

## Overview

- Level limit detection in liquids, slurries, foam, interfaces and solids
  - Compact unit
  - Wide range of applications
  - No maintenance
  - Full-, demand-, empty detector
  - Extended rod version or rope version
  - High pressure and high temperature
  - High chemical resistance on probes
  - RF technology with active shield
  - Sensitivity: dielectric constant  $\geq 1.5$
  - Simple modification of probe possible on site
- Standard electronics with:
    - Universal power supply
    - Solid-state switch and Relay output
  - Digital electronics with:
    - Communication via Profibus PA
    - Integrated Local User Interface
    - Self diagnostics
  - Multiple approvals available
  - 2011/65/EU RoHS conform

|           |                             |                                      |   |
|-----------|-----------------------------|--------------------------------------|---|
| Approvals | CE/ UKCA                    |                                      |   |
|           | ATEX/ UKEX/<br>INMETRO/ CCC | Zone 0                               | Intrinsically Safe                        |
|           |                             | Zone 0/1                             | Flameproof                                |
|           |                             | Zone 20/21                           | Dust Ignition Proof or Intrinsically Safe |
|           | FM/ CSA                     | General purp.                        |   |
|           |                             | Cl. I Div. 1                         | Intrinsically Safe                        |
|           |                             | Cl. I Div. 1                         | Explosionproof                            |
|           | TR-CU                       | Cl. II, III Div. 1                   | Dust Ignition Proof                       |
|           |                             | Ordinary Locations                   |   |
|           |                             | Zone 0                               | Intrinsically Safe                        |
|           |                             | Zone 0/1                             | Flameproof                                |
|           | Lloyds                      | Zone 20/21                           | Dust Ignition Proof                       |
|           |                             | Categories ENV1, ENV2, ENV3 and ENV5 |   |
|           | WHG                         | Overfill protection                  |   |

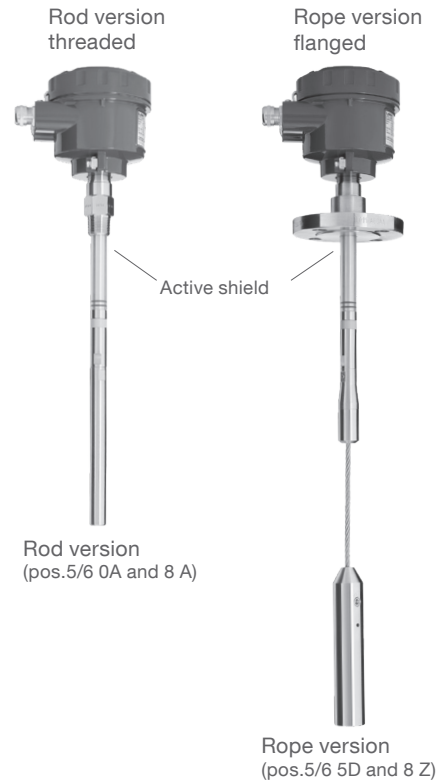
|             |                     | Electronic module Standard                                  | Electronic module Digital  |
|-------------|---------------------|---|--|
| Electronics | Supply voltage      | 12 .. 250 V AC/ DC (0 .. 60 Hz)                             | 12 .. 30 V DC (24 V for IS version)  |
|             | Signal output       | Relais SPDT<br>Solid-state switch (30 V DC/ AC peak, 82 mA) | Profibus PA<br>Solid-state switch (30 V DC/ AC peak, 82 mA)  |
|             | Signal output delay | Rise time or Fall time 1 .. 60 sec.                         | Rise time 0 .. 100 sec.<br>Fall time 0 .. 100 sec.   |
|             | Failsafe            | High or Low   | High or Low  |
|             | User interface      | Potentiometer, switches, 3 LED indicator                    | LCD local user interface or Profibus PA  |
|             | Diagnostics         | -   | Over and Under Range<br>Electronics temperature<br>Function check<br>Maintenance alarm<br>Internal electronic self check |

|         |                            |   |
|---------|----------------------------|---|
| Housing | Material                   | Aluminium, powder-coated  |
|         | Ingress protection         | Type 4/ NEMA 4/ IP68 <sup>(1)</sup>   |
|         | Temperature extended shaft | Option for RF 8100, standard for RF 8200:<br>Material 1.4404 (SS316L)   |
|         | Ambient temperature        | -40 .. 85°C (-40 .. 185°F)<br>With Ex-Certificate ATEX, UKEX, INMETRO, CCC, TR-CU:<br>-40 .. 80°C (-40 .. 176°F) with Flameproof or Dust Ignition Proof<br>-40 .. 60°C (-40 .. 140°F) with Intrinsically safe |

