

# Scintillation Detectors with Square or Rectangular Cross-Sections of Variable Lengths

Sodium Iodide [NaI(Tl)] scintillation detectors with square or rectangular cross-sections are a cost-effective alternate to the standard right circular cylinder. A square scintillator provides a 27% increase in volume over a cylindrical scintillator of the same diameter and length. This increases detector efficiency while keeping package size and shielding requirements down. It also allows for stacking of detectors in arrays.

Saint-Gobain Crystals has been building NaI(Tl) detectors in these configurations for over 35 years with excellent performance and longevity in the field in a variety of environments.

## Design Notes -

- Various lengths are available with 16" being a common size. Excellent uniformity can be achieved for long square or rectangular detectors. Up to 1m lengths have been designed and assembled. The stopping power is sufficient for high energy gammas.
- Photomultiplier tubes (PMTs) can be either integrated or removable. Removable PMTs are the most popular option since they allow for replacement without disturbing the hermetic package.
- With a PMT on each end, the position of interaction of the photon can be obtained.
- Square or rectangular detectors can be stacked to build massive radiation detectors for aerial survey or medium and high energy physics. The modular concept offers large detector area and volume with an economy and flexibility that complicated designs cannot provide.
- For the most extreme rugged environments, this style detector can be built with a welded, glass-to-metal seal in a stainless steel housing or other ruggedized configurations. These packages can operate in environments with conditions as severe as temperatures of -55°C to 60°C and shock up to 20g's.

## Features/Advantages -

- Easily stacked in arrays
- Increased efficiency
- Only one PMT needed for a large crystal volume
- Excellent energy resolution and uniformity, similar to multiple smaller detectors

## Options -

- Side and end well geometries
- Scintillator containers of low-background stainless steel or copper
- PMTs selected for low background, premium resolution, fixed HV use, or gain matching
- Special flanges, mounting fixtures or other modifications
- Integrated, low-background voltage divider/preamp base or multi-pin base for interface to plug-on electronics
- Low energy entrance windows
- Premium resolution assemblies
- Ruggedized and high-temperature detectors



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## Popular Configurations -

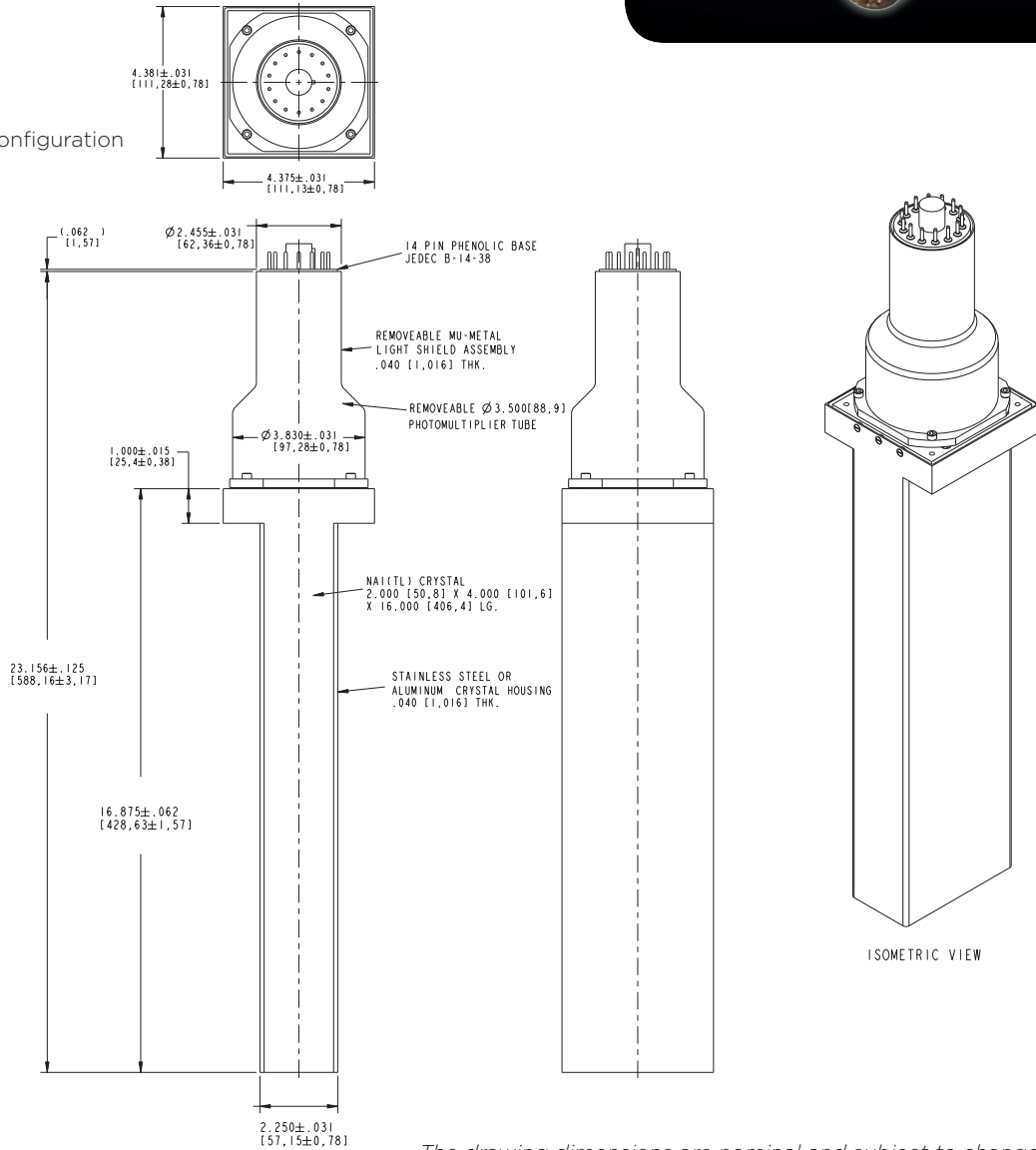
The most common sizes are 2"x4"x16", 3"x5"x16" and 4"x4"x16" assemblies. PMT sizes include 2", 3" and 3.5". Aluminum or stainless steel housings are common.

Applications include aerial survey, whole body counting, security portal monitoring and medium and high energy physics.



Model 2X4H16/3.5

Illustration of Typical Configuration



The drawing dimensions are nominal and subject to change. Call the factory for current values.



Manufacturer reserves the right to alter specifications.

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