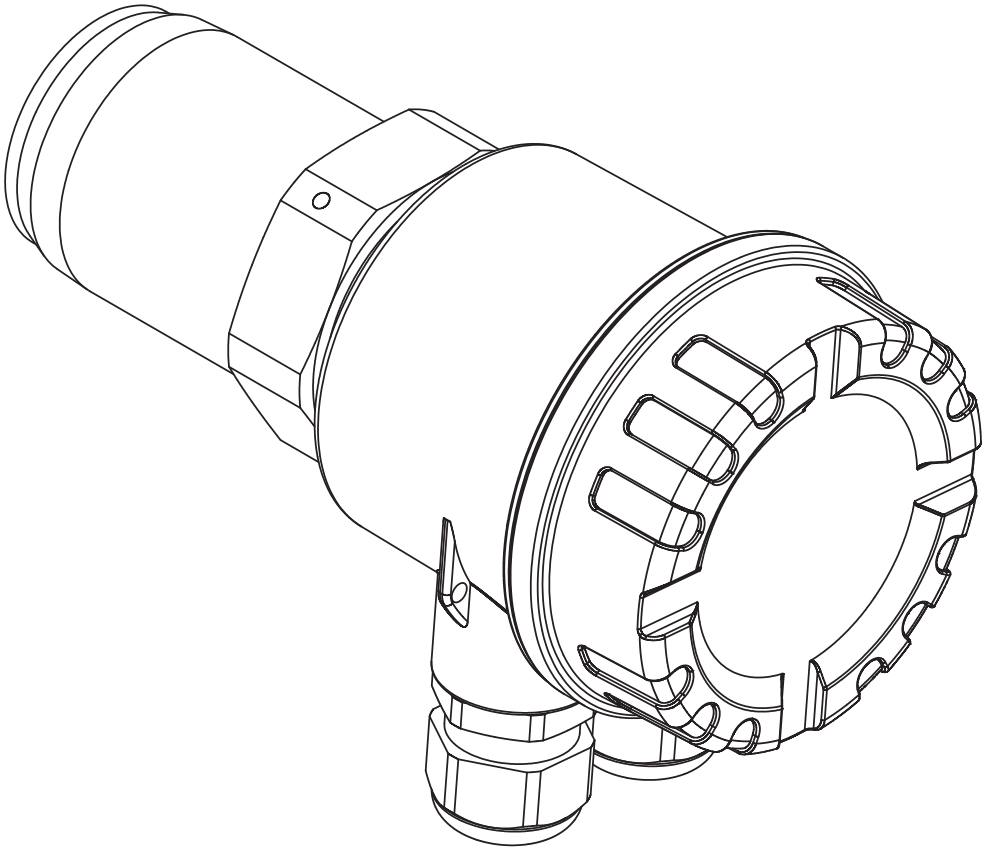
Operating Instructions
Solimotion FTR20

Flow indicator for bulk solids



Endress+Hauser

People for Process Automation

Table of contents

1 Information on the document

1.1 Document function

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

1.2 Symbols used

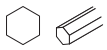
1.2.1 Warning symbols

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

1.2.2 Electrical symbols

Symbol	Meaning
⎓	Direct current A terminal at which there is DC voltage or through which direct current flows.
~	Alternating current A terminal at which there is (sinusoidal) alternating voltage or through which alternating current flows.
⏚	Protective earth connection A terminal which has to be grounded before other connections can be established.

1.2.3 Tool symbols

Symbol	Meaning
	Flat blade screwdriver
	Phillips head screwdriver
	Allen key
	Hexagon wrench

1.2.4 Symbols for information types

Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation Refers to the corresponding device documentation.
	Reference to page Refers to the corresponding page number.
	Reference to graphic Refers to the corresponding graphic number and page number.
1., 2., 3. ...	Series of steps
1, 2, 3 ...	Position numbers
	Hazardous area Indicates a hazardous area.
	Safe area (non-hazardous area) Indicates a non-hazardous area.

1.3 Documentation

1.3.1 Additional standard documentation on the device

Document	Purpose and content of the document
Technical Information TI00447F	**Planning aid for your device** The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

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

1.3.2 Safety instructions (XA)

Depending on the approval, safety instructions (XA) are included with the device; these are an integral part of the Operating Instructions.

Feature 010	Approval	Safety instructions
BA	ATEX II 1/2D Ex ta/tb IIIC T102°C Da/Db IP66 ATEX II 2D Ex tb IIIC T102°C Db IP66	XA00524F
IA	IECEx Ex ta/tb IIIC T102°C Da/Db IP66 IECEx Ex tb IIIC T102°C Db IP66	XA00544F

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Trained, qualified specialists must have a relevant qualification for this specific function and task
- Are authorized by the plant owner/operator
- Familiar with federal/national regulations
- Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- Following instructions and basic conditions

The operating personnel must fulfill the following requirements:
- Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- Following the instructions in these Operating Instructions

2.2 Intended use

Application and fluids
The device described in these Instructions is intended only for movement detection of bulk products and the detection of changes of a mass flow. Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing fluids.

Observing the limit values specified in the "Technical data" and listed in the Operating Instructions and supplementary documentation, the measuring device may be used for the following measurements only:
- Detected process variable: movement
- Calculable process variable: change of mass flow rate

To ensure that the device remains in proper condition for the operation time:
- Use the device only for fluids against which the process-wetted materials are adequately resistant.
- Observe the limit values in "Technical data".

Incorrect use
The manufacturer is not liable for damage caused by improper or non-designated use.

Verification for borderline cases:
- For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability.

Possible burn hazard from touching surfaces!
- For elevated fluid temperature, ensure protection against contact to prevent burns.

2.3 Workplace safety

For work on and with the device:
- Wear the required personal protective equipment according to federal/national regulations.

2.4 Operational safety

Risk of injury
- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for interference-free operation of the device.

Conversions to the device
Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.
- If, despite this, modifications are required, consult with Endress+Hauser.

Repair
To ensure continued operational safety and reliability,
- Carry out repairs on the device only if they are expressly permitted.
- Observe federal/national regulations pertaining to repair of an electrical device.
- Use original spare parts and accessories from Endress+Hauser only.

Hazardous area
To eliminate any danger for persons or for the facility when the device is used in the hazardous area (such as explosion protection, pressure vessel safety):
- Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area.
- Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

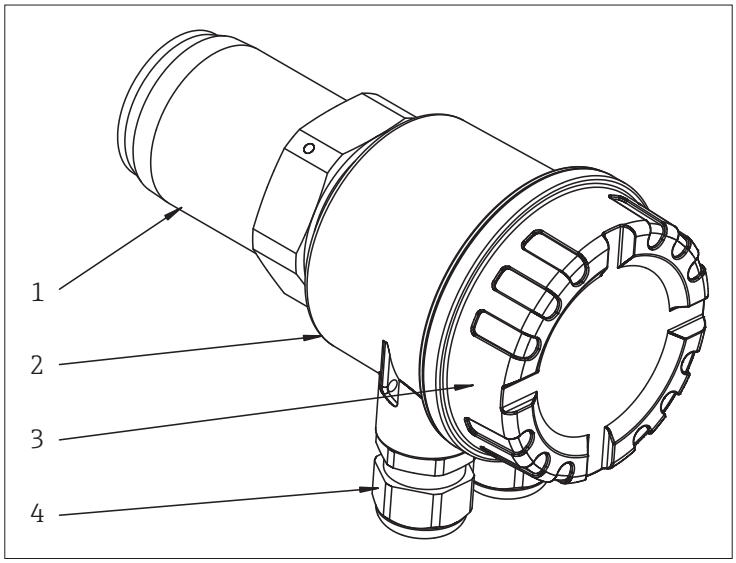
2.5 Product safety

This measuring device is designed to meet state-of-the-art safety requirements and good engineering practice, has been tested and left the factory in a condition in which it is safe to operate.

It fulfills general safety requirements and legal requirements. It also conforms to the EC directives listed in the device-specific EC declaration of conformity. Endress+Hauser confirms this fact by applying the CE mark.

3 Product description

3.1 Product structure

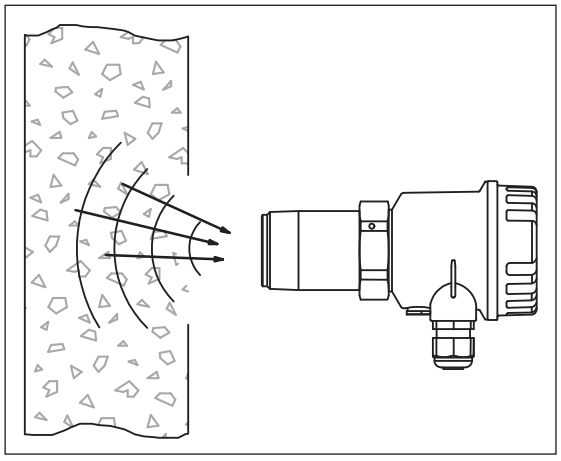


1 Process connection (threaded connection)
2 Electronics housing
3 Electronics housing cover
4 Cable glands

3.2 Functional principle

The Solimotion FTR20 flow indicator for bulk solids works using microwave technology and detects the movement of bulk solids and changes in the mass flow of a solid flow.

The device transmits a signal that is reflected by the moving bulk solids. In doing so, the FTR20 measures the strength of the reflected, frequency-shifted energy (Doppler effect) and uses it to form a display value or output signal.



The range of the FTR20 (maximum of 20 m) is influenced by various materials, with the attenuation depending on the reflection characteristics of the bulk solids.

4 Incoming acceptance and product identification

4.1 Incoming acceptance

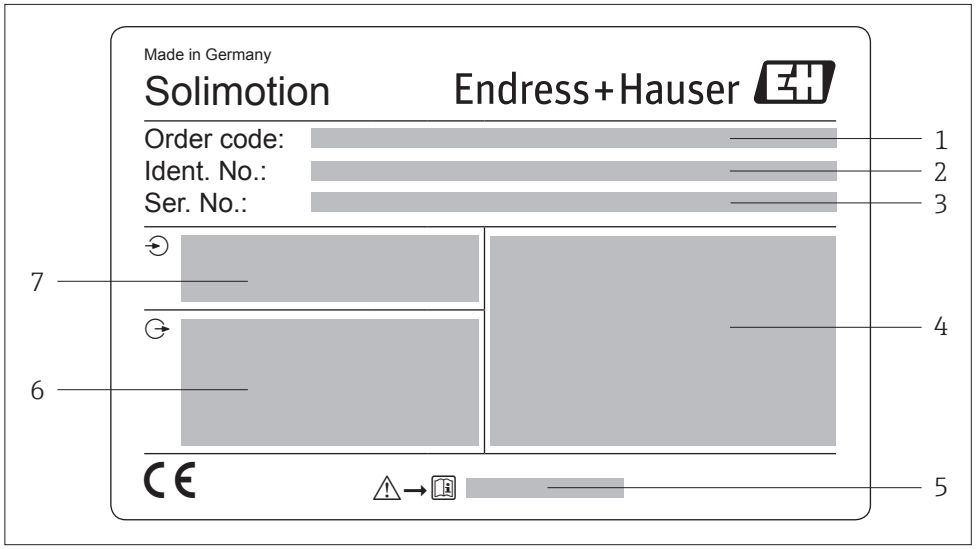
- Check whether the package or contents are damaged.
- Check that the goods supplied are complete and compare the scope of delivery with your order details.

4.2 Product identification

The following options are available for identification of the measuring device:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in W@M Device Viewer (www.endress.com/deviceviewer): All information about the measuring device is displayed.

4.2.1 Identifying the device via the nameplate

The nameplate is attached to the electronics housing (following example: F16 housing).



1 *Order code (reduced for reordering)*
For the meaning of the individual letters and digits, refer to the information in the order confirmations.
2 *Identification code*
3 *Serial number (for unique identification)*
4 *Operating temperature range, degree of protection, text for approval (optional)*
5 *Corresponding Operating Instructions*
6 *Output signal*
7 *Supply voltage*

4.2.2 Identifying the device via the order code

10	**Approval:**	
	AA	Non-hazardous area
	BA	ATEX II 1/2D Ex ta/tb IIIC T102°C Da/Db IP66
		ATEX II 2D Ex tb IIIC T102°C Db IP66
	IA	IECEx Ex ta/tb IIIC T102°C Da/Db IP66
		IECEx Ex tb IIIC T102°C Db IP66
	99	Special version, to be specified

20	**Output:**	
	1	Relay SPDT
	2	Analog 4 - 20 mA
	3	Solid-state relay
	9	Special version, to be specified

30	**Power supply:**	
	A	85 - 253 VAC, 50/60 Hz
	E	20 - 60 VDC
		20 - 30 VAC, 50/60 Hz
	Y	Special version, to be specified

40	**Housing:**	
	A	F16 polyester, IP66
	B	F15 sanitary stainless steel, IP66
	C	F15 sanitary stainless steel, IP66 + sight glass
	Y	Special version, to be specified

50	**Electrical connection:**	
	A	Gland M20 (EEx d > thread M20)
	D	Thread ½ NPT
	Y	Special version, to be specified

60	**Process connection:**	
	XFA	Thread EN 10226 R 1½, Alu
	VEA	Thread ANSI 1½ NPT, Alu
	XF2	Thread EN 10226 R 1½, 316Ti
	VE2	Thread ANSI 1½ NPT, 316Ti
	YYY	Special version, to be specified

70	**Window transmission:**	
	1	PTFE
	2	Ceramic
	9	Special version, to be specified

FTR20 -		(Complete order code)

The overview of the order structure does not mark options which are mutually exclusive.

