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**product specification**
**Boron-lined proportional counter**

**Application** : The CPNB64 is a high sensitivity thermal neutron detector operating in pulse mode and designed for source range monitoring of nuclear reactors. Its watertight HN connector ensures a high safety of use. This detector is the integral cable of the CPNB65.

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

**Nuclear characteristics**

Sensitivity to thermal neutrons :			
pulse mode (1)		20	c.s <sup>-1</sup> / n.cm <sup>-2</sup> .s <sup>-1</sup>
background noise (2)		< 0.3	c.s <sup>-1</sup>
Thermal neutron flux range :			
pulse mode (3)		5 x 10 <sup>-2</sup> to 5 x 10 <sup>4</sup>	n.cm <sup>-2</sup> .s <sup>-1</sup>
Exposure limits :			
thermal neutrons		1.3 x 10 <sup>18</sup>	n.cm <sup>-2</sup>
gamma radiation			2.4 x 10 <sup>8</sup>
exposure			
Gy			
dose rate (4)	max	10	Gy.h <sup>-1</sup>

**Electrical characteristics**

Insulating resistance at 800 V (5) :	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 (6) :		250	ns
Cable :			
capacitance		170	pF/m
characteristic impedance		50	Ω
attenuation		0.34	dB/m

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**product specification**
**Mechanical and physical characteristics**

## Detector :

## materials :

case, cathode (7)		high purity aluminium
central anode	Ø 25 µm	stainless steel wire
insulator		Al <sub>2</sub> O <sub>3</sub>
brazing		NiAu and AgCu

sensitive layer : B enriched in <sup>10</sup> B		> 92 %
mass	0.2	mg.cm <sup>-2</sup>

filling gas (6) :		Ar + 15 % CO <sub>2</sub>
pressure	26.6	kPa

## Dimensions :

nominal diameter		76.5	mm
detector length		702.5	mm
overall length, on request (8) :	max	12	m
sensitive length		562	mm

## Cable :

type (9) : high immunity , mineral insulator			6 coax
external diameter		6	mm
insulator			MgO
curvature radius (10)	min	60	mm

## Connector :

type (11)		watertight, male or female HN	
CPNB64/F (9)		female	
CPNB64/M (9)		male	
insulator		Al <sub>2</sub> O <sub>3</sub>	

**Environmental characteristics**

Operating temperature (12) :	max	200	°C
Vibration (any axis) (13)	max	100	m.s <sup>-2</sup>
Shock (perpendicular axis)	max	400	m.s <sup>-2</sup>

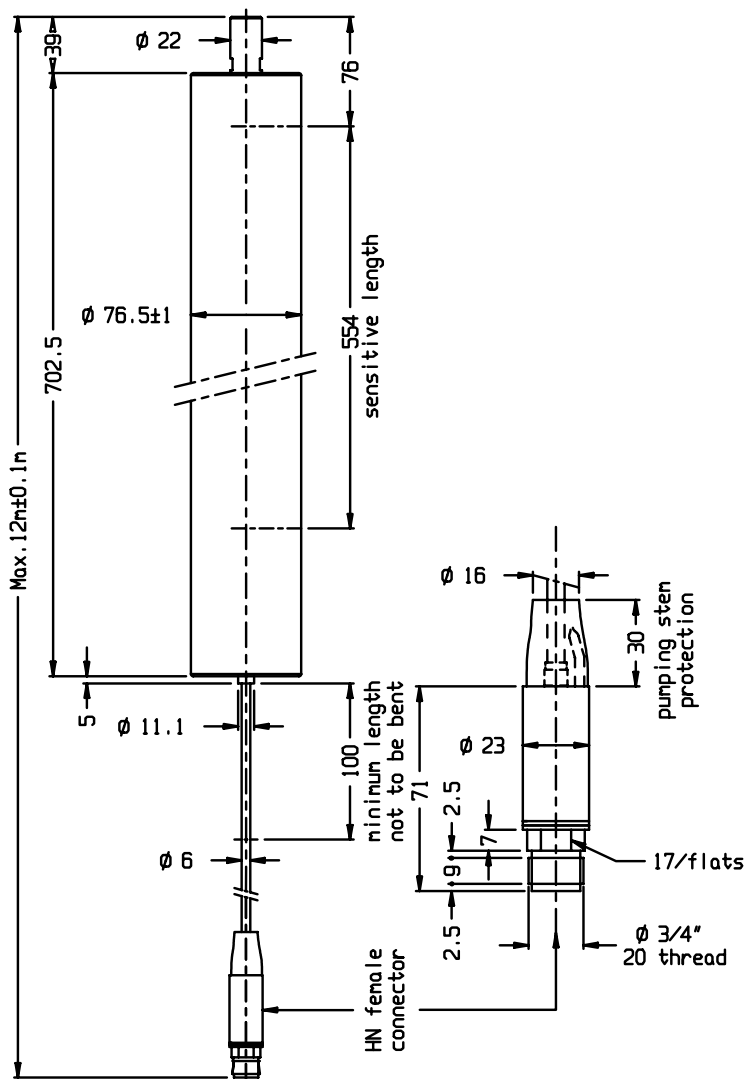
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**product specification****Notes**

- (1) 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.
- (2) Characteristic depending on the electronic equipment associated to the counter.
- (3) Value depending on the associated electronic equipment and the acceptable counting losses.
- (4) Standard counting measurement conditions. Under radiation, gamma rays generate low amplitude pulses which are not counted due to the discrimination threshold. For flux more than  $10 \text{ Gy.h}^{-1}$ , pulse overlapping occurs which increases the counting rate without correlation with the neutron flux.
- (5) 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.
- (6) Disappearing of  $\text{CO}_2$  induces an increase of the charge collection time up to 2  $\mu\text{s}$ .
- (7) The use of high purity aluminium further reduces the material activation after exposition to neutrons.
- (8) The type of connector (male or female) as well as the overall length (detector + cable + connector) constitute the version code to be mentioned in the detector reference after the basic type number. For example CPNB64/F5 indicates a detector with a female connector and a 5 m overall length.
- (9) Our "6 coax" cable is the 1 Zs FCAc 60 referenced cable from Thermocoax.
- (10) This is the smallest curvature radius allowing one reversible deformation.
- (11) In order to avoid humidity penetration during storage, the connector is closed with a cap to be removed just before use. As a general rule, prevent any humidity penetration at the connection level (refer to "Instructions for use and handling" in the package). Other connector types are possible on special request.
- (12) Including temperature increase due to gamma radiation (effective above  $10 \text{ Gy.h}^{-1}$ ). The leakage current in the 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.
- (13) Vibration test conditions : frequency 60 Hz, amplitude  $\pm 1$  mm.

product specification

CPNB64



All dimensions in mm unless otherwise indicated

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Drawing:51200014

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