Technical Information
Nivector FTC968, FTC968Z
Capacitance

Point level switch for powder and fine-grained bulk solids

Application
The Nivector is a small-sized point level switch for minimum or maximum detection in silos containing free-flowing, powdery or fine-grained bulk solids (max. particle size 10 mm (0.39 in)).

Its compact design 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

- Easy and economical commissioning: preliminary calibration at the factory
- Long service life: no mechanical moving parts, no wear
- Reliable operation: high degree of immunity to electromagnetic fields and voltage peaks
- Simple control: switching status visible from outside the vessel
- Point level switch protected by "Protector": removal and function test possible even when silo is filled

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People for Process Automation

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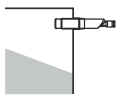
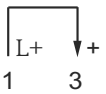
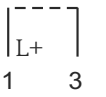
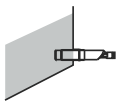
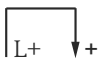
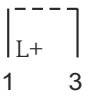
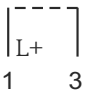
Function and system design

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 (red)	Options: Two-wire AC voltage (AC)	Options: Three-wire DC voltage (DC PNP)
			
 MAX	●		
	☼		
 MIN	●		
	☼		
	●		

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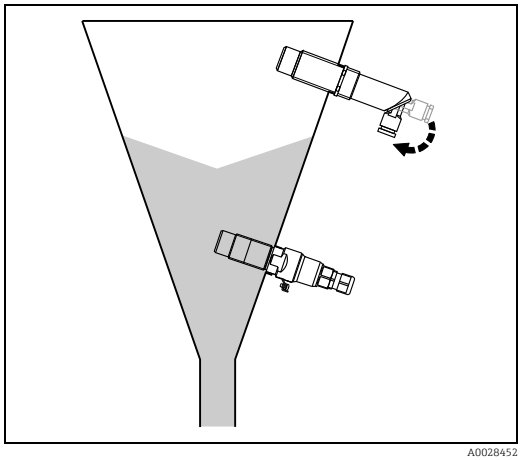
Measuring system

A miniature contactor, a solenoid valve or a programmable logic controller (PLC) can be directly connected to the point level switch.



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Examples: Nivector FTC968, FTC968Z

Signal processing

- Two-wire AC voltage (AC): load switching via thyristor directly into the power circuit, or
- Three-wire DC voltage (DC PNP): load switching via transistor and separate connection

Input

Measured variable	Level (point level switch)
Measuring range (detection range)	All media ≥ DK 1.6 (can be set via potentiometer)

Output

Output signal	Binary: output of thyristor or transistor is blocked if the point level is reached
Signal on alarm	Output of thyristor or transistor is blocked
Load (connectible load)	**Two-wire AC voltage (AC)** Load switched via thyristor directly into the power circuit. ▪ Continuous load – max. 7.4 VA at 21 V – max. 87 VA at 253 V – min. 2.5 VA at 253 V (10 mA) min. 0.5 VA at 21 V (20 mA) ▪ Pulse load (40 ms) – max. 1.5 A max. 375 VA at 253 V max. 31.5 VA at 21 V (not short-circuit proof) ▪ Voltage drop: max. 12 V ▪ Quiescent current: max. 4 mA with blocked thyristor **Three-wire DC voltage (DC PNP)** Load switched via transistor and separate PNP connection. ▪ Continuous load – max. 350 mA – max. 0.5 µF at 55 V max. 1.0 µF at 24 V ▪ Pulse load (50 ms) – max. 0.5 A max. 55 V (resistant to cyclical overload and short-circuit) ▪ Quiescent voltage: 3 V (with connected transistor) ▪ Quiescent current: < 100 µA (with blocked transistor)
Fail-safe mode	Minimum/maximum quiescent current, switchable 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 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
Switching time	Approx. 0.2 s after covering or clearing

