LENSES FOR PASSIVE INFRARED (PIR) MOTION DETECTION

FEATURES

- Designed to press onto standard T05 pyro
- Horizontal curtain and circular beam patterns
- Choice of profile shape to suit product styling
- Designed using optical ray-tracing software
- Compact shape with clearance for components
- Available in natural, white and black colours

APPLICATIONS

- Office and household lighting control
- Motion detection for security applications
- Individual luminaire switching
- Fan and air conditioning control
- Control panel illumination for appliances
- Vending machines, ATM’s, streetlights

**Dome Cap Lens HC**
For applications where a horizontal curtain detection pattern is preferred. For example, wall mounted or placed on a bookshelf. Dome shape gives superior performance.

**Dome Cap Lens 360**
For applications where a 360 degree detection pattern is preferred. For example, ceiling or pole mounted. Compact detection zones with high sensitivity to small movements.

**Dome Cap Lens WA**
For ceiling or pole mounted applications where a wider detection is required. For example, to detect all targets within the room, especially those moving across the edge of the room.

**Flat Cap Lens HC**
For applications requiring a horizontal curtain pattern, usually wall mounted, but with the emphasis being on aesthetic appearance.

**Flat Cap Lens 360**
For ceiling or pole mounted applications requiring a 360deg beam pattern, but with the emphasis being on aesthetic appearance.

**Flat Cap Lens HC+**
For wall mounted applications requiring a volumetric beam pattern. The lens will capture longer distance targets and those closer to the lens.

Small and compact, these lenses are suitable for numerous security and lighting applications, in the office, or around the home. Available in FOUR beam pattern versions, horizontal curtain (HC), 360deg ceiling, wide angle and HC Plus, there is a lens suitable for every application.

Polymer Optics Ltd, The Hall, Priory Hill, Rugby Road, Wolston, Coventry, CV8 3FZ, England
Tel: 02476 937394           www.polymer-optics.co.uk
OVERVIEW
High performance motion detection lens for security and lighting applications. Horizontal curtain (HC) beam pattern with 100deg FOV and up to 12m range. Ideal for portable security devices where pet immunity is required. Pyro not included.

FEATURES
- Designed to press onto standard T05 pyro
- Automatically sets correct focal distance
- Fresnel lenses to maximise IR collection
- Spherical shape creates natural rigidity
- Designed using optical ray-tracing software
- Compact shape with clearance for pcb components
- Available in natural, white and black colours

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Typical application 1: Bookshelf device, mounted 1.5m above floor, detects humans, immune to pets.

Typical application 2: Ceiling mounted corridor detection. Ideal for ceiling mounted luminaires. Detector is immune from air movement around windows and doors.
OVERVIEW
High performance motion detection lens for security and lighting applications. 360deg beam pattern with 100deg FOV and up to 7m field at 2.4m mounting height, ideal for ceiling mount applications. Tightly packed zones for minor motion detection.

FEATURES
- Designed to press onto standard T05 pyro
- Automatically sets correct focal distance
- Designed using optical ray-tracing software
- Compact shape with clearance for pcb components
- Available in natural, white and black colours

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Typical mounting method: 20x1mm o-ring stretched around lens flange. PCB screwed to housing via pillars. Orientation tab sits in channel next to fixing pillar.
OVERVIEW
Wide angle motion detection lens, recommended for lighting applications. Used in ceiling or pole mounted configurations up to 4m high. Ideal for detecting targets moving around edge of room rather than directly beneath the sensor.

FEATURES
- Designed to press onto standard T05 pyro
- Automatically sets correct focal distance
- Designed using optical ray-tracing software
- Compact shape with clearance for pcb components
- Available in natural, white and black colours

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Note: When mounted at 2.4m, typical sensing area is a 10m diameter circle. Beyond this area, the detection beam is below knee height and sensing may be less reliable. Diagram on left shows typical walk test detection.
OVERVIEW
Motion detection lens for security and lighting applications. Horizontal curtain (HC) beam pattern with 100deg FOV and up to 8m range. Ideal for portable security devices where pet immunity is required. Lens can be mounted flush with product housing which is ideal for devices where aesthetic appearance is important. Pyro not included.

FEATURES
- Designed to press onto standard T05 pyro
- Automatically sets correct focal distance
- Fresnel lenses to maximise IR collection
- Designed using optical ray-tracing software
- Compact shape with clearance for pcb components
- Available in natural, white and black colours

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Typical mounting method: 20x1mm o-ring stretched around lens flange. PCB screwed to housing via pillars. Orientation tab sits in channel next to fixing pillar.

Theoretical zone plot. Optimum range is 6m. Maximum Range 8m depending on electronic gain.
OVERVIEW

Motion detection lens for security and lighting applications. 360deg beam pattern with 100deg FOV within 6m diameter area. Lens can be flush mounted with product housing - ideal for devices where strong aesthetic appearance is important.

FEATURES

- Designed to press onto standard T05 pyro
- Fresnel lenses to maximise IR collection
- Uses POL’s unique free-form Fresnel system
- Designed using optical ray-tracing software
- Compact shape with clearance for pcb components
- Available in natural, white and black colours

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Note: White material has 25% lower IR transmission than natural material. Black material has 35% lower IR transmission than natural material.

