

ADPRO®

White paper

Introduction to Outdoor Passive Infra-Red Detection



Overview

Perimeter protection guards against unauthorised intrusion – delaying, deterring and detecting potential intruders.

To be effective, perimeter protection systems must be able to quickly, accurately and reliably detect unauthorised intrusion. Careful planning and design is required for all perimeter protection solutions, as customer requirements, threat levels and asset locations vary enormously.

Passive Infra-Red (PIR) detection is an effective front-line measure, when used as part of a system to protect valued assets.

The use of multiple technologies enables the most effective solution. For example, video technology may be used to verify an alarm triggered by a PIR detector, before security personnel are sent – saving time and money.

ADPRO®
by  **xtralis™**

Infra-red Radiation

The visible light spectrum (the colours seen in a rainbow) is just a small fraction of the electromagnetic radiation spectrum. Electromagnetic radiation is characterised by its wavelength, and visible light extends from 0.4 to 0.7 micrometres (millionths of a metre). Infra-red radiation has a longer wavelength than visible light and extends from 0.7 (the edge of visible light) to beyond 100 micrometres.

Infra-red radiation is best known for its heating effects, such as the household electric heater. For this reason infra-red radiation is often measured in relative temperature. There are many other things that produce infra-red radiation, such as the sun, incandescent lamps, all types of working engines, living plants and living animals, including humans. All these things produce infra-red radiation which can be detected by electronic sensors.

With such a large range of infra-red radiation being produced, an alarm sensor would trigger practically non-stop unless unwanted infra-red sources were blocked out. The heat (or infra-red) produced by humans is predominantly in a narrow band of the infra-red spectrum, centred about 10 micrometres. By using optical filtering techniques, a filter can be chosen to select this range only.

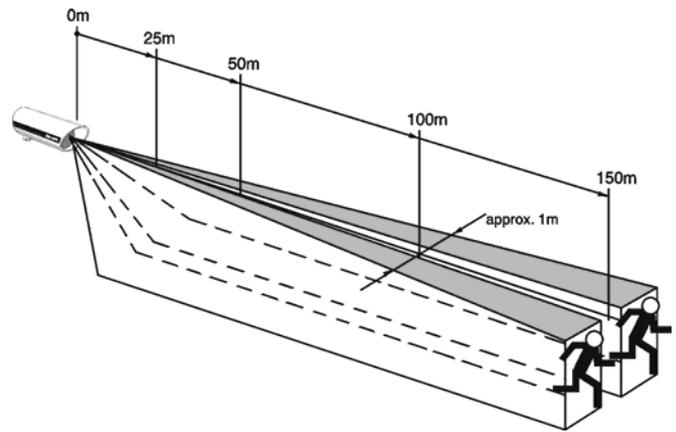


Figure 1 – Field of view

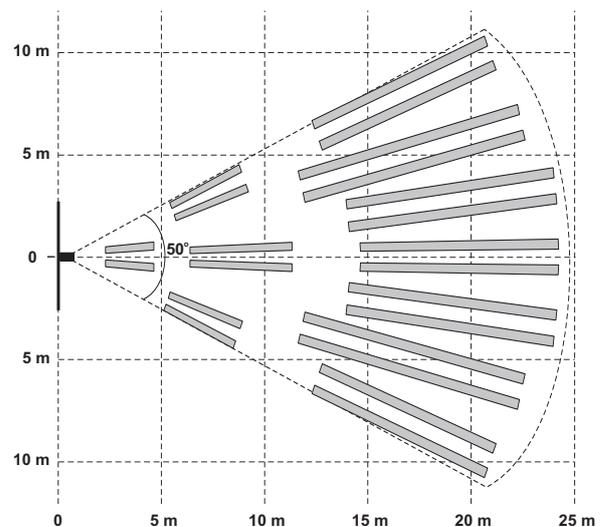


Figure 2 – Field of view for the PRO-18

Passive Detection

An outdoor passive infra-red detector uses two narrow, telescopic, curtain shaped detection areas directed in its line of sight. Figure 1 shows a diagrammatic representation of the two curtains. For the area detectors, there are multiple pairs of curtains which are created by specialised optics. Figure 2 shows the top view of an area detector's field of view.

