Brief Operating Instructions
Solimotion FTR16

Flow indicator for bulk solids

These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information about the device can be found in the Operating Instructions and the other documentation:
Available for all device versions via:
- Internet: www.endress.com/deviceviewer
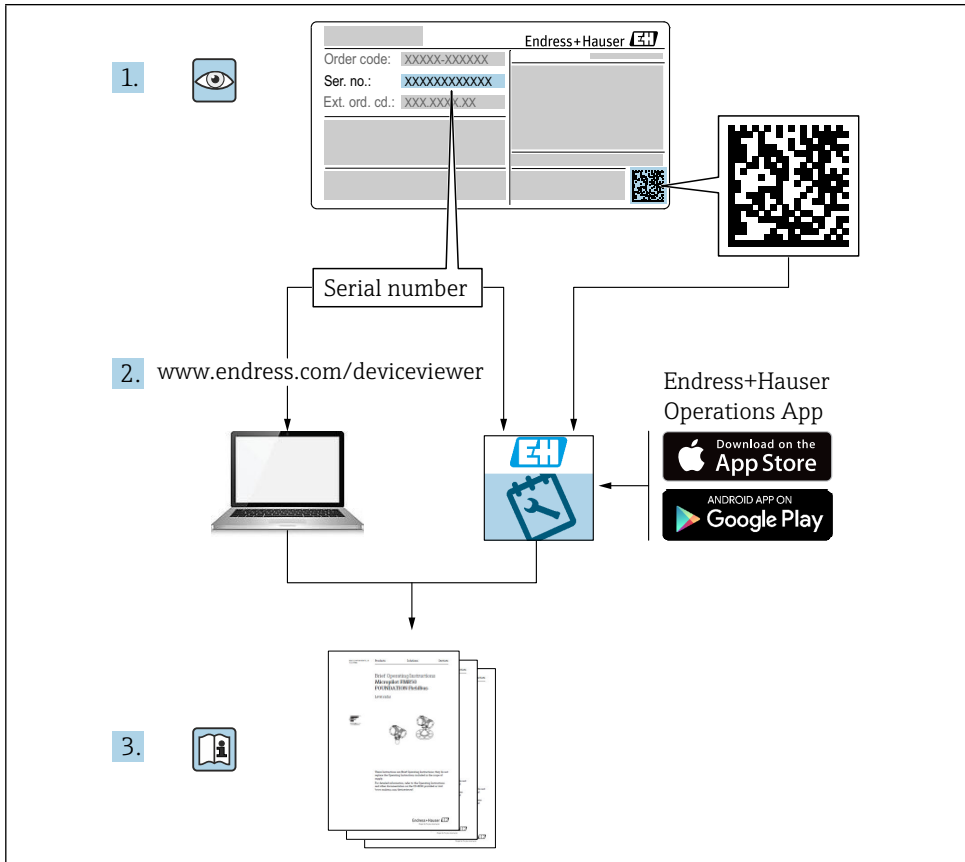- Smart phone/tablet: *Endress+Hauser Operations App*

Endress+Hauser [EH]

People for Process Automation

1.

2. www.endress.com/deviceviewer

Serial number

Endress+Hauser
Operations App

3.

Table of contents

1   About this document

1.1   Symbols

1.1.1   Safety symbols

⚠ DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

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

1.1.2   Electrical symbols

⏚ Ground connection
Grounded clamp, which is grounded via a grounding system.

