

Wichtige Hinweise zum Dokument	4
Symbols	4
Terms and abbreviations	6
Registered trademarks	7
Function and system design	8
Measuring principle	8
Input	10
Measured variable	10
Measuring range	10
Operating frequency	15
Transmitting power	15
Output	16
Output signal	16
Signal on alarm	17
Linearization	17
Galvanic isolation	17
Protocol-specific data	17
Power supply	22
Terminal assignment	22
Device plug connectors	30
Supply voltage	31
Power consumption	33
Current consumption	33
Power supply failure	34
Potential equalization	34
Terminals	34
Cable entries	34
Cable specification	34
Overvoltage protection	35
Performance characteristics	36
Reference operating conditions	36
Maximum measured error	36
Measured value resolution	37
Reaction time	37
Influence of ambient temperature	37
Influence of gas layer	37
Gas phase compensation with external pressure sensor (PROFIBUS PA, FOUNDATION Fieldbus)	38
Installation	39
Installation conditions	39
Measuring conditions	43
Mounting cladded flanges	44
Installation in vessel (free space)	44
Installation in stilling well	48
Installation in bypass	51
Container with heat insulation	53
Environment	54
Ambient temperature range	54
Ambient temperature limits	54
Storage temperature	62

2 V. 10, Rev. 3, 1-10-2019

Wichtige Hinweise zum Dokument

Symbols

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.

Electrical symbols

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.

Symbols for certain types of information

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.

Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1, 2, 3 ...	Series of steps
A, B, C, ...	Views
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
ϵ_r (DC value)	Relative dielectric constant
Operating tool	The term "operating tool" is used in place of the following operating software: - FieldCare / DeviceCare, for operation via HART communication and PC - SmartBlue (app), for operation using an Android or iOS smartphone or tablet.
BD	Blocking Distance; no signals are analyzed within the BD.
PLC	Programmable Logic Controller
CDI	Common Data Interface
PFS	Pulse Frequency Status (Switching output)
MBP	Manchester Bus Powered
PDU	Protocol Data Unit

HART®

PROFIBUS®

FOUNDATION™ Fieldbus

Bluetooth®

Apple®

Android®

KALREZ® , VITON®

TEFLON®

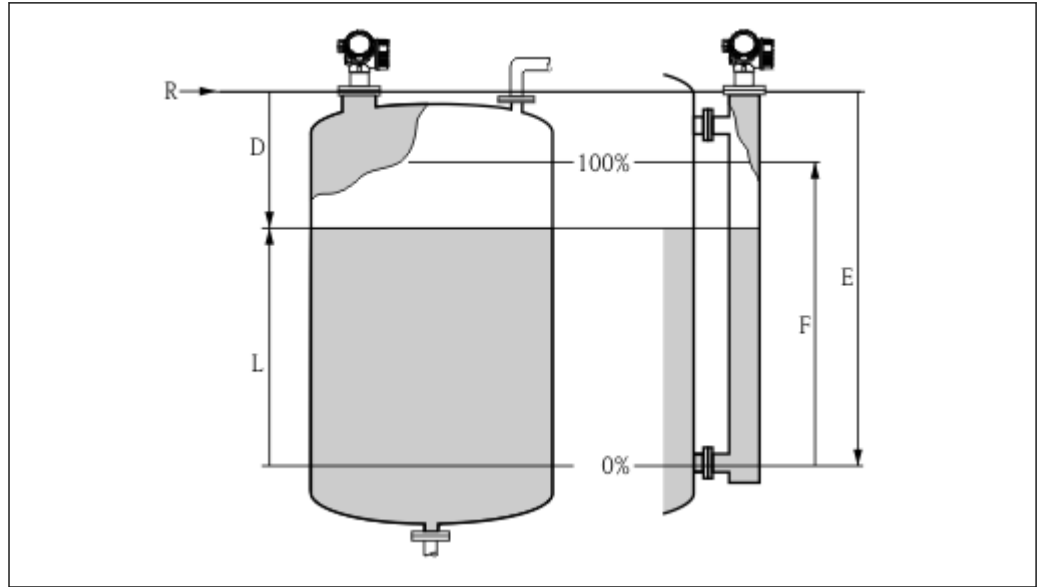
TRI CLAMP®

7

Function and system design

Measuring principle

The Micropilot is a "downward-looking" measuring system, operating based on the time-of-flight method (ToF). It measures the distance from the reference point (process connection) to the product surface. Radar impulses are emitted by an antenna, reflected off the product surface and received again by the radar system.



A0017871

1 Setup parameters of the Micropilot

- R Reference point of the measurement (lower edge of the flange or threaded connection)
- E Empty calibration (= zero)
- F Full calibration (= span)
- D Measured distance
- L Level ($L = E - D$)

Input

The reflected radar impulses are received by the antenna and transmitted into the electronics. A microprocessor evaluates the signal and identifies the level echo caused by the reflection of the radar impulse at the product surface. The unambiguous signal identification is accomplished by the PulseMaster® eXact software together with the Multi-echo tracking algorithms, based on many years of experience with time-of-flight technology.

The distance D to the product surface is proportional to the time of flight t of the impulse:

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

with c being the speed of light.

Based on the known empty distance E , the level L is calculated:

$$L = E - D$$

The reference point R of the measurement is located at the process connection. For details see the dimensional drawing:

- FMR51: → 68
- FMR52: → 74

The Micropilot is equipped with functions to suppress interference echoes. The user can activate these functions. Together with the multi-echo tracking algorithms they ensure that interference echoes (i.e. from edges and weld seams) are not interpreted as level echo.

Output

The Micropilot is commissioned by entering an empty distance "E" (=zero), a full distance "F" (=span) and application parameters which automatically adapt the instrument to the process conditions. For models with a current output, the factory adjustment for zero point "E" and span "F" is 4 mA and 20 mA. For digital outputs and the display module, the factory adjustment for zero point "E" and span "F" is 0 % and 100 %.

A linearization with max. 32 points, based on a table entered either manually or semi-automatically, can be activated locally or remotely. This function provides a measurement in engineering units and a linear output signal for spheres, horizontal cylindrical tanks and vessels with conical outlet.

Life cycle of the product

Engineering

- Universal measuring principle
- Measurement unaffected by medium properties
- Hardware and software developed according to SIL IEC 61508

Procurement

- Endress+Hauser being the world market leader in level measurement guarantees asset protection
- Worldwide support and service

Installation

- Special tools are not required
- Reverse polarity protection
- Modern, detachable terminals
- Main electronics protected by a separate connection compartment

Commissioning

- Fast, menu-guided commissioning in only a few steps on site or from the control room
- Plain text display in national languages reduces the risk of error or confusion
- Direct local access of all parameters
- Short instruction manual at the device

Operation

- Multi-echo tracking: Reliable measurement through self-learning echo-search algorithms taking into account the short-term and long-term history in order to check the found echoes for plausibility and to suppress interference echoes.
- Diagnostics in accordance with NAMUR NE107

Maintenance

- HistoROM: Data backup for instrument settings and measured values
- Exact instrument and process diagnosis to assist fast decisions with clear details concerning remedies
- Intuitive, menu-guided operating concept in national languages saves costs for training, maintenance and operation
- Cover of the electronics compartment can be opened in hazardous areas

Retirement

- Order code translation for subsequent models
- RoHS-conforming (Restriction of certain Hazardous Substances), unleaded soldering of electronic components
- Environmentally sound recycling concept

Input

Measured variable

The measured variable is the distance between the reference point and the product surface.

The level is calculated from this distance, taking into account the empty distance "E" entered by the user.

If required, the level can be converted into other variables (volume, mass) by means of a linearization (up to 32 points).

Measuring range

Maximum measuring range

Device	Maximum measuring range
FMR51 - standard version	40 m (131 ft)
FMR51 - with "Advanced dynamics" application package	70 m (230 ft)
FMR52 - standard version	40 m (131 ft)
FMR52 - with "Advanced dynamics" application package	60 m (197 ft)

Usable measuring range

The usable measuring range depends on the size of the antenna, the reflectivity of the medium, the mounting location and eventual 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 groups	DC (ϵ_r)	Example
A	1.4 to 1.9	non-conducting liquids, e.g. liquefied gas ¹⁾
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) Treat Ammonia NH_3 as a medium of 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)

Legend

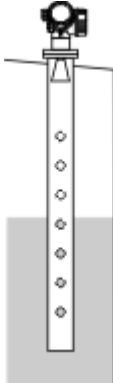
11

Legend

Endress+Hauser

Legend

13

Device	Stilling well	Bypass
	 A0018842	 A0018840
	Antenna size	Antenna size
FMR51	40 ... 100 mm (1½ ... 4 in)	40 ... 100 mm (1½ ... 4 in)
FMR52	50 ... 80 mm (2 ... 3 in)	50 ... 80 mm (2 ... 3 in)
	A, B, C, D  A0018851	C, D  A0018852
	Measuring range [m (ft)]	

Output signal

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

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.

Signal coding	Manchester Bus Powered (MBP)
Data transmission rate	31.25 kBit/s, voltage mode
Galvanic isolation	Yes

Signal coding	Manchester Bus Powered (MBP)
Data transmission rate	31.25 kBit/s, voltage mode
Galvanic isolation	Yes

 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"

16

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 digital communication (HART, PROFIBUS PA, FOUNDATION Fieldbus) 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										
	<table border="1"> <tr> <td>Manufacturer ID</td><td>17 (0x11)</td></tr> <tr> <td>Device type ID</td><td>0x1128</td></tr> <tr> <td>HART specification</td><td>7.0</td></tr> <tr> <td>Device description files (DTM, DD)</td><td>Information and files under: ■ www.endress.com ■ www.fieldcommgroup.org </td></tr> <tr> <td>HART load</td><td>min. 250 Ω</td></tr> </table>	Manufacturer ID	17 (0x11)	Device type ID	0x1128	HART specification	7.0	Device description files (DTM, DD)	Information and files under: ■ www.endress.com ■ www.fieldcommgroup.org	HART load	min. 250 Ω
Manufacturer ID	17 (0x11)										
Device type ID	0x1128										
HART specification	7.0										
Device description files (DTM, DD)	Information and files under: ■ www.endress.com ■ www.fieldcommgroup.org										
HART load	min. 250 Ω										

Wireless HART data

PROFIBUS PAEndress+Hauser

FOUNDATION Fieldbus

Transducer Blocks

1) depending on the configuration of the block

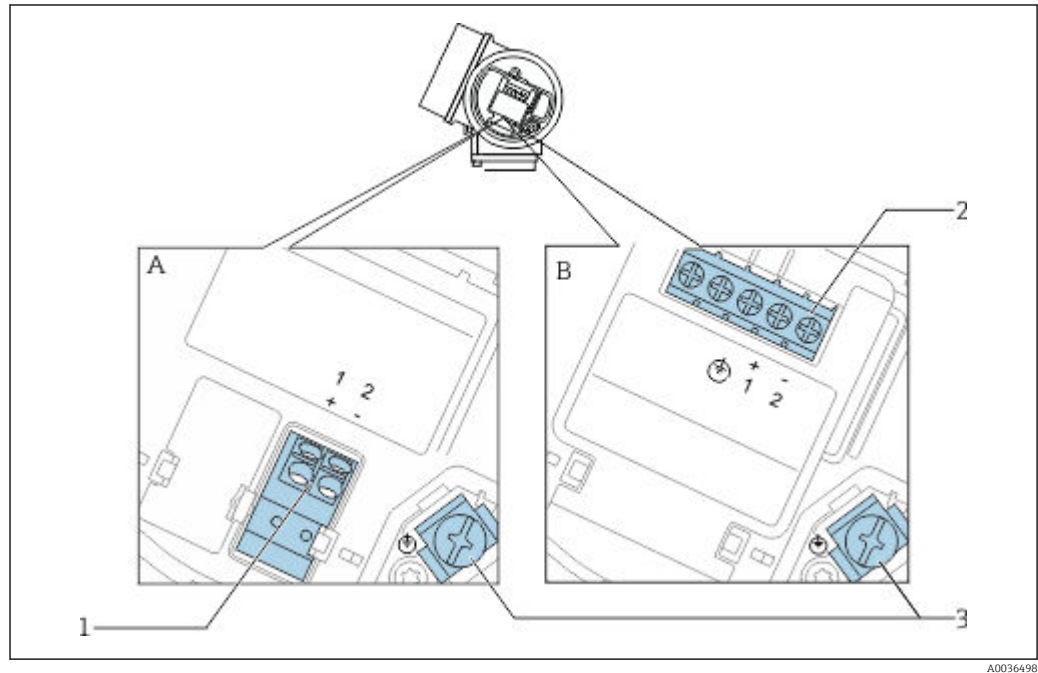
Block	Content	Number of permanent blocks	Number of instantiable blocks	Execution time	Functionality
Resource Block	The Resource Block contains all the data that uniquely identifies the field device. It is an electronic version of a nameplate of the device.	1	0	-	enhanced
Analog Input Block	The AI block takes the manufacturer's input data, selected by channel number, and makes it available to other function blocks at its output.	2	3	25 ms	enhanced
Discrete Input Block	The DI block takes a discrete input value (e.g. indication of an level limit), and makes it available to other function blocks at its output.	1	2	20 ms	standard
Mutiple Analog Output Block	This block is used to transfer analog data from the bus into the device	1	0	20 ms	standard
Mutiple Discrete Output Block	This block is used to transfer discrete data from the bus to the device.	1	0	20 ms	standard

Up to 20 blocks can be instantiated in the device altogether, including the blocks already instantiated on delivery.

Power supply

Terminal assignment

Terminal assignment 2-wire: 4-20 mA HART



A0036498

2 Terminal assignment 2-wire: 4-20 mA HART

A Without integrated overvoltage protection

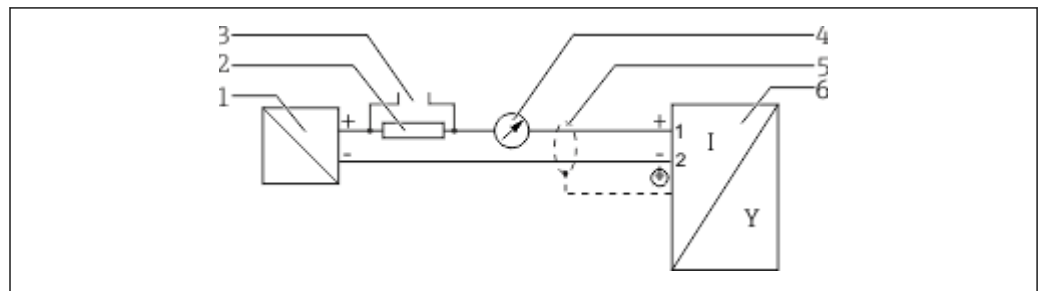
B With integrated overvoltage protection

1 Connection 4-20 mA HART passive: terminals 1 and 2, without integrated overvoltage protection

2 Connection 4-20 mA HART passive: terminals 1 and 2, with integrated overvoltage protection

3 Terminal for cable screen

Block diagram 2-wire: 4-20 mA HART



A0036499

3 Block diagram 2-wire: 4-20 mA HART

1 Active barrier with power supply (e.g. RN221N); observe terminal voltage

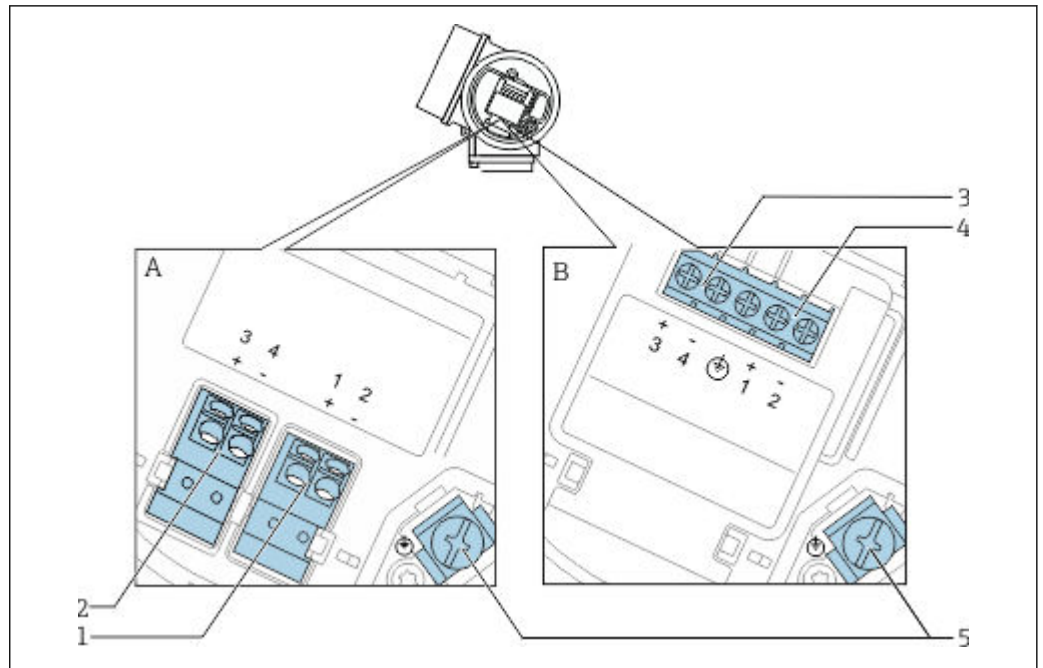
2 HART communication resistor ($\geq 250 \Omega$); observe maximum load

