

# Technical Information

## Soliswitch FTE20

Point level switch for granular solids



Safety comes first - with optical and optional automatic rotation monitoring

### Applications

The Soliswitch FTE20 is a paddle switch for granular solids. Its robust and compact design makes the point level switch an ideal sensor for detecting the full, empty or refill status in applications with bulk solids, such as in silos containing solids.

- Full sensor
- Empty sensor
- Point level sensor

### Your benefits

- Safe operation
  - Automatic rotation monitoring (optional)
  - Optical rotation monitoring
  - Ex approvals
    - ATEX II 1/3D
    - CSA DIP/ II, III/1/E-G
    - FM DIP/ II, III/1/E-G
  - Switching threshold can be set even during operation
  - Robust plastic housing with cover with sight glass
- Fault detection without uninstalling the device by means of
  - Visualization of shaft rotation, visible when device is installed
  - Ability to test the switching function
- Easy installation thanks to
  - Screw-cover housing
  - Preformed cable entries
  - Push-in double-level terminals
  - Captive screw cap
- Weight of solids can be adjusted without the need for tools
- Housing can be rotated through 360° to enable optimal alignment following installation

## Function and system design

### Measuring principle

The paddle switch is primarily used to detect the full or refill status in silos containing solids. When used as a refill switch, it is typically mounted from below or at an angled position from below in the silo cone. When used as a full switch, it is fitted in the roof of the silo.

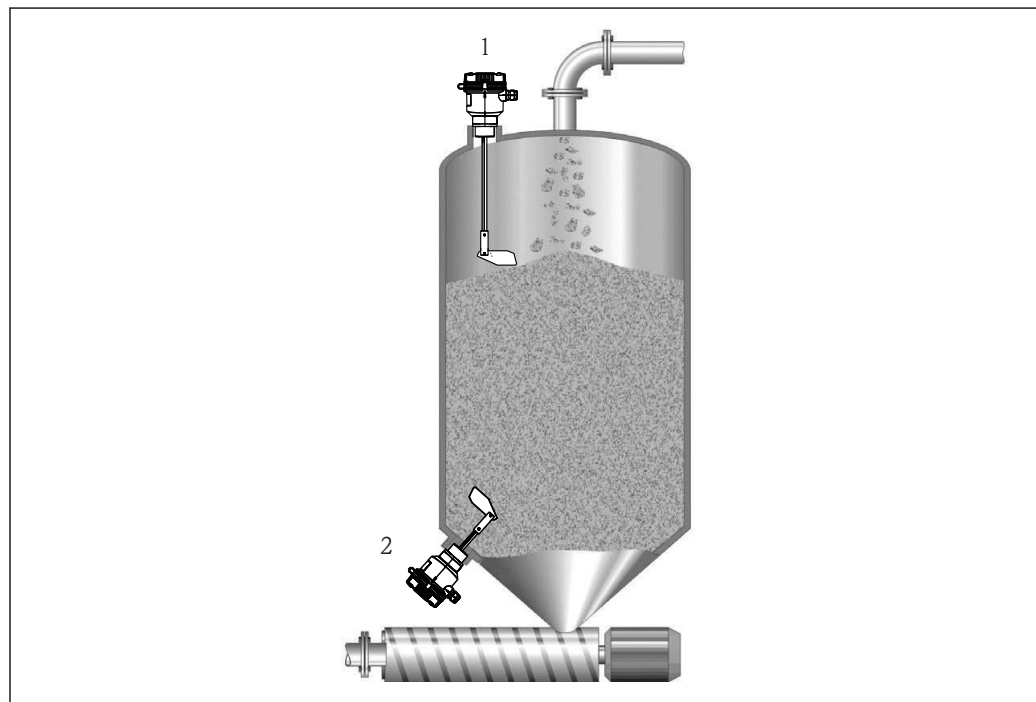
The shaft and paddle are driven using a reduction gear and synchronous motor. If the paddle is stopped by material covering it, the hinged motor in the housing moves from the rest to the switch position. This movement operates two switch contacts; the first is for external level indication and the second switches off the power to the motor.

The paddle starts to rotate once the medium level falls below the paddle, the hinged motor returns to its rest position and the two contacts switch to normal operation. Intermittent loads that operate against or even in the same direction of rotation are evened out by a slip clutch.

