EXOSENS
REVEAL THE INVISIBLE

GEIGER-MÜLLER TUBES

INDUSTRIAL CONTROL

HEALTH PHYSICS & MEDICAL

ENERGY

DEFENCE & SECURITY

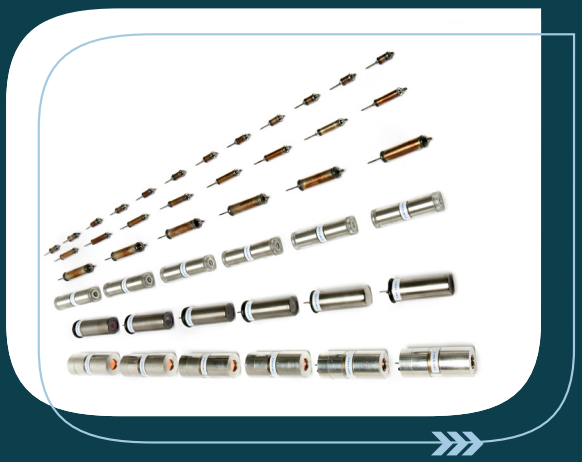
ALPHA, BETA, GAMMA DETECTORS FOR PROTECTION AND MEASUREMENT

GLOBAL LEADER IN GEIGER-MÜLLER TUBES

EXOSENS IS A GLOBAL LEADER IN THE DESIGN AND MANUFACTURE OF GEIGER-MÜLLER TUBES FOR RADIATION MEASUREMENT, CONTROL AND PROTECTION.

Formed through the merger of Centronic Limited into the Exosens Group, Exosens Geiger-Müller tubes are manufactured in Croydon, UK and incorporate decades of expertise including the original industry pioneers Twentieth Century Electronics and Philips Electronic Tubes.

Geiger-Müller tubes are the most fundamental high-gain gas filled radiation detector components and offer the instrument designer unparalleled access to a versatile and well understood signal in the form of one amplified pulse per radiation event.



PRODUCT PORTFOLIO

STANDARD PRODUCTS	**Standard products offer our core technologies in their most distilled form: a single bare counter tube.** • Four proven Geiger-Müller tube platforms • Often available on short lead times • Offer the designer direct access to the most immediate signal and with minimum risk
STANDARD COMBINATIONS	**Standard combinations focus or extend the capability of a standard product while avoiding the need for a customer specific design.** • Energy compensated Geiger-Müller tubes • Enclose a standard tube in a filter made of high atomic number (gamma absorbing) materials • Modify the energy response for effective or ambient dose
CUSTOM COMBINATIONS	**Custom combinations enable our core technologies to be optimised for a specific customer instrument or application** • Eliminate any unnecessary components or processing • Add elements such as readout electronics, filters, packaging, standards compliance or test protocols • Provide designers of high-end instruments with access to proven platforms for class-leading instrument innovation

TRUSTED PLATFORMS AND PRODUCTS

Engineers value the robustness and simplicity of Exosens Geiger-Müller tubes coupled with a price-performance combination which is unmatched by other technologies for:

- Thickness profiling
- Density profiling
- Process control
- Interlocks
- Radiation protection
- Dosimetry
- Criticality monitors
- Contamination monitors

STANDARD PRODUCT PLATFORMS

These are often used in combinations in order to equip an instrument with the widest possible sensitivity range and the confidence of fail-safe operation by including a high-dose rate detection capability.

