

# Уровнемеры Transmitter FTC470Z, FTC471Z

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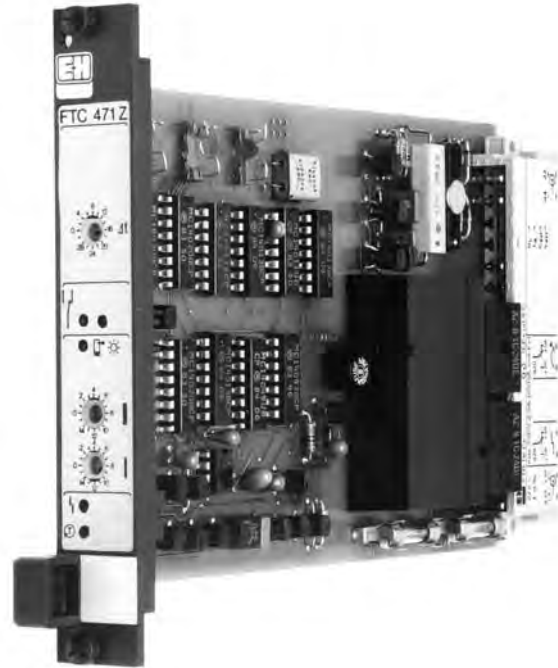
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# Capacitance Limit Detection *nivotester FTC 470 Z, 471 Z*

## Capacitance limit switch for liquids and bulk solids



### Application

The Nivotester FTC 470 Z, 471 Z is a level limit switch in compact Racksyst format for limit detection in liquids tanks and bulk solids silos.

The intrinsically safe probe current circuit [EEx ia] IIC T6 allows the use of the probes also in explosion-hazardous areas.

FTC 470 Z: without switching delay

FTC 471 Z: with adjustable switching delay

### Features and Benefits

- Approved for overspill protection – for water-polluting liquids conforming to German water regulations (WHG)
- User-friendly calibration
- Signal transmission over two-core cable
- With function monitoring of electronics and connection cables
- Each with one potential-free output for level signal and flow alarm, consequently safety precaution against fault response
- Wide supply voltage tolerance allows low-cost power supply from simple power pack

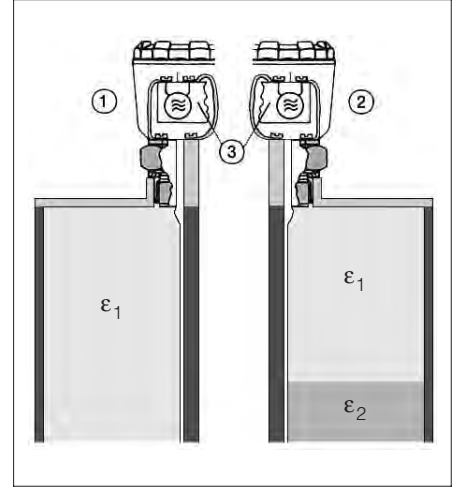
## Measuring System

The complete measuring system comprises:

- a Nivotester FTC 470 Z or FTC 471 Z
- a suitable electronic insert (see Technical Data)
- a probe matching the application.