The rotational movement of the shaft can be observed from the outside when the cover is closed. Optional automatic rotation monitoring detects a blockage or the failure of the drive unit.

### Measuring system

Complete point level switch consisting of a shaft (optionally available with rope extension) with synchronous motor and slip clutch, and single pole changeover contact. Typical application areas are point level detection in bulk solids, e.g. cereals, sugar, cacao, animal feeds, washing powders, chalk, dry plaster, cement, granulates and wood chips.



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1 Measuring system with Soliswitch FTE20

1 Functioning as full sensor

2 Functioning as demand sensor

## Input

### Measured variable

Level (in line with the orientation and length)

### Measuring range

The measuring range depends on the installation location of the Soliswitch FTE20 and the selected length of the shaft 75 to 300 mm (2.95 to 11.81 in) or the rope extension up to max. 2 000 mm (6.56 ft).

# Output

**Output signal** Binary


**Switching output** **Function**  
Switch a floating changeover contact.

**Switching behavior**

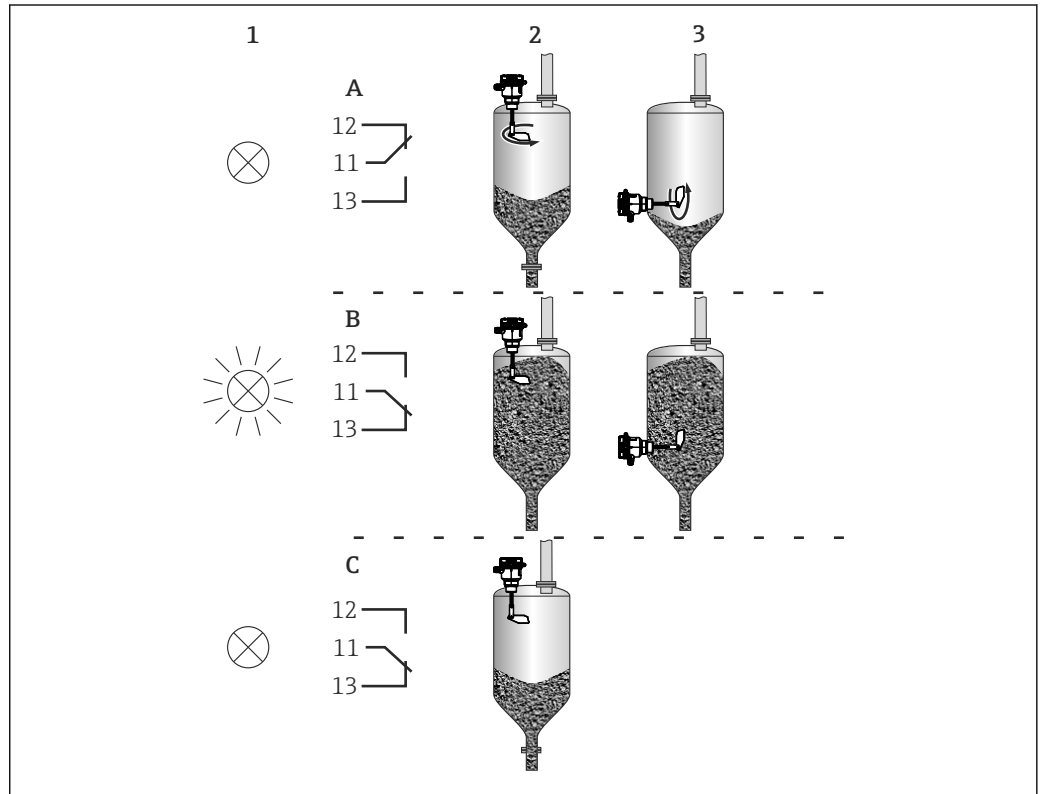
On/off

**Switching capacity**

- EN 61058: 250 V AC 5E4, 6(2) A
- UL 1054: 125 to 250 V AC, 5 A
- 30 V DC, 8 A
- Min. switching load 300 mW (5 V/5 mA)

 After actuating of a current >100 mA the switching function with a switching current I <100 mA cannot be guaranteed.