By:

- a) separating the curtains by a small amount, and
- b) arranging the two curtains in a 'parallel opposed' configuration, any changes in ambient infra-red conditions picked up by each curtain are similar and will cancel out. Thus background noise and changing environmental conditions do not affect the detector.

Generally a person, or other infra-red generating objects, will be in contrast with the ambient infra-red temperature of the background. The relative size of a person is such that they can only pass through one curtain at a time. This has an unbalancing effect on the curtains and is sensed as an alarm. It does not matter whether the person is 'warmer' or 'cooler' relative to the background infra-red temperature, an alarm will register.

Environmental Effects

Changing environmental conditions encountered outdoors have different effects on the various security sensors available to the market. In Figure 3, (a) and (b) show the infra-red absorption bands of the two primary atmospheric constituents at sea level (water vapour and carbon dioxide) that affect infra-red radiation in the 8 to 14 micron range, while (c) shows the typical wavelength of the infra-red radiated by humans.

From the graphs in Figure 3, neither water vapour nor carbon dioxide has any substantial absorption of the infrared radiation produced by humans. Therefore, by using unique optical techniques, infra-red detection can operate exceptionally well outdoors under almost all environmental conditions.

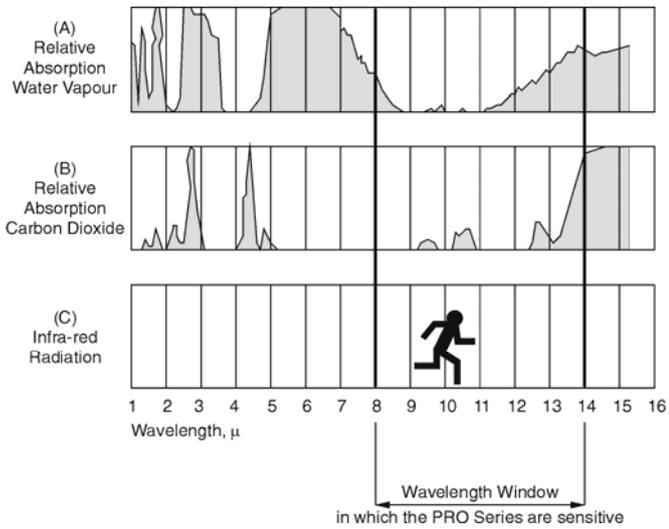


Figure 3 – The infra-red absorption of primary atmospheric constituents that affect infra-red radiation and the infra-red radiation produced by humans



Summary

Passive infra-red detectors are designed to be sensitive to the heat (or infrared radiation) produced by a human. By using unique optical techniques, passive infra-red sensors can be used outdoors to reliably detect human intrusion, under almost all environmental conditions.

The ADPRO PRO Series

The ADPRO PRO Series detectors are medium to high security sensors from Xtralis. They utilise all the features outlined to make them extremely sensitive, yet very selective passive infra-red devices.

All PRO Series detectors have efficient temperature compensation, ensuring a consistent level of detection probability across the entire temperature range.

PIR detectors must be mounted above ground, aligned along the fence (for perimeter protection) or at the area to be covered (volumetric detector). Mounting must be stable enough to withstand strong winds, without movement or shaking and high enough to prevent vandalism.

Security personnel may connect to ADPRO PRO detectors from a remote location, enabling the configuration of a detector to be changed, without having to physically visit a unit.

The ADPRO PRO-250H, PRO-100 and PRO-45 are ideally suited for perimeter protection, for medium to high security applications. The PRO-85 and PRO-18 series are used for area protection applications. They can be used with basic alarm systems or ideally as the detectors for advanced video verification systems such as the ADPRO V3100 network video and audio recorder/transmitter.

For even higher security applications, the ADPRO PRO Series makes the perfect complement to the ADPRO Presidium high performance video intrusion detector. For more information about these products, please refer to the ADPRO PRO Series Data Sheet available from your nearest ADPRO distributor.



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