



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



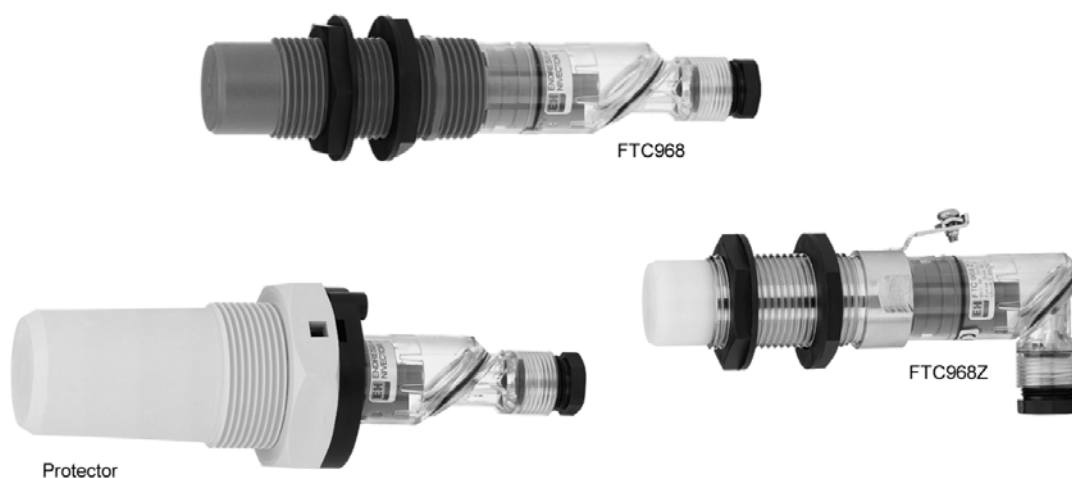
Solutions

## Technical Information

# Nivector FTC968, FTC968Z

## Capacitance

point level switch for powdery and fine-grained bulk solids



### Application

The Nivector is a very compact point level switch for minimum or maximum detection in silos containing free-flowing, powdery or fine-grained bulk solids (max. particle size 10 mm or 0,39 in).

Its construction and the materials used make the Nivector particularly suitable for installation in cramped conditions and for use with foodstuffs.

The Nivector FTC968Z can be used in dust-explosion hazardous areas, zone 20.

Typical applications:

Plastic granules, detergent, grain, sugar, spices, semolina, animal feed.

### Your benefits

- No calibration: quick and economical commissioning
- No mechanical moving parts: no wear, long service life
- High degree of immunity to electromagnetic interference and voltage peaks: reliable operation
- Switching status visible from outside the vessel: simple control
- Point level switch protected by "Protector": function test possible even when silo is filled

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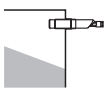

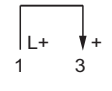


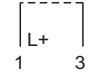
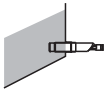

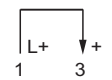


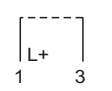


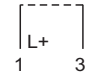
## Function and system design

### Measuring principle

The face of the Nivector acts as a sensor with regard to the environment and analyzes the different dielectric values of air and bulk solids. If the bulk solids come into contact with the face, the electronics change the switching status. The Nivector can be switched to either min. or max. fail-safe mode, ensuring quiescent current operation in all applications. The switching status is indicated by an LED. A screened electrode protects the sensor from interference from the vessel wall or from the effects of material build-up.

Depending on the fail-safe mode selected and the level, the Nivector switches and signals in the following cases:

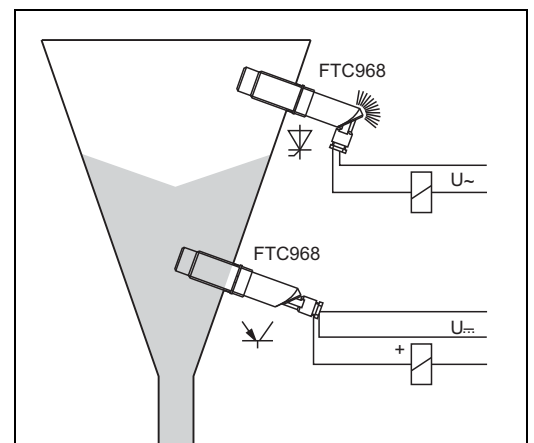
- point level is reached
- fault
- power failure (electrical switch is locked)

Level / fail-safe mode	LED	Version	
		AC	DC
			
 MAX	●		
			
 MIN	●		
			
	●		

L00-FTC968xx-15-06-xx-xx-001

### Measuring system

The Nivector FTC is a compact point level switch to which a miniature contactor, a solenoid valve or a programmable logic controller (PLC) can be directly connected.