**Switching states**

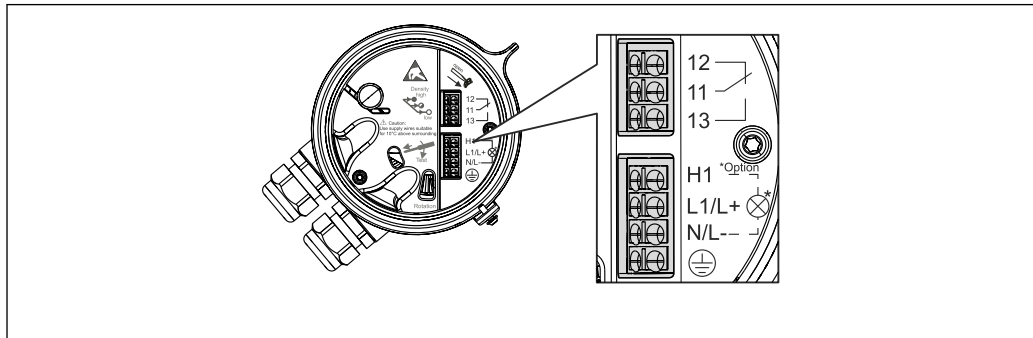


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	1 = signal lamp (optional, only non-Ex)	2 = full sensor	3 = demand sensor	axle rotation	internal lighting
A	OFF	OFF	ON	YES	ON
B	ON	ON	OFF	NO	ON
C (only with optional rotation monitoring)	OFF	ON	OFF	NO	Blinking

## Power supply

### Terminal assignment



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2 Terminal assignment of the point level switch

Symbol	Description	Symbol	Description
⊕	Protective ground	H1	Connection for signaling empty/full status detection (optional)
N (AC), L- (DC)	Power connection	N/L-	
L1 (AC), L+ (DC)	Power connection	11	Changeover contact
		12	Normally closed contact
		13	Normally open contact

### Supply voltage

- 20 to 28 V DC
- 24 V AC 50/60 Hz
- 115 V AC 50/60 Hz
- 230 V AC 50/60 Hz

**i** An overload protection element (rated current  $\leq 10$  A) is required for the power cable.

### Power consumption

Max. 3.5 VA

### Terminals

Terminals with spring terminal design

#### Permitted cable cross-sections

Rigid	0.2 to 2.5 mm <sup>2</sup> (24 to 14 AWG)
Flexible	0.2 to 2.5 mm <sup>2</sup> (24 to 14 AWG)
Flexible with wire end ferrule without plastic ferrule	0.5 to 2.5 mm <sup>2</sup> (22 to 14 AWG)
Flexible with wire end ferrule with plastic ferrule	0.5 to 1.5 mm <sup>2</sup> (22 to 16 AWG)
AWG as per UL/CUL/kcmil	

