



Scintillation Detectors

In-house design and manufacture for best performance,
and highest quality consistency.

A range of very reliable components which can be tailored to your needs, such as detectors, digital analysers and software.

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All our components are designed and manufactured in our own workshops, thus ensuring the high standard of performance of our instruments.

- In-house production of scintillation materials dating back 60 years.
- Organic polystyrene plastics in a wide variety of shapes and dimensions.
- Inorganic NaI(Tl) crystals and probes featuring consistent, superior energy resolution and efficiency.

With a long-time experience and R&D programs, we are able to provide innovative bespoke solutions that best fit your needs.

- Innovative neutron detectors, without ^3He or toxic BF_3 gas.
- Innovative plastic scintillators with custom properties.
- Lucas cells for advanced radon measurement.
- Capacity of delivering a full detector assembly coupled with photomultipliers (PMT) and electronics.



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NuDET SP Products

PLASTIC SCINTILLATORS

In principle, plastic scintillators consists of a mixture of luminophores dissolved in polymer matrix characterized by a short decay time and a resistance against high dose rates.

Plastic scintillators have an extremely wide field of application. Used in thin layers, they detect protons, electrons and beta particles with a small gamma-background. In larger volume, they are suitable for measuring gamma radiation.

Block, cylinder and foil scintillators of various sizes may be produced on request without housing, with or without polished surface, fixed to the light guide or as plastic detection assemblies completed with photomultiplier.



SP RANGE

PRODUCTS

- Material properties:
 - SP 32: blue emitting
 - SP 33: green emitting
- Designs:
 - Bar blocks and cylinders (SPB products)
 - Foils (SPF products)
 - Detection units (SPD, SPU products)

TECHNICAL DATA

Density	1.03 g/cm³
Refractive index	1,57
Softening point	70 °C to 75 °C
Light output	56 % (relative to anthracene)
Decay constant	2.5 ns
Wavelength of max. emission	420 to 440 nm

DIMENSIONS

Rectangular Blocks

length up to 2000 mm with height and thickness limited by max. weight 60 kg per piece (the standard thickness is 50 and 100 mm)

Rounded Blocks

max. 250 × 250 mm

Rounded Rods

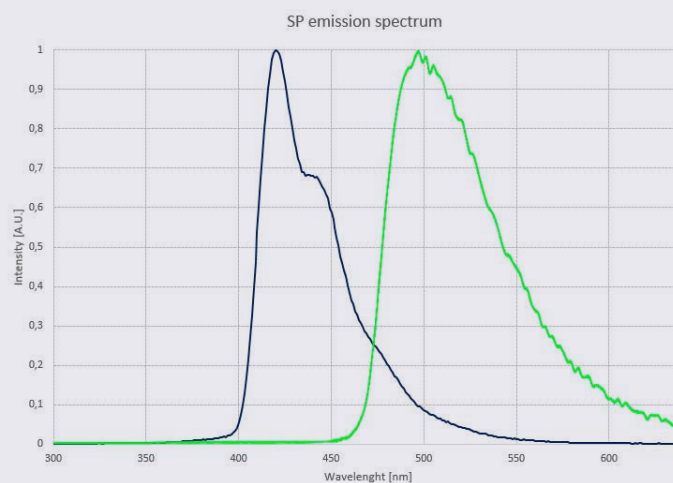
max. 50 × 1000 mm

Rectangular Rods

max. 2000 mm

Foils

max. 250 × 190 mm, minimal thickness 0.3 mm



SPD PRODUCT

CHARACTERISTICS

Large volume plastic scintillation detectors are widely used in the detection systems due to their high efficiency, high reliability and the variety of shapes and sizes that may be produced for specific applications. Plastic assembly consists of a machined plastic block, a grounded reflective material, a light-tightening black plastic foil and fastening system(s) for photomultiplier.

Assembly may be optionally equipped with a light guide, a voltage divider or PMT housing, according to the customer requirements. NUVIA has a vast experience with production of large volume plastic detectors - more than 20 tons per year -

designed to meet demanding requirements for security applications, such as gate monitoring systems for nuclear power plants, scrapyards, steelworks and detection systems for prevention of illegal transport of radioactive substances across country borders.

These products are tailored made, please contact our sales team for more information.



