

Technical Information

Solimotion FTR20

Flow indicator for bulk solids



Compact device for non-contact flow detection for bulk solids

Application

The FTR20 flow indicator for bulk solids is a non-contact device based on microwave technology. It is ideally suited for monitoring pneumatic and mechanical transport processes for bulk solids. The compact device can be used wherever the cost-effective monitoring of bulk solids movement is required.

Typical areas of application or bulk solids are:

- Building materials industry: Cement, plaster, wood chips etc.
- Chemical industry: Fertilizers, plastic powder, granules etc.
- Food industry: Coffee, tea, tobacco, cereals, malt etc.
- Energy production: Coal, carbon dust, fly-ash, coke etc.

Individual adjustments to the application are carried out by means of configurable functions (including automatic calibration). In addition, changes in the mass flow can be analyzed by the optional 4 - 20 mA current output.

Device properties

- Detection range up to 20 m depending on the bulk solids
- Process temperatures up to +70 °C (+158 °F) or +450 °C (+842 °F) with optional high temperature adapter
- Process pressure up to 680 kPa (6.8 bar) absolute or 2 MPa (20 bar) absolute with optional high pressure adapter
- For use in hazardous areas (dust)

Your benefits

- Compact device:
Sensor, transmitter and power unit are mounted in a housing, which means less effort is required for installation and mounting.
- The device can be used wherever cost-effective monitoring of a mass flow (present or not present) is required.
- Flush-mounted installation, non-contact installation possible
- Easy mounting using R 1½, 1½ NPT or G 1½ thread or a suitable mounting bracket
- Electronics housing can be rotated by 360 °, allowing orientation into optimum position after installation
- Easy electrical connection using the connectors (optional with suitable mating connectors or prefabricated connection cables)
- Mechanical robustness
 - No wear
 - Process-wetted ceramic sensor diaphragm (optional)
 - Long service life
 - Maintenance-free
- Signaling of mass flow
- Adjustable sensitivity
- Compliant with ATEX, CSA and IECEx

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Document information

Display conventions

Safety symbols

NOTICE

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

Electrical symbols

= Direct current

~ Alternating current

⊖ Protective Earth (PE)

A terminal which must be connected to ground prior to establishing any other connections.

Symbols for certain types of information

✔ Permitted

Procedures, processes or actions that are permitted.

✘ Forbidden

Procedures, processes or actions that are forbidden.

ℹ Tip

Indicates additional information

📖 Reference to documentation

📄 Reference to another section

🖼 Reference to a figure

1., 2., 3. Series of steps

Symbols in graphics

A, B, C ... View

1, 2, 3 ... Item numbers

Device-specific symbols

▣ Configuration mode

Indicates the function number or value

⬆ Key (+)

Indicates the key for increasing a function value

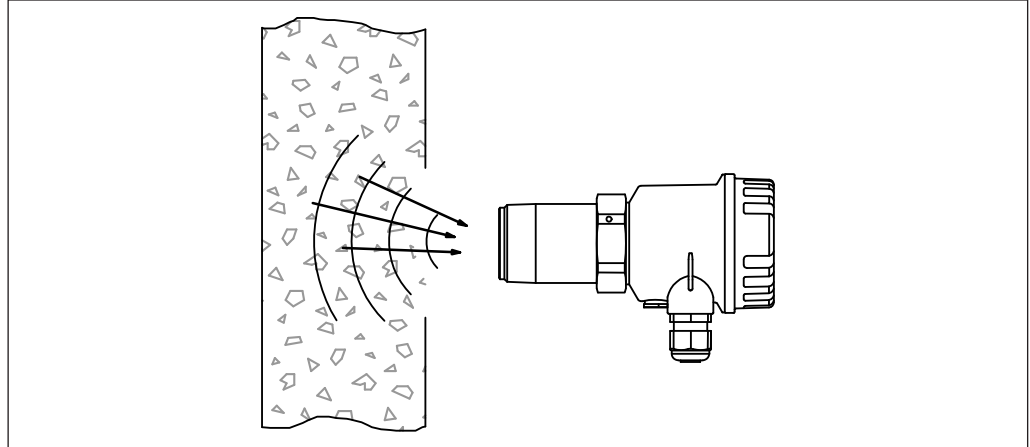
⬇ Key (-)

Indicates the key for reducing a function value

Function and system design

Measuring principle

The FTR20 flow indicator for bulk solids works using microwave technology. A signal is transmitted, and this signal is reflected by the moving bulk solids. The FTR20 measures the strength of the reflected, frequency-shifted (Doppler effect) energy, this is analyzed and put out via the display or the signal output.

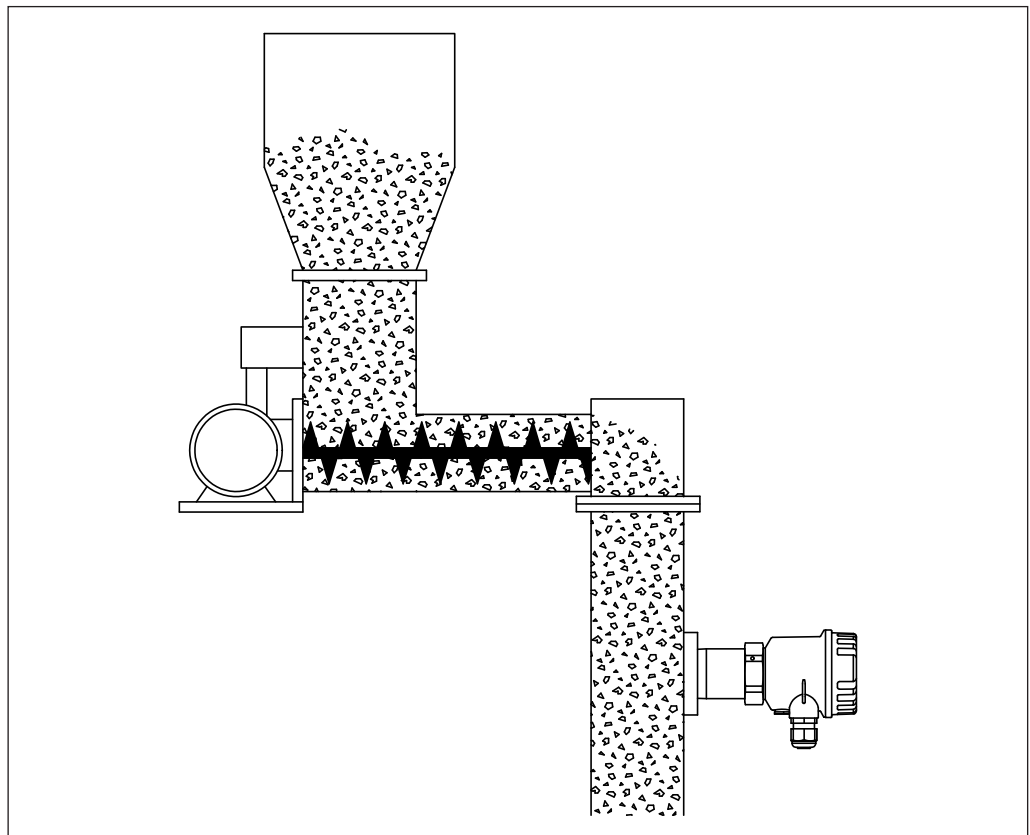


1 Measuring principle

The range of the FTR20 depends on the reflection characteristics of the bulk solids.

Example of volumetric dosing

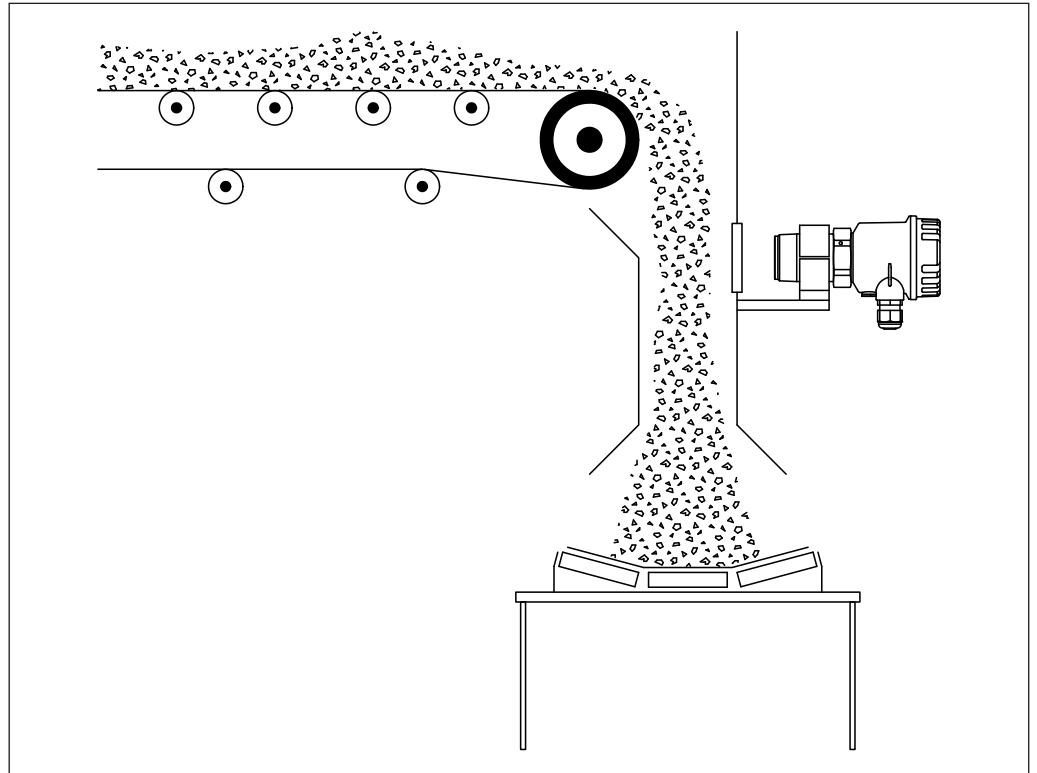
The FTR20 monitors the discharge of a screw conveyor. If the flow of material slows down (for example due to clogging of the pipe leading downwards or if there is no material being conveyed due to a failure in the screw conveyor), the device generates a message to this effect. This can then be processed further in the downstream system.



2 Example of volumetric dosing

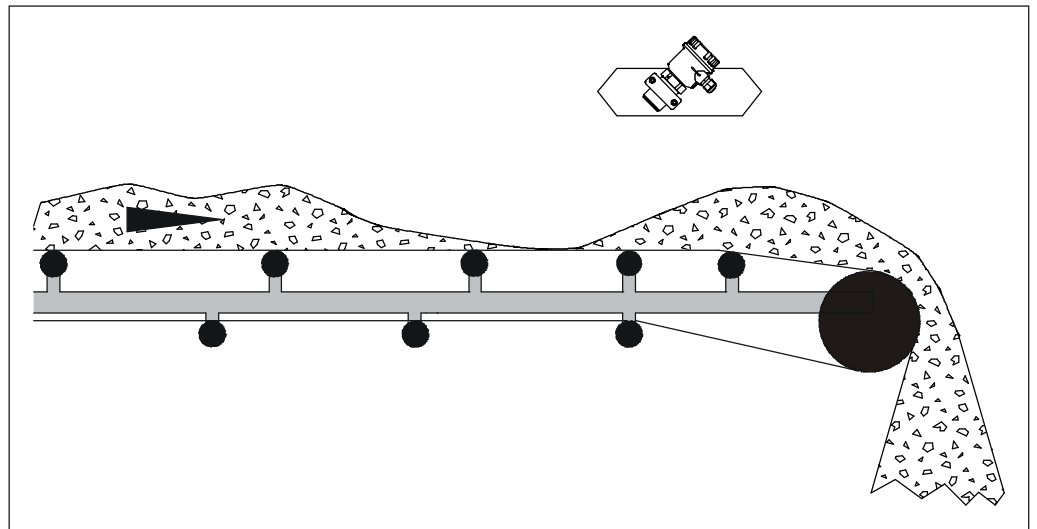
Example of a conveyor belt

The FTR20 monitors the continuous mass flow at a transition point, a break in the flow is detected and put out at the signal output.



3 Example transition point monitoring

The FTR20 monitors if there is material on the conveyor belt.



4 Example conveyor belt monitoring


NOTICE

For optimal installation of the FTR20 device, appropriate accessories such as welding sockets, sight glasses or high temperature adapters for process separation are available (→ 32).

Safety

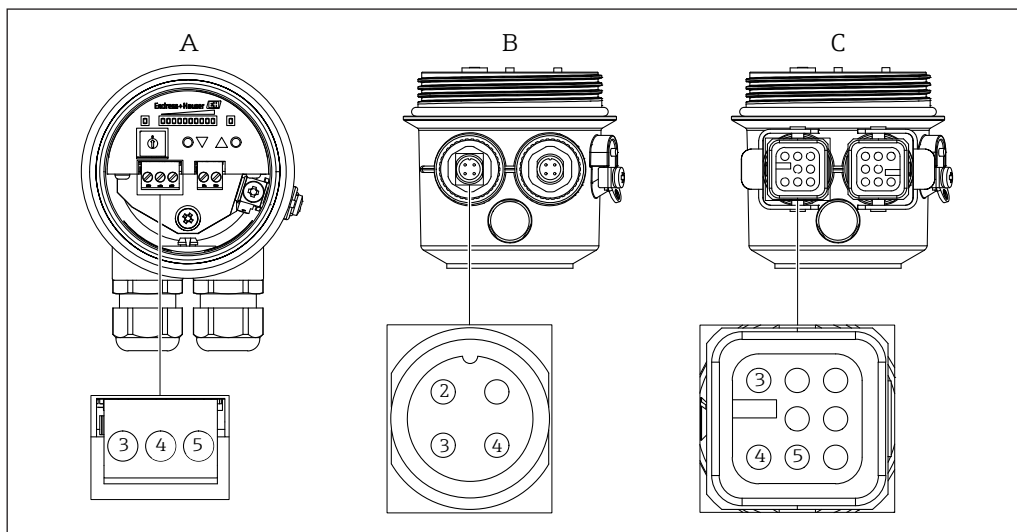
We shall only grant a guarantee if the device is installed and operated in accordance with the Operating Instructions. Safety measures in accordance with the user's safety standard, which provide additional protection for the device and its signal transfer, are to be implemented by the user.