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

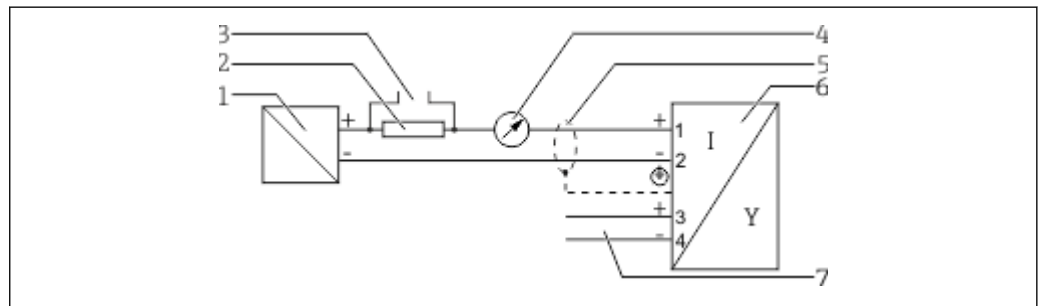
4 Analog display device; observe maximum load

5 Cable screen; observe cable specification

6 Measuring device

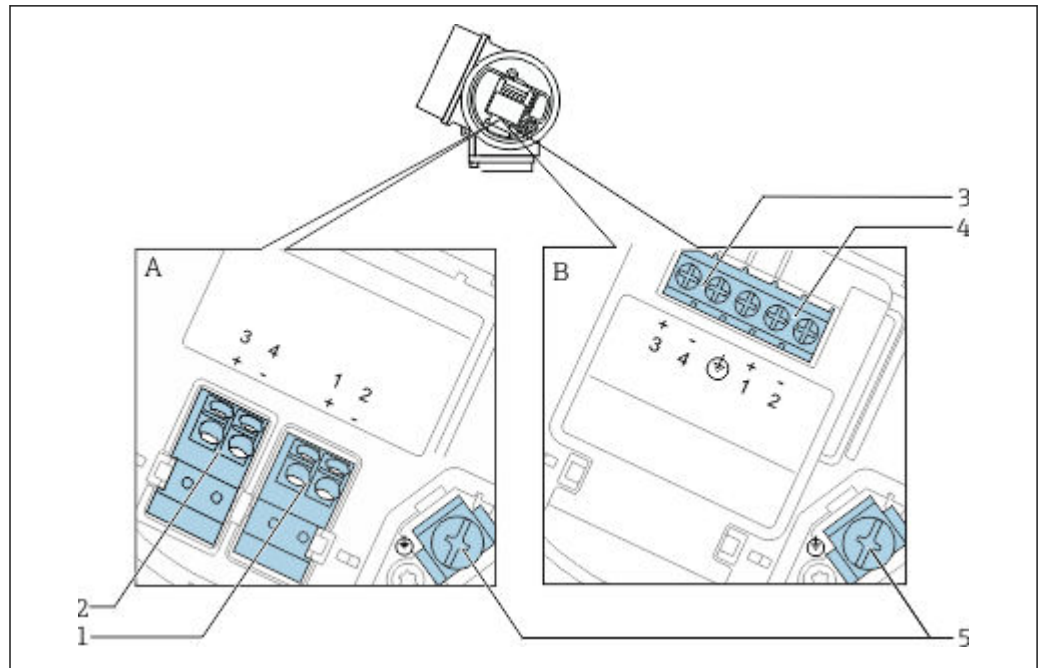
Terminal assignment 2-wire: 4-20 mA HART, switch output

A0036500

4 Terminal assignment 2-wire: 4-20 mA HART, switch output*A Without integrated overvoltage protection**B With integrated overvoltage protection**1 Connection 4-20 mA HART passive: terminals 1 and 2, without integrated overvoltage protection**2 Connection switch output (Open Collector): terminals 3 and 4, without integrated overvoltage protection**3 Connection switch output (Open Collector): terminals 3 and 4, with integrated overvoltage protection**4 Connection 4-20 mA HART passive: terminals 1 and 2, with integrated overvoltage protection**5 Terminal for cable screen***Block diagram 2-wire: 4-20 mA HART, switch output**

A0036501

5 Block diagram 2-wire: 4-20 mA HART, switch output*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 Measuring device**7 Switch output (Open Collector)*

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

A0036500

6 Terminal assignment 2-wire: 4-20 mA HART, 4-20 mA

A Without integrated overvoltage protection

B With integrated overvoltage protection

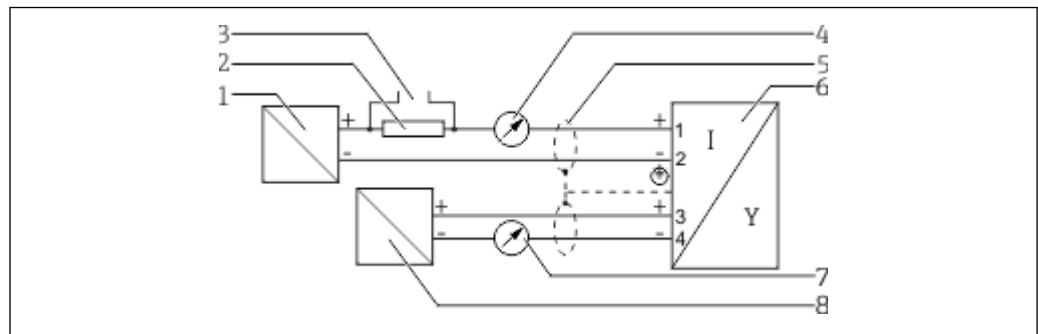
1 Connection current output 1, 4-20 mA HART passive: terminals 1 and 2, without integrated overvoltage protection

2 Connection current output 2, 4-20 mA: terminals 3 and 4, without integrated overvoltage protection

3 Connection current output 2, 4-20 mA: terminals 3 and 4, with integrated overvoltage protection

4 Connection current output 1, 4-20 mA HART passive: terminals 1 and 2, with integrated overvoltage protection

5 Terminal for cable screen

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

A0036502

7 Block diagram 2-wire: 4-20 mA HART, 4-20 mA

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

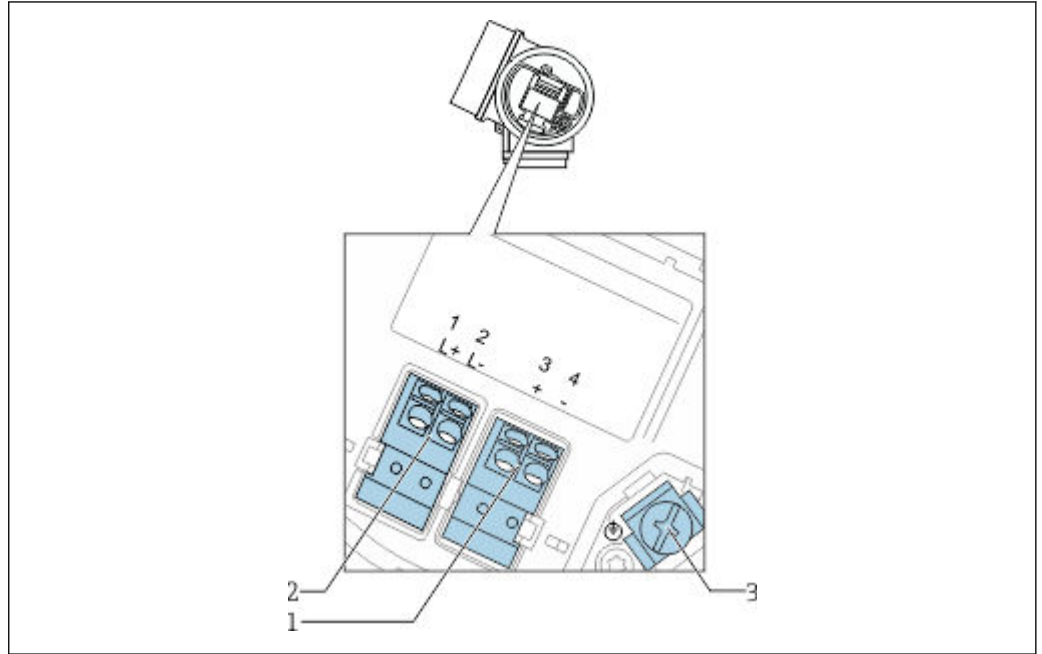
5 Cable screen; observe cable specification

6 Measuring device

7 Analog display device; observe maximum load

8 Active barrier with power supply (e.g. RN221N), current output 2; observe terminal voltage

Terminal assignment 4-wire: 4-20 mA HART (10.4 to 48 V_{DC})

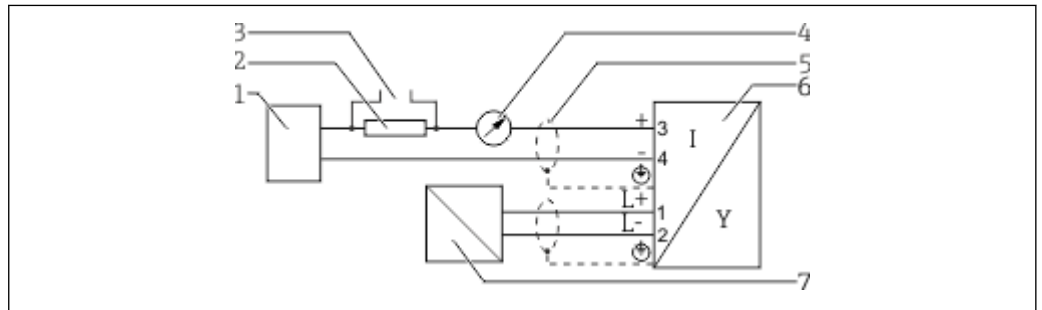


A0036516

8 Terminal assignment 4-wire: 4-20 mA HART (10.4 to 48 V_{DC})

- 1 Connection 4-20 mA HART (active): terminals 3 and 4
- 2 Connection supply voltage: terminals 1 and 2
- 3 Terminal for cable screen

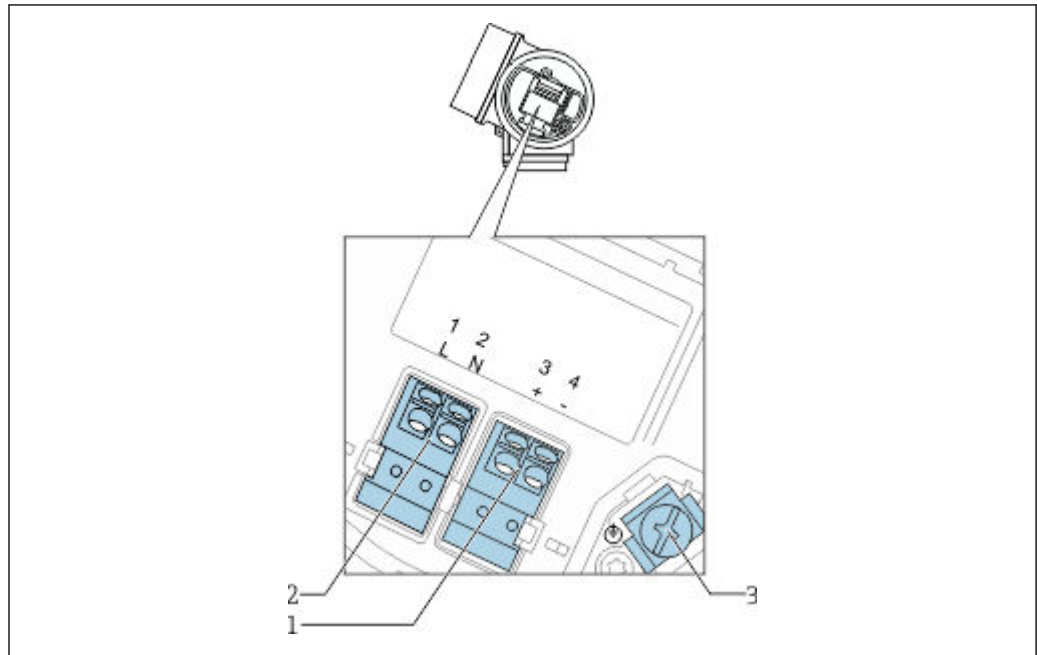
Block diagram 4-wire: 4-20 mA HART (10.4 to 48 V_{DC})



A0036526

9 Block diagram 4-wire: 4-20 mA HART (10.4 to 48 V_{DC})

- 1 Evaluation unit, e.g. PLC
- 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 Measuring device
- 7 Supply voltage; observe terminal voltage, observe cable specification

Terminal assignment 4-wire: 4-20 mA HART (90 to 253 V_{AC})

A0036519

10 Terminal assignment 4-wire: 4-20 mA HART (90 to 253 V_{AC})

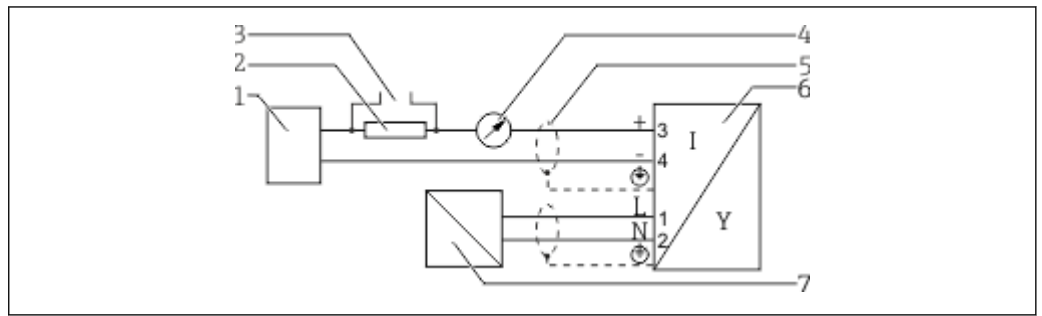
- 1 Connection 4-20 mA HART (active): terminals 3 and 4
- 2 Connection supply voltage: terminals 1 and 2
- 3 Terminal for cable screen

CAUTION

To ensure electrical safety:

- ▶ Do not disconnect the protective connection.
- ▶ Disconnect the supply voltage before disconnecting the protective earth.

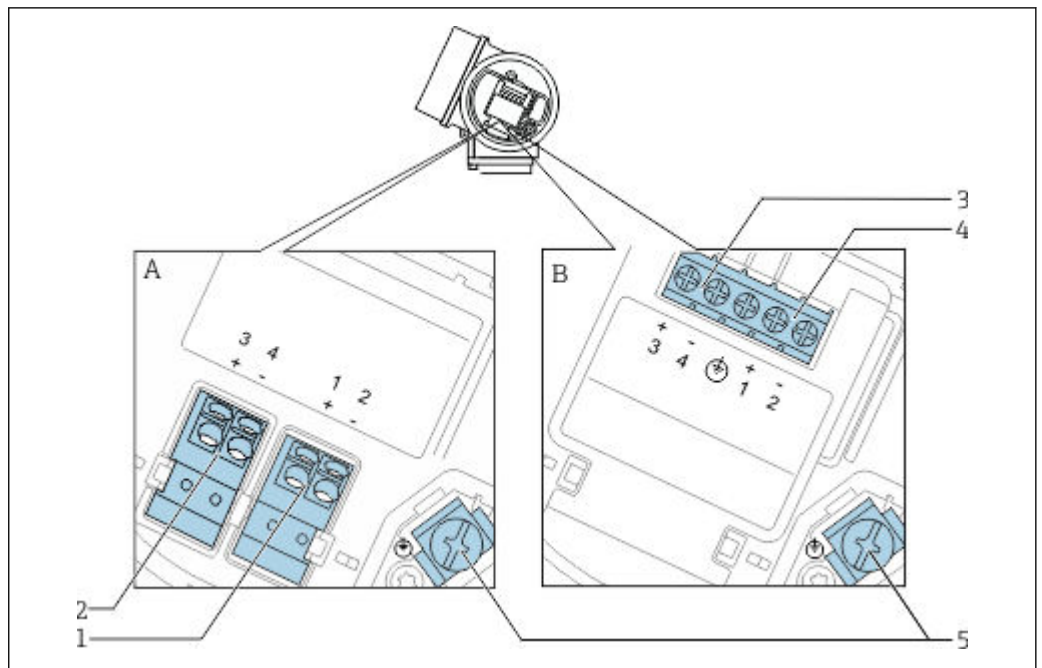
- i** Connect protective earth to the internal ground terminal (3) before connecting the supply voltage. If necessary, connect the potential matching line to the external ground terminal.
- i** In order to ensure electromagnetic compatibility (EMC): Do **not** only ground the device via the protective earth conductor of the supply cable. Instead, the functional grounding must also be connected to the process connection (flange or threaded connection) or to the external ground terminal.
- i** An easily accessible power switch must be installed in the proximity of the device. The power switch must be marked as a disconnect for the device (IEC/EN61010).

Block diagram 4-wire: 4-20 mA HART (90 to 253 V_{AC})

A0036527

11 Block diagram 4-wire: 4-20 mA HART (90 to 253 V_{AC})

- 1 Evaluation unit, e.g. PLC
- 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 scree; observe cable specification
- 6 Measuring device
- 7 Supply voltage; observe terminal voltage, observe cable specification

Terminal assignment PROFIBUS PA / FOUNDATION Fieldbus

A0036500

12 Terminal assignment PROFIBUS PA / FOUNDATION Fieldbus

- A Without integrated overvoltage protection
- B With integrated overvoltage protection
- 1 Connection PROFIBUS PA / FOUNDATION Fieldbus: terminals 1 and 2, without integrated overvoltage protection
- 2 Connection switch output (Open Collector): terminals 3 and 4, without integrated overvoltage protection
- 3 Connection switch output (Open Collector): terminals 3 and 4, with integrated overvoltage protection
- 4 Connection PROFIBUS PA / FOUNDATION Fieldbus: terminals 1 and 2, with integrated overvoltage protection
- 5 Terminal for cable screen

A0036530

- 1 Cable screen; observe cable specifications
- 2 Connection PROFIBUS PA / FOUNDATION Fieldbus
- 3 Measuring device
- 4 Switch output (open collector)

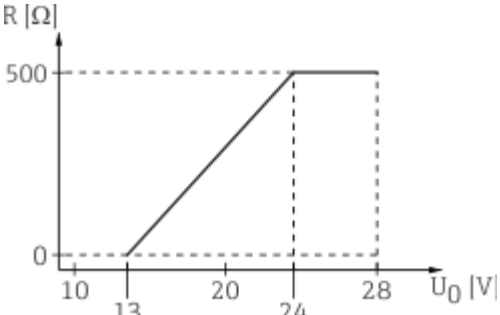
- 1 Cable screen; observe cable specifications
- 2 Connection PROFIBUS PA / FOUNDATION Fieldbus
- 3 Measuring device
- 4 Switch output (open collector)

Devices with PROFIBUS PA and FOUNDATION Fieldbus always have a switch output.



