

# X-ray Detectors

## For Low Energy Gamma and X-ray Detection

Our X-ray detectors and probes are used in various low-energy and X-ray detection applications. These detectors come in three types of assemblies: Packaged X-ray crystals, Integral X-ray detectors and X-ray probes. All use a thin 1mm or 2mm NaI(Tl) crystal — usually 25mm (1"), 38mm (1.5") or 51mm (2") in diameter — and a radiation entrance window.

The typical energy range for an assembly with a beryllium entrance window is 3 to 100 keV and 10 to 200 keV for an assembly with an aluminum entrance window.

### Design Notes -

- The radiation entrance window is selected to provide the appropriate transmission for the energy of interest. Thin aluminum or beryllium may be used.
- X-ray detectors for orbital and balloon-borne missions require special designs, materials, assembly techniques and testing.
- Special flanges, mounting fixtures and other modifications can be added to any X-ray probe.
- A coated Beryllium entrance window that resists chemical vapors and prevents corrosion is available.

### Advantages -

- Compact assembly
- Thin entrance window allows measurements down to 3 keV
- Thin crystal reduces sensitivity to background radiation
- Consistent, superior performance

### Assembly Types -

- Packaged X-ray assembly  
1mm thick NaI(Tl) crystal mounted in an aluminum container with a radiation entrance window on one end and a glass or quartz optical window on the other. The assembly is hermetically sealed.
- Integral X-ray assembly  
1mm thick NaI(Tl) crystal mounted in an aluminum container with a radiation entrance window, and optically coupled directly to a photomultiplier tube with an external mu-metal magnetic light shield. The PMT terminates in a 12- or 14-pin phenolic base, depending on whether a 1.5" or 2" PMT is used. The scintillator container and light shield form a continuous, hermetically-sealed, light-tight housing for the detector.
- Integral X-ray Probe Assembly  
Consists of a model 1XR.040/B X-ray detector mounted in an aluminum container with a removable brass collimator, and optically coupled to a photomultiplier tube with mu-metal magnetic light shield. The PMT is connected to a built-in, low-noise voltage divider that terminates with cables for signal and high voltage. The scintillator container and light shield form a continuous, light-tight housing for the detector.



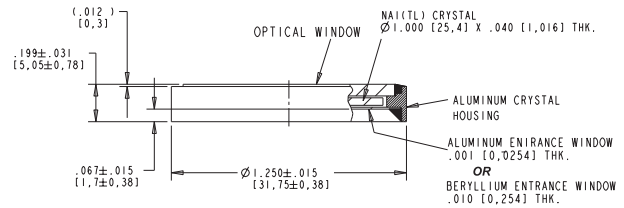
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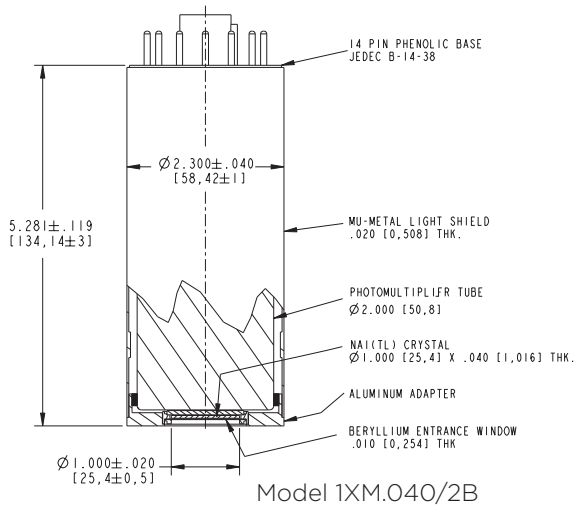
### Popular Configurations -

X-ray packaged crystals are used in X-ray diffraction, X-ray fluorescence, Mossbauer studies and gauging.

| Typical X-ray Packaged Models |              |
|-------------------------------|--------------|
| Model                         | Crystal Size |
| 1XR.040B                      | 1" x 1mm     |
| 1XR.040A                      | 1" x 1mm     |
| 1.5XR.040B                    | 1.5" x 1mm   |
| 2XR.040B                      | 2" x 1mm     |



Model 1XR.040B or 1XR.040A



Model 1XM.040/2B

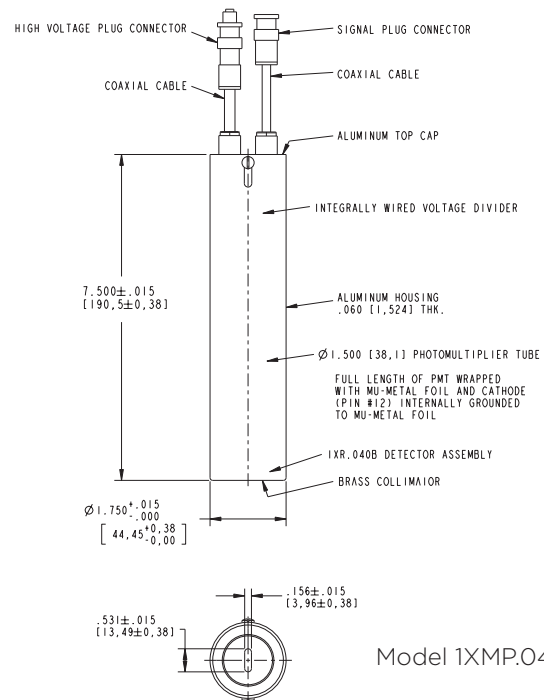
X-ray integral assemblies are used in health physics applications.

| Typical X-ray Integral Models |              |          |
|-------------------------------|--------------|----------|
| Model                         | Crystal Size | PMT Size |
| 1XM.040/1.5B                  | 1" x 1mm     | 1.5"     |
| 1XM.040/2B                    | 1" x 1mm     | 2"       |
| 1XM.25/1.5A                   | 1" x .25"    | 1.5"     |
| 1.5XM.040/2B                  | 1.5" x 1mm   | 2"       |
| 2XM.040/2A                    | 2" x 1mm     | 2"       |
| 2XM.040/2B                    | 2" x 1mm     | 2"       |
| 5XM.063Q/5B                   | 5" x 1.5mm   | 5"       |

B = beryllium entrance window  
A = aluminum entrance window

The fixed collimator makes the X-ray probe ideal when a constant area of exposure is needed.

| Typical X-ray Probe Models      |              |          |
|---------------------------------|--------------|----------|
| Model                           | Crystal Size | PMT Size |
| 1XM.040BP                       | 1" x 1mm     | 1.5"     |
| 1XMP.040B<br>(with FET Pre-amp) | 1" x 1mm     | 1.5"     |



Model 1XMP.040BP

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Saint-Gobain Crystals

www.crystals.saint-gobain.com

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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