1.1.3   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

1. , 2. , 3.   Series of steps

1.1.4   Symbols in graphics

A, **B**, **C** ... View

1, 2, 3 ... Item numbers

⚠ Hazardous area

⚠ Safe area (non-hazardous area)

1.1.5   Device-specific symbols

☀ LED on

Indicates an illuminated LED

● LED off

Indicates an non-illuminated LED

○ LED undefined

Indicates an undefined or arbitrary light state of the LED

⬆ Maximum bulk flow

Indicates a maximum bulk movement

⬆ Minimum bulk flow

Indicates a minimum or absent bulk movement

2   Basic safety instructions

2.1   Requirements for the personnel

The personnel must fulfill the following requirements to carry out the necessary tasks, e. g., commissioning and maintenance:

▸ Trained, qualified specialists must have a relevant qualification for the specific function and task
▸ Are authorized by the plant owner/operator
▸ Are familiar with federal/national regulations
▸ Must have read and understood the instructions in the manual and supplementary documentation
▸ Follow instructions and comply with conditions

2.2   Designated use

Only use the flow indicator to monitor a bulk material movement. Improper use can pose hazards. Ensure that the measuring device is free of defects while it is in operation.

• Use the measuring device only for media to which the process-wetted materials have an adequate level of resistance
• Do not exceed or drop below the limit values for the measuring device
  📖 TI01610F

2.2.1   Incorrect use

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

Residual risks

Due to heat transfer from the process, the temperature of the electronics housing and the assemblies contained therein may rise to 70 ℃ (158 ℉) during operation.

Danger of burns from contact with surfaces!

▸ If necessary, ensure protection against contact to prevent burns.

2.3 Workplace safety

For work on and with the device:
▶ Wear the required 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.

2.5 Product safety

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

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

Check the following during goods acceptance:
❑ Are the order codes on the delivery note and the product sticker identical?
❑ Are the goods undamaged?
❑ Do the nameplate data match the ordering information on the delivery note?
❑ If required (see nameplate): Are the Safety Instructions, e. g. XA, provided?
❑ Is the device properly secured?

If one of these conditions is not met, please contact the manufacturer's sales office.

3.2 Product identification

The measuring device can be identified in the following ways:
• Nameplate data
• Extended order code with breakdown of the device features on the delivery note
• Enter serial number from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer): All of the information on the measuring device is displayed along with an overview of the scope of technical documentation provided
• Enter the serial number on the nameplate into the *Endress+Hauser Operations App* or use the *Endress+Hauser Operations App* to scan the 2-D matrix code (QR Code) on the nameplate

3.2.1   Nameplate

☒ *1   Nameplate data*

1   Manufacturer address
2   Order number, external order code, serial number
3   Technical data
4   Approval-specific information

3.2.2   Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

3.3   Storage and transport

3.3.1   Storage conditions

Use original packaging.

3.3.2   Storage temperature

→ 🕮8

3.3.3   Transporting the device

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

4 Mounting

4.1 Mounting conditions

Minimization of application-specific influences
→ 🖺 TI01610F "Performance characteristics"

4.1.1 Mounting position
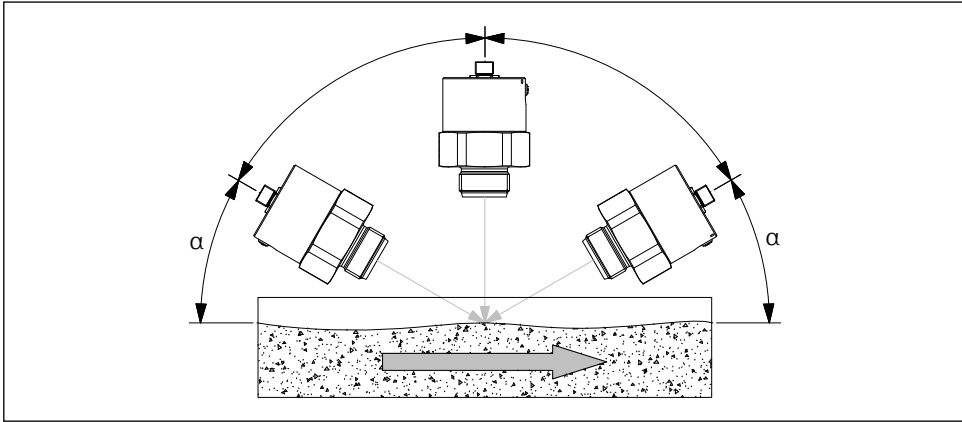
🖻 2 *Mounting position*

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| ℹ️ | • Any mounting position
• Small angle α can increase signal quality.
• Material detection on conveyor belts: α = 45° recommended |