29

31

"Power Supply, Output" ¹⁾	"Approval" ²⁾	Terminal voltage U at the device	Maximum load R, depending on the supply voltage U ₀ at the supply unit
C: 2-wire; 4-20mA HART, 4-20mA	any	13 to 28 V ^{3) 4)}	 The graph plots Maximum load R [Ω] on the y-axis against supply voltage U₀ [V] on the x-axis. The y-axis has markings at 0 and 500. The x-axis has markings at 10, 13, 20, 24, and 28. A solid line starts at (13, 0) and rises linearly to (24, 500). From U₀ = 24 V to U₀ = 28 V, the load R remains constant at 500 Ω, indicated by a horizontal solid line. Dashed lines connect the points (13, 0), (24, 500), and (28, 500) to their respective values on the axes.

A0034841

- 1) Feature 020 of the product structure
- 2) Feature 010 of the product structure
- 3) For ambient temperatures $T_a \leq -30^\circ\text{C}$ (-22°F) a minimum voltage of 16 V is required for the startup of the device at the minimum error current (3.6 mA).
- 4) If the Bluetooth modem is used, the minimum supply voltage increases by 3 V.

Polarity reversal protection	Yes
Admissible residual ripple at f = 0 to 100 Hz	$U_{SS} < 1\text{ V}$
Admissible residual ripple at f = 100 to 10000 Hz	$U_{SS} < 10\text{ mV}$

1) Feature 020 of the product structure

PROFIBUS PA, FOUNDATION Fieldbus

"Power supply; Output" ¹⁾	"Approval" ²⁾	Terminal voltage
E: 2-wire; FOUNDATION Fieldbus, switch output G: 2-wire; PROFIBUS PA, switch output	■ Non-Ex ■ Ex nA ■ Ex nA(ia) ■ Ex ic ■ Ex ic(ia) ■ Ex d(ia) / XP ■ Ex ta / DIP ■ CSA GP	9 to 32 V ³⁾
	■ Ex ia / IS ■ Ex ia + Ex d(ia) / IS + XP	9 to 30 V ³⁾

- 1) Feature 020 of the product structure
- 2) Feature 010 of the product structure
- 3) Input voltages up to 35 V will not spoil the device.

Polarity sensitive	No
FISCO/FNICO compliant according to IEC 60079-27	Yes

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
K: 4-wire 90-253VAC; 4-20mA HART	6 VA
L: 4-wire 10,4-48VDC; 4-20mA HART	1.3 W

- 1) Feature 020 of the product structure

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

PROFIBUS PA

Nominal current	14 mA
Failure current FDE (Fault Disconnection Electronic)	0 mA

Device basic current	15 mA
Failure current FDE (Fault Disconnection Electronic)	0 mA

U_i	17.5 V
I_i	550 mA
P_i	5.5 W
C_i	5 nF
L_i	10 μ H

Terminals	■ Without integrated overvoltage protection Plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG) ■ With integrated overvoltage protection Screw terminals for wire cross-sections 0.2 to 2.5 mm² (24 to 14 AWG)
------------------	--

Connection of power supply and signal line

- 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:
 - 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

Feature 030 "Display, Operation"	Cable entry for FHX50 connection
L: "Prepared for display FHX50 + M12 connection"	M12 socket
M: "Prepared for display FHX50 + M16 gland, custom connection"	M12 cable gland
N: "Prepared for display FHX50 + NPT1/2 thread, custom connection"	NPT1/2 thread

34

- 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.
- For 4-wire devices: Standard device cable is sufficient for the power line.

PROFIBUS

Use a twisted, screened two-wire cable, preferably cable type A.



For further information on the cable specifications, see Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning", PNO Guideline 2.092 "PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

FOUNDATION Fieldbus

Endress+Hauser recommends using twisted, shielded two-wire cables.



For further information on the cable specifications, see Operating Instructions BA00013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

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 μ s), an overvoltage protection module has to be installed.

Integrated overvoltage protection module

An integrated overvoltage protection module is available for 2-wire HART as well as PROFIBUS PA and FOUNDATION Fieldbus 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.

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 a minimum diameter of 1 m (40 in)
- No major interference reflections inside the signal beam

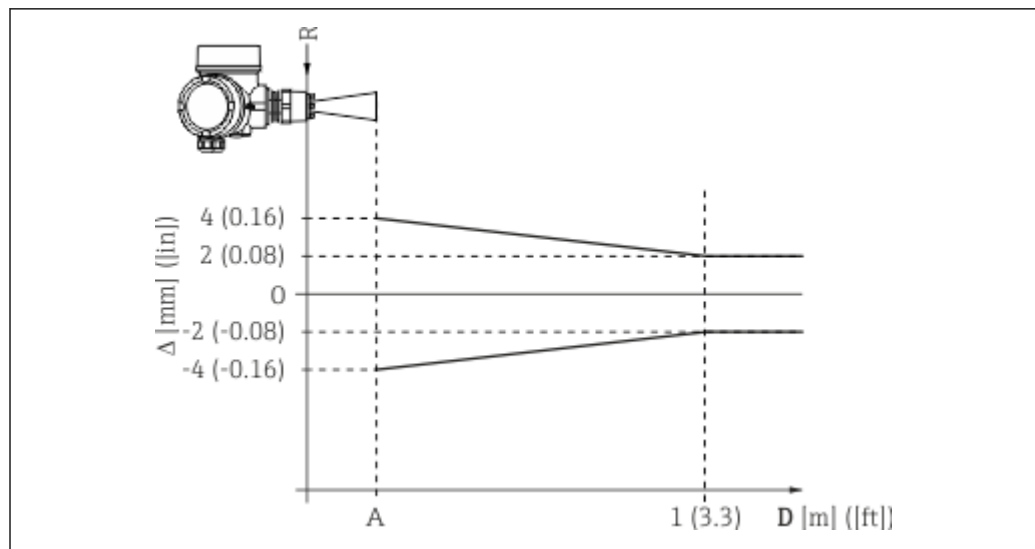
Maximum measured error

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

Device	Value	Output	
		digital	analog ¹⁾
FMR51/FMR52 Standard version	Sum of non-linearity, nonrepeatability and hysteresis	± 2 mm (0.08 in)	± 0.02 %
	Offset/Zero	± 4 mm (0.2 in)	± 0.03 %
FMR51/FMR52 Version with application package "Advanced dynamics" ²⁾	Sum of non-linearity, nonrepeatability and hysteresis	± 3 mm (0.12 in)	± 0.02 %
	Offset/Zero	± 4 mm (0.2 in)	± 0.03 %

- 1) Only relevant for 4-20mA current output; add error of the analog value to the digital value.
- 2) Product structure: Feature 540 "Application Package", Option EM "Advanced dynamics"

Differing values in near-range applications



16 Maximum measured error in near-range applications; values for standard version

- Δ Maximum measured error
 A Lower edge of the antenna
 D Distance from the lower edge A of the antenna
 R Reference point of the distance measurement



Δ	Maximum measured error
A	Lower edge of the antenna
D	Distance from the lower edge A of the antenna
R	Reference point of the distance measurement

- 1) According to DIN EN IEC 61298-2 / DIN EN IEC 60770-1 the response time is the time which passes after a sudden change of the input signal until the output signal for the first time assumes 90% of the steady-state value.
- 2) Feature 540 "Application Package", option EM

error for a few typical gases/vapors (with regard to distance; a positive value means that too large a distance is being measured):

Gas layer	Temperature		Pressure				
	°C	°F	1 bar (14,5 psi)	10 bar (145 psi)	50 bar (725 psi)	100 bar (1450 psi)	160 bar (2320 psi)
Air/ Nitrogen	20	68	0.00 %	0.22 %	1.2 %	2.4 %	3.89 %
	200	392	-0.01 %	0.13 %	0.74 %	1.5 %	2.42 %
	400	752	-0.02 %	0.08 %	0.52 %	1.1 %	1.70 %
Hydrogen	20	68	-0.01 %	0.10 %	0.61 %	1.2 %	2.00 %
	200	392	-0.02 %	0.05 %	0.37 %	0.76 %	1.23 %
	400	752	-0.02 %	0.03 %	0.25 %	0.53 %	0.86 %
Water (saturated steam)	100	212	0.02 %	-	-	-	-
	180	356	-	2.1 %	-	-	-
	263	505,4	-	-	8.6 %	-	-
	310	590	-	-	-	22 %	-
	364	687	-	-	-	-	41.8 %



When the pressure is known and constant, this measured error can, for example, be compensated by means of a linearization.

Gas phase compensation with external pressure sensor (PROFIBUS PA, FOUNDATION Fieldbus)

PROFIBUS devices can receive the signal of an external pressure sensor through the bus and use it to perform a pressure dependent time-of-flight correction. In the case of saturated steam in the temperature range from 100 to 350 °C (212 to 662 °F), for example, the measuring error of the distance measurement can be reduced by this method from up to 29 % (without compensation) to less than 3 % (with compensation).

Mounting position

Mounting position



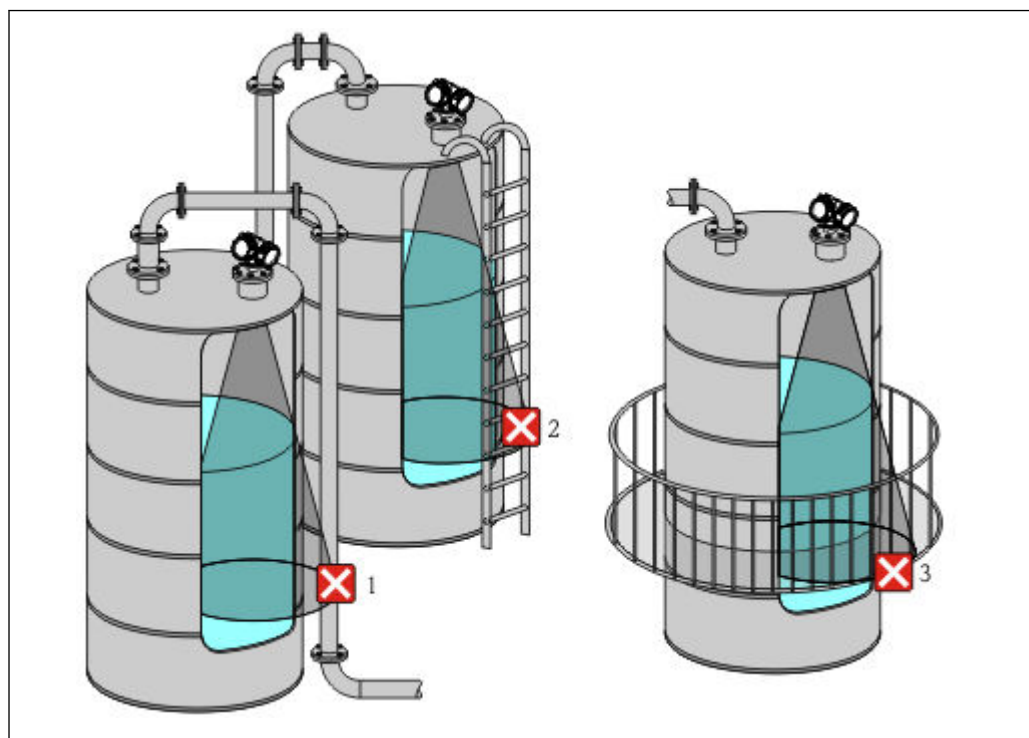
- ## Vessel installations



→ 41.

A0016890

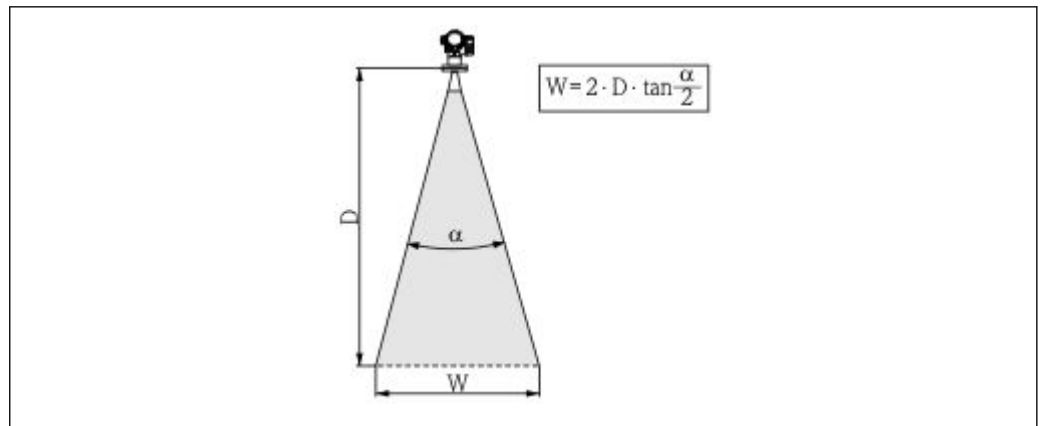
If the outer wall of the vessel is made of a non-conductive material (e.g. GRP), microwaves can also be reflected off interfering installations outside the vessel (e.g. metallic pipes (1), ladders (2), grates (3), ...). Therefore, there should be no such interfering installations in the signal beam. Please contact Endress+Hauser for further information.



A0017123

Optimization options

- Antenna size
The bigger the antenna, the smaller the beam angle α and the fewer interference echoes
→ 41.
- Mapping
The measurement can be optimized by means of electronic suppression of interference echoes.
- Antenna alignment
Take into account the marker on the flange or threaded connection .
- Stilling well
A stilling well can be applied to avoid interferences → 48.
- Metallic screens mounted at a slope
They spread the radar signals and can, therefore, reduce interference echoes.

Beam angle

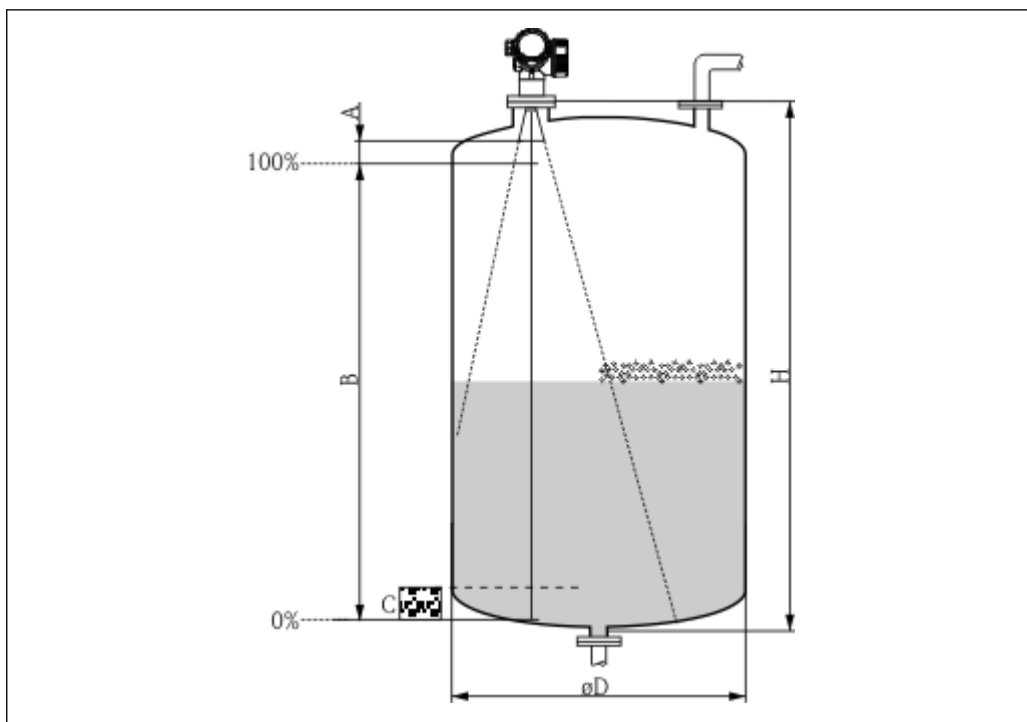
18 Relationship between beam angle α , distance D and beamwidth diameter W

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 (3-dB-width). Microwaves are also emitted outside the signal beam and can be reflected off interfering installations.