**i** Use supply wires suitable for 10 °C (18 °F) above surrounding.

## Performance characteristics

### Shaft speed

1 min<sup>-1</sup>

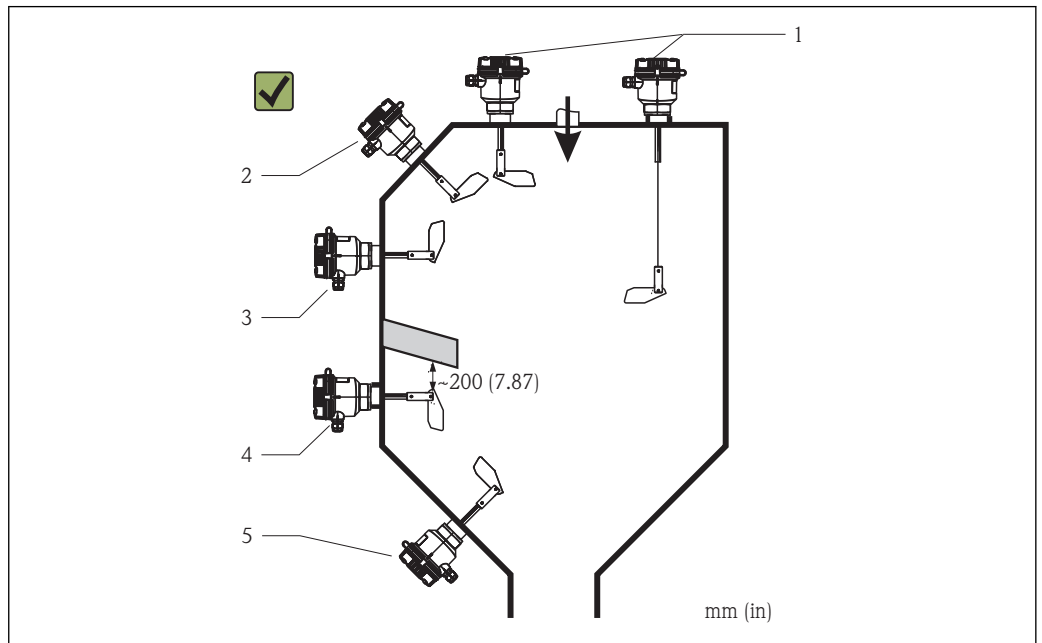
### Sensitivity

Can be adjusted using an operating element accessible from the top (→ 8).

- Minimum: 80 g/l (4.99 lb/ft<sup>3</sup>)
- Depending on the density of the bulk solids adjustable in three stages: low, medium (default), high

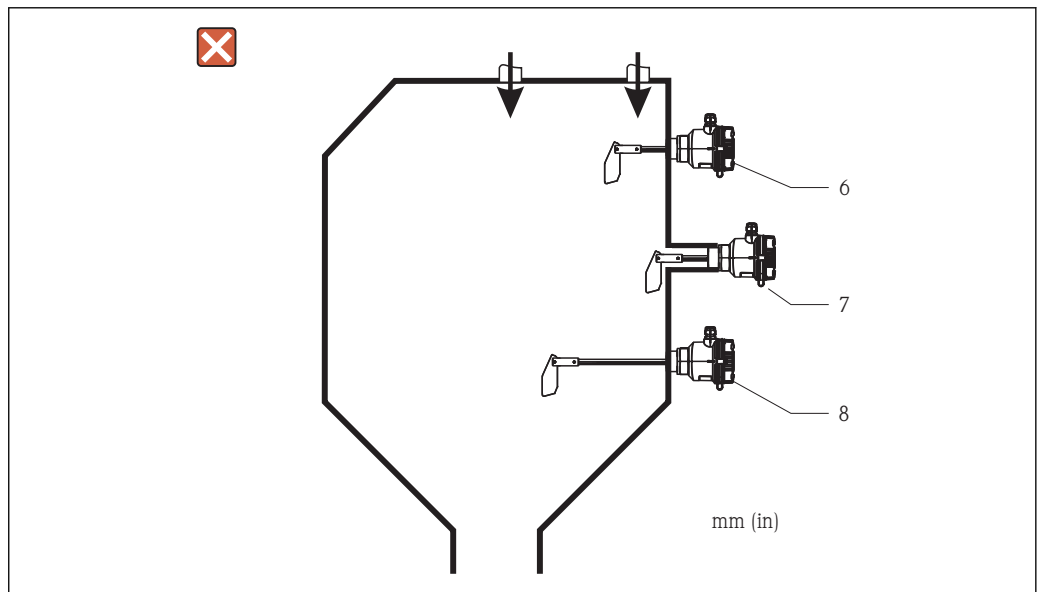
# Installation

## Mounting location



3 Correct installation positions of the device

- 1: Vertical from the top
- 2: Angled from the top
- 3: From the side
- 4: From the side with protective cover against falling solids
- 5: From the bottom (device must be protected against shock-type loads)



4 Incorrect installation positions of the device

- 6: In direction of solids flow
- 7: Installation coupling too long
- 8: Horizontal with shaft length >300 mm (11.8 in)

<b>Special mounting instructions</b>	<b>Side load on the shaft</b> Max. 60 N
	<b>Load on the rope</b> Max. 1 500 N
	<b>Operating pressure (abs.)</b> 0.5 to 2.5 bar (7.25 to 36.3 psi)
	<b>Housing can be rotated 360 °</b> To adjust to the direction of the cable entries (pointing downwards)
	<b>Cable entries</b> The dust protection plugs which are delivered with the device are only for protection during transport and storage. Close unused cable entry with a blind plug (IP65) when commissioning the device.
	<b>Mechanical load of optional signal lamp</b> The optional signal lamp must be protected against mechanical load (impact energy > 1 J).