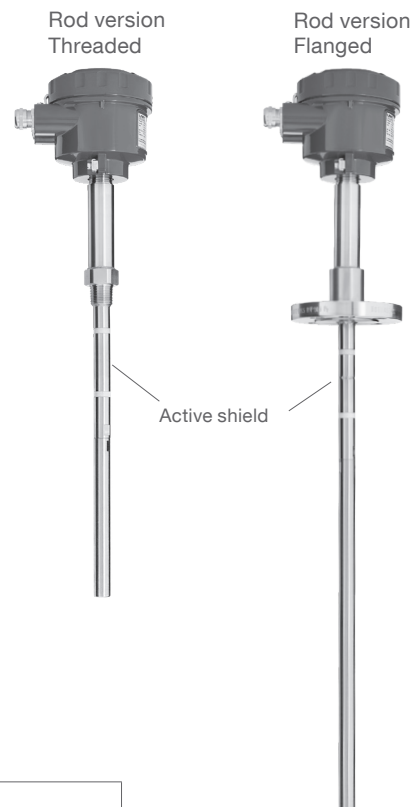
<sup>(1)</sup> For version with plug the type of protection can be lower (see pos.35).

## Overview

| RF 8100 Standard version |                         |  |  |                 |
|--------------------------|-------------------------|--|--|-----------------|
| Mechanics and Process    | Length of extension "L" | Rod<br>Rope  | 350 .. 1,000 mm (13.78 .. 39.37")<br>550 .. 25,000 mm (19.7 .. 984.3") |                 |
|                          | Active shield length    | Threaded<br>Flanged  | 125 .. 400 mm (4.92 .. 15.75")<br>105 .. 380 mm (4.13 .. 14.96")       |                 |
|                          | Diameter of rod/ rope   | Rod<br>Rope  | ø19 mm (ø0.75")<br>ø6 mm (ø0.3")                                       |                 |
|                          | Materials               | Process connection   |  | 1.4404 (SS316L) |
|                          |                         | Active shield area   |  | PFA coated      |
|                          |                         | Rod  |  | 1.4404 (SS316L) |
|                          |                         | Rope   |  | 1.4404 (SS316L) |
|                          |                         | Rope insulation  |  | PFA (optional)  |
|                          | Probe isolators         |  | PEEK   |                 |
| Wetted seals             |                         | FKM or FFKM  |  |                 |
| Process temperature      |                         | Without temperature extended shaft:<br>-40 .. 85°C (-40 .. 185°F)<br>With temperature extended shaft:<br>-40 .. 200°C (-40 .. 392°F) |  |                 |
| Process pressure         |                         | -1 .. 35 bar g (-14.6 .. 511 psi g) nominal<br>Observe Pressure versus Temperature Curves  |  |                 |
| Tensile load             |                         | max. 18.5 kN (rope version)  |  |                 |



| RF 8200 High temperature version (400°C) |                         |   |  |                 |
|--|-------------------------|---|--|-----------------|
| Mechanics and Process                    | Length of extension "L" | Rod   | 350 .. 1,000 mm (13.78 .. 39.37")                                |                 |
|  | Active shield length    | Threaded<br>Flanged   | 125 .. 400 mm (4.92 .. 15.75")<br>105 .. 380 mm (4.13 .. 14.96") |                 |
|  | Diameter                | Rod   | ø19 mm (ø0.75")  |                 |
|  | Materials               | Process connection  |  | 1.4404 (SS316L) |
|  |                         | Rod   |  | 1.4404 (SS316L) |
|  |                         | Probe isolators   |  | Ceramic         |
| Wetted seals                             |                         | Graphite  |  |                 |
| Process temperature                      |                         | -40 .. 400°C (-40 .. 752°F)   |  |                 |
| Process pressure                         |                         | -1 .. 35 bar g (-14.6 .. 511 psi g) nominal<br>Observe Pressure versus Temperature Curves |  |                 |