L00-FTC968xx-14-06-xx-xx-001

### Modularity

Compact point level switch with the sensor part projecting into the silo

### Signal processing

- Two-wire AC version:  
Load switching via thyristor directly into the power circuit
- Three-wire DC version:  
Load switching via transistor and separate connection

## Input

<b>Measured variable</b>	Level (limit, binary)
<b>Measuring range (detection range)</b>	Determined by mounting point in silo

## Output

<b>Output signal</b>	Binary: Output blocked if point level is reached
<b>Signal on alarm</b>	Output is blocked

<b>Load</b>	<b>AC version</b>
	<p>Load switched via thyristor directly into the power circuit</p> <ul style="list-style-type: none"> <li>■ Transient (40 ms) max. 1.5 A, max. 375 VA at 253 V or max. 31.5 VA at 21 V (not resistant to short-circuit)            continuous max. 87 VA at 253 V (with FTC968Z max. 250 V), max. 7.4 VA at 21 V            min. 2.5 VA at 253 V (10 mA), min. 0.5 VA at 21 V (20 mA)            Voltage drop max. 12 V            Quiescent current max. 4 mA with blocked Thyristor</li> </ul>

### DC version

Load switched via transistor and separate PNP connection
<ul style="list-style-type: none"> <li>■ Transient (50 ms) max. 0.5 A, max. 55 V (resistant to cyclical overload and short-circuit)            continuous max. 350 mA;            max. 0.5 <math>\mu</math>F at 55 V, max. 1.0 <math>\mu</math>F at 24 V;            Quiescent voltage &lt; 3 V (with connected transistor);            Quiescent current &lt; 100 <math>\mu</math>A (with blocked transistor)</li> </ul>

<b>Fail-safe mode</b>	<p>Minimum/ maximum quiescent current, switchable</p> <p>MIN = Minimum safety: The output switches in a safety-oriented manner when the probe is cleared. (Signal on alarm). Used for example for dry-running protection</p> <p>MAX = Maximum safety: The output switches in a safety-oriented manner when the sensor is covered. (Signal on alarm). Used for example for overflow protection</p>
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<b>Switching time</b>	approx. 0.2 s after covering or clearing
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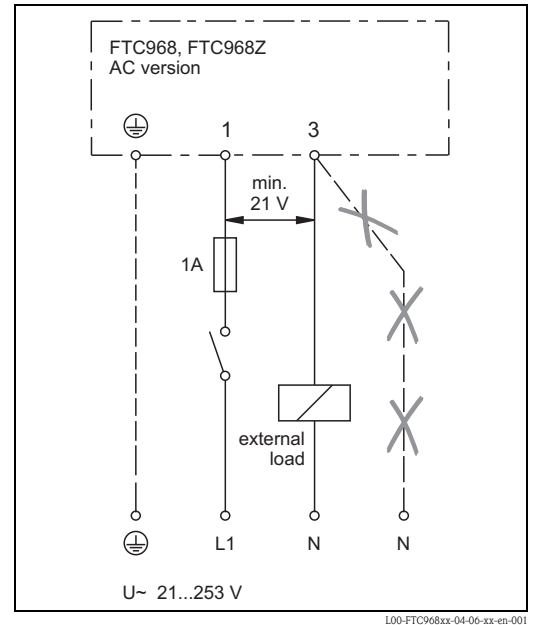
## Power supply

### Electrical connection

Screw terminals for max. 1.5 mm<sup>2</sup> (16 AWG) wire in sleeve A 1.5 - 7 as per DIN 46228;  
Cable gland Pg11, for cable diameter 6 to 8 mm (0,24...0,31 in)

#### Two-wire AC connection

Always connect a load in series!  
Take account of the voltage drop across the electronics when connected (max. 12V), the quiescent current when blocked (max. 4 mA) as well as the voltage drop across the load at low voltages. This ensures that the voltage across the Nivector does not fall below the minimum value of 21 V.