## Environment

The device must be protected against direct sunshine.

A weather protection cover is available as an accessory, see the "Accessories" section (→  10).

All values not indicated as per DIN EN 6054-1.

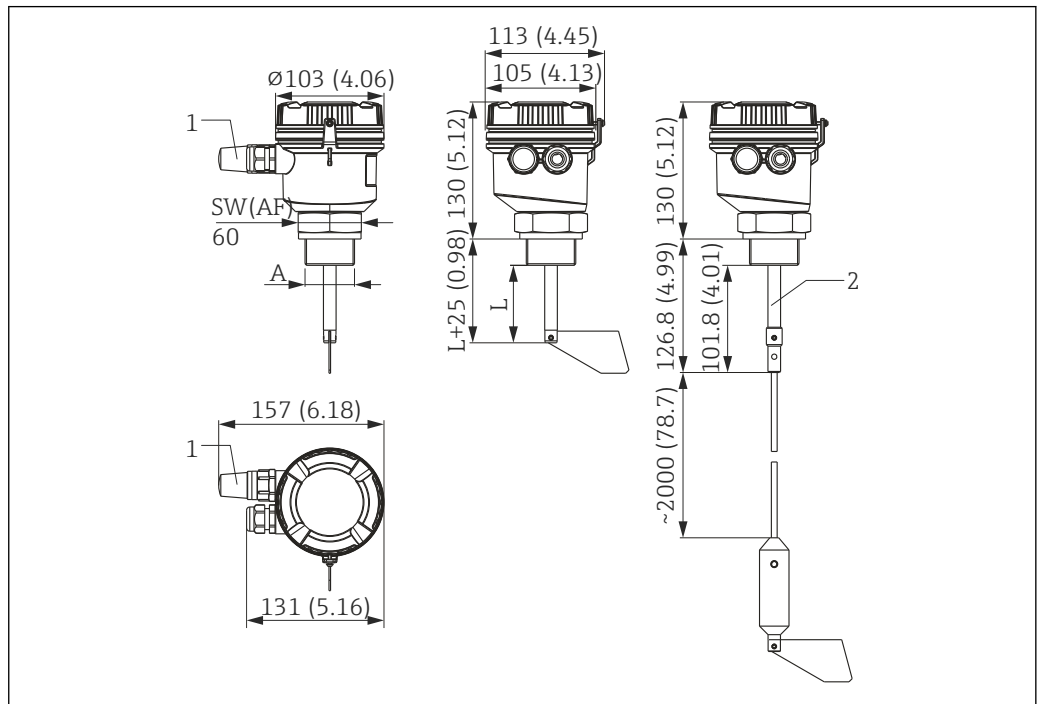
<b>Ambient temperature range</b>	-20 to 60 °C (-4 to 140 °F)
<b>Storage temperature</b>	-20 to 60 °C (-4 to 140 °F)
<b>Climate class</b>	EN60654-1, Class C2
<b>Degree of protection</b>	IP66
<b>Electromagnetic compatibility</b>	Electromagnetic compatibility in accordance with all the relevant requirements of the EN 61326 series. For details refer to the Declaration of Conformity. <ul style="list-style-type: none"> <li>■ Interference immunity: as per IEC 61326-1, industrial environment</li> <li>■ Interference emission: as per IEC 61326-1, Class B</li> </ul>
<b>Electrical safety</b>	As per IEC 61010-1 Class I equipment, overvoltage category II, pollution degree 2
<b>Altitude</b>	< 2 000 m (6 560 ft) over MSL

## Process

<b>Medium temperature range</b>	-20 to 80 °C (-4 to 176 °F)
<b>Process pressure range</b>	≤ 1.5 bar (21.8 psi) overpressure (e.g. when silo is filled)
<b>Solids weight</b>	≥80 g/l (4.99 lb/ft <sup>3</sup> )
<b>Grain size</b>	≤50 mm (1.97 in)