SPF PRODUCT

CHARACTERISTICS

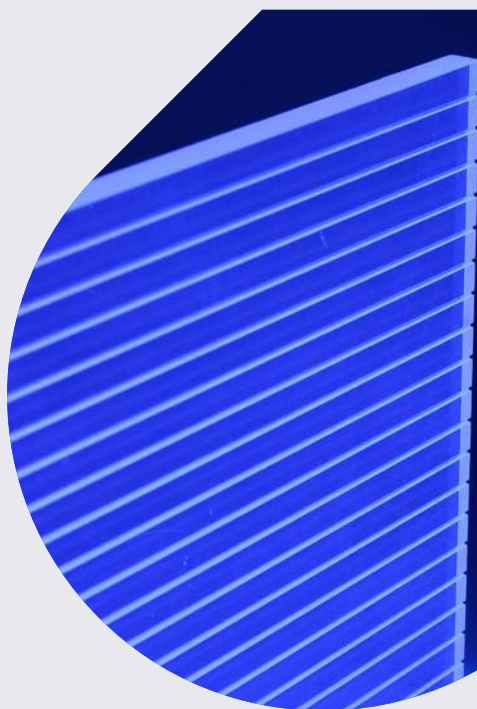
- SPF plastic scintillators are designed for detection of beta particles.
- The scintillator assembly is made of a thin scintillation plastic foil optically coupled to the light guide. Due to this arrangement the gamma-background is substantially decreased.
- Standard thickness of the foils is 0.3 mm and 0.5 mm.
- Custom-made pieces are available upon specifications.

UNIQUE DESIGNS

CERN/FERMILAB ICARUS PROJECT

- 1,000 pieces of long slabs with grooves for wls fibers for measuring cosmic muons.

Scintillator developed for
the CERN/ FERMILAB
ICARUS project.



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SuperNEMO EXPERIMENT

- 520 pieces of large volume plastic scintillators with improved performance built in Modane, France, working as calorimeter.
- Under TACR development project.

*The development of SuperNEMO was
funded by the Technology Agency of the
Czech Republic.*

T A

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Technology
Agency
of the Czech Republic

Scintillator developed for
the SuperNEMO project.



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NuDET AB Products

ZnS (Ag) SCINTILLATORS

We provide highly efficient and reliable ZnS(Ag) alpha, beta and alpha/beta scintillation detectors and assemblies for a wide range of applications: surface contamination, air filters, smears and wipe tests.

Our ZnS(Ag) scintillators are available in a variety of shapes and dimensions, completed with PMT (1 1/8" and 2") and MHV connector.

We also propose the manufacture of alpha scintillation chamber -Lucas cell - for Radon measurement with a glass window and gas-tight valves, and inner surface covered with ZnS(Ag) scintillator.

SA PRODUCT

PRODUCTS

- Material properties:
 - SA 32: blue emitting
 - SA 33: green emitting
- Designs: several designs are available.

Please contact us to know more.

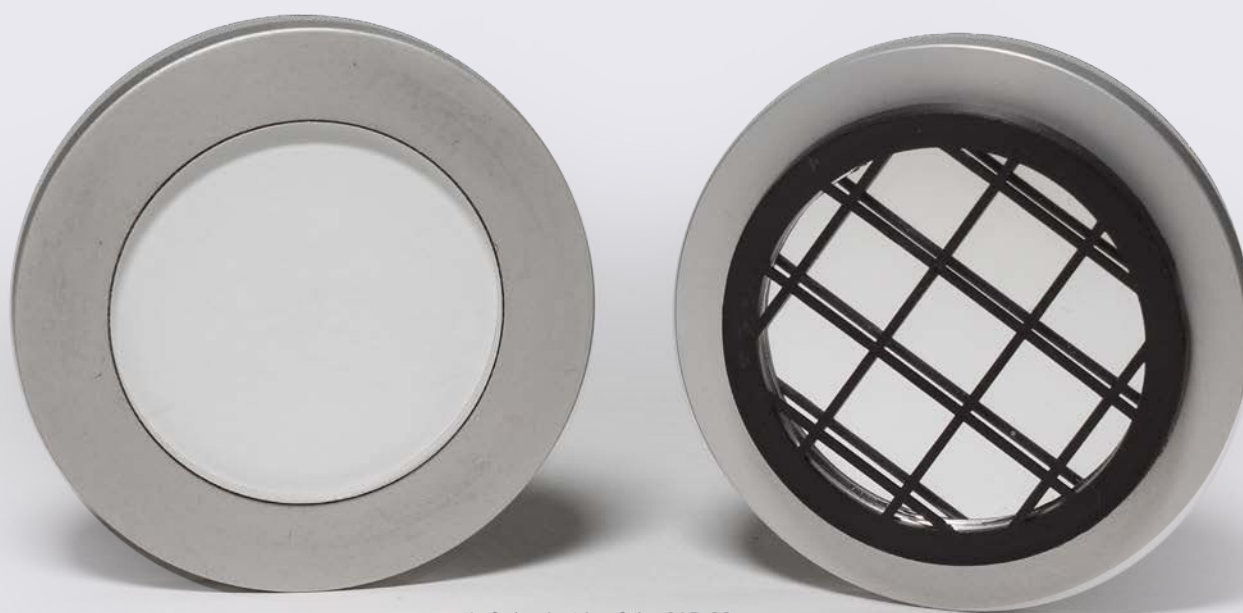
TECHNICAL DATA

- Luminophore ZnS(Ag).
- Light guide plexi-glass.
- Wavelength of max. emission 455 nm.
- Decay time 0.3 μ s.
- Storage temperature range from -25 °C to +45 °C.

