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## Important document information









### Safety symbols

Symbol	Meaning
	<b>DANGER!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
	<b>WARNING!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
	<b>CAUTION!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	<b>NOTE!</b> This symbol contains information on procedures and other facts which do not result in personal injury.

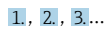
### Electrical symbols

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

### Symbols for certain types of information

Symbol	Meaning
	<b>Permitted</b> Procedures, processes or actions that are permitted.
	<b>Preferred</b> Procedures, processes or actions that are preferred.
	<b>Forbidden</b> Procedures, processes or actions that are forbidden.
	<b>Tip</b> Indicates additional information.
	Reference to documentation.
	Reference to page.
	Reference to graphic.
	Visual inspection.

### Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
	Series of steps
A, B, C, ...	Views





**Registered trademarks**

**HART®**  
Registered trademark of the HART Communication Foundation, Austin, USA

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

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**KALREZ®, VITON®**  
Registered trademark of DuPont Performance Elastomers L.L.C., Wilmington, USA

**TEFLON®**  
Registered trademark of E.I. DuPont de Nemours & Co., Wilmington, USA





# 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**

Device	Antenna <sup>1)</sup>	Maximum measuring range
FMR60	GA: Drip-off, PTFE 50 mm / 2"	50 m (164 ft)

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.

The following tables describe the groups of media as well as the achievable measuring range as a function of application and media group. If the dielectric constant of a medium is unknown, it is recommended to assume media group B to ensure a reliable measurement.

#### Media groups

Media group	DC ( $\epsilon_r$ )	Example
A0	1.2 to 1.4	Butane, liquid nitrogen, liquefied hydrogen
A	1.4 to 1.9	non-conducting liquids, e.g. liquefied gas <sup>1)</sup>
B	1.9 to 4	non-conducting liquids, e.g. benzene, oil, toluene, ...
C	4 to 10	e.g. concentrated acids, organic solvents, esters, aniline, alcohol, acetone, ...
D	> 10	conducting liquids, e.g. aqueous solutions, dilute acids and alkalis

1) NH<sub>3</sub> falls into medium group A.



For dielectric constants (DC values) of many media commonly used in various industries refer to:

- the Endress+Hauser DC manual (CP01076F)
- the Endress+Hauser "DC Values App" (available for Android and iOS)



## Output

### Output signal


#### HART

Signal coding	FSK $\pm 0.5$ 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 <sub>DC</sub> , $I = 0$ 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 $1\,350$ V <sub>DC</sub> to power supply and $500$ V <sub>AC</sub> 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	<ul style="list-style-type: none"> <li>▪ Level linearized</li> <li>▪ Distance</li> <li>▪ Terminal voltage</li> <li>▪ Electronic temperature</li> <li>▪ Relative echo amplitude</li> <li>▪ Diagnostic values, Advanced diagnostics</li> </ul>
Number of switching cycles	unlimited

**Signal on alarm**

Depending on the interface, failure information is displayed as follows:

- Current output (for HART devices)
  - Failsafe mode selectable (in accordance with NAMUR Recommendation NE 43):
    - Minimum alarm: 3.6 mA
    - Maximum alarm (= factory setting): 22 mA
  - Failsafe mode with user-selectable value: 3.59 to 22.5 mA
- Local display
  - Status signal (in accordance with NAMUR Recommendation NE 107)
  - Plain text display
- Operating tool via HART communication or service interface (CDI)
  - Status signal (in accordance with NAMUR Recommendation NE 107)
  - Plain text display

**Linearization**

The linearization function of the device allows the conversion of the measured value into any unit of length or volume. Linearization tables for calculating the volume in cylindrical tanks are pre-programmed. Other linearization tables of up to 32 value pairs can be entered manually or semi-automatically.

**Galvanic isolation**

All circuits for the outputs are galvanically isolated from each other.

**Protocol-specific data****HART**

Manufacturer ID	17 (0x11)
Device type ID	0x112B
HART specification	7.0
Device description files (DTM, DD)	Information and files under: <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a></li> <li>▪ <a href="http://www.fieldcommgroup.org">www.fieldcommgroup.org</a></li> </ul>
HART load	min. 250 $\Omega$
HART device variables	<p>The measured values can be freely assigned to the device variables.</p> <p><b>Measured values for PV (primary variable)</b></p> <ul style="list-style-type: none"> <li>▪ Level linearized</li> <li>▪ Distance</li> <li>▪ Electronic temperature</li> <li>▪ Relative echo amplitude</li> <li>▪ Area of incoupling</li> <li>▪ Analog output adv. diagnostics 1</li> <li>▪ Analog output adv. diagnostics 2</li> </ul> <p><b>Measured values for SV, TV, FV (second, third and fourth variable)</b></p> <ul style="list-style-type: none"> <li>▪ Level linearized</li> <li>▪ Distance</li> <li>▪ Electronic temperature</li> <li>▪ Terminal voltage</li> <li>▪ Relative echo amplitude</li> <li>▪ Absolute echo amplitude</li> <li>▪ Area of incoupling</li> <li>▪ Analog output adv. diagnostics 1</li> <li>▪ Analog output adv. diagnostics 2</li> </ul>
Supported functions	<ul style="list-style-type: none"> <li>▪ Burst mode</li> <li>▪ Additional transmitter status</li> </ul>

