

# NIGHT VISION AT A GLANCE

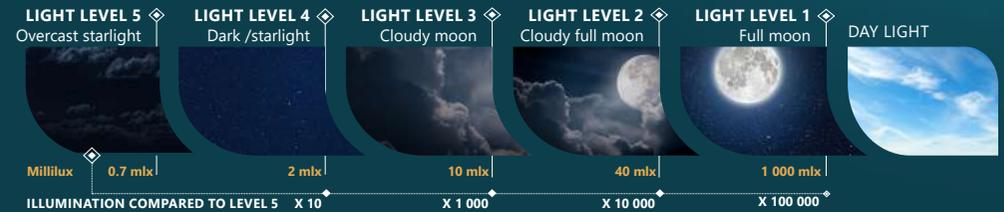
EVERYTHING YOU NEED TO KNOW ABOUT IMAGE INTENSIFIER TUBES

## EXOSENS

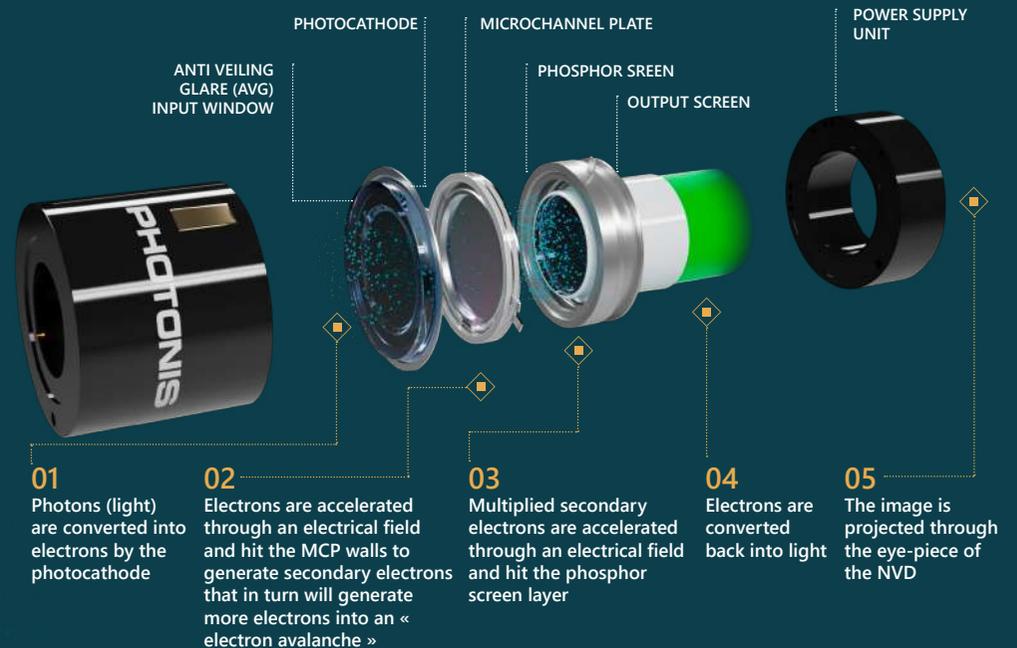
For more than 85 years, Exosens is a worldwide manufacturer of electro-optic components used in the detection of ions, electrons and photons. We develop, produce, and market innovative sensors for detecting and amplifying very low levels of light, charged particles, and radiation. Our products are used in a wide range of applications from night vision to analytical instruments, and even in nuclear reactor and warships.

## PHOTONIS NIGHT VISION

Photonis is the world leader in the design and manufacturing of state-of-the-art Image Intensifier Tubes (IIT) for military and commercial applications. Over the years, night vision has become a key opto-electronic technology in modern warfare as more and more operations take place by night.



An image intensifier tube (IIT) amplifies low light level images into levels that can be seen by the human eye. IIT collects the existing ambient light from natural or artificial sources, such as starlight, moonlight, street lights or infrared illuminators. The light passes through different internal components to be multiplied several thousand times, producing a much brighter image that can be seen by the soldier through the Night Vision Device (NVD).



**30% NON-DEFENSE**  
- Lifescience  
- Industrial & Non-Destructive Testing  
- Nuclear

**70% DEFENSE**  
- Portable sights (NVG)  
- Armored vehicles & Platform Sights  
- Electronic warfare



## PERFORMANCE CRITERIA AND FEATURES

The performance of an Image Intensifier Tube (IIT) is not dictated by one parameter:



### Figure Of Merit

FOM = Resolution x Signal to Noise Ratio (SNR)



### Modulation Transfer Function (MTF) : the

MTF illustrates how well this device can reproduce the contrast of the observed scene



**Resolution** : the limiting resolution measured in line pairs per millimeter (lp/mm), that the viewer can distinguish



**Auto-Gating** : tactical feature that provides soldiers with clear visuals in frequent and sudden changing light conditions by switching the photocathode voltage on/off to maintain optimal IIT performance



**Signal to Noise Ratio (SNR)** : at a given light level, the SNR quantifies how much the signal is corrupted by the noise introduced by the IIT



**Halo** : bright circle of light that surrounds a concentrated bright light source. The smaller the halo, the more precise the image



**Spectral Range** : 4G & 4G+ bandwidth is twice larger than Gen III IIT, collecting more photons and improving Detection, Recognition, Identification (DRI)



**Black spots** : common cosmetic blemishes that may originate from fixed particles inside the IIT or in the fiber optic of the screen



**Laser visibility** : enlarged spectrum providing soldiers with the crucial tactical advantage of seeing 1064nm lasers target designator



**Fixed Pattern Noise (FPN)** : it's caused when the MCP is saturated after a high-light exposure on the IIT



**Gain** : improve the ability to detect and recognize targets at a greater distance or in extreme low light conditions



**Phosphor screen** : converts the electron avalanche from the microchannel plate back into photons, resulting in the green or white image



Photonis was the **1<sup>st</sup> manufacturer in the world** to develop and sell white phosphor image intensifier tubes and is also the sole company to offer a 16mm format tube. This new standard has enabled the design of modern, lighter and smaller night vision binoculars.



Green phosphor (P43)



White phosphor (P45)



## PHOTONIS, WORLDWIDE NIGHT VISION EXPERT FOR MORE THAN 85 YEARS



### 4G+

The 4G+ image intensifier tube meets the stringent requirements of modern warfare at night to deliver end-users a very high performance in all field conditions. This technology offers extended bandwidth for high image quality on all theatres of operations (desert, snow, forest, urban), very high Figure Of Merit (FOM) performance and a small halo providing more details around light sources. This is an undeniable advantage on the darkest nights.



### 4G

The 4G technology has become the standard in all major European Land Forces programs. The 4G image intensifier tube is a more affordable version than 4G+ while maintaining a high level of performance. 4G IIT provides operators high image quality and long detection ranges in the most challenging light conditions: brightness of equipment, longevity of tubes, ability to see farther in increasingly low levels of darkness and very fast auto-gating.



### ECHO ECHO+

The ECHO technology is the commercial grade image intensifier tube by Photonis, offering two high performance levels: the ECHO and the ECHO+.

The ECHO IIT serve many night vision applications and make them perfect for sport shooters, hunters, airsoft practioners and night vision enthusiasts.

## PHOTONIS, THE BENCHMARK FOR NIGHT VISION



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