

### **Certified variance free.**

Internationally certified by independent testing laboratories as a class 3R laser-based fixture (the «R » stands for reduced control), with CB, CE, IECEE and NRTL labels, IVL Photon can be used by any lighting designer, operator, and company without any variance according to the FDA and IEC 60825-3: no training, no laser safety officer, no variance is required.

Laser products promoted for demonstration purposes are limited to hazard Class IIIa by FDA regulation 21 CFR 1040.11(c). This means that projectors are limited to 5 milliwatts output power in the visible wavelength range from 400 to 710 nanometers. There are also limits for any invisible wavelengths and for short pulses. Laser light show projectors therefore may not exceed the accessible emission limits of CDRH Class IIIa. Laser light show manufacturers must submit a variance request for FDA approval in order to sell and operate higher class (Class IIIb and IV) laser light show equipment.

Extract of the [FDA webpage " Laser light shows"](#): Variance only apply for class 3B and class 4.

Note: class 3R and class IIIa are equivalent (as explained [here](#)) .

Extract of the IEC 60825-3 summary:

"subclause 4.1.5 of IEC/TR 60825-14 specifies that only laser products that are Class 1, Class 2 or visible-beam Class 3R should be used for demonstration, display or entertainment purposes in unsupervised areas"

"Laser products available for use in a domestic environment or for use by people who cannot be expected to have received a suitable level of training should be Class 1, Class 2 or visible beam Class 3R. Therefore, such equipment is outside the scope of this guidance."

[IEC TR 60825-3:2008](#)

[Safety of laser products - Part 3: Guidance for laser displays and shows:  
safety guidance only apply for class 3B and class 4..](#)

### **As safe as LED:**

The definition of risk for a class 3R is the same as for LED: safe when being use responsibly, i.e when not "staring" into the beam (the mention "do not stare into the beam" can be found on every LED product). As for LED a class 3R can cause flash blinding at

short distance but the risk of injury is very low. Class 3R is very common in the USA since class 3R laser pointers can be sold to consumers market in the USA.

Class IIIa or IEC Class 3R lasers can be dangerous. Class IIIa lasers can cause temporary visual effects such as flash blinding, which could distract or startle the person exposed. The risk of injury is very small when Class IIIa pointers are used responsibly because natural body motion of a person holding the pointer or motion of a person who might be exposed makes it difficult to expose the eyes for a long period of time. People also have a natural aversion to bright lights and are likely to close their eyes and turn their heads if exposed.

Extract of this [FDA Webpage](#)

Any LED could also be classified as Laser. Most of the LED lighting product for live event would be classified as class 3R. The most powerfull LED products could be even class 3B.

The 60825-1 standards apply equally to lasers and LEDs. In most places we have used the word "laser", but "LED" can replace it. Generally speaking LEDs would be in the lower Classes (1, 1M, 2, 2M, 3R), but very exceptionally may be Class 3B. At the time of writing we are not aware of any Class 4 LEDs\*.

extract of the [U.S Department of Energy National Laboratory](#) webpage "laser safety classification".

In conclusion, the live events industry is already using every day fixtures with the same level of risk as to the IVL Photon, and the live events people are already well trained to this level of risk: do not stare into the beam at close distance, which also applies for the caa.

### **IVL Technology, a break-through innovation:**

The core of the IVL Technology is a unique and patented fail-safe 360° scanning system, continuously rotating at very high speed ( 330Hz), 10 times faster than usual laser projectors, combined with an extended source. Therefore, the exposure allowed by the standards is much greater than for usual laser projectors. As a result, the IVL Technology provides the first laser-based fixture to become as safe as any other light source with an output calibrated for mid-sized venues. Based on a laser source, the IVL technology is not a laser-effect, but an all new-concept of lighting with unique advantages.