4.1.2 Operating temperature range

-20 to +60 °C (-4 to +140 °F)

4.1.3 Process adapter

→ 🖺 TI01610F "Accessories"
• Weld-in or screw-in adapter type FAR52
• Welding sleeve, counternuts and mounting bracket
• Plug made of PTFE or aluminum oxide ceramics type FAR54
• Sight glass fitting
• Process nozzle type FAR50
• Insertion adapter type FAR51 for process nozzles
• High pressure and high temperature adapter

4.1.4 Mounting dimensions
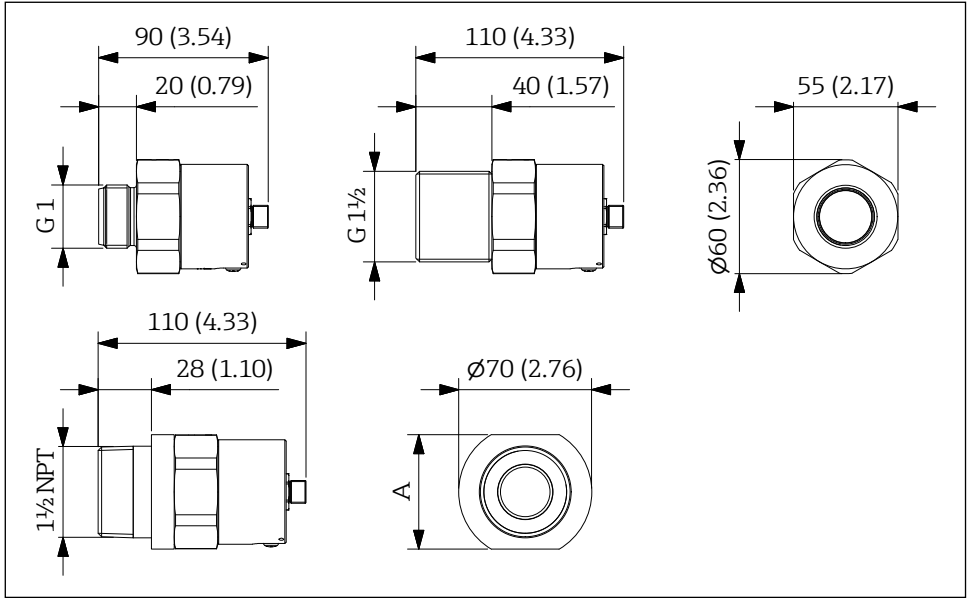
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⊡3 *Mounting dimensions. Unit of measurement mm (in)*

