) or an integer multiple of this value; however, take into account that the microwave transparency is significantly reduced when increasing the thickness of the window.

Installation: Drip-off antenna PTFE 50 mm / 2"

Aligning the antenna axis

Align the antenna vertically to the product surface.

Optionally, a variable flange seal (available as an accessory) can be used for alignment



Attention:

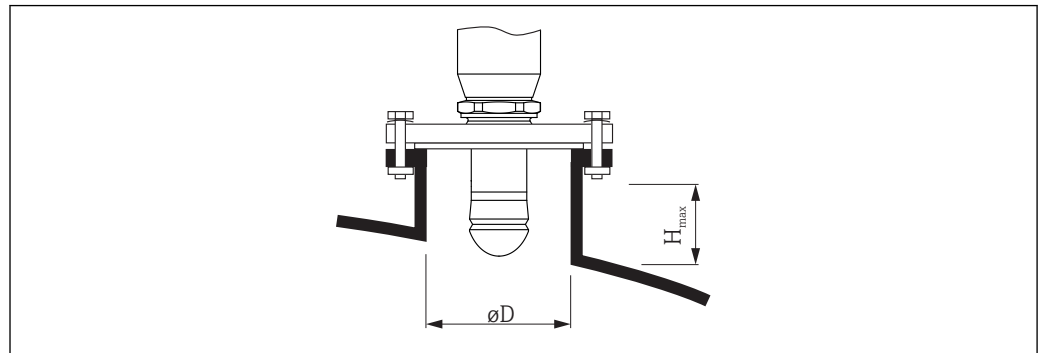
The maximum reach of the antenna can be reduced if it is not installed perpendicular to the product.

Radial alignment of the antenna

Based on the directional characteristic, radial alignment of the antenna is not necessary.

Information concerning nozzles

The maximum nozzle length H_{max} depends on the nozzle diameter D :



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Inner nozzle diameter D	Maximum nozzle height H_{max} ¹⁾
50 to 80 mm (2 to 3.2 in)	750 mm (30 in)
80 to 100 mm (3.2 to 4 in)	1 150 mm (46 in)
100 to 150 mm (4 to 6 in)	1 450 mm (58 in)
≥ 150 mm (6 in)	2 200 mm (88 in)

- 1) In case of longer nozzles, a reduction of the measuring performance is to be expected.



Note the following if the antenna does not project out of the nozzle:

- The end of the nozzle must be smooth and free from burrs. The edge of the nozzle should be rounded if possible.
- Mapping must be performed.
- Please contact Endress+Hauser for applications with nozzles that are higher than indicated in the table.

Information concerning threaded connections

- When screwing in, turn by the hex bolt only.
- Tool: open-ended wrench 55 mm
- Maximum permissible torque: 50 Nm (36 lbf ft)

Aligning the antenna axis

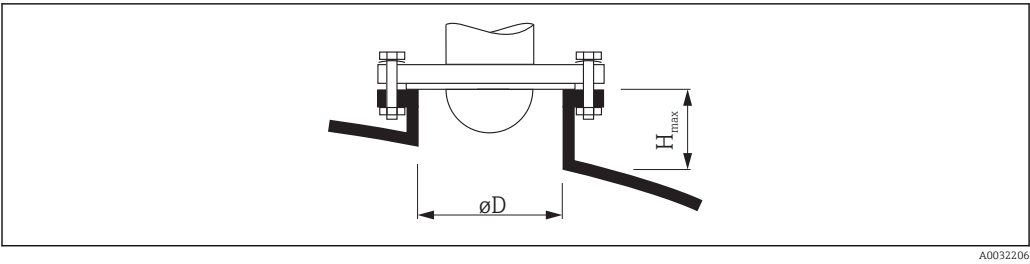
Process connection with alignment unit ¹⁾	UNI flange	Material	Pressure rating	Suitable for
XCA	UNI 4" / DN100 / 100A	Aluminum	max. 14.5lbs / PN1 / 1K	■ 4" 150lbs ■ DN100 PN16 ■ 10K 100A
XDA	UNI 6" / DN150 / 150A	Aluminum	max. 14.5lbs / PN1 / 1K	■ 6" 150lbs ■ DN150 PN16 ■ 10K 150A
XEA	UNI 8" / DN200 / 200A	Aluminum	max. 14.5lbs / PN1 / 1K	■ 8" 150lbs ■ DN200 PN16 ■ 10K 200A
XFA	UNI 10" / DN250 / 250A	Aluminum	max. 14.5lbs / PN1 / 1K	■ 10" 150lbs ■ DN250 PN16 ■ 10K 250A

A technical line drawing of a robotic arm assembly. The arm is shown in a side profile, mounted on a base. A dashed line indicates the vertical axis. A curved arrow at the bottom indicates a range of motion of $\pm 15^\circ$. The drawing includes solid lines for the main components and dashed lines for hidden or alternative positions.

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Based on the directional characteristic, radial alignment of the antenna is not necessary.

Information concerning nozzles



Inner nozzle diameter D	Maximum nozzle height H_{max}
min. 80 to 100 mm (3 to 4 in)	1 450 mm (57 in)
100 to 150 mm (4 to 6 in)	1 800 mm (71 in)
≥ 150 mm (6 in)	2 700 mm (106 in)

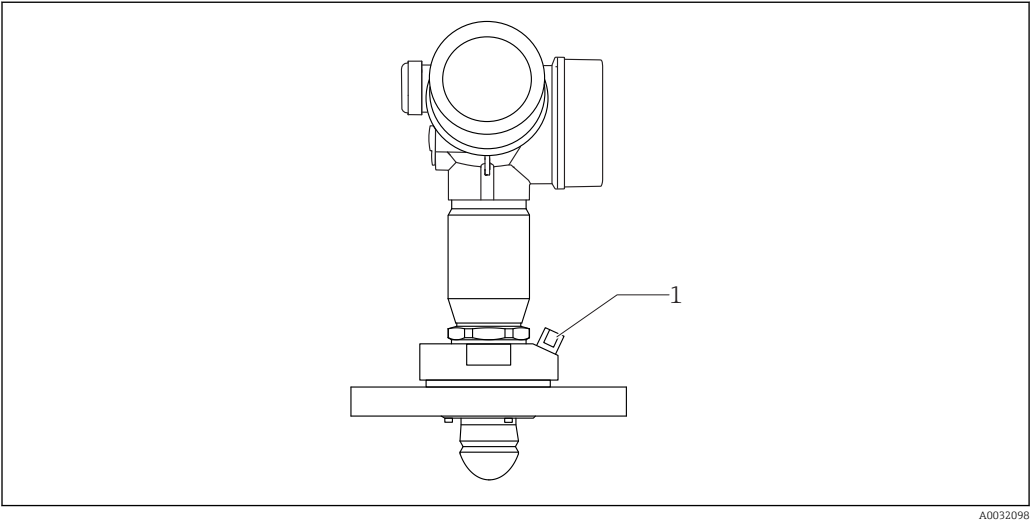
- i** Note the following if the antenna does not project out of the nozzle:
- The end of the nozzle must be smooth and free from burrs. The edge of the nozzle should be rounded if possible.
 - Mapping must be performed.
 - Please contact Endress+Hauser for applications with nozzles that are higher than indicated in the table.

Purge air connection for FMR67

Purge air adapter for Drip-off antennas

Purge air connection ¹⁾	Meaning
A	without
3	Purge air adapter G 1/4"
4	Purge air adapter NPT 1/4"

1) Feature 110 in the product structure



1 Purge air connection NPT 1/4" or G 1/4"

Purge air connection ¹⁾	Meaning
1	Purge air connection G 1/4"
2	Purge air connection NPT 1/4"

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 In general, purging should only be performed to the extent necessary as excess purging can cause mechanical damage (abrasion).

A diagram showing a microscope objective mounted on a slide. Label 1 points to the objective, and label 2 points to the slide.

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Environment

Ambient temperature range

Measuring device	-40 to +80 °C (-40 to +176 °F)
Local display	-20 to +70 °C (-4 to +158 °F), the readability of the display may be impaired at temperatures outside the temperature range.

Outdoor operation in strong sunlight:

- Mount the device in the shade.
- Avoid direct sunlight, particularly in warm climatic regions.
- Use a weather protection cover (see accessories).

Ambient temperature limits

i The following diagrams only consider functional aspects. Additional restrictions may apply for certified device versions. See the separate Safety Instructions for more information → 84.

In the event of temperature (T_p) at the process connection, the permitted ambient temperature (T_a) is reduced as indicated in the following diagram (temperature derating) in the table header.

FMR67 Antenna ¹⁾ GA: Drip-off, PTFE DN50 Seal ²⁾ A3: FKM Viton GLT, -40 to 80 °C (-40 to 176 °F) Temperature specifications: °C (°F)										
Housing type ³⁾	P1		P2		P3		P4		P5	
	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a
B: GT18 two-chamber 316L	-40 (-40)	76 (168.8)	76 (168.8)	76 (168.8)	80 (176)	75 (167)	80 (176)	-40 (-40)	-40 (-40)	-40 (-40)
A: GT19 two-chamber Plastic PBT	-40 (-40)	60 (140)	60 (140)	60 (140)	80 (176)	54 (129.2)	80 (176)	-40 (-40)	-40 (-40)	-40 (-40)
C: GT20 two-chamber Aluminum, coated	-40 (-40)	76 (168.8)	76 (168.8)	76 (168.8)	80 (176)	76 (168.8)	80 (176)	-40 (-40)	-40 (-40)	-40 (-40)

- 1) Feature 070 in the product structure
- 2) Feature 090 in the product structure
- 3) Feature 040 in the product structure

- 1) Feature 070 in the product structure
- 2) Feature 090 in the product structure
- 3) Feature 040 in the product structure

- 1) Feature 070 in the product structure
- 2) Feature 090 in the product structure
- 3) Feature 040 in the product structure

Climate class	DIN EN 60068-2-38 (test Z/AD)
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6) This restriction is valid if the following options of the product structure have been selected at the same time: 030 ("Display, Operation") = C ("SD02") or E ("SD03"); 040 ("Housing") = A ("GT19").

