X-Masking Detectors

White Paper

Hunter

Logica AM

Duo 220 AM

How Does Anti-Masking Function?

What is X-Masking?

The functionality of a high quality sensor cannot be limited to its detection capability and false alarm immunity alone. It should also prove its reliability by defeating unintentional and intentional blocking attempts and by initializing test procedures for diagnosing its own fitness and visibility.

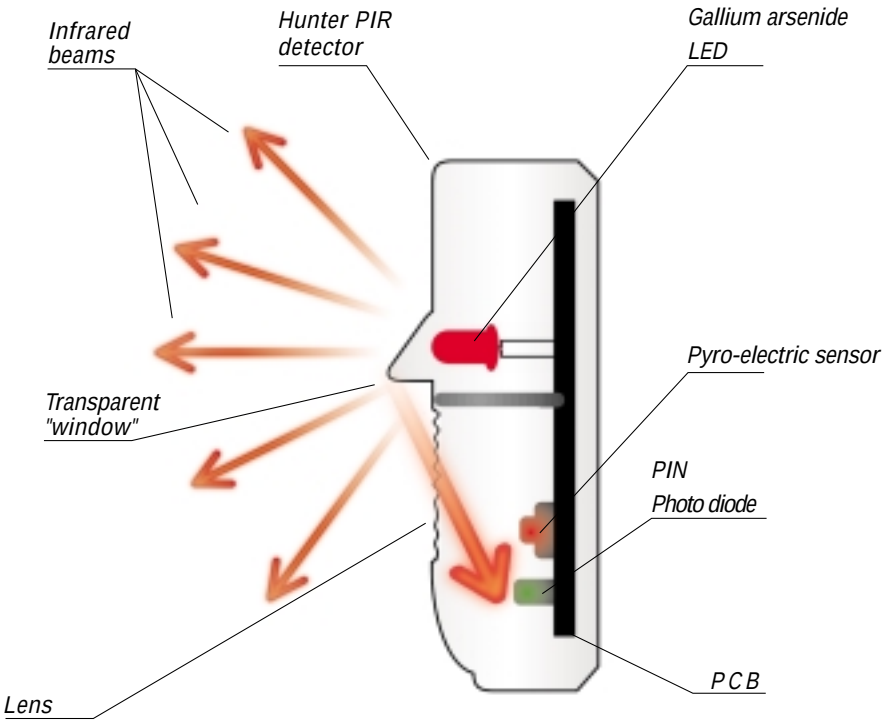
Most of the time, unintentional carelessness and negligence are the main causes of a blocked detector: boxes stacked too high or too close, or an object, such as a cabinet standing in the way of the detector.

Although, a detector's field-of-view can be blocked unintentionally, would-be intruders fight back by developing anti-detection tactics, as intrusion detection technologies become more sophisticated. The smart intruder surveys the protected area and tries to neutralize any detectors that are present, by blocking their field-of-view.

Some common, known techniques used to intentionally obscure, or mask, the detector, are: placing opaque materials in front of the sensor, taping over the lens or spraying the lens with materials that are not transparent to far-infrared human radiation.

For the best anti-masking detectors, look no further than Visonic Ltd's X-Masking detectors. In addition to the existing anti-tamper capabilities, Visonic Ltd has recently developed and implemented two types of revolutionary anti-masking technologies: active IR X-Masking and dual technology X-Masking. Visonic Ltd's X-Masking detectors are designed to comply with the new European security system standards for detectors.

