

Making the Invisible Visible



## DC-THOR.HE

Photon Counting Detectors

Superior Image Quality  
with High Resolution for  
Non-Destructive Testing

### OVERVIEW

The DC-THOR.HE series of industrial photon counting X-ray detectors are intended for demanding applications such as weld inspection in nuclear, oil & gas environments.

The DC-THOR.HE products are optimized for X-ray and isotope inspection, with energies of up to 450+ keV, and capable of imaging even at 1 MeV. The direct conversion photon counting technology used is unique in providing superb detection efficiency while maintaining excellent spatial resolution to meet the requirements of the inspection standards.

High detection efficiency of the DC THOR.HE series allows faster inspection of welds, increasing the inspection throughput. Hard-to-handle isotope sources can be replaced with X-rays, resulting in improved operational safety. The embedded dual energy technology opens up new opportunities for use, for example in inspection environments polluted by strong background radiation.

### FEATURES AND BENEFITS

- Support for energies up to 450+ keV
- 100  $\mu\text{m}$  native resolution
- High efficiency and high spatial resolution across the energy range
- Dual energy imaging
- Robust IPx7\* enclosure
- Long detector lifetime

### APPLICATIONS

- Pipe welds
- LNG containers
- Nuclear plants
- Aerospace

\* Not including the cooling fans

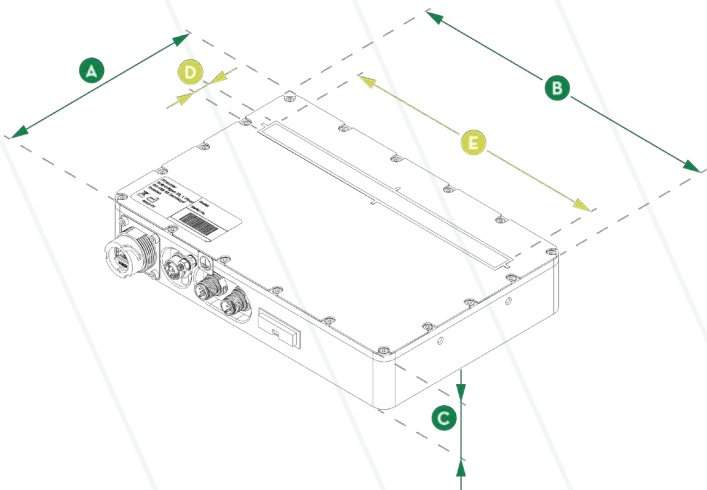
## WELD INSPECTION

Inspection of welds in pipes and containers can be a demanding task when dealing with thick or very dense materials. Typically, hard-to-handle high-energy isotope sources are needed to produce sufficient image quality in reasonable time.

Conventional X-ray imagers rely on thicker or specialized high energy scintillators. The trade-off is typically loss of spatial resolution. Direct conversion technology preserves spatial resolution even when using a thicker converter layer for improved efficiency needed in high energy inspection.

Inspection of thicker or denser welds is possible with high throughput using the DC-THOR.HE photon counting detectors.

## MECHANICAL CHARACTERISTICS



## PHYSICAL DIMENSIONS

Active Area Length (E) .....	78, 103, 206, 309, 412 mm
Active Area Width (D) .....	25 mm
Length (B) .....	140 - 450 mm <sup>1</sup>
Width (A) .....	180 - 330 mm
Thickness (C) .....	42 - 70 mm <sup>2</sup>
Weight .....	4 - 18.5 kg <sup>1</sup>

<sup>1</sup> Depending on the model

<sup>2</sup> Not including the cooling fans or the free space required for air-flow.

Unless otherwise specified, Varex Imaging Flat Panel X-ray Detectors are components intended to be integrated into products by X-ray system manufacturers. System manufacturers are responsible for qualifying and validating their products for their intended uses and meeting all applicable regulatory requirements.

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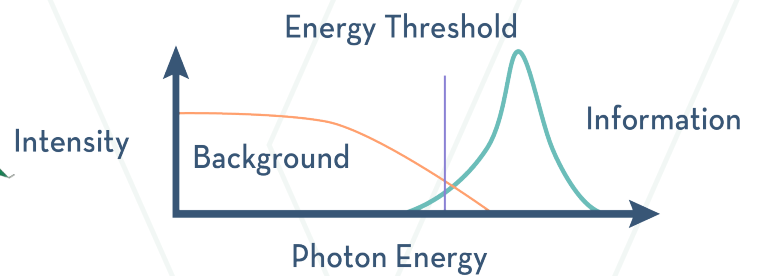
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## DUAL ENERGY IMAGING

Each incoming photon in every pixel is separately counted in one of the two energy bins, producing three simultaneous energy-domain images (low, high and total energy). The energy threshold (the light magenta vertical line) should be where the background and information curves cross each other.

Some environments, such as nuclear power plants, are characterized by a strong radiation background which badly degrades conventional X-ray images. In contrast, photon counting technology can be used to discard part of the radiation spectrum and thus to greatly reduce the effect of the harmful background radiation. This is achieved by using a suitable radiation source which has higher energy than most of the background and by adjusting the energy threshold to ignore the unwanted content.



\*Disclaimer: Simplified illustration, not an actual use case.

## SPECIFICATION HIGHLIGHTS

### SENSOR

Technology .....	Photon Counting Dual Energy
Energy Ranges.....	40 - 450+ kVp <sup>1</sup>
Converter .....	Cadmium Telluride (CdTe)
Pixel Size .....	100 µm (100% fill-factor)
Pixel Depth .....	up to 18 bits/pixel
Temperature Control .....	Active

### OPERATION

Modes .....	Digital TDS Scanning Frame Output
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Binning .....	1x1, 2x2, 4x4
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### PERFORMANCE

Maximum Speed @ 100 µm:	
Single Energy .....	90 - 390 fps <sup>1</sup>
Dual Energy .....	45 - 195 fps <sup>1</sup>
Lag .....	0% (after 6 · Gy)

### COMMUNICATION

Data Interface .....	1000Base-T
SDK Support.....	Windows, Linux