7) Available for download at www.de.endress.com.

The pressure ranges indicated can be reduced by the choice of process connection. The nominal pressure (PN) indicated on the nameplate refers to a reference temperature of 20 °C, and of 100 °F for ASME flanges. Observe pressure-temperature dependency.

- EN 1092-1:2001 Tab. 18

- ASME B 16.5a – 1998 Tab. 2-2.2 F316

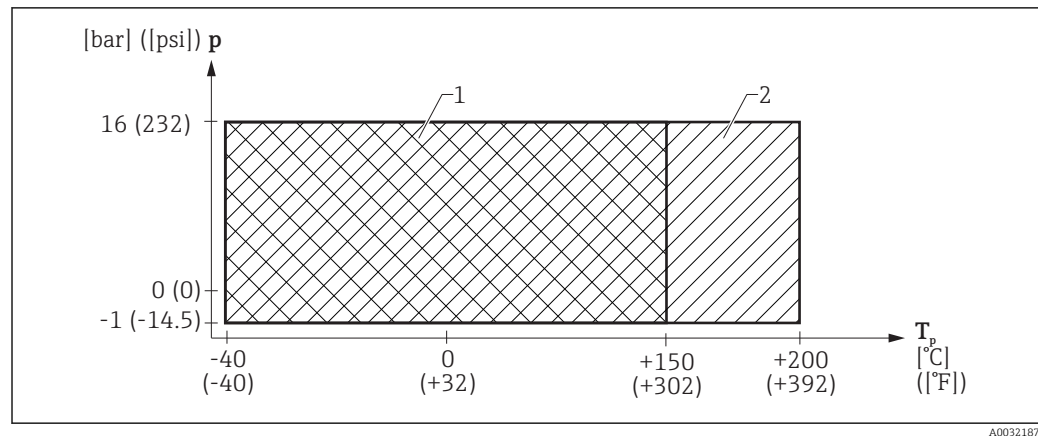
- JIS B 2220

Figure 1 is a graph showing the operating range of the system. The vertical axis represents pressure p in bar and lpsi, with values -1, 0, 3, and 16. The horizontal axis represents temperature T_p in $^{\circ}\text{C}$ and $^{\circ}\text{F}$, with values -40, 0, and +80. A shaded rectangular region indicates the operating range, bounded by $p = 3$ to 16 bar and $T_p = -40$ to $+80$ $^{\circ}\text{C}$.

1 Process connection: flange PP

Feature 100 "Process connection"	Process temperature range	Process pressure range
■ GGJ: Thread ISO228 G1-1/2 ■ RGJ: Thread ANSI MNPT1-1/2	-40 to +80 °C (-40 to +176 °F)	$p_{rel} = -1 \text{ to } 16 \text{ bar } (-14.5 \text{ to } 232 \text{ psi})$ $p_{abs} < 17 \text{ bar } (246 \text{ psi})^{1)}$
■ XJJ: UNI flange 3"/DN80/80A, 316L ■ XKJ: UNI flange 4"/DN100/100A, 316L ■ XLJ: UNI flange 6"/DN150/150A, 316L ■ XJG: UNI flange 3"/DN80/80A, PP ■ KKG: UNI flange 4"/DN100/100A, PP ■ XLG: UNI flange 6"/DN150/150A, PP		$p_{rel} = -1 \text{ to } 3 \text{ bar } (-14.5 \text{ to } 43.5 \text{ psi})$ $p_{abs} < 4 \text{ bar } (58 \text{ psi})$

35

FMR67, flush mount antenna, PTFE DN80, standard flange 316L

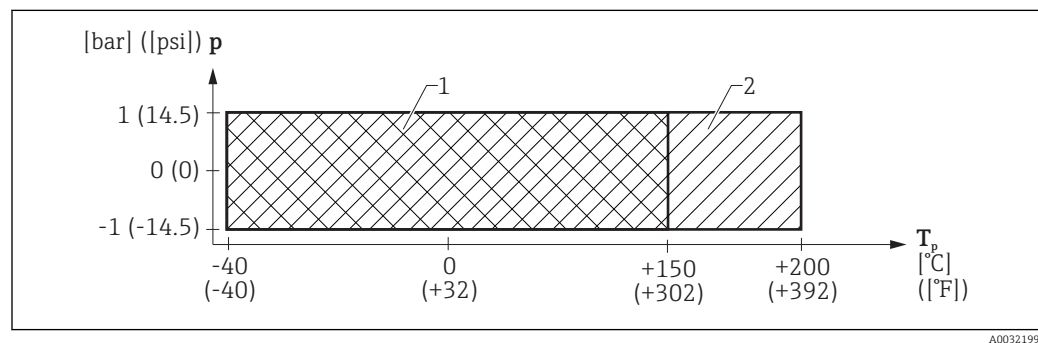
12 FMR67: Permitted range for process temperature and process pressure, antenna, PTFE DN80, standard flange 316L

- 1 Feature 90, seal: A5, FKM Viton GLT
 2 Feature 90, seal: A6, FKM Viton GLT

FMR67, PTFE DN80, standard flange 316L

Feature 100 "Process connection"	Feature 90 "Seal"	Process temperature range	Process pressure range
- AGJ: NPS 3" Cl.150 RF, 316/316L - AHJ: NPS 4" Cl.150 RF, 316/316L - CGJ: DN80 PN10/16 B1, 316L - CHJ: DN100 PN10/16 B1, 316L - KGJ: 10K 80A RF, 316L - KHJ: 10K 100A RF, 316L	A5, FKM Viton GLT	-40 to +150 °C (-40 to +302 °F)	$p_{rel} =$ -1 to 16 bar (-14.5 to 232 psi) ¹⁾
	A6, FKM Viton GLT	-40 to +200 °C (-40 to +392 °F)	

- 1) The pressure range may be further restricted in the event of a CRN approval

FMR67, flush mount antenna, PTFE DN80, UNI flange 316L

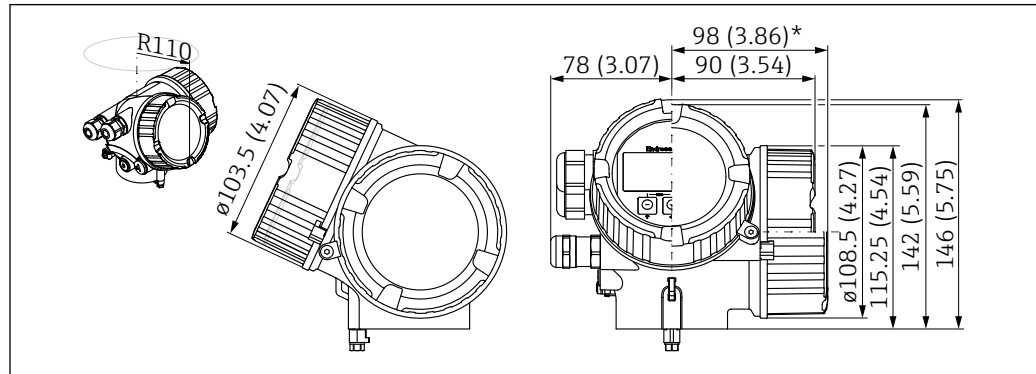
13 FMR67: Permitted range for process temperature and process pressure, antenna, PTFE DN80, UNI flange 316L

- 1 Feature 90, seal: A5, FKM Viton GLT
 2 Feature 90, seal: A6, FKM Viton GLT

Mechanical construction

Dimensions

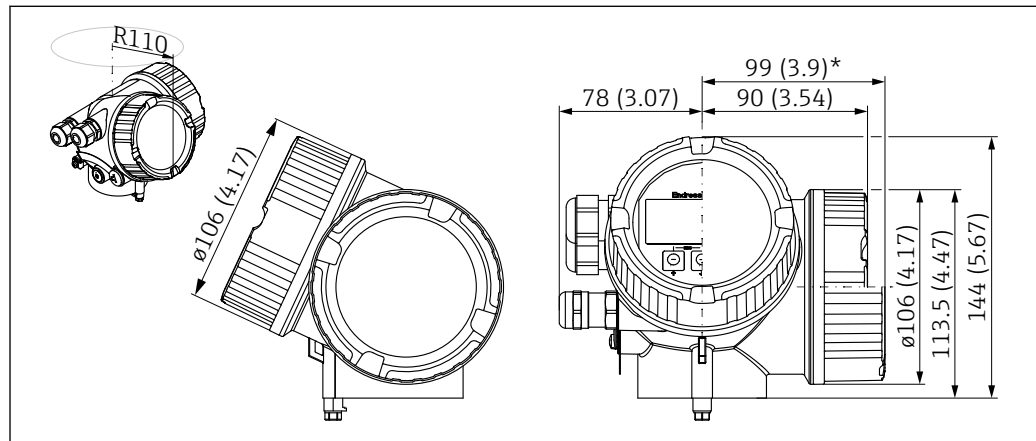
Dimensions of the electronics housing



A0011666

15 Housing GT18 (316L); Dimensions in mm (in)

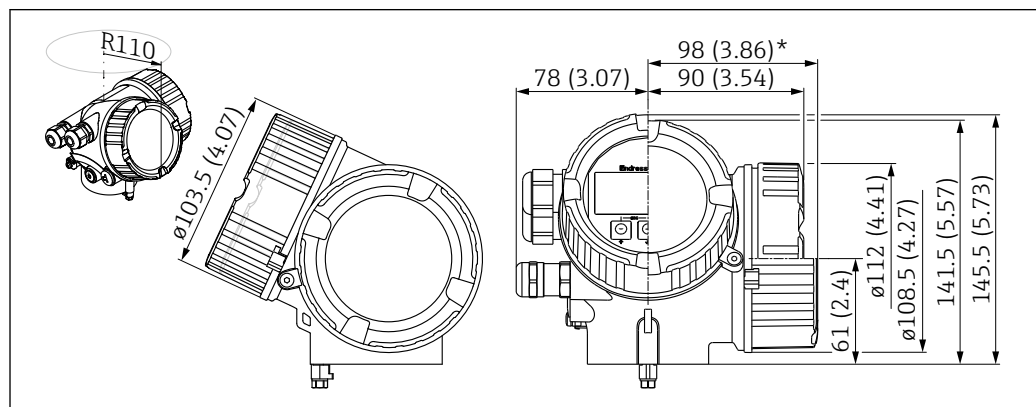
*for devices with integrated overvoltage protection.