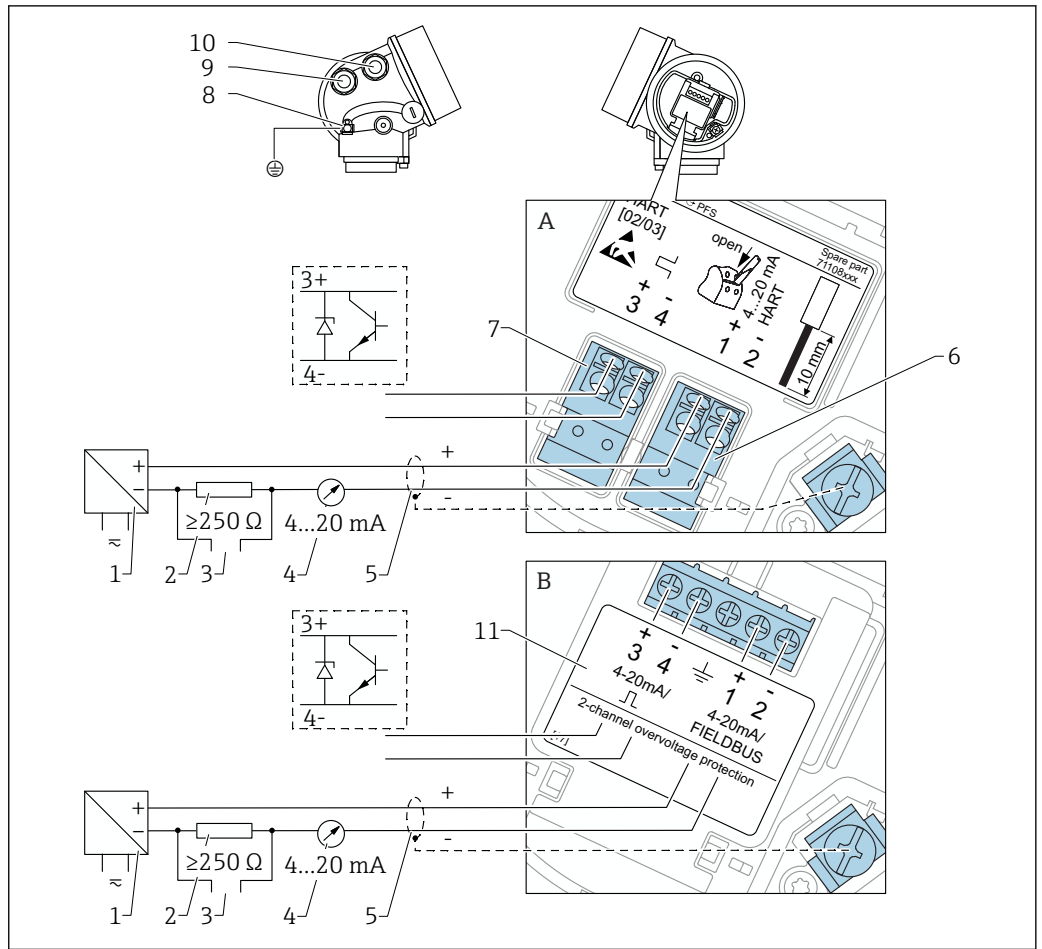
**Wireless HART data**

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





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









**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" <sup>1)</sup>	"Approval" <sup>2)</sup>	Terminal voltage U at device	Maximum load R, depending on the supply voltage U <sub>0</sub> of the power supply unit
<b>A:</b> 2-wire; 4-20mA HART	<ul style="list-style-type: none"> <li>▪ Non-hazardous</li> <li>▪ Ex nA</li> <li>▪ Ex ic</li> <li>▪ CSA GP</li> </ul>	14 to 35 V <sup>3)</sup>	
	Ex ia / IS	14 to 30 V <sup>3)</sup>	
	<ul style="list-style-type: none"> <li>▪ Ex d(ia) / XP</li> <li>▪ Ex ic(ia)</li> <li>▪ Ex nA(ia)</li> <li>▪ Ex ta / DIP</li> </ul>	14 to 35 V <sup>3) 4)</sup>	
	Ex ia + Ex d(ia) / IS + XP	14 to 30 V <sup>3)</sup>	

- 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<sub>a</sub> ≤ -20 °C, a terminal voltage U ≥ 16 V is required to start the device with the min. error current (3.6 mA).

"Power supply, output" <sup>1)</sup>	"Approval" <sup>2)</sup>	Terminal voltage U at device	Maximum load R, depending on the supply voltage U <sub>0</sub> of the power supply unit
<b>B:</b> 2-wire; 4-20 mA HART, switch output	<ul style="list-style-type: none"> <li>▪ Non-hazardous</li> <li>▪ Ex nA</li> <li>▪ Ex nA(ia)</li> <li>▪ Ex ic</li> <li>▪ Ex ic(ia)</li> <li>▪ Ex d(ia) / XP</li> <li>▪ Ex ta / DIP</li> <li>▪ CSA GP</li> </ul>	16 to 35 V <sup>3)</sup>	
	<ul style="list-style-type: none"> <li>▪ Ex ia / IS</li> <li>▪ Ex ia + Ex d(ia) / IS + XP</li> </ul>	16 to 30 V <sup>3)</sup>	

- 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.



**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  $\varnothing$ 5 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  $\varnothing$ 7 to 10 mm (0.28 to 0.39 in)<sup>1)</sup>
  - For Ex d:  
No gland available
- Thread
  - $\frac{1}{2}$ " NPT
  - G  $\frac{1}{2}$ "
  - M20 x 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 mm<sup>2</sup> (20 to 14 AWG)
- **Devices with integrated overvoltage protection**  
Screw terminals for wire cross-sections 0.2 to 2.5 mm<sup>2</sup> (24 to 14 AWG)
- For ambient temperature  $T_U \geq 60$  °C (140 °F): use cable for temperature  $T_U + 20$  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  $\mu$ s), 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	$2 \times 0.5 \Omega$ 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 $\mu$ s)	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; GT19 (plastic housing) and GT20 (aluminum housing): nickel-coated brass (CuZn).

## Performance characteristics

### Reference operating conditions

- 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

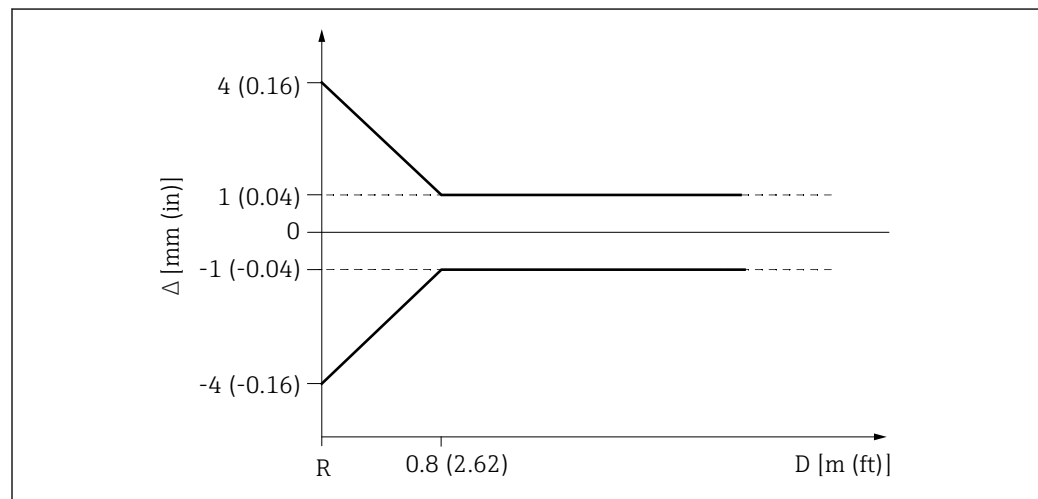
### Reference accuracy

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 <sup>1)</sup>
Accuracy (Sum of non-linearity, nonrepeatability and hysteresis) <sup>2)</sup>	Measuring distance up to 0.8 m (2.62 ft): max. ±4 mm (±0.16 in)	±0.03 %
	Measuring distance > 0.8 m (2.62 ft): ±1 mm (±0.04 in)	±0.02 %
Non-repeatability <sup>3)</sup>	≤ 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.

### 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

### Measured value resolution

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

- Digital: 1 mm
- Analog: 1 μA

### Response time

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

- 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.

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

**Influence of ambient temperature**


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

- Digital (HART): average  $T_K = 2 \text{ mm}/10 \text{ K}$
- Analog (current output):
  - Zero point (4 mA): average  $T_K = 0.02 \text{ \%}/10 \text{ K}$
  - Span (20 mA): average  $T_K = 0.05 \text{ \%}/10 \text{ K}$

**Influence of gas phase**

High pressure reduces the speed of propagation of the measuring signals in the gas/vapor above the medium. This effect depends on the type of gas phase and its temperature. This results in a systematic measured error that increases with increasing distance between the reference point of the measurement (flange) and the surface of the product. The following table shows this measured error for a few typical gases/vapors (with regard to the distance, a positive value means that a too large distance is measured):