GENERAL PURPOSE ALPHA, BETA, AND GAMMA

Our baseline gas volume and mixtures

HIGH DOSE GAMMA

Reduced volume and gas mix for lower sensitivity to prevent overload in high flux

LOW DOSE GAMMA

Increased volume and gas mix for higher sensitivity in low radiation environments

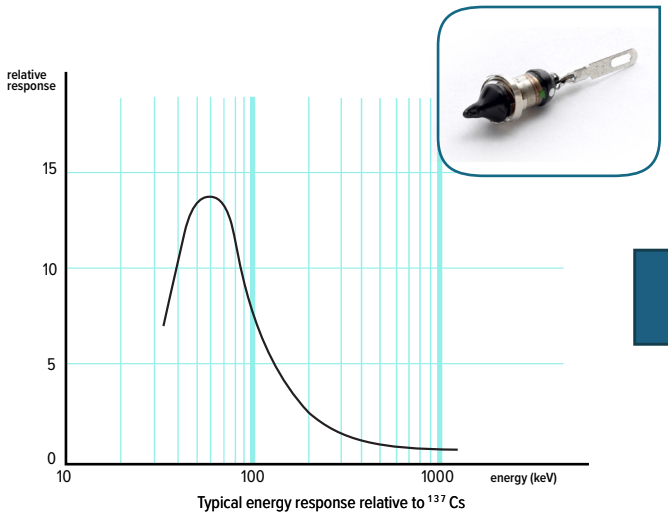
CONTAMINATION MONITOR ALPHA, BETA, AND GAMMA

Large area and thin window for efficient collection of alpha and beta particles

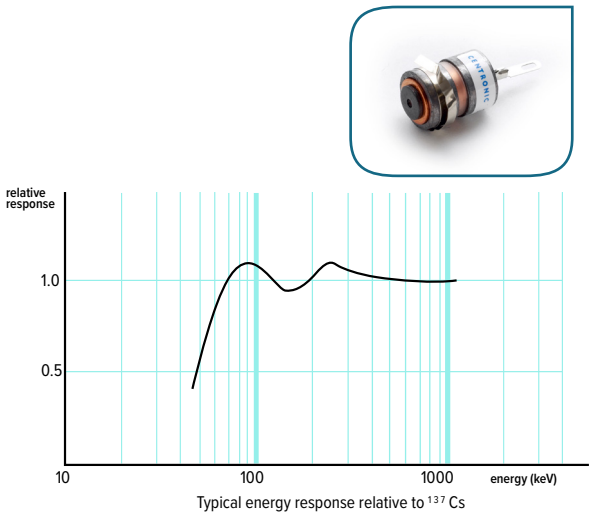
*Illustrations not to scale

STANDARD COMBINATONS: ENERGY COMPENSATED

The sensitivity of a bare Geiger-Müller tube is strongly related to the energy of the gamma radiation. Energy compensation using high atomic number materials can modify this for either ambient or equivalent dose measurements. The principle of a flatter response from a compensated device is illustrated below



Typical energy response relative to ^{137}Cs



Typical energy response relative to ^{137}Cs

SELECTION GUIDE

STANDARD PRODUCTS: BARE TUBES

TYPE	SENSITIVITY				PLATEAU			COUNTING RATE AT 10^{-2}Gy/h	DEAD TIME	BACK-GROUND SHIELDED	DOSE RATE RANGE
	BAND			LENGTH	THRESHOLD	LENGTH	SLOPE				
	α	β	Y	(mm)	(V)	(V)	(%V)	(counts/s)	(µs)	(count/min)	(mGy/h)
GENERAL PURPOSE ALPHA, BETA, GAMMA											
ZP1200			●	40	400	200	0.04	28	90	10	10^{-3}–10^{2}
ZP1400		●	●	9	400	200	0.04	25	90	10	10^{-3}–10^{2}
ZP1401	●	●	●	9	400	200	0.04	25	90	10	10^{-3}–10^{2}
HIGH DOSE GAMMA											
ZP1300		○	●	7	500	100	0.30	300	11	1	10^{-1}–10^{4}
ZP1310		○	●	16	500	150	0.15	1600	15	2	$2x10^{-2}$ – $4x10^{3}$
ZP1320		○	●	28	500	150	0.08	9	45	12	$3x10^{-3}$ – $2x10^{2}$
LOW DOSE GAMMA											
ZP1210			●	140	400	100	0.15	110	200	70	$3x10^{-4}$–10
ZP1220 (/01)			●	240	400	100	0.15	180	210	90 (60)	$2x10^{-4}$–3
CONTAMINATION MONITOR ALPHA, BETA, GAMMA											
ZP1431		●	●	27.8	450	250	0.04	44	230	25	$6x10^{-4}$–6
ZP1452		●	●	27.8	500	250	0.07	29	60	25	10^{-3}–20
ZP1480		●	●	17	400	100	0.20	24	120	30	10^{-3}–20
ZP1490	●	●	●	28	450	250	0.06	29	65	15	10^{-3}–20