A0011346

16 Housing GT19 (Plastics PBT); Dimensions in mm (in)

*for devices with integrated overvoltage protection.



A0020751

17 Housing GT20 (Alu coated); Dimensions in mm (in)

*for devices with integrated overvoltage protection.

Relevant ordering features

Technical drawings of two types of vertical support structures, A and B, showing dimensions in mm and inches.

Structure A:

- Top flange: 22 (0.87)
- Main body height: 127 (5.00)
- Lower section height: 78 (3.07)
- Base diameter: $\phi 42.5$ (1.67)
- Reference line: R

Structure B:

- Top flange: 107 (4.21)
- Lower section height: 205 (8.07)
- Base diameter: $\phi 42.5$ (1.67)

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40 V. 4, Rev. 1, 19-03-2018 Endress+Hauser

Ordering feature	Options
070: Antenna	GA: Drip-off, PTFE 50mm/2"
100: Process Connection	▪ XJG: UNI flange 3"/DN80/80, PP, max 4bar abs/58psia ▪ XKG: UNI flange 4"/DN100/100, PP, max 4bar abs/58psia ▪ XLG: UNI flange 6"/DN150/150, PP, max 4bar abs/58psia
110: Air Purge Connection	▪ 3: Adapter G1/4 ▪ 4: Adapter NPT1/4



<i>R</i>	<i>Reference point of the measurement</i>
<i>1</i>	<i>Bottom edge of housing</i>

Technical drawing of a circular part. The front view (left) shows a circular part with a central hole. The outer diameter is 20 (0.79). There are six holes arranged in a circle, with a 45° angle between the vertical centerline and the center of one hole. The distance between the center of the outer circle and the center of one of the six holes is labeled 'A'. The diameter of one of the six holes is labeled 'D'. The cross-section A-A (right) shows the internal structure. The total thickness of the part is labeled 'C'. The distance from the outer face to the start of the internal feature is labeled 'B'. The distance from the outer face to the center of the internal feature is labeled 'A'. The internal feature is labeled 'M80x1.5'. The cross-section A-A shows a central hole with a diameter of 20 (0.79) and a central feature with a diameter of 1.5. The cross-section A-A shows a central hole with a diameter of 20 (0.79) and a central feature with a diameter of 1.5.

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Feature 100: process connection	Suitable for	A	B	C	D
XJG: UNI flange 3"/DN80/80A, PP	3" 150lbs - DN80 PN16 10K 80A	150 mm (5.9 in)	160 mm (6.3 in)	200 mm (7.9 in)	19 mm (0.75 in)
XKG: UNI flange 4"/DN100/100A, PP	4" 150lbs - DN100 PN16 10K 100A	175 mm (6.9 in)	190.5 mm (7.5 in)	228.6 mm (9 in)	19 mm (0.75 in)
XLG: UNI flange 6"/DN150/150A, PP	6" 150lbs - DN150 PN16 10K 150A	240 mm (9.4 in)	241.3 mm (9.5 in)	285 mm (11.2 in)	23 mm (0.9 in)

Ordering feature	Options
070: Antenna	GP: PTFE flush mount 80mm/3"
090: Seal	■ A5: Viton GLT, -40...150°C/-40...302°F ■ A6: Viton GLT, -40...200°C/-40...392°F
100: Process Connection	■ AGJ: NPS 3" Cl.150 RF, 316/316L flange ASME B16.5 ■ AHJ: NPS 4" Cl.150 RF, 316/316L flange ASME B16.5 ■ CGJ: DN80 PN10/16 B1, 316L flange EN1092-1 ■ CHJ: DN100 PN10/16 B1, 316L flange EN1092-1 ■ KGJ: 10K 80A RF, 316L flange JIS 2220 ■ KHJ: 10K 100A RF, 316L flange JIS 2220
110: Air purge connection	■ 1: G1/4 ■ 2: NPT1/4



A Seal: FKM Viton GLT, -40 to 150°C/-40 to 302°F
 B Seal: FKM Viton GLT, -40 to 200°C/-40 to 392°F
 R Reference point of the measurement
 1 Bottom edge of housing

43

44

Ordering feature	Options
070: Antenna	GP: PTFE flush mount 80mm/3"
090: Seal	■ A5: Viton GLT, -40...150°C/-40...302°F ■ A6: Viton GLT, -40...200°C/-40...392°F
100: Process Connection	■ X3J: UNI flange DN200/8"/200, 316L, max PN1/14,5lbs/1K ■ X5J: UNI flange DN250/10"/250, 316L, max PN1/14,5lbs/1K
110: Air Purge Connection	■ 1: G1/4 ■ 2: NPT1/4



A Seal: FKM Viton GLT, -40 to 150°C/-40 to 302°F
 B Seal: FKM Viton GLT, -40 to 200°C/-40 to 392°F
 R Reference point of the measurement
 1 Bottom edge of housing

Technical drawings of two circular components, labeled 1 and 2, showing front and cross-sectional views with dimensions in mm and inches.

Component 1:

- Front View:** A circular component with a central hole. The outer diameter is $\varnothing 340$ (13.4). The inner diameter is $\varnothing 294.5$ (11.6). There are 12 holes arranged in a circle with a diameter of $\varnothing 26$ (1.02). The holes are spaced at $6 \times 60^\circ$ and $4 \times 90^\circ$. Section lines A-A are indicated.
- Cross-section A-A:** Shows a rectangular cross-section with a width of $\varnothing 80.3$ (3.16) and a height of 8 (0.31).

Component 2:

- Front View:** A circular component with a central hole. The outer diameter is $\varnothing 405$ (15.9). The inner diameter is $\varnothing 358$ (14.1). There are 12 holes arranged in a circle with a diameter of $\varnothing 29$ (1.14). The holes are spaced at $6 \times 60^\circ$. Section lines A-A are indicated.

1 Process connection X3J: UNI flange DN200/8"/200A, 316L
2 Process connection X5J: UNI flange DN250/10"/250A, 316L

Feature 100 "Process connection"	Suitable for	Pressure rating
X3J: UNI flange DN200/8"/200A, 316L	■ 8" 150lbs ■ DN200 PN16 ■ 10K 200A	$p_{abs} < 2 \text{ bar (29 psi)}$
X5J: UNI flange DN250/10"/250A, 316L	■ 10" 150lbs ■ DN250 PN16 ■ 10K 250A	$p_{abs} < 2 \text{ bar (29 psi)}$

Relevant ordering features

 25 Dimensions: mm (in)

- 47

Technical drawing of a circular mechanical part, showing four views: front, top, side, and end view. The drawing includes dimensions in millimeters (mm) and inches (in).

Front View (Top Left): Shows a circular part with a central hole. The outer diameter is $\varnothing 225$ (8.86). The inner diameter is $\varnothing 185$ (7.28). The thickness is $\varnothing 23$ (0.91). The inner hole diameter is $\varnothing 19$ (0.75). The outer hole diameter is $\varnothing 175$ (6.89). The part is divided into four quadrants by section lines A-A.

Top View (Bottom Left): Shows the top of the part. The outer diameter is $\varnothing 340$ (13.4). The inner diameter is $\varnothing 294.5$ (11.6). The thickness is $\varnothing 26$ (1.02). The part is divided into four quadrants by section lines A-A.

Side View (Bottom Right): Shows the side of the part. The outer diameter is $\varnothing 358$ (14.1). The inner diameter is $\varnothing 405$ (15.9). The thickness is $\varnothing 26$ (1.02). The part is divided into four quadrants by section lines A-A.

End View (Top Right): Shows the end of the part. The outer diameter is $\varnothing 280$ (11). The inner diameter is $\varnothing 240$ (9.45). The thickness is $\varnothing 12$ (0.47). The part is divided into four quadrants by section lines A-A.

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-  The number of bolts is reduced in some cases. To match different standards the bores are enlarged. Therefore the bolts should be aligned centrally to the counter flange before tightening.