A   *2⅜" (60.325 mm / 2.375 in)*

4.2   Mounting the device

4.2.1   Mounting with connection thread
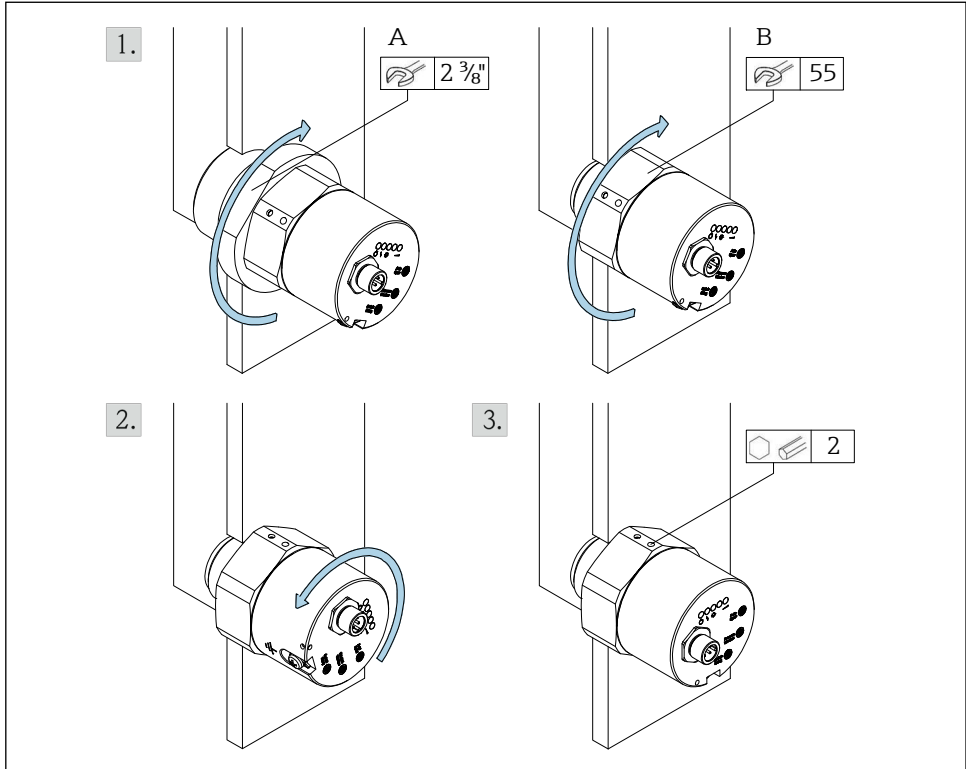
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🖎 4   *Mounting with connection thread*

A   1½ NPT
B   G 1 / G 1½

1. Screw in conical (**A**) or cylindrical (**B**) connection thread.
2. Align the housing of the electronics.
3. Fix the housing in place.

> Seal: to be provided by the customer

4.2.2 Mounting alternatives G thread

- Mounting with welding (**A**): Screw in the device as far as it will go.
- Mounting in existing thread (**B**): Screw in the device flush with the inner wall and lock it with a counternut.
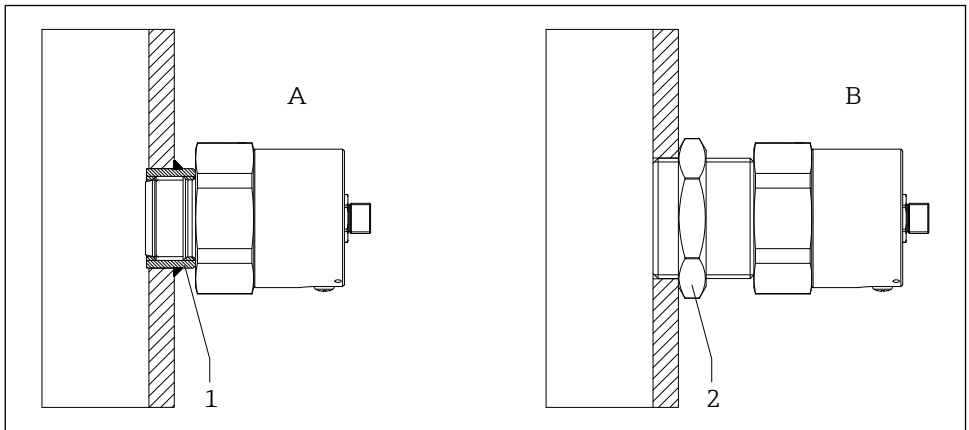
🖼 *5   Mounting alternatives G thread*

1   Welding sleeve G 1
2   Counternut G 1½

ℹ️   Seal: to be provided by the customer

4.2.3   Mounting without contact with the process

ℹ️
- Risk of condensate formation on the inner process wall → plug **2**
- **A** minimize → minimize signal attenuation
- Observe maximum temperature **T**
- Erroneous measurements due to moving passage surfaces