Power supply

Electrical connection

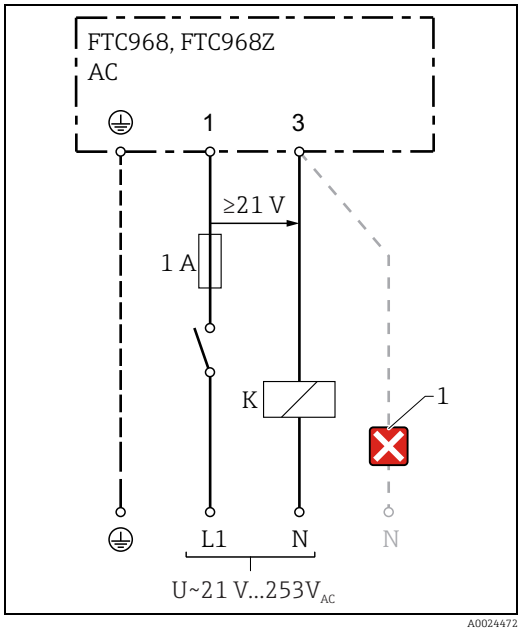
- Screw terminals for max. 1.5 mm² (16 AWG); wire in sleeve
- Cable gland: FTC968 Pg11, ø6 to 8 mm (0.24 to 0.31 in), FTC968Z M20, ø6 to 13 mm (0.24 to 0.43 in)
- Double isolation: only for FTC968
- Ground connection: only for FTC968Z

Two electronic versions are available for the device. A fine-wire fuse is necessary for operation: 1 A slow-blow (AC), 500 mA slow-blow (DC PNP).

Two-wire alternating voltage (AC)
Always connect a load in series!
Take the following into consideration to ensure that the minimum terminal voltage at the Nivector (21 V) is not undershot:

- The voltage drop across the electronics when switched through (max. 12 V),
- The residual current in the blocked state (max. 4 mA),
- The voltage drop over the load at a low connection voltage.

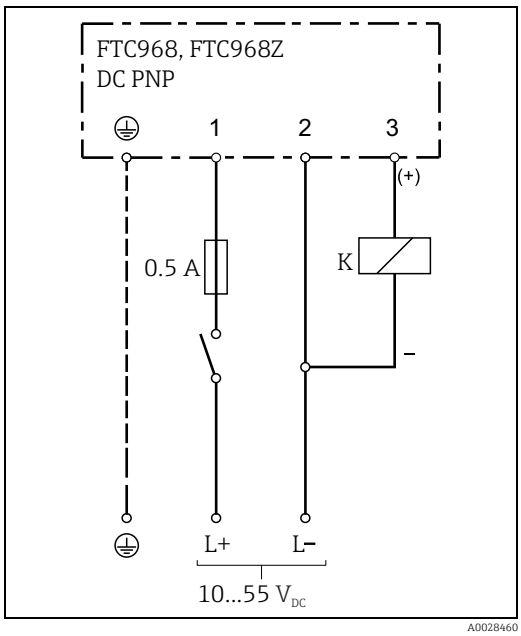
K = external load, e.g. relay, PLC



1 Do not operate without a load!

Three-wire DC voltage (DC PNP)
Preferred for programmable logic controllers (PLCs).
Positive signal at the switching output of the electronics (DC PNP).

K = external load, e.g. relay, PLC



Two-wire alternating voltage (AC)

- Voltage at terminals 1 and 3: 21 to 253 V_{AC}, 50/60 Hz
- Current consumption (thyristor blocked) max. 4 mA

Three-wire DC voltage (DC PNP)

- 10 to 55 V_{DC}, ripple max. 1.7 V, 0 to 400 Hz
- Current consumption max. 15 mA, reverse polarity protection