Part	Weight
GT18 housing - stainless steel	Approx. 4.5 kg (9.9 lb)
GT19 housing - plastic	Approx. 1.2 kg (2.7 lb)
GT20 housing - aluminum	Approx. 1.9 kg (4.2 lb)

Device	Antenna ¹⁾	Weight of antenna / process connection
FMR67	GA: Drip-off, PTFE DN50	Max. 2 kg (4.4 lb) + flange weight ²⁾
	GP: PTFE flush mount DN80	Max. 3.5 kg (7.72 lb) + flange weight ²⁾ Flange weight for process connection with alignment unit, see the following table → 49

- | Antenna ¹⁾ | Process connection ²⁾ | Flange weight
incl. clamping ring |
|------------------------------|---|--------------------------------------|
| GP:
PTFE flush mount DN80 | XCA:
Alignment unit, UNI 4"/DN100/100, aluminum | 1.65 kg (3.64 lb) |
| | XDA:
Alignment unit, UNI 6"/DN150/150, aluminum | 2.45 kg (5.40 lb) |
| | XEA:
Alignment unit, UNI 8"/DN200/200, aluminum | 3.45 kg (7.61 lb) |
| | XFA:
Alignment unit, UNI 10"/DN250/250, aluminum | 4.95 kg (10.91 lb) |

- 49

Materials: GT18 housing
(stainless steel, corrosion-resistant)



No.	Part	Material
1	Housing	CF3M similar to 316L/1.4404
2.1	Cover of the electronics compartment	■ Cover: CF3M (similar to 316L/1.4404) ■ Window: glass ■ Cover seal: NBR ■ Seal of the window: NBR ■ Thread-coating: Graphite-based lubricant varnish
2.2	Cover of the terminal compartment	■ Cover: CF3M (similar to 316L/1.4404) ■ Cover seal: NBR ■ Thread-coating: Graphite-based lubricant varnish
3	Cover lock	■ Screw: A4 ■ Clamp: 316L (1.4404)
4	Lock at the housing neck	■ Screw: A4-70 ■ Clamp: 316L (1.4404)
5.1	Dummy plug, cable gland, adapter or plug (depending on the device version)	■ Dummy plug, depending on the device version: – PE – PBT-GF ■ Cable gland: 316L (1.4404) or nickel-plated brass ■ Adapter: 316L (1.4404/1.4435) ■ Seal: EPDM ■ M12 plug: Nickel-plated brass ¹⁾ ■ 7/8" plug: 316 (1.4401) ²⁾
5.2	Dummy plug, cable gland or adapter (depending on the device version)	■ Dummy plug: 316L (1.4404) ■ Cable gland: 316L (1.4404) or nickel-plated brass ■ Adapter: 316L (1.4404/1.4435) ■ Seal: EPDM
6	Dummy plug or M12 socket (depending on the device version)	■ Dummy plug: 316L (1.4404) ■ M12 socket: 316L (1.4404)
7	Pressure relief stopper	316L (1.4404)
8	Ground terminal	■ Screw: A4 ■ Spring washer: A4 ■ Clamp: 316L (1.4404) ■ Holder: 316L (1.4404)
9	Nameplate	■ Plate: 316L (1.4404) ■ Groove pin: A4 (1.4571)

- 1) For the version with M12 plug the sealing material is Viton.
- 2) For the version with 7/8" plug, the sealing material is NBR.

Materials: GT19 housing (plastic)



- 1) For the version with M12 plug the sealing material is Viton.
- 2) For the version with 7/8" plug, the sealing material is NBR.

Materials: GT20 housing
(die-cast aluminum, powder-coated)



Nr.	Part	Material
1	Housing, RAL 5012 (blue)	■ Housing: AlSi10Mg(<0,1% Cu) ■ Coating: Polyester
2.1	Cover of the electronics compartment; RAL 7035 (gray)	■ Cover: AlSi10Mg(<0,1% Cu) ■ Window: Glass ■ Cover seal: NBR ■ Seal of the window: NBR ■ Thread-coating: Graphite-based lubricant varnish
2.2	Cover of the terminal compartment; RAL 7035 (gray)	■ Cover: AlSi10Mg(<0,1% Cu) ■ Cover seal: NBR ■ Thread-coating: Graphite-based lubricant varnish
3	Cover lock	■ Screw: A4 ■ Clamp: 316L (1.4404)
4	Lock at the housing neck	■ Screw: A4-70 ■ Clamp: 316L (1.4404)
5.1	Dummy plug, cable gland, adapter or plug (depending on the device version)	■ Dummy plug, depending on the device version: – PE – PBT-GF ■ Cable gland, depending on the device version: – Nickel-plated brass (CuZn) – PA ■ Adapter: 316L (1.4404/1.4435) ■ Seal: EPDM ■ M12 plug: Nickel-plated brass ¹⁾ ■ 7/8" plug: 316 (1.4401) ²⁾
5.2	Dummy plug, cable gland or adapter (depending on the device version)	■ Dummy plug, depending on the device version: – PE – PBT-GF – Nickel-plated steel ■ Cable gland, depending on the device version: – Nickel-plated brass (CuZn) – PA ■ Adapter: 316L (1.4404/1.4435) ■ Seal: EPDM
6	Dummy plug or M12 socket (depending on the device version)	■ Dummy plug : Nickel-plated brass (CuZn) ■ M12 socket: Nickel-plated GD-Zn
7	Pressure relief stopper	Nickel-plated brass (CuZn)

- 1) For the version with M12 plug the sealing material is Viton.
- 2) For the version with 7/8" plug, the sealing material is NBR.

FMR67



B Antenna flush mount DN80

Threaded fasteners	A4-70 A2-70
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C Antenna flush mount DN80 with alignment device

No.	Component part	Material
1	Antenna	PTFE
	Seals	Viton: FKM
2	Flange / process connection	Aluminum
3	Antenna adapter, housing adapter	316L / 1.4404
4	Housing seal	EPDM
5	Threaded adapter, screw plug Purge air adapter	316L / 1.4404
6	Sensor adapter with alignment device	316L / 1.4404
7	Lock washer	3.1645 / aluminum
	Threaded fasteners	A4-70 A2-70

Operating concept

- Commissioning
- Operation
- Diagnostics
- Expert level

- English
- Deutsch
- Français
- Español
- Italiano
- Nederlands
- Portuguesa
- Polski
- русский язык (Russian)
- Svenska
- Türkçe
- 中文 (Chinese)
- 日本語 (Japanese)
- 한국어 (Korean)
- Bahasa Indonesia
- tiếng Việt (Vietnamese)
- čeština (Czech)

 Feature 500 of the product structure determines which of these languages is preset on delivery.

- Interactive wizard with graphical interface for easy commissioning via FieldCare/DeviceCare
- Menu guidance with brief explanations of the individual parameter functions
- Standardized operation at the device and in the operating tools

- Enables transfer of configuration when changing electronic modules
- Records up to 100 event messages in the device
- Records up to 1000 measured values in the device
- Saves the signal curve on commissioning which can later be used as a reference.

- Remedy information is integrated in plain text
- Diverse simulation options and line recorder functions

- Easy and fast setup via SmartBlue (app)
- No additional tools or adapters required
- Signal curve via SmartBlue (app)
- Encrypted single point-to-point data transmission (Fraunhofer-Institut, third party, tested) and password-protected communication via Bluetooth® wireless technology

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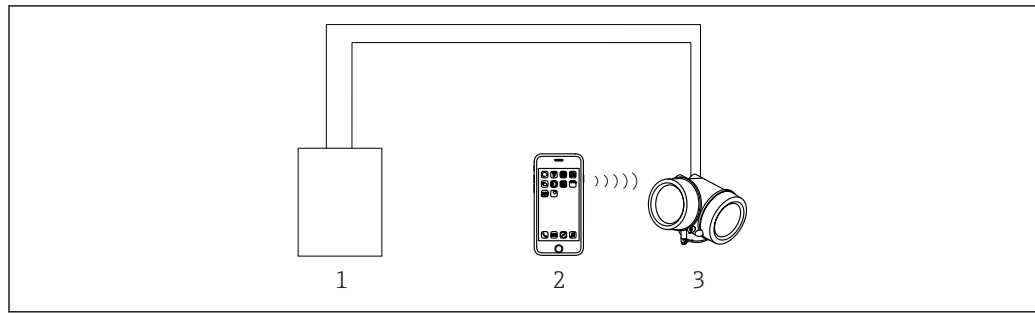
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- A0036314

Operation via Bluetooth® wireless technology



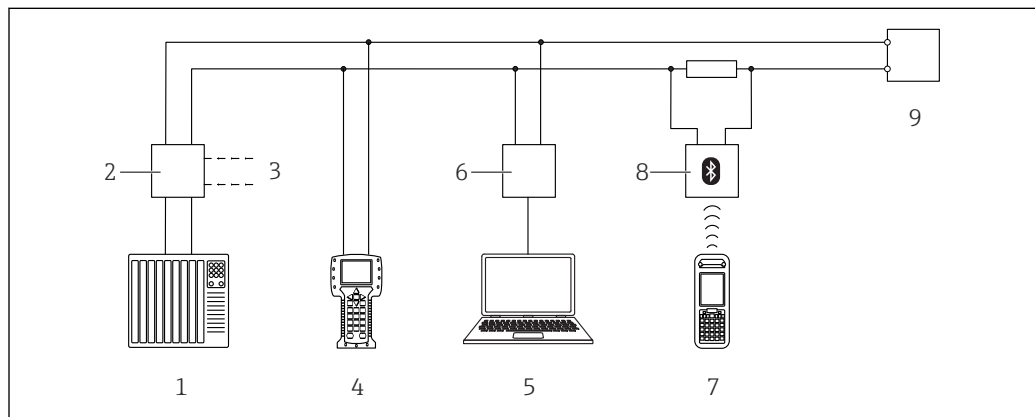
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28 Possibilities for remote operation via Bluetooth® wireless technology

- 1 Transmitter power supply unit
- 2 Smartphone / tablet with SmartBlue (app)
- 3 Transmitter with Bluetooth® wireless technology