FMR51				
Antenna size	40 mm (1½ in)	50 mm (2 in)	80 mm (3 in)	100 mm (4 in)
Beam angle α	23°	18°	10°	8°
Measuring distance (D)	Beamwidth diameter W			
3 m (9.8 ft)	1.22 m (4 ft)	0.95 m (3.1 ft)	0.53 m (1.7 ft)	0.42 m (1.4 ft)
6 m (20 ft)	2.44 m (8 ft)	1.9 m (6.2 ft)	1.05 m (3.4 ft)	0.84 m (2.8 ft)
9 m (30 ft)	3.66 m (12 ft)	2.85 m (9.4 ft)	1.58 m (5.2 ft)	1.26 m (4.1 ft)
12 m (39 ft)	4.88 m (16 ft)	3.80 m (12 ft)	2.1 m (6.9 ft)	1.68 m (5.5 ft)
15 m (49 ft)	6.1 m (20 ft)	4.75 m (16 ft)	2.63 m (8.6 ft)	2.10 m (6.9 ft)
20 m (66 ft)	8.14 m (27 ft)	6.34 m (21 ft)	3.50 m (11 ft)	2.80 m (9.2 ft)
25 m (82 ft)	10.17 m (33 ft)	7.92 m (26 ft)	4.37 m (14 ft)	3.50 m (11 ft)
30 m (98 ft)	-	9.50 m (31 ft)	5.25 m (17 ft)	4.20 m (14 ft)
35 m (115 ft)	-	11.09 m (36 ft)	6.12 m (20 ft)	4.89 m (16 ft)
40 m (131 ft)	-	12.67 m (42 ft)	7.00 m (23 ft)	5.59 m (18 ft)
45 m (148 ft)	-	-	7.87 m (26 ft)	6.29 m (21 ft)
60 m (197 ft)	-	-	10.50 m (34 ft)	8.39 m (28 ft)
70 m (230 ft)	-	-	-	9.79 m (32 ft)

Measuring conditions

- In case of **boiling surfaces, bubbling** or tendency for **foaming** use FMR53 or FMR54. Depending on its consistence, foam can either absorb microwaves or reflect them off the foam surface. Measurement is possible under certain conditions. For FMR50, FMR51 and FMR52, the additional option "Advanced dynamics" is recommended in these cases (feature 540: "Application Package", option EM).
- In case of heavy **steam development** or **condensate**, the maximum measuring range of FMR50, FMR51 and FMR52 may decrease depending on density, temperature and composition of the steam → use FMR53 or FMR54.
- For the measurement of absorbing gases such as **ammonia NH₃** or some **fluorocarbons**³⁾, please use Levelflex or Micropilot FMR54 in a stilling well.
- The measuring range begins, where the beam hits the tank bottom. Particularly with dish bottoms or conical outlets the level cannot be detected below this point.
- In stilling well applications, the electromagnetic waves do not propagate completely outside the tube. It must be taken into account that the accuracy may be reduced in the area **C**. In order to guarantee the required accuracy in these cases, it is recommended to position the zero-point at a distance **C** above the end of the tube (see figure).
- In case of media with a low dielectric constant ($\epsilon_r = 1.5$ to 4)⁴⁾ the tank bottom can be visible through the medium at low levels (low height **C**). Reduced accuracy has to be expected in this range. If this is not acceptable, we recommend positioning the zero point at a distance **C** (see figure) above the tank bottom in these applications.
- In principle it is possible to measure up to the tip of the antenna with FMR51, FMR53 and FMR54. However, due to considerations regarding corrosion and build-up, the end of the measuring range should not be chosen any closer than **A** (see figure) to the tip of the antenna.
- When using FMR54 with planar antenna, especially for media with low dielectric constants, the end of the measuring range should not be closer than **A: 1 m (3.28 ft)** to the flange.
- The smallest possible measuring range **B** depends on the antenna version (see figure).
- The tank height should be at least **H** (see table).



Device	A [mm (in)]	B [m (ft)]	C [mm (in)]	H [m (ft)]
FMR51	50(1.97)	> 0.2 (0.7)	50 to 250 (1.97 to 9.84)	> 0.3 (1.0)
FMR52	200(7.87)			

3) Affected compounds are e.g. R134a, R227, Dymel 152a.

4) Dielectric constants of important media commonly used in various industries are summarized in the DC manual (CP01076F) and in the Endress +Hauser "DC Values App" (available for Android and iOS).

-

Flange size	Number of screws	Recommended torque [Nm]	
		minimum	maximum
EN			
DN50/PN16	4	45	65
DN80/PN16	8	40	55
DN100/PN16	8	40	60
DN150/PN16	8	75	115
ASME			
2"/150lbs	4	40	55
3"/150lbs	4	65	95
4"/150lbs	8	45	70
6"/150lbs	8	85	125
JIS			
10K 50A	4	40	60
10K 80A	8	25	35
10K 100A	8	35	55
10K 100A	8	75	115

Horn antenna (FMR51)

- Align the antenna vertically to the product surface.
The maximum range may be reduced if the horn antenna is not vertically aligned.
- A marking at the flange (somewhere between the flange holes) or the boss enables alignment of the antenna. This marking must be aligned towards the tank wall as well as possible.



1) Feature 070 of the product structure

- ### Threaded connection

- Tighten with the hexagonal nut only.
- Tool : 55 mm hexagonal wrench
- Maximum permissible torque: 60 Nm (44 lbf ft)

- Dielectric constant of the medium: $\epsilon_r > 10$
- If possible, use an antenna 100 mm (4 in).
- The distance from the lower edge of the antenna to the tank ceiling 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.

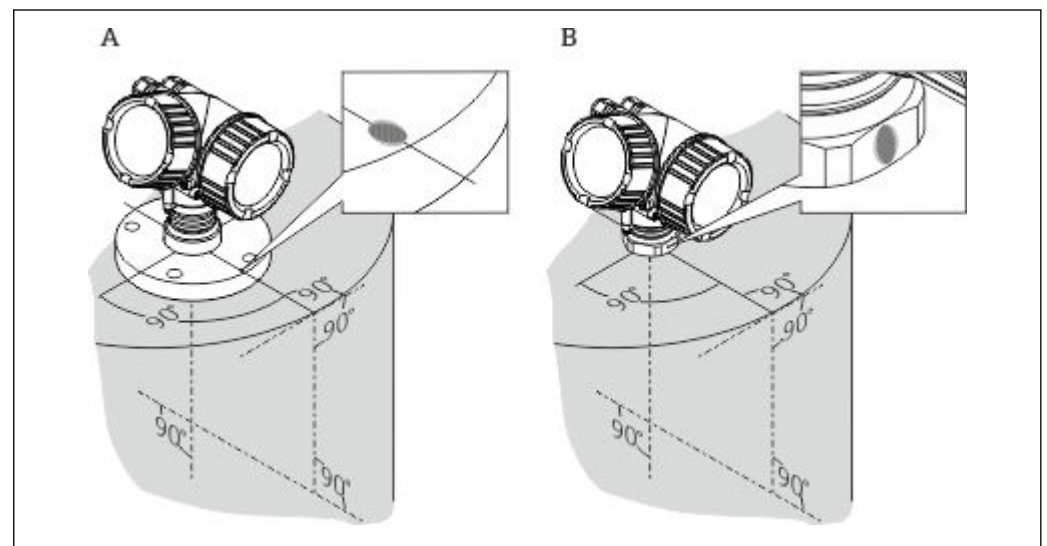
46

- 1) Other possible values for the thickness are multiples of the values listed (e.g. for PE: 7,6 mm (0.3 in), 11,4 mm (0.45 in))

Horn antenna, flush mount (FMR52)

Alignment

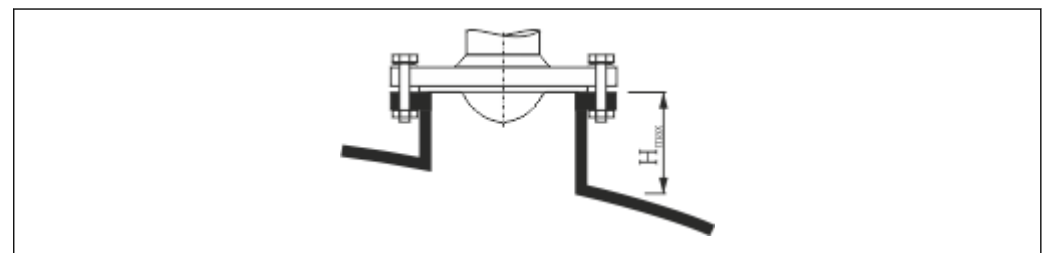
- Align the antenna vertically to the product surface.
The maximum range may be reduced if the horn antenna is not vertically aligned.
- A marking at the flange (somewhere between the flange holes) or the boss enables alignment of the antenna. This marking must be aligned towards the tank wall as well as possible.



A0018974

- Depending on the device version the marking may be a circle or two short parallel lines.

Nozzle mounting



A0016819

- 20 Nozzle height for horn antenna, flush mount (FMR52)

1) Feature 070 of the product structure

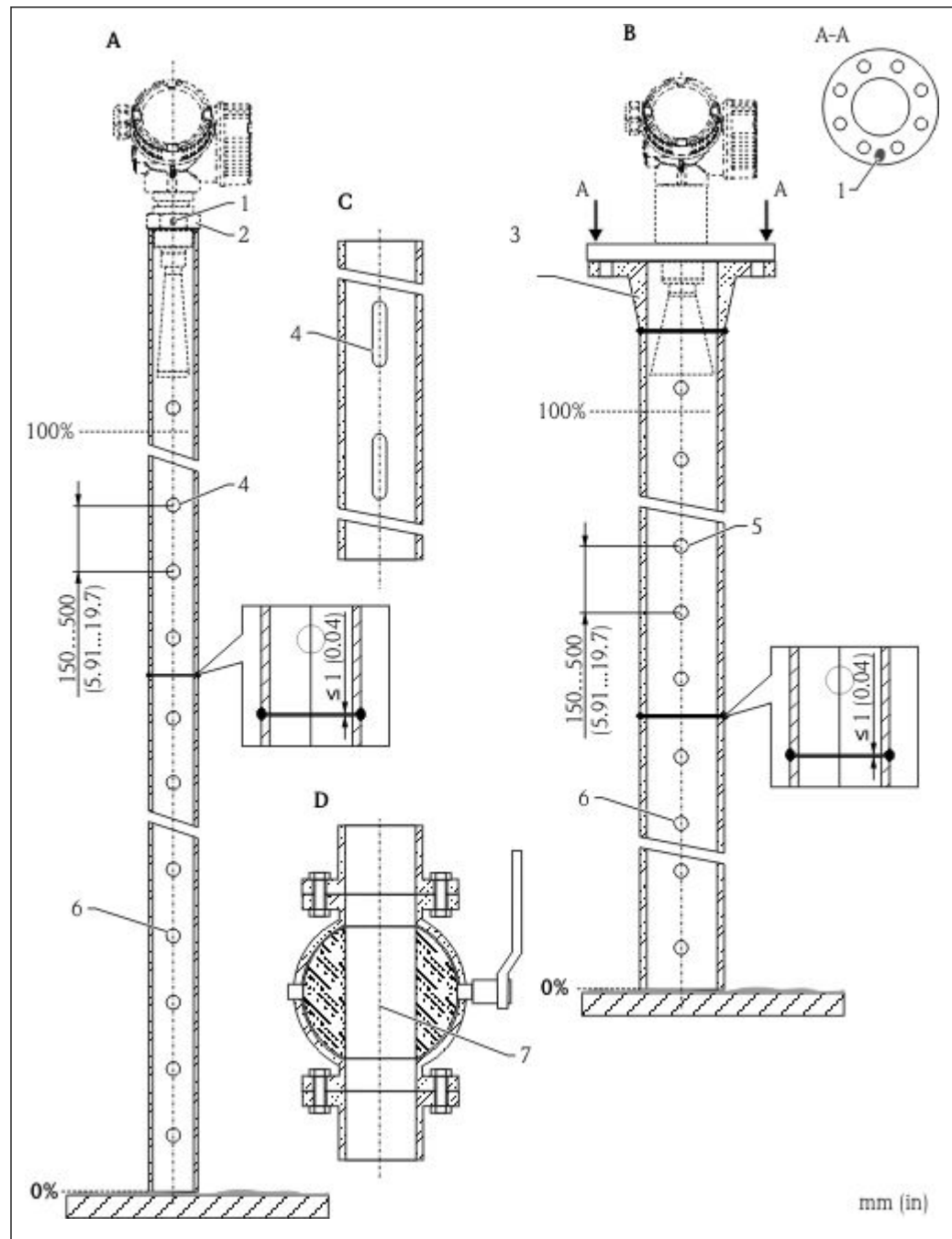
- For flanges with PTFE cladding: Observe the notes on the mounting of cladded flanges → 44.
- Usually, the PTFE flange cladding also serves as a seal between the nozzle and the device flange.

1 Marking for antenna alignment

- For horn antenna: Align the marking towards the slots of the stilling well.
- Measurements can be performed through an open full bore ball valve without any problems.
- After mounting, the housing can be turned 350° in order to facilitate access to the display and the terminal compartment.

- Metal (no enamel coating; plastic on request).
- Constant diameter.
- Diameter of stilling well not larger than antenna diameter.
- Diameter difference between horn antenna and inner diameter of the stilling well as small as possible.
- Weld seam as smooth as possible and on the same axis as the slots.
- Slots offset 180° (not 90°).
- Slot width or diameter of holes max. 1/10 of pipe diameter, de-burred. Length and number do not have any influence on the measurement.
- Select horn antenna as big as possible. For intermediate sizes (e.g. 180 mm (7 in)) select next larger antenna and adapt it mechanically (for horn antennas)
- At any transition (i.e. when using a ball valve or mending pipe segments), no gap may be left exceeding 1 mm (0.04 in).

Examples for the construction of stilling wells



A0019009

- A Micropilot FMR50/FMR51: Horn 40mm(1½")
- B Micropilot FMR50/FMR51/FMR52/FMR54: Horn 80mm(3")
- C Stilling well with slots
- D Full bore ball valve
- 1 Marking for axial alignment
- 2 Threaded connection
- 3 e.g. welding neck flange DIN2633
- 4 ϕ hole max. $1/10 \phi$ stilling well
- 5 ϕ hole max. $1/10 \phi$ stilling well; single sided or drilled through
- 6 Inside of holes deburred
- 7 Diameter of opening of ball valve must always be equivalent to pipe diameter; avoid edges and constrictions.

22 Installation in bypass

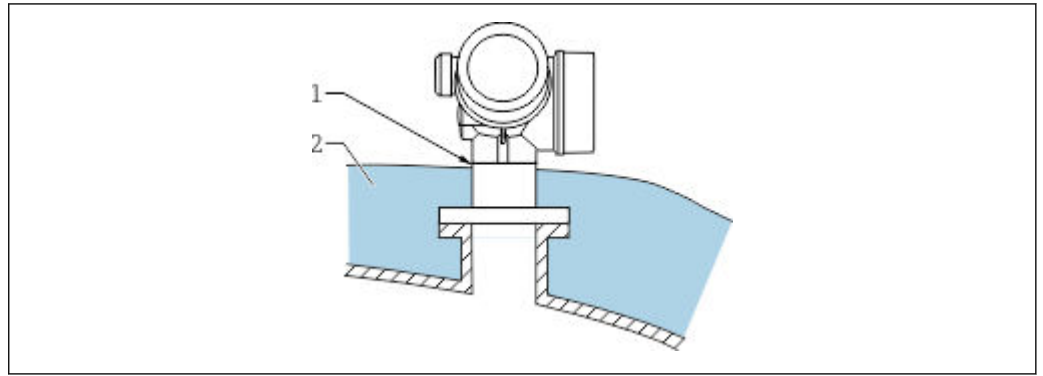
- Align the marker perpendicular (90°) to the tank connectors.
- Measurements can be performed through an open full bore ball valve without any problems.
- After mounting, the housing can be turned 350° in order to simplify access to the display and the terminal compartment.

- Metal (no plastic or enamel coating).
- Constant diameter.
- Select horn antenna as big as possible. For intermediate sizes (e.g. 95 mm (3.5 in)) select next larger antenna and adapt it mechanically (for horn antennas).
- Diameter difference between horn antenna and inner diameter of the bypass as small as possible.
- At any transition (i.e. when using a ball valve or mending pipe segments), no gap may be created exceeding 1 mm (0.04 in).
- In the area of the tank connections ($\sim \pm 20$ cm (7.87 in)) a reduced accuracy of the measurement has to be expected.

[illegible]

- Endress+Hauser

Container with heat insulation



A0032207

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).

Environment

Ambient temperature range

Measuring device	-40 to +80 °C (-40 to +176 °F); -50 °C (-58 °F) with manufacturer declaration on request
Measuring device (option for FMR51, FMR52 and FMR54)	-50 to +80 °C (-58 to +176 °F) ¹⁾
Local display	-20 to +70 °C (-4 to +158 °F), the readability of the display may be impaired at temperatures outside the temperature range.
Remote display FHX50	-40 to 80 °C (-40 to 176 °F)
Remote display FHX50 (option)	-50 to 80 °C (-58 to 176 °F) ¹⁾

- 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), increased failure rates have to be expected.

When operating the device in the open with strong sunlight:

- Mount the device in a shady position.
- Avoid direct sunlight, especially in warmer regions.
- Use a weather protection cover (see accessories).

Ambient temperature limits



The following diagrams take into account only functional aspects. There may be further restrictions for certified device versions. Please refer to the separate Safety Instructions → 116.