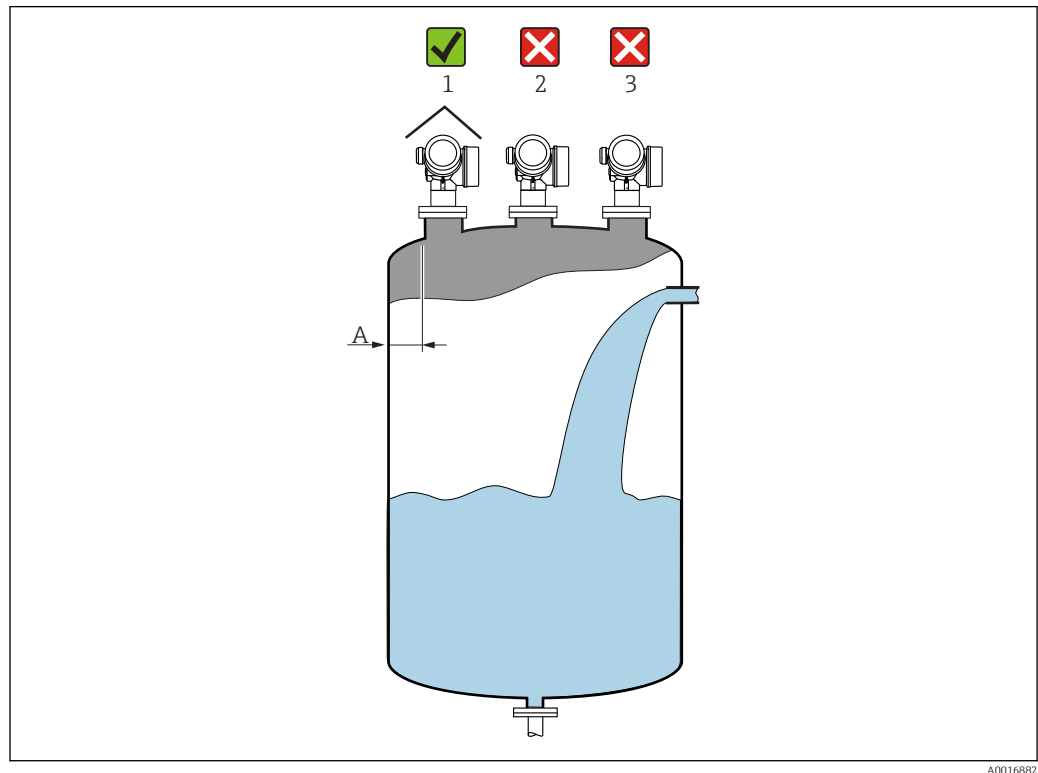
Gas phase	Temperature		Pressure		
	°C	°F	1 bar (14,5 psi)	10 bar (145 psi)	25 bar (362 psi)
Air/nitrogen	20	68	0.00 %	0.22 %	0.58 %
	200	392	-0.01 %	0.13 %	0.36 %
	400	752	-0.02 %	0.08 %	0.29 %
Hydrogen	20	68	-0.01 %	0.10 %	0.25 %
	200	392	-0.02 %	0.05 %	0.17 %
	400	752	-0.02 %	0.03 %	0.11 %
Water (saturated steam)	100	212	0.02 %	-	-
	180	356	-	2.1 %	-
	263	505,4	-	-	4.15 %
	310	590	-	-	-
	364	687	-	-	-

 With a known, constant pressure, it is possible to compensate for this measured error with a linearization, for example.

## Installation

### Installation conditions

### Mounting position

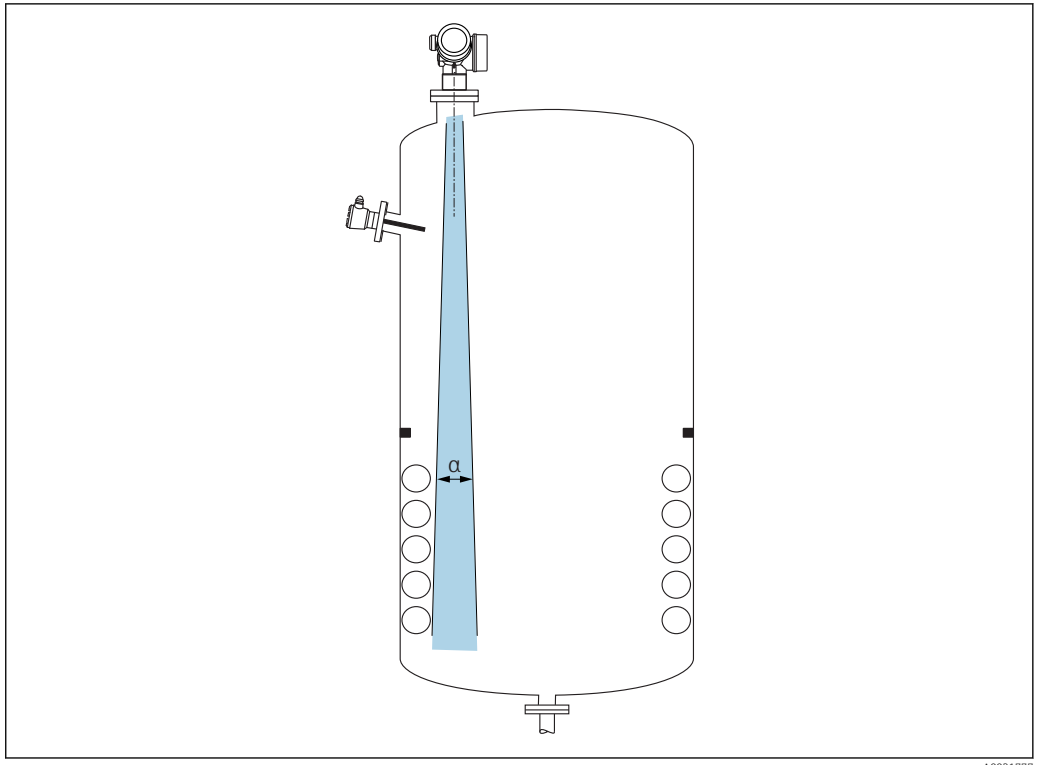


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- Recommended distance **A** wall - nozzle outer edge:  $\sim 1/6$  of the container diameter. However, the device must not under any circumstances be mounted closer than 15 cm (5.91 in) to the tank wall.
- Not in the center (2) as interference can cause signal loss.
- Not above the filling curtain (3).
- The use of a weather protection cover (1) is recommended to protect the transmitter from direct sunlight or rain.



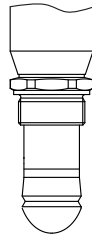
Internal container fittings



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Avoid the location of internal fittings (limit switches, temperature sensors, struts, vacuum rings, heating coils, baffles etc.) inside the signal beam. Take into account the beam angle → 26.

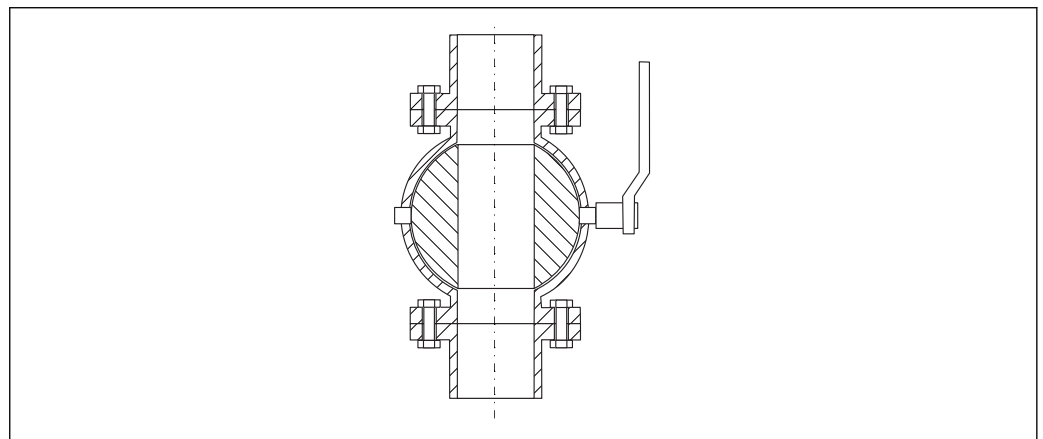


FMR60	
	
Antenna <sup>1)</sup>	Drip-off, PTFE 50 mm / 2"
Beam angle $\alpha$	6°
<b>Distance (D)</b>	<b>Beamwidth diameter W</b>
5 m (16 ft)	0.52 m (1.70 ft)
10 m (33 ft)	1.05 m (3.44 ft)
15 m (49 ft)	1.57 m (5.15 ft)
20 m (66 ft)	2.10 m (6.89 ft)
25 m (82 ft)	2.62 m (8.60 ft)
30 m (98 ft)	3.14 m (10.30 ft)
35 m (115 ft)	3.67 m (12.04 ft)
40 m (131 ft)	4.19 m (13.75 ft)
45 m (148 ft)	4.72 m (15.49 ft)
50 m (164 ft)	5.24 m (17.19 ft)

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1) Feature 070 in the product structure

**Measurement through a ball valve**



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- Measurements can be performed through an open full bore ball valve without any problems.
- At the transitions, no gap may be left exceeding 1 mm (0.04 in).
- Diameter of opening of ball valve must always be equivalent to pipe diameter; avoid edges and constrictions.