Remote operation

Via HART protocol

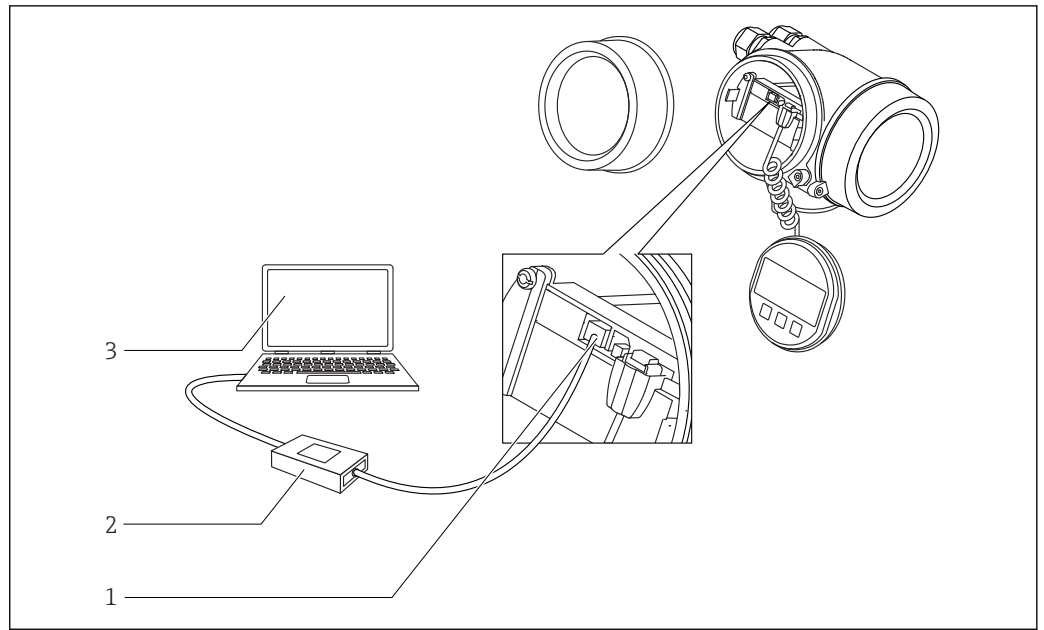


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29 Options for remote operation via HART protocol

- 1 PLC (programmable logic controller)
- 2 Transmitter power supply unit, e.g. RN221N (with communication resistor)
- 3 Connection for Commubox FXA191, FXA195 and Field Communicator 375, 475
- 4 Field Communicator 475
- 5 Computer with operating tool (e.g. DeviceCare/FieldCare, AMS Device Manager, SIMATIC PDM)
- 6 Commubox FXA191 (RS232) or FXA195 (USB)
- 7 Field Xpert SFX350/SFX370
- 8 VIATOR Bluetooth modem with connecting cable
- 9 Transmitter

DeviceCare/FieldCare via service interface (CDI)



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30 DeviceCare/FieldCare via service interface (CDI)

- 1 Service interface (CDI) of the instrument (= Endress+Hauser Common Data Interface)
- 2 Commubox FXA291
- 3 Computer with DeviceCare/FieldCare operating tool

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

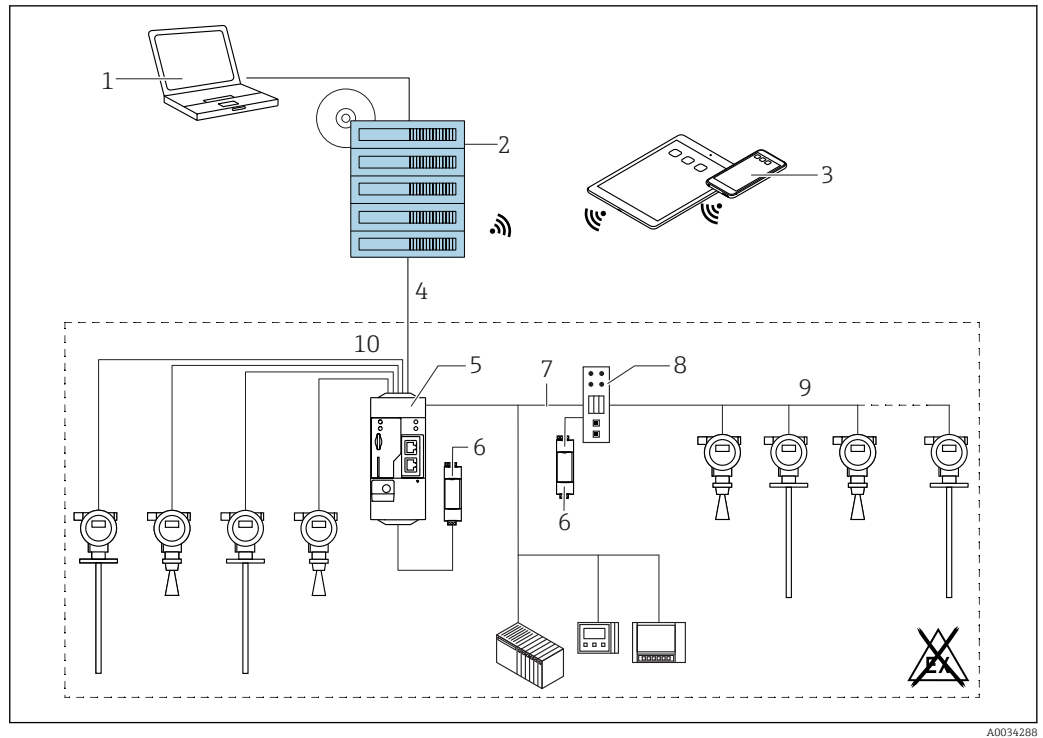
All the tanks and the tank inventories are represented graphically on a map (based on Google Maps). The tanks and inventory situations can be filtered by tank group, product, supplier or location.

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.



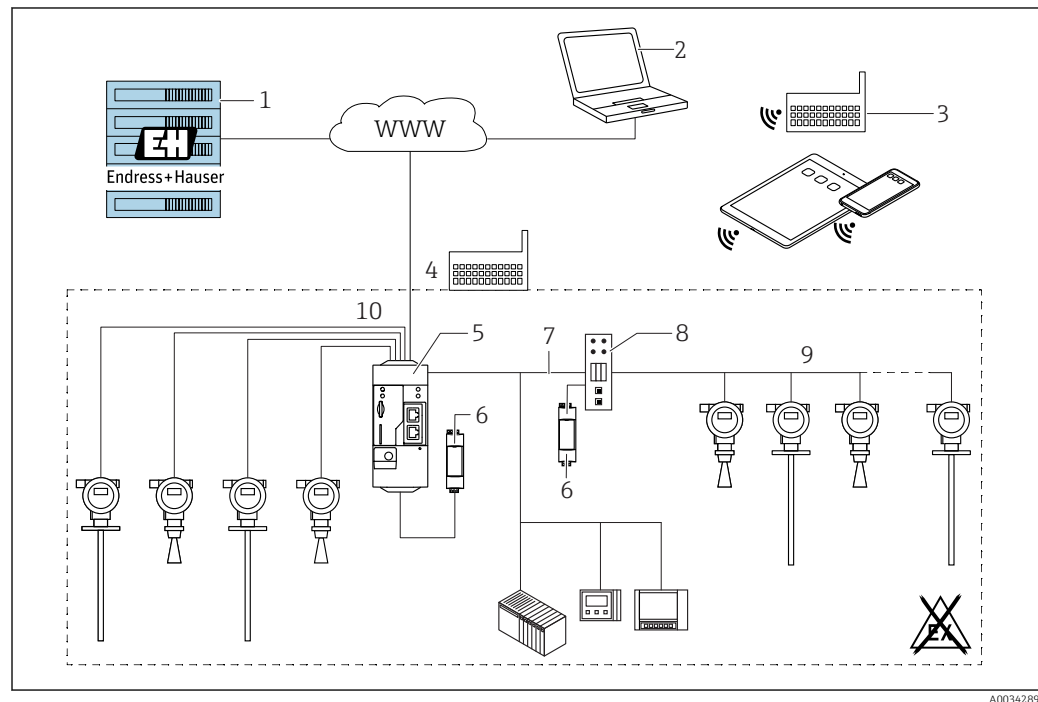
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31 Example of inventory management platform with SupplyCare Enterprise SCE30B

- 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.



32 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.

CE mark

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

RoHS

RCM-Tick marking



A0029561

Ex approval

- ATEX
- IECEx
- CSA
- FM
- NEPSI
- KC
- INMETRO
- TIIS ⁸⁾
- EAC

Additional safety instructions must be followed for use in hazardous areas. Please refer to the separate "Safety Instructions" (XA) document included in the delivery. Reference to the applicable XA can be found on the nameplate.



For details on the available certificates and associated XAs: → 84

Dual seal according to
ANSI/ISA 12.27.01

The devices have been designed according to ANSI/ISA 12.27.01 as dual seal devices, allowing the user to waive the use and save the cost of installing external secondary process seals in the conduit as required by the process sealing sections of ANSI/NFPA 70 (NEC) and CSA 22.1 (CEC) These instruments comply with the North-American installation practice and provide a very safe and cost-saving installation for pressurized applications with hazardous fluids.

Further information can be found in the Safety Instructions (XA) of the relevant devices.

Functional safety

Use for level monitoring (MIN, MAX, range) up to SIL 3 (homogeneous or diverse redundancy), independently evaluated by TÜV Rheinland in accordance with IEC 61508, refer to the "Functional Safety Manual" for information.

WHG

WHG approval: No. requested

Pressure equipment with allowable pressure ≤ 200 bar (2 900 psi)

Pressure instruments with a flange and threaded boss that do not have a pressurized housing do not fall within the scope of the Pressure Equipment Directive, irrespective of the maximum allowable pressure.

Reasons:

According to Article 2, point 5 of EU Directive 2014/68/EU, pressure accessories are defined as "devices with an operational function and having pressure-bearing housings".

8) in preparation

If a pressure instrument does not have a pressure-bearing housing (no identifiable pressure chamber of its own), there is no pressure accessory present within the meaning of the Directive.