4.3 Transportation and storage

4.3.1 Storage

The device must be stored in a dry, clean area and protected against damage from impact (EN 837-2). Always store the device with the housing cover closed and the cable glands sealed off (to protect from dust).

Storage temperature range:
−40°C to +80°C (−40°F to +176°F)

4.3.2 Transport to the measuring point

Transport the device to the measuring point in the original packaging.

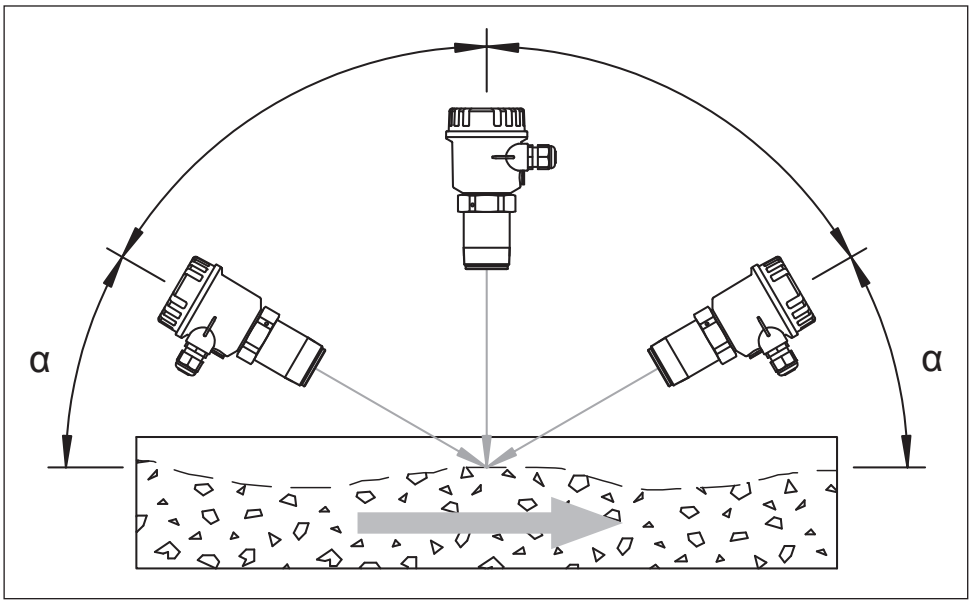
5 Installation

5.1 Mounting requirements

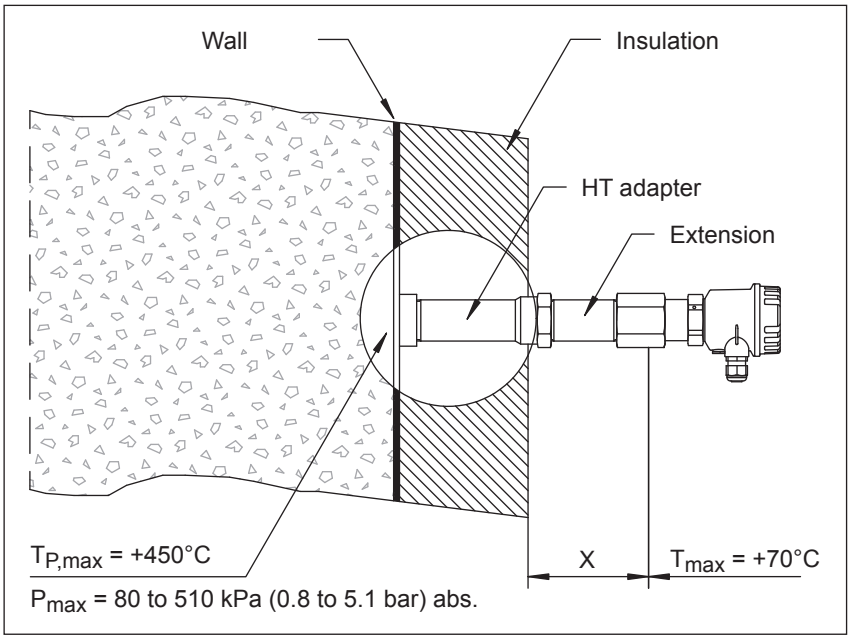
The Solimotion FTR20 flow indicator for bulk solids comes with a standard thread (R 1½ as per EN 10226 or 1½ NPT as per ANSI/ASME B1.20.1) as a process connection. This enables easy installation in existing container couplings or nozzles.

For optimal orientation after installation in the process, the electronics housing can be rotated as desired (by 360°).

Any orientation is possible for the FTR20 flow indicator for bulk solids. However, a small angle **α** may increase the signal quality.



For applications with process temperatures up to +450°C, the temperature reduction to max. +70°C takes place on the FTR20 using an appropriate high-temperature adapter (with extension where necessary, → 🖹49). The length of the adapter is based on the insulation thickness to be penetrated (if present) and the ambient conditions at the measuring point.

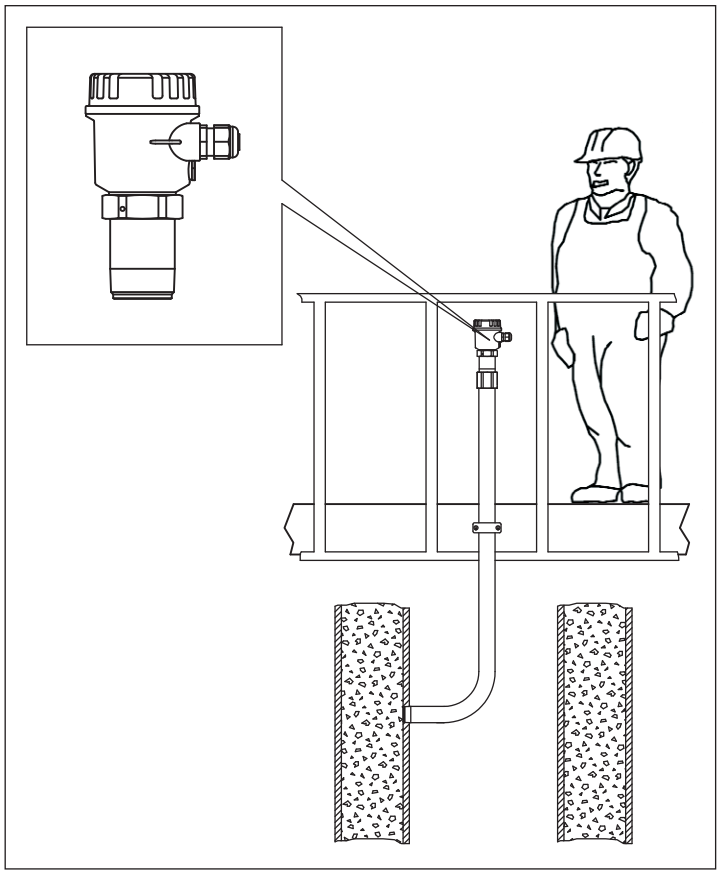


NOTICE

- To maintain the maximum temperature of +70°C at the FTR20, we recommend a minimum difference (X) of 200 mm between the process or the insulation and the device.
- The individual extensions can also be combined in any way desired.
- Each high-temperature adapter results in a reduction of the range.

A pipe (including a bent pipe) made of any metallic material can be used as a waveguide to separate the instrument from the process (for example, in unfavorable conditions from heavy contamination or excessive temperatures).

Edges inside the pipe (for example at transitions) can cause signal attenuation and thus should be avoided wherever possible.



NOTICE

The pipe length is irrelevant due to the waveguide effect.

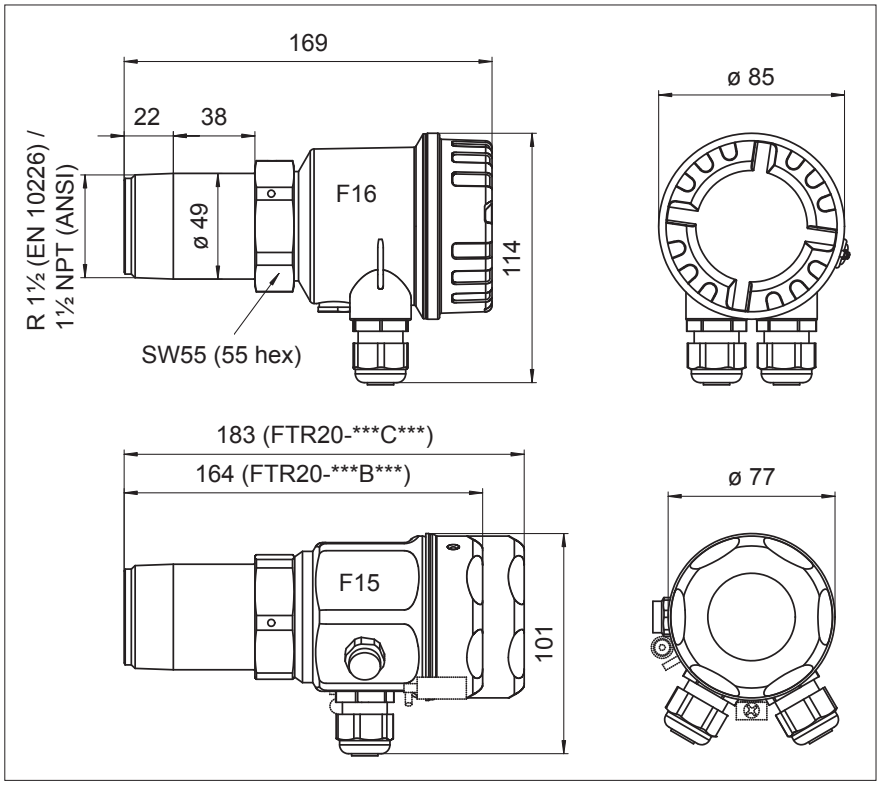
5.1.1 Additional conditions

- Additional window made of microwave-permeable glass (borosilicate glass) or plastic (for example, PTFE or PVC) are possible.
- Please observe that, when using/installing optional sight glass fittings, no material collects in front of the glass.

NOTICE

For details about the optionally available accessories, refer to the corresponding section in these Operating Instructions.