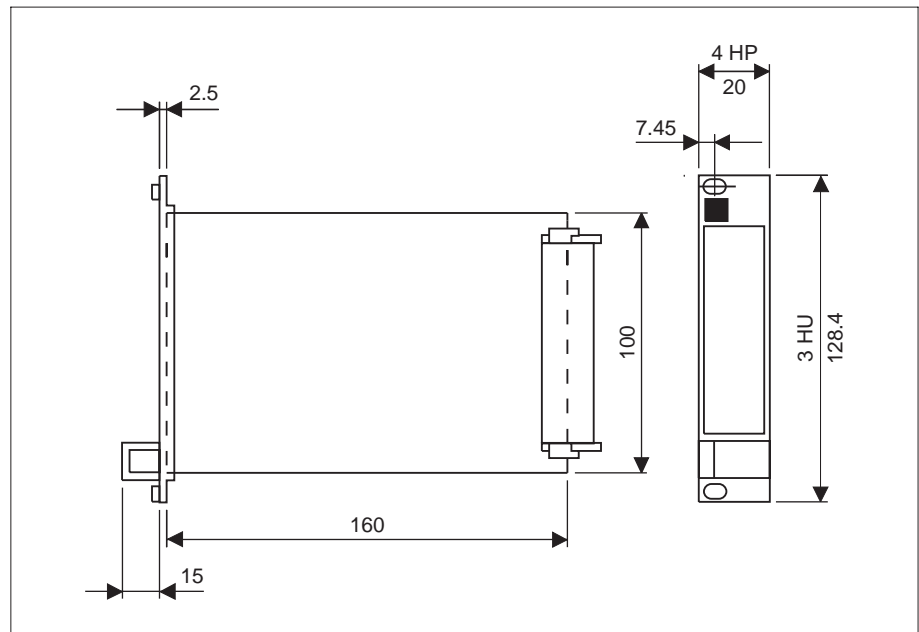
## Measuring Principle

The capacitance measurement principle is based on the physical properties of a capacitor formed by the sensor and the vessel wall. The capacitance is affected by the dielectric value of the product. When the sensor is not covered ①, the dielectric constant is  $\epsilon_1$  (usually  $\epsilon_1$  of air with  $\epsilon_r = 1$ ). When the sensor is covered with material ② (dielectric constant  $\epsilon_2$ ), an increase in capacitance occurs. The electronic insert EC... is either mounted in the probe head (③) or, at operating temperatures above 100 °C, in the separate protection housing HTC. It converts the level-dependent capacitance signal into a frequency, which is then transmitted over two-core cable to the Nivotester FTC... as a series of current pulses superimposed on the DC power supply: pulse-frequency-modulation (PFM).



The principle of capacitance limit detection

## Dimensions



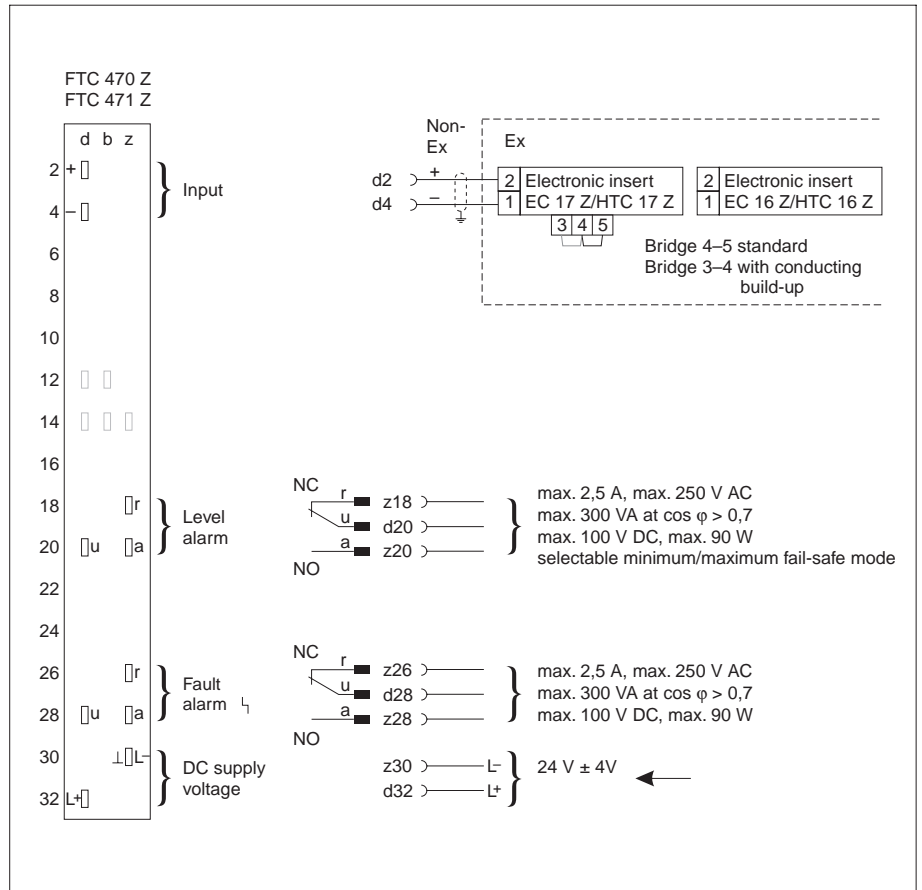
Dimensions in mm  
of the Nivotester  
FTC 470 Z / FTC 471 Z