## Mechanical construction

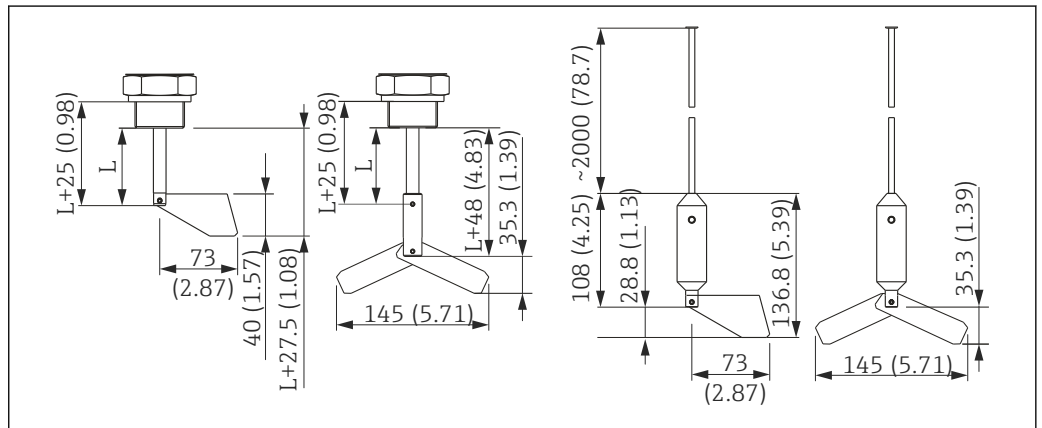
### Design, dimensions



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5 Dimensions of the point level switch, dimensions in mm (in)

- 1 Indicator light (optional)
- 2 Version with rope extension



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6 Dimensions of the rotating paddle - standard and foldable versions, for shaft and rope, dimensions in mm (in)

Dimensions depending on the version		
A	Process connection	NPT 1¼", NPT 1½", G 1½"
L	Length of shaft	75 to 300 mm (2.95 to 11.81 in)

### Weight

Version / part	Weight (approx.)
FTE20 with shaft 100 mm (3.94 in), plastic process connection	800 g (1.76 lb)
FTE20 with shaft 100 mm (3.94 in), metal process connection	1600 g (3.53 lb)
Hinged paddle	110 g (0.24 lb)
Rope extension	755 g (1.66 lb)

**Materials**

- Housing: Polycarbonate
- Captive screw cap: Polyamide
- Cover seal: Silicone
- Housing / process connection seal: Viton
- Process seal: Synthetic/organic fiber elastomer seal (asbestos-free)  
NPT versions do not have a process seal and the thread must be sealed by the customer onsite, e.g. using a Teflon tape.
- Shaft seal: NBR
- Process connections: G3/4": Stainless steel 303  
Other versions: Stainless steel 303 version or PBT version

**Cable entries**

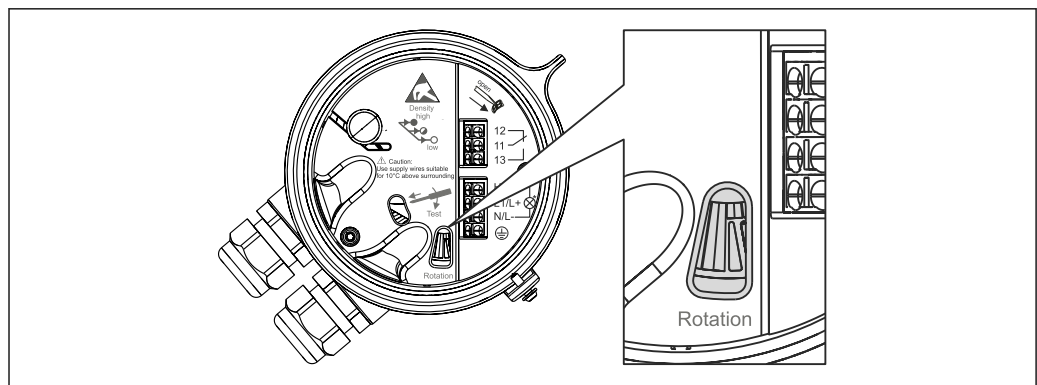
2 x cable gland, M20 x1.5  
(optionally 1 x cable gland M20 x 1.5 and indicator lamp)  
Permitted cable diameter  
5 to 9 mm (0.2 to 0.35 in)


## Operability

**Local operation****Rotational movement display**

The shaft's rotational movement is displayed by a reflector disk fitted on drive shaft of the paddle and can be monitored through a sight opening in the drive/terminal cover. The disk's viewing area is lit up by an LED to make it easier to see.