5.2 Installation dimensions

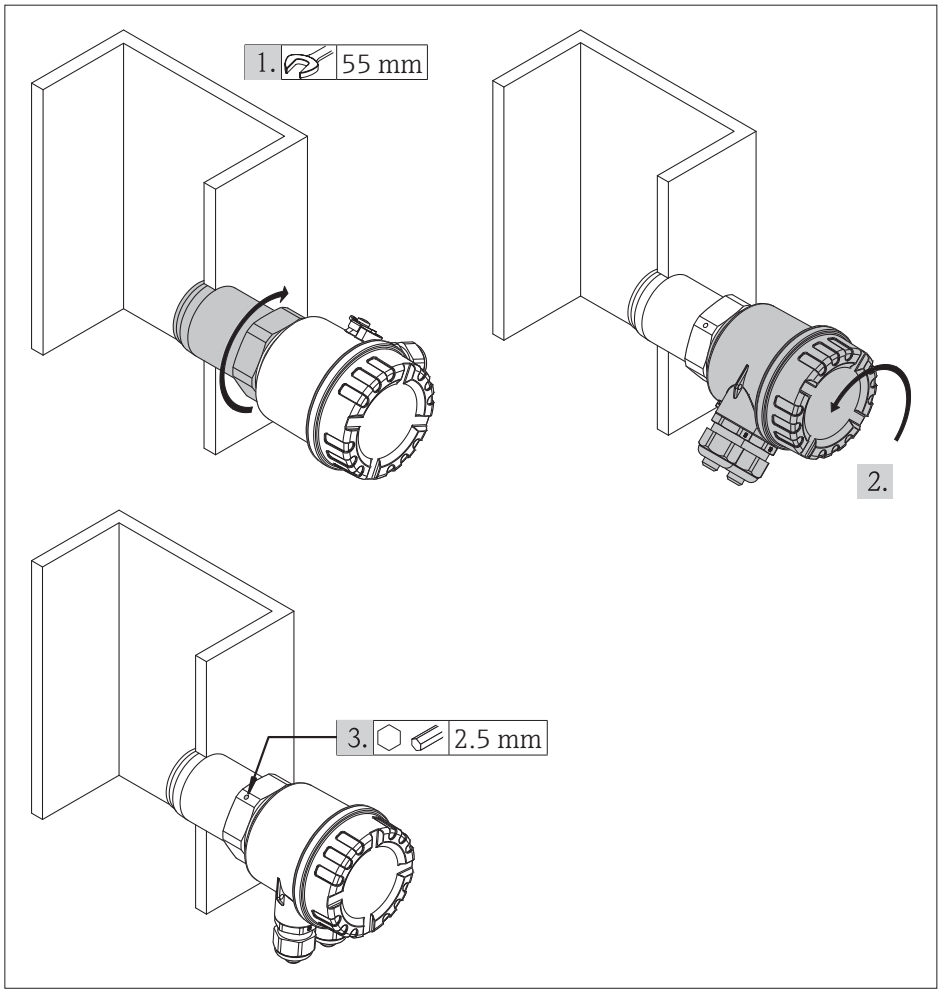


5.3 Mounting the Solimotion FTR20

The Solimotion FTR20 flow indicator for bulk solids comes with a standard thread (R 1½ as per EN 10226 or 1½ NPT as per ANSI/ASME B1.20.1) 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°).

Following installation, the housing must be secured using the Allen head screw.



1. *Screw in the FTR20 tightly*
2. *Orient the electronics housing as desired (can be rotated by 360°)*
3. *Fasten the electronics housing*

5.4 Post-mounting check

☐	Is the device undamaged (visual inspection)?
☐	Does the device conform to the measuring point specifications? For example: ▪ Process temperature ▪ Process pressure ▪ Ambient temperature ▪ Measuring range
☐	Are the measuring point identification and labeling correct (visual inspection)?
☐	Is the device adequately protected from precipitation and direct sunlight?
☐	Are the securing screw and securing clamp tightened securely?

6 Electrical connection

6.1 Connection requirements

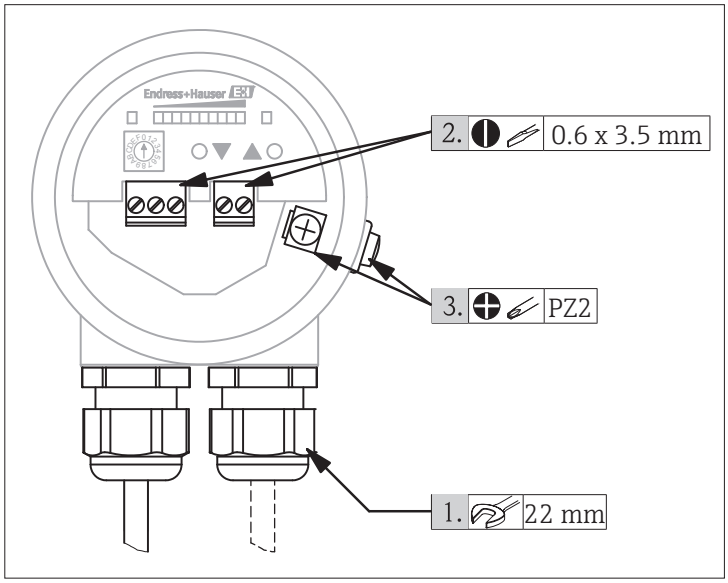
Please note the following points before connecting up the device:
- The voltage supply must match the voltage specified on the nameplate.
- Switch off the supply voltage before connecting the device.
- Connect a potential matching line to the terminal to be used on the Solimotion before connecting the device to the power supply.
- When using the device in explosion hazard zones, the corresponding national standards and specifications must be observed.
- When connecting to the public power supply, a power switch for the device must be installed within easy reach of the device. The switch is to be identified as a disconnecting device for the device (EN/IEC 61010).
- The cable glands are permitted for connecting fixed cables and lines only. The operator must ensure adequate strain relief.
- The device is to be attached so that the cable gland is protected from mechanical damage (degree of mechanical hazard “low” – impact energy: 4 joules).
- Unused guide openings must be sealed off using sealing plugs, the plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.
- The maximum thermal load of the introduced cables and lines must be observed.
- Endress+Hauser recommends commercially available installation wires with a maximum connection cross-section of 1.5 mm².

⚠ WARNING

In addition, always observe the safety instructions on this provided in Chapter 2 of these Operating Instructions and, where applicable, the corresponding XA!

6.2 Connecting the Solimotion

6.2.1 Wiring of F16 housing (plastic)



1. *Screw the cap nut tight until the rubber seal is touching the cable (clamping area 5 to 10 mm as per EN 50262 or 7 to 10 mm as per UL-514 B) on all sides, tighten cap nut with by ½ turn*
2. *Connect the power supply and signal output (0.14 to 1.5 mm², min. 0.5 Nm)*
3. *Connect the protective ground (max. 4 mm²)*

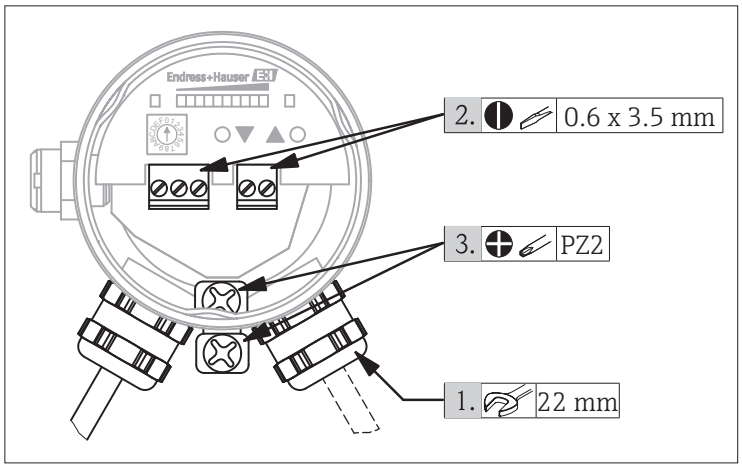
NOTICE

For optimum electromagnetic compatibility, the potential matching line should be as short as possible. The recommended minimum cable cross-section is 2.5 mm².

⚠ WARNING

The Solimotion's potential matching should be included in the local potential matching.

6.2.2 Wiring of F15 housing (stainless steel)



1. *Screw the cap nut tight until the rubber seal is touching the cable on all sides, tighten cap nut by ½ turn*
   Clamping areas:
   - FTR20 without certification: 5 to 10 mm as per EN 50262 or 7 to 10 mm as per UL-514 B
   - FTR20 with certification: 7 to 10.5 mm (tightening torque max. 10 Nm)
2. *Connect the power supply and signal output (0.14 to 1.5 mm², min. 0.5 Nm)*
3. *Connect the protective ground (max. 4 mm²)*

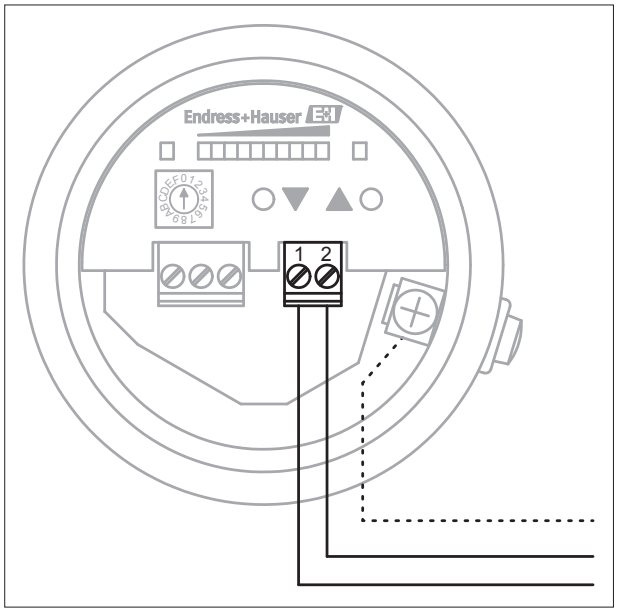
NOTICE

For optimum electromagnetic compatibility, the potential matching line should be as short as possible. The recommended minimum cable cross-section is 2.5 mm².

⚠ WARNING

The Solimotion's potential matching should be included in the local potential matching.

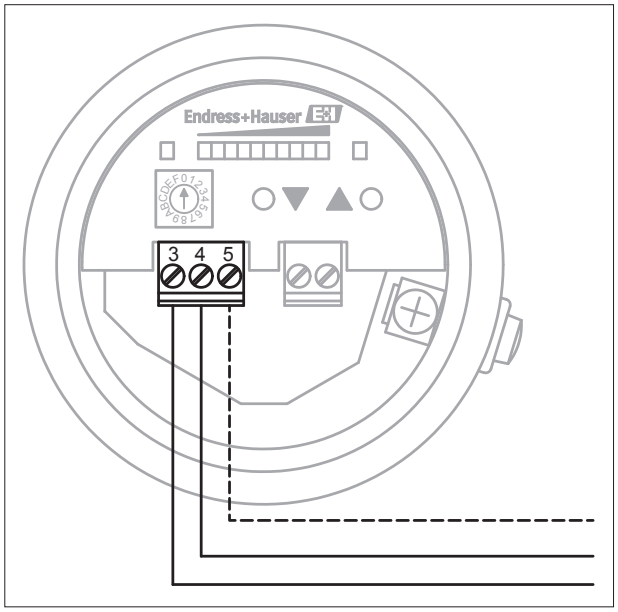
6.2.2 Power supply connection



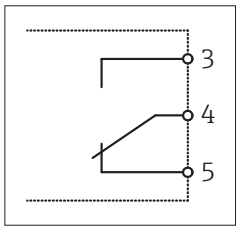
Depending on the device version selected (see product identification), a power supply with the following values can be connected to the Solimotion:
- 85 - 253 V (AC), 50/60 Hz, max. 4 VA
- 20 - 60 V (DC) or 20 - 30 V (AC) 50/60 Hz, max. 1.5 W

NOTICE
The polarity of the supply voltage can be set as required.

6.2.3 Signal output connection



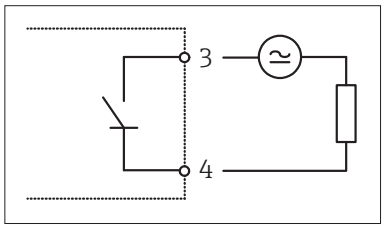
6.2.3.1 Relay



The following characteristic data apply for the relay signal output (floating switchover contact):
- Switching capacity:
  - AC: 250 V / 6 A
  - DC: 125 V / 0.4 A or 30 V / 5 A
- Contact material: AgCdO (gold-flashed)
- Switching frequency: max. 2 Hz

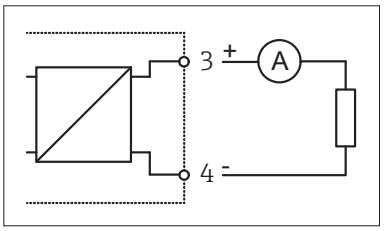
NOTICE
- The contact material is also suitable for switching small-signal circuits. However, this is possible only if no inductive loads or higher currents have been switched previously.
- For a high switching frequency, please use the solid-state relay.