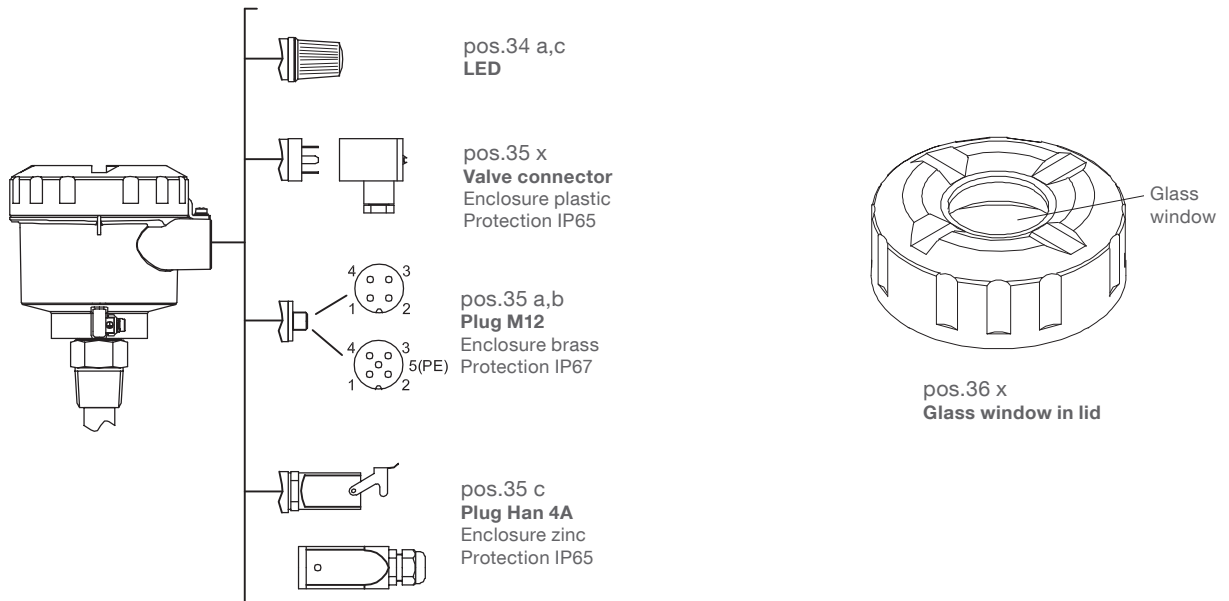


### Cable entries (by default)

Depending on model selected, the following cable entries are supported (options see pos.33):

| Version:                 | Cable entries:  |
|--------------------------|---|
| Flameproof (pos.2 T,L,5) | M20 x 1.5 (1x open conduit + 1x blind plug)                   |
| FM/FMc (pos.2 M,U,P,N)   | NPT ½" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug) |
| All other versions       | M20 x 1.5 (1x screwed cable gland + 1x blind plug)            |

## Options



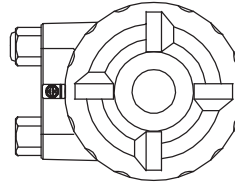
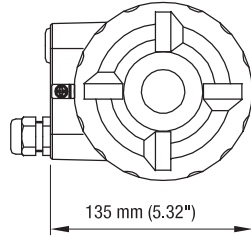
## Dimensions

### Enclosure

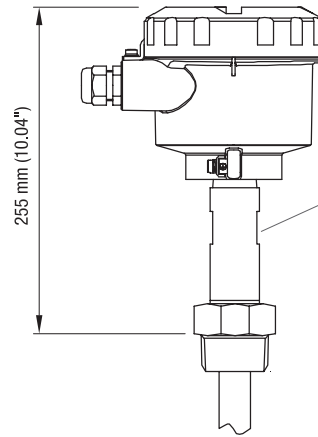
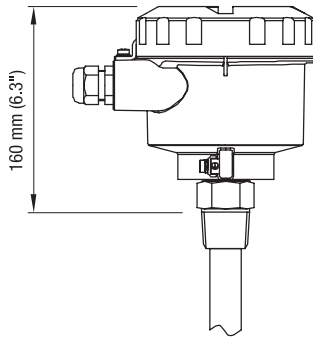
#### Top view

M20 x 1.5 cable gland

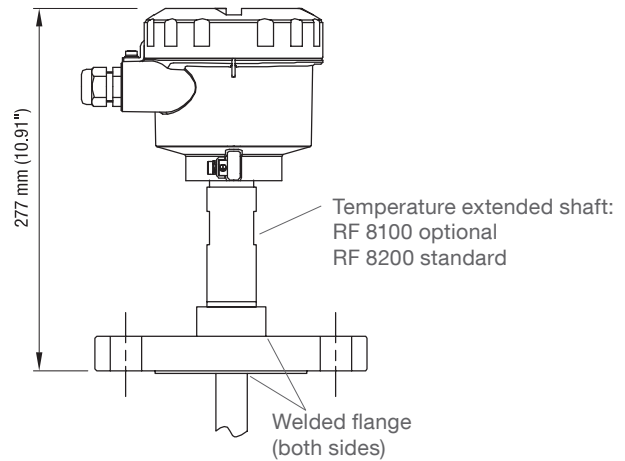
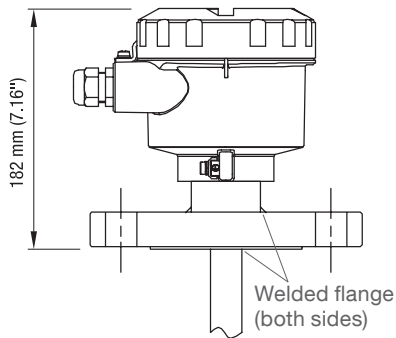
NPT 1/2" conduit