APPLICATIONS

These polycrystalline scintillators are designed for a simple detection of alpha radiation.

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Left: back side of the SAD 32.
Right: front side of SAD 32
layered with thin mylar foil.

SRN DESIGN LUCAS CELLS

CHARACTERISTICS

Lucas cells are important scintillation detectors tailored for measurement of ^{226}Ra and ^{222}Rn concentrations.

These cells are designed in the form of cylindrical chambers. The chamber is provided with a glass window and fitted with gas-tight valves for inlet of the measured sample. A thin layer of ZnS(Ag) phosphor is applied to the interior surface of the metal cell. Below are the available designs for Lucas cells scintillators.

The scintillation chambers make up a basic part for counting systems, such as:

- airborne ^{222}Rn activity measurements,
- ^{226}Ra or ^{222}Rn in water or soil measurements.

In the former case, an air sample is taken from the atmosphere to be tested, in the latter case, radon is transported from the sampling vessel into the scintillation chamber.

The volume activity is determined from the results of alpha activity of radon and its short-lived decay products measurement.



SAB PRODUCT

CHARACTERISTICS

The combined scintillators are designed for measurements of alpha and beta radiation. When measuring beta radiation, these scintillators are suitable for detection of medium and high energy beta radiation. While measuring alpha radiation, these scintillators can detect alpha particles within a wide range of energies.

Alpha detection phosphor is made of silver activated zinc sulfide and the scintillation plastic foil is used for detection of beta radiation.

PRODUCTS

- Material properties:
 - SAB 32: blue emitting
 - SAB 33: green emitting

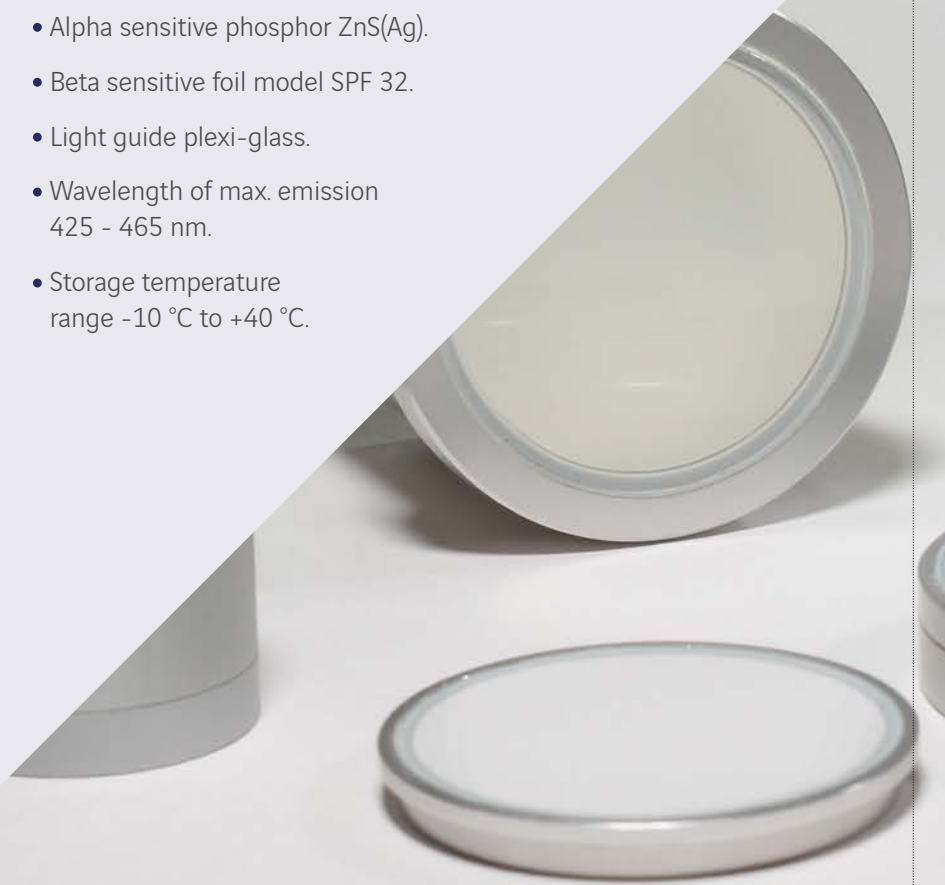
TECHNICAL DATA

- Alpha sensitive phosphor ZnS(Ag).
- Beta sensitive foil model SPF 32.
- Light guide plexi-glass.
- Wavelength of max. emission 425 - 465 nm.
- Storage temperature range -10 °C to +40 °C.