6.2.3.2 Solid-state relay



The following characteristic data apply for the solid-state relay signal output (switching contact of a semiconductor relay):
- Switching capacity:
  - AC: 30 V / 0.4 A
  - DC: 40 V / 0.4 A
- Switching frequency: max. 2 Hz

6.2.3.3 Current output



The following characteristic data apply for the current output:
- 4-20 mA, active
- Max. load: 600 Ω

6.3 Post-connection check

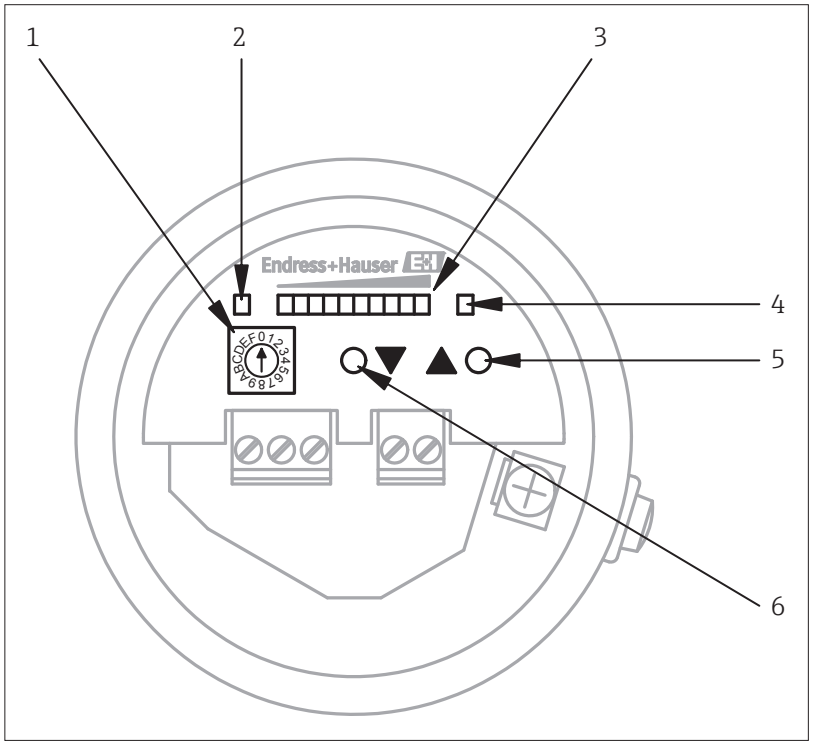
☐	Are the device and the connecting cable(s) undamaged (visual inspection)?
☐	Do the cables used comply with the requirements?
☐	Do the mounted cables have adequate strain relief?
☐	Are all cable glands installed, firmly tightened and correctly sealed?
☐	Does the supply voltage match the specifications on the nameplate?
☐	Is the terminal assignment correct (→ 🖹18)?
☐	If power supply is switched on: Is the device operational (at least one LED illuminated)?
☐	Is the housing cover installed and firmly tightened?
☐	For Ex version only: Is the lid safeguard installed correctly?

7 Operation options

7.1 Overview

The Solimotion is configured using a function selection switch (encoding switch) and two operating buttons (adjustment to the sensitivity needed for clear and unambiguous material flow detection of the products). The parameter configuration is stored internally and is retained even after the supply voltage is disconnected.

No other operator intervention is necessary during operation.



1 *Function selection switch*
2 *Ready LED (green)*
3 *Display*
- *Signal strength in normal mode*
- *Function number and function value in configuration mode*

4 *Switch output LED (yellow), relay and solid-state relay*
5 *Operating button for decrease or toggle*
6 *Operating button for increase or toggle*

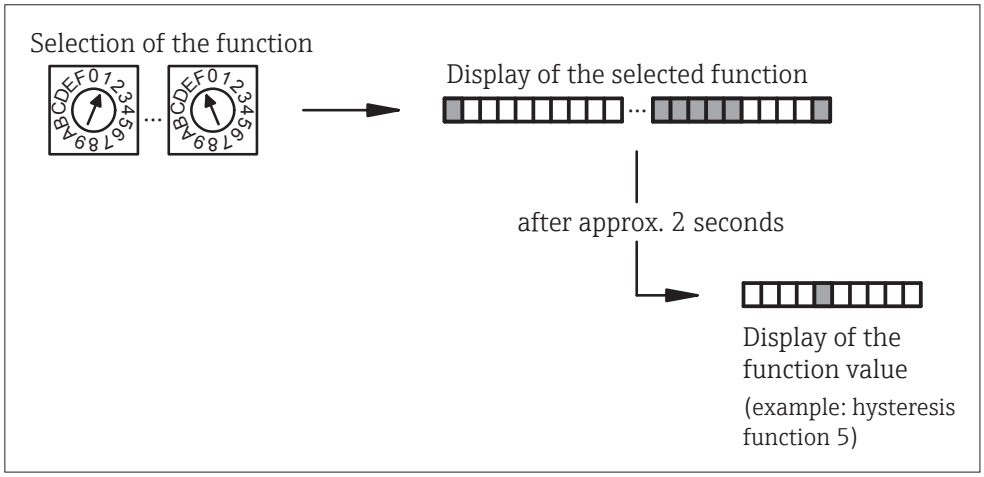
NOTICE

- The device is in operating mode in position 0 of the encoding switch only. All other positions are for parameter configuration. The FTR20 flow indicator for bulk solids continues to work in the background, changed settings are taken into account directly.
- Remember to reset the encoding switch to the initial position (0 = operation) when you have finished configuring settings.

7.1.1 Device-specific symbols

Symbol	Meaning
	LED on Indicates an illuminated LED
	LED off Indicates a non-illuminated LED
	Configuration mode Indicates the function number or value
	Normal operation Indicates only the signal strength of the bulk solids movement
	Key (+) Indicates the key for increasing a function value
	Key (-) Indicates the key for reducing a function value
	Solid flow minimum Indicates a minimum or absent solid flow
	Solid flow maximum Indicates a maximum solid flow

7.2 Structure and function of the control



Parameters are configured as follows:

1. Select any function (overview →📄39)
   → Encoding switch 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 for moving bulk solids)
   → You can use the two operating buttons ▲ and ▼ to increase or decrease the sensitivity in 10% increments.

   → ▲ → ▲ ... or → ▼ → ▼ ...
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 parameter configuration function and changed if necessary.
4. Once parameter configuration is complete (i.e. once the flow indicator has been adapted to the bulk solids in question), the encoding switch must be returned to the “0” position. The Solimotion FTR20 is now ready for operation.

8 Commissioning

8.1 Installation and function check

Make sure that the post-installation and post-connection check has been carried out before you commission your measuring point:

- "Post-mounting check" checklist (→ 15)
- "Post-connection check" checklist (→ 20)

NOTICE

You can write down all configurable settings of the following chapters in a table for documentation purposes (→ 50).

8.2 Calibrating the Solimotion

The Solimotion FTR20 can be calibrated under the following conditions:

Calibration in the process for moving bulk solids

- Automatic calibration for moving bulk solids (Function 1, → 25), sufficient for most applications
- Additional calibration functions (required for specific applications only):
  - Manual calibration for moving bulk solids (Function 3, → 25), ideally after the automatic calibration
  - Configuring detection range and gain (Function B and C, → 27), fine adjustment ideally after an automatic and/or manual calibration

Calibration in the process for unmoving bulk solids

- Automatic calibration for unmoving bulk solids (Function 2, → 26), sufficient for most applications
- Additional calibration functions (required for specific applications only):
  - Manual calibration for unmoving bulk solids (Function 4, → 26), ideally after the automatic calibration
  - Configuring detection range and gain (Function B and C, → 27), fine adjustment ideally after an automatic and/or manual calibration

Calibration outside the process

- Configure the detection range and gain (Function B and C, → 27)

In addition, the following additional settings are available for optimal adaptation of the Solimotion to the process:

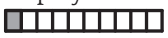
- Hysteresis (Function 5): Setting a switching delay (for signal output relay and solid-state relay only, → 34)
- Limit signal function (Function 6): Setting the switching behavior (for signal output relay and solid-state relay only, → 35)
- Switching delay (Function 7 and 8): Setting a switch-on and/or switch-off delay (for signal output relay and solid-state relay only, → 36)
- Damping (Function A): Averaging the detected signal strength (→ 37)

8.2.1 Calibration with movement of bulk solids

Automatic calibration with movement of bulk solids (Function 1)

The automatic calibration is adequate for most applications. If the bulk solids movement after an automatic calibration is not displayed as desired, you can adjust the Solimotion to the application manually using an additional manual calibration.

1. Set encoding switch to Position 1
   → Display of the function number

   After 2 seconds: Display of the current signal strength, example:

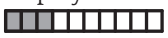
   
2. Simultaneously press the ▲ and ▼ keys on the device with maximum solid flow
   → Automatic calibration is carried out
   → Display of the signal strength with maximum solid flow

   
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

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

Using the manual calibration, which is ideally carried out after the automatic calibration, the Solimotion can be adapted to the application manually if necessary.

1. Move the encoding switch to position 3
   → Display of the function number

   After 2 seconds: Display of the current signal strength, example:

   
2. Press the ▲ or ▼ key on the device to achieve an increase or reduction of the signal strength display with maximum solid flow
   → Display of the signal strength with maximum solid flow (all 10 LEDs illuminate)

   
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE

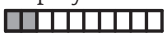
- The Solimotion FTR20 is calibrated if,
  - for moving bulk solids, the switch point (LED 5) of the switch output is exceeded reliably.
  - For the current output, only one or two (minimum solid flow) or at least six LEDs (maximum solid flow) are illuminated.
- A repeated automatic calibration resets any calibration carried out earlier.

8.2.2 Calibration with no movement of bulk solids or minimum solid flow

Automatic calibration with no movement of bulk solids or minimum solid flow (function 2)

The automatic calibration is adequate for most applications. If movement is detected anyways after an automatic calibration with no movement of bulk solids (for example, movement in the area surrounding the measuring point), the Solimotion can be manually adapted to the application using an additional manual calibration.

1. Move the encoding switch to position 2
   → Display of the function number

   After 2 seconds: Display of the current signal strength, example:

   
2. Simultaneously press the ▲ and ▼ keys on the device with no movement of bulk solids or minimum solid flow
   → Automatic calibration is carried out
   → Display of the signal strength with no movement of bulk solids or minimum solid flow

   
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

Optional: Additional manual calibration with no movement of bulk solids or minimum solid flow (function 4)

Using the manual calibration, which is ideally carried out after the automatic calibration, the Solimotion can be adapted to the application manually if necessary.

1. Move the encoding switch to position 4
   → Display of the function number

   After 2 seconds: Display of the current signal strength, example:

   
2. Press the ▲ or ▼ key on the device to achieve an increase or reduction of the signal strength display with no movement of bulk solids or minimum solid flow
   → Display of the signal strength with no movement of bulk solids or minimum solid flow (all 10 LEDs are not lit)

   
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE

- The Solimotion FTR20 is calibrated if,
  - for moving bulk solids, the switch point (LED 5) of the switch output is exceeded reliably.
  - For the current output, only one or two (minimum solid flow) or at least six LEDs (maximum solid flow) are illuminated.
- A repeated automatic calibration resets any calibration carried out earlier.

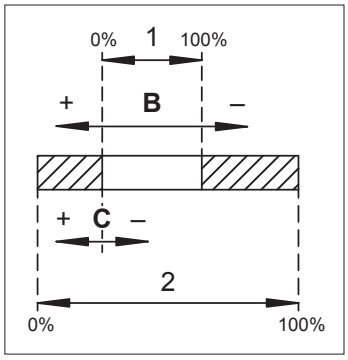
8.2.3 Gain and detection range (Function B and C)

The “Gain” and “Detection range” functions are for fine adjustment after an automatic and/or manual calibration; for most applications they are not needed. Alternatively, a calibration even without the process is possible only with these functions.

The functions are particularly helpful in the following cases:
- Calibration for applications with low reflection or low solid flow
- Mapping of movements in the area surrounding the measuring point with no movement of bulk solids
- Calibration of the Solimotion outside of the process
- Adoption of the calibration parameters with a device replacement at the same measuring point

Introduction
The Solimotion FTR20 detects the movement of a wide variety of bulk solids. The total detection range (0 to 100% ≙ minimum to maximum possible signal strength) is designed to be correspondingly wide. This way even products with very low reflection (small signal strengths), such as rigid polystyrene foam, can be detected.

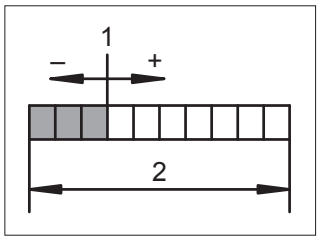
Since with most applications the signal strengths do not cover the entire detection range, this can be adapted with function B “Gain” and function C “Detection range”.



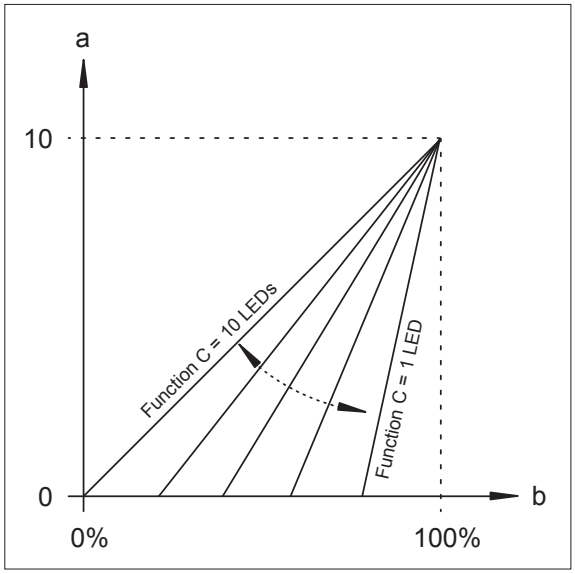
1 Configured detection range
2 Total available detection range
B Shift of the detection range within the total detection range
C Specification of the width of the detection range by shifting the lower range

If the reflection of the bulk solids is, for example, very low for the application, the detection range (function C) should be decreased and shifted in the direction of smaller signal strengths using the gain (function B).