Input

Measured variable	Doppler frequency
Measuring range (detection range)	With an unobstructed radiation path to the surface of the bulk solids, the maximum range is 20 m depending on bulk solids (reflection characteristics). This is reduced if container walls, sight glasses or similar need to be penetrated.
Operating frequency	24.15 GHz \pm 80 MHz
Transmitting power	<p>The power produced by the FTR20 is maximum 100 mW e.i.r.p. (equivalent isotrope radiation performance).</p> <ul style="list-style-type: none">■ Power density directly in front of the device: Approx. 1 mW/cm²■ Power density at a distance of 1 m: Approx. 0.3 μW/cm² <p> The power density is clearly below the recommended limit values of the ICNIRP guidelines "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)" and thus is completely harmless for humans.</p>
Switching frequency	Max. 2 Hz
Antenna opening angle (3 dB)	Approx. \pm 11°
Detectable speed	0.09 ... 62 m/s

Output

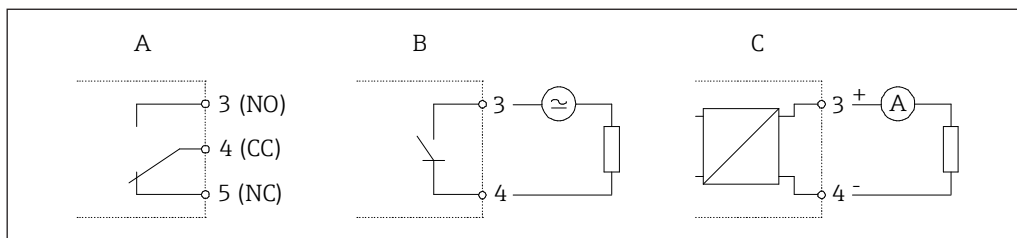
Terminal and connector assignment



5 Output: Terminal and connector assignment

- A Terminal assignment signal output
- B Pin assignment signal output connector 2 (Binder)
- C Pin assignment signal output connector 2 (Harting)

Signal outputs



6 Signal outputs

- A Relay
- B Solid-state relay
- C Current

Relay

- Potential-free change-over contact
- Switching capacity:
 - ~ 250 V / 4 A (Harting connector type HAN8D max. 50 V)
 - = 125 V / 0.4 A or 30 V / 4 A
- Switching frequency: max. 2 Hz

Electrical connection	Relay		
Connection terminals	Terminal 3 (NO)	Terminal 4 (CC)	Terminal 5 (NC)
M12 connector (Binder series 713/763)	Terminal 2 (NO)	Connector 2	Terminal 4 (NC)
Harting connector type HAN8D	Terminal 3 (NO)	Connector 2	Terminal 5 (NC)

NOTICE

- The contact material is also suitable for switching small signal circuits. However, this is possible only if no inductive loads or higher currents have been switched previously.
- The solid-state relay can be used to evaluate higher switching frequencies.

Solid-state relay

- Switching contact of a semiconductor relay
- Switching capacity:
 - ~ 30 V / 0.4 A
 - = 40 V / 0.4 A
- Switching frequency: max. 2 Hz

Electrical connection	Solid-state relay
Connection terminals	Terminal 3 – 4
M12 connector (Binder series 713/763)	Connector 2, contact 3 – 4
Harting connector type HAN8D	Connector 2, contact 3 – 4

Current

- Current output 4 ... 20 mA
- Active
- Max. load: 600 Ω

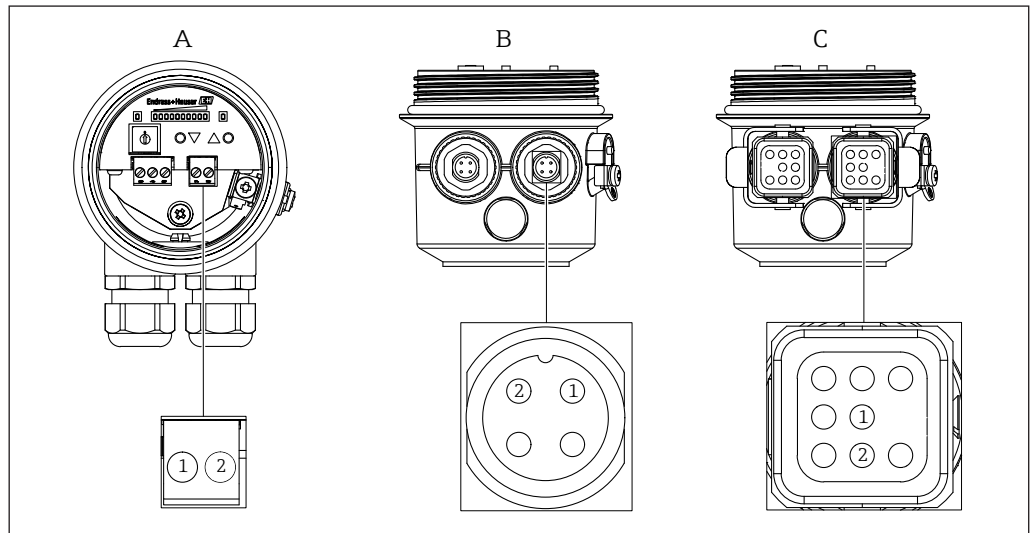
Electrical connection	Current output
Connection terminals	Terminal 3 (+) – 4 (-)
M12 connector (Binder series 713/763)	Connector 2, contact 3 (+) – 4 (-)
Harting connector type HAN8D	Connector 2, contact 3 (+) – 4 (-)



The value of the current output corresponds to the signal strength.

Power supply

Terminal and connector assignment



7 Power supply: Terminal and connector assignment

- A Terminal assignment power supply
 B Pin assignment power supply connector 1 (Binder)
 C Pin assignment power supply connector 1 (Harting)

Electrical connection	Power supply
Connection terminals	Terminal 1 – 2
M12 connector (Binder series 713/763)	Connector 1, contact 1 – 2
Harting connector type HAN8D	Connector 1, contact 1 – 2

A suitable wire (\rightarrow 10) is used to connect the FTR20 to the power supply.

Supply voltage

- \sim 85 to 253 V, 50/60 Hz
- $=$ 20 to 60 V or \sim 20 to 30 V, 50/60 Hz

NOTICE

- The polarity of the supply voltage can be set as required.
- When using the public powers supply, install an easy accessible power switch in the proximity of the instrument. Mark the power switch as a disconnector for the instrument (EN/IEC 61010).
- You should use a fuse to protect the power supply against short-circuit.
- The electrical connection with connector is only available for the power supply with $=$ 20 ... 60 V or \sim 20 ... 30 V, 50/60 Hz (ordering option "E").

Power consumption

- Max. 9 VA (\sim 85 to 253 V, 50/60 Hz)
- Max. 2.4 W ($=$ 20 to 60 V) or 4 VA (\sim 20 to 30 V, 50/60 Hz)

Potential equalization

Requirements:

- The potential equalization should be connected to the outer ground terminal.
- For optimum electromagnetic compatibility, the potential matching line should be as short as possible.
- The recommended minimum cable cross-section is 2.5 mm².
- Potential equalization of the FTR20 should be incorporated in the local potential equalization.



For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

Terminals

Max. 1.5 mm²

Cable entries


- Cable gland M20 x 1.5 or cable entry ½ NPT
- Degree of protection: Min. IP66
- Cable gland in non-hazardous areas:
 - Material: Plastic
 - Color: Gray
 - Clamping range: 5 to 10 mm (EN 61444) or 7-10 mm (UL-514 B)
- Cable gland in hazardous areas:
 - Material: Nickel-plated brass
 - Color: Silver
 - Clamping range: 7 to 10.5 mm
- Quantity: 2 pieces per device

NOTICE

The cable gland is only admissible for the connection of fixed-installation lines and cables. The operator must ensure corresponding strain relief.

Device connector

- M12 connector (Binder series 713/763)
- Harting connector type HAN8D

-  ■ Suitable mating connectors are available as an order variant (Ordering information → 32).
- Suitable mating connectors and prefabricated connection cables are available as accessories (→ 32).

Cable specification

- Normal instrument cable is sufficient
- Conductor cross-section: max. 1.5 mm²

Performance characteristics

Reference operating conditions

Every application is different in terms of its shape (such as influential reflexion edges), medium as well as the properties of the medium (such as attenuation and moisture levels) and therefore always requires an individual basic setup of the flow indicator.

Influence of ambient temperature

The ambient temperature has no direct influence on the measuring system (FTR20 is temperature-compensated internally).

Influences on bulk flow detection**Distance of FTR20 from the medium**

The signal strength is influenced by the distance from the medium to the device. The installation location should therefore be selected so that this distance is as small as possible. If the distance of the medium to the device fluctuates, the flow indicator should be calibrated under the most unfavorable conditions (at maximum distance).

Movement in the vicinity of the measuring point

The flow indicator also detects movements in the vicinity of the measuring point within the detection range, such as vibrating plant components, moving objects and persons. The installation location should therefore be selected so that there are as few moving sources of interference as possible in the surrounding area.

Vibration effects

Vibration resistance – continuous load with sliding frequency in accordance with EN 60068-2-6:

- -40 to +80 °C (-40 to +176 °F)
- Excitation: Sine
- Frequency range: 10 to 55 Hz
- Amplitude: 0.75 mm
- Throughput speed: 1 octave per minute
- Test axes: Three directions (X, Y, Z)
- Number of frequency cycles: 20 per axis
- Test duration: Approx. 1 h 38 min per axis
- Test temperature: Room temperature

Installation

Mounting location

The mounting location must be selected such that application-specific influences are minimized (→ 11).

NOTICE

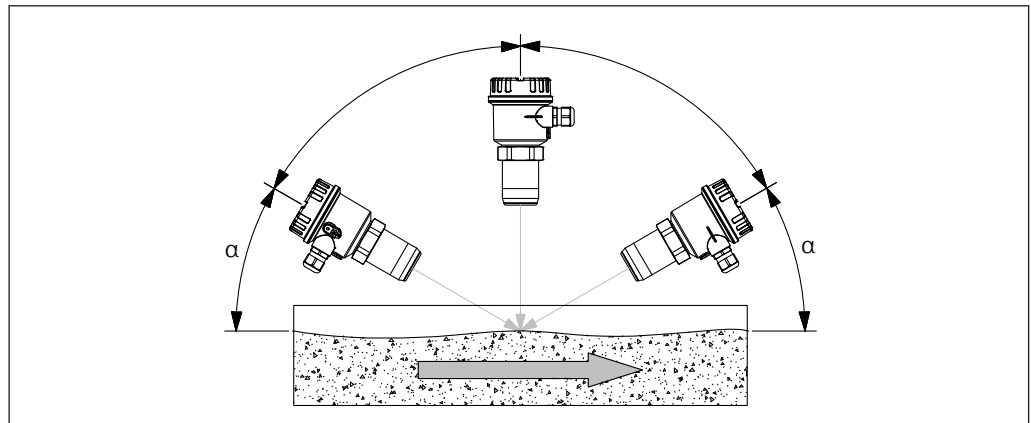
- In case of vibrating mounting locations it is recommended to use devices with encapsulated electronics (see ordering structure "Accessory mounted").
- Depending on the installation locations, different process adapters are available as accessories (→ 32).



For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

Orientation

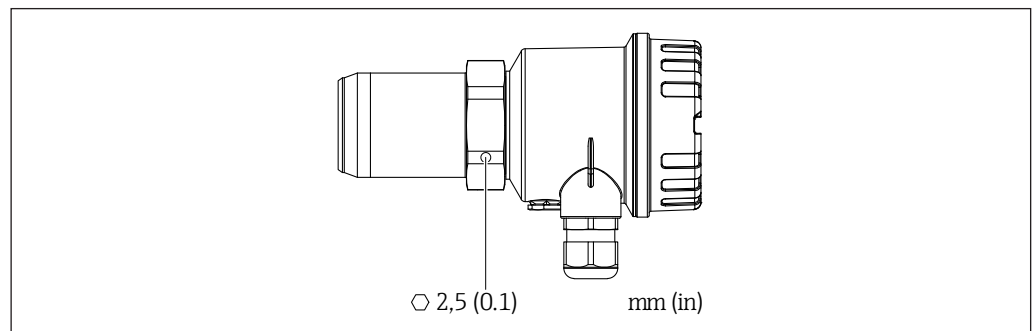
Any orientation is possible for the FTR20 flow indicator. However, a small angle α may increase the signal quality. We recommend an angle of 45° for material detection on conveyor belts (→ 4).



8 Orientation

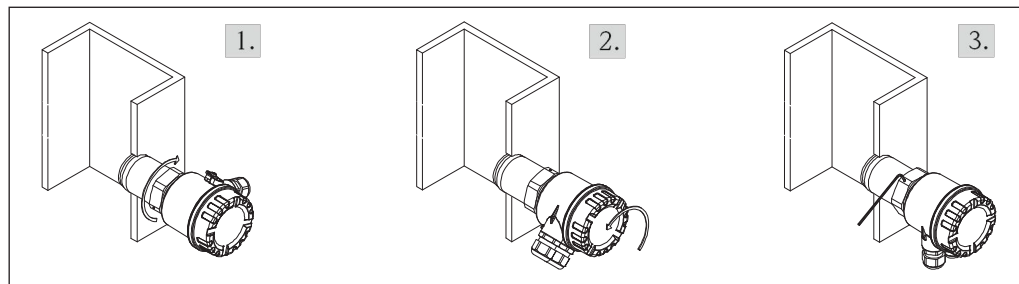
Installation instructions

The FTR20 flow indicator comes with a standard thread (R $1\frac{1}{2}$ as per EN 10226, $1\frac{1}{2}$ NPT as per ANSI/ASME B1.20.1 or G $1\frac{1}{2}$ as per ISO 228-1) as a process connection. This enables easy installation in existing container couplings or nozzles. For optimal orientation after installation in the process, the electronics housing can be rotated as desired (by 360°).



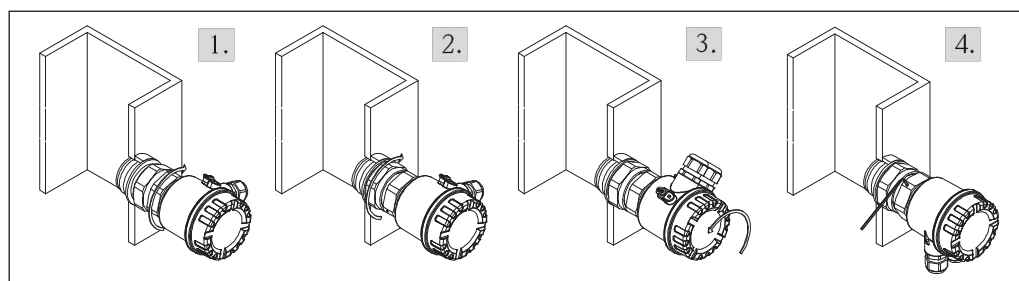
9 Fixing the electronic housing

Following installation, the housing must be secured using the Allen head screw (2.5 AF).

Installation with self-sealing connection thread (R 1½ and 1½ NPT)

☞ 10 Installation with self-sealing connection thread

1. Turn self-sealing connection thread R 1½ or 1½ NPT into existing screw-in thread (SW55 hexagon).
2. Align electronic housing.
3. Secure the housing (2 mm hex socket).