Marine approval

Device	Marine approval ¹⁾			
	LF: ABS marine approval	LG: LR marine approval	LH: BV marine approval	LJ: DNV GL marine approval
FMR67	✓	✓	✓	✓

1) See order code for 590 "Additional approval"

**Radio standard
EN 302729-1/2**

The devices comply with the Level Probing Radar (LPR) radio standard EN 302729-1/2. The devices are approved for unrestricted use inside and outside closed containers in countries of the EU and the EFTA that have already implemented this standard.

The following countries are those that have currently implemented the directive:

Belgium, Bulgaria, Germany, Denmark, Estonia, France, Greece, UK, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Latvia, Malta, The Netherlands, Norway, Austria, Poland, Portugal, Romania, Sweden, Switzerland, Slovakia, Spain, Czech Republic and Cyprus.

Implementation is still underway in all of the countries not listed.

Please note the following for operation of the devices outside of closed vessels:

1. Installation must be carried out by properly trained, expert staff.
2. The device antenna must be installed in a fixed location pointing vertically downwards.
3. The installation site must be located at a distance of 4 km from the astronomy stations listed below or otherwise approval must be provided by the relevant authority. If the device is installed at a distance of 4 to 40 km from one of the listed stations, it must not be installed at a height of more than 15 m (49 ft) above the ground.

Astronomy stations

Country	Name of the station	Latitude	Longitude
Germany	Effelsberg	50°31'32" North	06°53'00" East
Finland	Metsähovi	60°13'04" North	24°23'37" East
	Tuorla	60°24'56" North	24°26'31" East
France	Plateau de Bure	44°38'01" North	05°54'26" East
	Floirac	44°50'10" North	00°31'37" West
Great Britain	Cambridge	52°09'59" North	00°02'20" East
	Damhall	53°09'22" North	02°32'03" West
	Jodrell Bank	53°14'10" North	02°18'26" West
	Knockin	52°47'24" North	02°59'45" West
	Pickmere	53°17'18" North	02°26'38" West
Italy	Medicina	44°31'14" North	11°38'49" East
	Noto	36°52'34" North	14°59'21" East
	Sardinia	39°29'50" North	09°14'40" East
Poland	Fort Skala Krakow	50°03'18" North	19°49'36" East
Russia	Dmitrov	56°26'00" North	37°27'00" East
	Kalyazin	57°13'22" North	37°54'01" East
	Pushchino	54°49'00" North	37°40'00" East
	Zelenchukskaya	43°49'53" North	41°35'32" East
Sweden	Onsala	57°23'45" North	11°55'35" East
Switzerland	Bleien	47°20'26" North	08°06'44" East

Radio standard
EN 302372-1/2

FCC

In addition, the devices are compliant with Section 15.256 . For these LPR (Level Probe Radar) applications the devices must be professionally installed in a downward operating position. In addition, the devices are not allowed to be mounted in a zone of 4 km around RAS stations and within a radius of 40 km around RAS stations the maximum operation height of devices is 15 m (49 ft) above ground.

Canada CNR-Gen Section 7.1.3

- The installation of the LPR/TLPR device shall be done by trained installers, in strict compliance with the manufacturer's instructions.
- The use of this device is on a "no-interference, no-protection" basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. However, devices found to interfere with primary licensing operations will be required to be removed at the user's expense.
- This device shall be installed and operated in a completely enclosed container to prevent RF emissions, which can otherwise interfere with aeronautical navigation.
- The installer/user of this device shall ensure that it is at least 10 km from the Dominion Astrophysical Radio Observatory (DRAO) near Penticton, British Columbia. The coordinates of the DRAO are latitude 49°19'15" N and longitude 119°37'12" W. For devices not meeting this 10 km separation (e.g., those in the Okanagan Valley, British Columbia,) the installer/user must coordinate with, and obtain the written concurrence of, the Director of the DRAO before the equipment can be installed or operated. The Director of the DRAO may be contacted at 250-497-2300 (tel.) or 250-497-2355 (fax). (Alternatively, the Manager, Regulatory Standards Industry Canada, may be contacted.)



CRN approval

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- Process connections that do not have CRN approval are not listed in this table.
 - Please refer to the product structure to discover which process connections are available for a specific device type.
 - CRN-approved devices bear the registration number (tbd.) on the nameplate.
-  An additional pressure restriction applies for the device versions listed in the table below if they are CRN-approved. The pressure range indicated in the "Process" section →  35 continues to apply for device versions not listed in the table below (in preparation).

Feature 100 in the product structure	Process connection
AGJ	NPS 3" Cl.150 RF, 316/316L
AHJ	NPS 4" Cl.150 RF, 316/316L
RGJ	Thread ANSI MNPT1-1/2, 316L

- Process connections that do not have CRN approval are not listed in this table.
 - Please refer to the product structure to discover which process connections are available for a specific device type.
 - CRN-approved devices bear the registration number (tbd.) on the nameplate.
-  An additional pressure restriction applies for the device versions listed in the table below if they are CRN-approved. The pressure range indicated in the "Process" section →  35 continues to apply for device versions not listed in the table below (in preparation).

Test, certificate

Test reports, declarations and inspection certificates are available in electronic format in the *W@M Device Viewer*:

This concerns the options for the following order codes:

- ### Hard-copy product documentation

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Other standards and guidelines

- EN 60529
Degrees of protection provided by enclosures (IP code)
- EN 61010-1
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use
- IEC/EN 61326
"Emission in accordance with Class A requirements". Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 43
Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 107
Status classification as per NE107
- NAMUR NE 131
Requirements for field devices for standard applications.
- IEC61508
Functional safety of safety-related electric/electronic/programmable electronic systems

Ordering information

- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.

- **Product Configurator** - the tool for individual product configuration



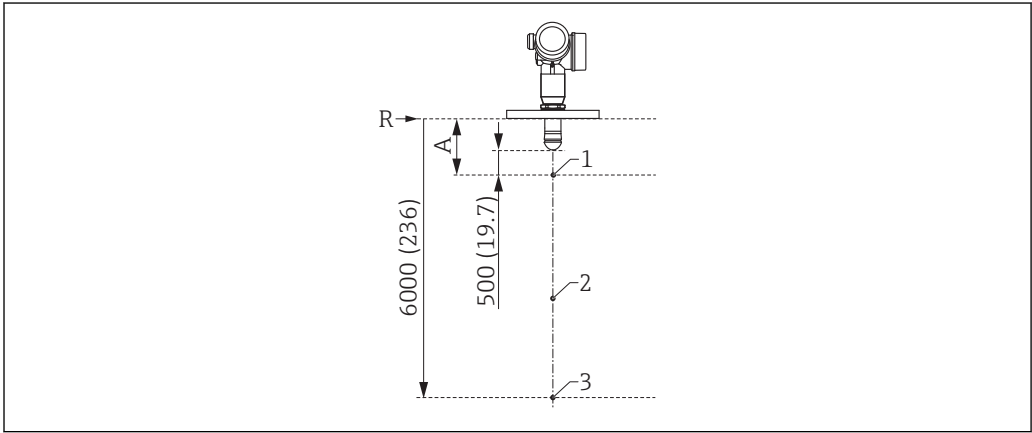
- Up-to-the-minute configuration data

- 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

i The following points must be considered if option F3 (3-point linearity protocol) was selected in feature 550 ("Calibration").

The 3 points of the linearity protocol are defined as follows:



A0032642

33 Points of the 3-point linearity protocol; engineering unit: mm (in)

- A Distance from the reference point R to the first measuring point
- R Reference point of measurement
- 1 First measuring point
- 2 Second measuring point (in the middle between the first and third measuring point)
- 3 Third measuring point

Measuring point	Position
1st measuring point	- At a distance A from the reference point - A = length of antenna + 500 mm (19.7 in) - Minimum distance: A_{min} = 1 000 mm (39.4 in)
2nd measuring point	In the middle between the 1st and 3rd measuring point
3rd measuring point	6 000 mm (236 in) below the reference point R

i The position of the measuring points can vary by ±1 cm (±0.04 in).

i The linearity check is performed under reference operating conditions.

The 5 points of the linearity protocol are evenly distributed over the measuring range (0% - 100%). **Empty calibration** (E) and **Full calibration** (F) must be specified in order to define the measuring range⁹⁾.

A diagram showing a vertical stack of three rectangular blocks. The top block has a height of A . The middle block has a height of E . The bottom block has a height of F . A horizontal dashed line extends from the top of the stack, and a vertical dashed line extends from the bottom of the stack. A radius R is indicated at the top left corner of the stack.

1) minimum value for FMR67: 861 mm (16 in)



The selected values for **Empty calibration** and **Full calibration** are only used to create the linearity protocol. Afterwards, the values are reset to the default values specific for the antenna. If values other than the default values are required, they must be ordered as a customized parameterization → 📄 72.

Endress+Hauser

Services

The following services can be selected via the product structure in the Product Configurator¹⁰⁾:

Ordering feature	895: Marking
Option	Z1: Tagging (TAG), see additional spec.
Position of the measuring point marking	To be selected in the additional specifications: ■ Tag plate Stainless Steel ■ Self-adhesive paper label ■ Supplied label/plate ■ RFID TAG ■ RFID TAG + Tag plate Stainless Steel ■ RFID TAG + Self-adhesive paper label ■ RFID TAG + Supplied label/plate
Definition of the measuring point designation	To be defined in the additional specifications: 3 lines containing up to 18 characters each The measuring point designation appears on the selected label and/or the RFID TAG.
Designation in the Electronic Name Plate (ENP)	The first 32 characters of the measuring point designation
Designation on the display module	The first 12 characters of the measuring point designation

- Customized parameterization HART →  72
- Customized parameterization PA →  72
- Customized parameterization FF →  72

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Application Packages

Heartbeat Diagnostics

Availability

Available in all device versions.

