Technical
Information
TI 192F/00/en

Operating Instructions
017191-1000

Capacitance Limit Detection
Rod Probes 11 450, 11 450 ZS

PE-partially-insulated rod probes for pressures up to 30 bar (440 psi)









Applications
The rod probe 11 450 is used primarily for capacitance level limit detection in solids at temperatures up to +80 °C (180 °F) and pressures up to 30 bar (440 psi).

The 11 450 ZS version is approved for use in Zone 10 dust explosion hazardous areas. This zone includes areas which often or permanently contain hazardous, potentially explosive dusts.

Versions
The two basic models 11 450 and 11 450 ZS are available in different versions:

Process connection
- G 1 $^1/_2$ A or NPT 1 $^1/_2$" threaded boss
- DIN (DN 50 to DN 100) or ANSI (2" to 4") flange (not available for 11 450 ZS)

Materials
- Steel rod, PE partly insulated
- 1.4571 stainless steel rod, PE partly insulated

Housing
- Aluminium housing IP 66
- Coated aluminium housing IP 66
- Polyester housing (PBTP) IP 66 (not available for 11 450 ZS)

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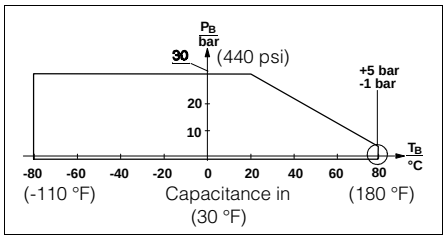
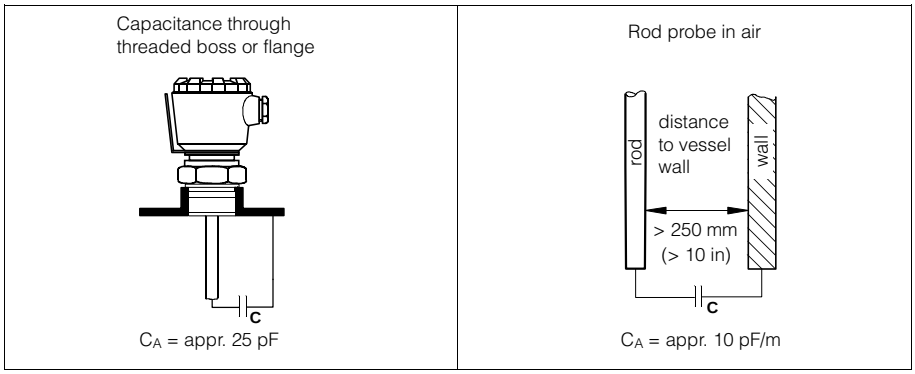
Technical Data

Operating Data

Relationship between permissible operating pressure and operating temperature



Capacitance value of the probe



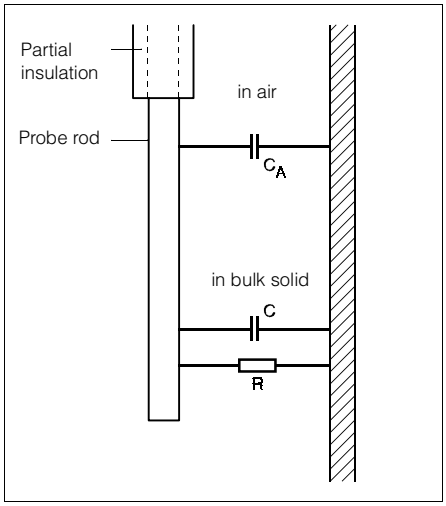
Materials

Information about the materials used is given with the product structures on Pages 4 and 5.