Installation with non-self-sealing connection thread (G 1½)

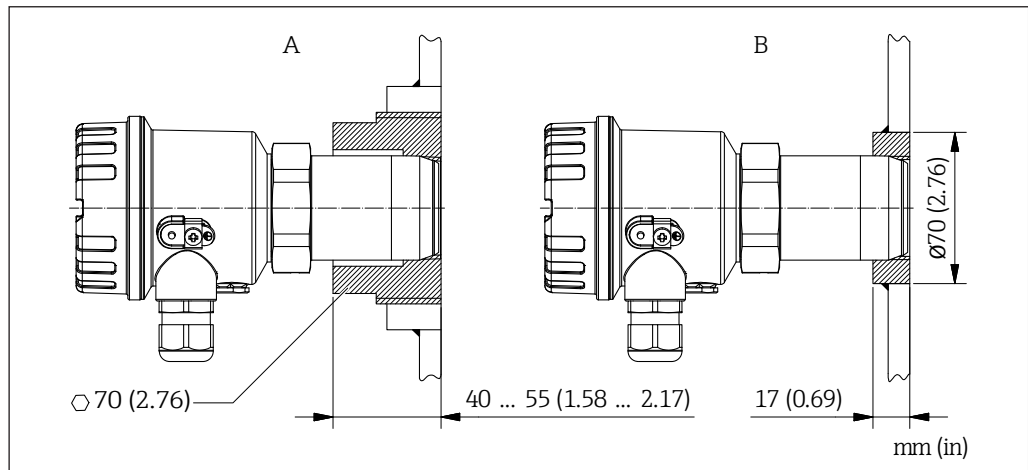
☞ 11 Installation with non-self-sealing connection thread

1. Slide the enclosed process seal over the process connection and screw the non-self-sealing connection thread G 1½ into the existing screw-in thread (SW55 hexagon).
2. Tighten the counter nut of the connection thread (also SW55 hexagon).
3. Align electronic housing.
4. Secure the housing (2 mm hex socket).

NOTICE

- If the process connection is not screwed far enough into the process wall, there is a risk that material will accumulate in front of the FTR20 and cause attenuation of the microwave signal.
- If, on the other hand, the process connection is screwed too far into the process, there is a risk of damage due to large falling product pieces.

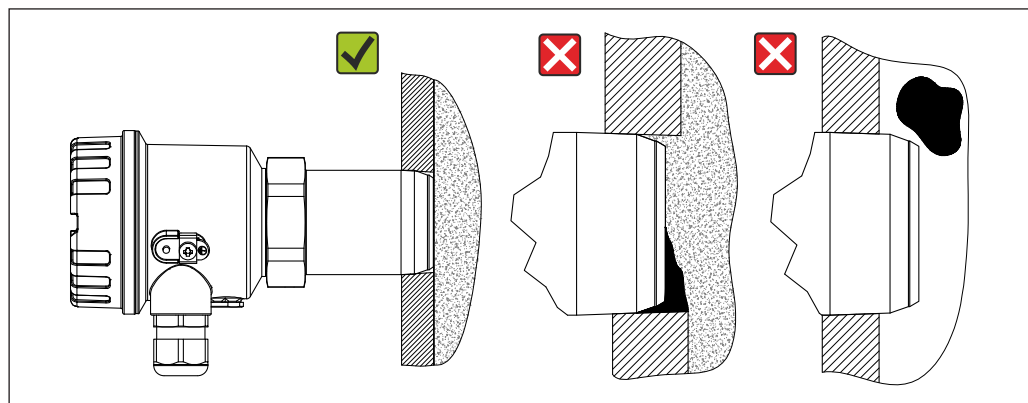
Direct mounting with threaded connection The simplest mounting method is by screwing into the process wall. To do this, a corresponding internal thread (Rp 1½, 1½ NPT or G 1½) must be available in the process.



12 FAR52 weld-in (B) and screw-in (A) adapter

- i** Weld-in adapters (B) of type FAR52-A*, with corresponding internal thread, are available as accessories (→ 32).
- If the internal threads available in the process wall are different (R 2 to R 4 or 2 NPT to 4 NPT), additional screw-in adapters (A) of type FAR52-B* are available as accessories (→ 32).

With direct mounting in the process wall, it must be ensured that the front edge of the process connection is flush with the internal edge.



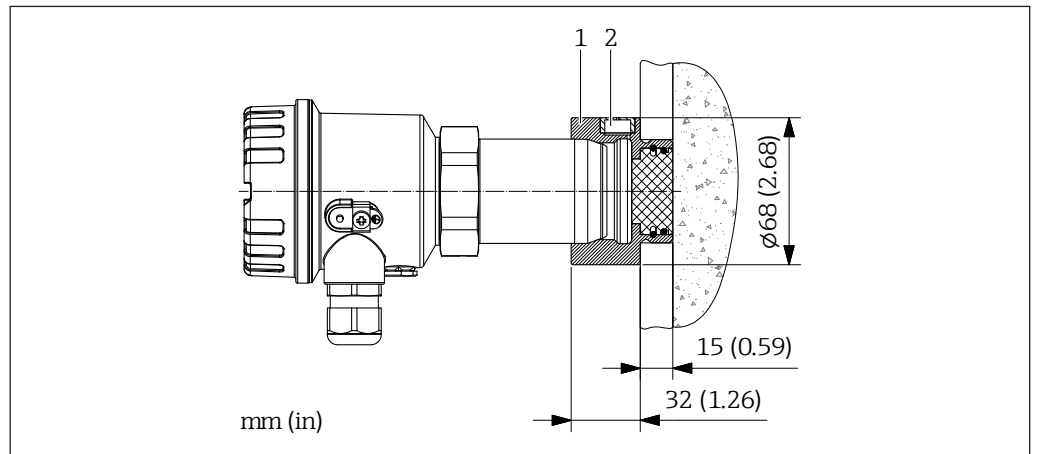
13 Direct mounting with threaded connection

NOTICE

- If the process connection is not screwed far enough into the process wall (A), there is a risk that material will collect in front of the FTR20 and cause attenuation of the microwave signal.
- If, on the other hand, the process connection is screwed too far into the process (B), there is a risk of damage due to large falling product pieces.

- i** When using the G 1½ -process connection (standard thread to ISO 228-1, hexagon SW55) with integrated counter nut, the devices can be flush mounted especially easily, as a parallel thread is used.

For applications with a high process pressure up to 2 MPa (20 bar) absolute, we recommend the following high pressure adapter (accessories → 32).



14 Mounting with high-pressure adapter

- 1 High pressure adapter
- 2 Integrated venting element

NOTICE

The maximum temperature at the FTR20 must be observed.

Mounting in front of microwave-impermeable process wall

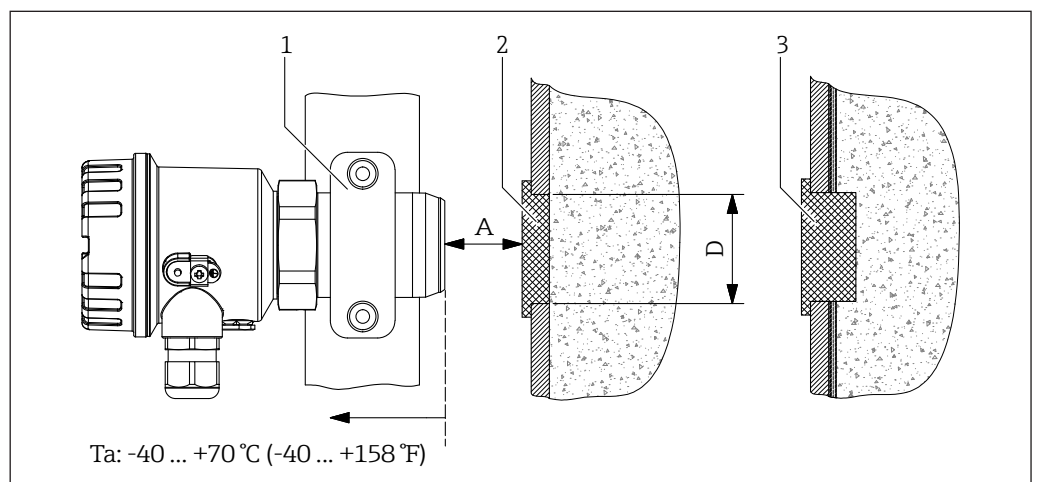
If, due to the process conditions (such as high temperatures, high pressures or hazardous nature of the material), no direct installation in the microwave-impermeable process wall is possible, the flow indicator can emit its signal through an additionally installed plug.

The following materials have been tested and are suitable for radiation:

- Plastics (virginal, unfilled) such as polytetrafluorethylene (PTFE), polyethylene (PE) or polypropylene (PP)
- Aluminum oxide ceramic (purity min. 99.5 %, uncolored)
- Borosilicate glass (uncolored)

NOTICE

Colorations or added (colored) substances can cause a potentially high signal attenuation, depending on the material, and are therefore not suitable for this purpose.



15 Bracket mounting in front of a microwave-permeable process wall

- 1 Mounting bracket
- 2 Microwave-permeable plug
- 3 Microwave-permeable plug with the risk of condensation on the inner wall
- A Distance between device and plug
- D Diameter of the plug

NOTICE

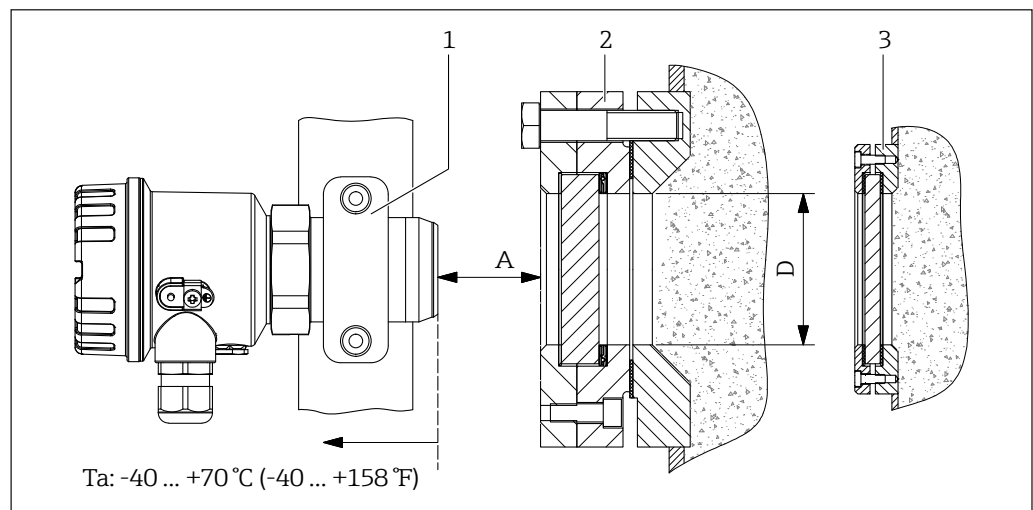
- With bracket mounting in front of a microwave-permeable plug and the risk of the formation of condensate on the inner wall of the container, we recommend a plug protruding into the process (3).
- The maximum temperature at the FTR20 must be observed.
- Distance A is based on the clear opening area D. To prevent possible signal attenuation, we recommend keeping the distance as short as possible (e.g. max. 40 mm at DN50).



- Suitable mounting brackets (1) made of plastic or aluminum are available as accessories (→ 32).
- Suitable plugs made of PTFE or aluminum oxide ceramic of type FAR54 are available as accessories in different lengths and diameters (→ 32).
- Details on plug mounting → TI01371F/97/EN

Mounting in front of microwave-permeable sight glass fitting

If the process wall is not permeable, it is possible to have the flow indicator emit its signal from outside through a suitable sight glass fitting. The sight glass in this fitting is made of uncolored borosilicate glass.



16 Bracket mounting in front of microwave-permeable sight glass fitting

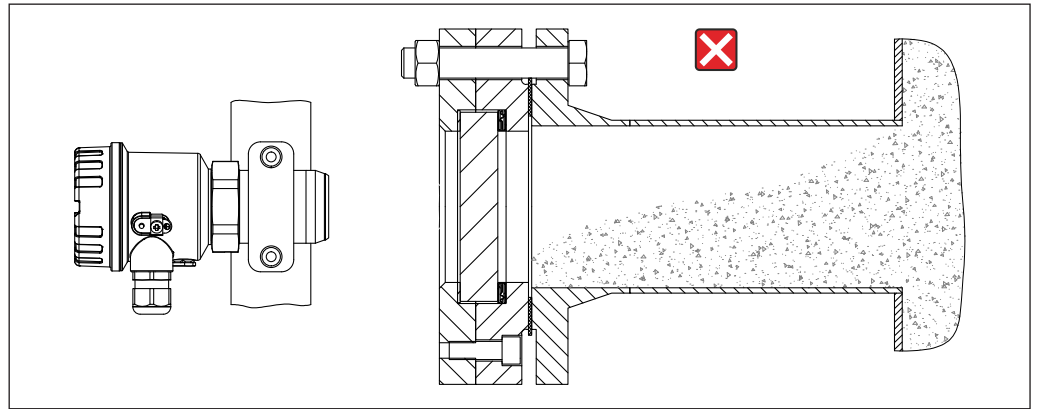
- 1 Mounting bracket
 2 Screw-on sight glass fitting
 3 Sight glass fitting for welding in
 A Distance between device and sight glass fitting
 D Diameter of the sight glass fitting

NOTICE

Distance A is based on the clear opening D and the temperature in this area. To prevent possible signal attenuation, we recommend keeping the distance as short as possible (e.g. max. 40 mm at DN50).



- Suitable mounting brackets (1) made of plastic or aluminum are available as accessories (→ 32).
- Suitable sight glass fittings (2+3) made of stainless steel with borosilicate glass are available as accessories (→ 32).



17 Impermissible mounting with the risk of material collection

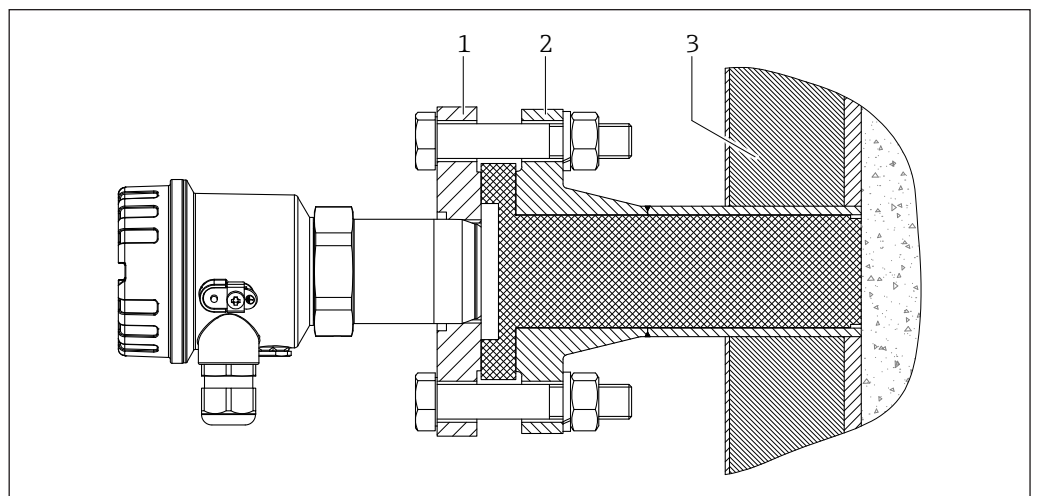
NOTICE

Sight glass fittings should in principle only be installed at places where no material can collect on the process side. Mounting on a connecting nozzle, for example, could result in the inability to detect a free path.