Overvoltage protection

Overvoltage category II

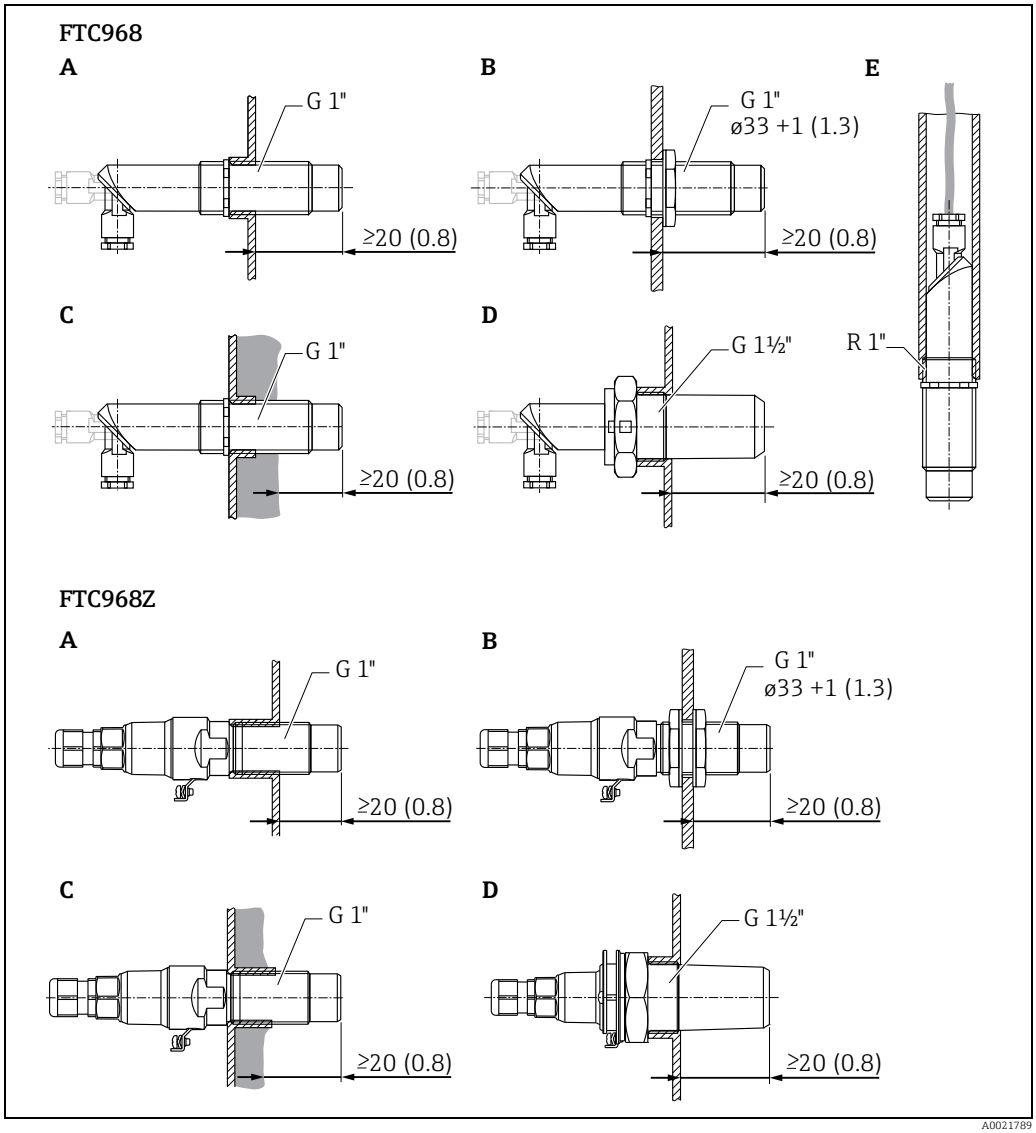
Installation

Installation instructions

The point level switch 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 welding socket G 1" < 50 mm (1.97 in) long