Active IR X-Masking



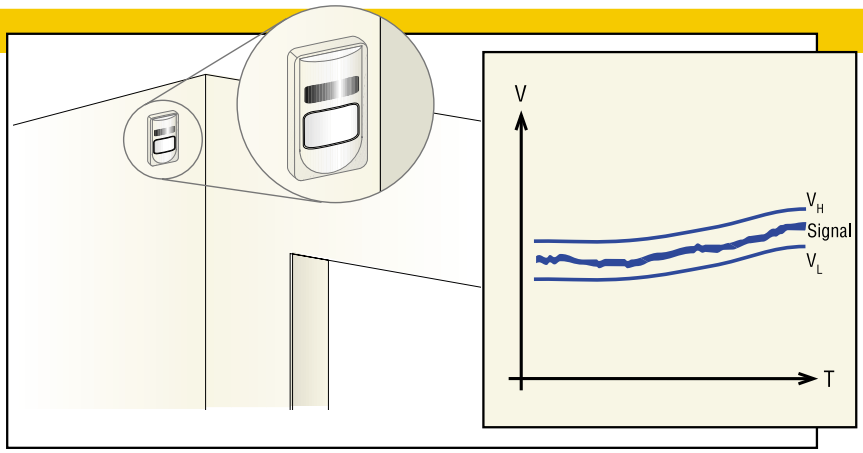
Because the basic principle of PIR is its passivity, it is impossible to conclude, just from the received signals alone, if a detector is masked or not. In order to detect objects in the proximity of the detector that obscure its vision, a parallel active system needs to be added to the PIR. This protects the immediate vicinity of the detector, including the PIR detection lens itself.

The best IR anti-masking technology is a combination of active IR transmitter and receiver, that operates in the near-infrared IR range (NIR), 0.8 to 0.9 microns. The active system consists of a galium arsenide light-emitting diode (LED), that transmits NIR signals through a special window from inside the detector outward in all directions, including the external side of the detector's lens.

NIR pulses are reflected by the surrounding walls, ceiling or furniture. A part of these pulses reflect back to the detector, where they are picked up by an NIR-sensitive PIN photo diode, placed behind the PIR lens. The NIR photo diode receiver is optically isolated from the NIR transmitter, thus the level of the detected signal represents the optical reflecting properties of the environment in the vicinity of the PIR detector.

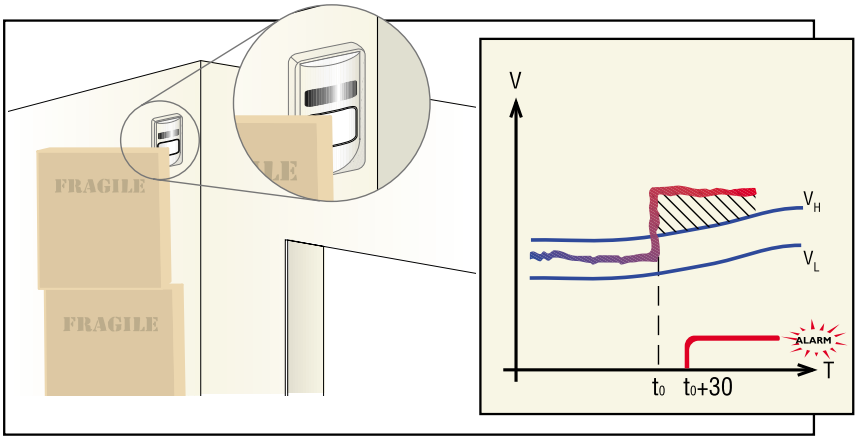
Upon installation, for a duration of up to 60 seconds, the NIR detector learns its immediate surroundings and sets a reference value, representing steady state conditions. When the learning stage is over, any change in the environment near the detector will change the level of the detected signal. The level might change when a reflective (increase) or absorbent (decrease) material is used in the masking attempt, thus affecting the amount of energy passing through the lens. If the signal exceeds any of the preset thresholds, and the disturbance continues for more than 30 seconds, an anti-masking trouble signal is activated. The masking attempt is recorded in the detector's internal memory, and stored there until it is reset by the user.

The active IR X-Masking technology is based on a complex system of adaptive algorithms, that maintains its high sensitivity, even in extreme environmental conditions. Long-term stability is assured by means of a self-adapting algorithm, that continuously compensates for relatively slow environmental changes, such as, humidity, dust, wall paint. Use of adaptive techniques to increase sensitivity enables the detection of unintentional masking attempts, even if they are relatively far from the detector (50 cm). This is an advantage when the masking attempt is done by spraying the lens, or by blocking only part of the lens and especially, when an unintentional masking attempt occurs by stacking cartons in front of the detector.