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As shown on the photo, several designs are available for this product.

Please contact a sales representative for more information.





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NuDET SND Products

NEUTRON SCINTILLATORS

Neutron detectors are innovative ^3He -free neutron detectors with high gamma rejection capability.

The detection module is based on a plastic light guide coated with a $^6\text{LiF/ZnS:Ag}$ detection layer.

Detectors are supplied with standard 14-pin socket or with voltage dividers and MHV/ BNC connectors.



SND PRODUCT

PRODUCTS

- Standard products are supplied in the following geometries: block, cylinder and disc.
- Standard blocks are coupled with 50 mm thick light guides of various dimensions.
- Detectors are encapsulated in high-density polyethylene moderator (30 mm thick) to further increase the detection efficiency.
- All detection units are fitted with a 2" photomultiplier.

APPLICATIONS

- Block design: personal, cargo or Vehicles screening at checkpoints, such as border crossings, airports, harbors, nuclear facilities.
- Cylinder and disc designs: radiation monitoring systems, direction sensitive probes, screens for neutron imaging systems.

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DIMENSIONS

	SND.300.100.50	SND.500.100.50	SND.500.200.50	SND.D35.40	SND.D40.4
Geometry	block	block	block	cylinder	disc
Detector size (mm)	300 × 100 × 50	500 × 100 × 50	500 × 200 × 50	D35 × 40	D40 × 4
Thermal neutron detection efficiency (%)*	26	24	23	24	36
Sensitivity (pieces/nv)*	156	240	470	12	4.5
Neutron detection efficiency (pieces/ng)**	0.47	0.76	149	-	-

* Data for a detector without moderator.

** According to PNNL-18903 when meeting requirements for gamma insensitivity. Detector with moderator.

Important note: The product is subject to export licence procedure and an end-user statement is required.

The development
of this product
was funded by
the Technology
Agency of the
Czech Republic.

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Agency
of the Czech Republic

BENEFITS

- High detection efficiency: optimized composition and thickness.
- Innovative concept: scintillation detector without ^3He or toxic BF_3 gas.
- Low gamma sensitivity: materials inherently gamma insensitive.
- Mechanical resistance: gas-free technology applicable to harsh environment.
- Variability: easy to customize the shape and the size.
- Competitive price, independent of the ^3He market.



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NuDET NaI Products

INORGANIC CRYSTAL SCINTILLATORS

This product range encompasses superior sodium iodide scintillation detectors and probes for gamma spectrometry and more.

We manufacture NaI(Tl) scintillation detectors with standard shapes and dimensions.

According to a customer request, we are able to produce tailor-made detectors with required shapes, materials and parameters.



SK PRODUCT

CHARACTERISTICS

- Sodium iodide crystals are manufactured from a raw melt by the use of a careful and accurately controlled growing technique. Grown ingots are machined to obtain standard dimensions.
- Due to the high hygroscopicity of sodium iodide, the crystals are hermetically encapsulated. Luminescent light output is ensured by the front glass window optically coupled to the crystal.
- The remaining parts of the crystal are covered with reflective layer.

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TECHNICAL DATA

Density	3.67 g×cm-3
Refractive index	1.775
Light output relative to anthracene	240 %
Wavelength of maximum emission	420 nm +/- 10 nm
Decay time	0.23 µs
Working temperature	- 10 °C to + 45 °C
Storage temperature	- 25 °C to + 55 °C
Mechanical strenght	3 g at 50 pieces (up to 63 mm dia)





APPLICATIONS

- Thallium activated sodium iodide crystals are the most frequently used scintillators designed for the detection of gamma radiation.
- In addition to their primary application, i.e. gamma radiation detection and spectrometry, these scintillators are also used for the detection of soft x-radiation.
- Due to their high light output, high detection efficiency and good energy resolution, these scintillators are extensively used in biology, medicine, geology, industrial radionuclide applications, environmental monitoring etc...