#### Threaded process connection



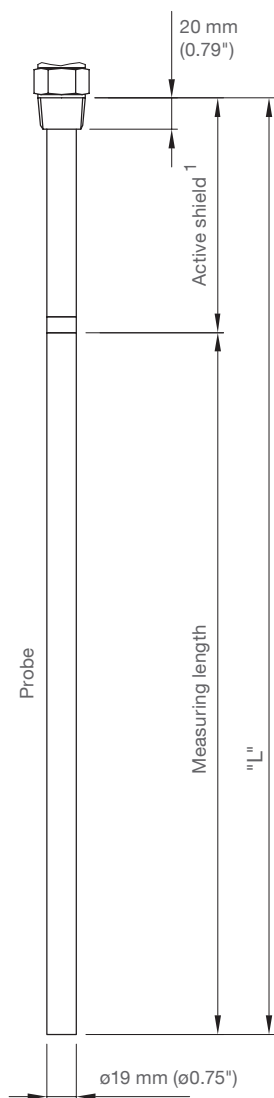
#### Flanged process connection



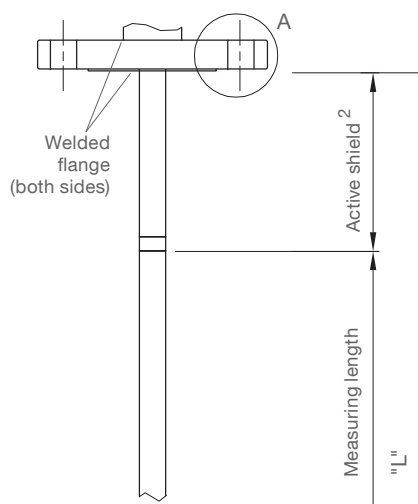
## Dimensions

RF 8100 Rod version  
 RF 8200 Rod version (high temperature)

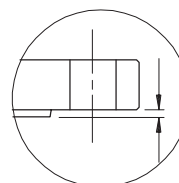
Threaded process connection



Flanged process connection



Detail "A"



"L" does not include any raised face

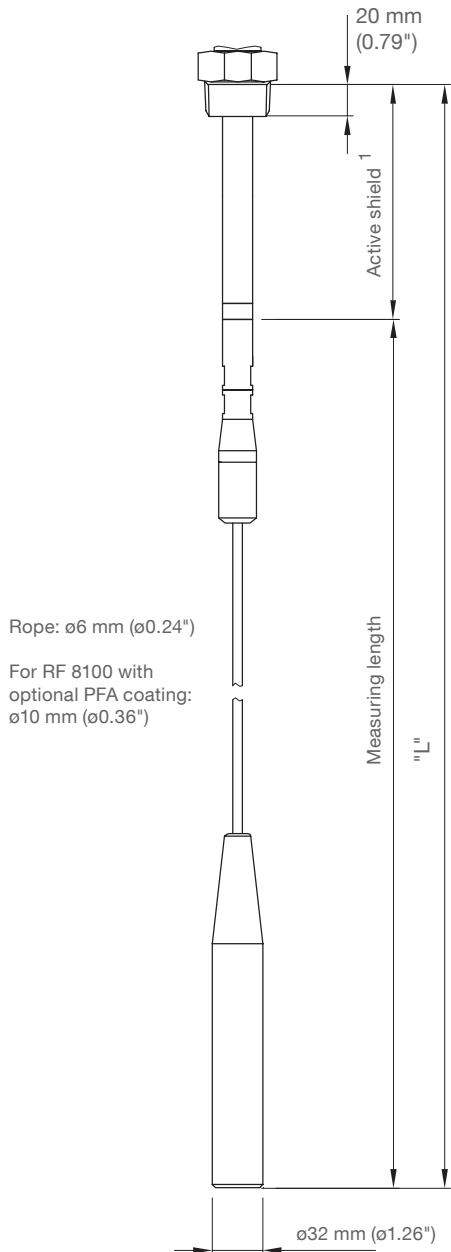
<sup>1</sup> For RF 8100 coated with PFA  
 Standard 125 mm (4.92")  
 Optional 250 mm (9.84") or  
 400 mm (15.75")