If rotation monitoring (optional) detects an error, the LED flashes.



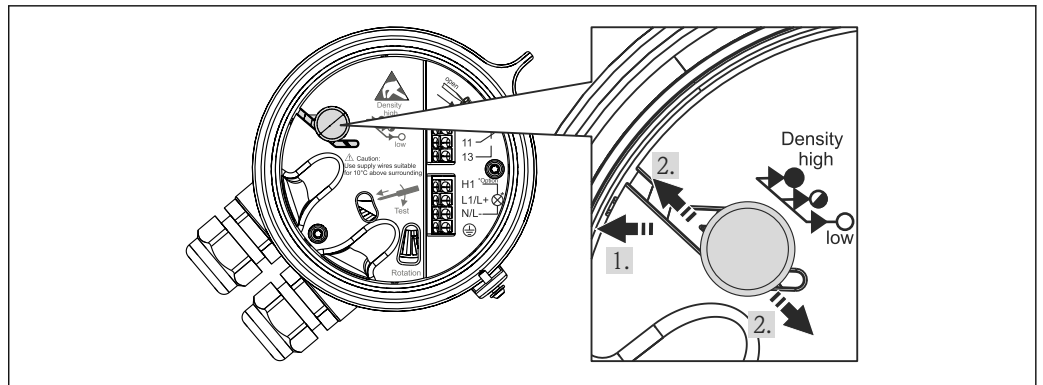
 7 Inspection glass to observe rotational movement

**Setting the switching threshold (sensitivity)**

The switching threshold can be adapted to the weight of the bulk solids in 3 stages via an operating element that is accessible from above (also possible during operation):

- Minimum: 80 g/l (4.99 lb/ft<sup>3</sup>)
- Depending on the density of the bulk solids adjustable in three stages: low, medium (default), high





8 Setting the switching threshold

## Certificates and approvals

### CE mark

The measuring system meets the legal requirements of the EU Directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

### Ex approval

Information about currently available Ex versions (ATEX, FM, CSA, etc.) can be supplied by your E+H Sales Center on request. All explosion protection data are given in a separate documentation which is available upon request.

### Other standards and guidelines

- IEC 60529:  
Degrees of protection provided by enclosures (IP code)
- IEC 61010-1: 2001 cor 2003  
Safety requirements for electrical equipment for measurement, control and laboratory use
- IEC 61326 series:  
Electromagnetic compatibility (EMC requirements)
- Climate class as per EN60654-1, Class C2

## Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: [www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: [www.endress.com/worldwide](http://www.endress.com/worldwide)



### 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
- Ability to order directly in the Endress+Hauser Online Shop

## Accessories

Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. 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](http://www.endress.com).

## Device-specific accessories

Accessories	Description
Flanged version, incl. seal and nut for the process connection	<div style="text-align: center;"> </div> <div style="display: inline-block;"> </div> <div style="text-align: center;"> <i>Dimensions of the flange connection, dimensions in mm (in)</i> </div> <div style="text-align: center;">           Order as an accessory in the product structure         </div> <div style="text-align: right; font-size: small;">           A0018472         </div>
Protective cover	<div style="text-align: center;">           Used to protect the measuring device from the adverse effect of the weather and sunlight when fitted in the roof of a silo.         </div> <div style="text-align: center;"> </div> <div style="display: inline-block;"> </div> <div style="text-align: center;"> <i>Dimensions of the protective cover, dimensions in mm (in)</i> </div> <div style="text-align: center;">           Order as an accessory in the product structure         </div> <div style="text-align: right; font-size: small;">           A0017694         </div>

## Documentation

Documentation on Endress+Hauser products is available for download at [www.endress.com/download](http://www.endress.com/download)

- Operating Instructions:  
BA01069F/09
- ATEX Safety instructions:  
XA01034F/09

[www.addresses.endress.com](http://www.addresses.endress.com)

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