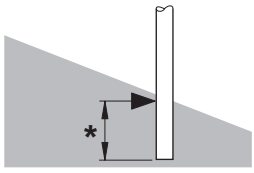
- Partial insulation: PE
- Threaded boss: galvanised steel or stainless steel 1.4301
- Probe rod: steel or stainless steel 1.4571

Operating Principle

The probe forms a capacitor with the vessel wall or counter electrode so that when the probe is in the air, the capacitance has a known, low, base value. When the probe is immersed in material, a parallel circuit is formed by the larger capacitor and the resistance of the material. It is this impedance which is measured. Consequently, when the partly insulated probe is used for limit switching, the switchpoint is unaffected by changes in the dielectric constant or capacitance even when the material is of very low conductivity. Continuous measurement with partly insulated probes is not possible with conductive materials.



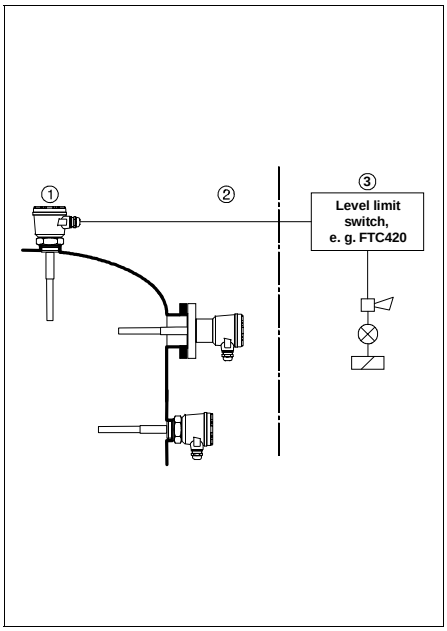
Probe Length

Type of material, relative dielectric constant ε_r	 * additional length to be immersed
electrically conductive	10 mm (0.4 in)
non-conductive:	
$\varepsilon_r > 10$	100 mm (4 in)
ε_r 5 ... 10	200 mm (8 in)
ε_r 2 ... 5	500 mm (20 in)
ε_r 1.5 ... 2	600 mm (24 in)

The lengths given are minimum lengths to be added to that from the seal of the flange or thread to the limit level required.
Probe length tolerances - see Page 4.

It is important for safe operation that the difference in capacitance between the covered and uncovered parts of the probe is at least 10 pF.
Contact us for advice in cases where the dielectric constant of the material is unknown.

Measuring System and Type of Mounting



Measuring device
① Electronic insert in probe head
② 2- or 3-wire connecting cable
③ Level limit switch

Vertical Mounting
For non-conductive materials, the height of the switchpoint can be adjusted on the level limit switch. A minimum length of the probe must be immersed in the product for it to function correctly. Therefore a probe should be used which is longer than the distance between the mounting position and the switchpoint.