<sup>2</sup> For RF 8100 coated with PFA  
 Standard 105 mm (4.13")  
 Optional 230 mm (9.06") or  
 380 mm (14.96")

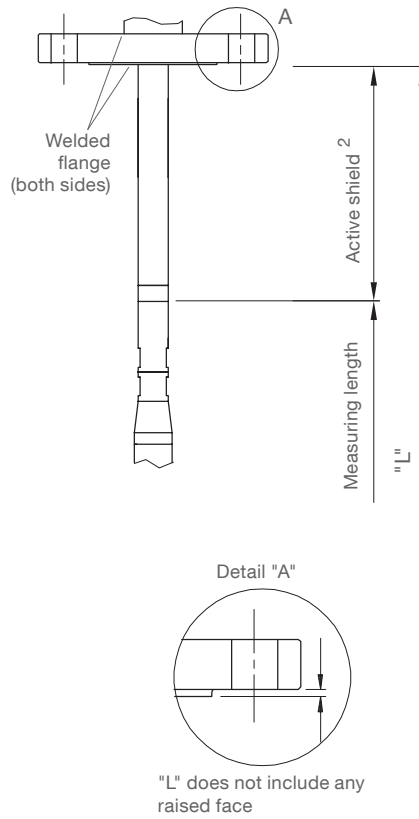
## Dimensions

### RF 8100 Rope version

Threaded process connection



Flanged process connection



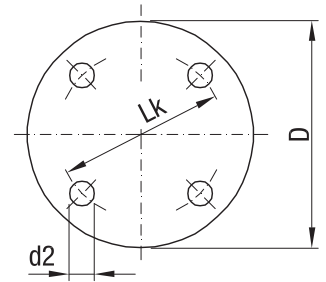
<sup>1</sup> Coated with PFA  
 Standard 125 mm (4.92")  
 Optional 250 mm (9.84") or  
 400 mm (15.75")

<sup>2</sup> Coated with PFA  
 Standard 105 mm (4.13")  
 Optional 230 mm (9.06") or  
 380 mm (14.96")