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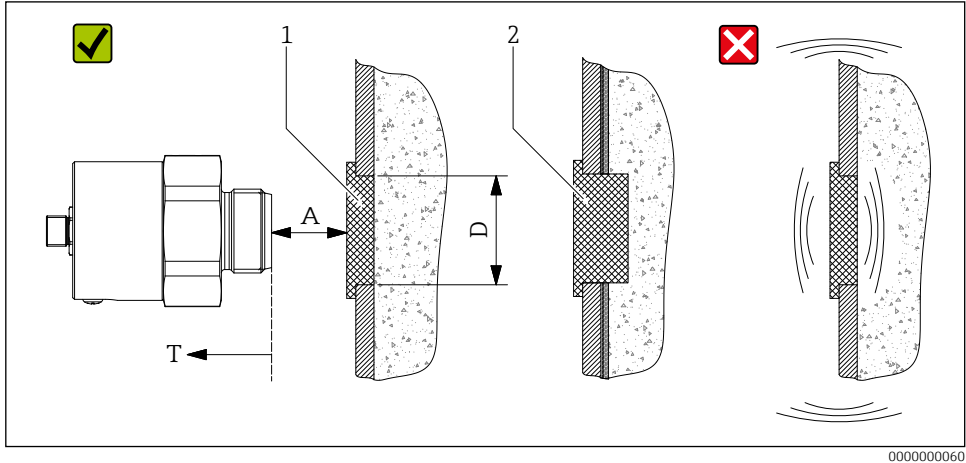
🔲*6   Mounting in front of microwave-impermeable process wall*

1   Microwave-permeable plug
2   Microwave-permeable plug in case of condensate formation on the inner process wall

4.2.4   Mounting with accessories

→ 🔲 TI01610F "Accessories"

ℹ️ Observe the enclosed instructions enclosed with the accessories!

4.3   Post-installation check

❑ Is the device undamaged (visual inspection)?

❑ Does the device conform to the measuring point specifications?

For example:
- Process temperature
- Process pressure
- Ambient temperature

❑ Are the measuring point number and labeling correct (visual inspection)?

❑ Is the device adequately protected against precipitation and direct sunlight?

❑ Is the device properly secured?

5   Electrical connection

📖 For a device for the hazardous area:
Observe the instructions in the Ex documentation (XA).

5.1   Connection requirements

5.1.1   Connect potential equalization

- The potential equalization must be connected to the external ground terminal on the device.
- For optimum electromagnetic compatibility, keep the potential equalization line as short as possible.
- The recommended cable cross-section is 2.5 mm².
- The potential equalization of the FTR16 must be included in the local potential equalization.

5.1.2   Connecting cable requirements

- Permissible temperature range → 🖹8
  ⚙ IP69 / △ IP67
- Connection cable max. 5 Ω/core
- Total capacity < 100 nF
- Pre-fabricated connection and interconnection cables → ▣ TI01610F "Accessories"

5.2   Connecting the device

5.2.1   Wiring
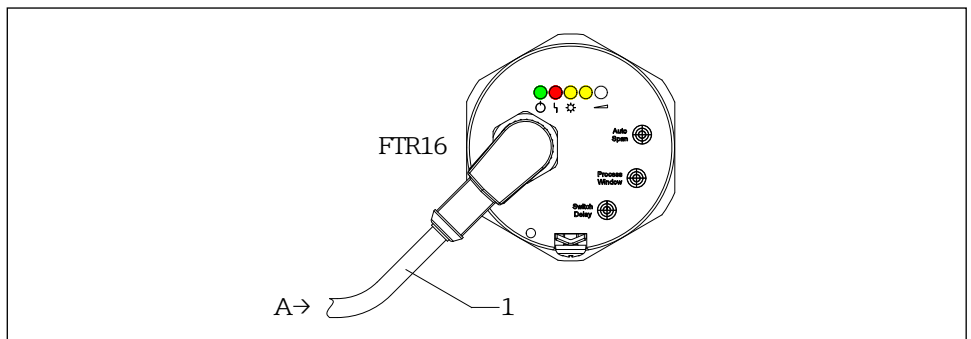
🖻7   Wiring

A   Supply and signal circuit
1   Connection cable with M12 right-angle socket

Supply voltage
- U = 18 to 30 V DC
- In accordance with IEC/EN61010 a suitable circuit breaker must be provided for the measuring device.
- Voltage source: Non-hazardous contact voltage or Class 2 circuit (North America).