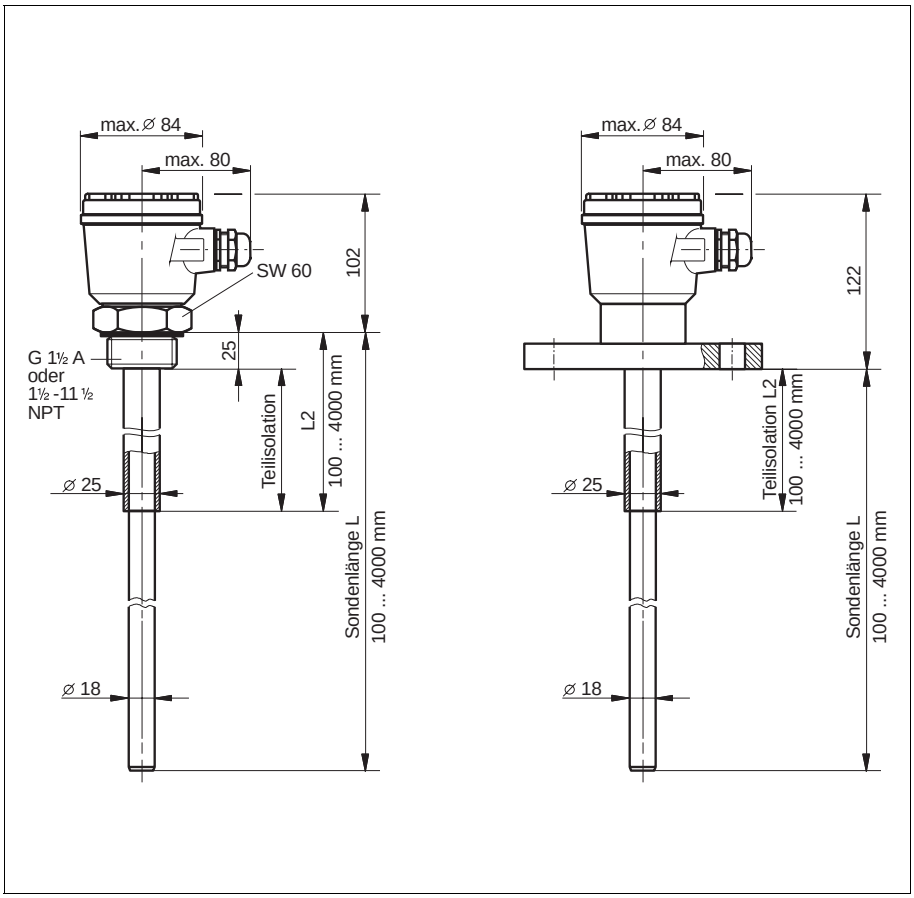
Horizontal Mounting
If the probe is mounted horizontally, the limit switch trips exactly to the centimetre at the point determined by the mounting position. The probe should, in this case, fit as closely as possible to the vessel wall, so that no material can build up in the connection.

Recommended minimum probe lengths - see table on Page 2.

Probe 11450 ZS
Observe all local regulations covering explosion protection and the instructions stated in certificates for probes and electronic inserts.
The special guidelines/requirements given in the design approval certificate under Section (A7) 1. and 2. are fulfilled when an EC 17 Z is fitted in the probe.

If you wish to remove an electronic insert but not to replace it with another one immediately, then connect the central screw in the probe housing to the ground connection. This prevents an electrostatic charge forming on the probe.

Dimensions



All dimensions
in mm
100 mm = 3.94 in
1 in = 25.4 mm

Left:
Rod probe 11 450
with threaded boss

Right:
Rod probe 11 450
with flange

Product Structure for the Rod Probe 11 450

Partly insulated rod probe 11 450

	Process connection / Material	**Weight**
G1	Thread G $1^1/_2$ A / steel	0.5 kg
G2	Thread G $1^1/_2$ A / 1.4301	0.5 kg
H1	Thread NPT $1^1/_2$" / steel	0.5 kg
H2	Thread NPT $1^1/_2$" / 1.4301	0.5 kg
K1	Flange DN 50 PN 16 / steel	3.0 kg
K2	Flange DN 50 PN 16 / 1.4571	3.0 kg
P1	Flange DN 100 PN 16 / steel	5.4 kg
P2	Flange DN 100 PN 16 / 1.4571	5.4 kg
Q1	Flange ANSI 2" 150psi / steel	3.2 kg
Q2	Flange ANSI 2" 150psi / 1.4571	3.2 kg
R1	Flange ANSI 4" 150psi / steel	5.4 kg
R2	Flange ANSI 4" 150psi / 1.4571	5.4 kg
Y9	Other process connections on request	

Partial insulation material

A	PE partial insulation	
Y	Other materials on request	

Length of partial insulation (from 100 mm)

1	...mm partial insulation (give length in mm)	
2	100 mm partial insulation length	
9	Special length on request	

Material / rod

A	Steel rod	2.2 kg/m
B	1.4571 rod	2.2 kg/m
Y	Other materials on request	

Length of probe (100...4000 mm)