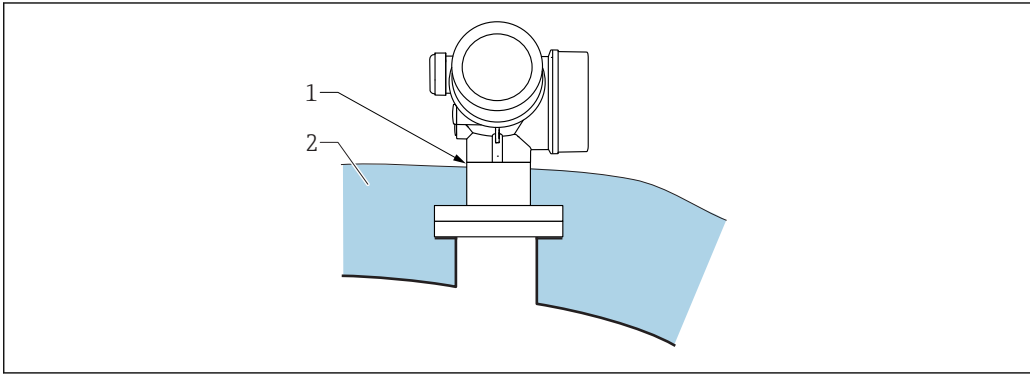
Inner nozzle diameter $D$	Maximum nozzle height $H_{max}^{1)}$
100 to 150 mm (4 to 6 in)	1 450 mm (58 in)
$\geq 150$ mm (6 in)	2 200 mm (88 in)

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

**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)


**Container with heat insulation**



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If process temperatures are high, the device should be included in the usual container insulation system (2) to prevent the electronics from heating as a result of thermal radiation or convection. The insulation should not be higher than the neck of the device (1).



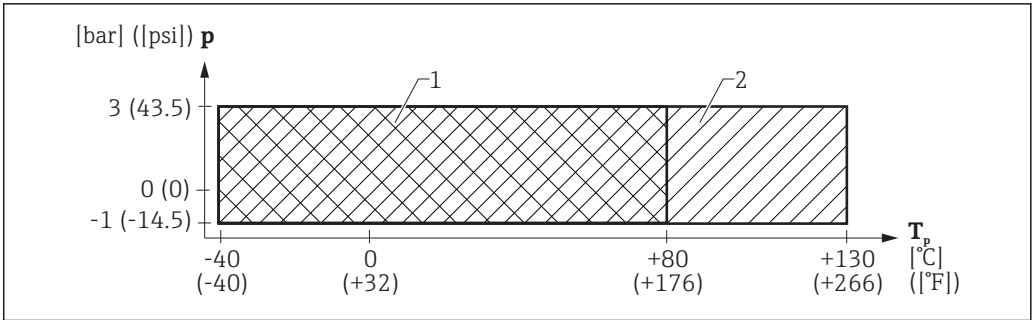
<b>Storage temperature</b>	-40 to +80 °C (-40 to +176 °F)
<b>Climate class</b>	DIN EN 60068-2-38 (test Z/AD)
<b>Altitude according to IEC61010-1 Ed.3</b>	<ul style="list-style-type: none"> <li>■ Generally up to 2 000 m (6 600 ft) above MSL.</li> <li>■ Above 2 000 m (6 600 ft) if the following conditions are met:               <ul style="list-style-type: none"> <li>- Ordering feature 020 "Power supply; Output" = A, B, C, E or G (2-wire versions)</li> <li>- Supply voltage <math>U &lt; 35 \text{ V}</math></li> <li>- Supply voltage of overvoltage category 1</li> </ul> </li> </ul>
<b>Degree of protection</b>	<ul style="list-style-type: none"> <li>■ With closed housing tested according to:               <ul style="list-style-type: none"> <li>- IP68, NEMA6P (24 h at 1.83 m under water surface)</li> <li>- For plastic housing with transparent cover (display module): IP68 (24 h at 1.00 m under water surface)<sup>3)</sup></li> <li>- IP66, NEMA4X</li> </ul> </li> <li>■ With open housing: IP20, NEMA1</li> <li>■ Display module: IP22, NEMA2</li> </ul> <p> Degree of protection IP68 NEMA6P applies for M12 PROFIBUS PA plugs only when the PROFIBUS cable is plugged in and is also rated IP68 NEMA6P.</p>
<b>Vibration resistance</b>	DIN EN 60068-2-64 IEC 60068-2-64 at 5 to 2 000 Hz: $1.5 (m/s^2)^2/Hz$
<b>Electromagnetic compatibility (EMC)</b>	<p>Electromagnetic compatibility in accordance with all of the relevant requirements outlined in the EN 61326 series and NAMUR Recommendation EMC (NE 21). For details, please refer to the Declaration of Conformity<sup>4)</sup>.</p> <p>A normal device cable suffices if only the analog signal should be used. Use a shielded cable for digital communication (HART/ PA/ FF).</p> <p>Maximum measured error during EMC testing: &lt;0.5 % of the span. By way of derogation, for devices with a plastic housing and see-through lid (integrated display SD02 or SD03) the measured error can be up to 2 % of the span in the event of strong electromagnetic radiation in the 1 to 2 GHz frequency range.</p>

3) 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").  
 4) Available for download at [www.de.endress.com](http://www.de.endress.com).





**FMR60 flange process connection**



11 FMR60: Permitted range for process temperature and process pressure

- 1 Process connection: flange PP
- 2 Process connection: flange 316L

*FMR60 flange process connection*

Feature 100 "Process connection"	Process temperature range	Process pressure range
<ul style="list-style-type: none"> <li>▪ XJG: UNI flange 3"/DN80/80A, PP</li> <li>▪ XKG: UNI flange 4"/DN100/100A, PP</li> <li>▪ XLG: UNI flange 6"/DN150/150A, PP</li> </ul>	-40 to +80 °C (-40 to +176 °F)	$p_{rel} = -1$ to 3 bar (-14.5 to 43.5 psi) $p_{abs} < 4$ bar (58 psi) <sup>1)</sup>
<ul style="list-style-type: none"> <li>▪ XJJ: UNI flange 3"/DN80/80A, 316L</li> <li>▪ XKJ: UNI flange 4"/DN100/100A, 316L</li> <li>▪ XLJ: UNI flange 6"/DN150/150A, 316L</li> </ul>	-40 to +130 °C (-40 to +266 °F)	