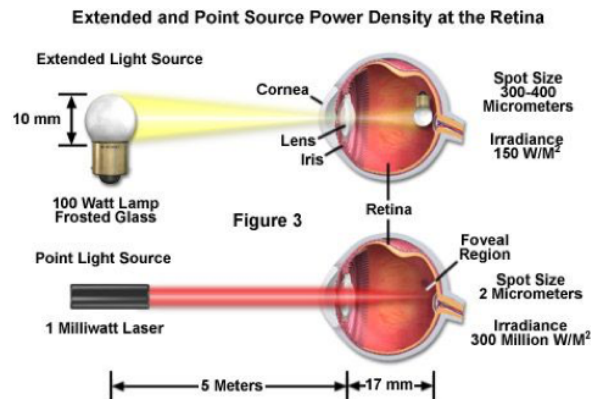
### **To know more about the two main developments:**

#### **1) safeguard:**

IVL Technology scanning safeguard system is based on a redundant safety check of the scanning speed. A mirror is mounted on the brushless rotating motor. An infrared emitter/ detector is positioned so that signal is reflected to the detector at each tour. The speed is fixed and monitored. Laser emissions extinguished upon reduction of rotational speed via a fail-safe monitored system.

2) extended source:

Like LED or LAMP, the IVL' Photon's output is an extended source with a beam diameter greater than 14mm. Unlike most laser projectors, it is not a point source.



## What about camera?

### **A laser based lighting fixture certified class 3R for the eye**

As explained previously, the IVL Photon is a class 3R certified fixture, with an extended beam greater than 14mm, when most of the laser fixture have a beam size of a few millimeters only: . With an extended beam of 14mm, the beam of the IVL Photon is having the same size, or even greater, than an LED diode. Therefore the safety for camera is to be compared with the safe use of camera with an LED fixture, and not as with an usual laser, (small beam laser).

### **But such certification doesn't exist for cameras.**

Unfortunately there is no standard for camera safety that would allow us to make a safety statement, as it is possible for eye safety and the classification.

And it is for a simple reason: the camera safety depends on the way the camera is being used, at which distance, how long and with which parameters and it is true for any kind of light: for example it is safe to capture the sun, but if you have a camera staring at the sun with a wrong combination of parameters you can burn the captors. It is true also for any moving head. And there are many different captors, when there is only one human eye. This is why there is no standard on this topic, and therefore it is not possible for Minuit Une to make a general safety statement for camera.

Again, it is important to remember that the camera are already being exposed to class 3R exposure since most of the LED or LAMP used for entertainment could be also classified as class 3R.

## Result of a case-study with a well-known camera.

In terms of sensors, there are different kinds. Usually, cameras used for streaming (such as BlackMagic, Canon 6D, or higher quality of sensors) or professional camera do not present any issue with our class 3R fixture in normal conditions of operations. For the purpose of remote demo and remote session, Minuit Une use a camera 6D in front of a class 3R IVL fixture, the IVL Photon, on a daily basis. **After one year of daily scann, the Canon 6D being scanned thousands of times per day, located at 5 meters from the IVL Square and/or the IVL Photon (both fixtures are having the same engine), no damage appears on the sensor of any kind.**

Owever, the cheaper is the camera, the more you should be precautionous, as for smartphone camera.

Note that many references of camera shooting our products can be found on our website:

## The behaviour we recommend :

- not to be too close to the IVL fixture, specially with sensors of low quality. For such sensors, the distance of 5 meters from our case study is a good reference.
- the light of the IVL can scan the sensor. Or the camera can cross the light. You should simply avoid having the camera staring straight into the beam.

Keep in mind that the main difference between a camera and the eye, is that the aversion response: if the light feels to bright for your eyes, your brain will make your head turn away or your eyes blink to protect it. Such aversion doesn't exist for camera. Sensor Safety is always a ratio of power/time of exposure.

## Flickering

When filming the IVL Photon, keep in mind that the IVL Photon scanning frequency is fixed at 330HZ (and an not be changed for safety and classification reasons).

Therefore, the value of your shutter must be the result of the scanning frequency divided by a whole number.

IVL Photon's scanning frequency / shutter frequency = a whole number.

As a result, you will have excellent result around 165 (330/2), 110 (330/3), 82,5 (330/4), etc... until 30hz (330/11) which will already provide good result (as with the camera of a smartphone, the fps being 29,97).