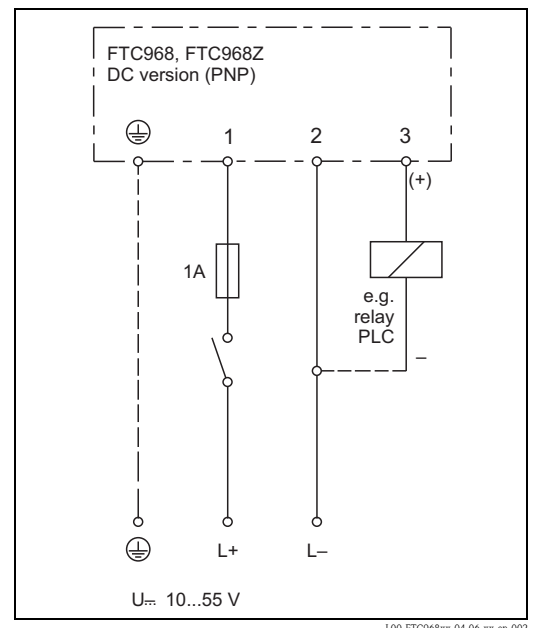


#### Three-wire DC connection

Preferred for programmable logic controllers (PLCs).  
Positive signal at the switching output of the electronics (PNP).

A ground connection is required only for the FTC968Z.

The Nivector FTC968 has double isolation .



### AC version

Voltage at terminals 1 and 3: 21 to 253 V, 50/60 Hz (with FTC968Z max. 250 V);  
Current consumption (stand-by) max. 4 mA

### DC version

10 to 55 V, ripple max. 1.7 V, 0 to 400 Hz;  
Current consumption max. 15 mA, reverse polarity protection

## Installation

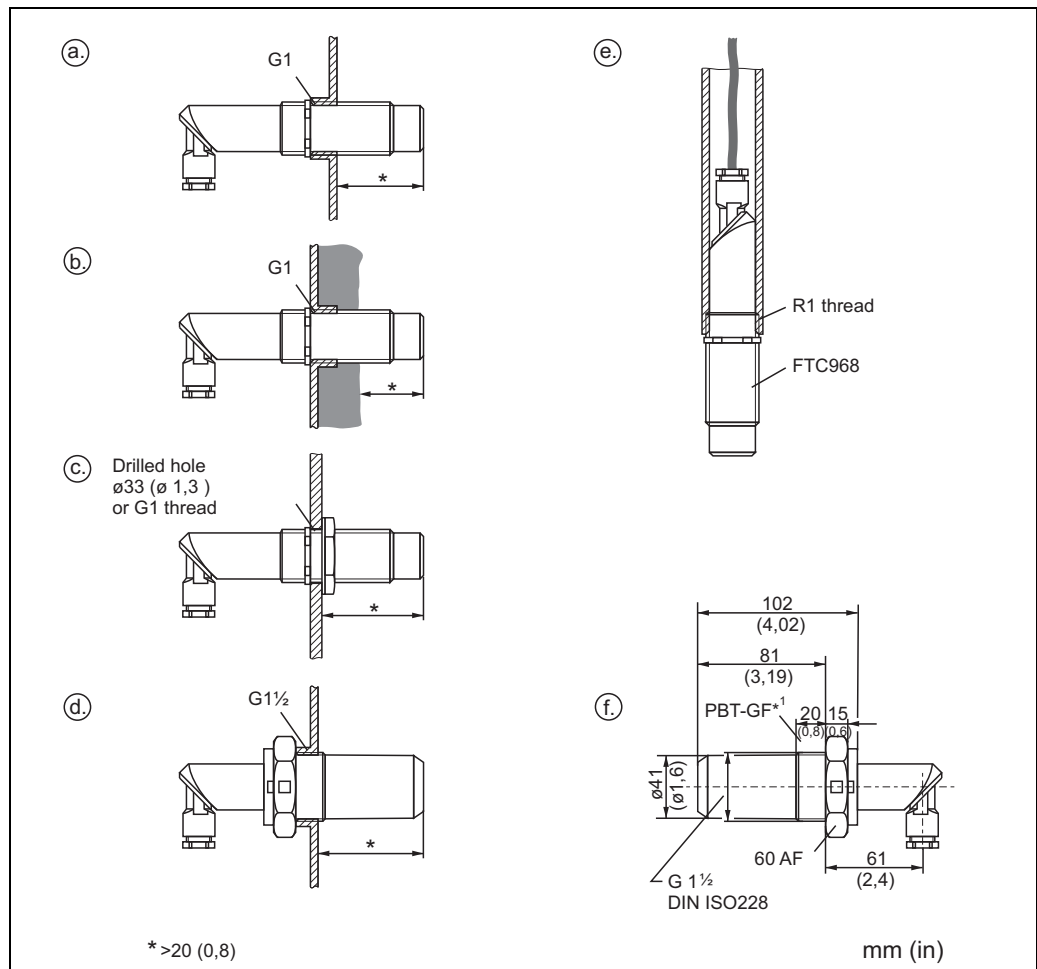
### Installation

The Nivector FTC968 may be installed and positioned in any orientation in a bulk solids silo.