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

**Dielectric constant**

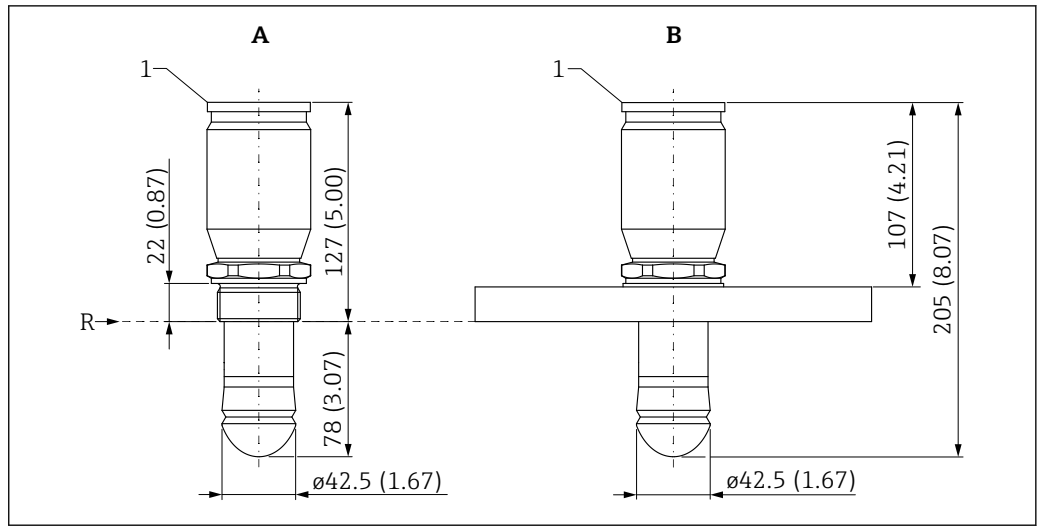
**For liquids**  
 $\epsilon_r \geq 1.9$

Please contact Endress+Hauser for applications with lower dielectric constants than indicated.

- i** For dielectric constants (DC values) of many media commonly used in various industries refer to:
  - the Endress+Hauser DC manual (CP01076F)
  - the Endress+Hauser "DC Values App" (available for Android and iOS)



**FMR60: Antenna and process connection**



A0031560

- 14 Dimensions: mm (in)
- A Process connection: G1-1/2" or MNPT1-1/2" thread
  - B Process connection: UNI flange 3"/DN80/80A to 6"/DN150/150A
  - R Reference point of the measurement
  - 1 Bottom edge of housing



**Weight**

*Housing*

Part	Weight
GT19 housing - plastic	Approx. 1.2 kg (2.7 lb)
GT20 housing - aluminum	Approx. 1.9 kg (4.2 lb)

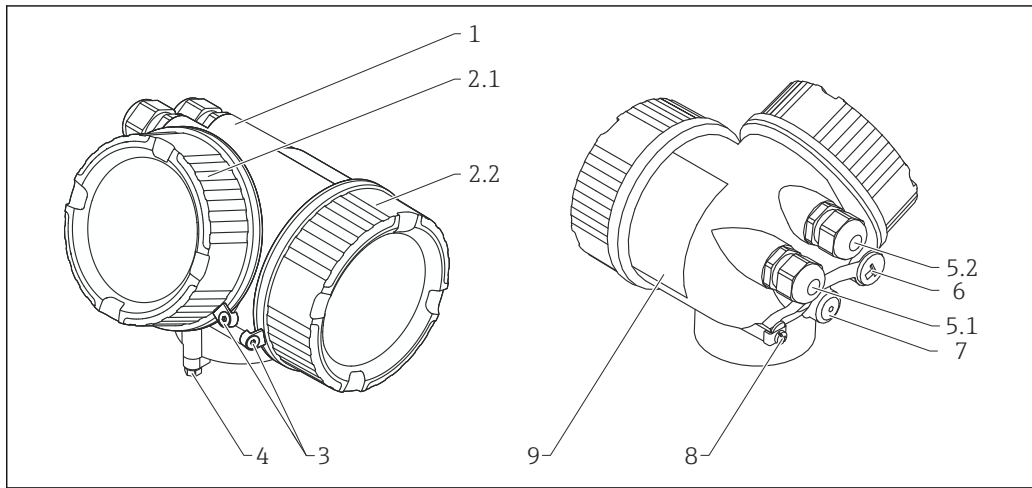
*Antenna and process connection*

Device	Antenna <sup>1)</sup>	Weight of antenna / process connection
FMR60	GA: Drip-off, PTFE DN50	Max. 2 kg (4.41 lb) + flange weight <sup>2)</sup>

- 1) Order code 070
- 2) For flange weights (316/316L) see Technical Information TI00426F.



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



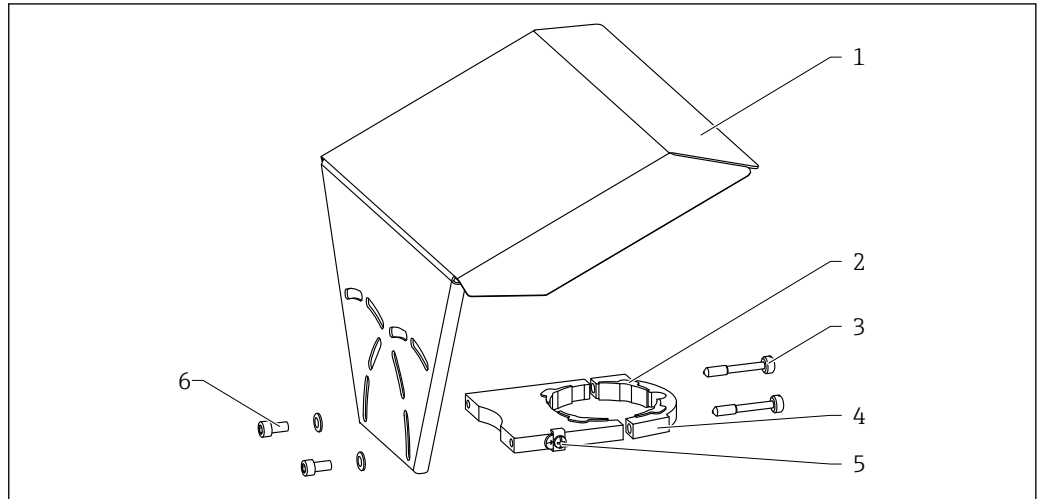
A0036037

Nr.	Part	Material
1	Housing, RAL 5012 (blue)	<ul style="list-style-type: none"> <li>▪ Housing: AlSi10Mg (&lt;0,1% Cu)</li> <li>▪ Coating: Polyester</li> </ul>
2.1	Cover of the electronics compartment; RAL 7035 (gray)	<ul style="list-style-type: none"> <li>▪ Cover: AlSi10Mg (&lt;0,1% Cu)</li> <li>▪ Window: Glass</li> <li>▪ Cover seal: NBR</li> <li>▪ Seal of the window: NBR</li> <li>▪ Thread-coating: Graphite-based lubricant varnish</li> </ul>
2.2	Cover of the terminal compartment; RAL 7035 (gray)	<ul style="list-style-type: none"> <li>▪ Cover: AlSi10Mg (&lt;0,1% Cu)</li> <li>▪ Cover seal: NBR</li> <li>▪ Thread-coating: Graphite-based lubricant varnish</li> </ul>
3	Cover lock	<ul style="list-style-type: none"> <li>▪ Screw: A4</li> <li>▪ Clamp: 316L (1.4404)</li> </ul>
4	Lock at the housing neck	<ul style="list-style-type: none"> <li>▪ Screw: A4-70</li> <li>▪ Clamp: 316L (1.4404)</li> </ul>
5.1	Dummy plug, cable gland, adapter or plug (depending on the device version)	<ul style="list-style-type: none"> <li>▪ Dummy plug, depending on the device version:                             <ul style="list-style-type: none"> <li>- PE</li> <li>- PBT-GF</li> </ul> </li> <li>▪ Cable gland, depending on the device version:                             <ul style="list-style-type: none"> <li>- Nickel-plated brass (CuZn)</li> <li>- PA</li> </ul> </li> <li>▪ Adapter: 316L (1.4404/1.4435)</li> <li>▪ Seal: EPDM</li> <li>▪ M12 plug: Nickel-plated brass<sup>1)</sup></li> <li>▪ 7/8" plug: 316 (1.4401)<sup>2)</sup></li> </ul>
5.2	Dummy plug, cable gland or adapter (depending on the device version)	<ul style="list-style-type: none"> <li>▪ Dummy plug, depending on the device version:                             <ul style="list-style-type: none"> <li>- PE</li> <li>- PBT-GF</li> <li>- Nickel-plated steel</li> </ul> </li> <li>▪ Cable gland, depending on the device version:                             <ul style="list-style-type: none"> <li>- Nickel-plated brass (CuZn)</li> <li>- PA</li> </ul> </li> <li>▪ Adapter: 316L (1.4404/1.4435)</li> <li>▪ Seal: EPDM</li> </ul>
6	Dummy plug or M12 socket (depending on the device version)	<ul style="list-style-type: none"> <li>▪ Dummy plug : Nickel-plated brass (CuZn)</li> <li>▪ M12 socket: Nickel-plated GD-Zn</li> </ul>
7	Pressure relief stopper	Nickel-plated brass (CuZn)