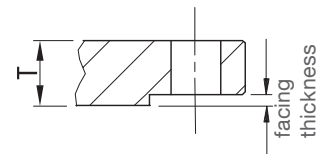
## Dimensions

### Flanges

|                              | Code       | Type        | Number of holes | d2            |                | Lk            |              | D         |           | T (thickness) |  |
|------------------------------|------------|-------------|-----------------|---------------|----------------|---------------|--------------|-----------|-----------|---------------|--|
|                              |            |             |                 | mm (inch)     | mm (inch)      | mm (inch)     | mm (inch)    | mm (inch) | mm (inch) |               |  |
| ASME B16.5, raised face      | 5A         | 1" 150 lbs  | 4               | 15.9 (0.63")  | 79.3 (3.12")   | 108.0 (4.25") | 14.3 (0.56") |           |           |               |  |
|                              | 5B         | 1" 300 lbs  | 4               | 19.1 (0.75")  | 88.9 (3.5")    | 123.8 (4.87") | 17.5 (0.69") |           |           |               |  |
|                              | 5C         | 1" 600 lbs  | 4               | 19.1 (0.75")  | 88.9 (3.5")    | 123.8 (4.87") | 17.5 (0.69") |           |           |               |  |
|                              | 5D         | 1½" 150 lbs | 4               | 15.9 (0.63")  | 98.6 (3.88")   | 127.0 (5.0")  | 17.5 (0.69") |           |           |               |  |
|                              | 5E         | 1½" 300 lbs | 4               | 22.2 (0.87")  | 114.3 (4.5")   | 155.6 (6.13") | 20.6 (0.81") |           |           |               |  |
|                              | 5F         | 1½" 600 lbs | 4               | 22.2 (0.87")  | 114.3 (4.5")   | 155.6 (6.13") | 22.4 (0.88") |           |           |               |  |
|                              | 5G         | 2" 150 lbs  | 4               | 19.1 (0.75")  | 120.7 (4.75")  | 152.4 (6.01") | 19.1 (0.75") |           |           |               |  |
|                              | 5H         | 2" 300 lbs  | 8               | 19.1 (0.75")  | 127.0 (5.0")   | 165.1 (6.5")  | 22.2 (0.87") |           |           |               |  |
|                              | 5J         | 2" 600 lbs  | 8               | 19.1 (0.75")  | 127.0 (5.0")   | 165.1 (6.5")  | 25.4 (1.0")  |           |           |               |  |
|                              | 5K         | 3" 150 lbs  | 4               | 19.1 (0.75")  | 152.4 (6.01")  | 190.5 (7.5")  | 23.9 (0.94") |           |           |               |  |
|                              | 5L         | 3" 300 lbs  | 8               | 22.2 (0.87")  | 168.2 (6.62")  | 209.6 (8.25") | 28.6 (1.13") |           |           |               |  |
|                              | 5M         | 3" 600 lbs  | 8               | 22.2 (0.87")  | 168.2 (6.62")  | 209.6 (8.25") | 31.7 (1.25") |           |           |               |  |
|                              | 5N         | 4" 150 lbs  | 8               | 19.1 (0.75")  | 190.5 (7.5")   | 228.6 (9.0")  | 23.9 (0.94") |           |           |               |  |
| 5P                           | 4" 300 lbs | 8           | 22.2 (0.87")    | 200.0 (7.87") | 254.0 (10.0")  | 31.7 (1.25")  |              |           |           |               |  |
| 5Q                           | 4" 600 lbs | 8           | 25.4 (1.0")     | 215.9 (8.5")  | 273.1 (10.75") | 38.1 (1.5")   |              |           |           |               |  |
| EN 1092-1 type A, flat faced | 6A         | DN25 PN16   | 4               | 14.0 (0.55")  | 85.0 (3.35")   | 115.0 (4.53") | 18.0 (0.71") |           |           |               |  |
|                              | 6B         | DN25 PN40   | 4               | 14.0 (0.55")  | 85.0 (3.35")   | 115.0 (4.53") | 18.0 (0.71") |           |           |               |  |
|                              | 6C         | DN40 PN16   | 4               | 18.0 (0.71")  | 110.0 (4.33")  | 150.0 (5.91") | 18.0 (0.71") |           |           |               |  |
|                              | 6D         | DN40 PN40   | 4               | 18.0 (0.71")  | 110.0 (4.33")  | 150.0 (5.91") | 18.0 (0.71") |           |           |               |  |
|                              | 6E         | DN50 PN16   | 4               | 18.0 (0.71")  | 125.0 (4.92")  | 165.0 (6.5")  | 18.0 (0.71") |           |           |               |  |
|                              | 6F         | DN50 PN40   | 4               | 18.0 (0.71")  | 125.0 (4.92")  | 165.0 (6.5")  | 20.0 (0.79") |           |           |               |  |
|                              | 6G         | DN80 PN16   | 8               | 18.0 (0.71")  | 160.0 (6.3")   | 200.0 (7.87") | 20.0 (0.79") |           |           |               |  |
|                              | 6H         | DN80 PN40   | 8               | 18.0 (0.71")  | 160.0 (6.3")   | 200.0 (7.87") | 24.0 (0.94") |           |           |               |  |
|                              | 6J         | DN100 PN16  | 8               | 18.0 (0.71")  | 180.0 (7.09")  | 220.0 (8.66") | 20.0 (0.79") |           |           |               |  |
|                              | 6K         | DN100 PN40  | 8               | 22.0 (0.87")  | 190.0 (7.48")  | 235.0 (9.25") | 24.0 (0.94") |           |           |               |  |























**Raised face**



| Type                         | Facing thickness |
|------------------------------|------------------|
| ASME 150 lbs<br>ASME 300 lbs | 2 mm (0.08")     |
| ASME 600 lbs                 | 7 mm (0.28")     |