1	...mm probe length (give length in mm)	
2	350 mm (length, can be shortened)	
3	500 mm (length, can be shortened)	
4	1.000 mm (length, can be shortened)	
9	Special length on request	

Housing / Cable entry

B	Aluminium housing IP66, Pg16 (IP66)	0.4 kg
C	Aluminium housing IP66, NPT ½"	0.4 kg
D	Aluminium housing IP66, G ½	0.4 kg
E	Aluminium housing IP66, M20×1.5	0.4 kg
F	Aluminium housing IP66, HNA24×1.5	0.4 kg
K	PBTP-plastic housing IP66, Pg16 (IP66)	0.3 kg
L	PBTP-plastic housing IP66, NPT ½"	0.3 kg
M	PBTP-plastic housing IP66, G ½	0.3 kg
O	PBTP-plastic housing IP66, M20×1.5	0.3 kg
P	PBTP-plastic housing IP66, HNA24×1.5	0.3 kg
R	Coated aluminium housing IP66, Pg16 (IP66)	0.4 kg
T	Coated aluminium housing IP66, NPT ½"	0.4 kg
U	Coated aluminium housing IP66, G ½	0.4 kg
V	Coated aluminium housing IP66, M20×1.5	0.4 kg
W	Coated aluminium housing IP66, HNA24×1.5	0.4 kg
Y	Special version on request	

Electronic insert

A	Without electronic insert	
C	EC 17 Z built-in	0.2 kg
D	EC 27 Z built-in	0.2 kg
Y	Other electronic inserts on request	

Total weight [ ] kg

11 450 — [ ][ ][ ][ ][ ][ ][ ][ ] product designation

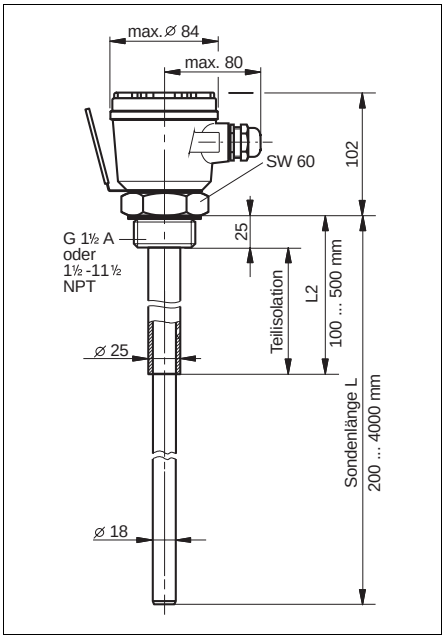
1.4571 = SS 316 L 1.4301 = SS 304 H 1 kg = 2.2 lbs

Probe Length Tolerances

These probe length tolerances apply to the partly insulated rod probes 11 450, 11 450 M and 11 450 ZS.

Probe length	Tolerances
up to 3 m	+0 mm, –10 mm
up to 4 m	+0 mm, –20 mm

Product Structure for the Rod Probe 11 450 ZS



Rod probe 11 450 ZS

Partly insulated rod probe 11 450 ZS for Zone 10 dust explosion hazardous areas

Certificates / approvals — **Weights**

D St Ex Zone 10 (BVS)

For connection to level limit switch Nivotester (type as per name-plate)

C FTC 470 Z / 471 Z, EC 17 Z
D FTC 671 Z, EC 27 Z
X No specific instrument

Process connection / Material

G1 Thread G 1½ A / steel	0,5 kg
G2 Thread G 1½ A / 1.4301	0.5 kg
H1 Thread NPT 1½" / steel	0.5 kg
H2 Thread NPT 1½" / 1.4571	0.5 kg

Y9 Other process connections on request

Partial insulation material

A PE - partial insulation
Y Other materials on request

Length of partial insulation (100…500 mm)

Maximum length of partial insulation: length of the probe less 100 mm
1 …m length of partial insulation (give length in mm)
2 250 mm length of partial insulation (standard)