Power consumption

P ≤ 1.1 W

Current consumption

I ≤ 60 mA (without load)

Load

Max. 200 mA

Switching output

• 3-wire DC-PNP (positive voltage signal at the switching output of the electronics)
• 2 DC-PNP outputs, antivalent switched

ℹ️ The device is internally equipped with a fine-wire fuse 500 mA (slow-blow) according to IEC 60127-2, this cannot be changed by the user in the event of a fault.

5.2.2 Pin assignment
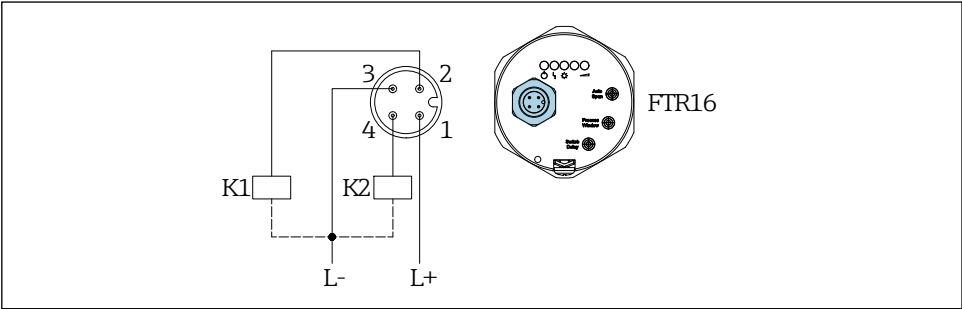
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⊞8   *Pin assignment for supply voltage and output circuit*

Kx   External load

Switching output

Bulk movement	Signal strength (LED white)	Sensor state	Switching output	
⬆	LED on or flashing fast (approx. 9 to 15 Hz)	●	1 ⌐ 2	1 ⌐ 4
⬆	LED off or flashing slowly (approx. 2 to 8 Hz)	☀	1 ⌐ 2	1 ⌐ 4

Function test

Bulk movement	Sensor state	Error/Warning	Switching output	
⬆	●	**Warning** 🔴	1 — 2	1 ╱ 4
⬆	☀	LED flashing	1 ╱ 2	1 — 4
⬆ / ⬆	●	**Error** 🔴 LED lights up permanently	1 ╱ 2	1 ╱ 4

5.3   Post-connection check

❑ Is the device or cable undamaged?

❑ Do the cables used comply with the requirements?

❑ Do the mounted cables have adequate strain relief?

❑ Are the connectors firmly tightened?

❑ Does the supply voltage match the specifications on the nameplate?

❑ No reverse polarity, is terminal assignment correct?

❑ If supply voltage is present, is the green LED lit?

6 Operation options
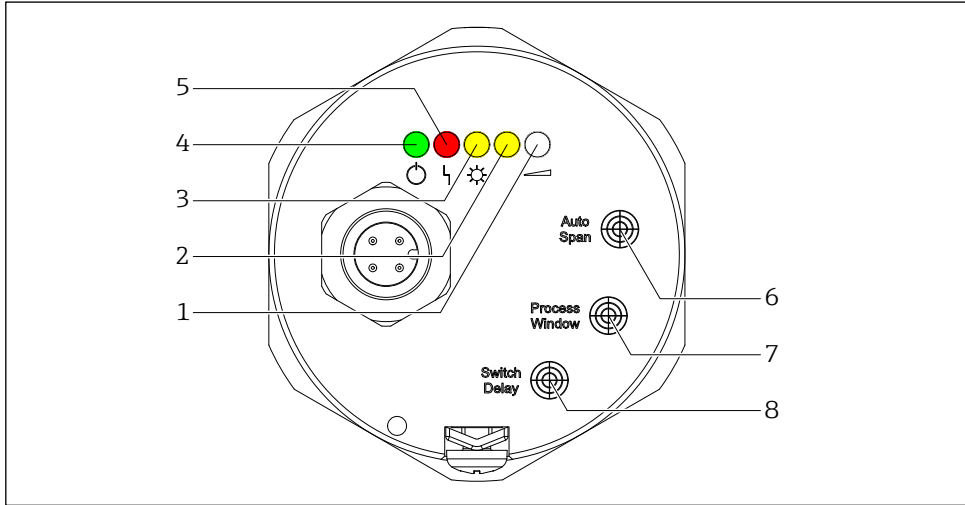
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⊡9   *Display and operating elements of the FTR16*