Typical mounting method: 20x1mm o-ring stretched around lens flange. PCB screwed to housing via pillars. Orientation tab sits in channel next to fixing pillar.
OVERVIEW
Motion detection lens for security and lighting applications. Volumetric beam pattern with 100deg FOV and 10m range*. With mid-range and creep zones. Ideal for portable security devices. Lens can be mounted flush with product housing which is ideal for devices where aesthetic appearance is important. Pyro not included.

FEATURES
- Designed to press onto standard T05 pyro
- Included holder, automatically sets correct focal distance
- Free-form Fresnel lenses to maximise IR collection and reduce distortion
- Designed using optical ray-tracing software and manufactured in UK
- Compact shape with clearance for pcb components
- Available in natural, white and black colours, HDPE material

* In tests, >10m range has been achieved, however range is also subject to environmental conditions and quality of electronics and software.

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Note: White material has 25% lower IR transmission than natural material. Black material has 35% lower IR transmission than natural material.

When mounted at 2.1m with a 15deg downward tilt, then any movement of less than 2m in any direction will cause detection within this area of an 8x5m room.
Walk Test Results for DOME Cap Lens 360 (ceiling version)

Walk Test with detector mounted at 2.4m height

Each square is 0.5m x 0.5m. Overall grid size is 10m x 10m.

- **Minor motion detection.**
  - Hand or leg movements within each 0.5m square are enough to trigger the sensor.

- **Major motion detection.**
  - Sensor is triggered when human target moves from one 0.5m square to an adjacent 0.5m square.

- **No detection.**
  - Sensor was not triggered in this area.

Walk Test with detector mounted at 4m height

Notes:-
1. Sensor was set on low-sensitivity mode.
2. Dual element pyro used for both tests.
   - Performance would be better with quad pyro.
3. Room temperature 21degC
4. Performance will vary depending on type of pyro and electronic circuit. Diagrams represent likely performance with typical sensor devices used for lighting control.
5. Lens moulded in natural (clear) material.
Walk Test Results for DOME Cap Lens WA (ceiling version)

Walk Test with detector mounted at 2.4m height

Each square is 0.5m x 0.5m. Overall grid size is 10m x 10m.

- **Minor motion detection.**
  - Hand or leg movements within each 0.5m square are enough to trigger the sensor.

- **Major motion detection.**
  - Sensor is triggered when human target moves from one 1m square to an adjacent 1m square.

- **Motion detection.**
  - Sensor is triggered when human target moves less than 2m from the previous detection.

- **No detection.**
  - Sensor was not triggered in this area

Walk Test with detector mounted at 4m height (as pictured)

Notes:-

1. Quad element pyro used for both tests.
2. Room temperature 21degC
3. Performance will vary depending on type of pyro and electronic circuit. Diagrams represent likely performance with typical sensor devices used for lighting control.
4. Lens moulded in natural (clear) material.
Walk Test Results for FLAT Cap Lens 360 (ceiling version)

Each square is 0.5m x 0.5m. Overall grid size is 10m x 10m.

- **Minor motion detection.**
  Hand or leg movements within each 0.5m square are enough to trigger the sensor.

- **Major motion detection.**
  Sensor is triggered when human target moves from one 0.5m square to an adjacent 0.5m square.

- **No detection.**
  Sensor was not triggered in this area

Notes:-
1. Sensor was set on low-sensitivity mode.
2. Dual element pyro used for both tests.
   Performance would be better with quad pyro.
3. Room temperature 21degC
4. Performance will vary depending on type of pyro and electronic circuit. Diagrams represent likely performance with typical sensor devices used for lighting control.
5. Lens moulded in natural (clear) material.
Walk Test Results for Similar Competitor Lenses

Each square is 0.5m x 0.5m. Overall grid size is 10m x 10m.

- **Minor motion detection.** Hand or leg movements within each 0.5m square are enough to trigger the sensor.
- **Major motion detection.** Sensor is triggered when human target moves from one 0.5m square to an adjacent 0.5m square.
- **No detection.** Sensor was not triggered in this area.

Notes:-
1. Carclo sensor was set on low-sensitivity mode.
2. Dual element pyro used for for Carclo test.
4. Room temperature 21degC
5. Performance will vary depending on type of pyro and electronic circuit. Diagrams represent likely performance with typical sensor devices used for lighting control.
6. Both lenses moulded in natural (clear) material.
Case Study: Ceiling Downlight

The Polymer Optics Cap Lens is designed for passive Infrared (PIR) motion detection. The lens is available in two versions (i) domed and (ii) flat, and each variant has two beam configurations (a) 360 circular pattern and (b) horizontal curtain pattern.

There are numerous applications for these lenses, but one of the most interesting is within ceiling downlighters.

The PIR lens assembly is small and compact, and can easily fit between an LED array. The self-contained nature of the PIR assembly shields the pyro from unwanted heat and dust particles.

While the domed lens provides superior performance, the flat lens solution provides an aesthetic advantage, and for most downlight applications it would be the preferred choice.

Case Study: Automatic Door Control

The Polymer Optics Cap Lens is designed for passive Infrared (PIR) motion detection. The lens is available in two versions (i) domed and (ii) flat, and each variant has two beam configurations (a) 360 circular pattern and (b) horizontal curtain pattern HC.

The Cap Lens HC is designed for wall or shelf mounted devices, but one of the most interesting applications is door entry control systems. When used for this purpose the lens should be rotated through 90deg so that the lens projects a series of zones in a vertical curtain pattern.

Detection zones are projected in a vertical curtain pattern, which makes the device more sensitive to objects moving towards the door.

Narrower detection zones make device less sensitive to air currents and curtain movements.
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