SB & SN PRODUCTS

CHARACTERISTICS

- The integrally-mounted scintillation assemblies are hermetically sealed units containing a NaI(Tl) crystal optically coupled to a photomultiplier tube.
- The assemblies are designed for crystals up to 5 inches in diameter.
- An internal magnetic shield is built into each detector, which serves as sufficient protection against the earth magnetic field.
- A complete SBG detector ended with PMT pins can be simply used as a plug-in unit.
- A SNG unit is equipped with a voltage divider and ended with connectors.

BENEFITS

Advanced encapsulating techniques and photomultiplier selection help to improve the energy resolution and the long-term stability of the probes. Integrally-mounted scintillation assemblies have several advantages:

- Permanent light sealing.
- Adaptation of the photomultiplier to the darkness.
- Prevention of accidental photomultiplier damage by exposing the detector to the light.

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SIK PRODUCT

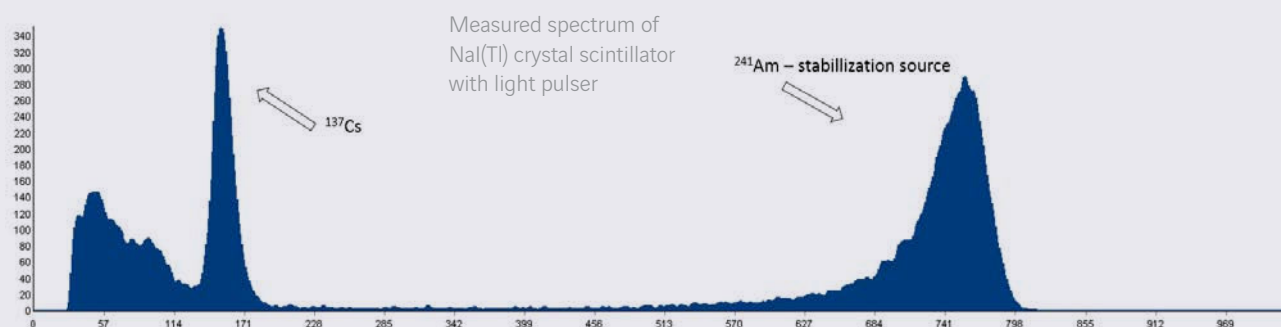
CHARACTERISTICS

- The stabilization technique of scintillation spectrometers requires a light pulser that produces pulses of similar shape as those produced by gamma absorption in the NaI(Tl) or another inorganic crystals and which can be easily included in the crystal assembly.
- The SIK model consists of NaI(Tl) crystal and a ^{241}Am alpha radiation source generating light pulses for stabilization. The alpha particles are absorbed in the first few microns of the crystal and resulting light is led through the whole crystal to the photomultiplier.



Alpha source can be placed on the bottom or sideways of the crystal.

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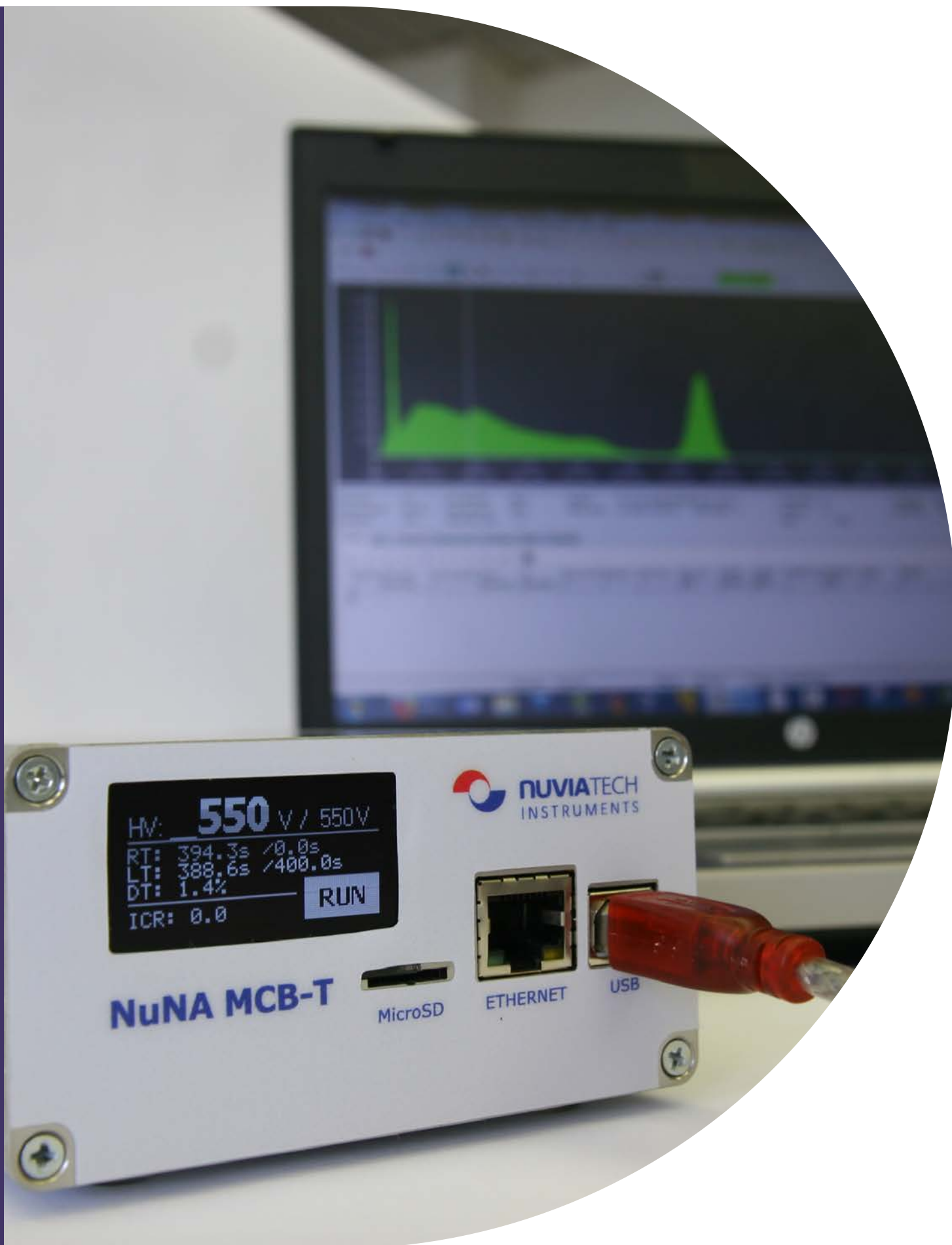
5 NuNA Products