Detection range (function C)
The detection range can be configured depending on the gain (function B) in the range from 1 to a maximum of 10 LEDs (corresponds to the maximum possible detection range).



1 Configured detection range (here, 3 LEDs)
2 Maximum possible detection range depending on the gain



a Illuminated LEDs of the signal strength display
b Total available detection range

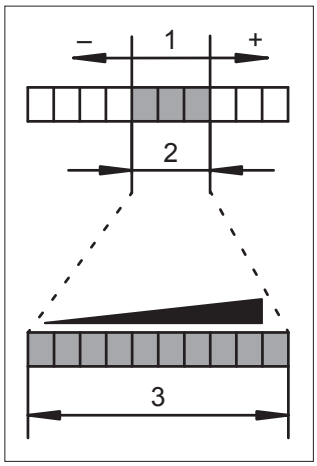
The detection range is configured as follows:

1. Move the encoding switch to position C
   → Display of the function number
   
   → After 2 seconds: Display of the configured detection range, example:
   
2. Press the ▲ or ▼ key on the device to increase or decrease the detection range depending on the gain (→ 30)
   → Display of the changed detection range, example:
    (detection range decreased by 1 LED)
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

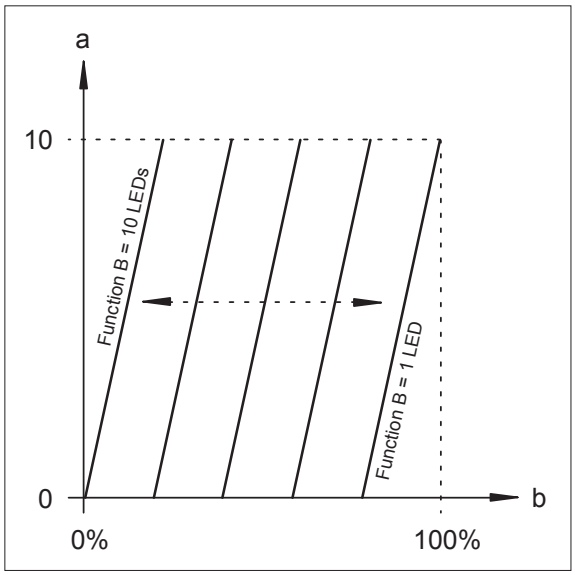
NOTICE

- If the difference between maximum and minimum signal strength in the process is large (fluctuations in the solid flow), a larger detection range should be selected.
- If the difference between maximum and minimum signal strength in the process is small (fluctuations in the solid flow), a smaller detection range should be selected.
- Do not adjust the detection range and gain until the display of the signal strength has reliably exceeded/undershot the upper and lower switch point (→ 34) (switch output) or the desired output signal has been output (output current).
- The following sections explain this in detail by way of some exemplary calibration procedures using functions B and C.

Gain (function B)
The configured detection range (function C) can be shifted within the maximum possible range using the gain. Depending on the detection range, it can be configured in the range from 1 to a maximum of 10 LEDs in 20 increments (2 increments correspond to 1 LED). The smaller the detection range selected, the larger the gain selected can be (→ 30).



1 Configured detection range (function C); here, for example, 3 LEDs
2 Gain; here, for example, 7 LEDs
3 LED signal strength display



a Illuminated LEDs of the signal strength display
b Total available detection range

The gain is configured as follows:

1. Move the encoding switch to position B
   → Display of the function number
   
   → After 2 seconds: Display of the configured gain, example:
   
2. Press the ⏶ or ⏷ key on the device to increase or decrease the gain depending on the detection range (see the following table)
   → Display of the changed gain, example:
    (gain increased by 2 LEDs)
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE
- If bulk solids with low reflection (small signal strength) are detected, the detection range should be shifted in the direction of smaller signal strengths (high gain).
- If bulk solids with high reflection (large signal strength) are detected, the detection range should be shifted in the direction of larger signal strengths (low gain).
- Do not adjust the detection range and gain until the display of the signal strength has reliably exceeded/undershot the upper and lower switch point (→ 34) (switch output) or the desired output signal has been output (output current).
- The following sections explain this in detail by way of some exemplary calibration procedures using functions B and C.

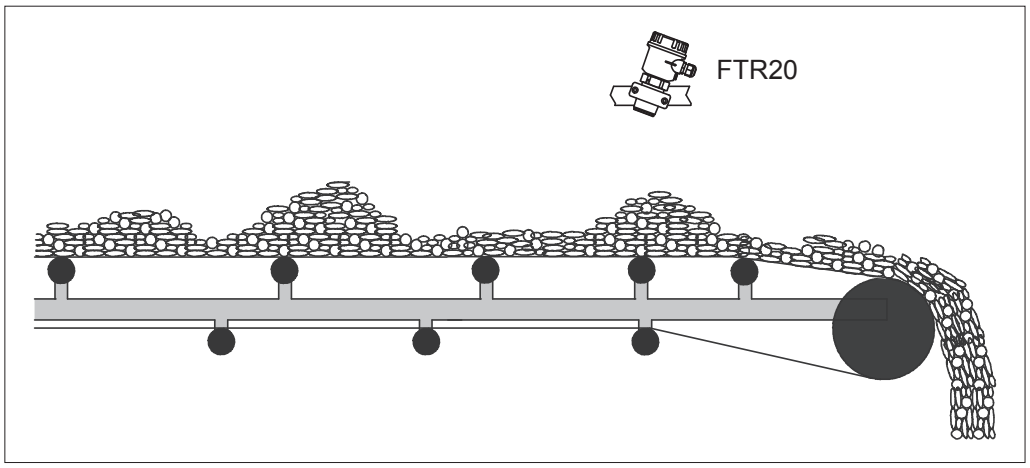
Overview of the dependency between detection range and gain

Detection range	Maximum gain
	
	
	
	
	
	
	
	
	
	

NOTICE
- For the calibration it is advisable first to carry out the automatic calibration in function 1 or 2, in order to start with meaningful values.
- The adjustable gain depends on the configured detection range and vice versa.
- Carrying out another automatic calibration overrides all previous calibration values.
- When changing devices, the configured values can be directly applied here; another calibration of the application is not required.

8.2.3.1 Example of bulk solids detection on a conveyor belt

The bulk solids for which movement is to be detected are transported via a conveyor belt. Due to process fluctuations, the belt is loaded unevenly.



Default setting of the Solimotion FTR20 (→ 🖹39):

 Gain (function B)

 Detection range (function C)

Signal strength display **in this particular example** with the default settings:

 Maximum loading (current output: 15.2 mA)

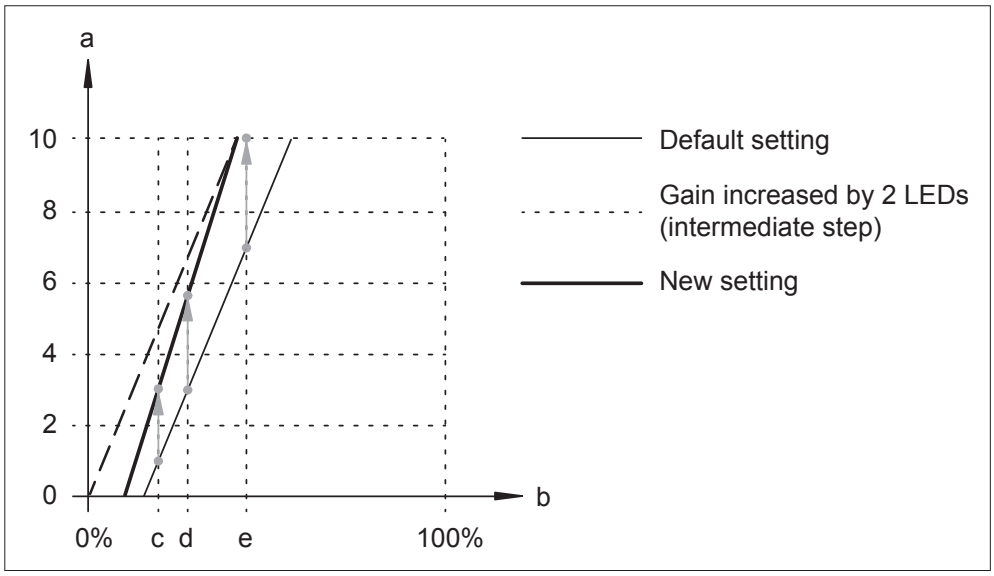
 Minimum loading (current output: 8.8 mA)

 No loading (current output: 5.6 mA)

NOTICE

- A calibration of the switch output and the current output is explained on the following pages, based on the bulk solids detection on a conveyor belt presented above.
- The following settings are only examples of a configuration using functions B and C.

Example: Calibrate switch output
For example, the Solimotion FTR20 with switch output should be calibrated such that the output relay remains closed despite the fluctuating signal strength (if loading of the belt is low (= minimum signal strength), the switch point (LED 5) must remain reliably exceeded). If the belt is empty, the switch point must not be exceeded.

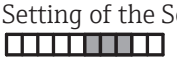


a Illuminated LEDs of the signal strength display
b Total available detection range
c Signal strength when belt is empty
d Signal strength when belt loading is minimum
e Signal strength when belt loading is maximum

The calibration is carried out as follows:

1. Increasing the gain (function B) by 2 LEDs to 7 (shifting the detection range in the direction of smaller signal strengths)
   → Display of the maximum belt loading (dashed curve) now with 10 LEDs; the minimum loading is displayed with 6 to 7 LEDs and the empty belt with 4 to 5 LEDs
2. Reduction of the detection range (function C) by 1 LED to 3 in order to reduce the signal strength display of the measured signal strength of the empty belt
   → Display of the empty belt (bold curve) with 3 LEDs; the minimum loading is displayed with 5 to 6 LEDs
   → Exceeding of the switch point with low loading is ensured

Setting of the Solimotion FTR20 after calibration of the switch output:

 Gain (function B)

 Detection range (function C)

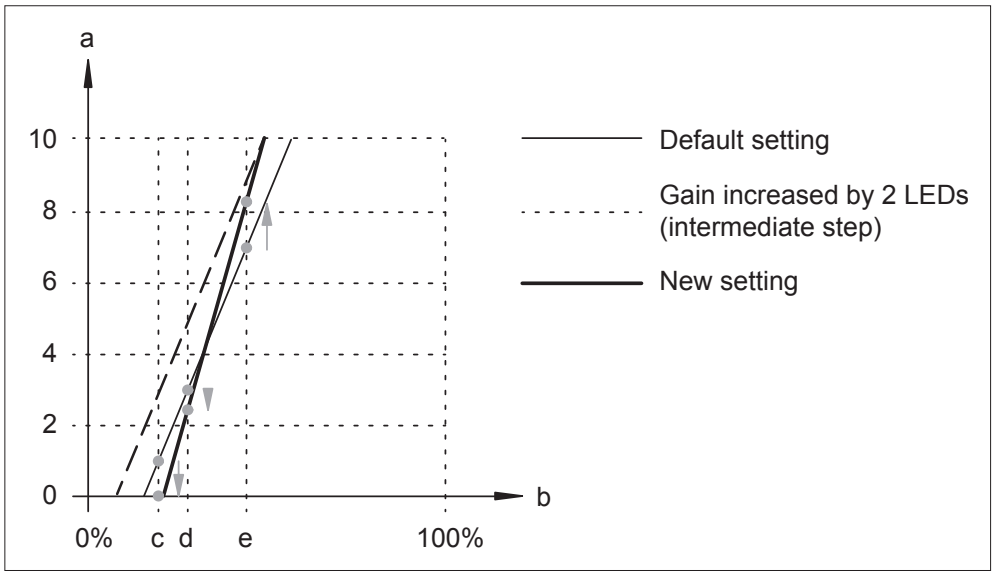
Signal strength display **in this particular example** with new settings:

 Maximum loading (current output: 20 mA)

 Minimum loading (current output: 12 mA)

 No loading (current output: 8.8 mA)

Example: Calibrate current output
For example, the Solimotion FTR20 with current output should be calibrated such that the irregular loading height can be detected due to process fluctuations (make better use of the output signal range (4-20 mA) in comparison to the default setting). The movement of the empty belt must not be detected.