Material / rod

A Steel rod	2.2 kg/m
B 1.4571 rod	2.2 kg/m

Y Other materials on request

Length of probe (200…4000 mm)

1 …m probe length (give length in mm)
2 350 mm fixed length
9 Special length on request

Housing / Cable entry

B Aluminium housing IP66, Pg16 (IP66)	0.4 kg
C Aluminium housing IP66, NPT ½"	0.4 kg
D Aluminium housing IP66, G ½	0.4 kg
E Aluminium housing IP66, M20×1.5	0.4 kg
F Aluminium housing IP66, HNA24×1.5	0.4 kg
R Coated aluminium housing IP66, Pg16 (IP66)	0.4 kg
T Coated aluminium housing IP66, NPT ½	0.4 kg
U Coated aluminum housing IP66, G ½	0.4 kg
V Coated aluminium housing IP66, M20×1.5	0.4 kg
W Coated aluminium housing IP66, HNA24×1.5	0.4 kg

Y Special versions on request

Electronic insert

A Without electronic insert	
C EC 17 Z built-in	0.2 kg
D EC 27 Z built-in	0.2 kg

Total weight ☐ kg

11 450 ZS —	D									

product designation

1.4571 = SS 316 L 1.4301 = SS 304 H 1 kg = 2.2 lbs

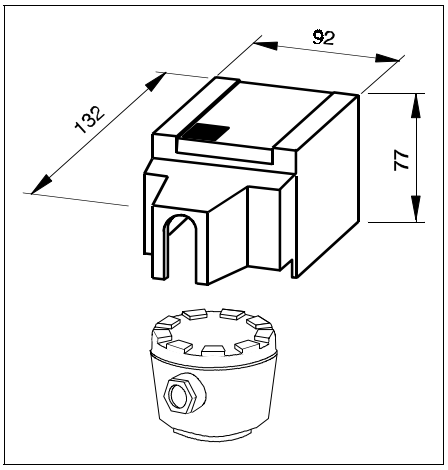
Measuring and Switching Instruments

The approval allows the rod probe 11 450 ZS to be connected to instruments with an intrinsically safe signal circuit [EEx ia]. This can be an FTC...Z level limit switch with an intrinsically safe input circuit and an electronic insert EC 17 Z, HTC 17 Z or another electronic insert with an intrinsically safe input circuit.

Accessories

Accessories
- Gasket for G 1 $^1/_2$ A thread: elastomer/fibre (asbestos-free), included
- All-weather cover for aluminium housing; material polyamide
  Maximum ambient temperature: 100 °C

All-Weather Cover
When the probe with an aluminium housing is mounted in the open, an all-weather cover protects it from excessive temperatures and from the condensation which can occur in the housing as a result of rapid fluctuations in temperature.
For dimensions see Fig. on right.



Supplementary Documentation

Level Limit Switches
- ☐ Nivotester FTC 420 / 421 / 422
  Technical Information TI 127F/00/en
- ☐ Nivotester FTC 470 Z / 471Z
  Technical Information TI 088F/00/en
- ☐ Nivotester FTC 520 Z / 521 Z
  Technical Information TI 081F/00/en

Electronic Inserts
- ☐ Electronic Insert EC 17 Z
  Technical Information TI 268F/00/en

Certificates
- ☐ Partially Insulated Rod Probe
  11450 ZS
  Design Approval Certificate
  BVS 93.Y.8004 B
  Certificate ZE 088F/00/de
- ☐ Electronic Insert EC 17 Z
  Certificate of Conformity
  PTB No. Ex-93.C.2061 X
  Certificate ZE 095F/00/a3

Specifications When Ordering

- ☐ Product designation
- ☐ Probe length in mm
- ☐ Partial insulation length
- ☐ Special version if required
- ☐ Accessories (e. g. all-weather cover)

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