DIGITAL ANALYSERS

Our powerful fully digital multichannel analysers and counters are available in compact and lightweight sockets, or optionally as desktop version provided with external PMT active divider with preamplifier.

The analysers are dedicated for scintillation and solid-state spectrometry and counting.

Supplied together with scintillation detectors, and acquisition and evaluation software GamWin, they enable comprehensive digital measurement solutions for gamma spectrometry analysis.



MCB MODEL

CHARACTERISTICS

The MCB digital multichannel analyser in a compact housing is a MCA base for processing signals that can be directly plugged in detectors equipped with a 14-pin, 10-stage photomultiplier tube.

Signal processing enables to display energy spectra from the photon radiation detected by the most common types of scintillation detectors as NaI(Tl), LaBr₃ (Ce), plastic materials and others.

MCB comprises a 14-Pin PMT socket, preamplifier, high voltage supply and control unit.

MCB can be connected to a local network using an Ethernet interface or to a computer using a USB interface. GAMWIN Software provides control and display interface.

BENEFITS

- PMT socket: 14-pin PMT (10 stages).
- USB-B connector, Ethernet (RJ45).
- Power Supply: 9 V to 30 V / 3 W DC.
- Conversion Gain: up to 4096 channels.
- High voltage: max. 1250 V.

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Left: Digital multichannel analyser. Right: Desktop digital multichannel analyser.



MCB T MODEL

CHARACTERISTICS

The NuNA MCB T digital multichannel analyser is a desktop version of MCB with an added variable gain amplifier, preamp power supply, high voltage supply and status display.

MCB T can be connected to a local network using an Ethernet interface or to a computer using a USB interface.

The rear panel is equipped with a standard SHV high voltage connector, BNC signal input and NIM compatible D-SUB9 preamp power connector. MCB T can process signals from the most common types of scintillation detectors (NaI(Tl), LaBr₃ (Ce), plastic materials and others).

GAMWIN Software provides control and display interface.

BENEFITS

- USB-B connector, Ethernet (RJ45).
- Input gain: 0.5×, 1×, 2×, 4×, 8×, 16×, 32×.
- High voltage: max. 1250 V.
- Preamp power output: ±12 V, ±24 V.
- Power supply: 9 V to 30 V / 5 W DC.
- Conversion Gain: up to 4096 channels.



PMP MODEL

CHARACTERISTICS

- The NuNA PMT base with active PMT divider and preamplifier serves as a link between standard 14-pin, 10-stage photomultiplier tubes and signal processing electronic devices (MCA, counters).
- The PMT base is equipped with an industry standard high voltage connector SHV, signal output BNC and NIM compatible power supply D-SUB.

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BENEFITS

- Output impedance: 50 Ω .
- High voltage: max. 1250 V.
- Power supply: ± 12 V / 20 mA.
- PMT socket: 14-pin PMT (10 stages).



