



# CCTV Illumination

## Practical Tips for Security Lighting



that infrared, by cutting down on image noise, can significantly reduce network storage requirements may come as a welcome surprise.

Low light levels increase the bit rate of encoded video streams and if left unaddressed will result in greater storage needs. Installing IR illumination enables cameras to deliver high quality night-time images with virtually zero noise. Reduced noise allows for better compression, reduced bit rate, better use of bandwidth, lower storage requirements and all the associated cost savings.

### 8. To avoid light pollution, use infrared illumination rather than visible light for security.

This leaves the night-time environment unchanged for people and animals. If deterrent or safety lighting is required in combination with security, a visible White Light LED solution like Bosch's AEGIS SuperLED White Light unit is best. Both LED infrared and White Light illuminators deliver far better energy efficiency than bulb based products and as such can deliver huge savings in terms of running costs and CO<sup>2</sup> emissions.

### 9. Specifying the correct illuminator is important so as not to waste light in areas of the scene that the camera is not viewing.

This in turn leads to increased operational costs and lower performance, especially if the illumination angle is wider than the field of view or worse still, if the illumination angle is less than the camera's field of view. This will result in a very bright, over-exposed spot in the centre of the screen and black halo surrounding it. Specification is easy if you have a lens wheel or can perform some simple trigonometry, alternatively you can use our HTML based web tool to select the right illuminator for the job.

### 10. When using infrared illumination, always use an infrared corrected lens or zero-focus shift lens.

As infrared illumination is further from the central part of the visible spectrum, most standard lenses have not been designed to cope with this wider range. IR-corrected lenses have a coating applied to the optic to allow both the colour and infrared wavelengths to be focused correctly on the sensor. This coating is also anti-reflective in the near infrared range, which increases the throughput of infrared through the lens and onto the sensor.



#### Bosch Security Systems

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The overall effectiveness of any integrated surveillance system depends on its ability to deliver useful images at night.

Specifying and installing the correct type of illumination for night-time surveillance is easy if you plan properly and follow a few simple rules. Here, Bosch Security Systems presents practical tips and advice to ensure you get the best performance from its range of high performance LED infrared illuminators and visible White Light

### 1. Specify the correct type of light

Choosing the right lighting for each individual application is critical – here are some things to consider

#### Infrared or White Light?

This depends very much on the purpose of the system. Infrared light enables cameras to deliver useable images at night. 850nm IR enables long-range surveillance capabilities, and has a discreet but visible glow which can draw attention to the camera and deter any criminal

Figure 1  
Illuminator  
mounting  
height

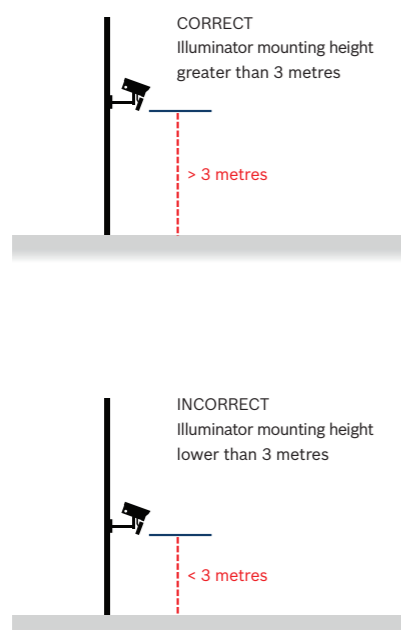
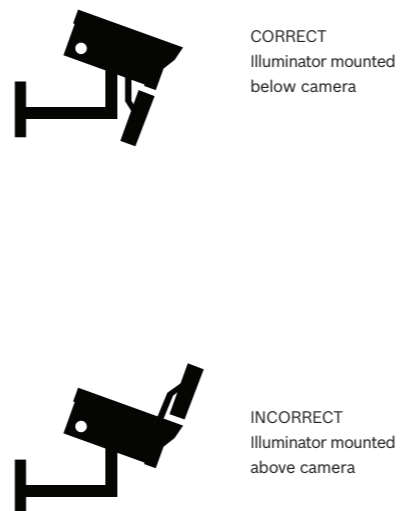


Figure 2  
Illuminator  
mounting  
position



Bosch's AEGIS  
LED infrared and  
white light  
illuminators  
deliver reliable  
performance, low  
maintenance and  
running costs  
and enable  
night-time  
imaging at  
distances of up  
to (320m /  
1050ft)



activity. 940nm IR has no visible glow so is perfect for covert surveillance, however it does require a very IR sensitive camera to work to its optimum capabilities.