Function

- Continuous self-monitoring of the device.
- Diagnostic messages output to
 - the local display.
 - an asset management system (e.g. FieldCare/DeviceCare).
 - an automation system (e.g. PLC).

Advantages

- Device condition information is available immediately and processed in time.
- The status signals are classified in accordance with VDI/VDE 2650 and NAMUR recommendation NE 107 and contain information about the cause of the error and remedial action.

Detailed description

See Operating Instructions of the device (→  84); chapter "Diagnostics and trouble shooting"

Heartbeat Verification

Availability

Available for the following options of feature 540 "Application Package":

- EH: Heartbeat Verification + Monitoring
- EJ: Heartbeat Verification

Device functionality checked on demand

- Verification of the correct functioning of the measuring device within specifications.
- The verification result provides information about the condition of the device: **Passed** or **Failed**.
- The results are documented in a verification report.
- The automatically generated report supports the obligation to demonstrate compliance with internal and external regulations, laws and standards.
- Verification is possible without interrupting the process.

Advantages

- No onsite presence is required to use the function.
- The DTM ¹¹⁾ triggers verification in the device and interprets the results. No specific knowledge is required on the part of the user.
- The verification report can be used to prove quality measures to a third party.
- **Heartbeat Verification** can replace other maintenance tasks (e.g. periodic check) or extend the test intervals.

SIL/WHG-locked devices ¹²⁾

- The **Heartbeat Verification** module contains a wizard for the proof test which must be performed at appropriate intervals for the following applications:
 - SIL (IEC61508/IEC61511)
 - WHG (German Water Resources Act)
- To perform a proof test, the device must be locked (SIL/WHG locking).
- The wizard can be used via FieldCare, DeviceCare or a DTM-based process control system.

 In the case of SIL-locked and WHG-locked devices, it is **not** possible to perform verification without additional measures (e.g. by-passing of the output current) because the output current must be simulated (Increased safety mode) or the level must be approached manually (Expert mode) during subsequent re-locking (SIL/WHG locking).

Detailed description



SD01870F

11) DTM: Device Type Manager; controls device operation via DeviceCare, FieldCare or a DTM-based process control system.

12) Only relevant for devices with SIL or WHG approval: order code 590 ("Additional approval"), option LA ("SIL") or LC ("WHG").

Availability

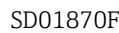
Function

- ## "Foam detection" wizard

- ## "Build-up detection" wizard

- ### Advantages

- ### Detailed description



Weather protection cover

Weather protection cover

 34 *Weather protection cover; Dimensions: mm (in)*

 The weather protection cover can be ordered together with the device (product structure, feature 620 "Accessory Enclosed", option PB "Weather Protection Cover").
Alternatively, it can be separately ordered as an accessory; order code 71162242.

Adjustable flange seal

A0032292

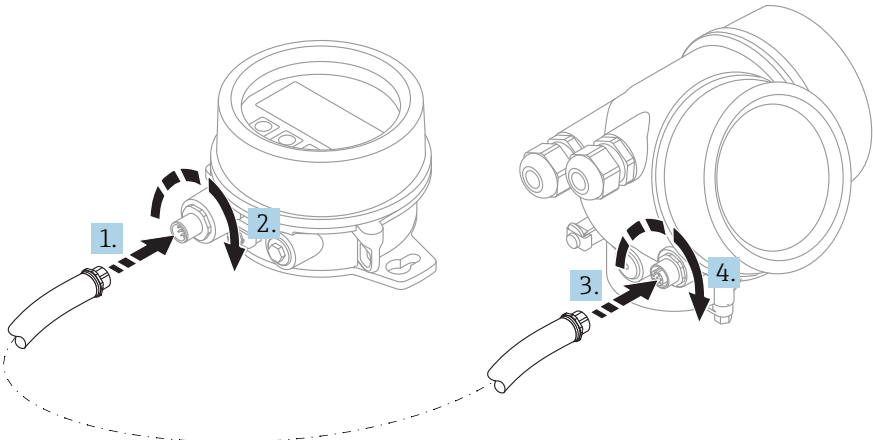
Accessories	Description			
	Technical data: version ASME/JIS			
	Order number	71249070	71249072	71249073
	Compatible with	■ ASME 3" 150lbs ■ JIS 80A 10K	ASME 4" 150lbs	ASME 6" 150lbs
	Recommended screw length	100 mm (3.9 in)	100 mm (3.9 in)	110 mm (4.3 in)
	Recommended screw size	M14	M14	M18
	Material	EPDM		
	Process pressure	−0.1 to 0.1 bar (−1.45 to 1.45 psi)		
	Process temperature	−40 to +80 °C (−40 to +176 °F)		
	D	133 mm (5.2 in)	171 mm (6.7 in)	219 mm (8.6 in)
	d	89 mm (3.5 in)	115 mm (4.53 in)	168 mm (6.6 in)
	h	22 mm (0.87 in)	23.5 mm (0.93 in)	26.5 mm (1.04 in)
	h _{min}	14 mm (0.55 in)	14 mm (0.55 in)	14 mm (0.55 in)
	h _{max}	30 mm (1.18 in)	33 mm (1.3 in)	39 mm (1.45 in)

Mounting bracket adjustable

A0032295

- 1) Feature 040 in the product structure
- 2) Feature 070 in the product structure
- 3) Feature 100 in the product structure

Remote display FHX50

Accessories	Description
Remote display FHX50	 A0019128 - Material: - Plastic PBT 316L/1.4404 - Aluminum - Degree of protection: IP68 / NEMA 6P and IP66 / NEMA 4x - Suitable for display modules: - SD02 (push buttons) - SD03 (touch control) - Connecting cable: - Cable supplied with device up to 30 m (98 ft) - Standard cable supplied by customer up to 60 m (196 ft) - Ambient temperature range: -40 to 80 °C (-40 to 176 °F) - Ambient temperature range (option): -50 to 80 °C (-58 to 176 °F) ¹⁾  - If the remote display should be used, order the device version "Prepared for display FHX50" (feature 030, version L or M). For the FHX50, you must select option A: "Prepared for display FHX50" under feature 050 "Measuring device version". - If the device version "Prepared for display FHX50" was not originally ordered and a FHX50 display is to be retrofitted, you must select version B "Not prepared for display FHX50" under feature 050: "Measuring device version" when ordering the FHX50. In this case, a retrofit kit for the device is supplied with the FHX50. The kit can be used to prepare the device so that the FHX50 can be used.  Use of the FHX50 may be restricted for transmitters with an approval. A device can only be retrofitted with the FHX50 if the option L or M ("Prepared for FHX50") is listed under <i>Basic specifications</i>, item 4 "Display, operation" in the Safety Instructions (XA) for the device. Also pay attention to the Safety Instructions (XA) of the FHX50.  Retrofitting is not possible on transmitters with: - An approval for use in areas with flammable dust (dust ignition-proof approval) - Ex nA type of protection  For details, see document SD01007F.

1) This range is valid if option JN "Ambient temperature transmitter -50 °C (-58 °F)" has been selected in ordering feature 580 "Test, Certificate". If the temperature is permanently below -40 °C (-40 °F), failure rates may be increased.

Overvoltage protection

Accessory	Description
Overvoltage protection for 2-wire-devices OVP10 (1 channel) OVP20 (2 channel)	A0021734 Technical data ■ Resistance per channel: $2 \cdot 0.5 \Omega_{\max}$ ■ Threshold DC voltage: 400 to 700 V ■ Threshold impulse voltage: < 800 V ■ Capacitance at 1 MHz: < 1.5 pF ■ Nominal arrest impulse voltage (8/20 μs): 10 kA ■ Suited for wire cross-sections: 0.2 to 2.5 mm² (24 to 14 AWG) i Ordering with device The overvoltage protection module is preferably ordered with the device. See product structure, feature 610 "Accessory mounted", option NA "Overvoltage protection". Separate ordering of the module is only necessary if a device is to be retrofitted with the overvoltage protection. i Order code for retrofitting ■ For 1-channel devices (feature 020, option A) OVP10: 71128617 ■ For 2-channel devices (feature 020, option B, C, E or G) OVP20 : 71128619 Housing lid for retrofitting In order to keep the necessary safety distances, the housing lid needs to be replaced if the device is retrofitted with the overvoltage protection. Depending on the housing type, the order code of the suitable lid is as follows: ■ GT18 housing: Lid 71185516 ■ GT19 housing: Lid 71185518 ■ GT20 housing: Lid 71185516 i Restrictions for retrofitting Depending on the approval of the transmitter the usage of the OVP module may be restricted. A device may only be retrofitted with an OVP module if the option NA (overvoltage protection) is quoted under <i>Optional Specifications</i> in the Safety Instructions (XA) pertaining to the device. i For details refer to SD01090F.

Communication-specific accessories

Accessory	Description
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface.  For details refer to Technical Information TI00404F

Accessory	Description
Commubox FXA291	Connects Endress+Hauser field devices with CDI interface (= Endress+Hauser Common Data Interface) to the USB interface of a computer. Order code: 51516983  For details refer to Technical Information TI00405C

Accessory	Description
HART Loop Converter HMX50	Evaluates the dynamic HART variables and converts them to analog current signals or limit values. Order code: 71063562  For details refer to Technical Information TI00429F and Operating Instructions BA00371F

Accessory	Description
WirelessHART Adapter SWA70	Connects field devices to a WirelessHART network. The WirelessHART adapter can be mounted directly at a HART device and is easily integrated into an existing HART network. It ensures safe data transmission and can be operated in parallel with other wireless networks.  For details refer to Operating Instructions BA00061S

Accessories	Description
Connect Sensor FXA30/FXA30B	Fully integrated, battery-powered gateway for simple applications with SupplyCare Hosting. Up to 4 field devices with 4 to 20 mA communication (FXA30/FXA30B), serial Modbus (FXA30B) or HART (FXA30B) can be connected. 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.  For details, see "Technical Information" TI01356S and Operating Instructions BA01710S.

