

## INORGANIC SCINTILLATOR DETECTOR ASSEMBLIES FOR MULTIPLE APPLICATION

# Inorganic Scintillator Detectors

### MAIN FEATURES

- PMTs surrounded by solid Mu-Metal Shield
- Compact assembly
- Superior energy resolution
- Optional voltage divider
- Optional fastening tread and holder for  $\gamma$ stream based assemblies
- NaI(Tl):
  - Very high light output
  - good energy resolution
- CsI(Tl):
  - Non-hygroscopic
  - Rugged
  - Long wavelength emission
- BGO:
  - High density and Z
- CeBr:
  - Fast timing
  - high light output
  - Ultra-Low background Scintillation Crystal

### DESCRIPTION

**Inorganic scintillators** are composed by certain materials, which have the properties to emit light when ionizing radiation interact in it. The detection of ionizing radiation through scintillation light is one of the oldest techniques documented.

Efficient detection of Gamma rays requires the material of the scintillator to be with high density and high atomic number. Inorganic scintillation crystals meet the requirements of stopping power and optical transparency, their densities ranging from roughly 3 to 9 g/cm<sup>3</sup> makes them very suitable to absorb penetrating radiation (Gamma rays). Materials with high Z-values are used for Gamma ray spectroscopy at high energies (>1 MeV).



Since photoelectron statistics plays a key role in the accurate determination of the energy of the radiation, so the use of scintillation materials with a high light output is preferred for all spectroscopic applications. On the other side, fast light emission (through fluorescence process), improves the measurement of the ionizing radiation interaction time.

The **Inorganic scintillator assemblies** are composed by the following components:

- the crystal (e.g. NaI(Tl), CsI(Na))
- A 14-pin 10 stages PMT

This can be matched with MCA PMT base **yStream**, **bPAD** and **bmCA**.

The assembly can be also provided with a voltage divider, to be matched with **TOPAZ-Pico** MCA.

## ACCESSORIES

In addition to standard supply, the following accessories are available upon request:

- **yStream** active digital Multi-Channel Analyzer integrated in a 14-pin PMT base
- **bPAD** compact microcontroller-based Single Channel Analyzer
- **bmCA** digital Multi-Channel Analyzer integrated in a 14-pin PMT base
- **TOPAZ-Pico** compact, stand-alone digital Multi-Channel Analyzer

## APPLICATION

Each scintillation crystal has its own specific application. For high resolution Gamma ray spectroscopy, NaI(Tl), or CsI(Na) (high light output) are normally used. CeBr<sub>3</sub> has exceptional light emission and fast light deexcitation time.

For high energy physics applications, the use of bismuth germanate Bi<sub>4</sub>Ge<sub>3</sub>O<sub>12</sub> (BGO) crystals (high density and Z) improves the Gamma ray energy confinement.

### NaI(Tl):

- General scintillation counting
- health physics
- environmental monitoring
- high temperature use

### CsI(Tl):

- Particle and high energy physics
- general radiation detection
- photodiode readout
- phoswiches

### BGO:

- Particle physics
- geophysical research
- PET
- anti-Compton spectrometers

### CeBr<sub>3</sub>:

- High resolution spectroscopy
- fast timing
- particle and high energy physics
- ultra-low background

## OPTIONS AVAILABLE

Model	Material	Dimension	Decay Constant	Voltage Divider	Resolution for <sup>137</sup> Cs
51B51/2M	NaI(Tl)	2" Ø x 2" h	0.23 ms	no	< 7,5 %
51B51/2M-E1	NaI(Tl)	2" Ø x 2" h	0.23 ms	yes	< 7,5 %
76B76/3M	NaI(Tl)	3" Ø x 3" h	0.23 ms	no	< 7,5 %
76B76/3M-E1	NaI(Tl)	3" Ø x 3" h	0.23 ms	yes	< 7,5 %
51B51/2M-Cs	CsI(Tl)	2" Ø x 2" h	0.6/3.4 ms	no	< 8 %
51B51/2M-E1-Cs	CsI(Tl)	2" Ø x 2" h	0.6/3.4 ms	yes	< 8 %
76B76/3M-CS	CsI(Tl)	3" Ø x 3" h	0.6/3.4 ms	no	< 8 %
76B76/3M-E1-CS	CsI(Tl)	3" Ø x 3" h	0.6/3.4 ms	yes	< 8 %
51B51/2M-BGO	BGO	2" Ø x 2" h	0.3 ms	no	< 13 %
51B51/2M-E1-BGO	BGO	2" Ø x 2" h	0.3 ms	yes	< 13 %
76B76/3M-BGO	BGO	3" Ø x 3" h	0.3 ms	no	< 13 %
76B76/3M-E1-BGO	BGO	3" Ø x 3" h	0.3 ms	yes	< 13 %
38B38/2M-CEBR-LB-X	CeBr	1.5" Ø x 1.5" h	19 ns	no	< 4,2 %
38B38/2M-E1-CEBR-LB-X	CeBr	1.5" Ø x 1.5" h	19 ns	yes	< 4,2 %



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