a Illuminated LEDs of the signal strength display
b Total available detection range
c Signal strength when belt is empty
d Signal strength when belt loading is minimum
e Signal strength when belt loading is maximum

The calibration is carried out as follows:

1. Increasing the gain (function B) by 1 LED to 6 (shifting the detection range in the direction of smaller signal strengths)
   → Display of the maximum belt loading (dashed curve) now with 9 LEDs; the minimum loading is displayed with 5 LEDs and the empty belt with 3 LEDs
2. Reduction of the detection range (function C) by 1 LED to 3 in order to reduce the signal strength display of the measured signal strength of the empty belt
   → Display of the empty belt (bold curve) with 0 LEDs; the minimum loading is displayed with 2 LEDs

Setting of the Solimotion FTR20 after calibration of the current output:

 Gain (function B)

 Detection range (function C)

Signal strength display **in this particular example** with new settings:

 Maximum loading (current output: 18.4 mA)

 Minimum loading (current output: 7.2 mA)

 No loading (current output: 4 mA)

8.3 Advanced settings

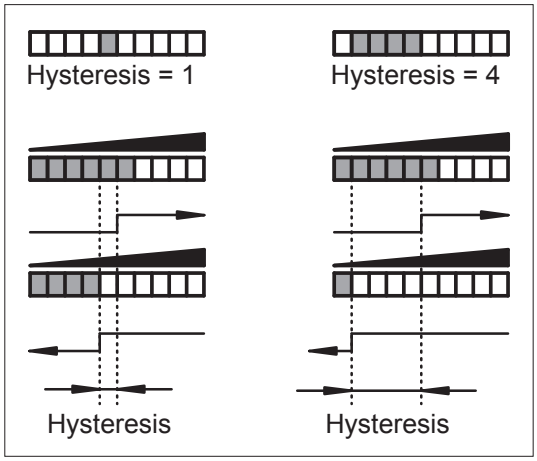
The following settings are optional and not required in most cases; it may make sense to use them only for special adaptations to the application and/or to the downstream analysis (process control system).

NOTICE

Overview of the factory defaults → 39

8.3.1 Hysteresis (function 5)

A hysteresis from 1 to 4 LEDs can be programmed for the switch output (change-over contact with relay, normally open contact with solid-state relay, of no significance for current output). The fixed switch point with increasing signal strength is at the transition from LED 5 to LED 6. For decreasing signal strength, the switch point can be configured between the transition from LED 5 to LED 4 (minimum hysteresis of an LED) and maximum between LED 2 to LED 1 (maximum hysteresis of four LEDs).



The hysteresis is configured as follows:

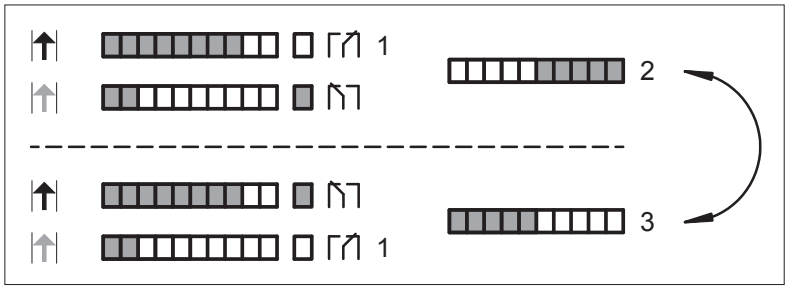
1. Move the encoding switch to position 5
   → Display of the function number
   
   → After 2 seconds: Display of the configured hysteresis, example:
   
2. Press the ▲ or ▼ key on the device in order to configure the hysteresis in the range from 1 to 4 LEDs
   → Display of the changed hysteresis, example:
    (hysteresis increased from 3 LEDs to 4 LEDs)
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE

- A larger hysteresis can also be used to prevent the output from continuously switching with a fluctuating signal strength. If, for example, the signal strength continuously fluctuates between the third and eighth LED, the factory default hysteresis of an LED would lead to the switch output continuously switching when the fourth LED is undershot.
- This setting has no significance for the current output.

8.3.2 Limit signal function (function 6)

For devices with a relay and solid-state relay, the limit signal function determines the switching behavior upon exceeding and undershooting the limit value (upper limit value LED 5, lower limit determined by hysteresis).

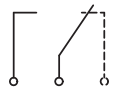
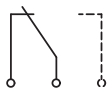
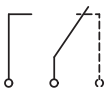
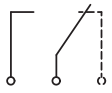
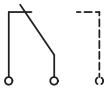


1 Rest position (supply voltage missing)
2 Maximum safety
3 Minimum safety

The limit signal function is configured as follows:

1. Move the encoding switch to position 6
   → Display of the function number
   
   → After 2 seconds: Display of the configured limit signal function, example:
   
2. Press the ▲ or ▼ key on the device in order to change between the two possible limit signal functions
   → Display of the changed limit signal function, example:
   
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

Possible settings:

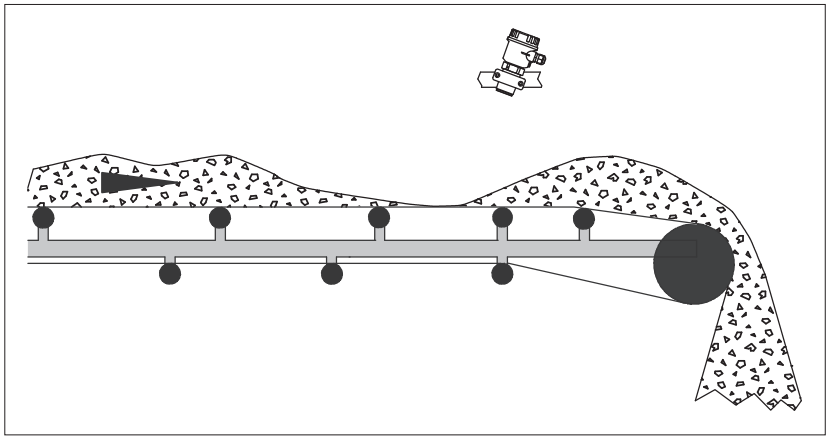
Output	Rest position	Setting	Exceeding of switch point (LED 5)	Undershooting hysteresis (function 5)
Relay (Contact 3-4-5) or **Solid-state relay** (Contact 3-4)				
				

NOTICE

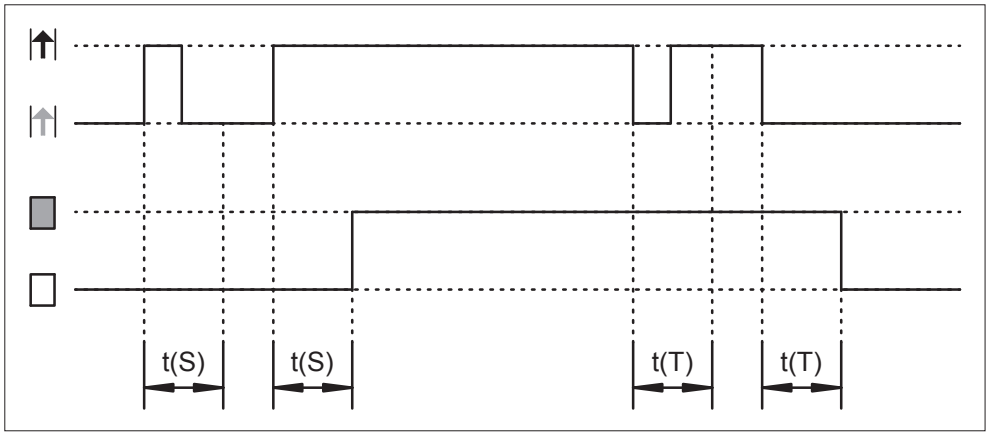
- These settings are for adapting the switching function to the downstream analysis (process control system).
- This setting has no significance for the current output.

8.3.3 Switching delay (function 7 and 8)

An additional switch-on and/or off delay can be configured for the switch output. This can be used, for example, to stabilize the switch output when the signal strength fluctuates greatly, so that the relay does not switch until the switch point has been exceeded or undershot for a corresponding time.



As long as the times in which no bulk solids are detected on the belt or are smaller than the switch-off delays, the switch output remains in the state “Bulk solids movement detected”.



t(S) Switch-on delay (function 7)
t(T) Switch-off delay (function 8)

Possible settings:

Setting	Delay t(S), t(T)	Setting	Delay t(S), t(T)
	Off		2 s
	100 ms		3 s
	200 ms		5 s
	300 ms		10 s
	500 ms		20 s
	1 s		

The switching delays t(S) and t(T) are configured as follows:

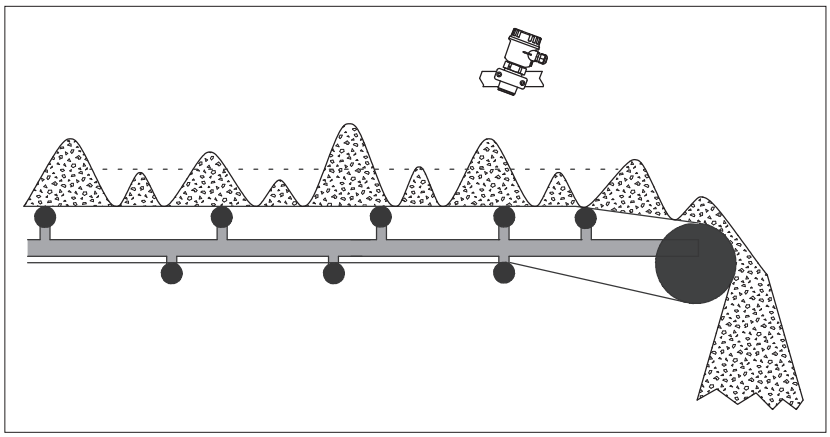
1. Move the encoding switch to position 7 (switch-on delay t(S)) or position 8 (switch-off delay t(T))
   → Display of the function number, switch-off delay example
   
   → After 2 seconds: Display of the configured delay time, example:
    (switch-off delay = off)
2. Press the ▲ or ▼ key on the device to configure the delay time
   → Display of the changed delay time, example:
    (switch-off delay = 300 ms)
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE

- The delays impact only the switch outputs (relay and solid-state relay); they have no significance for the current output.
- If the entire bulk solids detection (including the signal strength display) is to be stabilized, it is advisable to enter an (additional) damping (averaging over a set time, see following section).

8.3.4 Damping (function A)

For unstable process conditions, the display of the signal strength can be stabilized by a configurable damping; averaging of the output signal takes place here over the set time.



Changing conveyor loads can lead to unstable signal strengths; these are stabilized using a configured damping (averaging over the set time).

Possible settings:

Setting	Damping	Setting	Damping
	Off		2 s
	100 ms		3 s
	200 ms		5 s
	300 ms		10 s
	500 ms		20 s
	1 s		

The damping is configured as follows:

1. Move the encoding switch to position A
   → Display of the function number
   
   → After 2 seconds: Display of the configured damping, example:
    (damping = 200 ms)
2. Press the ▲ or ▼ key on the device to configure the damping
   → Display of the changed damping, example:
    (damping increased to 500 ms)
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE

- The set time not only damps the signal strength display, but also impacts the switch output (for example, a delayed switching) and the current output (rises/falls with a delay).
- If only the switch output is to be stabilized, it is advisable to configure a switch-on and/or off delay (→ 🖹36).
- The switch-on and/or off delay and damping can be combined, which causes the detection to be significantly slower.

8.3.5 Resetting to factory defaults (function F)

You can reset the Solimotion FTR20 to its factory defaults with this function as follows:

1. Move the encoding switch to position F
   → Display of the function number
   
   → All LEDs go out after 2 seconds.
2. Press the ▲ and ▼ keys on the device to set it to the factory defaults
   → All LEDs illuminate as confirmation.
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

Overview of the factory defaults:

Function		Description	Default value
0		Display of the signal strength	–
1		Automatic configuration with movement of bulk solids	–
2		Automatic configuration with no movement of bulk solids	–
3		Manual configuration with movement of bulk solids	–
4		Manual configuration with no movement of bulk solids	–
5		Hysteresis	
6		Limit signal function	
7		Switch-on delay	
8		Switch-off delay	
9		Simulation	–
A		Damping	
B		Gain	
C		Detection range	
D		- has no function -	–
E		- has no function -	–
F		Reset to factory settings	–

8.4 Simulation

The Solimotion FTR20 gives you the ability to simulate a signal and thereby an output variable, independent of the process, for example, in order to configure a downstream PLC or a data logger.