SCA (T) MODEL

CHARACTERISTICS

SCA product:

- Powerful digital four-channel counter designed for signal processing from plastic scintillation detectors.
- Detectors are connected directly into the counter using PMT socket on the rear panel.

SCA T product:

- Powerful digital four-channel counter dedicated to the signal processing primarily from plastic scintillation detectors.
- Detectors are connected through the single BNC or MHV connector on the rear panel.

Common characteristics:

- The front panel is equipped with an Ethernet interface for connecting to local network and a USB interface for connecting directly to a PC.
- GAMWIN Software provides control and display interface.

BENEFITS

SCA product:

- PMT socket: 14-pin PMT (10 stages).
- USB-B connector, Ethernet (RJ45).
- High voltage: max. 1250 V.
- Power Supply: USB or 9 V to 30 V / 2 W DC.

SCA T product:

- USB-B connector.
- Ethernet (RJ45).
- High voltage: max. 1250 V.
- Power Supply: USB or 9 V to 30 V / 2 W DC.



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NUISOFT GAMWIN

SOFTWARE SOLUTION

As part of the NuSOFT product range, GAMWIN is a gamma and alpha spectrometry analysis software package designed for comprehensive spectral analysis and evaluation for data obtained from semiconductor and scintillation detectors.

Developed for Windows operating systems, it includes features for nuclide identification and quantification, peak searching and area determination, peak fitting (including the fitting of multiplets), and background subtraction.



About NUVIATech Instruments

NUVIATech Instruments, a NUVIA brand, provides standard and tailored measurement solutions to nuclear owners, operators and stakeholders for all stages of the facilities' life-cycle.

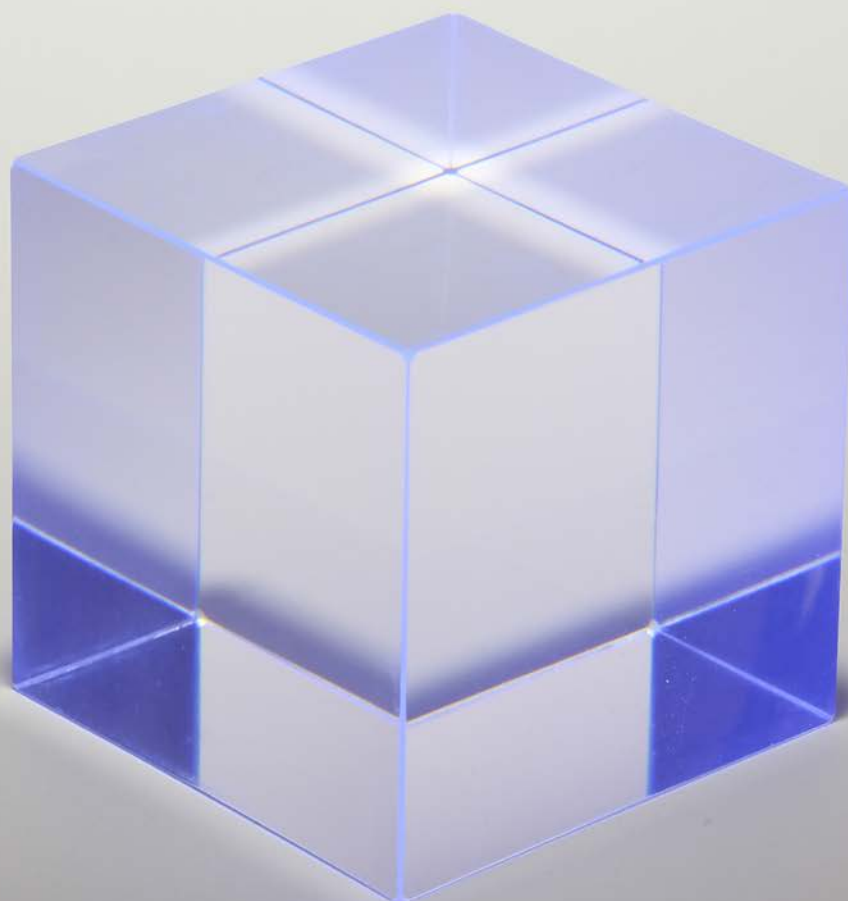
NUVIATech Instruments can supply both components (detectors, analysers and software) and complete measurement systems.

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From modelling to implementation, NUVIATech Instruments uses exclusive know-how and state-of-the-art technologies in its monitoring systems dedicated to six major fields of application: waste management, homeland security, laboratories, health physics, continuous process monitoring and environmental monitoring.