100 mm = 3.94 in

# Electrical Connection

Electrical connection of the Nivotester FTC 470 Z / FTC 471 Z in the assembly rack.

View on the contact blades on the unit's male multipoint or on the connection side of the female connector in the rack.



# Product Structure

**FTC 470 Z** Level limit switch  
**FTC 471 Z** Level limit switch with adjustable switching delay

### Certificate

- A ATEX II (1) GD [EEx ia] IIC, WHG
- C CSA, Class I, Groups A-D, Class II, Group E-G
- K TIIS, Ex ia IIC T3
- Y Special version

### Version

- 0 RACKSYST plug-in card, 4PU
- 9 Special version

### Power supply

- E Power supply 20...28 V DC
- Y Special version

### Switch output; Limit signal and fault indication

- 0 Output: 1relay, volt free SPDT
- 3 Output: 1 open collector
- 9 Special version

FTC 47x Z -

Product designation

## Technical Data

Mechanical construction	Racksyst plug-in board to DIN 41494, Part 2 and Part 4; t = 160, h = 100 (Europa format)
Connection	strip to DIN 41612, Part 3, Format F
Coding pins in strip	for FTC 470 Z / 471 Z with relay output at Points 1 and 6
Width	4 HP (20 mm)
Protection type to DIN 40050	front panel IP 20, plug-in board IP 00
Permissible ambient temperature	0 °C...+70 °C (30 °F...160 °F)
Storage temperature	-20 °C...+85 °C (0 °F...185 °F)
DC supply voltage	24 V ± 4 V
Current consumption	70 mA
Input	galvanically isolated from other circuits
Suitable electronic insert	
• in probe head	EC 16 Z / EC 17 Z
• in separate housing	HTC 16 Z / HTC 17 Z
Explosion protection type	[EEx ia] IIC T6 (Zone 0)
Electromagnetic compatibility	Interference Emission to EN 61326, Electrical Equipment Class A Interference Immunity to EN 61326
Connection cable	2 -core, screened
Cable resistance	max. 25 Ω per core
Short circuit current	max. 50 mA (continuous short circuit proof)
Initial capacitance range $C_A$	approx. 20 pF...1000 pF
Outputs	each with 1 relay with potential-free change-over contact
Max. contact load	U~: 250 V, U-: 100 V, I~: 2.5 A, P~: 300 VA, cos φ > 0.7, P-: 90 W
Electrical connection	See diagram on page 3
Safety mode for level alarm	selectable min./max. safety mode
Switching delay	FTC 470 Z: 0.5 s, FTC 471 Z: 0...30 s
Switching hysteresis	0.5 pF (at $C_A = 30$ pF)
Compensation for build-up	The switchpoint can be adjusted further from point $C_A$ with the switch if build-up is expected on the probe.

## Supplementary Documentation

- Electronic Insert EC 16 Z  
Technical Information TI 170F/00/en
- Electronic Insert EC 17 Z  
Technical Information TI 268F/00/en
- Electronic insert in separate housing  
HTC 16 Z  
Technical Information TI 171F/00/en
- Separate housing for electronic insert  
Technical Information TI 228F/00/en
- EMC Test Procedures  
Technical Information TI 241F/00/en

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