Orientation



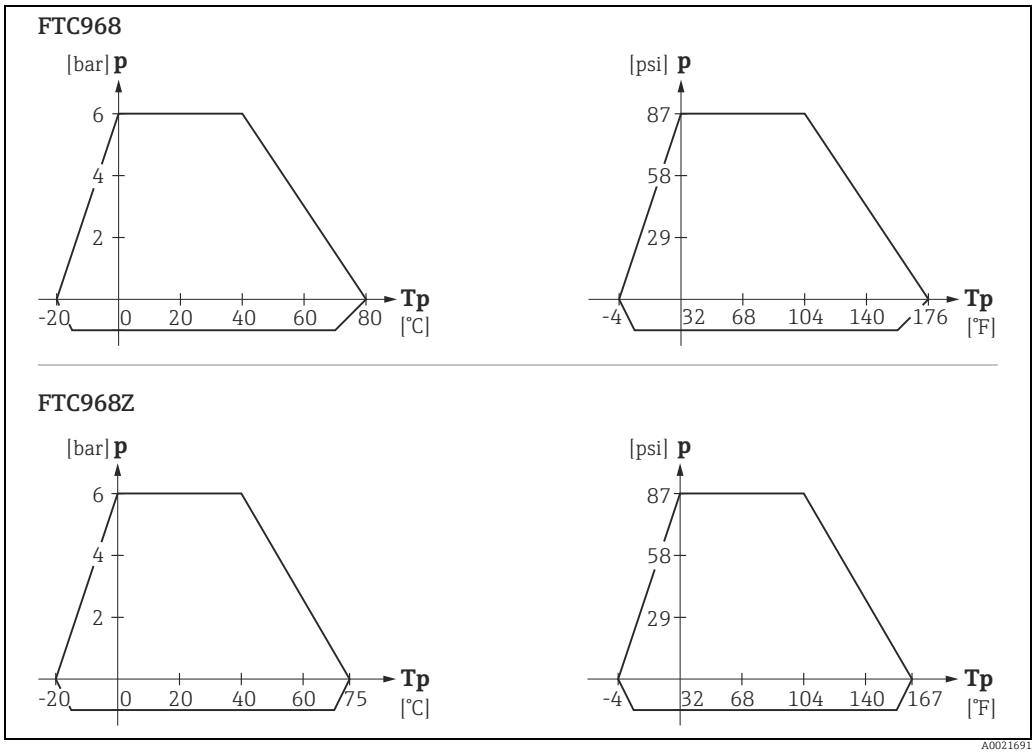
Dimensions in mm (in)

A: Standard mounting with external G 1" threaded adapter
B: Bore hole in silo wall
C: Where build-up occurs on the silo wall with internal G 1" threaded adapter
D: With "Protector"[1] built-in adapter for G 1½" threaded adapter;
outflow protection for function testing when the silo is full.
Protection of point level switch against damage by particularly abrasive or coarse product.
[1] "Protector" built-in adapter: FDA-compliant, dimensions → 8
E: Only for FTC968: in extension pipe for installation from above

Environment

Ambient temperature	−20 to +60 °C (−4 to 140 °F)
Storage temperature	−25 to +85 °C (−13 to 185 °F)
Degree of protection	IP66/67 according to EN 60529
Electromagnetic compatibility	Interference Emission to EN 61326, Electrical Equipment Class B Interference Immunity to EN 61326
Pollution degree	2
Altitude	Up to 2000 m (6600 ft) above mean sea level