Mounting on process nozzles

Mounting on a process nozzle offers the following advantages:

- By using available nozzles, no modifications of the process are required.
- The use of suitable plugs can prevent material from collecting in the nozzle.
- At the same time, the plug acts as wear protection for the flow indicator and can be replaced easily in the event of significant wear.
- Mounting or disassembly of the FTR20 devices can be carried out during ongoing operation, which significantly simplifies the service process.



18 Mounting on available process nozzles

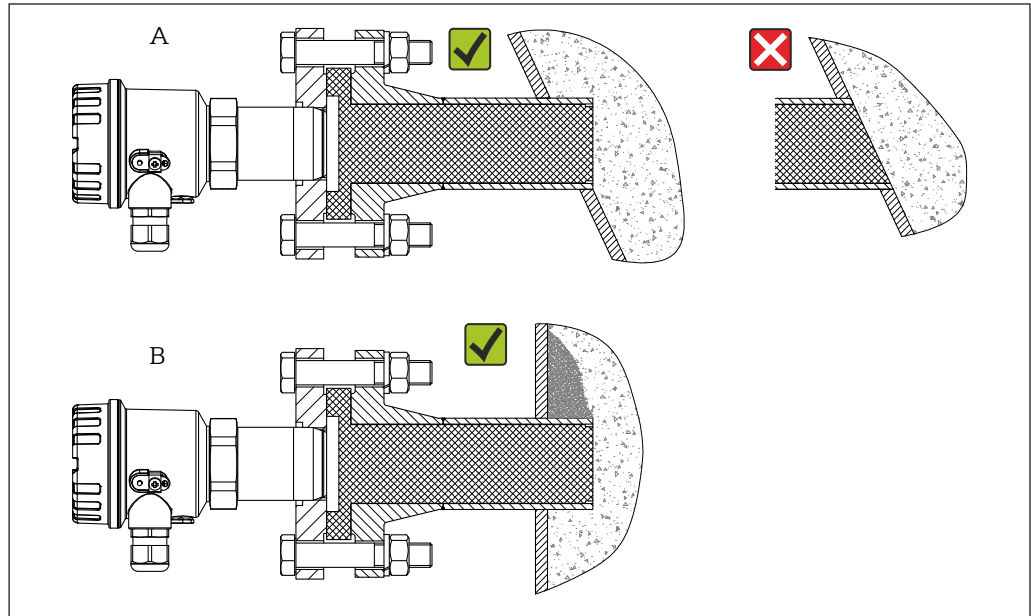
- 1 Mounting flange
- 2 Process nozzle with inserted plug
- 3 Process insulation



- Suitable mounting flanges with corresponding connection threads made of stainless steel and plugs made of PTFE or aluminum oxide ceramic for the available process nozzles are available as accessories (→ 32).
- Process nozzles of type FAR50, consisting of connection nozzle, plug and mounting flange, are available as accessories in different sizes and materials (→ 32).

NOTICE

- For non-vertical process walls, we recommend mounting the process nozzle far enough into the process that no material can collect in front of it (1).
- For process nozzle mounting and when there is a risk of material building up on the inner wall of the container, we recommend a nozzle that protrudes into the process (2).
- The maximum plug length is dependent on the attenuation and water absorption of the material. Please note the manufacturer's instructions in this regard.

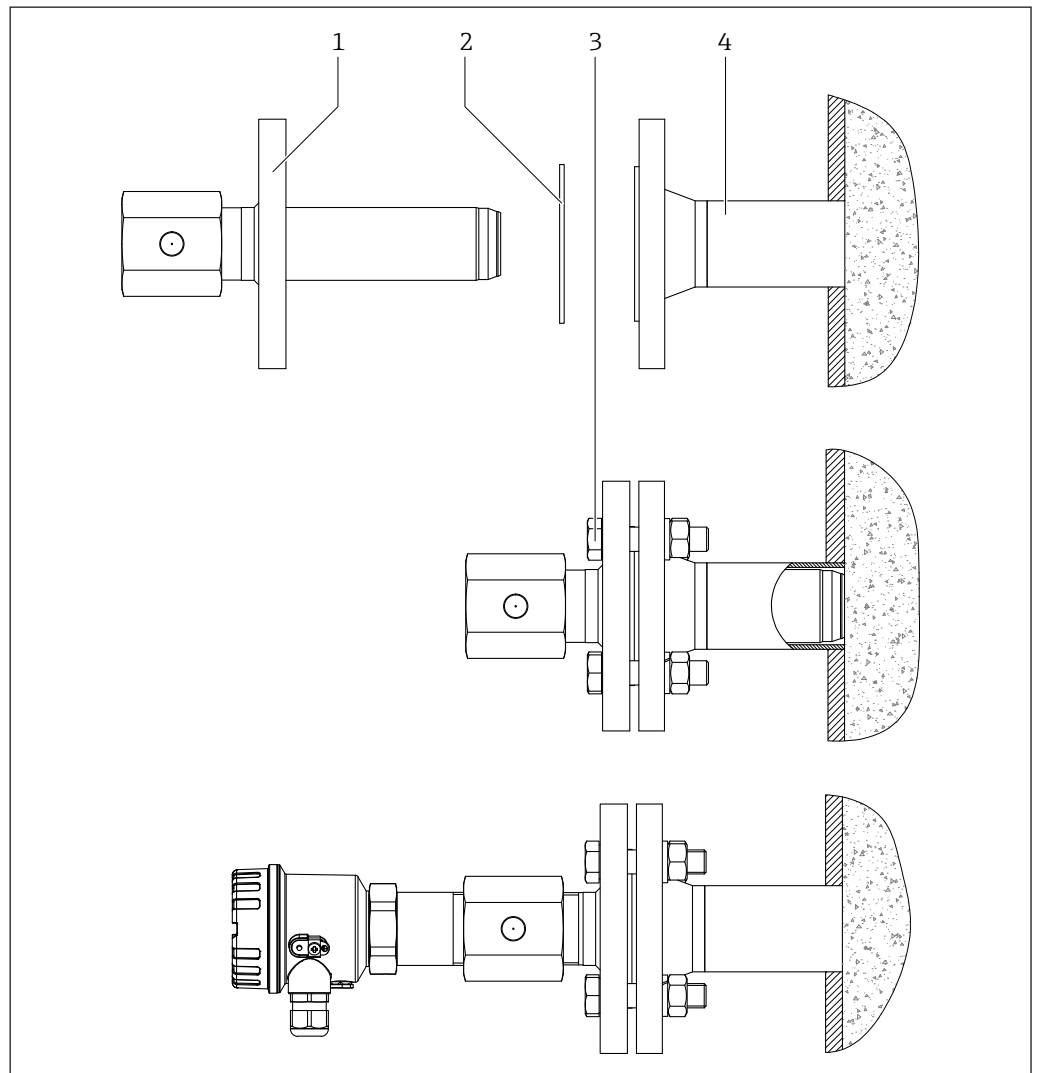


19 Mounting with inclined process wall and risk of build-up

- A Mounting of process nozzle with inclined process wall
 B Mounting of process nozzle with risk of build-up

NOTICE

When there is a risk of condensate forming between the process connection of the FTR20 and the plug, we recommend using the process nozzle type FAR50 (→ 32), which is equipped with a mounting flange with a pressure equalization element.



☒20 Mounting with FAR51 insertion adapter

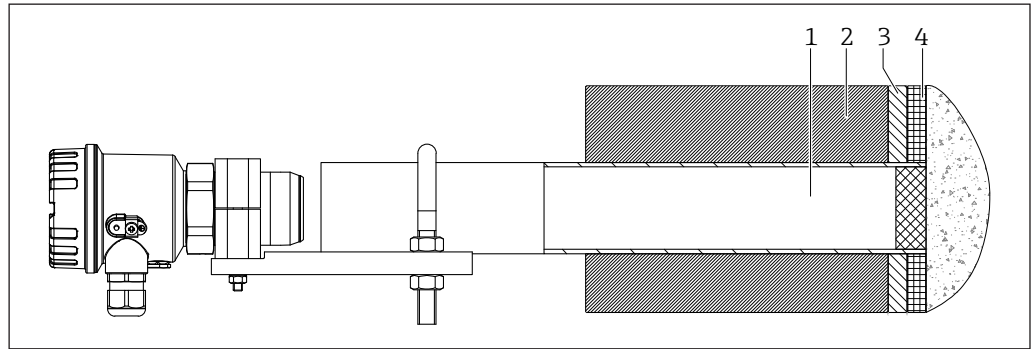
- 1 Insertion adapter
- 2 Customer-supplied gasket
- 3 Customer-supplied installation material
- 4 Process nozzle

i For process temperatures of +70 to +450 °C (+158 to +842 °F), plug-in adapters for stainless steel flange nozzles of type FAR51 are available as accessories (→ ☒32).

Mounting with spacer tube (wave guide)

For many processes, mounting with a spacer tube is a simple and cost-effective way of separating the devices of the FTR20 flow indicator from the high process temperatures of +70 to +450 °C (+158 to +842 °F). The spacer tube can be secured in place in various ways, depending on the application conditions (e.g. screwed into the process wall, bolted-on mounting brackets, welded or clamped to available cross beams).

We also recommend this mounting method for processes that are lined with clay or similar materials on the inside. The spacer tube can be glued into place, for example.



▣21 Mounting with spacer tube

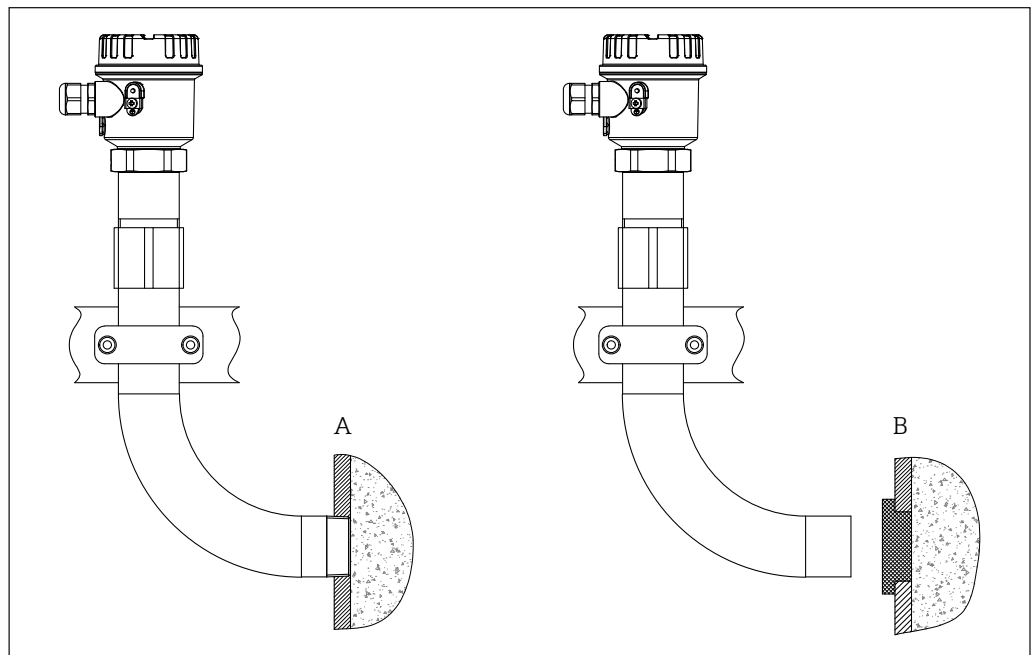
- 1 Spacer tube
- 2 Process insulation
- 3 Container wall
- 4 Inner lining

i Suitable spacer tubes of type FAR53, made of steel or stainless steel, are available as accessories in different versions (→ ▣32).

NOTICE

When there is a risk of condensate forming in the spacer tube, we recommend using process nozzle type FAR50 (→ ▣32), which is equipped with a mounting flange with a pressure equalization element.

For structural or space reasons, it may be necessary to mount the FTR20 devices at an angle to the planned mounting location. In this case, a spacer tube can be used as a wave guide, meaning that no additional signal attenuation occurs due to the wave guide effect.



▣22 Mounting with wave guide

- 1 Mounting directly in the process with connection thread
- 2 Mounting in front of the process plug without connection thread

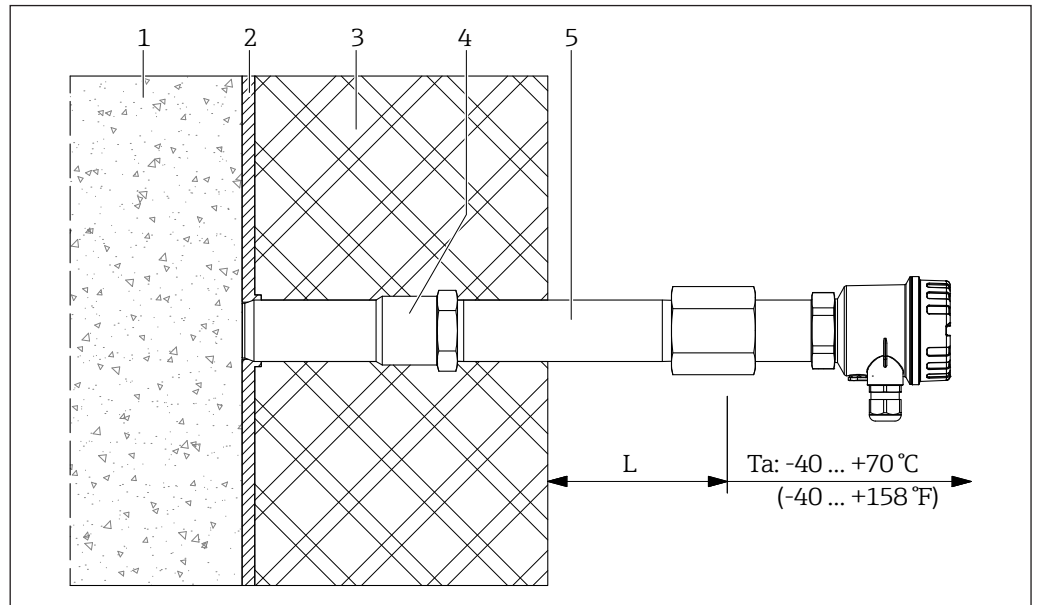
NOTICE

- The pipe can be made of any desired metallic material.
- Edges inside the pipe (for example at transitions) can cause signal attenuation and thus should be avoided wherever possible.

i Suitable stainless steel wave guides of type FAR55 are available as accessories in different versions (→ 32).

