

# Neutron detector

# CPNB35

## Boron-lined proportional counter

### Application

- ✓ Detection of thermal neutrons in pulse mode

### Features

- ✓ Watertight HN connector
- ✓ High safety of use

Nuclear characteristics at 20°C			
Sensitivity to thermal neutrons:	Pulse mode <sup>1</sup> Background noise <sup>2</sup>	12 <0.2	c.s. <sup>-1</sup> / n.cm <sup>-2</sup> .s <sup>-1</sup> c.s. <sup>-1</sup>
Neutron flux range:	Pulse mode <sup>3</sup>	10 <sup>-1</sup> - 10 <sup>5</sup>	n.cm <sup>-2</sup> .s <sup>-1</sup>
Exposure limits:	Thermal neutrons Gamma exposure Gamma dose rate <sup>4</sup>	max 6.5x10 <sup>17</sup> max 1.2x10 <sup>8</sup> max 10	n.cm <sup>-2</sup> Gy Gy.h <sup>-1</sup>

Electrical characteristics			
Insulating resistance at 800V <sup>5</sup> :		min 10 <sup>12</sup>	Ω
Operating voltage:			
	Nominal up to 200°C	800	V
	Maximum at 20°C	850	V
	Limit with no radiation	950	V
Charge collection time <sup>6</sup> :		250	ns
Mechanical and physical characteristics			
Detector:	Materials:	Cathode <sup>7</sup> Central anode	High purity aluminium Ø25µm stainless steel wire
		Insulator Brazing	Al <sub>2</sub> O <sub>3</sub> NiAu and AgCu
	Sensitive layer:	B enriched in <sup>10</sup> B Mass	>92% 0.2 mg.cm <sup>-2</sup>
Filling gas (pressure) <sup>8</sup>			Argon + 15% CO <sub>2</sub> (at 26.6 kPa)
Dimensions:	Nominal diameter	76.5	mm
	Detector length <sup>8</sup>	443	mm
	Sensitive length	278	mm
Connector:	Type		Al, female HN Watertight
	Insulator		Al <sub>2</sub> O <sub>3</sub>

### Notes.

*Unless otherwise stated, all characteristics are given at 20°C*

<sup>1</sup> This characteristic depends on the electronic equipment associated to the detector and the conditions of measurement. The figures have been determined with a Merlin-Gerin type SAITB equipment, working in current amplification (G = 80 dB) with a discrimination threshold of 600 mV.

<sup>2</sup> Characteristic depending on the electronic equipment associated to the counter.

<sup>3</sup> Value depending on the associated electronic equipment and the acceptable counting losses.

<sup>4</sup> Standard counting measurement conditions. Under radiation, gamma rays generate low amplitude pulses which are not counted due to the discrimination threshold. For dose rate more than 10 Gy.h<sup>-1</sup>, pulse overlapping occurs which increases the counting rate without correlation with the neutron flux.

<sup>5</sup> The insulating resistance is measured between anode and cathode at 800 V, with polarity (+) on the anode. **CAUTION:** a wrong polarity could destroy the anode.

<sup>6</sup> Disappearing of CO<sub>2</sub> induces an increase of the charge collection time up to 2 µs.

<sup>7</sup> The use of high purity aluminium further reduces the material activation after exposition to neutrons.

<sup>8</sup> On request this type of counter can be supplied with an integrated cable (CPNB34).

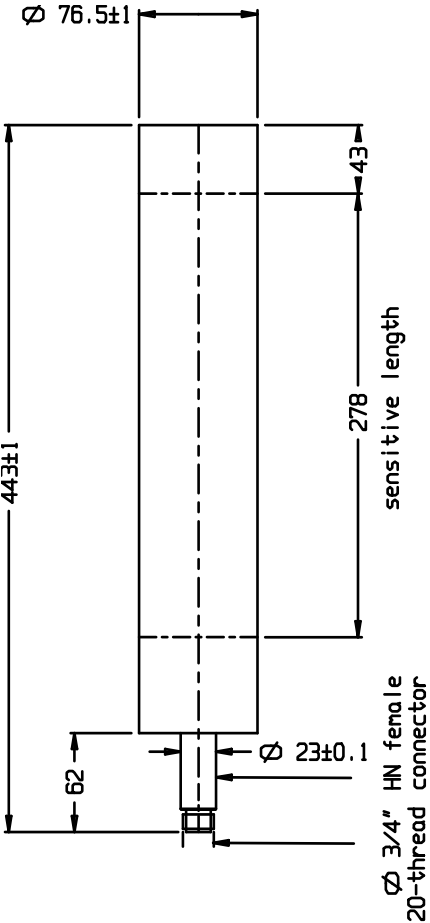
<sup>9</sup> Including temperature increase due to gamma radiation (effective above 10 Gy.h<sup>-1</sup>). The leakage current in the connection cable increases rapidly with temperature. It is therefore necessary to take into account this characteristic, which limits the maximum temperature so that the ratio of wanted signal/parasitic signal remains acceptable. Consider CPNB34 detector if integral cable needed.

<sup>10</sup> Vibration test conditions : frequency 60 Hz , amplitude ± 1 mm.

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Outline (dimensions in mm)



Limiting values	Max
Operating temperature <sup>9</sup>	200 °C
Vibration (any axis) <sup>10</sup>	100 m.s <sup>-2</sup>
Shock (perpendicular axis)	400 m.s <sup>-2</sup>