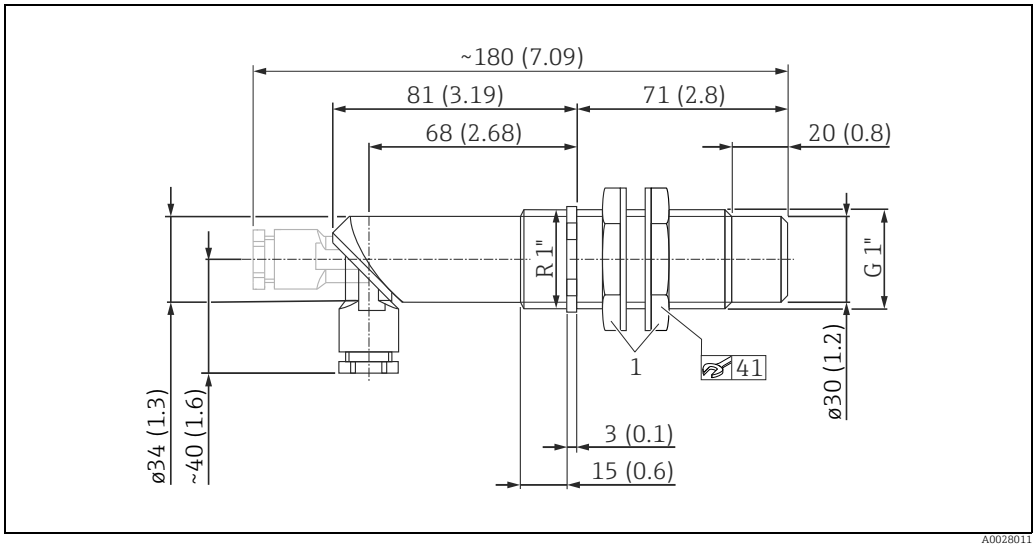
Process

Process temperature range	▪ FTC968: −20 to +80 °C (−4 to 176 °F) ▪ FTC968Z: −20 to +75 °C (−4 to 167 °F)
Process pressure	−1 to +6 bar (−15 to 90 psi)
Pressure-temperature ratings	 *Permissible values for the process pressure p in the silo are dependent on the process temperature T_P in the silo*
Medium particle size	< 10 mm (0.39 in)
Dielectric constant	Min. ε_r 1.6