1   Signal strength (LED white)
2   Only for parameterization: LED yellow
3   Sensor state (LED yellow)
4   Operation (LED green)
5   Error/warning (LED red)
6   Parameterization point automatic adjustment
7   Parameterization point process window
8   Parameterization point switch delay

Light signals (LEDs)

Display	Meaning
☀ ○ ○ ○ ○	**Betrieb** LED lights up: Device is ready for operation (supply voltage is applied) LED flashes: Device is in parameterization mode (→ 🖺18)
○ ☀ ○ ○ ○	**Error/Warning** LED lights up: Error/device failure (unrecoverable error) LED flashes: Warning/maintenance required (recoverable error)
○ ○ ☀ ○ ○	**Sensor state** LED off: Movement of the bulk material LED on: No movement of the bulk material
○ ○ ○ ☀ ○	For parameterization only
○ ○ ○ ○ ☀	**Signal strength** Light state (off, 2 to 15 Hz or permanently lit) is proportional to the strength of the signal

On-site operation
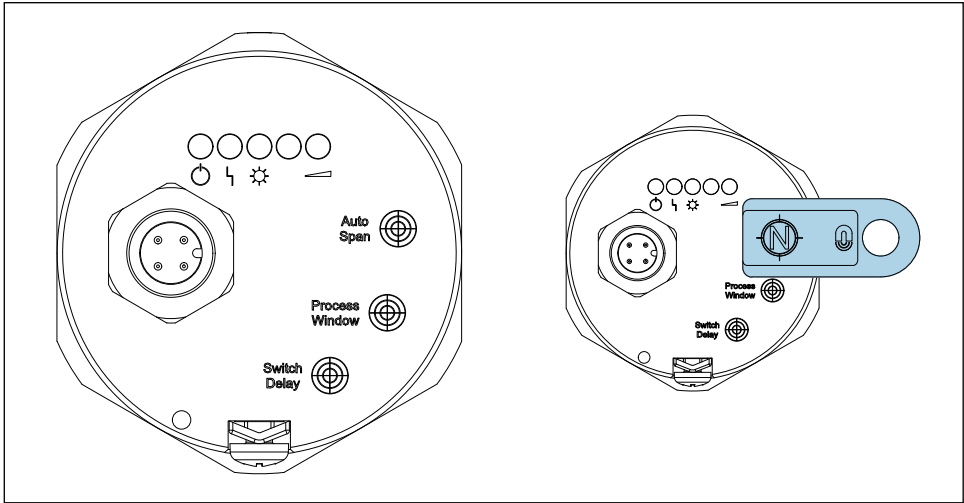
🖾10   On-site operation

Place the operating magnet on the marked surfaces of the FTR16 for operation (north pole visible as shown).

7 Commissioning

The device is ready for operation a maximum of 3 s after the supply voltage is applied.
Initial setup → 7.2 ... 7.5

7.1 Function check

Function check
- "Post-installation check" checklist
- "Post-connection check" checklist

7.2 Activation parameterization mode

Setting options only available with activated parameterization mode (7.3 ... 7.5)

Activation parameterization mode

1. Power supply off: Operating magnet on "**Auto Span**", "**Process Window**" or "**Switch Delay**"

2. Power supply on: Initialization → green LED (operation) flashes slowly

3. Remove operating magnet → parameterization mode (green LED continues to flash slowly)

- The device continues to operate normally in the background depending on the current settings, so that, for example, an occurring bulk material movement leads to a changeover of the signal output.
- 10 minutes no action → parameterization mode is terminated (device switches to normal operation)
- The parameterization mode can also be terminated by a voltage reset.