**Materials: Weather protection cover**



A0015473

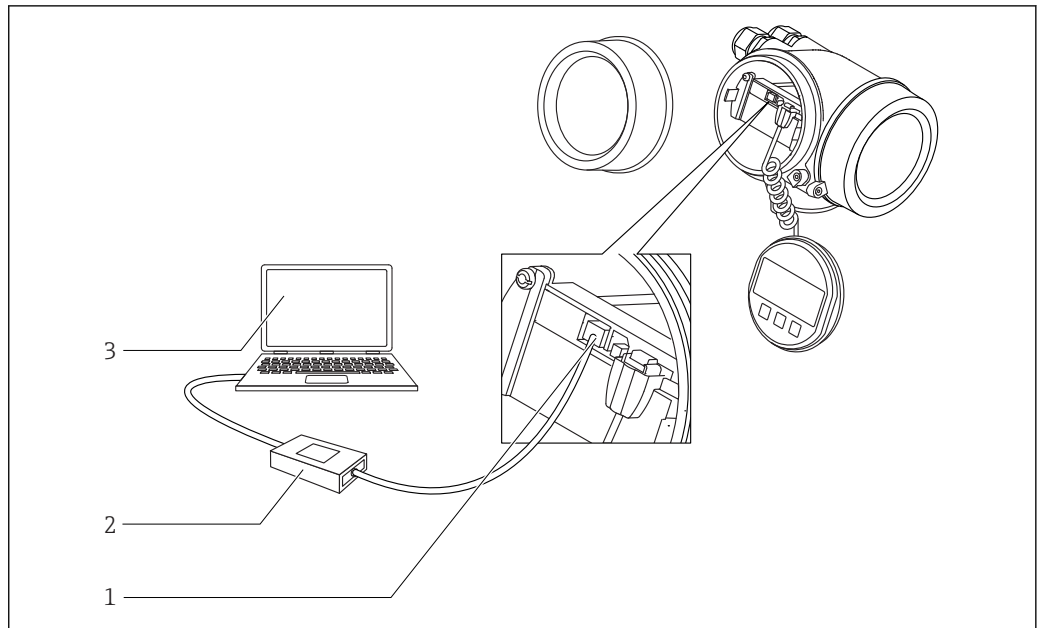
No	Part: Material
1	Protection cover: 316L (1.4404)
2	Molded rubber part (4x): EPDM
3	Clamping screw: 316L (1.4404) + carbon fibre
4	Bracket: 316L (1.4404)
5	Ground terminal ■ Screw: A4 ■ Spring washer: A4 ■ Clamp: 316L (1.4404) ■ Holder: 316L (1.4404)
6	■ Washer: A4 ■ Cheese head screw: A4-70







**DeviceCare/FieldCare via service interface (CDI)**



A0032466

**19** 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









## Certificates and approvals

 Currently available certificates and approvals can be called up via the product configurator.

**CE mark**                      The measuring system meets the legal requirements of the applicable EC guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied.  
Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

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

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



A0029561

**Ex approval**

- ATEX
- IECEX
- CSA
- FM
- NEPSI
- KC
- INMETRO
- TIIS <sup>5)</sup>
- 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: →  68

**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".

5)        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.

#### 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
Spain	Yebes	40°31'27" North	03°05'22" West
	Robledo	40°25'38" North	04°14'57" West
Hungary	Penc	47°47'22" North	19°16'53" East



As a general rule, the requirements outlined in EN 302729-1/2 must be observed.

<b>Radio standard EN 302372-1/2</b>	The devices comply with the Tanks Level Probing Radar (TLPR) radio standard EN 302372-1/2 and are approved for use in closed containers. For installation, points a to f in Annex B of EN 302372-1 must be taken into consideration.
<b>FCC</b>	<p>This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p>[Any] changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.</p> <p>The devices are compliant with the FCC Code of Federal Regulations, CFR 47, Part 15, Sections 15.205, 15.207, 15.209.</p> <p>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.</p>
<b>Industry Canada</b>	<p><b>Canada CNR-Gen Section 7.1.3</b></p> <p>This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.</p> <p><i>Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.</i></p> <p>[Any] changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.</p> <ul style="list-style-type: none"> <li>▪ The installation of the LPR/TLPR device shall be done by trained installers, in strict compliance with the manufacturer's instructions.</li> <li>▪ 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.</li> <li>▪ This device shall be installed and operated in a completely enclosed container to prevent RF emissions, which can otherwise interfere with aeronautical navigation.</li> <li>▪ 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.)</li> </ul> <p> The model FMR60L is a submodel of the FMR60 that fulfills the requirements for use as LPR (Level Probe Radar).</p>

<b>CRN approval</b>	<p>Some device versions have CRN approval. Devices are CRN approved if the following two conditions are met:</p> <ul style="list-style-type: none"> <li>▪ The device has a CSA approval (product structure: feature 010 "Approval")</li> <li>▪ The device has a CRN-approved process connection as per the following table:</li> </ul>
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**Test, certificate**

Feature 580 "Test, certificate"	Description
JA	3.1 Material certificate, wetted metal parts, EN10204-3.1 inspection certificate



Test reports, declarations and inspection certificates are available in electronic format in the *W@M Device Viewer*:  
Enter the serial number from nameplate ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer))  
This concerns the options for the following order codes:

- 550 "Calibration"
- 580 "Test, certificate"

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**Hard-copy product documentation**

Hard-copy versions of the test reports, declarations and inspection certificates can also be order via order code 570 "Service", option I7 "Hard-copy product documentation". The documents are then supplied with the product.

**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





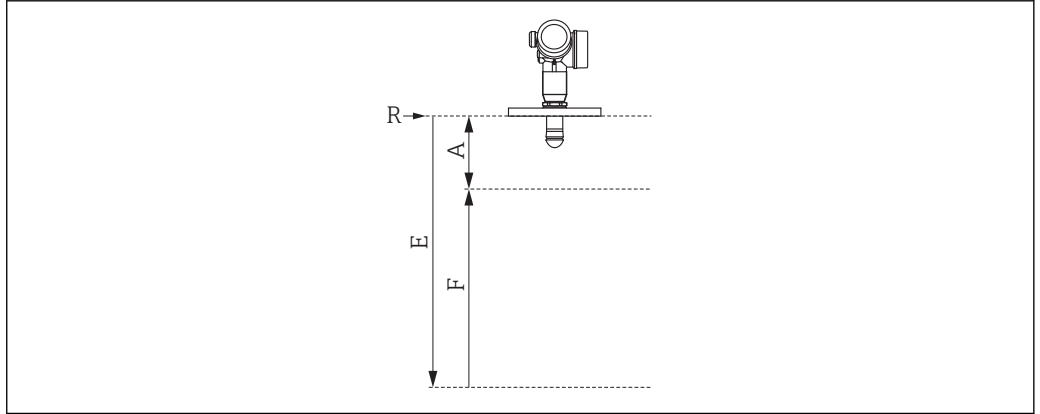


**5-point linearity protocol**




 The following points must be considered if option F4 (5-point linearity protocol) was selected in feature 550 ("Calibration").