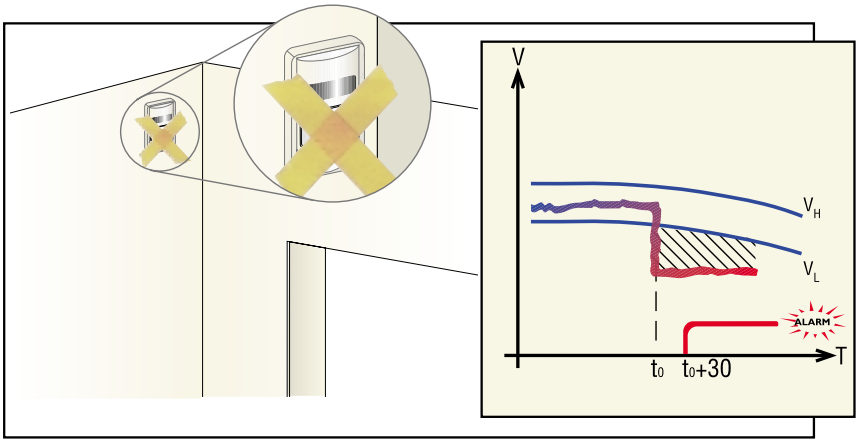
Normal state

The alarm signal is between the adaptive thresholds



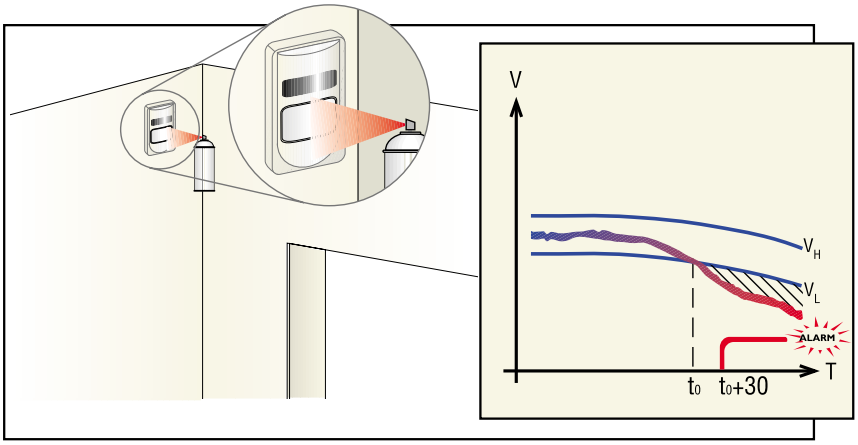
Boxes masking the detector

Reflection of the NIR signal increases and exceeds the higher threshold



Tape or other materials block the lens itself

The NIR signal decreases below the lower threshold



Spray gradually builds on the lens

The NIR signal is gradualy reduced until it is detected in the lower threshold

Dual Technology X-Masking

Mask attempt recognition's main algorithmic principles

The X-Masking principle is used for dual technology detectors, as well. Here, it utilizes the fact that a parallel microwave active channel already exists. It uses both channels, microwave and PIR, to detect masking attempts.

In order to detect masking attempts, the sensitivity of the microwave detector is significantly reduced at constant intervals for a short period, during which the detection volume is limited only to the vicinity of the detector.

The signals detected in this short range most probably represent masking attempts. There is a time delay of 60 seconds to avoid false alarms. Only after a masking state is registered for more than 60 seconds, without any simultaneous signal detection by the PIR, the trouble output is activated, and an LED indicator flashes. Later, if a significant PIR motion signal is detected, the detector assumes that it was not masked, and the masking alarm is cleared.

Visonic Ltd X-Masking Products

The Hunter PIR detector has active IR X-Masking technology. Together with TMR™ (True Motion Recognition), true temperature compensation and periodical self-diagnostics, Hunter is one of the most sophisticated PIR detectors in the market today. Both the Duo 220 AM and the Logica AM detectors utilize dual technology X-Masking innovative techniques.

Both detectors feature outstanding TMR™ detection reliability, with self-diagnostics, that simulate both PIR and microwave motion detection. As always, Visonic Ltd takes the lead with new technologies and design. Enjoy the benefits, and remember that when it comes to security product innovation, no one secures your environment like Visonic Ltd.

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