With a temperature (T_p) at the process connection the admissible ambient temperature (T_a) is reduced according to the following diagram (temperature derating):

Information concerning the derating tables

Option	Meaning
A	2-wire; 4-20 mA HART
B	2-wire; 4-20 mA HART, switch output
C	2-wire; 4-20 mA HART, 4-20 mA
E	2-wire; FF, switch output
G	2-wire; PA, switch output
K	4-wire 90-253VAC; 4-20 mA HART
L	4-wire 10, 4-48VDC; 4-20 mA HART

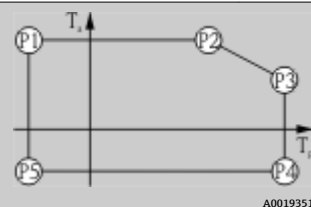
FMR51

Seal:

- Viton GLT, -40 to 150 °C (-40 to 302 °F)
- Kalrez, -20 to 150 °C (-4 to 302 °F)

Housing: GT18 (316 L)

Temperature unit: °C (°F)



Power Supply; Output (Pos. 2 of the product structure)	P1		P2		P3		P4		P5		P6	
	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a
A	-40 (-40)	81 (178)	81 (178)	81 (178)	150 (302)	66 (151)	150 (302)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
B Switch output not used	-40 (-40)	82 (180)	82 (180)	82 (180)	150 (302)	67 (153)	150 (302)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
B Switch output used	-40 (-40)	77 (171)	77 (171)	77 (171)	150 (302)	61 (142)	150 (302)	-40 (-40)	-40 (-40)	-40 (-40)	-	-

Housing: GT20 (Alu, coated)
Temperature unit: °C (°F)



Seal: Graphite, -40 to 250 °C (-40 to 482 °F)
Housing: GT18 (316 L)
Temperature unit: °C (°F)

Endress+Hauser

FMR51 Seal: Graphite, -196 to 450 °C (-321 to 842 °F) Housing: GT19 (Plastics PBT) Temperature unit: °C (°F)												
												
Power Supply; Output (Pos. 2 of the product structure)	P1		P2		P3		P4		P5		P6	
	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
A	-196 (-321)	80 (176)	80 (176)	80 (176)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)
B Switch output not used	-196 (-321)	76 (169)	76 (169)	76 (169)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)
B Switch output used	-196 (-321)	60 (140)	60 (140)	60 (140)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)
C Channel 2 not used	-196 (-321)	82 (180)	82 (180)	82 (180)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)
C Channel 2 used	-196 (-321)	74 (165)	74 (165)	74 (165)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)
E, G Switch output not used	-196 (-321)	79 (174)	79 (174)	79 (174)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)
E, G Switch output used	-196 (-321)	63 (145)	63 (145)	63 (145)	450 (842)	-29 (-20)	450 (842)	-40 (-40)	-40 (-40)	-40 (-40)	-196 (-321)	9 (48)

FMR52 Antenna: Horn 50mm/2" Housing: GT19 (Plastics PBT) Temperature unit: °C (°F)												
												
Power Supply; Output (Pos. 2 of the product structure)	P1		P2		P3		P4		P5		P6	
	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
A	-40 (-40)	80 (176)	80 (176)	80 (176)	200 (392)	42 (108)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
B Switch output not used	-40 (-40)	76 (169)	76 (169)	76 (169)	200 (392)	42 (108)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
B Switch output used	-40 (-40)	60 (140)	60 (140)	60 (140)	200 (392)	31 (88)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
C Channel 2 not used	-40 (-40)	82 (180)	82 (180)	82 (180)	200 (392)	42 (108)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
C Channel 2 used	-40 (-40)	74 (165)	74 (165)	74 (165)	200 (392)	42 (108)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
E, G Switch output not used	-40 (-40)	79 (174)	79 (174)	79 (174)	200 (392)	42 (108)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-
E, G Switch output used	-40 (-40)	63 (145)	63 (145)	63 (145)	200 (392)	33 (91)	200 (392)	-40 (-40)	-40 (-40)	-40 (-40)	-	-

A0019351

A0019351

Storage temperature	-40 to +80 °C (-40 to +176 °F) -50 °C (-58 °F) with manufacturer declaration on request
----------------------------	--

Process

Process temperature, Process pressure



The specified pressure range may be reduced due to the selected process connection. The pressure rating (PN) specified on the flanges refers to a reference temperature of 20 °C, for ASME flanges 100 °F. Pay attention to pressure-temperature dependencies.

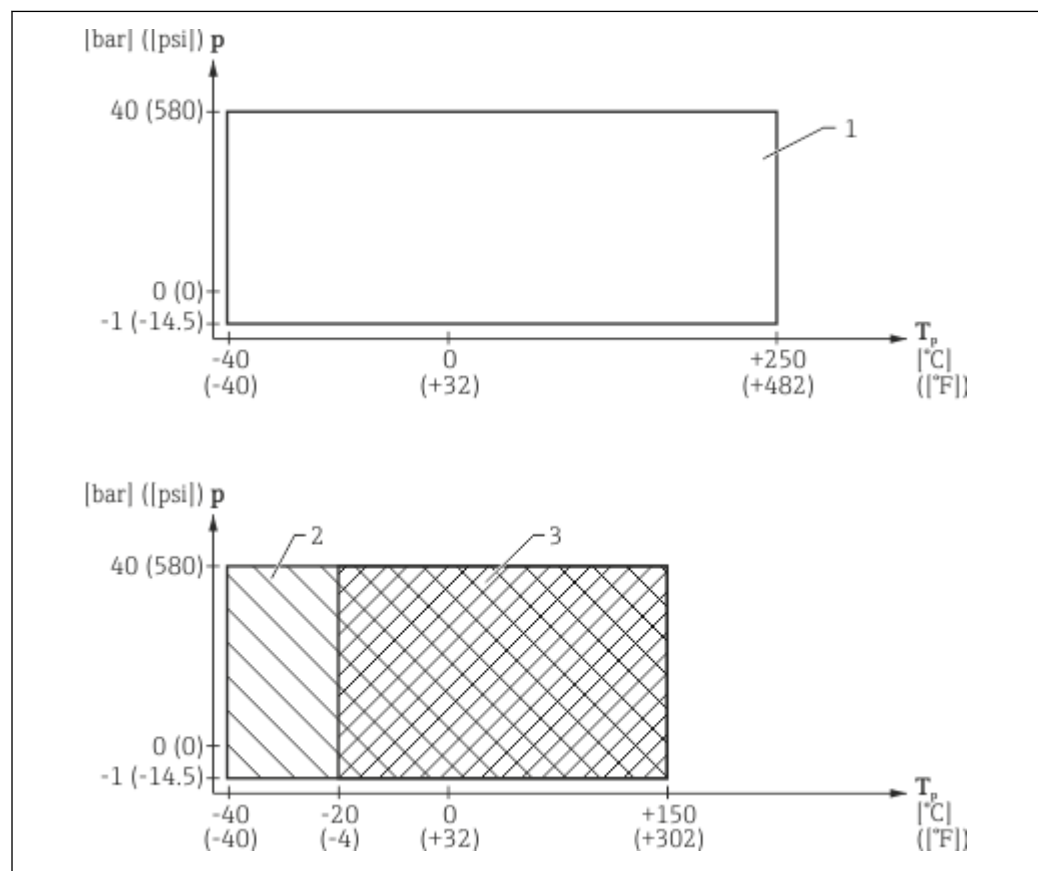
Please refer to the following standards for the pressure values permitted for higher temperatures:

- EN 1092-1: 2001 Tab. 18

With regard to their temperature stability properties, the materials 1.4435 and 1.4404 are grouped under 13E0 in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.

- ASME B 16.5a - 1998 Tab. 2-2.2 F316
- ASME B 16.5a - 1998 Tab. 2.3.8 N10276
- JIS B 2220

FMR51



A0022656-EN

23 FMR51: Admissible range of process temperature and process pressure

- 1 Seal: Graphite (Feature 090 "Seal", Option D3)
- 2 Seal: Viton (Feature 090 "Seal", Option A5)
- 3 Seal: Kalrez (Feature 090 "Seal", Option C1)



24 *FMR51: Admissible range of process temperature and process pressure of the HT version (Feature 090 "Seal", Option D2)*

Feature 090 "Seal"	Admissible process temperature	Admissible process pressure
A5: Viton GLT	-40 to +150 °C (-40 to 302 °F)	p _{rel} = -1 to 40 bar (-14.5 to 580 psi)
C1: Kalrez	-20 to +150 °C (-4 to 302 °F)	
D3: Graphite, 40...250°C/-40...482°F	-40 to +250 °C (-40 to 482 °F)	
D2: Graphite, 196...450°C/-321...842°F (HT)	-196 to +450 °C (-321 to 842 °F)	p _{rel} = -1 to 160 bar (-14.5 to 2 320 psi) Observe the temperature-dependent restrictions indicated in the diagram above ¹⁾ .

1) For devices with CRN approval the pressure range may be reduced → 97

FMR52



25 *FMR52: Admissible range of process temperature and process pressure*

- 1 Valid for the following process connections: 6" (ANSI), DN150 (EN), 10K150A (JIS)
2 Valid for all other types of process connection

- 1) For devices with CRN approval the pressure range may be reduced → 97
- 2) Process connections up to 25 bar (363 psi) on request

- For liquids

- $\varepsilon_r \geq 1.9$ in free-field applications
- $\varepsilon_r \geq 1.4$ in stilling well

- For bulk solids

$$\varepsilon_r \geq 1.6$$


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)

Dimensions



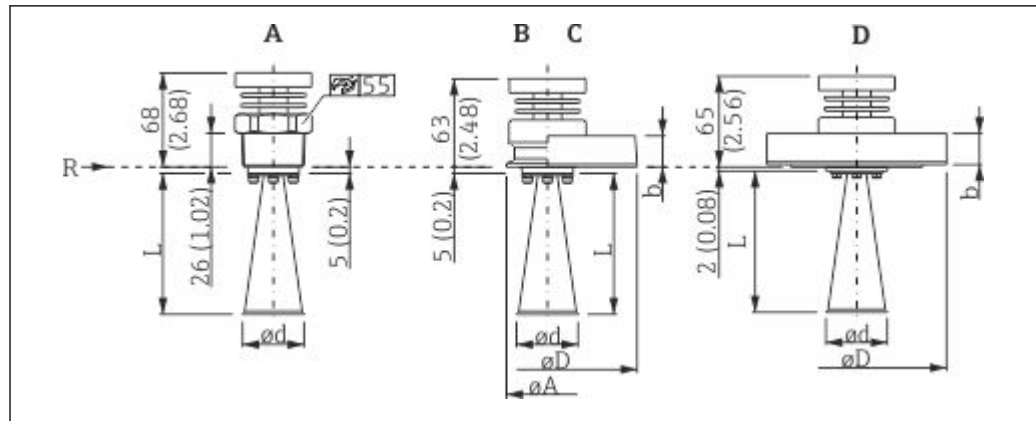
**for devices with integrated overvoltage protection.*



**for devices with integrated overvoltage protection.*



**for devices with integrated overvoltage protection.*

FMR51: Version $T \leq 150\text{ °C}$ (302 °F); without antenna extension

A0023383

29 FMR51: Version $T < 150\text{ °C}$ (302 °F); without antenna extension; dimensions: mm (in)

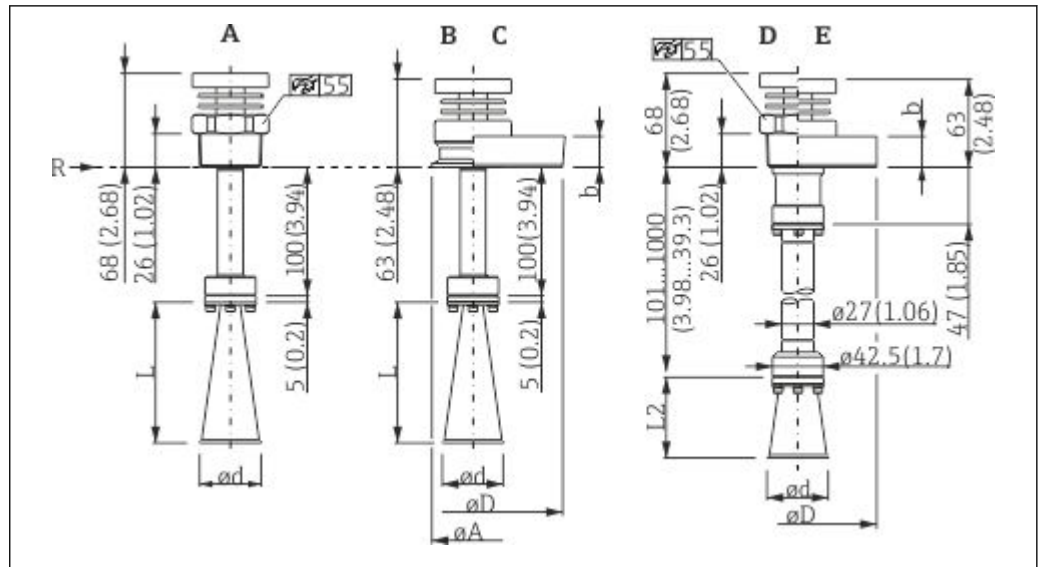
- A Process connection: Thread
 B Process connection: Tri-Clamp ISO2852
 C Process connection: Flange 316L
 D Process connection: Flange Alloy C>316L
 R Reference point of the measurement

Valid for the following device versions**Feature 090 "Seal":**

- A5: Viton GLT
- C1: Kalrez



- Dimensions of the horn antenna (L, ød): → 72
- Dimensions of the process connection (øA, øD, b): → 72

FMR51: Version $T \leq 150\text{ °C}$ (302 °F); with antenna extension

30 MR51: Version $T < 150\text{ °C}$ (302 °F); with antenna extension; dimensions: mm (in)

- A Process connections: Thread; Accessory mounted: 100mm/4" antenna extension
 B Prozessanschluss: Tri-Clamp ISO2852; Accessory mounted: 100mm/4" antenna extension
 C Process connection: Flange 316L; Accessory mounted: 100mm/4" antenna extension
 D Process connection: Thread; Accessory mounted: mm/inch antenna extension
 E Process connection: Flange 316L; Accessory mounted: mm/inch antenna extension
 R Reference point of the measurement

Valid for the following device versions**■ Feature 090 "Seal":**

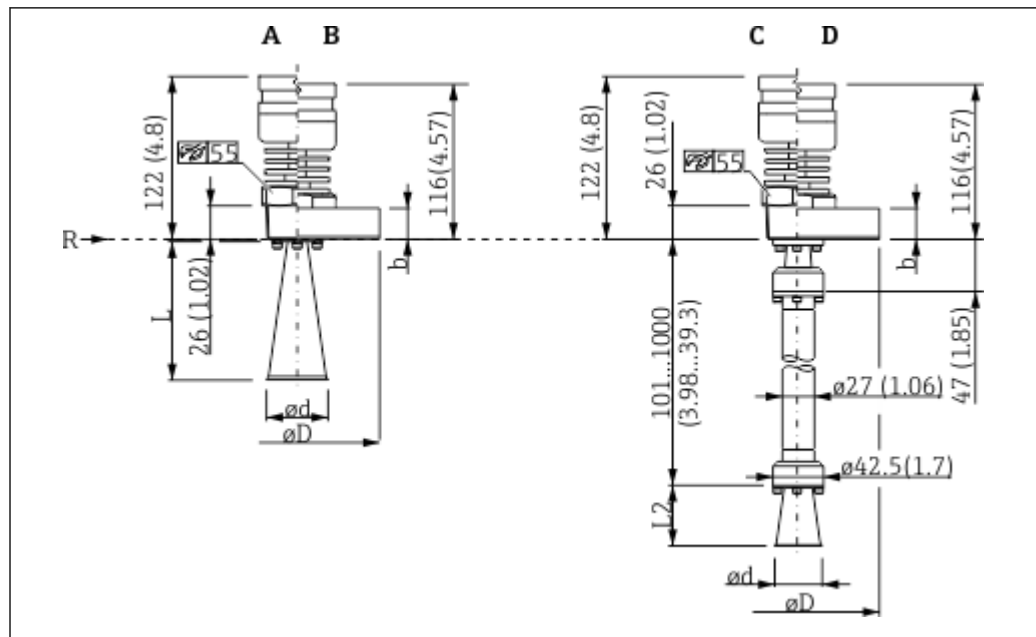
- A5: Viton GLT
- C1: Kalrez

■ Feature 610 "Accessory mounted"

- OM: 100mm/4" antenna extension (diagrams A, B, C)
- OU: mm antenna extension (101 ... 1000 mm) (diagrams D, E)
- OV: inch antenna extension (3,98 ... 39,3 in) (diagrams D, E)



- Dimensions of the horn antenna (L, L2, ød): → 72
- Dimensions of the process connections (øA, øD, b): → 72

FMR51: Version T ≤ 250 °C (482 °F)

A0023385

31 FMR51: Version T < 250 °C (482 °F); dimensions: mm (in)

A Process connection: Thread

B Process connection: Flange 316L

C Process connection: Thread; Accessory mounted: mm/inch antenna extension

D Process connection: Flange 316L; Accessory mounted: mm/inch antenna extension

R Reference point of the measurement

Valid for the following device versions**Feature 090 "Seal":**

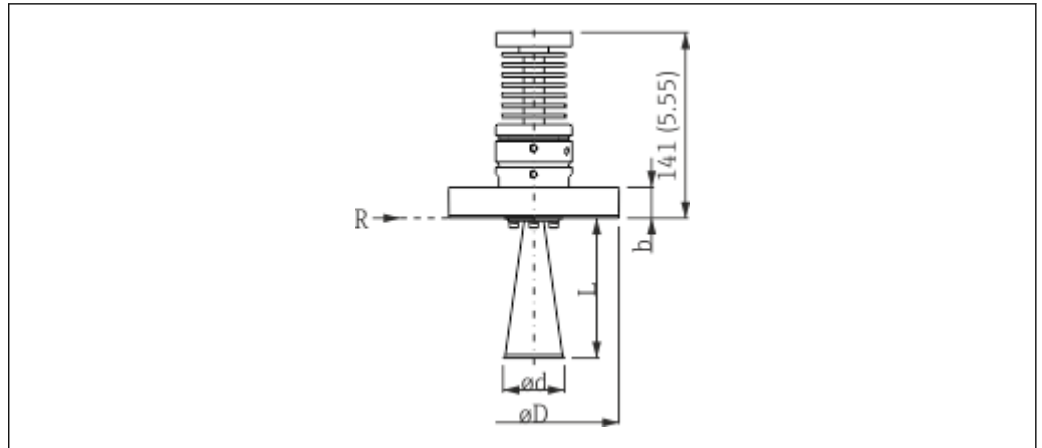
D3: Graphite, -40...250°C/-40...482°F



▪ Dimensions of the horn antenna (L, ød): → 72

▪ Dimensions of the process connection (øD, b): → 72

FMR51: Version $T \leq 450\text{ °C}$ (842 °F)



A0023386

32 FMR51: Version $T < 450\text{ °C}$ (842 °F); dimensions: mm (in)

Valid for the following device versions

Feature 090 "Seal":