## Detailed Ex-markings

### Detailed Ex-markings

| Code                 | Certificate                  | RF 8100   | RF 8200   | Protection method                       |
|----------------------|------------------------------|---|---|---|
| pos.2 T              | ATEX II 1/2G<br>ATEX II 1/2D | Ex ia/db [ia Ga] IIC T  Ga/Gb<br>Ex ia/tb [ia Da] IIIC T  Da/Db     | Ex ia/db [ia Ga] IIC T  Ga/Gb<br>Ex ia/tb [ia Da] IIIC T  Da/Db     | Flameproof,<br>Dust Ignition Proof      |
| pos.2 Y              | ATEX II 1G<br>ATEX II 1/2D   | Ex ia IIC T  Ga<br>Ex ia IIIC T  Da/Db                              | Ex ia IIC T  Ga<br>Ex ia IIIC T  Da/Db                                | Intrinsically Safe                      |
| pos.2 W              | ATEX II 1/2D                 | Ex ia/tb [ia Da] IIIC T  Da/Db   | Ex ia/tb [ia Da] IIIC T  Da/Db  | Dust Ignition Proof                     |
| pos.2 U              | FM/ CSA                      | XP-IS Class I, Div.1, Gr. A, B, C, D<br>DIP-IS Class II, Div.1, Gr. E, F, G<br>DIP-IS Class III T4  | XP-IS Class I, Div.1, Gr. A, B, C, D<br>DIP-IS Class II, Div.1, Gr. E, F, G<br>DIP-IS Class III T4  | Explosion Proof,<br>Dust Ignition Proof |
| pos.2 P              | FM/ CSA                      | IS Class I, Div.1, Gr. A, B, C, D<br>IS Class II, Div.1, Gr. E, F, G<br>IS Class III T4   | IS Class I, Div.1, Gr. A, B, C, D<br>IS Class II, Div.1, Gr. E, F, G<br>IS Class III T4   | Intrinsically Safe                      |
| pos.2 N              | FM/ CSA                      | DIP-IS Class II, Div.1, Gr. E, F, G<br>DIP-IS Class III T4  | DIP-IS Class II, Div.1, Gr. E, F, G<br>DIP-IS Class III T4  | Dust Ignition Proof                     |
| pos.2 L              | TR-CU                        | Ga/Gb Ex ia/d IIC T6...T3 X<br>Ex ia/tb IIIC T <sub>200</sub> 80°C...T <sub>200</sub> 195°C Da/Db X   | Ga/Gb Ex ia/d IIC T6...T1 X<br>Ex ia/tb IIIC T <sub>200</sub> 80°C...T <sub>200</sub> 405°C Da/Db X   | Flameproof,<br>Dust Ignition Proof      |
| pos.2 V              | TR-CU                        | 0Ex ia IIC T6...T3 Ga X<br>Ex ia IIIC T <sub>200</sub> 80°C...T <sub>200</sub> 195°C Da/Db X  | 0Ex ia IIC T6...T1 Ga X<br>Ex ia IIIC T <sub>200</sub> 80°C...T <sub>200</sub> 405°C Da/Db X  | Intrinsically Safe                      |
| pos.2 E              | TR-CU                        | Ex ia/tb IIIC T <sub>200</sub> 80°C...T <sub>200</sub> 195°C Da/Db X  | Ex ia/tb IIIC T <sub>200</sub> 80°C...T <sub>200</sub> 405°C Da/Db X  | Dust Ignition Proof                     |
| pos.2 5<br>+pos.20 a | INMETRO                      | Ex ia/db [ia Ga] IIC T6...T3 Ga/Gb<br>Ex ia/tb [ia Da] IIIC T* Da/Db  | Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb<br>Ex ia/tb [ia Da] IIIC T* Da/Db  | Flameproof,<br>Dust Ignition Proof      |
| pos.2 3<br>+pos.20 a | INMETRO                      | Ex ia IIC T6...T3 Ga<br>Ex ia IIIC T* Da/Db   | Ex ia IIC T6...T1 Ga<br>Ex ia IIIC T* Da/Db   | Intrinsically Safe                      |
| pos.2 2<br>+pos.20 a | INMETRO                      | Ex ia/tb [ia Da] IIIC T* Da/Db  | Ex ia/tb [ia Da] IIIC T* Da/Db  | Dust Ignition Proof                     |
| Pos.2 5<br>+Pos.20 c | CCC                          | Ex db ia [ia Ga] IIC TX Ga/Gb<br>Ex ia tb [ia Da] IIIC TX Da/Db   | Ex db ia [ia Ga] IIC TX Ga/Gb<br>Ex ia tb [ia Da] IIIC TX Da/Db   | Flameproof,<br>Dust Ignition Proof      |
| Pos.2 3<br>+Pos.20 c | CCC                          | Ex ia IIC TX Ga<br>Ex ia IIIC TX Da/Db  | Ex ia IIC TX Ga<br>Ex ia IIIC TX Da/Db  | Intrinsically Safe                      |
| Pos.2 2<br>+Pos.20 c | CCC                          | Ex ia tb [ia Da] IIIC TX Da/Db  | Ex ia tb [ia Da] IIIC TX Da/Db  | Dust Ignition Proof                     |
| Pos.2 5<br>+Pos.20 e | UKEX II 1/2G<br>UKEX II 1/2D | Ex ia/db [ia Ga] IIC T  Ga/Gb<br>Ex ia/tb [ia Da] IIIC T  Da/Db | Ex ia/db [ia Ga] IIC T  Ga/Gb<br>Ex ia/tb [ia Da] IIIC T  Da/Db | Flameproof,<br>Dust Ignition Proof      |
| Pos.2 3<br>+Pos.20 e | UKEX II 1G<br>UKEX II 1/2D   | Ex ia IIC T  Ga<br>Ex ia IIIC T  Da/Db                          | Ex ia IIC T  Ga<br>Ex ia IIIC T  Da/Db                            | Intrinsically Safe                      |
| Pos.2 2<br>+Pos.20 e | UKEX II 1/2D                 | Ex ia/tb [ia Da] IIIC T  Da/Db   | Ex ia/tb [ia Da] IIIC T  Da/Db  | Dust Ignition Proof                     |