The simulation is carried out as follows:

1. Move the encoding switch to position 9
   → Display of the function number
   
   → After 2 seconds: Display of the simulated signal strength
   
   (signal strength = 0 LEDs, switch output: not switched, current output: 4 mA)
2. Press the ▲ or ▼ key on the device to configure the desired signal strength
   → Display of the changed simulated signal strength, example:
   
   (signal strength = 8 LEDs, switch output: switched, current output: 16.8 mA)
3. Move the encoding switch to the initial position 0
   → Display of the current signal strength

NOTICE

The simulation ends as soon as the encoding switch is no longer at position 9.

9 Diagnostics and troubleshooting

9.1 General troubleshooting

Make sure beforehand that the following checks have been carried out:

- "Post-mounting check" checklist (→ 15)
- "Post-connection check" checklist (→ 20)

9.2 Diagnostic information

Error	Possible cause	Remedy
Green LED not lit	Supply voltage absent or too low	Check supply voltage
	FTR20 defective	Replace device or electronics module
Yellow LED (switch output) always illuminated, regardless of the signal strength display	FTR20 defective	Replace device or electronics module
Bulk solids that move are not detected	Incorrect settings	Check settings (→ 24)
	Incorrect installation	Check installation (→ 14)
	Beam path soiled	Check beam path and clean where necessary
Signal despite unmoving bulk solids	FTR20 is configured too sensitively (movements in the area surrounding the measuring point are detected)	Check settings (→ 24)
Signal strength fluctuates heavily	Unstable application, reflections	Increase signal damping (→ 37)
Switch point (switch output) is not exceeded	Incorrect settings	Check settings (→ 24)
Switch output switches continuously	Unstable application	Increase hysteresis (→ 34) or switching delay (→ 36) / increase gain (→ 27)

9.3 Resetting the Solimotion

To avoid errors that can be caused by an incomplete and/or faulty configuration, you can reset the device to the delivery condition (→ 39).

10 Maintenance

No special maintenance work is required.

If medium is building up, however, we recommend regularly checking the beam path and cleaning where appropriate. This can be done using:
- PTFE or ceramic disk at the process connection
- Sight glass fitting or technical special product solutions with PTFE or ceramic disk (optional accessories)
- Materials the customer uses in the process that allow media to pass through

11 Repair

11.1 General notes

11.1.1 Repair policy

The Endress+Hauser repair policy provides that repairs to the modularly designed devices can be carried out by Endress+Hauser Service or customers with corresponding training.

Spare parts are combined in useful kits and are accompanied by the associated replacement instructions.

For more information on service and spare parts, please contact Endress+Hauser Service.

11.1.2 Repairing Ex-certified devices

When repairing Ex-certified devices, please also note the following:

- Ex-certified devices may be repaired only by properly trained personnel or Endress+Hauser Service.
- Relevant standards, national regulations and safety instructions (XA) and certificates must be observed.
- Only original Endress+Hauser spare parts may be used.
- When ordering spare parts, please note the device designation on the nameplate. Parts may only be replaced with the same parts.
- Carry out repairs according to the instructions. Following a repair, the individual testing prescribed for the device must be carried out.
- A certified device may be converted to another certified version by Endress+Hauser Service only.
- All repairs and modifications must be documented.

11.1.3 Replacing the electronics or a device

After replacing the electronics or a device, a new calibration is required, since the settings are saved in the electronic insert.

If you are still able to read out the settings before making the replacement, make note of them (→ 50) and reenter them after the replacement. If this is no longer possible, the device has to be recalibrated (→ 24).

11.2 Spare parts

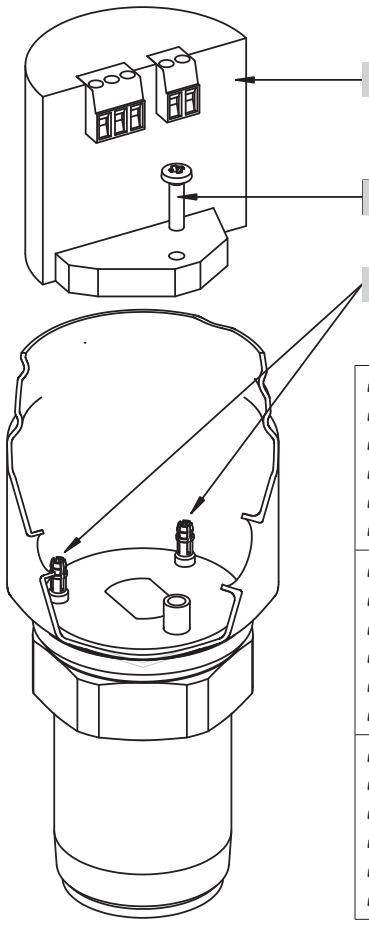
Electronic inserts are available for all device versions of the FTR20. Specifications for the electronics you need are located on the nameplate.

NOTICE

- All spare parts for the device, including the order code, are listed and can be ordered at the Internet site **www.endress.com/deviceviewer** (W@M Device Viewer). If available, the corresponding Installation Instructions can also be downloaded there.
- Each electronic insert is identified by an order number. When making a replacement, please make sure that only the correct electronics are installed.

⚠ WARNING

- In the case of devices certified for potentially explosive areas, installation of incorrect electronics leads to loss of conformity, which means the device is no longer permitted to be operated in a hazardous area.
- Selection of an incorrect supply voltage can lead to the immediate destruction of the electronics.
- Selection of an incorrect signal output can lead to the downstream machine getting damaged.



▪ 71125444 ▪ 71125445 ▪ 71125447 ▪ 71125449 ▪ 71125450 ▪ 71125451	FTR20-AA1A**** FTR20-AA1E**** FTR20-AA2A**** FTR20-AA2E**** FTR20-AA3A**** FTR20-AA3E****	EX	
▪ 71125452 ▪ 71125453 ▪ 71125454 ▪ 71125455 ▪ 71125456 ▪ 71125457	FTR20-BA1A**** FTR20-BA1E**** FTR20-BA2A**** FTR20-BA2E**** FTR20-BA3A**** FTR20-BA3E****	EX	ATEX
▪ 71125458 ▪ 71125459 ▪ 71125460 ▪ 71125461 ▪ 71125462 ▪ 71125463	FTR20-IA1A**** FTR20-IA1E**** FTR20-IA2A**** FTR20-IA2E**** FTR20-IA3A**** FTR20-IA3E****	EX	IECEx

11.2.1 Replacing the electronics

The electronics are attached to two self-clamping spacers and secured with a screw.
To replace the electronics, proceed as follows:

1. Loosen the screw
2. Detach the electronic insert by gently pulling it from the two spacers and take it out of the device vertically
3. Insert the new electronic insert into the housing vertically, gently push it onto the spacers to snap it in and fasten it with the screw (min. 1 Nm)

11.3 Return

The device has to be returned in the event of repair, incorrect delivery or incorrect ordering. As an ISOcertified company and due to legal regulations, Endress+Hauser is obligated to use particular handling techniques for all returned products that have come into contact with a medium.

To ensure the safe, proper and fast return of your device:
Learn about the procedure and basic conditions at the Endress+Hauser Internet site
www.services.endress.com/return-material

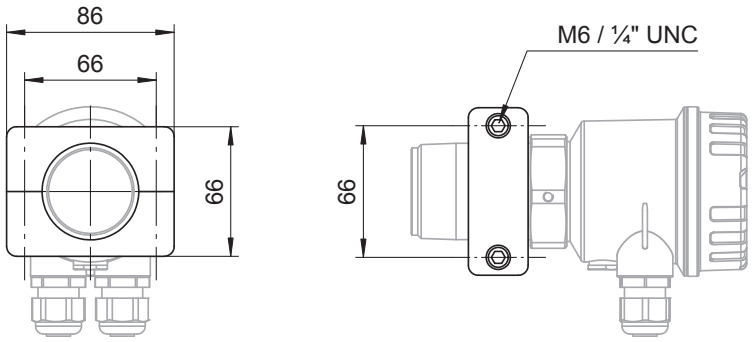
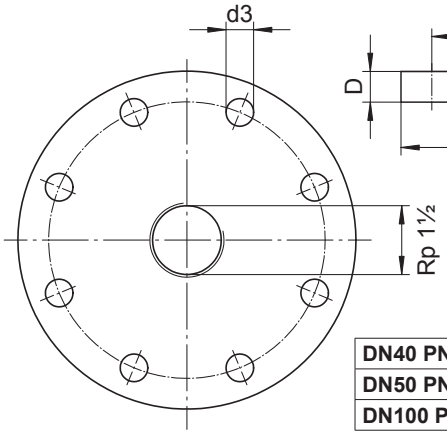
A preprinted form of the “Declaration of Contamination” is in the appendix.

11.4 Disposal

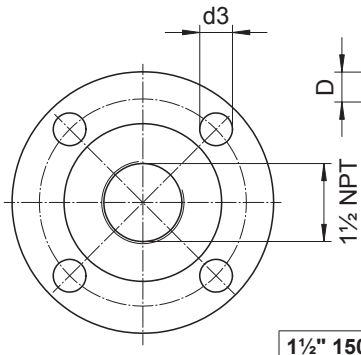
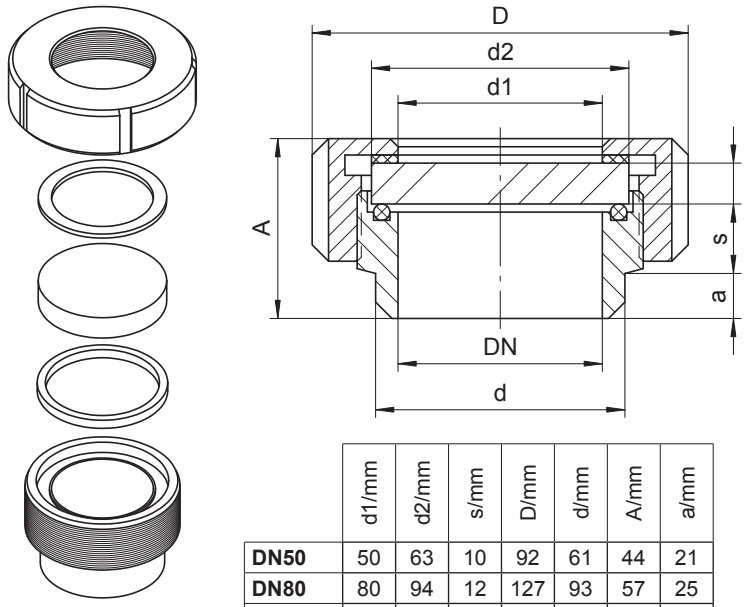
At disposal, ensure that materials are properly separated and the device components are reused.

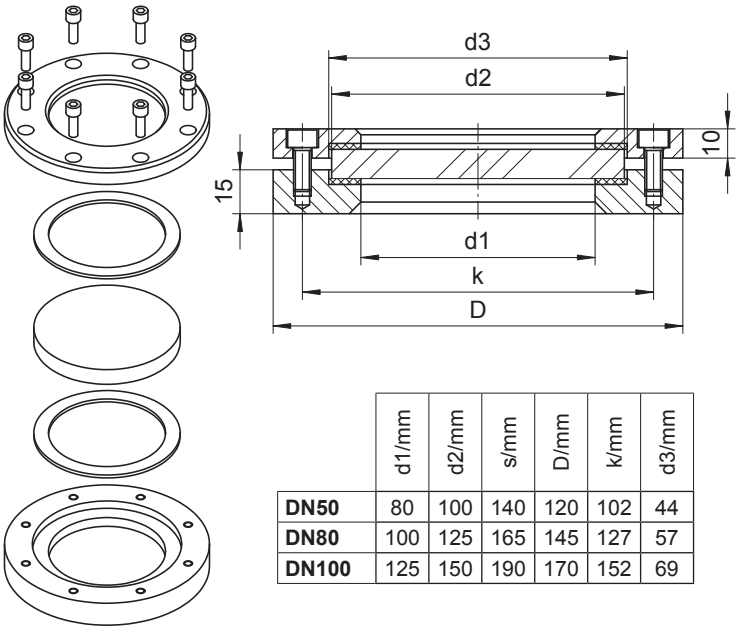
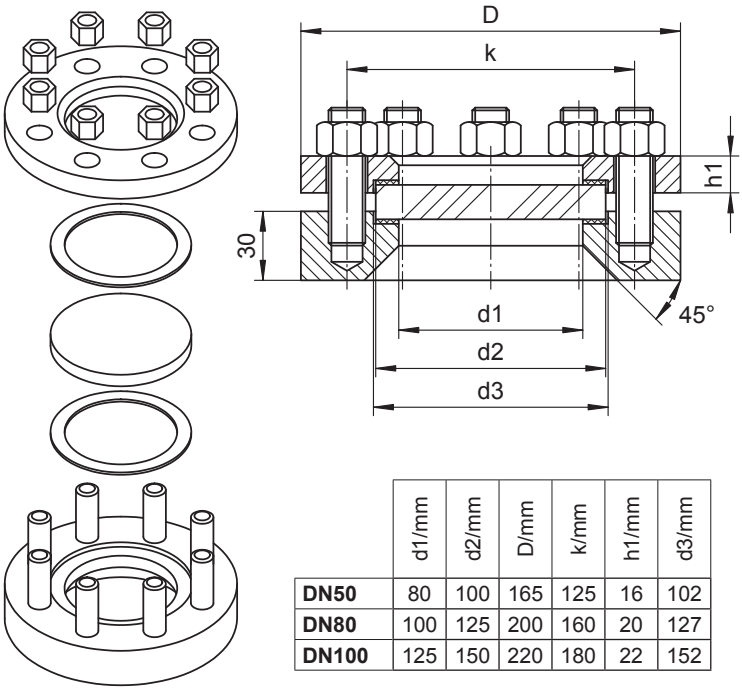
12 Accessories