7.3 Automatic adjustment

- Setting to the process-dependent bulk material movement
- To be performed once during commissioning **with maximum movement of the bulk material**

Perform automatic adjustment

1. Operating magnet on "**Auto Span**" → green LED flashes quickly

2. Remove the operating magnet within 10 seconds:
   → green LED lights up for 2 s
   → automatic adjustment successfully performed

- Automatic adjustment not feasible (for example, in the absence of bulk material movement) → Warning
- After an automatic adjustment, the white LED (signal strength) lights up permanently if the bulk material movement is sufficiently high.
- If there is no or only slight bulk material movement, the yellow LED (sensor status) report the lack of movement, and the white LED is off or flashing at a low frequency. If this is not the case, the process window must then be adjusted.

7.4 Set process window

- If, after an automatic adjustment, a movement is detected despite the absence of bulk material movement (for example, due to moving plant parts in the detection range of the FTR16), the process window must reduced step by step.
- An enlargement of the process window is also possible. This is useful if, for example, the bulk material quantity or the conveying speed fluctuate.

Customize process window

1. Operating magnet on "**Process Window**":
   → green LED flashes quickly
   → display (5 s) current process window

2. Continue to stop operating magnet → every 5 s change to next process window

3. Remove operating magnet → last displayed process window selected

Display	Meaning
🟢 🔴 🟡 🟡 ⚪	**100 %** (very large process window)
🟢 🔴 🟡 🟡 ⚫	**70 %** (large process window)
🟢 🔴 🟡 ⚫ ⚫	**50 %** (factory setting)
🟢 🔴 ⚫ ⚫ ⚫	**30 %** (small process window)
🟢 ⚫ ⚫ ⚫ ⚫	**15 %** (very small process window)

7.5 Set switching delay

A switching delay is helpful, for example, if the signal strength fluctuates strongly, so that the outputs only switch when the switching point is exceeded or undershot for a correspondingly long time.

Set switching delay

1. Operating magnet on "**Switch Delay**":
   → green LED flashes quickly
   → display (5 s) current switching delay

2. Continue to stop operating magnet → every 5 s change to next switching delay

3. Remove operating magnet → last displayed switching delay selected

Display	Meaning
🟢 ⚫ ⚫ ⚫ ⚫	Switching delay off (factory setting)
🟢 🔴 ⚫ ⚫ ⚫	500 ms
🟢 🔴 🟡 ⚫ ⚫	1 s
🟢 🔴 🟡 🟡 ⚫	5 s
🟢 🔴 🟡 🟡 ⚪	10 s

7.6   Reset to factory settings

In case of unknown settings or use in a new application, it is recommended to reset the FTR16 to its factory settings beforehand.

Perform factory reset

1. Operating magnet on "**Auto Span**" → green LED flashes quickly
2. Continue to stop operating magnet (min. 20 s):
   → after 10 s, red LED flashes slowly (warning of resetting)
   → after another 10 s red LED flashes quickly
3. Remove operating magnet → parameter reset to factory setting (7.2 ... 7.4)

ℹ️   Factory settings → 📖 BA02155F

7.7   Perform function test

- Function test only possible with parameterization mode deactivated! → 📄18
- If the operating magnet is held ≥ 30 s against the marking, the red LED flashes and the device automatically returns to the current switching state.

Perform function test

1. Operating magnet on "**Auto Span**", "**Process Window**" or "**Switch Delay**" (min. 2 s)
   → all LEDs light up briefly
   → current switching state is inverted
   → function test is performed
2. Remove operating magnet → change to normal operation

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