



Technical Documentation

Searchlight SL1

Night Vision Solutions



General Information

The searchlight SL1 consists of a lamp head and a rechargeable battery connected via a bayonet coupling. Both elements are built with durable, anodized aluminum. The red magnetic switch operates two power settings of 25W and 35W. The battery lasts up to 4 hours. The beam similar to daylight can be focused for spot or flood illumination.

The light source is a HID-Xenon-Bulb with an illumination distance of up to 1500m. The SL1 is robust, watertight (IP68, 30m); it is designed for professional use under difficult and rough conditions. The most important operational areas are security and military, construction, natural disaster, search & rescue, safety.

An infrared filter can be added via a bayonet coupling to the SL1. This solution supports night vision equipment.



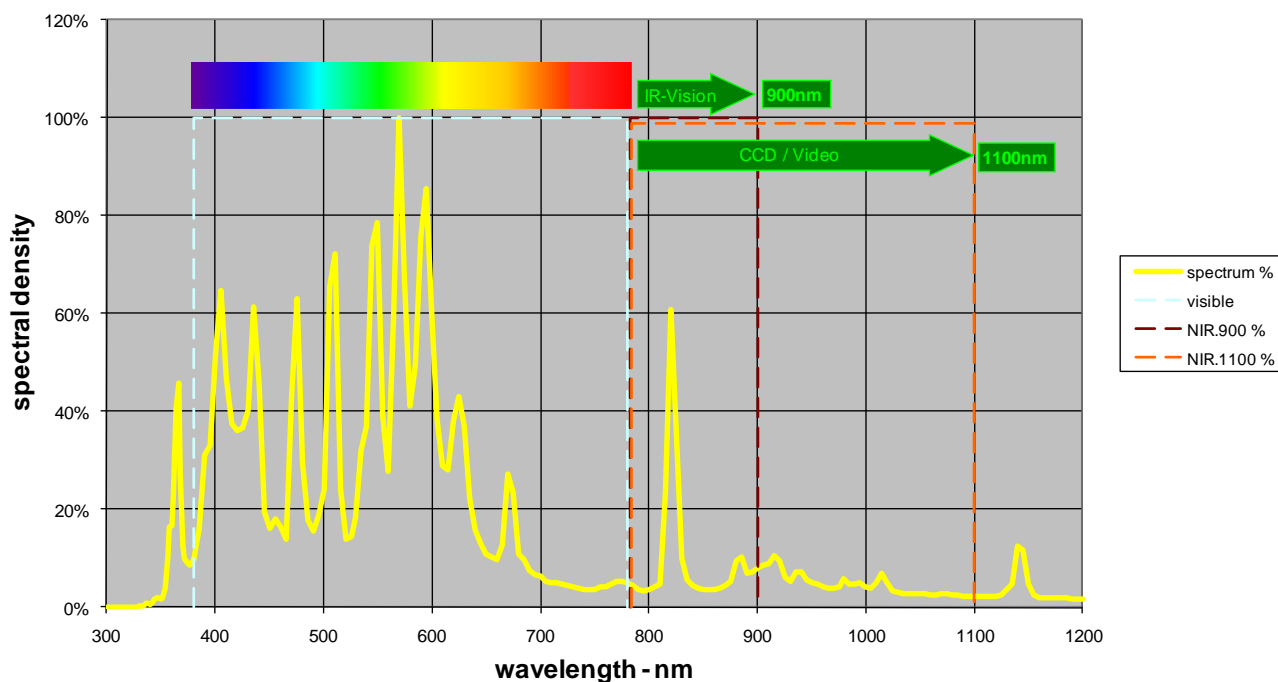
Available Light Spectrum

The HID-Xenon-lamp is extremely intense offering a broad light spectrum from visible into infrared. For the human eye, light between a wavelength from 380nm to 780nm is visible. The adjacent spectrum up to 1500nm is called "near infrared" (NIR).