STANDARD COMBINATIONS: ENERGY COMPENSATED, PLUG BASE

GENERAL PURPOSE ALPHA, BETA, GAMMA												
ZP1201	**E**			●	40	400	200	0.04	20	110	10	10^{-3}–40
ZP1202	**A**			●	40	400	200	0.04	20	110	10	10^{-3}–40
ZP1402	**E**	●	●	●	9	400	200	0.04	20	110	10	10^{-3}–10^{2}
HIGH DOSE GAMMA												
ZP1301	**E**			●	7	500	100	0.30	340	13	1	10^{-1}–10^{4}
ZP1304	**A**			●	7	500	100	0.30	340	13	1	10^{-1}–10^{4}
ZP1313	**E**			●	16	500	150	0.15	1600	15	2	10^{-2}–$3x10^{3}$
ZP1314	**A**			●	16	500	150	0.15	1600	15	2	10^{-2}–$3x10^{3}$
ZP1321	**E**			●	28	500	150	0.08	9	55	12	$3x10^{-3}$–10^{2}
ZP1324	**A**			●	27	500	150	0.08	9	55	12	$3x10^{-3}$–10^{2}
LOW DOSE GAMMA												
ZP1211/02	**A**			●	140	400	100	0.15	110	200	70	$3x10^{-4}$–10
ZP1221 (/01)	**E**			●	240	400	100	0.15	180	210	90 (60)	$2x10^{-4}$–3
ZP1221/02	**A**			●	240	400	100	0.15	180	210	60	$2x10^{-4}$–3
CONTAMINATION MONITOR ALPHA, BETA, GAMMA												
ZP1481	**P**		●	●	17	400	100	0.20	24	120	30	10^{-3}–20

A: ambient E: effective P: plug base ○: high energy β >0.5MeV

CUSTOM COMBINATIONS

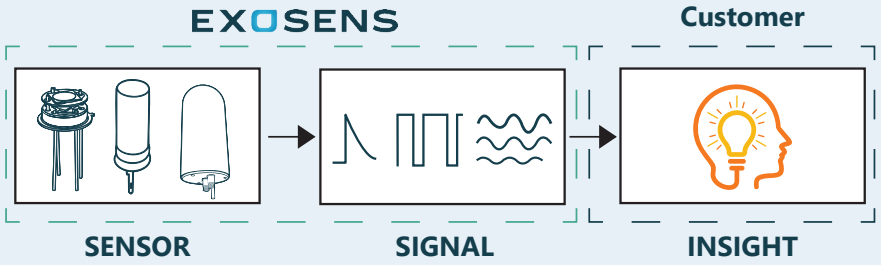
Please contact the factory to discuss custom configurations of the above tubes including cathode straps, additional test protocols and integration into pre-tested modules