Mounting with high temperature adapter and length extensions

For simple and easily accessible high temperature applications in the range from +70 to +450 °C (+158 to +842 °F) there is an adapter with flush-mounted aluminum oxide ceramic available, which can be extended with length extensions.



23 Mounting with high temperature adapter and length extensions



- 1 Process
- 2 Wall
- 3 Insulation
- 4 High temperature adapter
- 5 Length extensions

NOTICE

The maximum temperature of +70 °C (+158 °F) at the process connection of FTR20 devices must be observed (L is to be selected according to the process and ambient temperatures); exceeding this temperature will cause destruction.

i Suitable high temperature adapters and length extensions made of stainless steel are available as accessories (→ 32).

Environment

Operating temperature range	-40 to +70 °C (-40 to +158 °F) For outdoor operation in strong sunlight: <ul style="list-style-type: none">▪ Mount the device in the shade▪ Avoid direct sunlight, particularly in warmer climatic regions▪ Use a protective cover, which can be ordered as an accessory (→  32)
Storage temperature	-40 to +80 °C (-40 to +176 °F)
Degree of protection	<ul style="list-style-type: none">▪ IP66 (with closed housing)▪ IP20 (with open housing)
Vibration resistance	See vibration influence (→  11)
Electromagnetic compatibility (EMC)	<ul style="list-style-type: none">▪ Interference emission to EN 61326, Electrical Equipment Class B▪ Interference immunity to EN 61326, Appendix A (Industrial)▪ Normal installation cable is sufficient for the wiring.

Process

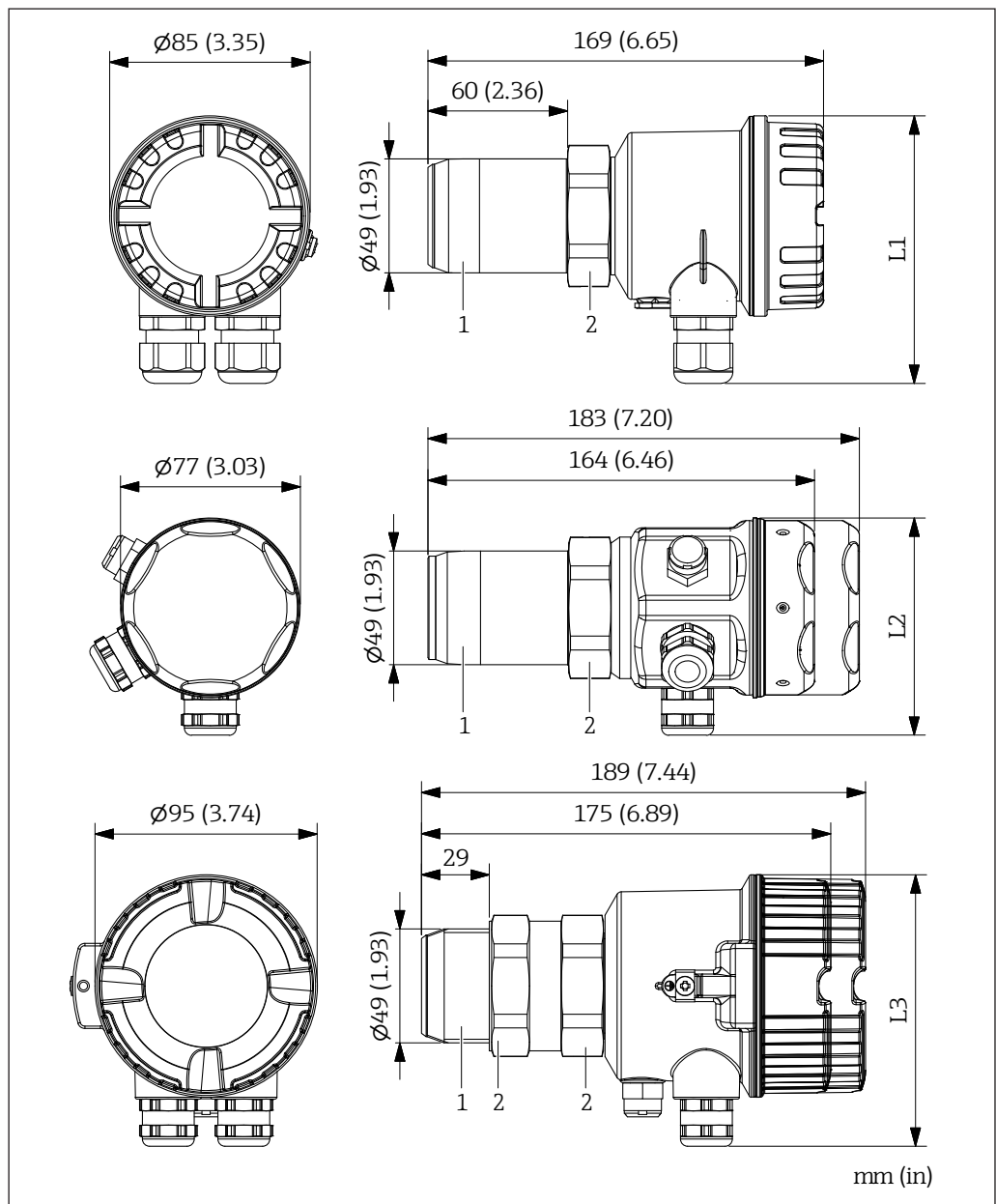
- Process temperature range**
- Without optional process adapter: -40 to +70 °C (-40 to +158 °F)
 - With optional high temperature adapter (→ [32](#)): -40 to +450 °C (-40 to +842 °F)
 - Note deviating temperature ranges with the accessories offered!
-

- Process pressure range**
- 50 to 680 kPa (0.5 to 6.8 bar) absolute, only to be observed with FTR20 installed directly in the process
 - 80 to 510 kPa (0.8 to 5.1 bar) absolute, with use of the optional high temperature adapter
 - 50 to 2000 kPa (0.5 to 20 bar) absolute, with use of the optional high pressure adapter
 - Note deviating pressure ranges with the accessories offered.
-

Vibration See vibration influence (→ [11](#))

Mechanical construction

Dimensions



24 Dimensions

- 1 Connection thread R 1½, 1½ NPT or G 1½
 2 Hexagon SW55

Weight

0.7 to 1.7 kg (1.54 to 3.75 lbs), depending on the selected housing and process connection

i On device variants with connector and extended ordering option "Electronics, encapsulated" the weight increases by 0.2 kg (0.44 lbs).

Materials

- Stainless steel 316Ti (1.4571):
 - Process connection
 - Pressure equalization element (F15/F34 housing)
- Stainless steel 316L (1.4435):
 - F15 housing
 - Adapter ½ NPT (F15/F34 housing)
- Aluminum:
 - F34 housing
- Plastic:
 - F16 housing
 - M20 cable gland, adapter ½ NPT and pressure equalization element (F16 housing)
- Die-cast zinc:
 - M12 connector, nickel-plated
 - Harting connector, powder-coated
- Brass, nickel-plated:
 - M20 cable gland (F15/F34 housing)

Process connections

- Connection thread:
- R 1½ in accordance with EN 10226
 - 1½ NPT in accordance with ANSI/ASME
 - G 1½ in accordance with ISO 228-1

Operability

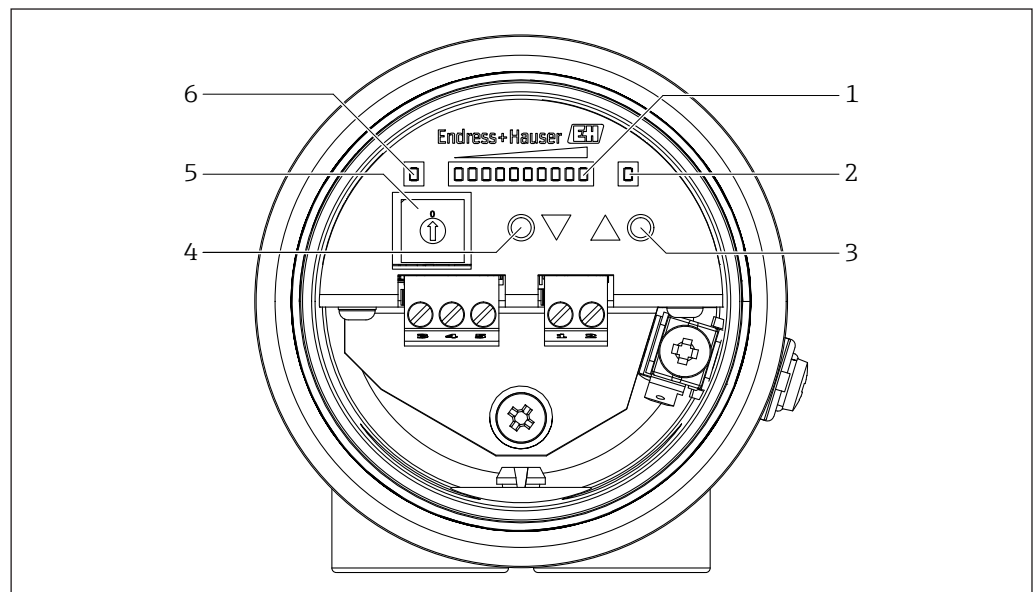
By using frequencies in the 24 GHz range and the adjustable high sensitivity of the FTR20, it is possible to detect even low throughputs and bulk materials with poor reflective properties. The many adjustment options of the FTR20 flow indicator offer the necessary flexibility to adapt the device to the most diverse applications without any problems:

- Adjustable sensitivity
- Switchable limit signal function:
 - Switch point exceeded = max. safety or
 - Switch point not reached = min. safety
- Adjustable switching hysteresis (not for current output)
- Switching delay (not at current output):
 - 100 ms to 20 s
 - Response and drop-out delay, can be selected separately
- LED field strength indicator as an adjustment and positioning aid

Operating concept

The FTR20 is configured using the function selection and the two operating keys. By doing so, calibration to a sensitivity necessary for clear and unambiguous material flow identification is carried out. If the movement of the bulk solids is sufficient, the FTR20 responds with an output signal to this effect.

The parameter configuration is stored internally and is retained even after the supply voltage is disconnected. No other operator intervention is necessary during operation. The adaptation to the application is required during initial installation only. However, subsequent changes can be made and stored at any time.



25 Display and control elements

- 1 Bar graph
- 2 LED switch output (yellow)
- 3 Operation key (+)
- 4 Operation key (-)
- 5 Rotary coding switch function selection
- 6 LED operate (green)

Display

The signal strength as well as the configured values (in the function selection) are displayed locally using a bar graph display. In addition, a green LED indicates that the device is ready to operate (supply voltage is present) and a yellow LED displays the status of the switch output (function 6 = standard setting, LED off: relay in rest position, solid-state relay high-impedance).

NOTICE

- Toggling the encoding switch position unequal "0" (function selection) puts the FTR20 into parameter configuration mode. The bulk solids motion detector continues to work in the background, changed settings are taken into account directly.
- Remember to set the encoding switch to position "0" (= operation) when you have finished configuring settings.
- For current output, the yellow LED has no function and remains off.

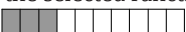
Local operation

Parameter configuration is performed as follows:

1. Select any function (the available functions can be found in the section "Parameterization functions")

→ Encoding switch (1) = 1 to F

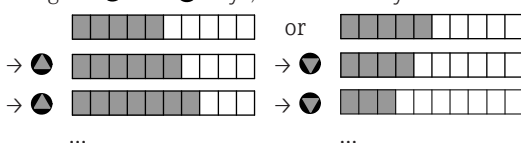
→ The display shows the selected function for two seconds.

Example function 3: 

2. Setting the selected function

Example: Function 3 (manual calibration with movement of bulk solids)

→ Using the  and  keys, the sensitivity can be increased or reduced.


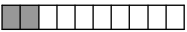

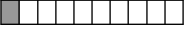


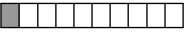


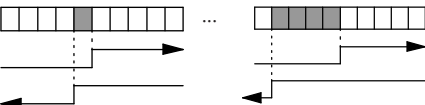







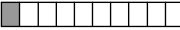



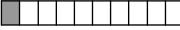


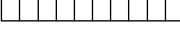
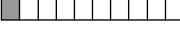

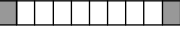
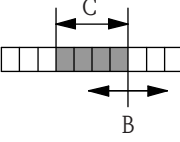

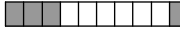
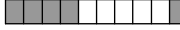

3. The configured value is stored as soon as the function is switched. The value can be displayed again at any time by selecting the corresponding programming function and changed if necessary.
4. Once parameter configuration is complete (i.e. once the motion detector has been adapted to the bulk solids in question), the encoding switch must be returned to the "0" position. The FTR20 is now ready for operation.

NOTICE

When a calibration is carried out, it can be read out and, for example in the case of a device change, transferred directly to the new FTR20. If the new device is installed in the same position, this means that the device is correctly calibrated.

Parameterization functions

Function/meaning	Value range
1 =  Automatic calibration with movement of bulk solids	—
2 =  Automatic calibration with no movement of bulk solids	—
3 =  Manual calibration with movement of bulk solids	Upper limit from function 1:  minimum ...  maximum
4 =  Manual calibration with no movement of bulk solids	Lower limit from function 1:  minimum ...  maximum
5 =  Hysteresis setting	
6 =  Selection of the limit signal function (Min./Max. safety, relay output only)	 Relay switches with movement of bulk solids  Relay switches with slow or no movement of bulk solids

Function/meaning	Value range
7 =  Switching delay setting (switch-on delay)	 off (no delay)  100 ms
8 =  Switching delay setting (switch-off delay)	... (200/300/500 ms, 1/2/3/5/10 s)  20 s
9 =  Enable simulation mode	 Low level of bulk solids movement ...  High level of bulk solids movement
A =  Attenuation setting	 off (no attenuation)  100 ms ... (200/300/500 ms, 1/2/3/5/10 s)  20 s
B =  Configuring the amplification	 <p>Display and, if necessary, adjustment of settings made in function 1 to 4</p>
C =  Setting of detection range (window width)	
D =  E = 	without function
F =  Reset to factory settings	—

NOTICE

Further information on settings and parameter configuration can be found in the Operating Instructions (→ 43).

Certificates and approvals

CE mark

The FTR20 flow indicator meets the legal requirements of the applicable EU guidelines. These are listed in the corresponding EU Declaration of Conformity, together with the applied standards. By applying the CE mark, Endress+Hauser confirms that the device has passed the necessary tests.

Ex approval

The device is certified for use in hazardous areas and the safety instructions to be observed are provided in the separate "Safety Instructions" (XA) document. This is also referenced on the nameplate.



The separate Ex documentation (XA) with all relevant data regarding explosion protection can be obtained from your Endress+Hauser sales center or as a download from www.endress.com.