The NIR-Spectrum up to 900nm is best suited for the use of night vision devices based on image converter tubes. The spectrum up to 1100nm is best suited for night vision gear based on Charge-Coupled-Devices (CCD). CCD-Cameras today are used for long distance surveillance.

The SL1, equipped with an infrared-filter, can be used to extend the range of use of night vision equipment. Depending on environment and selected IR-filter the SL1 can illuminate objects up to 1000m of distance with infrared.

Normalised Spectrum of the SL1-HID-Xenon-Light



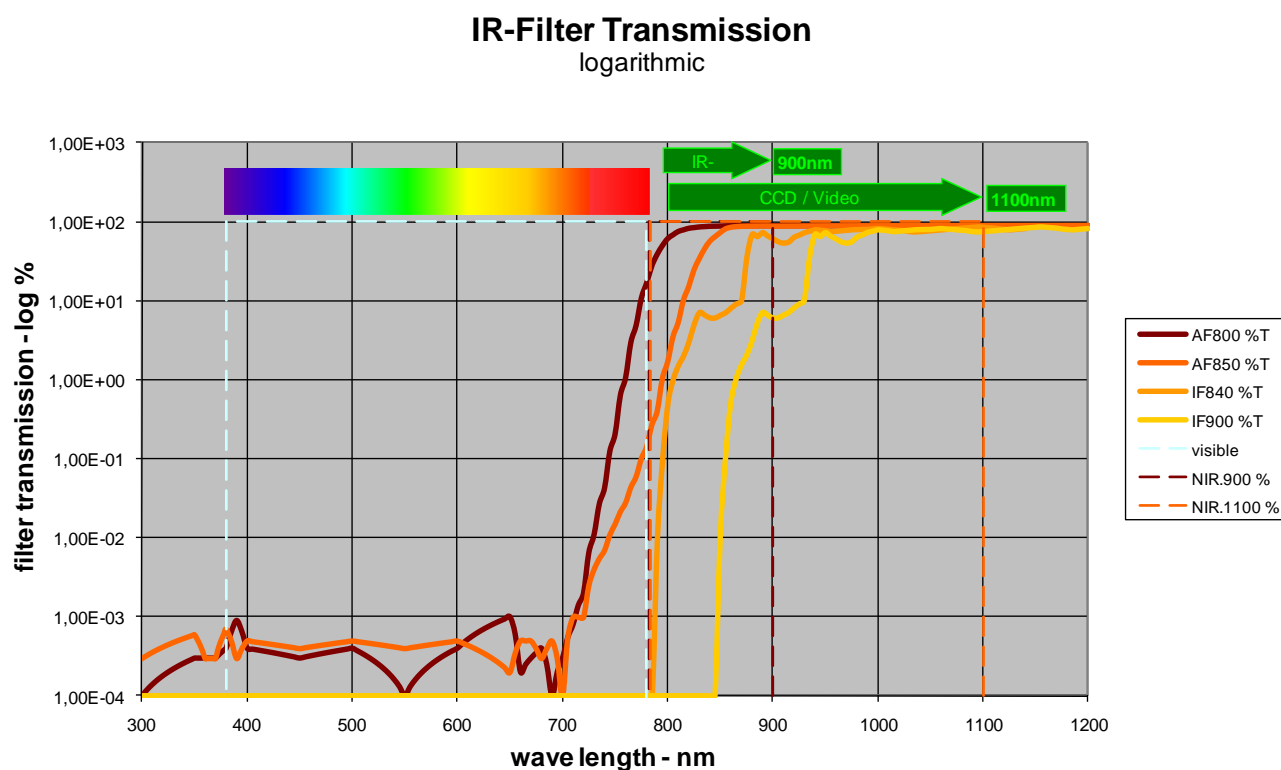
Filters

To provide selected illumination in the near infrared spectrum the SL1 needs IR-filters which do suppress the visible light and which allow the IR-spectrum to pass. IR-filters are usually built on principles of absorption or interference.