D2: Graphite, -196...450°C/-321...842°F



- Dimensions of the horn antenna (L, ød): → 72
- Dimensions of the process connection (øD, b): → 72

	Feature 070 "Antenna"			
Dimension	BA: Horn 40mm/1-1/2"	BB: Horn 50mm/2"	BC: Horn 80mm/3"	BD: Horn 100mm/4"
L	86 mm (3.39 in)	115 mm (4.53 in)	211 mm (8.31 in)	282 mm (11.1 in)
L2	51 mm (2.01 in)	80 mm (3.15 in)	176 mm (6.93 in)	247 mm (9.72 in)
Ød	Ø40 mm (1.57 in)	Ø48 mm (1.89 in)	Ø75 mm (2.95 in)	Ø95 mm (3.74 in)

Flanges according to EN1092-1 (suitable for DIN2527) ¹⁾

- 1) For flanges with a higher pressure rating than those listed in the product structure please contact Endress +Hauser.
- 2) see feature 100 "Process connection"

		Nominal diameter ²⁾			
Pressure rating ²⁾	Dimension	50A	80A	100A	150A
10K	b	16 mm (0.63 in)	18 mm (0.71 in)	18 mm (0.71 in)	22 mm (0.87 in)
	φD	φ155 mm (6.1 in)	φ185 mm (7.28 in)	φ210 mm (8.27 in)	φ280 mm (11 in)
63K	b	-	-	44 mm (1.73 in)	-
	φD	-	-	φ270 mm (10.6 in)	-

- 72

Flanges according to ANSI B16.5¹⁾

		Nominal diameter ²⁾			
Pressure rating ²⁾	Dimension	2"	3"	4"	6"
150 lbs	b	17.5 mm (0.69 in)	22.3 mm (0.88 in)	22.3 mm (0.88 in)	23.9 mm (0.94 in)
	øD	ø150 mm (6 in)	ø190 mm (7.5 in)	ø230 mm (9 in)	ø280 mm (11 in)
300 lbs	b	20.7 mm (0.81 in)	27 mm (1.1 in)	30.2 mm (1.2 in)	35 mm (1.4 in)
	øD	ø165 mm (6.5 in)	ø210 mm (8.25 in)	ø255 mm (10 in)	ø320 mm (12.5 in)

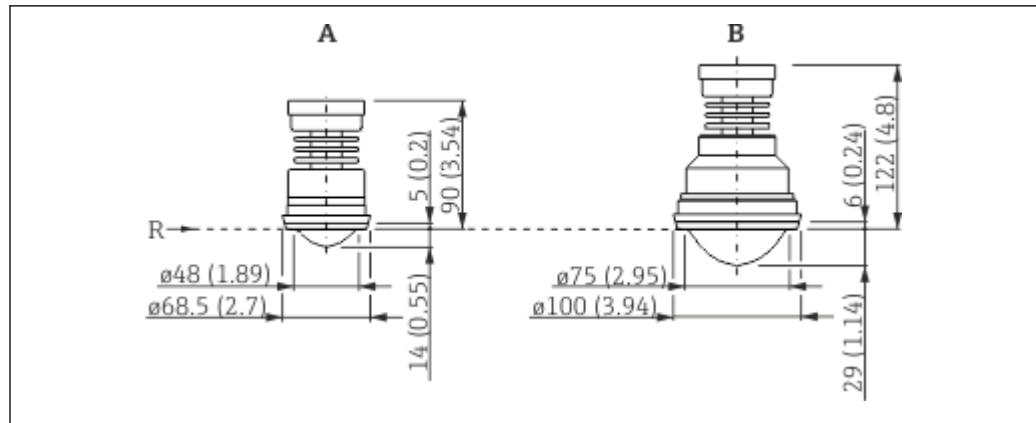
- 1) For flanges with a higher pressure rating than those listed in the product structure please contact Endress +Hauser.
- 2) see feature 100 "Process connection"

Tri-Clamp according to ISO 2852

	Nominal diameter ¹⁾	
Dimension	51 (2")	DN70-76.1 (3")
A	64 mm (2.52 in)	91 mm (3.58 in)

- 1) see feature 100 "Process connection"

FMR52 with dairy coupling DIN11851



A0023387

33 FMR52 with dairy coupling DIN11851; dimensions: mm (in)

A Antenna: Horn 50mm/2"; Process connection DIN11851 DN50 PN25

B Antenna: Horn 80mm/3"; Process connection DIN11851 DN80 PN25

R Reference point of the measurement

Valid for the following device versions:

Feature 100 "Process connection"

- MRK: DIN11851 DN50 PN25 slotted nut, PTFE>316L (diagram A)
- MTK: DIN11851 DN80 PN25 slotted nut, PTFE>316L (diagram B)

Technical drawings of two types of mechanical components, A and B, showing their dimensions and a reference line R.

Component A:

- Reference line R is indicated by a dashed arrow pointing left.
- Overall height: 93 (3.66)
- Height from base to the start of the threaded section: 14 (0.55)
- Height of the threaded section: 2.6 (0.1)
- Base diameter: $\phi 48$ (1.89)
- Base width: ϕa

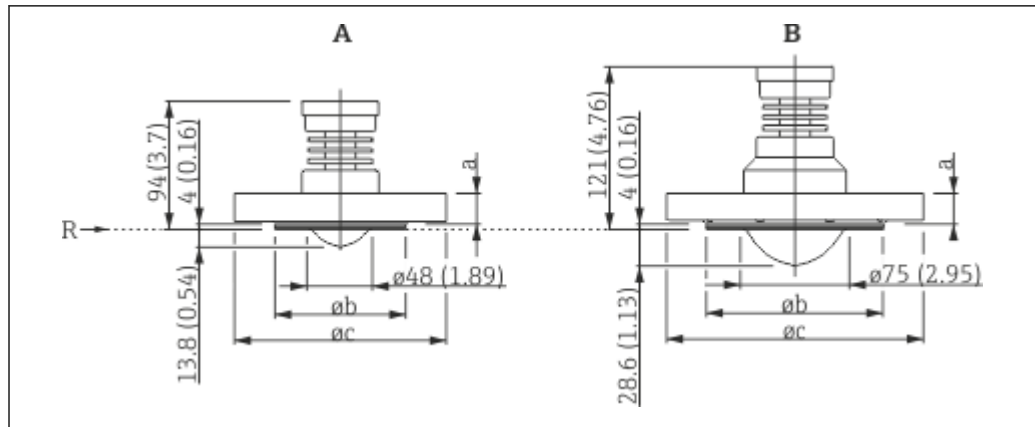
Component B:

- Reference line R is indicated by a dashed arrow pointing left.
- Overall height: 120 (4.72)
- Height from base to the start of the threaded section: 2.6 (0.1)
- Height of the threaded section: 29 (1.14)
- Base diameter: $\phi 75$ (2.95)
- Base width: ϕa

A0023388

R Reference point of the measurement

- 1) Feature 070 of the product structure
- 2) Feature 100 of the product structure

FMR52 with flange

A0023389

35 Dimensions FMR52 with flange; dimensions: mm (in)

A Antenna: Horn 50mm/2"

B Antenna: Horn 80mm/3"

R Reference point of the measurement

Flanges according to EN1092-1 (suitable for DIN2527)

Antenna ¹⁾	Process connection ²⁾	a	$\varnothing b$	$\varnothing c$
BO Horn 50mm/2"	CFK Flange DN50	20 mm (0.79 in)	102 mm (4.02 in)	165 mm (6.5 in)
BP Horn 80mm/3"	CGK Flange DN80	20 mm (0.79 in)	138 mm (5.43 in)	200 mm (7.87 in)
	CHK Flange DN100	20 mm (0.79 in)	158 mm (6.22 in)	220 mm (8.66 in)
	CJK Flange DN150	22 mm (0.87 in)	212 mm (8.35 in)	285 mm (11.2 in)

1) Feature 70 of the product structure

2) Feature 100 of the product structure

Flanges according to ANSI B16.5

Antenna ¹⁾	Process connection ²⁾	a	$\varnothing b$	$\varnothing c$
BO Horn 50mm/2"	AFK Flange 2" Cl.150	17.5 mm (0.69 in)	92 mm (3.62 in)	150 mm (6 in)
BP Horn 80mm/3"	AGK Flange 3" Cl.150	22.3 mm (0.88 in)	127 mm (5 in)	190 mm (7.5 in)
	AHK Flange 4" Cl.150	22.3 mm (0.88 in)	158 mm (6.22 in)	230 mm (9 in)
	AJK Flange 6" Cl.150	23.9 mm (0.94 in)	212 mm (8.35 in)	280 mm (11 in)
	ATK Flange 4" Cl.300	32.2 mm (1.27 in)	158 mm (6.22 in)	255 mm (10 in)

1) Feature 70 of the product structure

2) Feature 100 of the product structure

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)

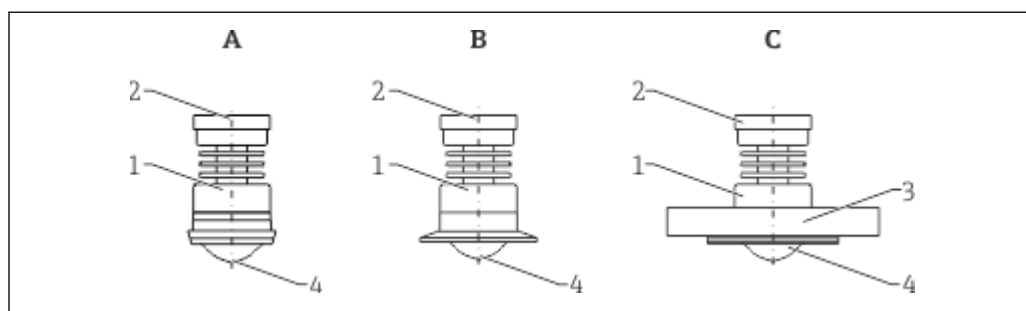
- 1) For the version with M12 plug the sealing material is Viton.
- 2) For the version with 7/8" plug, the sealing material is NBR.

FMR51



- Endress+Hauser

Pos.	Part	Material		
	Process separation cone	Standard: PTFE	XT: PEEK	HT: Al ₂ O ₃
	Seal	Standard: ■ Viton: FKM ■ Kalrez: FFKM (K6375)	XT: Graphite	HT: Graphite
2	Process adapter	316L (1.4404)		
	Locking washer			
3	Housing adapter	316L (1.4404)		
	Temperature reduction (XT)	316L (1.4404)		
	Intermediate adapter (HT)	316L (1.4404)		
	Process adapter	316L (1.4404)		
4	Flange	316L (1.4404/1.4435) optionally AlloyC22 (2.4602) clad		
5	Extension process adapter	316L (1.4404)		
	Locking washer			

FMR52

A0018951

- A Dairy coupling
 B Clamp adapter
 C Flange version

Pos.	Part	Material
1	Process adapter	316L (1.4435)
2	Housing adapter	304 (1.4301)
3	Flange	316L (1.4404/1.4435)
4	Cladding	PTFE (in accordance with FDA 21 CFR 177.1550 and USP <88> Class VI)

Operating concept

- Commissioning
- Operation
- Diagnostics
- Expert level

Operating languages

- 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.

Quick and save commissioning

- 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

Integrated data storage device (HistoROM)

- 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.

Efficient diagnostics increase measurement reliability

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

Integrated Bluetooth module (option for HART devices)

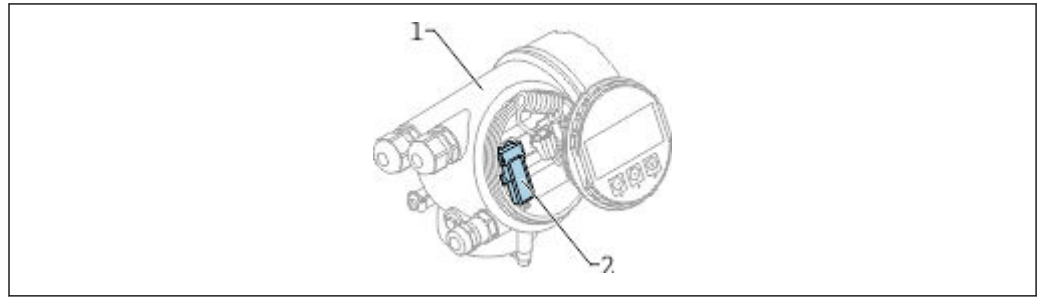
- Easy and fast setup via SmartBlue (app)
- No additional tools or adapters required
- Signal curve via SmartBlue (app)
- Encrypted single point-to-point data transmission (Fraunhofer-Institut, third party, tested) and password-protected communication via Bluetooth® wireless technology

Operation with remote display and operating module FHX50

- 1 Display and operating module SD03, optical keys; can be operated through the glass of the cover
- 2 Display and operating module SD02, push buttons; cover must be removed

Operation via Bluetooth® wireless technology

Requirements



A0036790

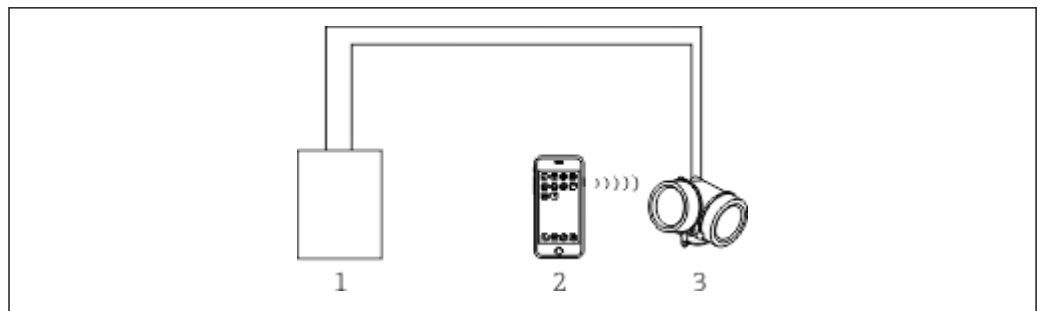
37 Device with Bluetooth module

- 1 Electronics housing of the device
- 2 Bluetooth module

This operation option is only available for devices with Bluetooth module. There are the following options:

- The device has been ordered with a Bluetooth module:
Feature 610 "Accessory Mounted", option NF "Bluetooth"
- The Bluetooth module has been ordered as an accessory (ordering number: 71377355) and has been mounted. See Special Documentation SD02252F.

Operation via SmartBlue (app)