Mechanical construction

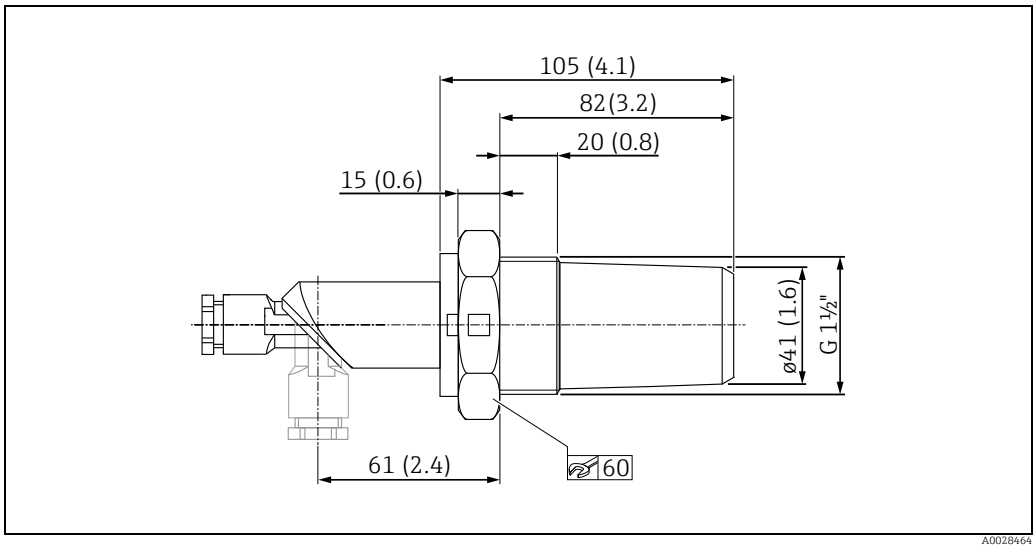
Design, dimensions

FTC968 with thread made of plastic



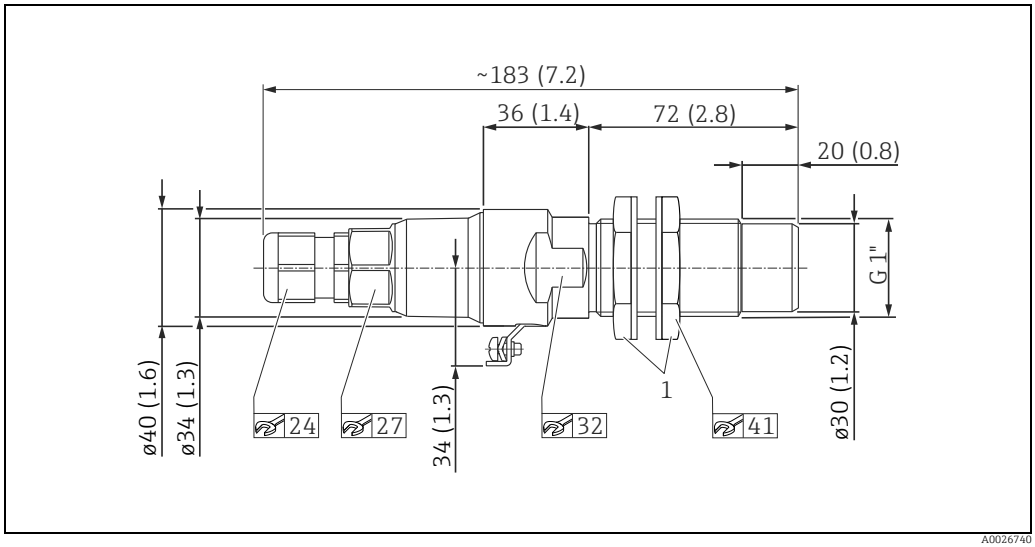
1 Lock nuts; dimensions in mm (in)

FTC968 with Protector



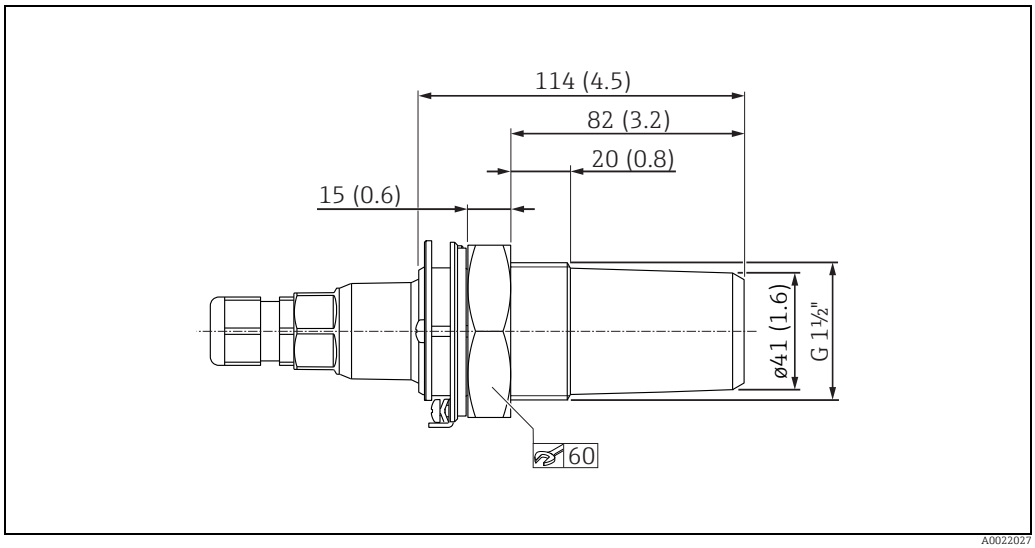
Dimensions in mm (in)

FTC968Z with thread made of metal



Dimensions in mm (in)
Also for use in dust incendive hazard areas, zone 20
1 Lock nuts