Absorption-filters (left) consist of tinted glasses which allow light of a certain spectrum to pass through. Interference filter (right) rely on mirrors with reflective material that do capture some spectral bands and transmit others.



Absorption-filters (AF) are less selective than interference-filters (IF). The filter curves of the AF are less steep than those of IF – a clear indication that some visible light can pass through the AF while the IF can cut-off most of the visible light.



In AF the filtering happens gradually and it always allows some fraction of visible light to pass through the filter. This fraction of visible light can be seen up to a certain distance as a dark red glow.

Swisslicht offers Absorption-filters as well as Interference-Filters. Both are attached to the SL1 via a bayonet coupling.

With AF the small fraction of visible red light is used to extend the illumination range for night vision equipment with image amplifier tubes. IF additionally suppress most of the red glow resulting in a reduced illumination distance.

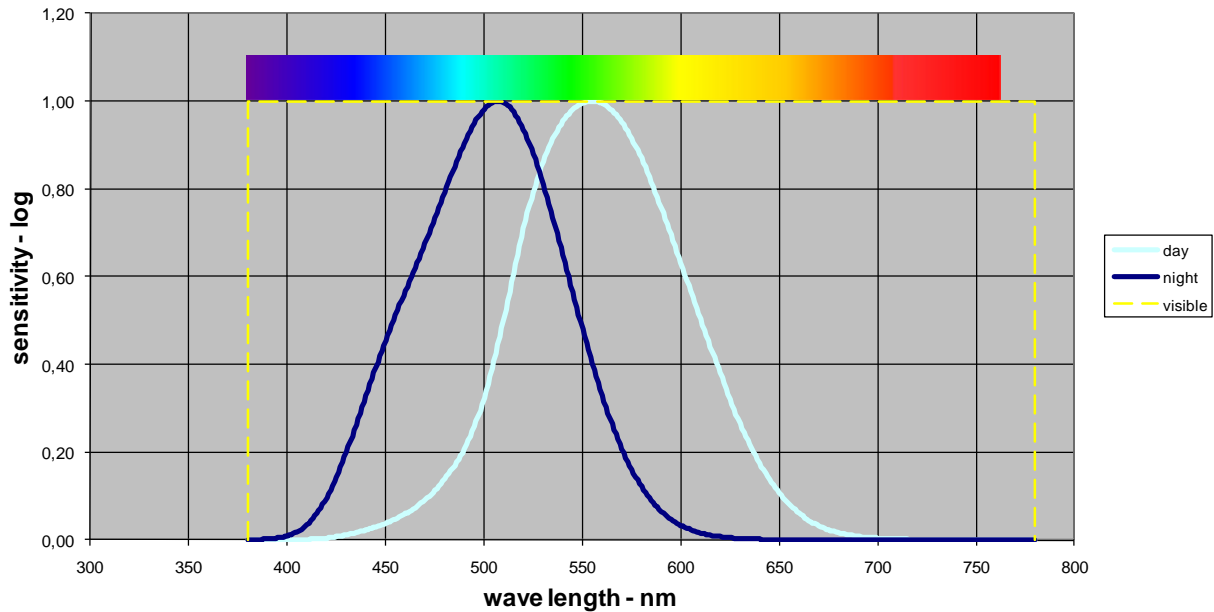
Sensors

All the involved equipments and the human eye combined define the quality of the night vision. A proper alignment and integration of all elements is extremely important.

During daylight the human eye is most sensitive for green colors. At night the sensitivity shifts a bit into the blue spectrum. Therefore night vision gear usually displays green pictures. In car panels illumination often is done in red in order not to disturb our night vision capabilities.

Light Sensitivity of the Human Eye

logarithmic



The human eye has the least sensitivity at the red spectrum, even more during night time. Therefore this part of the spectrum can be used to extend the illumination distance for night vision equipment, particularly for image intensifier tubes with a maximum sensitivity in the red spectrum.

Night Vision Equipment - Tube Sensitivity