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 range<sup>6)</sup>.

The following restrictions must be considered when selecting E and F:



Minimum distance between reference point R and 100% mark	Minimum span	Maximum value for "Empty calibration"
A ≥ length of antenna + 200 mm (8 in) Minimum value: 400 mm (16 in)	F ≥ 400 mm (16 in)	E ≤ 24 m (79 ft)

-  The linearity check is performed under reference operating conditions.
-  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 →  58.

6) If (E) and (F) are not specified, antenna-dependent default values will be used instead.

**Customer-specific configuration**

If the option IJ: "Customized parameterization HART", IK "Customized parameterization PA" or IL "Customized parameterization FF" has been selected in feature 570 "Service", presets that differ from the default settings can be selected for the following parameters:




Parameters	Communication protocol	Picklist / range of values
Setup → Unit of length	<ul style="list-style-type: none"> <li>▪ HART</li> <li>▪ PA</li> <li>▪ FF</li> </ul>	<ul style="list-style-type: none"> <li>▪ in</li> <li>▪ ft</li> <li>▪ mm</li> <li>▪ m</li> </ul>
Setup → Empty calibration	<ul style="list-style-type: none"> <li>▪ HART</li> <li>▪ PA</li> <li>▪ FF</li> </ul>	max. 70 m (230 ft)
Setup → Full calibration	<ul style="list-style-type: none"> <li>▪ HART</li> <li>▪ PA</li> <li>▪ FF</li> </ul>	max. <70 m (230 ft)
Setup → Extended setup → Curr. output 1 or 2 → Damping	HART	0 to 999.9 s
Setup → Extended setup → Curr. output 1 or 2 → Failure mode	HART	<ul style="list-style-type: none"> <li>▪ Min</li> <li>▪ Max</li> <li>▪ Last valid value</li> </ul>
Expert → Comm. → HART config. → Burst mode	HART	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>

**Tagging (TAG)**

<b>Ordering feature</b>	895: Marking
<b>Option</b>	Z1: Tagging (TAG), see additional spec.
<b>Position of the measuring point marking</b>	To be selected in the additional specifications: <ul style="list-style-type: none"> <li>▪ Tag plate Stainless Steel</li> <li>▪ Self-adhesive paper label</li> <li>▪ Supplied label/plate</li> <li>▪ RFID TAG</li> <li>▪ RFID TAG + Tag plate Stainless Steel</li> <li>▪ RFID TAG + Self-adhesive paper label</li> <li>▪ RFID TAG + Supplied label/plate</li> </ul>
<b>Definition of the measuring point designation</b>	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.
<b>Designation in the Electronic Name Plate (ENP)</b>	The first 32 characters of the measuring point designation
<b>Designation on the display module</b>	The first 12 characters of the measuring point designation

**Services**

The following services can be selected via the product structure in the Product Configurator <sup>7)</sup>:

- PWIS-free (PWIS = paint-wetting impairment substances)
- Customized parameterization HART →  58
- Customized parameterization PA →  58
- Customized parameterization FF →  58
- W/o tooling DVD (FieldCare)
- Hard-copy product documentation

7) Feature 570 in the product structure



**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<sup>8)</sup> 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<sup>9)</sup>**

- 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

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

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

**Heartbeat Monitoring****Availability**

Available for the following options of feature 540 "Application Package":  
EH: Heartbeat Verification + Monitoring

**Function**

- In addition to the verification parameters, the corresponding parameter values are also logged.
- Existing measured variables, such as the echo amplitude, are used in the **Foam detection** and **Build-up detection** wizards.

**"Foam detection" wizard**

- The Heartbeat Monitoring module contains the **Foam detection** wizard.
- This wizard is used to configure automatic foam detection, which detects foam on the product surface on the basis of the reduced signal amplitude. Foam detection can be linked to a switch output in order to control a sprinkler system, for example, which dissolves the foam.
- This wizard can be used via FieldCare, DeviceCare or a DTM-based process control system.

**"Build-up detection" wizard**

- The Heartbeat Monitoring module contains the **Build-up detection** wizard.
- The wizard is used to configure automatic buildup detection, which detects the buildup of deposits on the antenna on the basis of the increased area of the coupling signal. Buildup detection can be linked to a switch output in order to control a compressed air system, for example, to clean the antenna.
- This wizard can be used via FieldCare, DeviceCare or a DTM-based process control system.

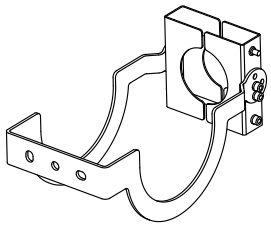
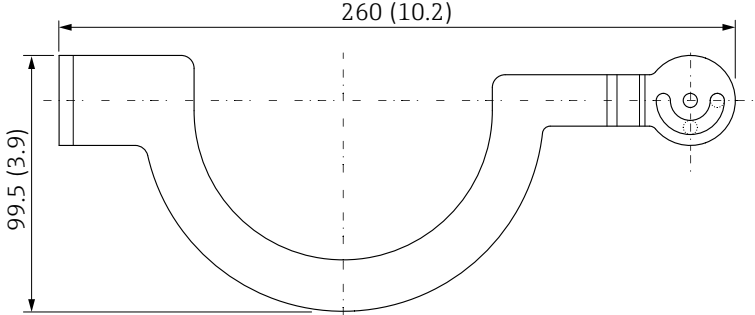
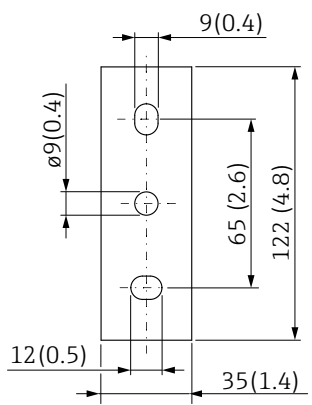
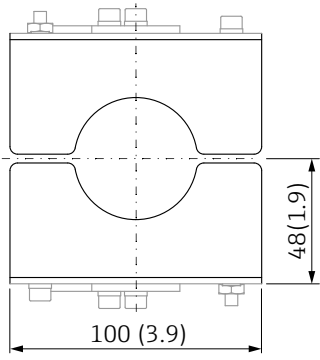
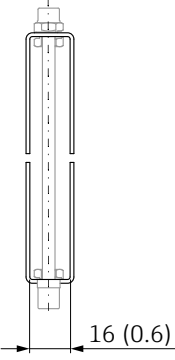

**Advantages**

- Early detection of changes (trends) to ensure plant availability and product quality.
- Use of information for the proactive planning of measures (e.g. cleaning/maintenance).
- Identification of undesirable process conditions as the basis to optimizing the facility and the processes.
- Automated control of measures to remove foam or buildup.