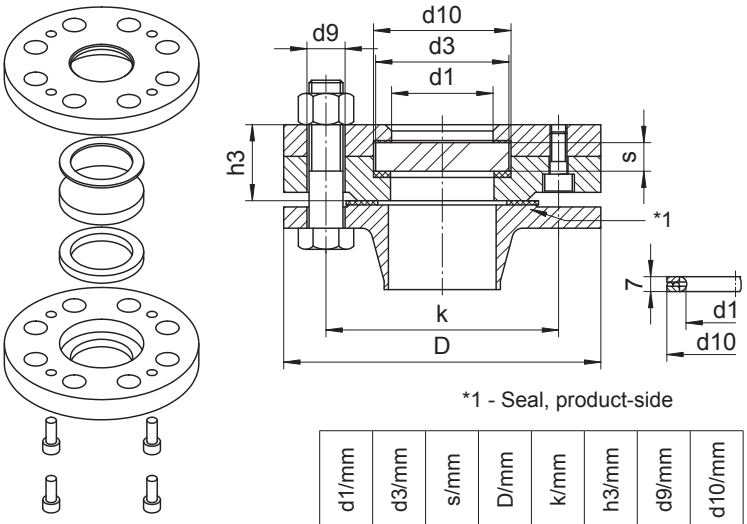
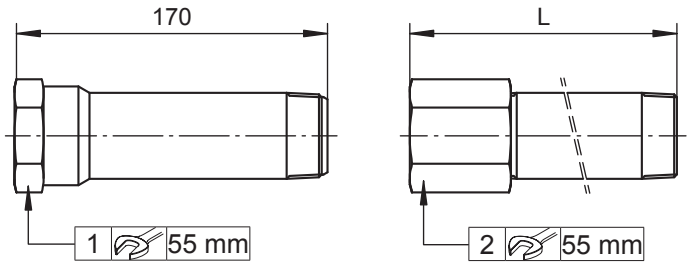
All available accessories aid the installation of the Solimotion FTR20 in the process.

Accessories	Description
Mounting bracket	 Mounting bracket for frame mounting ▪ Aluminum material: Part number 52017501 ▪ Plastic material: Part number 52017502 The FTR20 can be easily mounted on an existing frame using a mounting bracket.
Installation flange, DIN EN 1092-1	 Connection dimensions as per DIN EN 1092-1, with Rp 1½ internal thread, material 316Ti (stainless steel): ▪ DN40 PN16 Part number 71006348 Part number 71108383 + inspection certificate as per EN 10204-3.1 ▪ DN50 PN16 Part number 71006350 Part number 71108388 + inspection certificate as per EN 10204-3.1 ▪ DN100 PN16 Part number 71006352 Part number 71108390 + inspection certificate as per EN 10204-3.1

	d1/mm	d2/mm	d3/mm	D/mm	Number of holes
DN40 PN16	110	150	18	16	4
DN50 PN16	125	165	18	18	4
DN100 PN16	180	220	18	20	8

Accessories	Description
Installation flange, as per ANSI/ASME B16.5	 **1½" 150 lbs**: d1 98.6 mm, d2 127 mm, d3 15.7 mm, D 17.5 mm, Number of holes 4 **2" 150 lbs**: d1 120.7 mm, d2 152.4 mm, d3 19.1 mm, D 19.1 mm, Number of holes 4 **4" 150 lbs**: d1 190.5 mm, d2 228.6 mm, d3 19.1 mm, D 23.9 mm, Number of holes 8 Connection dimensions as per ANSI/ASME B16.5, with 1½ NPT internal thread, material 316Ti (stainless steel): ▪ 1½" 150 lbs Part number 71006349 Part number 71108387 + inspection certificate as per EN 10204-3.1 ▪ 2" 150 lbs Part number 71006351 Part number 71108389 + inspection certificate as per EN 10204-3.1 ▪ 4" 150 lbs Part number 71006353 Part number 71108391 + inspection certificate as per EN 10204-3.1
Sight glass fitting, similar to DIN 11851	 **DN50**: d1 50 mm, d2 63 mm, s 10 mm, D 92 mm, d 61 mm, A 44 mm, a 21 mm **DN80**: d1 80 mm, d2 94 mm, s 12 mm, D 127 mm, d 93 mm, A 57 mm, a 25 mm **DN100**: d1 100 mm, d2 113 mm, s 15 mm, D 148 mm, d 114 mm, A 69 mm, a 34 mm Screw-type fitting similar to DIN 11851, materials: stainless steel 304, silicone and C4400, Pmax = 600 kPa (6 bar), Tmax = 200°C, borosilicate glass, screw-on installation, thread adapter nut ▪ DN50, Part number 71026440 ▪ DN80, Part number 71026441 ▪ DN100, Part number 71026442

Accessories	Description
Sight glass fitting, for unpressurized containers	 |	d1/mm	d2/mm	s/mm	D/mm	k/mm	d3/mm | |---|---|---|---|---|---|---| | **DN50** | 80 | 100 | 140 | 120 | 102 | 44 | | **DN80** | 100 | 125 | 165 | 145 | 127 | 57 | | **DN100** | 125 | 150 | 190 | 170 | 152 | 69 | Weld-in fitting for unpressurized containers, materials: stainless steel 316Ti and silicone, Tmax = 200°C, borosilicate glass, screw-on installation ▪ DN50, Part number 71026443 ▪ DN80, Part number 71026444 ▪ DN100, Part number 71026445
Sight glass fitting, acc. to DIN 28120	 |	d1/mm	d2/mm	D/mm	k/mm	h1/mm	d3/mm | |---|---|---|---|---|---|---| | **DN50** | 80 | 100 | 165 | 125 | 16 | 102 | | **DN80** | 100 | 125 | 200 | 160 | 20 | 127 | | **DN100** | 125 | 150 | 220 | 180 | 22 | 152 | Weld-in fitting acc. to DIN 28120, materials: stainless steel 316Ti/321 and silicone, Pmax = 1 MPa (10 bar), Tmax = 200°C, borosilicate glass, screw-on installation ▪ DN50, Part number 71026446 ▪ DN80, Part number 71026447 ▪ DN100, Part number 71026448

Accessories	Description
Sight glass fitting, acc. to DIN 28121	 *1 - Seal, product-side | | d1/mm | d3/mm | s/mm | D/mm | k/mm | h3/mm | d9/mm | d10/mm | |---|---|---|---|---|---|---|---|---| | **DN50** | 65 | 80 | 15 | 165 | 125 | 41 | 18 | 82 | | **DN80** | 80 | 100 | 20 | 200 | 160 | 50 | 18 | 102 | | **DN100** | 100 | 125 | 25 | 235 | 190 | 59 | 22 | 127 | Flange fitting acc. to DIN 28121 for screwing onto existing counter-flanges, materials: stainless steel 316Ti, PTFE and C4400, Pmax = 2.5 MPa (25 bar), Tmax = 200°C, borosilicate glass ▪ DN50, Part number 71026449 ▪ DN80, Part number 71026450 ▪ DN100, Part number 71026451
High-temperature adapter and extension	 1 HT adapter with flush-mounted ceramic disk, material: 316Ti/1.4571 ▪ Thread R 1½ or Rp 1½ Part number 71113441 ▪ Thread 1½ NPT Part number 71113449 2 Extension for HT adapter, material: 316Ti/1.4571 ▪ Thread R 1½ or Rp 1½ L = 225 mm Part number 71113450 L = 325 mm Part number 71113451 L = 525 mm Part number 71113452 ▪ Thread 1½ NPT L = 225 mm Part number 71113453 L = 325 mm Part number 71113454 L = 525 mm Part number 71113455 **NOTICE** ▪ The length of the high-temperature adapter and extension (if applicable) is based on the insulation thickness to be penetrated and the ambient conditions at the measuring point. ▪ To maintain the maximum temperature of +70°C at the FTR20, we recommend a minimum difference of 200 mm between the process or the insulation and the instrument. ▪ The individual extensions can be combined in any way desired. ▪ Each high-temperature adapter results in a reduction of the range.

13 Appendix

13.1 Settings of the Solimotion FTR20

You can make a note of your settings for documentation purposes using the following table:

Order code: **FTR20 -**	
Instrument number:	

Function/meaning	Value range	Setting
5 =  Hysteresis	 (Minimum) …  (Maximum)	
6 =  Limit signal function (Min./Max. safety, relay output only)	 Relay switches for moving bulk solids or  Relay switches for non-moving bulk solids	
7 =  Switching delay (response delay)	 (off)  (100 ms) … (200/300/500 ms, 1/2/3/5/10 s)  (20 s)	
8 =  Switching delay (drop-out delay)		
A =  Damping		
B =  Gain	 (Minimum) …  (Maximum)	
C =  Detection range	 (Minimum) …  (Maximum)	

13.2 Declaration of Contamination

Endress+Hauser

People for Process Automation

Declaration of Hazardous Material and De-Contamination

Erklärung zur Kontamination und Reinigung

RA No. ☐☐☐☐☐☐☐☐

Please reference the Return Authorization Number (RA#), obtained from Endress+Hauser, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.

Bitte geben Sie die von E+H mitgeteilte Rücklieferungsnummer (RA#) auf allen Lieferpapieren an und vermerken Sie diese auch außen auf der Verpackung. Nichtbeachtung dieser Anweisung führt zur Ablehnung ihrer Lieferung.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.

Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination und Reinigung", bevor Ihr Auftrag bearbeitet werden kann. Bringen Sie diese unbedingt außen an der Verpackung an.

Type of instrument / sensor
Geräte-/Sensortyp _____

Serial number
Seriennummer _____

☐ **Used as SIL device in a Safety Instrumented System /** *Einsatz als SIL Gerät in Schutzeinrichtungen*

Process data/ *Prozessdaten*

Temperature / *Temperatur* _____ [°F] _____ [°C] Pressure / *Druck* _____ [psi] _____ [Pa]
Conductivity / *Leitfähigkeit* _____[µS/cm] Viscosity / *Viskosität* _____ [cp] _____ [mm²/s]

Medium and warnings
Warnhinweise zum Medium

	Medium /concentration *Medium /Konzentration*	Identification CAS No.	flammable *entzündlich*	toxic *giftig*	corrosive *ätzend*	harmful/ irritant *gesundheits-schädlich/ reizend*	other * *sonstiges**	harmless *unbedenklich*
Process medium / *Medium im Prozess*								
Medium for process cleaning / *Medium zur Prozessreinigung*								
Returned part cleaned with / *Medium zur Endreinigung*								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive
* *explosiv; brandfördernd; umweltgefährlich; biogefährlich; radioaktiv*

Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.
Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Description of failure / *Fehlerbeschreibung* _____

_____

_____

Company data / *Angaben zum Absender*

Company / *Firma* _____
_____
Address / *Adresse*
_____
_____

Phone number of contact person / *Telefon-Nr. Ansprechpartner:*
_____
Fax / E-Mail _____
Your order No. / *Ihre Auftragsnr.* _____

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge.We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."

"Wir bestätigen, die vorliegende Erklärung nach unserem besten Wissen wahrheitsgetreu und vollständig ausgefüllt zu haben. Wir bestätigen weiter, dass die zurückgesandten Teile sorgfältig gereinigt wurden und nach unserem besten Wissen frei von Rückständen in gefahrbringender Menge sind."

P/SF/Konta.XV

_____ (place, date / *Ort, Datum)*

_____ Name, dept./*Abt.* (please print / *bitte Druckschrift*)

_____ Signature / *Unterschrift*

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