Telecommunications

- EN 300440
Short range radio devices (SRD) – radio devices for operation in a frequency range of 1 GHz to 40 GHz
- FCC Rule Parts 15C
- IC according to RSS-210 Issue 8, RSS-GEN Issue 3 and RSS-102 Issue 4

Other standards and guidelines

- EN 60529
Degrees of protection through housing (IP code)
- EN 61010-1
Protection measures for electrical equipment for measurement, control, regulation and laboratory procedures
- EN 61326-X
EMC product family standard for electrical equipment for measurement, control and laboratory use

Ordering information

Detailed ordering information is available from the following sources:

- In the product configurator on the Endress+Hauser website: www.endress.com → Select your country → Products → Select measurement technologies, software or components → Select product (selection lists: Measuring methods, product family, etc.) → Device support (right column): Configure the selected product → The product configurator opens for the selected product.
- From your Endress+Hauser sales center: www.addresses.endress.com



Product Configurator – the tool for individual product configuration

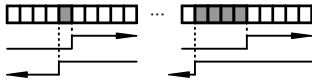
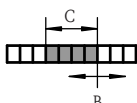
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format

Scope of delivery

The scope of delivery includes the FTR20 in a box with operating instructions included.

User-specific settings

Ordering a device with the extended option "User-specific settings", it will be programmed according to the customers specification during assembly, in this case the following form must be completed and added.

User-specific settings FTR20		Endress+Hauser
Order code: FTR20 -		
Device no.:		
Function / Meaning	Value range	Setting
1 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Automatic adjustment with bulk solids in motion		—
2 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Automatic adjustment with bulk solids standing still		—
3 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Manual adjustment with bulk solids in motion	Upper limit from function 1: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (minimum) ... <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (maximum)	—
4 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Manual adjustment with bulk solids standing still	Lower limit from function 1: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (minimum) ... <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (maximum)	—
5 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Hysteresis setting		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
6 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Selection of the limit signal function (min./max. safety, relay output only)	Relay switches with: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> movement of bulk solids <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> no movement of bulk solids	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
7 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Switching delay setting (switch-on delay)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> off (no delay) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 100 ms <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 200 ms ... (300 ms, 500 ms, 1 s, 2 s, 3 s, 5 s, 10 s)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
8 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Switching delay setting (switch-off delay)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 20 s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9 = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Enable simulation mode	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Bulk solids not in motion ... <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Bulk solids in motion	—
A = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Damping setting	See function 7/8	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
B = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Amplification setting		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
C = <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Detection range setting		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Example (Adjustment by specifying of B+C not necessary):		
• Hysteresis (5) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> = minimum		
• Limit signal function (6) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> = Relay switches with movement of bulk solids		
• Switch-on delay (7) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> = off		
• Switch-off delay (8) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> = 300 ms		
• Damping (A) <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> = 100 ms		
• Amplification (B) <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
• Detection range (C) <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		

ad059005en; Rev. 2.1

The blank form can be used for documentation of the FTR20 device settings.

Accessories

Various accessories are available for the device, and can be ordered with the device or at a later stage from Endress+Hauser. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Mating connectors

For the device variants with connectors the following mating connectors can be used:

- Order No.:
71381872, M12 series 713/763, 4-pole
71381882, Harting HAN8D

 On device variants with electrical connection **F** and **J** the mating connectors are part of delivery.

Prefabricated connection cables

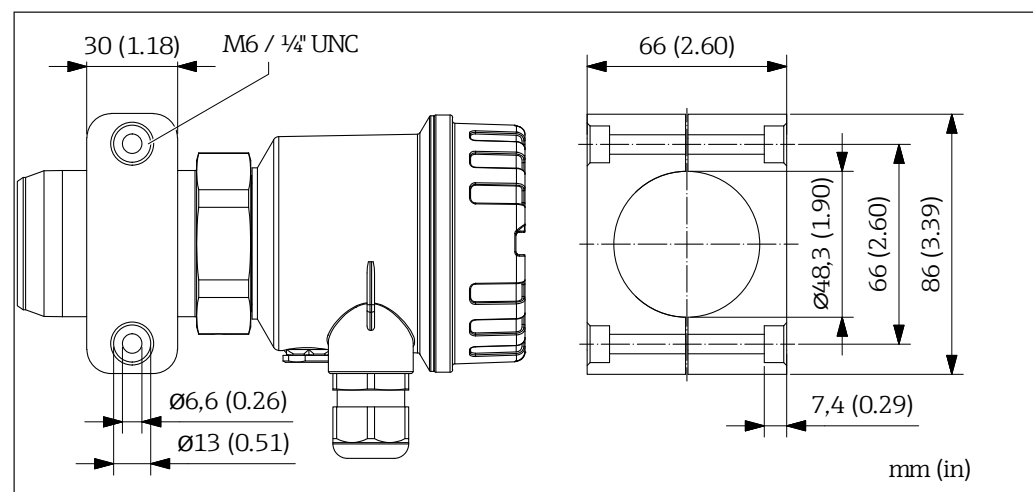
For the device variants with connectors the following prefabricated connection cables can be used:


- Order No.:
71381853, M12 series 713/763, 4 x 0.34 mm², PUR, length 2 m (6.45 ft)
71381870, M12 series 713/763, 4 x 0.34 mm², PUR, length 5 m (16.40 ft)
71381877, Harting HAN8D, 4 x 0.75 mm², PUR, length 2 m (6.45 ft)
71381879, Harting HAN8D, 4 x 0.75 mm², PVC, length 5 m (16.40 ft)
- Weight: Approx. 0.19 kg (M12 series 713/763, 2 m) / 0.45 kg (Harting HAN8D, 5 m)

Mounting bracket

For mounting on frames, cross beams or similar which are already available, the following mounting brackets can be used:

- Order No.:
52017501, aluminum
52017502, plastic
- Weight: Approx. 0.06 kg (plastic)/0.22 kg (aluminum)
- The delivery does not include any mounting screws, as the type and length are dependent on on-site conditions.

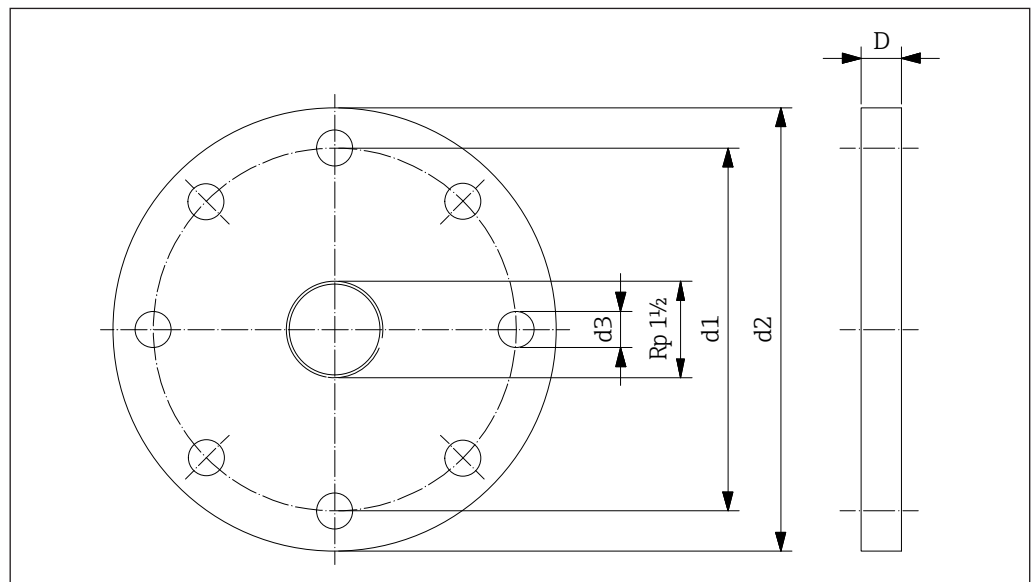


 26 Mounting bracket dimensions

Mounting flange

The following mounting flanges can be used for mounting on available process nozzles with connection dimensions in accordance with DIN EN 1092-1:

- Order No.:
 - 71006348, DN40 PN40, Rp 1½ internal thread
 - 71108383, DN40 PN40, Rp 1½ internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71381884, DN40 PN40, G 1½ internal thread
 - 71381885, DN40 PN40, G 1½ internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71006350, DN50 PN16, Rp 1½ internal thread
 - 71108388, DN50 PN16, Rp 1½ internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71381887, DN50 PN16, G 1½ internal thread
 - 71381888, DN50 PN16, G 1½ internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71006352, DN100 PN16, Rp 1½ internal thread
 - 71108390, DN100 PN16, Rp 1½ internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71381890, DN100 PN16, G 1½ internal thread
 - 71381891, DN100 PN16, G 1½ internal thread, inspection certificate in accordance with EN 10204-3.1
- Material: 316Ti stainless steel (1.4571)
- Weight: DN40 approx. 2.3 kg (5.07 lbs) to DN100 approx. 5.8 kg (12.79 lbs)

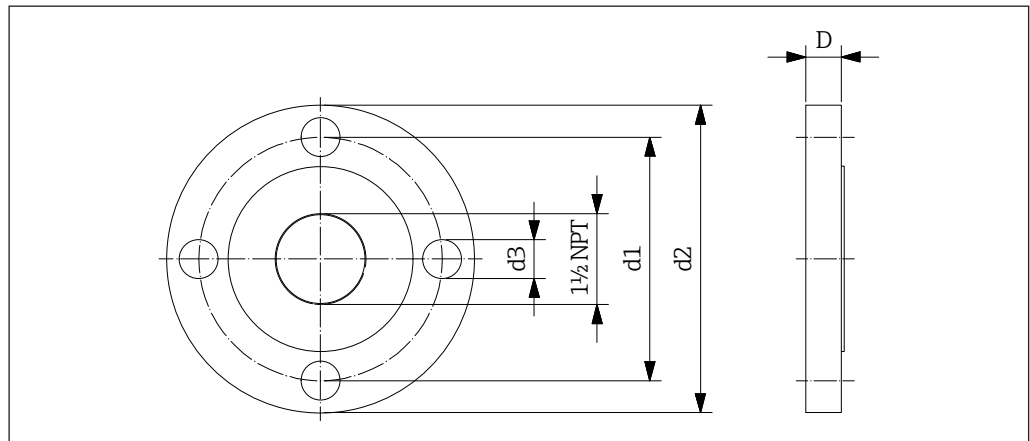


27 Dimensions of mounting flange (connection dimensions in accordance with EN 1092-1)

Flange	d1 mm (in)	d2 mm (in)	d3 mm (in)	D mm (in)	Holes
DN40/PN40	110 (4.33)	150 (5.91)	18 (0.71)	18 (0.71)	4
DN50/PN16	125 (4.92)	165 (6.50)	18 (0.71)	18 (0.71)	4
DN100/PN16	180 (7.09)	220 (8.66)	18 (0.71)	20 (0.79)	8

The following mounting flanges can be used for mounting on available process nozzles with connection dimensions in accordance with ANSI/ASME B16.5:

- Order No.:
 - 71006349, 1½" 150 lbs, 1½ NPT internal thread
 - 71108387, 1½" 150 lbs, 1½ NPT internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71006351, 2" 150 lbs, 1½ NPT internal thread
 - 71108389, 2" 150 lbs, 1½ NPT internal thread, inspection certificate in accordance with EN 10204-3.1
 - 71006353, 4" 150 lbs, 1½ NPT internal thread
 - 71108391, 4" 150 lbs, 1½ NPT internal thread, inspection certificate in accordance with EN 10204-3.1
- Material: 316Ti stainless steel (1.4571)
- Weight: 1½" approx. 1.5 kg (3.31 lbs) to 4" approx. 6.8 kg (15.0 lbs)



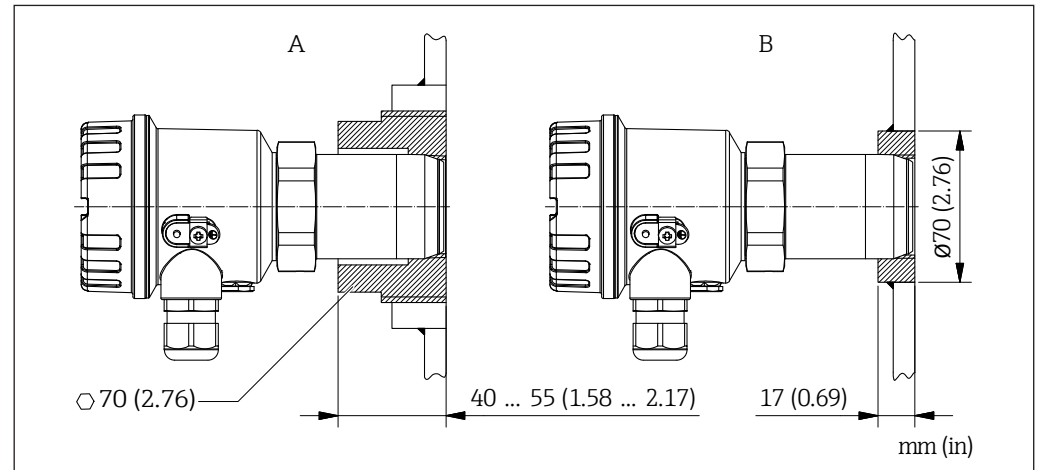
28 Dimensions of mounting flange (connection dimension in accordance with ANSI/ASME B16.5)

Flange	d1 mm (in)	d2 mm (in)	d3 mm (in)	D mm (in)	Holes
1½" 150 lbs	98.6 (3.88)	127 (5.00)	15.7 (0.62)	17.5 (0.69)	4
2" 150 lbs	120.7 (4.75)	152.4 (6.00)	19.1 (0.75)	19.1 (0.75)	4
4" 150 lbs	190.5 (7.50)	228.6 (9.00)	19.1 (0.75)	23.9 (0.94)	8

Weld-in or screw-in adapter

For mounting in process walls with existing threads or bores, adapters of type FAR52 can be used (→ [TI01369F/97/EN](#)):

- Weld-in adapter with internal thread Rp 1½, 1½ NPT and G 1½
- Screw-in adapter for thread R 2 to R 4 and 2 NPT to 4 NPT, with internal thread R 1½ or 1½ NPT
- Material: 316Ti stainless steel (1.4571) and P235GH steel (1.0345)
- Weight: FAR52-AAAA1A approx. 0.3 kg (0.66 lbs) to FAR52-BVL22B approx. 1.8 kg (4 lbs)