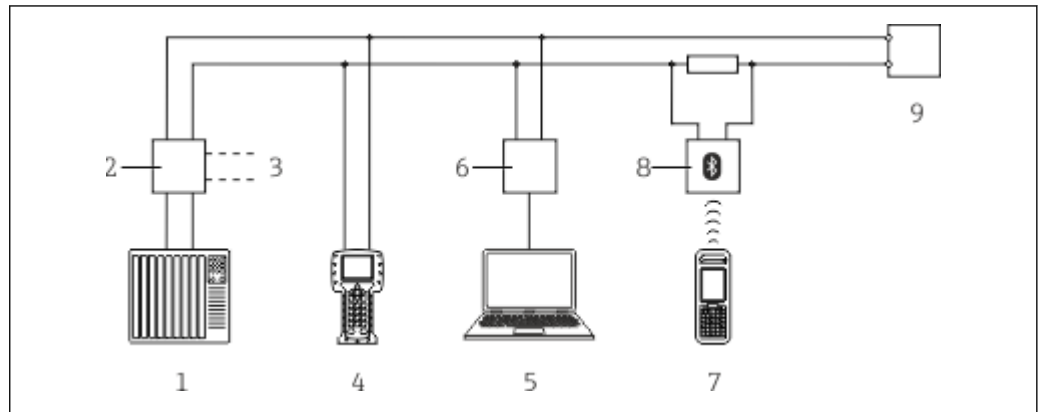
A0034939

38 Operation via SmartBlue (app)

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

Remote operation

Via HART protocol

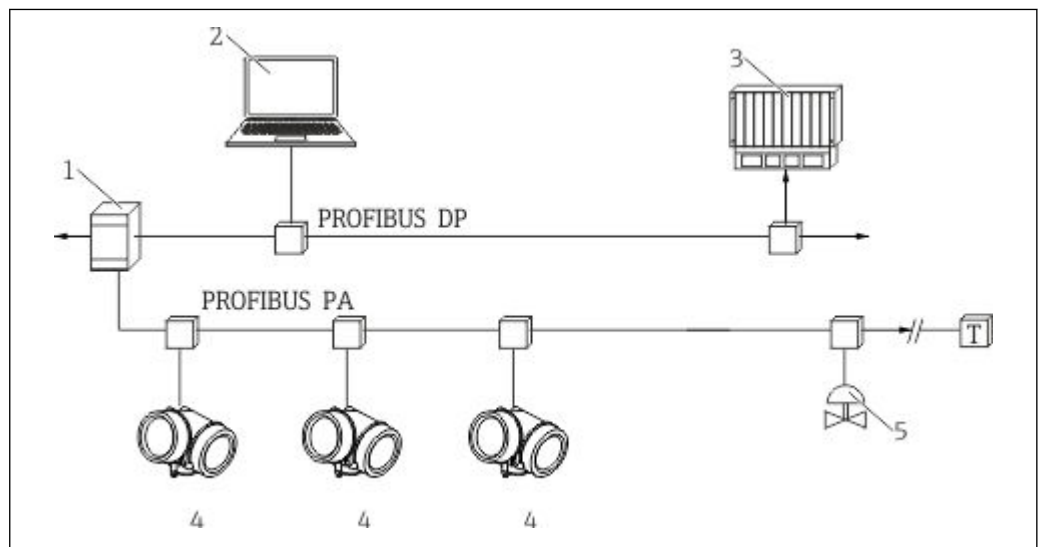


A0036169

39 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

Via PROFIBUS PA protocol

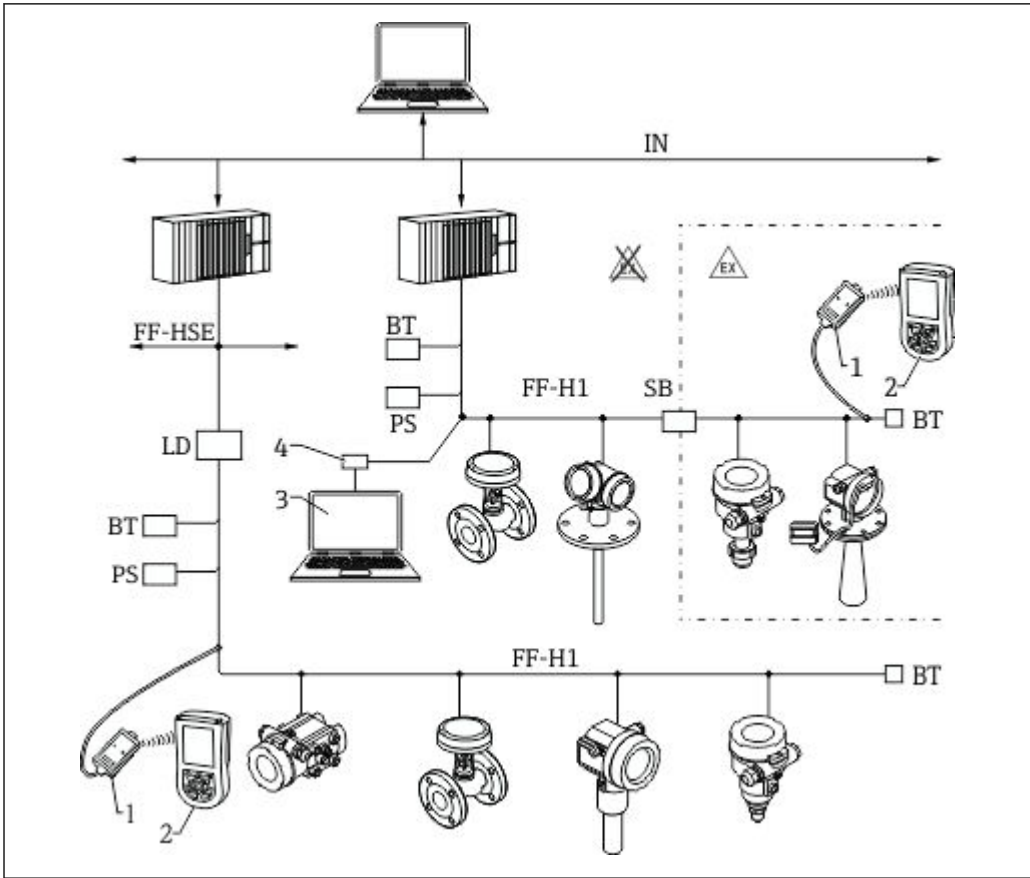


A0036301

40 Options for remote operation via PROFIBUS PA protocol

- 1 Segment coupler
- 2 Computer with Profiboard/Proficard and operating tool (e.g. DeviceCare/FieldCare)
- 3 PLC (Programmable Logic Controller)
- 4 Transmitter
- 5 Additional functions (valves etc.)

Via FOUNDATION Fieldbus



A0017188

41 FOUNDATION Fieldbus system architecture with associated components

- 1 FFblue Bluetooth modem
- 2 Field Xpert SFX350/SFX370
- 3 DeviceCare/FieldCare
- 4 NI-FF interface card

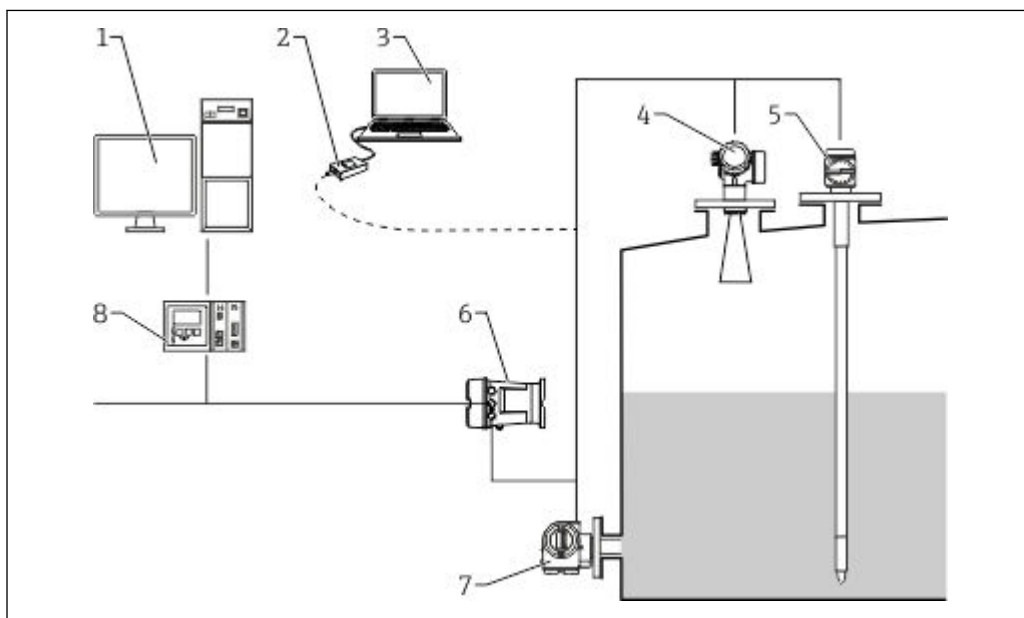
IN	Industrial network
FF-HSE	High Speed Ethernet
FF-H1	FOUNDATION Fieldbus-H1
LD	Linking Device FF-HSE/FF-H1
PS	Bus Power Supply
SB	Safety Barrier
BT	Bus Terminator

A0032466

- 89

Integration in tank gauging system

The Endress+Hauser Tank Side Monitor NRF81 provides integrated communications for sites with multiple tanks, each with one or more sensors on the tank, such as radar, spot or average temperature, capacitive probe for water detection and/or pressure sensors. Multiple protocols out of the Tank Side Monitor guarantee connectivity to nearly any of the existing industry standard tank gauging protocols. Optional connectivity of analog 4...20 mA sensors, digital I/O and analog output simplify full tank sensor integration. Use of the proven concept of the intrinsically safe HART bus for all on-tank sensors yields extremely low wiring costs, while at the same time providing maximum safety, reliability and data availability.



A0017982

43 The complete measuring system consists of:

- 1 Tankvision workstation
- 2 Commubox FXA195 (USB) - optional
- 3 Computer with operating tool (ControlCare) - optional
- 4 Level measuring device
- 5 Temperature measuring device
- 6 Tank Side Monitor NRF81
- 7 Pressure measuring device
- 8 Tankvision Tank Scanner NXA820

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.

The main functions of SupplyCare:

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.

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

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.

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.

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.

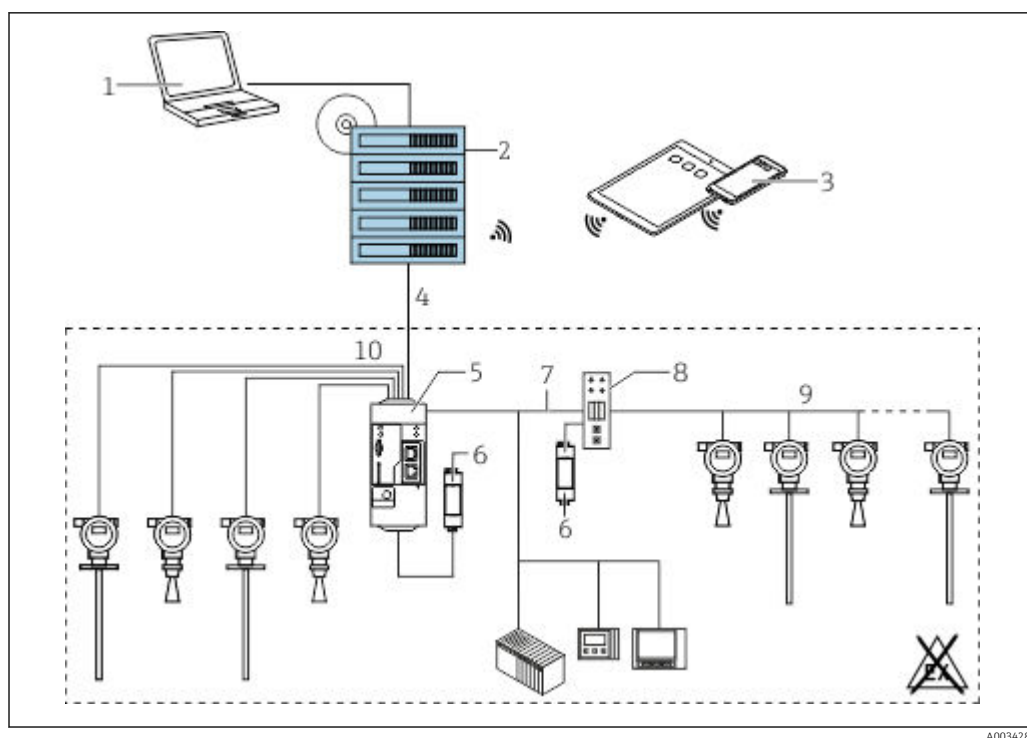
The integrated delivery planning function automatically generates an order proposal if a pre-set minimum inventory level is undershot. Scheduled deliveries and disposals are monitored continuously by SupplyCare. SupplyCare notifies the user if scheduled deliveries and disposals are not going to be met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

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.

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.

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 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.



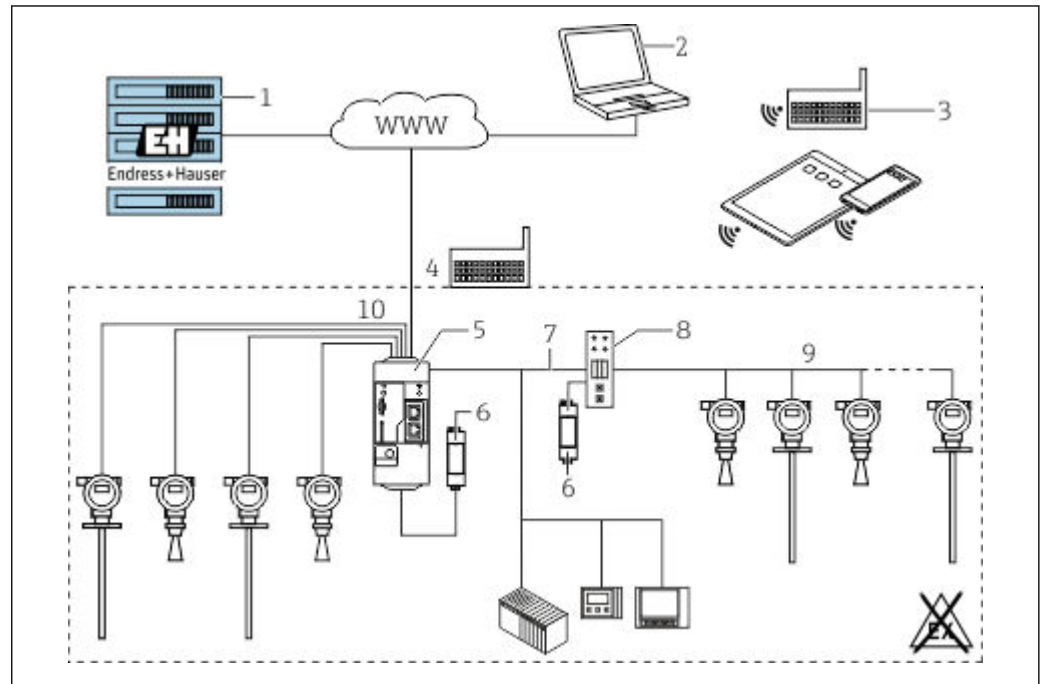
A0034288

44 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.



45 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.

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



A0029561

 The 316L housing (GT18), option B in the order attribute 40, is not suitable for applications which need a 3A approval.

- The wetted, metal materials comply with the requirements of NACE MR 0175 / ISO 15156.
- Declaration of Conformity: see the product structure, feature 580, version IB

- The wetted, metal materials comply with the requirements of NACE MR 0103.
- The Declaration of Conformity is based on NACE MR 0175.
The hardness and intergranular corrosion have been tested, and heat treatment (solution annealed) has been performed. The materials used therefore meet the requirements of NACE MR 0103.
- Declaration of Conformity: see the product structure, feature 580, version IE.

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.

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".

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.

Device	Marine certificate ¹⁾				
	GL	ABS	LR	BV	DNV
FMR51	✓	✓	✓	✓	✓
FMR52	✓	✓	✓	✓	✓

The devices Micropilot FMR51 with Antenna Horn 100 mm /4" and FMR52 with Antenna Horn 80 mm / 3" flush mounted conform with the LPR (Level Probing Radar) standard EN302729. The devices Micropilot FMR51 with Antenna Horn 100 mm /4" and FMR52 with Antenna Horn 80 mm / 3" flush mounted are allowed to be used inside or outside of closed bins or tanks in countries of the EU and the EFTA. Precondition is that the country itself already has implemented the directive.

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

1. The installation has to be done by trained personnel.
2. The antenna of the device has to be mounted on a fixed place and vertically to the bottom.
3. The mounting place has to be in a distance of at least 4 km to the mentioned astronomical stations or an appropriate permission has to be issued by the national authority. If the device is mounted at a distance of 4 to 40 km from the stations mentioned, the maximum mounting height is restricted to 15 m (49 ft).

Country	Name of the station	Geographical latitude	Geographical longitude
Germany	Effelsberg	50°31'32" N	06°53'00" E
Finland	Metsähovi	60°13'04" N	24°23'37" E
	Tuorla	60°24'56" N	24°26'31" E
France	Plateau de Bure	44°38'01" N	05°54'26" E
	Floirac	44°50'10" N	00°31'37" W
United Kingdom	Cambridge	52°09'59" N	00°02'20" E
	Damhall	53°09'22" N	02°32'03" W
	Jodrell Bank	53°14'10" N	02°18'26" W
	Knockin	52°47'24" N	02°59'45" W
	Pickmere	53°17'18" N	02°26'38" W
Italy	Medicina	44°31'14" N	11°38'49" E
	Noto	36°52'34" N	14°59'21" E
	Sardinia	39°29'50" N	09°14'40" E
Poland	Krakow Fort Skala	50°03'18" N	19°49'36" E
Russia	Dmitrov	56°26'00" N	37°27'00" E
	Kalyazin	57°13'22" N	37°54'01" E
	Pushchino	54°49'00" N	37°40'00" E
	Zelenchukskaya	43°49'53" N	41°35'32" E
Sweden	Onsala	57°23'45" N	11°55'35" E
Switzerland	Bleien	47°20'26" N	08°06'44" E
Spain	Yebes	40°31'27" N	03°05'22" W
	Robledo	40°25'38" N	04°14'57" W
Hungary	Penc	47°47'22" N	19°16'53" E



The devices comply with the Tanks Level Probing Radar (TLPR) radio standard EN 302372 and are approved for use in closed containers. For installation, points a to f in Annex E of EN 302372 must be taken into consideration.

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.

The devices are compliant with the FCC Code of Federal Regulations, CFR 47, Part 15, Sections 15.205, 15.207, 15.209.

In addition, the devices FMR51 with antenna Horn 100 mm / 4" and FMR52 with antenna Horn 80 mm / 3" flush mount, 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

Micropilot FMR51, FMR52

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.

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.

[Any] changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 4,5 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 4,5 cm de séparation du corps humain en tout temps

- 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.)
-  ■ The FMR51T is a submodel of the FMR51 that fulfills the requirements for use as TLPR (Tank Level Probe Radar).
- The model FMR51L is a submodel of the FMR51. "L" indicates the unique option BD of the feature 070 ("Antenna") that fulfills the requirements for use as LPR (Level Probe Radar).
 - The FMR52T is a submodel of the FMR52 that fulfills the requirements for use as TLPR (Tank Level Probe Radar).
 - The model FMR52L is a submodel of the FMR52. "L" indicates the unique option BP of the feature 070 ("Antenna") that fulfills the requirements for use as LPR (Level Probe Radar).