Quick start, LED White Light can be used to illuminate an area safely for pedestrians, staff and vehicles, and can also be used as a visual deterrent when an intruder is detected by a PIR.

**Angle and Distance**

The illumination should ideally match the angle of the camera and lens in order to deliver optimum performance. After selecting the angle, the next consideration is distance. How far should the lighting illuminate considering that as the angle increases, achievable distance will decrease?

**Camera and Lens**

Exact performance of any illuminator depends upon the camera and lens combination used. For best results, a high sensitivity camera (for IR projects an IR sensitive camera) should be used with a high transmission lens

**2. Mount the illuminator at a height of greater than three meters.**

Mounting any illuminator at this height will greatly reduce the intensity of the light directed into the

foreground and prevents objects at the front of the scene becoming overexposed. Innovative 3D diffuser technology used in Bosch's AEGIS illuminators negates this problem by distributing light to the foreground and background of the scene enabling perfectly evenly illuminated CCTV images. (figure 1)

**3. When mounting an illuminator with a camera housing or AutoDome style camera, the illuminator should be mounted underneath the camera.**

The illuminator should be at least 300mm from the camera. Insects and spiders are attracted to the heat generated by the illuminator and can interfere with video content analysis and motion detection software. Spiders tend to nest near sources of heat, and although this will have little impact on the illumination output, nobody really wants a spider calling their camera lens home. (figure 2) Also if the illuminator is mounted above the camera housing, a shadow will be cast (in the same way as sunlight behind a building) compromising surveillance.

**4. Synchronize your camera and illuminator using the IO ports on both components.**

There are two ways to do this, either with the camera leading or the illuminator leading.

When it comes to camera leading, the decision to switch is based on video level. The advantage is that it gives you greater flexibility (all cameras are different and this allows for the camera to be set to the user's preference) The disadvantage is that when the illumination is switched on, the camera will switch to monochrome and the image noise level will increase significantly. Although cameras have built in lag to avoid this, at times the illumination can overpower this safe guard.

Illuminator leading is a decision based upon the light level. The advantage is that when the illuminator comes on, the camera moves to monochrome based upon the absolute light level. Assuming this has been set accurately, the camera will produce low noise images and will not switch too early. The disadvantage is that the light level at the photocell is not necessarily the same as that on scene.

**5. Illumination aids megapixel and HD imaging**

Megapixel cameras have similar sensor sizes (active area) to capture photons as standard definition cameras, but this area is divided up into far smaller 'buckets' know as pixels. Dividing the total illumination between more pixels means that each pixel gets proportionally less light. This generates a lower quality video signal if the gain function of the camera or the number of

photons that hit the sensor are not increased. Therefore, the trade-off for increasing resolution is generally reduced low-light performance.

More pixels equal more components, especially for CMOS sensors, which generate additional heat into the active area of the sensor. This leads to an increase in the noise of the image produced in both daylight and night-time conditions. To enable high clarity imaging in low light two megapixel cameras would appear to provide the best resolution and sensitivity balance.

**6. When using 1/4" sensors like those found in fully functional pan-tilt-zoom cameras, the same idea applies.**

The pixel count often remains the same as for 1/3" and 1/2" sensors but obviously the total active area decreases. Think of a mobile phone camera; if you try to use a phone camera in the dark the images produced are disappointing. Ensure you have enough, and the right type of illumination for any critical surveillance applications.

**7. Use infrared to improve bandwidth management**

Given that storage is one of the biggest expenses incurred when operating a surveillance system the fact