FTC968Z with Protector

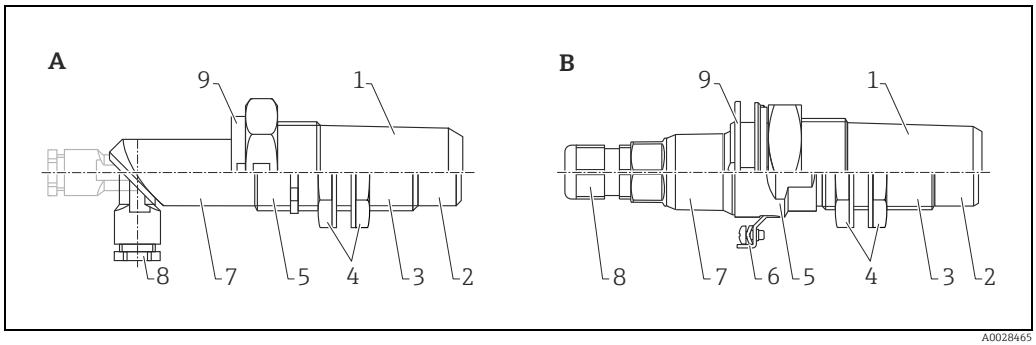


Dimensions in mm (in)

Weight

- FTC968: 140 g (4.94 oz)
- FTC968Z: 292 g (10.29 oz)

Material



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Item	Component part	Material	
		A: FTC968	B: FTC968Z
Wetted			
1	Protector (optional)	PBT GF20 FDA-listed material in accordance with 21 CFR Part 177.1660	PBT GF20
2	Probe	PC (blue)	ECTFE (white)
3	Threaded sleeve	PC (blue)	316L (1.4404)
4	Lock nut	PA (black)	PA (black)
Not wetted			
5	Housing	PC (blue)	316L (1.4404)
6	Ground terminal	–	304 (1.4301)
7	Cover Terminal block (internal)	PC (transparent) PC (blue)	PC (transparent) PC (blue)
8	Cable gland	PA (black)	PA (black)
9	Protector retaining ring (optional)	POM (black)	POM (white)

Process connections

- FTC968:
  Thread G 1" A (ISO228), two lock nuts for mounting in a threaded coupling or wall opening
  Thread R 1" (DIN EN 10226) for mounting in an extension pipe
- FTC968Z:
  Thread G 1" A (ISO228), two lock 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

- Switch to set the minimum/maximum fail-safe mode
- Potentiometer for switching sensitivity in connection compartment
  Factory setting: ε_r > 1.6 with Protector, ε_r > 2.0 without Protector

Certificates and approvals

CE mark

The measuring system meets the legal requirements of the applicable EC directives.
These are listed in the corresponding EC Declaration of Conformity along with the standards applied.
Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

Ex approval

DMT 00 ATEX E 026 X

Dust-Ex design approval
ATEX: ⟨Ex⟩ II 1/3 D

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

Ordering information

Nivector FTC968

Two-wire AC voltage (AC) order number: 918098-0000
Three-wire DC voltage (DC PNP) order number: 918098-0140

Nivector FTC968Z

Two-wire AC voltage (AC) order number: 918098-1000
Three-wire DC voltage (DC PNP) order number: 918098-1140

Accessories

Built-in adapter and outflow protection

- Protector for FTC968 order number: 71329077
- Protector for FTC968Z order number: 71329083
- Thread G 1½" A
- Material (wetted): FDA-listed material in accordance with 21 CFR Part 177.1660

Documentation

Compact Instructions

KA00072F/00/A6 Nivector FTC968
KA00101F/00/A6 Nivector FTC968Z

Safety Instructions

XA00078F/00/A3 ATEX, Nivector FTC968Z

Protector Installation Instructions

SD01648F/00/A2

General information on EMC

TI00241F/00/EN

www.addresses.endress.com

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