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Topic: Passive Infrared Sensor Technology

Passive Infrared Sensor Technology

PIR sensing systems are passive systems, and react only to energy sources (such as the human body) from within their control areas. They sense occupancy by “noticing” the difference in the heat emitted between the human body and the background.

PIR Operation

The lens of the sensor divides coverage into zones. When a change in infrared energy is detected in one of the zones, it assumes the area is occupied. PIR sensors use a dual-element pyroelectric sensing device to detect occupancy. When one of the dual elements detects infrared energy before the other, it generates a positive pulse – a few milliseconds later, the other element produces a negative pulse, creating an “ON” state within the sensor.

Lens Importance

The fresnel is what the PIR sensor uses to “see” the room. The Watt Stopper PIR sensors use a patented lens which is manufactured exclusively for use in Watt Stopper sensors. The advanced lens design minimizes optical aberrations through the use of a totally aspheric surface, an aperiodic groove structure and constant depth grooves.

Sensor Placement

Unlike ultrasonic sensors, which can sometimes sense occupancy around solid barriers, passive infrared sensors must be able to “see” the area they need to control. Partitions and bookshelves will prevent detection in the blocked area. PIR sensors will also better sense motion when the movement is across the sensor’s field of coverage rather than directly towards or away from it.

Possible Interference

Normally, PIR sensors will desensitize as air temperature rises, rendering them far less effective at detecting occupancy. Through the use of carefully-tuned, high-quality, dual-element sensors, The Watt Stopper PIR sensors are largely insensitive to temperature fluctuations. Visible light can cause PIR sensors to falsely activate or to not trigger upon occupancy because the temperature differential between background and subject is not great enough. Watt Stopper PIR sensors utilize a daylight filter system (several Watt Stopper sensors also use a special poly IR lens) to reduce the negative effects of visible light.

Best Applications

- Enclosed offices where sensors can have a clear view of the entire area
- As a wall switch replacement
- Areas with high air flow: computer rooms, laboratories, etc
- Warehouses, hallways, high-ceiling-mount applications
- Areas that require direct line-of-sight viewing
- Spaces that need to mask off unwanted detection in certain areas

Poor Applications

- Bathrooms (sensors cannot see in the partitioned areas)
- Open office space with ceilings under 12 feet, requiring 360° coverage
- Larger enclosed spaces — the infrared zones get to be too large
- Areas where storage areas, cabinets and shelving can block the view
- Areas where very small motions must be sensed

The Watt Stopper Passive Infrared Sensors

- Patented Multi-element Segmented Fresnel Lens
- Dual-Element Pyroelectric Sensor
- Daylight Filter System
- Low-Profile Designs
- Adjustable Time Delay and Sensitivity Settings
- Light Level Sensor integrated into the WI, WS, WA, CI and CX series sensors
- Custom ASIC reduces components and enhances reliability
- Detection Signature Analysis eliminates false triggers; provides immunity to RFI and EMI