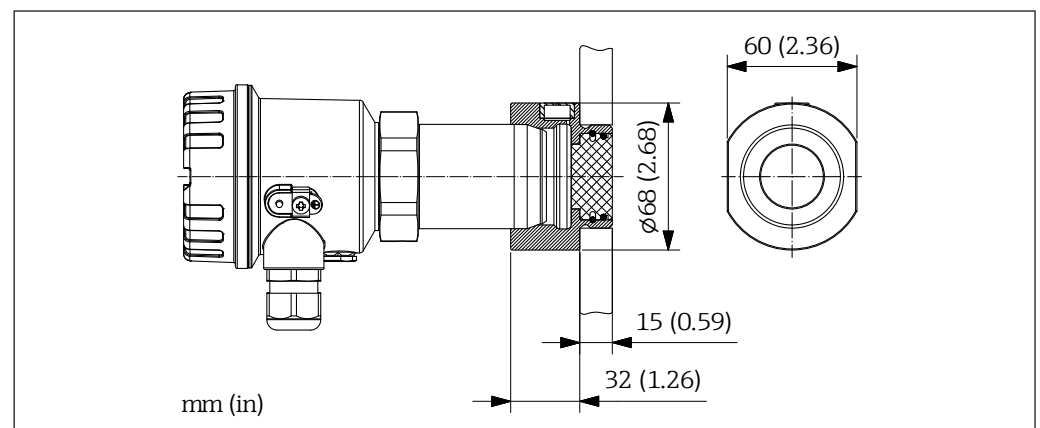
29 Dimensions of weld-in or screw-in adapter FAR52

- A Screw-in adapter
- B Weld-in adapter

High pressure adapter

For mounting of with a microwave-impermeable process wall and high process pressure up to 2 MPa (20 bar) absolute, the following high pressure adapters (→ [14](#)) can be used:

- Order No.:
 - 71381894: Process and device connecting thread G 1½ in accordance with ISO 228-1 (also suitable for R 1½ in accordance with EN 10226)
 - 71381898: Process and device connecting thread G 1½ in accordance with ISO 228-1 (also suitable for R 1½ in accordance with EN 10226), inspection certificate in accordance with EN 10204-3.1
 - 71381899: Process connecting thread G 1½ in accordance with ISO 228-1, device connecting thread 1½ NPT in accordance with ANSI/ASME
 - 71381904: Process connecting thread G 1½ in accordance with ISO 228-1, device connecting thread 1½ NPT in accordance with ANSI/ASME, inspection certificate in accordance with EN 10204-3.1
- Material: 316Ti stainless steel, PTFE window transmission
- Weight: Approx. 0.8 kg (1.76 lbs)

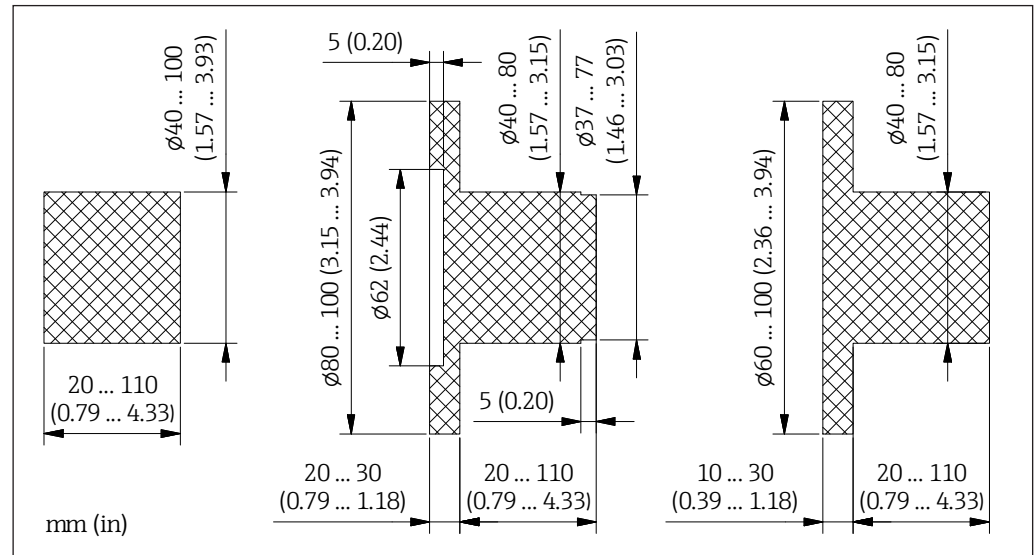


30 Dimension of the high pressure adapter

Plug

For mounting with microwave-impermeable process walls, plugs of type FAR54 can be used
(→ [TI01371F/97/EN](#)):

- Material: PTFE and aluminum oxide ceramic
- Process temperature: Max. -40 to +800 °C (-40 to +1472 °F)
- Weight: FAR54-ABCBFAAAA2 approx. 0.06 kg (0.13 lbs) to FAR54-CCBCABEBJ3 approx. 3.2 kg (7.05 lbs)

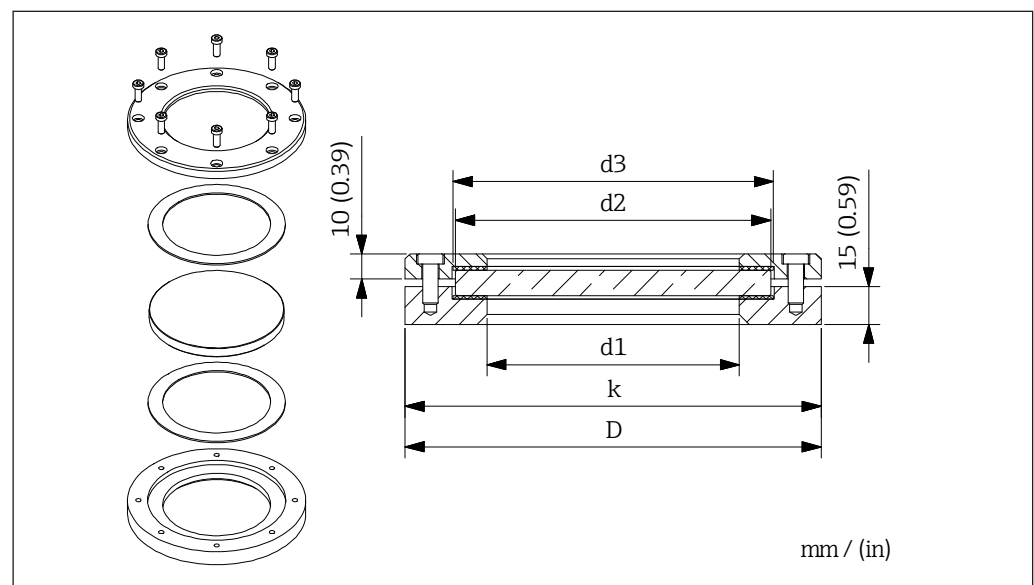


31 Dimensions of FAR54 plugs

Sight glass fitting

For mounting with microwave-impermeable process walls and unpressurized process, the following sight glass fittings can be used for welding on or in:

- Order No.:
71026443, DN50
71026444, DN80
71026445, DN100
- Material: 316Ti stainless steel, silicon seal (max. +200 °C/+392 °F)
- Weight: DN50 approx. 2.4 kg (5.29 lbs) to DN100 approx. 4.1 kg (9.04 lbs)
- The delivery includes the inspection glass fitting, incl. seals and mounting screws.

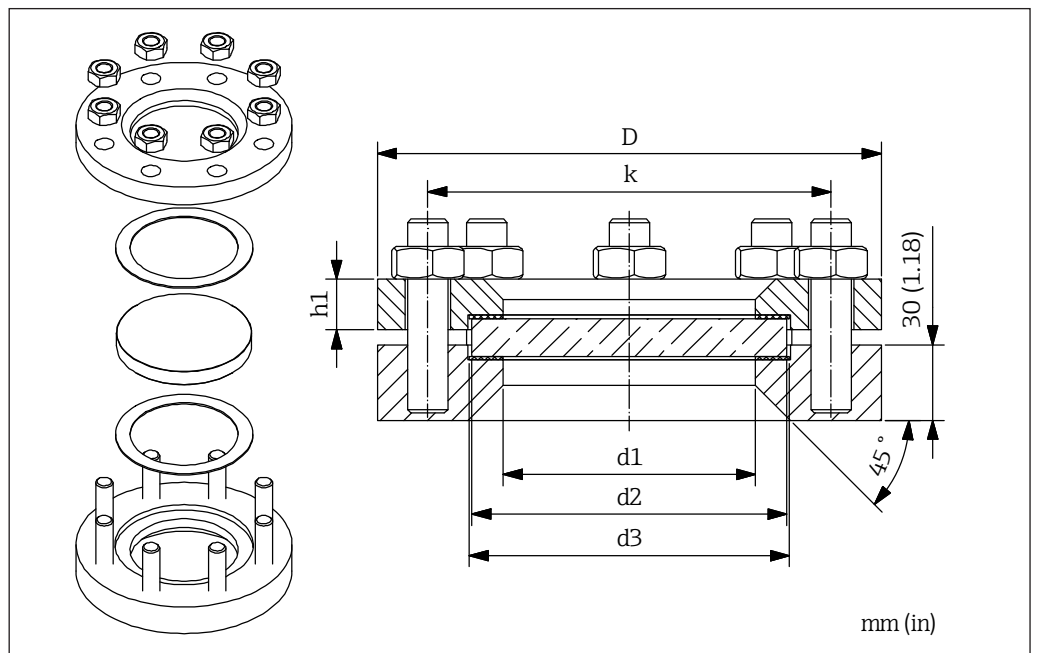


32 Dimensions of sight glass fitting for welding on/in for unpressurized processes

DN	d1 mm (in)	d2 mm (in)	d3 mm (in)	D mm (in)	k mm (in)
50	80 (3.15)	100 (3.94)	102 (4.02)	140 (5.51)	120 (4.72)
80	100 (3.94)	125 (4.92)	127 (5.00)	165 (6.50)	145 (5.71)
100	125 (4.92)	150 (5.91)	152 (5.98)	190 (7.48)	170 (6.69)

For mounting with microwave-impermeable process walls and process up to max. 1 MPa (10 bar), the following sight glass fittings can be used for welding on or in:

- Order No.:
71026446, DN50
71026447, DN80
71026448, DN100
- Material: 316Ti stainless steel, silicon seal (max. +200 °C/+392 °F)
- Weight: DN50 approx. 6.7 kg (14.77 lbs) to DN100 approx. 13.0 kg (28.66 lbs)
- The delivery includes the inspection glass fitting, incl. seals and mounting screws.

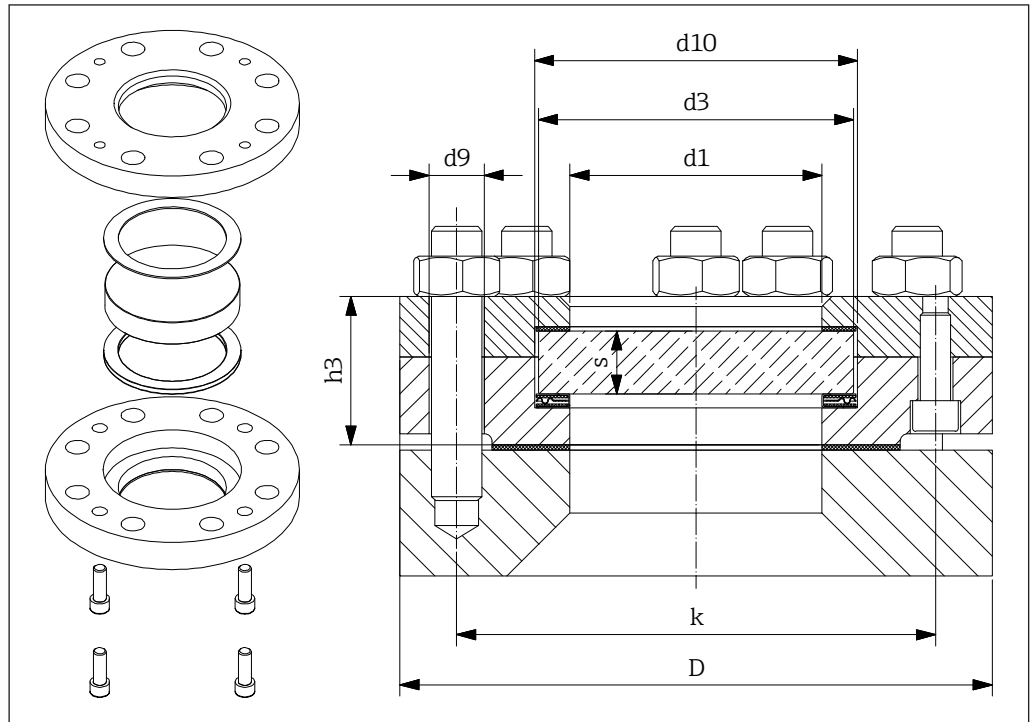


33 Dimensions of sight glass fitting for welding on/in for processes up to 1 MPa

DN	d1 mm (in)	d2 mm (in)	d3 mm (in)	D mm (in)	k mm (in)	h1 mm (in)
50	80 (3.15)	100 (3.94)	102 (4.02)	165 (6.50)	125 (4.92)	16 (0.63)
80	100 (3.94)	125 (4.92)	127 (5.00)	200 (7.87)	160 (6.30)	20 (0.79)
100	125 (4.92)	150 (5.91)	152 (5.98)	220 (8.66)	180 (7.09)	22 (0.87)

For mounting on available block flanges or counter flanges (process pressure up to max. 2.5 MPa (25 bar), the following bolt-on sight glass fittings can be used:

- Order No.:
 - 71026449, DN50
 - 71026450, DN80
 - 71026451, DN100
- Material: 316Ti stainless steel, PTFE seal and C4400 (max. +200 °C/+392 °F)
- Weight: DN50 approx. 5.4 kg (11.90 lbs) to DN100 approx. 15.9 kg (35.05 lbs)
- The delivery includes the sight glass fitting incl. seals but does not include mounting screws (type and length are dependent on the structural situation).