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

Accessories	Description
SupplyCare Enterprise SCE30B	Inventory management software that visualizes levels, volumes, masses, temperatures, pressures, densities or other tank parameters. The parameters are recorded and transmitted by means of gateways of the type Fieldgate FXA42. 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.  For details, see "Technical Information" TI01228S and Operating Instructions BA00055S

Accessory	Description
Field Xpert SFX350	Field Xpert SFX350 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION fieldbus devices in the non-Ex area.  For details, see Operating Instructions BA01202S

Service-specific accessories

System components

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Supplementary documentation

-  For an overview of the scope of the associated Technical Documentation, refer to the following:
- The *W@M Device Viewer*: enter the serial number from the nameplate (www.endress.com/deviceviewer)
 - The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

 The following document types are available:
In the Download Area of the Endress+Hauser Internet site: www.endress.com → Downloads

Standard documentation

Micropilot FMR67

Correlation of documentations to the device:

Device	Power supply, output ¹⁾	Communication	Document type	Document code
FMR67	A, B, C, K, L	HART	Operating Instructions	BA01620F
			Brief Operating Instructions	KA01253F
			Description of Device Parameters	GP01101F

1) Feature 020 in the product structure

Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

 The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Feature 010	Approval	Feature 020 "Power Supply; Output"		
		A ¹⁾	B ²⁾	C ³⁾
BA	ATEX II 1G Ex ia IIC T6 Ga	XA01549F	XA01549F	XA01549F
BB	ATEX II 1/2G Ex ia IIC T6 Ga/Gb	XA01549F	XA01549F	XA01549F
BC	ATEX II 1/2G Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01552F	XA01552F	XA01552F
BD	ATEX II 1/2/3G Ex ia/ic [ia Ga] IIC T6 Ga/Gb/Gc	XA01550F	XA01550F	XA01550F
BE	ATEX II 1D Ex ta IIIC Da	* 4)	* 4)	* 4)
BF	ATEX II 1/2D Ex ta/tb IIIC T85°C Da/Db	XA01554F	XA01554F	XA01554F
BG	ATEX II 3G Ex ec IIC T6 Gc	XA01551F	XA01551F	XA01551F
BH	ATEX II 3G Ex ic IIC T6 Gc	XA01551F	XA01551F	XA01551F
BL	ATEX II 1/2/3G Ex ia/ec [ia Ga] IIC T6 Ga/Gb/Gc	XA01550F	XA01550F	XA01550F
B2	ATEX II 1/2G Ex ia IIC T6 Ga/Gb, 1/2D Ex ia IIIC T85°C Da/Db	XA01555F	XA01555F	XA01555F
B3	ATEX II 1/2G Ex ia/db [ia Ga] IIC T6, Ga/Gb 1/2D Ex ta/tb IIIC T85°C Da/Db	XA01556F	XA01556F	XA01556F
CB	CSA IS Cl.I Div.1 Gr.A-D	XA01612F	XA01612F	XA01612F
CD	CSA DIP Cl.II,III Div.1 Gr.E-G [Ex ia]	XA01613F	XA01613F	XA01613F
C2	CSA IS Cl.I,II,III Div.1 Gr.A-G, Ex ia, NI Cl.1 Div.2 [Ex ia]	XA01612F	XA01612F	XA01612F
C3	CSA XP Cl.I,II,III Div.1 Gr.A-G, Zn0/1, NI Cl.I Div.2 [Ex ia]	XA01613F	XA01613F	XA01613F
FA	FM IS Cl.I Div.1 Gr.A-D	XA01615F	XA01615F	XA01615F
FB	FM IS Cl.I,II,III Div.1 Gr.A-G, AEx ia, NI Cl.1 Div.2	XA01615F	XA01615F	XA01615F
FC	FM XP-IS Cl.I Div.1 Gr.A-D, AIS Cl.I Div.1 Gr.A-D	XA01616F	XA01616F	XA01616F
FD	FM XP-IS Cl.I Div.1 Gr.A-D, Zn0/1, DIP-IS Cl.II,III Div.1 Gr.E-G, NI Cl.I Div.2	XA01616F	XA01616F	XA01616F
FE	FM DIP Cl.II,III Div.1 Gr.E-G	XA01616F	XA01616F	XA01616F
GA	EAC OEx ia IIC T6...T3 Ga X	XA01617F	XA01617F	XA01617F

Feature 010	Approval	Feature 020 "Power Supply; Output"		
		A ¹⁾	B ²⁾	C ³⁾
GB	EAC Ga/Gb Ex ia IIC T6...T3 X	XA01617F	XA01617F	XA01617F
GC	EAC Ga/Gb Ex ia/db [ia Ga] IIC T6...T3 X	XA01618F	XA01618F	XA01618F
GE	EAC Ex ta IIIC Da	★ ⁴⁾	★ ⁴⁾	★ ⁴⁾
GF	EAC Ex ta/tb IIIC T85°C Da/Db X	XA01619F	XA01619F	XA01619F
IA	IEC Ex ia IIC T6 Ga	XA01549F	XA01549F	XA01549F
IB	IEC Ex ia IIC T6 Ga/Gb	XA01549F	XA01549F	XA01549F
IC	IEC Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01552F	XA01552F	XA01552F
ID	IEC Ex ia/ic [ia Ga] IIC T6 Ga/Gb/Gc	XA01550F	XA01550F	XA01550F
IE	IEC Ex ta IIIC Da	★ ⁴⁾	★ ⁴⁾	★ ⁴⁾
IF	IEC Ex ta/tb IIIC T85°C Da/Db	XA01554F	XA01554F	XA01554F
IG	IEC Ex ec IIC T6 Gc	XA01551F	XA01551F	XA01551F
IH	IEC Ex ic IIC T6 Gc	XA01551F	XA01551F	XA01551F
IL	IEC Ex ia/ec [ia Ga] IIC T6 Ga/Gb/Gc	XA01550F	XA01550F	XA01550F
I2	IEC Ex ia IIC T6 Ga/Gb, Ex ia IIIC T85°C Da/Db	XA01555F	XA01555F	XA01555F
I3	IEC Ex ia/db [ia Ga] IIC T6 Ga/Gb, Ex ta/tb IIIC T85°C Da/Db	XA01556F	XA01556F	XA01556F
JA	JPN Ex ia IIC T6 Ga	XA01631F ⁴⁾	XA01631F ⁴⁾	XA01631F ⁴⁾
JB	JPN Ex ia IIC T6 Ga/Gb	XA01631F ⁴⁾	XA01631F ⁴⁾	XA01631F ⁴⁾
JC	JPN Ex d [ia] IIC T6 Ga/Gb	XA01632F ⁴⁾	XA01632F ⁴⁾	XA01632F ⁴⁾
JG	JPN Ex nA IIC T6 Gc	XA01725F ⁴⁾	XA01725F ⁴⁾	XA01725F ⁴⁾
JH	JPN Ex ic IIC T6 Gc	XA01725F ⁴⁾	XA01725F ⁴⁾	XA01725F ⁴⁾
J2	JPN Ex ia IIC T6 Ga/Gb, JPN Ex ia IIIC T85°C Da/Db	XA01728F ⁴⁾	XA01728F ⁴⁾	XA01728F ⁴⁾
J3	JPN Ex d [ia] IIC T6 Ga/Gb, JPN Ex ta/tb IIIC T85°C Da/Db	XA01729F ⁴⁾	XA01729F ⁴⁾	XA01729F ⁴⁾
KA	KC Ex ia IIC T6 Ga	XA01623F ⁴⁾	XA01623F ⁴⁾	XA01623F ⁴⁾
KB	KC Ex ia IIC T6 Ga/Gb	XA01623F ⁴⁾	XA01623F ⁴⁾	XA01623F ⁴⁾
KC	KC Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01624F ⁴⁾	XA01624F ⁴⁾	XA01624F ⁴⁾
MA	INMETRO Ex ia IIC T6 Ga	XA01620F	XA01620F	XA01620F
MB	INMETRO Ex ia IIC T6 Ga/Gb	XA01620F	XA01620F	XA01620F
ME	INMETRO Ex ta IIIC Da	★ ⁴⁾	★ ⁴⁾	★ ⁴⁾
MG	INMETRO Ex ec IIC T6 Gc	XA01621F	XA01621F	XA01621F
MH	INMETRO Ex ic IIC T6 Gc	XA01621F	XA01621F	XA01621F
NA	NEPSI Ex ia IIC T6 Ga	XA01625F	XA01625F	XA01625F
NB	NEPSI Ex ia IIC T6 Ga/Gb	XA01625F	XA01625F	XA01625F
NC	NEPSI Ex ia/d [ia Ga] IIC T6 Ga/Gb	XA01627F	XA01627F	XA01627F
NF	NEPSI Ex tD A20/A21 IP6X T85°C	XA01628F	XA01628F	XA01628F
NG	NEPSI Ex nA IIC T6 Gc	XA01626F	XA01626F	XA01626F
NH	NEPSI Ex ic IIC T6 Gc	XA01626F	XA01626F	XA01626F
N2	NEPSI Ex ia IIC T6 Ga/Gb, NEPSI Ex iaD 20/21 T85	XA01629F	XA01629F	XA01629F
N3	NEPSI Ex ia/d [ia Ga] IIC T6 Ga/Gb, NEPSI Ex tD A20/A21 IP6X T85°C	XA01630F	XA01630F	XA01630F

- 1) 2-wire; 4-20mA HART
- 2) 2-wire; 4-20mA HART, switch output
- 3) 2-wire; 4-20mA HART, 4-20mA
- 4) in preparation