Product Table for Scintillation Detectors

Identification	Product Line	Prefix type	Dimension	Suffix version	PN Example
Plastic Scintillators - NuDET (page 4)					
Blocks	SP	B	500.500.50	P - packing	SPB.500.500.50 SPB.500.500.50P SPB.D90.120
Foils	SP	F	D90.120		SPF.150.100.1
Detectors PMT	SP	D	150.100.1		SPD.1000.500.50 SPD.D90.120
Detectors U PMT (integrated PMT)	SP	U	1000.500.50	MHV, BNC, CAB (cable)	SPU.200.200.100MHV
Alpha / Beta Scintillators - NuDET AB (page 10)					
ZnS(Ag) + organic glass (alpha, flange)	SAD	D	D40	NL - non light-tight shielding / OF -	SAD.D40OF SAD.D40NL
ZnS(Ag) + organic glass (alpha, capsule)	SAK	K	D100	T - external thread	SAK.D100 SAK.D100T
ZnS(Ag) + organic glass (alpha, probe, PMT)	SAP	P	D40	NL - non light-tight shielding MHV, BNC, CAB (cable)	SAPD40 SAPD40MHV SAPD40NL.MHV
SPB (beta, flange)	SBD	D	D250.3	AF - aluminum shielding foil OF - organic shielding foil	SBD.D250.3 SBD.D250.3AF
SPF + organic glass (beta, flange)	SBF	F	D40.07	NL - non light-tight shielding	SBFD40.07 SBFD40.07NL
SPF + organic glass (beta, probe, PMT)	SBP	P	D40.07	NL - non light-tight shielding MHV, BNC, CAB (cable)	SBPD40.07 SBPD40.07MHV SBPD40.07NL.MHV
ZnS(Ag) + SPF (alpha + beta, flange)	SAB	B	D40.07		SAB.D40.07
ZnS(Ag) + SPF (alpha + beta, foil)	SDF	F	177.107.05		SDF.177.107.05
ZnS(Ag) + SPF (alpha + beta, capsule)	SDK	K	D88.05	T - external thread	SDK.D88.05 SDK.D88.05T
ZnS(Ag) + SPF (alpha + beta, probe, PMT)	SDP	P	D40.07	MHV, BNC, CAB (cable)	SDPD40.07 SDPD40.07MHV
ZnS(Ag) + SPF + VD (rectangle probe)	SDR	R	100.125	A - alpha / B - beta / AB - alpha/beta / MHV, BNC	SDR.100.125AB.MHV SDR.100.125A.BNC
Radon Chambers - NuDET (page 13)					
Chambers for Radon	SRN		125, 500, 1000	T - valves with thread / S - valves with sleeve	SRN.125TS SRN.500TT SRN.1000SS
Neutron Scintillators - NuDET SND (page 16)					
Neutron detector for portals	SND		500.200.50	Always with moderator	SND.500.200.50
Neutron detector for SB DSA	SND		D35.40 / D40.4		SND.D40.4
Nal(Tl) Crystals - NuDET Nal (page 22)					
Crystal	SK	G	D50.50	F - Flange / M - Mortise	SKG.D50.50 SKG.D50.50F SKG.D50.50M
Crystal - well	SK	W	D160.125.D65.96	F - Flange / M - Mortise	SKWD160.125.D65.96F
X-ray Detection Crystal	SK	X	D40.2	AL - aluminum window / BE - beryllium window	SKXD40.2AL SKXD40.2BE
Nal(Tl) Detectors / Probes - NuDET Nal (page 24)					
Detectors PMT	SB	G	D2.2.2		SBG.D2.2.2
Detectors PMT - well	SB	W	D2.2.D20.35.2 crystal / well / PMT		SBWD2.2.D20.35.2
Probes (NKG)	SN	G	D2.2.2	C - connector / D - double connector V - wire / W - double wire / N - negative voltage	SNG.D2.2.2C SNG.D40.40.2CN
Probes (NKG) - well	SN	W	D2.2.D20.35.2 crystal / well / PMT	C - connector / D - double connector V - wire / W - double wire / N - negative voltage	SNWD2.2.D20.35.2C SNWD2.2.D20.35.2W
Reference Light Pulser - NuDET Nal (page 25)					
Nal(Tl) - Am-241	SIK		D40.40 / D2.2.2	F - Flange / M - Mortise	SIKD40.40F SIKD2.2.2
Electronics - NuDET					
Voltage divider	VD		14 - 14PIN	MHV, BNC	VD.14MHV



NUVIATech Instruments provides standard and bespoke measurement solutions to nuclear owners, operators and stakeholders for all stages of the facilities' life cycle.

Product Catalog



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