## Electrical installation

### Standard

Relay SPDT/  
 Solid state switch

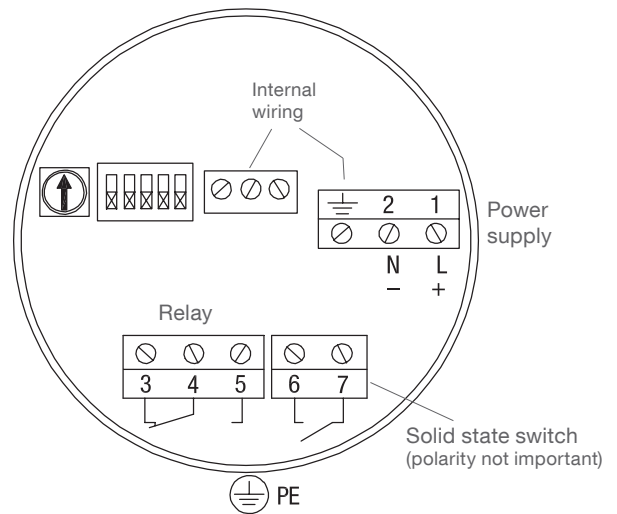
#### Power supply:

12 .. 250 V AC/ DC (0 .. 60 Hz)  
 2 W max.

#### Signal output:

Relay:  
 Floating relay SPDT  
 AC max. 250 V, 8 A, 2000 VA, non inductive  
 DC max. 30 V, 5 A, 150 W, non inductive

Solid state switch:  
 30 V DC or 30 V AC (peak), 82 mA  
 Observe protection (see below)



### Digital

Profibus PA/  
 Solid state switch

#### Power supply:

12 .. 30 V DC, 12.5 mA

#### Intrinsically Safe:

12 .. 24 V DC, 12.5 mA

Intrinsically safe barrier required

For ATEX, UKEX, TR-CU, INMETRO, CCC:

$U_i = 24\text{ V}$   $I_i = 380\text{ mA}$   $P_i = 5.32\text{ W}$   $C_i = 5\text{ nF}$   $L_i = 10\text{ uH}$

For FM/ CSA:

See "Connection drawing" in the Instruction Manual

#### Signal output:

##### Solid state switch:

30 V DC or 30 V AC (peak), 82 mA  
 Observe protection (see below)

##### With Intrinsically safe:

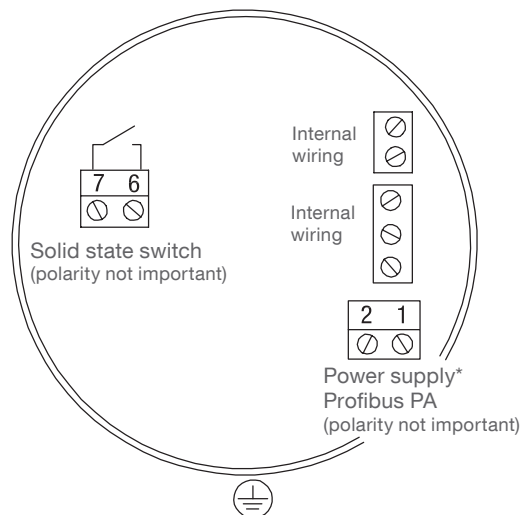
Intrinsically safe barrier required

For ATEX, UKEX, TR-CU, INMETRO, CCC:

$U_i = 30\text{ V}$   $I_i = 200\text{ mA}$   $P_i = 350\text{ mW}$   $C_i = 0$   $L_i = 0$

For FM/ CSA:

See "Connection drawing" in the Instruction Manual



\* With use of Profibus the wiring must be according to Profibus PA standards. If Profibus is not used, a shielded cable is recommended to ensure stable measurement.

### Protection of Solid State Switch

Observe a Protection diode in case of connecting an external relay to the Solid state switch.