Face >20 mm (>0,79 in) projecting into silo

Silo wall thickness <35 mm (<1,38 in) or G1 welding socket <50 mm (<1,97 in) long

### Orientation



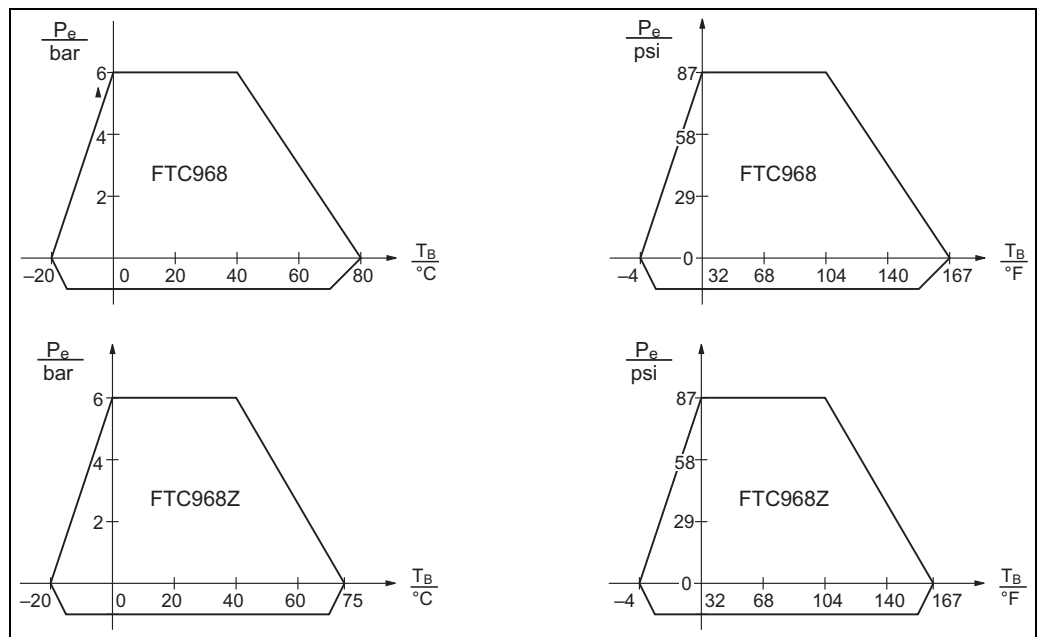
- Standard mounting with external G1 thread adapter
- Where build-up occurs on the silo wall with internal G1 thread adapter
- Without thread adapter but with drilled hole or threaded directly in the silo wall or a flange
- With "Protector" built-in adapter \*1 for G1 1/2 thread adapter; outflow protection sleeve for function testing when the silo is full. Protection of point level switch against damage by particularly abrasive or coarse product.
- In extension tube for mounting from above (not with FTC968Z)
- Dimensions of the "Protector"\*1 (accessory)

\*1 FDA-compliant

## Environment

<b>Ambient temperature</b>	-20...+60 °C (-4...140 °F)
<b>Limiting temperature range</b>	-20...+60 °C (-4...140 °F)
<b>Storage temperature</b>	-25...+85 °C (-13...185 °F)
<b>Degree of protection</b>	<ul style="list-style-type: none"> <li>■ FTC968: IP65/IP67 as per EN 60529</li> <li>■ FTC968Z: IP65</li> </ul>