Japanese radio approval	The devices comply with Japanese Radio Law, Article 6, Section 1(1)																												
CRN approval	Some device versions have a CRN approval. Devices are CRN approved if the following two conditions are met: ■ The device has a CSA approval (Product structure: Feature 010 "Approval") ■ The device has a CRN approved process connection according to the following table. <table> <tr> <th>Feature 100 of the product structure</th><th>Process connection</th></tr> <tr><td>AFJ</td><td>NPS 2" Cl.150 RF, 316/316L</td></tr> <tr><td>AFK</td><td>NPS 2" Cl.150, PTFE >316/316L</td></tr> <tr><td>AFM</td><td>NPS 2" Cl.150, AlloyC >316/316L</td></tr> <tr><td>AGJ</td><td>NPS 3" Cl.150 RF, 316/316L</td></tr> <tr><td>AGK</td><td>NPS 3" Cl.150, PTFE >316/316L</td></tr> <tr><td>AGM</td><td>NPS 3" Cl.150, AlloyC >316/316L</td></tr> <tr><td>AHJ</td><td>NPS 4" Cl.150 RF, 316/316L</td></tr> <tr><td>AHK</td><td>NPS 4" Cl.150, PTFE >316/316L</td></tr> <tr><td>AHM</td><td>NPS 4" Cl.150, AlloyC >316/316L</td></tr> <tr><td>AJJ</td><td>NPS 6" Cl.150 RF, 316/316L</td></tr> <tr><td>AJK</td><td>NPS 6" Cl.150, PTFE >316/316L</td></tr> <tr><td>AJM</td><td>NPS 6" Cl.150, AlloyC >316/316L</td></tr> <tr><td>ARJ</td><td>NPS 2" Cl.300 RF, 316/316L</td></tr> </table>	Feature 100 of the product structure	Process connection	AFJ	NPS 2" Cl.150 RF, 316/316L	AFK	NPS 2" Cl.150, PTFE >316/316L	AFM	NPS 2" Cl.150, AlloyC >316/316L	AGJ	NPS 3" Cl.150 RF, 316/316L	AGK	NPS 3" Cl.150, PTFE >316/316L	AGM	NPS 3" Cl.150, AlloyC >316/316L	AHJ	NPS 4" Cl.150 RF, 316/316L	AHK	NPS 4" Cl.150, PTFE >316/316L	AHM	NPS 4" Cl.150, AlloyC >316/316L	AJJ	NPS 6" Cl.150 RF, 316/316L	AJK	NPS 6" Cl.150, PTFE >316/316L	AJM	NPS 6" Cl.150, AlloyC >316/316L	ARJ	NPS 2" Cl.300 RF, 316/316L
Feature 100 of the product structure	Process connection																												
AFJ	NPS 2" Cl.150 RF, 316/316L																												
AFK	NPS 2" Cl.150, PTFE >316/316L																												
AFM	NPS 2" Cl.150, AlloyC >316/316L																												
AGJ	NPS 3" Cl.150 RF, 316/316L																												
AGK	NPS 3" Cl.150, PTFE >316/316L																												
AGM	NPS 3" Cl.150, AlloyC >316/316L																												
AHJ	NPS 4" Cl.150 RF, 316/316L																												
AHK	NPS 4" Cl.150, PTFE >316/316L																												
AHM	NPS 4" Cl.150, AlloyC >316/316L																												
AJJ	NPS 6" Cl.150 RF, 316/316L																												
AJK	NPS 6" Cl.150, PTFE >316/316L																												
AJM	NPS 6" Cl.150, AlloyC >316/316L																												
ARJ	NPS 2" Cl.300 RF, 316/316L																												

- Process connections without CRN approval are not included in this table.
- Refer to the product structure to see which process connections are available for a specific device type.
- For some process connections not listed in the product structure a CRN approval is available on request.
- CRN approved devices are marked with the registration number OF15872.5C on the nameplate.

For device versions listed in the table below, the maximum allowed pressure is reduced if they have a CRN approval. For device versions not listed in the table below the pressure range as indicated in the "Process" chapter → 64 is not affected by the CRN approval.

- 1) Feature 070 of the product structure
- 2) Feature 100 of the product structure
- 3) Feature 090 of the product structure

FMR5x is the upgrade model of the corresponding FMR2xx series.



Enter the serial number from the nameplate (www.endress.com/deviceviewer)

- 550 "Calibration"
- 580 "Test, Certificate"
- 590 "Additional Approval", option LW: "CoC-ASME BPE"

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.

- 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

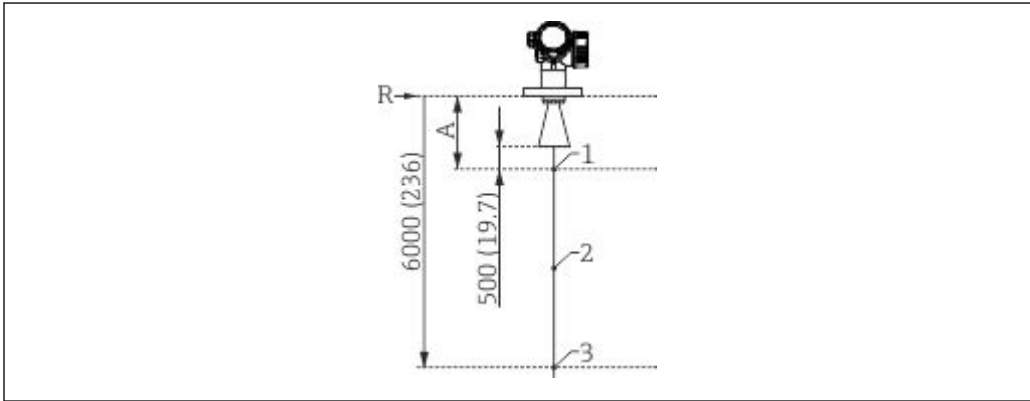


- 101

3-point linearity protocol

i The following notes must be taken into account if option F3 ("3 point linearity protocol") has been selected in feature 550 ("Calibration").

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



46 Points of the 3-point linearity protocol; Dimensions: mm (in)
A Distance from reference point R to first measuring point
R Reference point of the measurement
1 First measuring point
2 Second measuring point (centrally between first and third measuring point)
3 Third measuring point

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

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

i The linearity is checked under reference conditions.

The
100

The

A diagram of a vertical beam of total height E . A horizontal force R is applied at the top. A camera is positioned above the beam, with its lens at a distance A from the top. The beam is divided into two segments of height $E/2$ by a horizontal dashed line.

Device version	Minimum distance between reference point (R) and 100% level	Minimum span	Maximum value for "Empty calibration"
FMR51/FMR52 Without antenna extension	$A \geq \text{antenna length} + 200 \text{ mm (8 in)}^{1)}$	$F \geq 400 \text{ mm (16 in)}$	$E \leq 24 \text{ m (79 ft)}$
FMR51 with 100 mm/4" antenna extension ²⁾	$A \geq \text{antenna length} + \text{antenna extension} 100 \text{ mm (4 in)} + 200 \text{ mm (8 in)}$		
FMR51 with variable antenna extension ³⁾	$A \geq \text{antenna length} + \text{maximum antenna extension} 1000 \text{ mm (40 in)}^{4)} + 200 \text{ mm (8 in)}$		

- 



103

Services

The following services can be selected via the product structure in the Product Configurator⁹⁾:

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

- PWIS free (PWIS: paint wetting impairment s
- Customized parametrization HART → 104
- Customized parametrization PA → 104
- Customized parametrization FF → 104
- Without tooling DVD (FieldCare)

9) Feature 570 of the product structure

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 (→  116); chapter "Diagnostics and trouble shooting"

Availability

- EH: Heartbeat Verification + Monitoring
- E]: Heartbeat Verification

- 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.

- No onsite presence is required to use the function.
- The DTM¹⁰⁾ 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.

- 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).

 SD01871F

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

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.

 For Micropilot FMR5x, the **Foam detection** and **Build-up detection** wizards cannot be used together.

"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

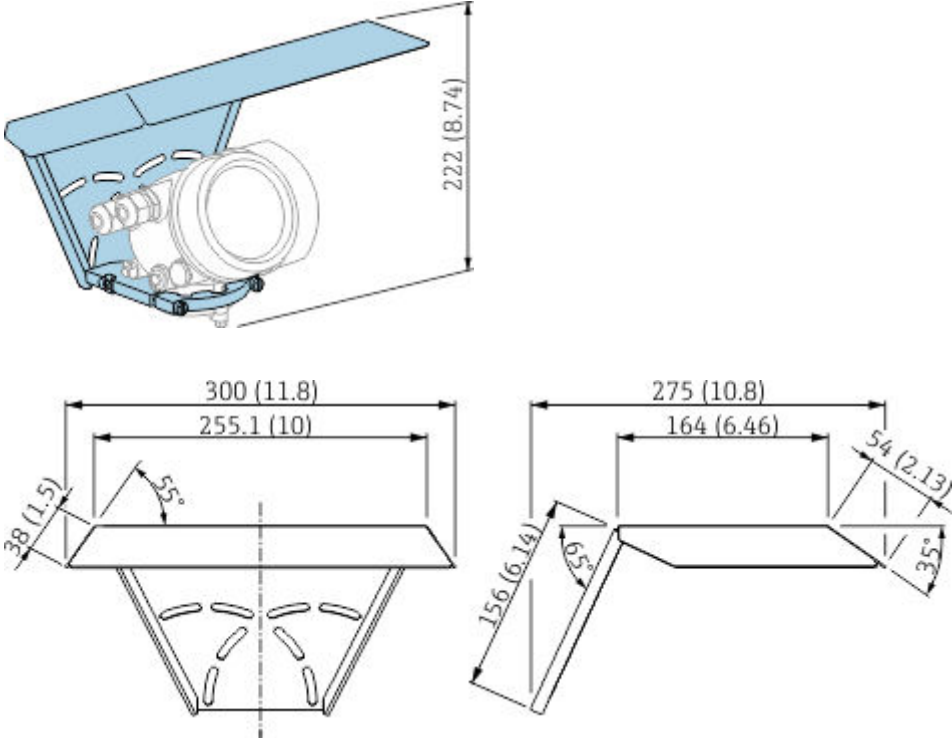
- Early detection of changes (trends) to ensure plant availability and product quality.
- Use of information for the proactive planning of measures (e.g. cleaning/maintenance).
- Identification of undesirable process conditions as the basis to optimizing the facility and the processes.
- Automated control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

Detailed description

 SD01871F

Accessories

Device-specific accessories Weather protection cover

Accessory	Description
Weather protection cover	 A0015466 A0015472  47 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.

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, M or N). 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, M or N ("Prepared for FHX50") is listed under *Basic specifications*, 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.

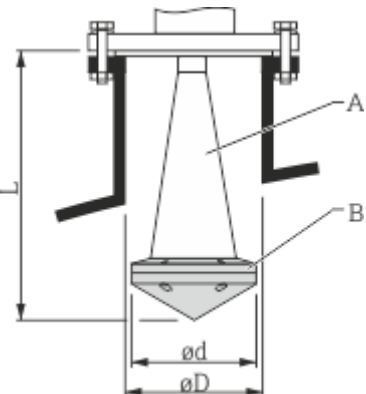
1) This range is valid if option JN "Ambient temperature transmitter -50 °C (-58 °F)" has been selected in ordering feature 580 "Test, Certificate". If the temperature is permanently below -40 °C (-40 °F), failure rates may be increased.

Horn protection for horn antenna

This section is **not** valid for the following options of ordering feature 610 "Accessory Mounted".

- OU: ...mm antenna extension
- OV: ... inch antenna extension

For these cases: → 111

Accessory	Description
Horn protection for horn antenna 80 mm (3 in) or 100 mm (4 in)	 A0019143 A Horn antenna of the Micropilot (not supplied with the horn protection) B Horn protection $\varnothing d$ Diameter of horn protection (see table below) $\varnothing D$ Minimum nozzle diameter (see table below) L Length of antenna with horn protection (see table below) For details refer to mounting instructions SD01084F. Process conditions ▪ Maximum vessel pressure: 0.5 bar (7.252 psi) ▪ Maximum process temperature: 130 °C (266 °F) Danger of explosion Avoid electrostatic charging of the horn protection.

Horn protection for FMR51

Antenna ¹⁾	Order code horn protection	Dimensions antenna + horn protection		
		L ²⁾	$\varnothing d$	$\varnothing D$
BC: Horn 80mm/3"	71105890	238 mm (9.4 in)	96 mm (3.78 in)	≥ DN100
BD: Horn 100mm/4"	71105889	302 mm (11.9 in)	116 mm (4.57 in)	≥ DN150

1) Feature 070 of the product structure

2) A different length is valid for antennas with variable antenna extension (ordering feature 610, option OU or OV).



The horn protection can also be ordered together with the device. Product structure: Feature 610 "Accessory Mounted", option OW "Horn protection, PTFE".

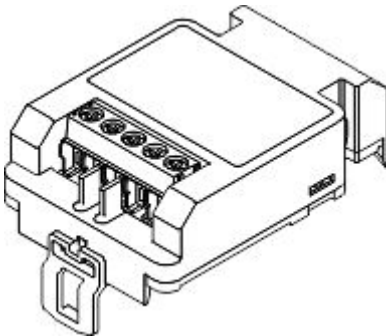
- OU: ...mm antenna extension
- OV: ... inch antenna extension

A0027190

Antenna ¹⁾	Order code horn protection	Dimensions antenna + horn protection		
		L	Ød	ØD
BC: Horn 80mm/3"	71105890	203 mm (8 in)	96 mm (3.78 in)	≥ DN100
BD: Horn 100mm/4"	71105889	267 mm (10.5 in)	116 mm (4.57 in)	≥ DN150

1)

Overvoltage protection

Accessory	Description
Overvoltage protection for 2-wire-devices OVP10 (1 channel) OVP20 (2 channel)	 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.

Gas-tight feedthrough

Accessory	Description
Gas-tight feedthrough	Chemically inert glass feedthrough; prevents migration of gases into the electronics housing. To be ordered with the device: product structure, feature 610 "Accessory Mounted", option NC "Gas-tight feedthrough"

Bluetooth module for HART devices

A0036493

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

115

In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

Micropilot FMR51, FMR52

Device	Power supply, output	Communication	Document type	Document code
FMR51 FMR52	A, B, C, K, L	HART	Operating Instructions	BA01049F/00/EN
			Brief Operating Instructions	KA01100F/00/EN
			Description of Device Parameters	GP01014F/00/EN
	G	PROFIBUS PA	Operating Instructions	BA01125F/00/EN
			Brief Operating Instructions	KA01129F/00/EN
			Description of Device Parameters	GP01018F/00/EN
	E	FOUNDATION Fieldbus	Operating Instructions	BA01121F/00/EN
			Brief Operating Instructions	KA01125F/00/EN
			Description of Device Parameters	GP01017F/00/EN

Application Package ¹⁾	Document type	Document code
- EH: Heartbeat Verification + Monitoring - EJ: Heartbeat Verification	Special documentation	SD01871F

Device	Document type	Document code
Fieldgate FXA520	Technical Information	TI00369F
Tank Side Monitor NRF81	Technical Information	TI01251G
	Operating Instructions	BA01465G
	Description of Device Parameters	GP01083G

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

116

Endress+Hauser

Feature 010	Approval	Available for	Feature 020 "Power Supply; Output"				
			A ¹⁾	B ²⁾	C ³⁾	E ⁴⁾ /G ⁵⁾	K ⁶⁾ /L ⁷⁾
KB	KC Ex ia IIC T6 Ga/Gb	■ FMR51 ■ FMR52	XA01045F	XA01045F	XA01045F	XA01047F	-
KC	KC Ex d[ia] IIC T6	■ FMR51 ■ FMR52	XA01046F	XA01046F	XA01046F	XA01048F	XA01046F
MA	INMETRO: Ex ia IIC T6 Ga	■ FMR51 ■ FMR52	XA01286F	XA01287F	XA01288F	XA01296F	-
MC	INMETRO: Ex d[ia] IIC T6 Ga/Gb	■ FMR51 ■ FMR52	XA01292F	XA01292F	XA01293F	XA01298F	XA01294F
MH	INMETRO: Ex ic IIC T6 Gc	■ FMR51 ■ FMR52	XA01289F	XA01290F	XA01291F	XA01297F	-
NA	NEPSI Ex ia IIC T6 Ga	■ FMR51 ■ FMR52	XA01199F	XA01199F	XA01199F	XA01208F	-
NB	NEPSI Ex ia IIC T6 Ga/Gb	■ FMR51 ■ FMR52	XA01199F	XA01199F	XA01199F	XA01208F	-
NC	NEPSI Ex d[ia] IIC T6 Ga/Gb	■ FMR51 ■ FMR52	XA01202F	XA01202F	XA01202F	XA01211F	XA01202F
NG	NEPSI Ex nA II T6 Gc	■ FMR51 ■ FMR52	XA01201F	XA01201F	XA01201F	XA01210F	XA01201F
NH	NEPSI Ex ic IIC T6 Gc	■ FMR51 ■ FMR52	XA01201F	XA01201F	XA01201F	XA01210F	XA01201F
N2	NEPSI Ex ia IIC T6 Ga/Gb, Ex iaD 20/21 T85... 90oC	■ FMR51 ■ FMR52	XA01205F	XA01205F	XA01205F	XA01214F	-
N3	NEPSI Ex d[ia] IIC T6 Ga/Gb, DIP A20/21 T85...90oC IP66	■ FMR51 ■ FMR52	XA01206F	XA01206F	XA01206F	XA01215F	XA01206F
8A	FM/CSA IS+XP Cl.I,II,III Div.1 Gr.A-G	■ FMR51 ■ FMR52	■ XA01112F ■ XA01113F ■ XA01116F ■ XA01117F	■ XA01112F ■ XA01113F ■ XA01116F ■ XA01117F	■ XA01112F ■ XA01113F ■ XA01116F ■ XA01117F	■ XA01114F ■ XA01115F ■ XA01118F ■ XA01119F	-

- 1) 2-wire; 4-20mA HART
 2) 2-wire; 4-20mA HART, switch output
 3) 2-wire; 4-20mA HART, 4-20mA
 4) 2-wire; FOUNDATION Fieldbus, switch output
 5) 2-wire; PROFIBUS PA, switch output
 6) 4-wire 90-253VAC; 4-20mA HART
 7) 4-wire 10.4-48VDC; 4-20mA HART



For certified devices the relevant Safety Instructions (XA) are indicated on the nameplate.

If the device is prepared for the remote display FHX50 (product structure: feature 030: Display, Operation", option L or M), the Ex marking of some certificates changes according to the following table ¹²⁾:

Feature 010 ("Approval")	Feature 030 ("Display, Operation")	Ex marking
BG	L, M or N	ATEX II 3G Ex nA [ia Ga] IIC T6-T1 Gc
BH	L, M or N	ATEX II 3G Ex ic [ia Ga] IIC T6-T1 Gc
B3	L, M or N	ATEX II 1/2G Ex d [ia] IIC T6-T1 Ga/Gb, ATEX II 1/2D Ex ta [ia Db] IIIC Txx°C Da/Db
IG	L, M or N	IECEX Ex nA [ia Ga] IIC T6-T1 Gc
IH	L, M or N	IECEX Ex ic [ia Ga] IIC T6-T1 Gc

¹²⁾ The marking of certificates not mentioned in this table are not affected by the FHX50.