OPERATING PRINCIPLES

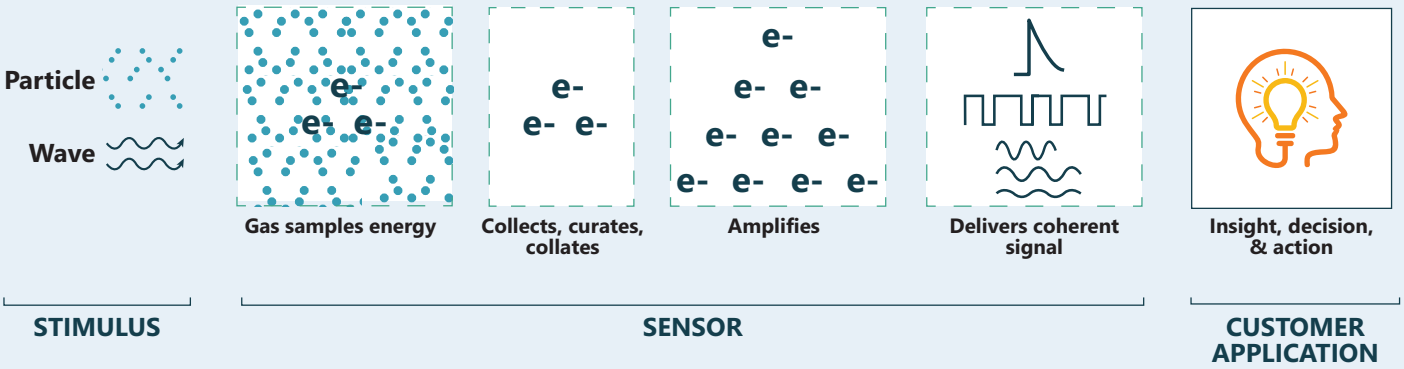
Many instrument designers are experienced in selecting and deploying Geiger-Müller tubes however we recognise that for some engineers this technology may be less familiar. In both cases we strongly encourage users to engage with us at the earliest opportunity in their design process.

THE SENSOR

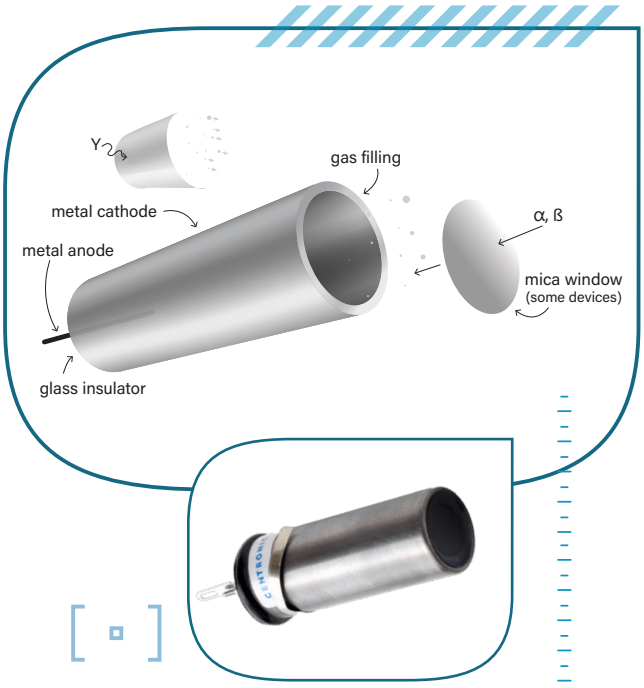
Common to all sensor technology, our sensor generates a signal which generates insight:



In a Geiger-Müller tube the sensor consists of a carefully formulated gas mixture contained inside a hermetic tube with a metal wall which serves as both the cathode and, for gamma rays, the absorption medium:



- An ionising voltage is applied between the anode and cathode of the Geiger-Müller tube
- Gamma radiation absorbed in the metal cathode wall causes electrons to be ejected into the detector volume
- Alpha, Beta or Gamma radiation enters the detector volume through a thin window (present on some devices)
- The charge injected by the radiation event causes the detector gas to ionise (briefly separate into a conductive plasma) and the high voltage causes avalanche multiplication when ions are accelerated in the electric field and collide with other gas molecules causing further ionisation
- The conductive gas briefly enables a current to flow between the anode and cathode
- The quench gas in the filling mixture takes effect and prevents further avalanche multiplication, thereby causing the detector to reset and the pulse to end, ready for the next detection event



WE MAKE SENSORS,
MAKE SIGNALS,
MAKE SENSE

EXOSENS
REVEAL THE INVISIBLE

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