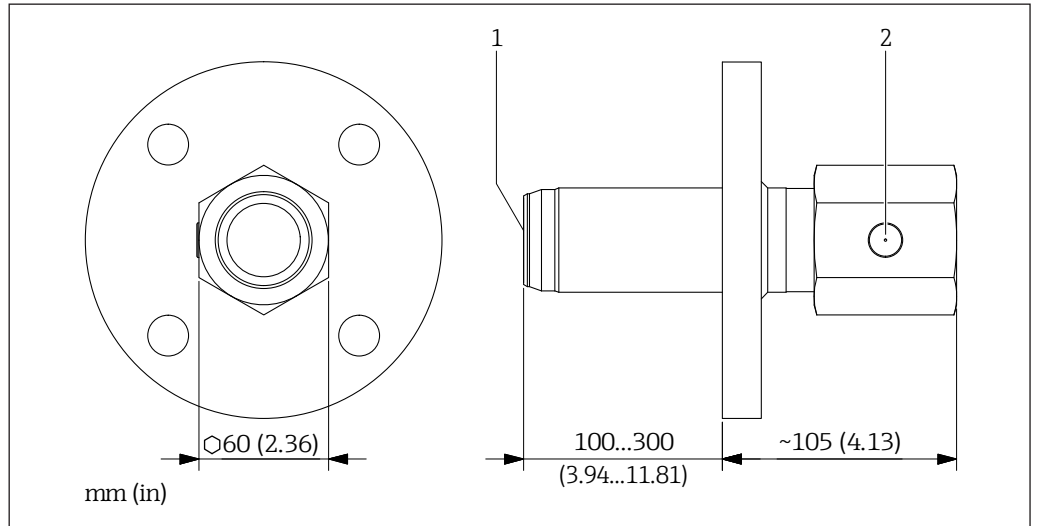
34 Dimensions of sight glass fitting for bolting on for processes up to 2.5 MPa

DN	d1 mm (in)	d2 mm (in)	s mm (in)	D mm (in)	k mm (in)	h3 mm (in)	d9 mm (in)	d10 mm (in)
50	65 (2.56)	80 (3.15)	15 (0.59)	165 (6.50)	125 (4.92)	41 (1.61)	18 (0.71)	82 (3.23)
80	80 (3.15)	100 (3.94)	20 (0.79)	200 (7.87)	160 (6.30)	50 (1.97)	18 (0.71)	102 (4.02)
100	100 (3.94)	125 (4.92)	25 (0.98)	235 (9.25)	190 (7.48)	59 (2.32)	22 (0.87)	127 (5.00)

Insertion adapter

For mounting on existing process nozzles, insertion adapters of type FAR51 can be used (→ TI01368F/97/EN):

- Process nozzle DN50 to DN100 PN16 shape A, 2 NPT to 4 NPT 150 lbs RF
- Nozzle lengths: 100 to 300 mm
- Connection thread R 1½, 1½ NPT and G 1½
- Optional with PTFE or aluminum oxide ceramic disc
- Process temperature: Max. -40 to +450 °C (-40 to +842 °F)
- Process pressure: Max. 80 to 510 kPa (0.8 to 5.1 bar) absolute
- Material: 316Ti stainless steel (1.4571)
- Weight: Approx. 5 to 10 kg (11 to 22 lbs)



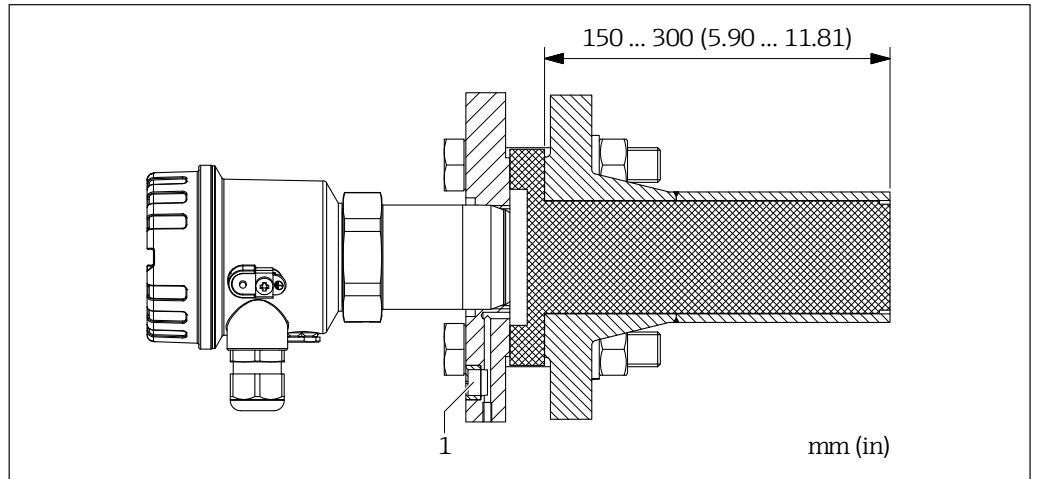
35 Dimensions of plug-in adapters

- 1 Sealed disc, optional
- 2 Venting element

Weld-in nozzles

For nozzle mounting, weld-in nozzles of type FAR50 can be used (→ TI01362F/97/EN):

- Process nozzle DN50 to DN100 PN16 shape A, 2 NPT to 4 NPT 150 lbs RF
- Nozzle lengths: 150 to 300 mm
- Connection thread R 1½, 1½ NPT and G 1½
- With optional PTFE disc
- Process temperature: Max. -40 to +200 °C (-40 to +392 °F)
- Material: 316Ti stainless steel (1.4571)
- Weight: Approx. 6 to 28 kg (13 to 62 lbs)



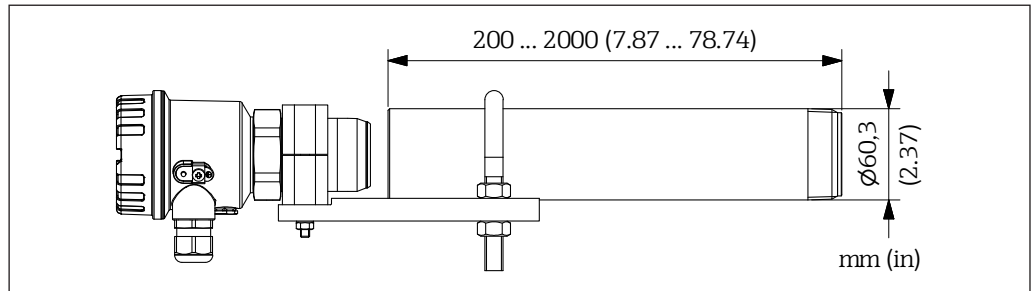
36 Dimensions of weld-in nozzles

- 1 Venting element

Spacer tube (wave guide)

For mounting in open processes or processes with an internal lining, such as clay, spacer tubes of type FAR53 can be used (→ TI01370F/97/EN):

- Process connection: With or without thread R 2, 2 NPT and G 2
- Pipe lengths: 200 to 2000 mm
- With optional aluminum oxide ceramic disc
- Process temperature: Max. -40 to +450 °C (-40 to +842 °F)
- Material: 316Ti stainless steel (1.4571) or P235GH steel (1.0345)
- Weight: 200 mm approx. 5.3 kg (11.7 lbs) to 2000 mm approx. 22.2 kg (48.9 lbs)

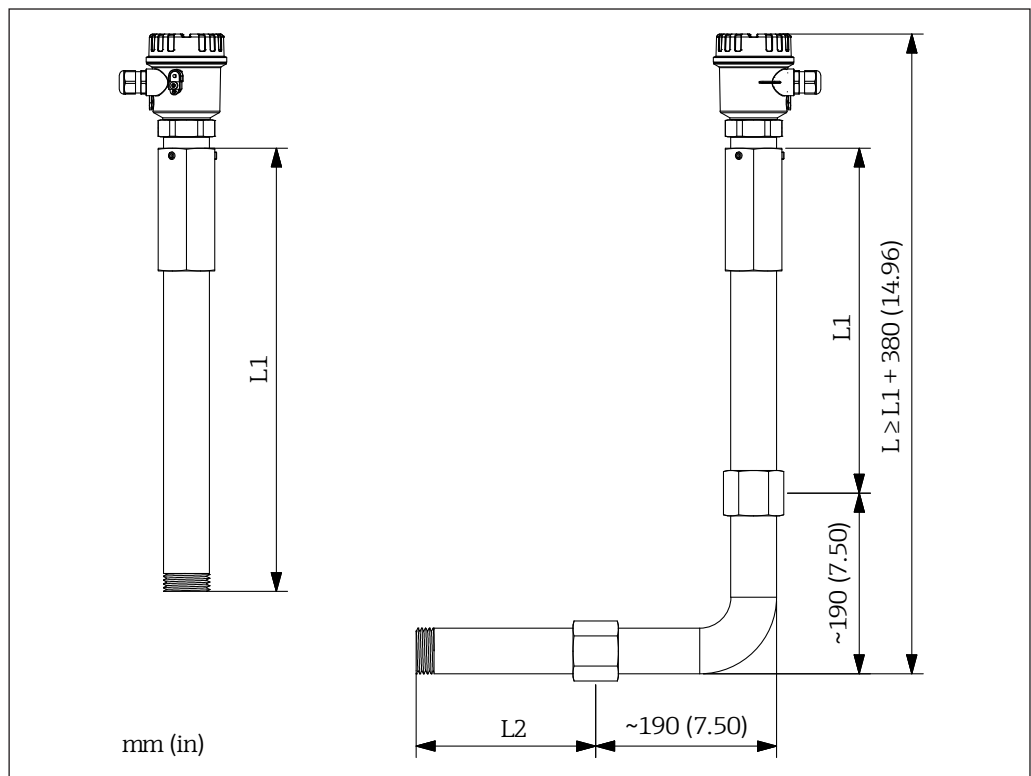


37 Dimensions of spacer tube (wave guide)

Wave guide

For mounting in structurally restricted installation positions, wave guides of type FAR55 can be used (→ TI01372F/97/EN).

- Process connection: With or without thread R 1½ and 1½ NPT
- Lengths: L1 = 200 to 1500 mm, L2 = 200 to 2000 mm
- Process temperature: Max. -40 to +450 °C (-40 to +842 °F)
- Device connection: Receptacle, suitable for thread R 1½, 1½ NPT and G 1½
- Material: 316Ti stainless steel (1.4571)
- Weight: FAR55-AAAACGAA2* approx. 2.0 kg (4.41 lbs) to FAR55-BAAADGDL2* approx. 17.8 kg (39.24 lbs)



38 Dimensions of wave guide

High temperature adapter with length extensions

For mounting with connection thread in processes with temperatures up to max. +450 °C (+842 °F), the following high temperature adapters (SW55) and length extensions can be used (→ 32):

- Order No. (high temperature adapter with flush-mounted ceramic disc and pressure equalization element):

71113441, thread R 1½/Rp 1½ (also suitable for devices with thread ISO 228 G 1½)

71478114, thread R 1½/Rp 1½ (also suitable for devices with thread ISO 228 G 1½), inspection certificate in accordance with EN 10204-3.1

71113449, thread 1½ NPT

71478115, thread 1½ NPT, inspection certificate in accordance with EN 10204-3.1

- Order No. (extension):

71113450, thread R 1½/Rp 1½, L = 225 mm (also suitable for devices with thread ISO 228 G 1½)

71113451, thread R 1½/Rp 1½, L = 325 mm (also suitable for devices with thread ISO 228 G 1½)

71113452, thread R 1½/Rp 1½, L = 525 mm (also suitable for devices with thread ISO 228 G 1½)

71113453, thread 1½ NPT, L = 225 mm

71113454, thread 1½ NPT, L = 325 mm

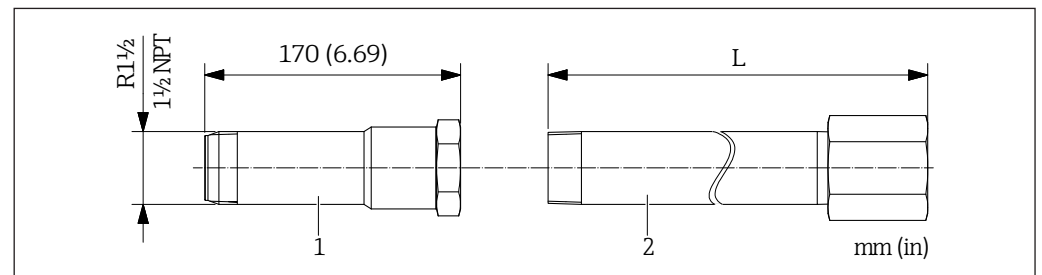
71113455, thread 1½ NPT, L = 525 mm

- Material: 316Ti stainless steel (1.4571)

- Weight:

- High temperature adapter approx. 1.4 kg (3.09 lbs)

- Extension 225 mm approx. 1.1 kg (2.43 lbs) to 525 mm approx. 2.2 kg (4.85 lbs)



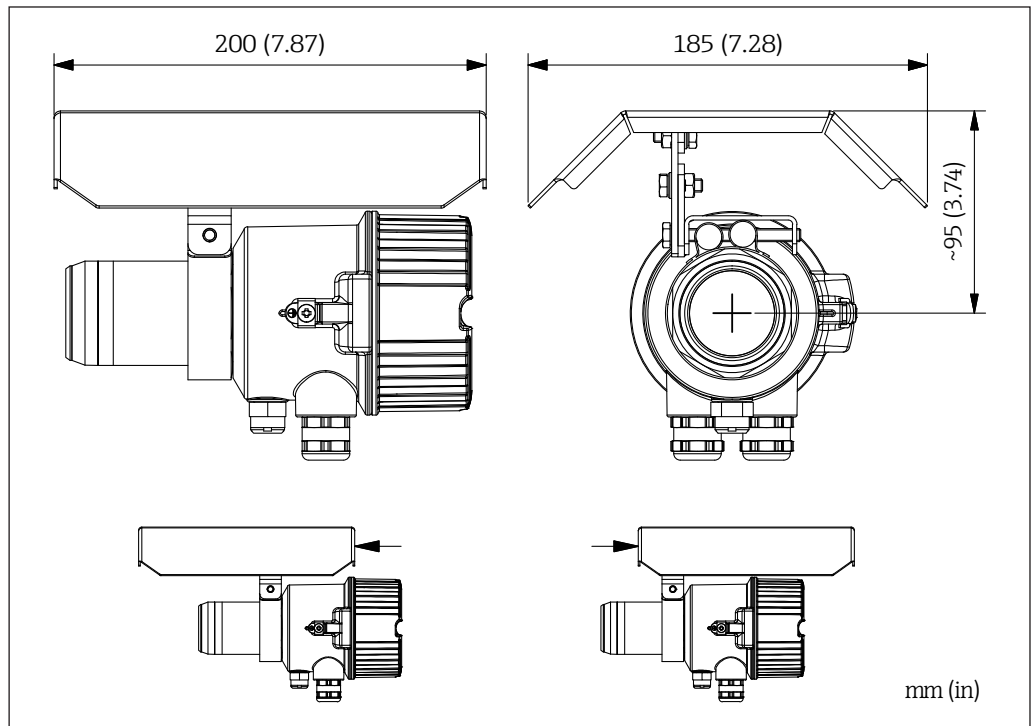
39 Dimensions of high temperature adapter and extensions

- 1 High temperature adapter
- 2 Length extension

Weather protective cover

For outdoor installation in strong sunlight, the following weather protection cover can be used:

- Order No.: 71454446
- Material: Stainless steel 316L (1.4404)
- Weight: approx. 0.8 kg (1.76 lbs)



40 Dimensions weather protective cover

Supplementary documentation



For an overview of the scope of the associated technical documentation, see the W@M Device Viewer: enter serial number from nameplate (www.endress.com/deviceviewer)

Standard documentation

Operating instructions for Solimotion FTR20
Documentation code: BA01136F/97/EN

Supplementary device- dependent documentation

Safety instructions ATEX
Documentation code: XA00524F/97/A3

Safety instructions CSA
Documentation code: XA01245F/97/EN

Safety instructions IECEX
Documentation code: XA00544F/97/EN

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