<b>Electromagnetic compatibility</b>	Interference Emission to EN 61326, Electrical Equipment Class B Interference Immunity to EN 61326
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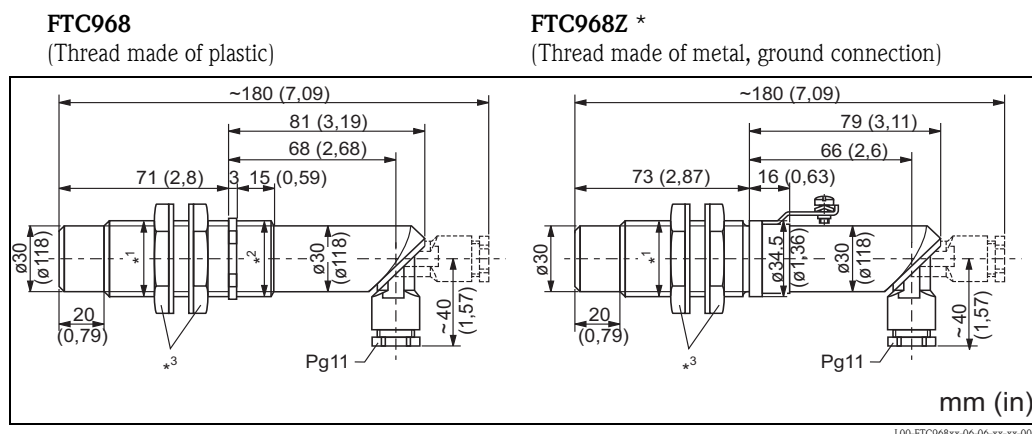
Permissible values for operating pressure  $p_e$  in silo are dependent on the operating temperature  $T_B$  in the silo.

## Process

<b>Medium temperature</b>	<ul style="list-style-type: none"> <li>■ FTC968: -20...+80 °C (-4...176 °F), see also above diagram</li> <li>■ FTC968Z: -20...+75 °C (-4...167 °F), see also above diagram</li> </ul>
<b>Medium temperature limits</b>	<ul style="list-style-type: none"> <li>■ FTC968: -40...+80 °C (-40...176 °F)</li> <li>■ FTC968Z: -20...+75 °C (-4...137 °F)</li> </ul>
<b>Medium pressure <math>p_e</math></b>	-1 to +6 bar (-15...90 psi), see also the following diagram
<b>Medium pressure limits</b>	Test pressure: 10 bar (145 psi) at 20 °C (68 °F)
<b>Medium particle size</b>	<10 mm (0,39 in)
<b>Relative dielectric constant <math>\epsilon_r</math> of product</b>	Min. 1.6

## Mechanical construction

### Design, dimensions



\* for use in dust-explosion hazardous area, zone 20

- \*1 G1 (cylindrical), DIN ISO 228/1
- \*2 R1 (conical), DIN 2999 (ISO 7/1)
- \*3 2 loose nuts 41 AF

### Weight

- FTC968: 0.14 kg (0,31 lbs)
- FTC968Z: 0.25 kg (0,55 lbs)

### Material

#### Wetted

- FTC968: Housing in blue PC, locking nuts in black PA
- FTC968Z: Housing in white ECTFE, threaded sleeve in nickel-plated brass, locking nuts in black PA
- "Protector" built-in adapter: FDA-listed material (as per 21 CFR Part 177.1660)

#### Not wetted

- Connection compartment in transparent PC

### Process connections

- FTC968:  
Cylindrical G1A thread with 2 nuts for mounting in a threaded coupling or wall opening and R1 thread (DIN 2999) for mounting in extension tube
- FTC968Z:  
Cylindrical G1A thread with 2 nuts for mounting in a threaded coupling or wall opening

## Operability

### Display elements

Red LED in connection compartment to indicate switching status, visible from outside

### Operating elements

Rotary switch to switch between minimum/maximum fail-safe mode  
 Adjuster for sensitivity in connection compartment  
 (set in factory to  $\epsilon_r > 1.6$  with Protector, to  $\epsilon_r > 2.0$  without Protector)



## Certificates and approvals

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**CE Mark** The device meets the legal requirements of the EC directives.  
Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

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**Ex approval**

DMT 00 ATEX E 026

Dust-Ex design approval  
ATEX: **CE** II 1/3 D



Note!

For applications in dust-explosive atmospheres, protect housing against impact.

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## Ordering information

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**FTC968**

- AC version: Order no. 918098-0000
  - DC version: Order no. 918098-0140
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**FTC968Z**

- AC version: Order no. 918098-1000
  - DC version: Order no. 918098-1140
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## Accessories

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**"Protector" built-in adapter  
and  
outflow protection**

G1 1/2 A: Order no. 917255-1000

Wetted part of "Protector" built-in adapter:  
FDA-listed material (as per 21 CFR Part 177.1660)

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## Documentation

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**Safety Instructions (FTC968Z)** XA00078F/00/a3 (ATEX)

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**General information on EMC** TI00241F/00/en

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**Certificates** ZE00168F/00/en (design approval)

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