**Detailed description**



## Mounting bracket adjustable

Accessories	Description
Mounting bracket adjustable	     <p data-bbox="1476 1321 1524 1344">A0032295</p> <p data-bbox="414 1355 638 1388"><b>Material:</b> 304 (1.4301)</p> <p data-bbox="414 1393 638 1422"><b>Suitable for housing</b><sup>1)</sup>:</p> <ul style="list-style-type: none"> <li data-bbox="414 1422 798 1451">- A: GT19 dual compartment, plastic PBT</li> <li data-bbox="414 1451 798 1480">- C: GT20 dual compartment, Alu, coated</li> </ul> <p data-bbox="414 1485 638 1514"><b>Suitable for antenna</b><sup>2)</sup>:</p> <p data-bbox="414 1514 638 1543">GA: Drip-off, PTFE DN50</p> <p data-bbox="414 1547 734 1576"><b>Suitable for process connection</b><sup>3)</sup>:</p> <ul style="list-style-type: none"> <li data-bbox="414 1576 734 1606">- GGJ: thread ISO228 G1-1/2, 316L</li> <li data-bbox="414 1606 766 1635">- RGJ: thread ANSI MNPT1-1/2, 316L</li> </ul> <p data-bbox="414 1639 662 1668"><b>Order number:</b> 71336522</p> <p data-bbox="414 1673 1460 1814">  <ul style="list-style-type: none"> <li data-bbox="470 1680 1356 1709">■ There is <b>no</b> conductive connection between the mounting bracket and the transmitter housing.</li> <li data-bbox="470 1709 734 1738">■ Risk of electrostatic charge.</li> <li data-bbox="470 1738 1149 1767">■ Integrate the mounting bracket in the local potential equalization system.</li> <li data-bbox="470 1767 1460 1814">■ Only to be fastened at stable materials (e.g. metal, brick, concrete) using suitable fastening material (to be supplied by customer).</li> </ul> </p>

1) Feature 040 in the product structure

2) Feature 070 in the product structure


3) Feature 100 in the product structure











**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

Accessories	Description
SupplyCare Hosting SCH30	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, FXA30 and FXA30B. 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.  For details, see "Technical Information" TI01229S and Operating Instructions BA00050S.




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 <b>non-Ex area</b> .  For details, see Operating Instructions BA01202S

Accessory	Description
Field Xpert SFX370	Field Xpert SFX370 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION fieldbus devices in the <b>non-Ex area</b> and the <b>Ex area</b> .  For details, see Operating Instructions BA01202S


Service-specific accessories

Accessory	Description
DeviceCare SFE100	Configuration tool for HART, PROFIBUS and FOUNDATION Fieldbus devices  Technical Information TI01134S  DeviceCare is available for download at <a href="http://www.software-products.endress.com">www.software-products.endress.com</a> . The download requires a registration in the Endress+Hauser software portal.  Alternatively, a DeviceCare DVD can be ordered with the device. Product structure: Feature 570 "Service", Option IV "Tooling DVD (DeviceCare Setup)".
FieldCare SFE500	FDT-based Plant Asset Management tool. Helps to configure and maintain all field devices of your plant. By supplying status information it also supports the diagnosis of the devices.  Technical Information TI00028S

System components

Accessory	Description
Graphic Data Manager Memograph M	The graphic data manager Memograph M provides information on all the relevant process variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on an SD card or USB stick.  For details refer to Technical Information TI00133R and Operating Instructions BA00247R
RN221N	Active barrier with power supply for safe separation of 4 to 20 mA current circuits. Provides bi-directional HART transmission.  For details refer to Technical Information TI00073R and Operating Instructions BA00202R
RNS221	Transmitter supply for 2-wire sensors or transmitters exclusively for non-Ex areas. Provides bi-directional communication using the HART communication sockets.  For details refer to Technical Information TI00081R and Operating Instructions KA00110R

## 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](http://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](http://www.endress.com) → Downloads

### Standard documentation

#### Micropilot FMR60

*Correlation of documentations to the device:*

Device	Power supply, output <sup>1)</sup>	Communication	Document type	Document code
FMR60	A, B, C, K, L	HART	Operating Instructions	BA01618F
			Brief Operating Instructions	KA01251F
			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 <sup>1)</sup>	B <sup>2)</sup>	C <sup>3)</sup>
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
BG	ATEX II 3G Ex ec IIC T6 Gc	XA01551F	XA01551F	XA01551F
BH	ATEX II 3G Ex ic IIC T6 Gc	XA01551F	XA01551F	XA01551F
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
B4	ATEX II 1/2G Ex ia IIC T6 Ga/Gb, Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01553F	XA01553F	XA01553F
CB	CSA IS Cl.I Div.1 Gr.A-D	XA01612F	XA01612F	XA01612F
CC	CSA XP Cl.I Div.1 Gr.A-D [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
GA	EAC 0Ex ia IIC T6...T3 Ga X	XA01617F	XA01617F	XA01617F
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
IA	IEC Ex ia IIC T6 Ga	XA01549F	XA01549F	XA01549F
IB	IEC Ex ia IIC T6 Ga/Gb	XA01549F	XA01549F	XA01549F

Feature 010	Approval	Feature 020 "Power Supply; Output"		
		A <sup>1)</sup>	B <sup>2)</sup>	C <sup>3)</sup>
IC	IEC Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01552F	XA01552F	XA01552F
IG	IEC Ex ec IIC T6 Gc	XA01551F	XA01551F	XA01551F
IH	IEC Ex ic IIC T6 Gc	XA01551F	XA01551F	XA01551F
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
I4	IEC Ex ia IIC T6 Ga/Gb, Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01553F	XA01553F	XA01553F
JA	JPN Ex ia IIC T6 Ga	XA01631F <sup>4)</sup>	XA01631F <sup>4)</sup>	XA01631F <sup>4)</sup>
JB	JPN Ex ia IIC T6 Ga/Gb	XA01631F <sup>4)</sup>	XA01631F <sup>4)</sup>	XA01631F <sup>4)</sup>
JC	JPN Ex d [ia] IIC T6 Ga/Gb	XA01632F <sup>4)</sup>	XA01632F <sup>4)</sup>	XA01632F <sup>4)</sup>
JG	JPN Ex nA IIC T6 Gc	XA01725F <sup>4)</sup>	XA01725F <sup>4)</sup>	XA01725F <sup>4)</sup>
JH	JPN Ex ic IIC T6 Gc	XA01725F <sup>4)</sup>	XA01725F <sup>4)</sup>	XA01725F <sup>4)</sup>
J2	JPN Ex ia IIC T6 Ga/Gb, JPN Ex ia IIIC T85°C Da/Db	XA01728F <sup>4)</sup>	XA01728F <sup>4)</sup>	XA01728F <sup>4)</sup>
J3	JPN Ex d [ia] IIC T6 Ga/Gb, JPN Ex ta/tb IIIC T85°C Da/Db	XA01729F <sup>4)</sup>	XA01729F <sup>4)</sup>	XA01729F <sup>4)</sup>
J4	JPN Ex ia IIC T6 Ga/Gb, JPN Ex d [ia] IIC T6 Ga/Gb	XA01726F <sup>4)</sup>	XA01726F <sup>4)</sup>	XA01726F <sup>4)</sup>
KA	KC Ex ia IIC T6 Ga	XA01623F <sup>4)</sup>	XA01623F <sup>4)</sup>	XA01623F <sup>4)</sup>
KB	KC Ex ia IIC T6 Ga/Gb	XA01623F <sup>4)</sup>	XA01623F <sup>4)</sup>	XA01623F <sup>4)</sup>
KC	KC Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01624F <sup>4)</sup>	XA01624F <sup>4)</sup>	XA01624F <sup>4)</sup>
MA	INMETRO Ex ia IIC T6 Ga	XA01620F	XA01620F	XA01620F
MB	INMETRO Ex ia IIC T6 Ga/Gb	XA01620F	XA01620F	XA01620F
MC	INMETRO Ex ia/db [ia Ga] IIC T6 Ga/Gb	XA01622F	XA01622F	XA01622F
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
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
8A	FM/CSA IS+XP-IS Cl.I,II,III Div.1 Gr.A-G, AIS Cl.I,II,III Div.1 Gr.A-G	XA01612F XA01615F XA01616F	XA01612F XA01615F XA01616F	XA01612F XA01615F XA01616F
* 4)				

- 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







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