

The ABCs to WSDs of Occupancy Sensors

# SENSORPEDIA

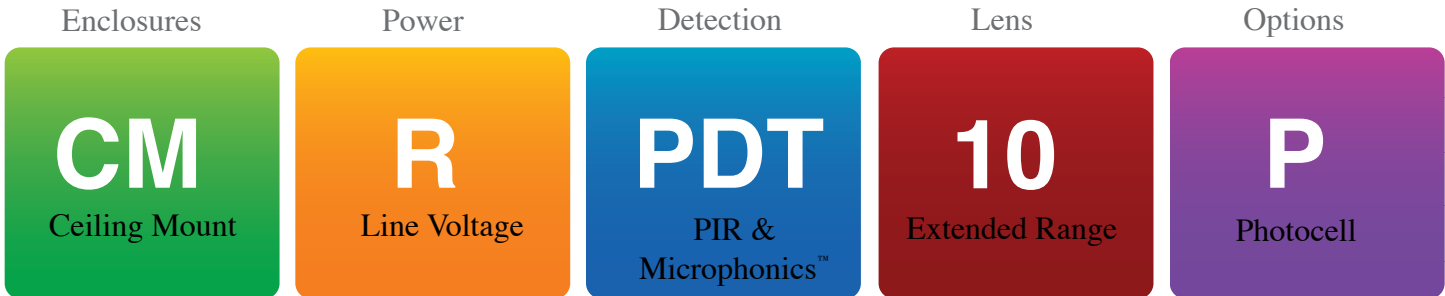


sensor**switch**<sup>®</sup>

# SENSORPEDIA

## Occupancy Sensor Selection Guide

This guide is intended to assist with choosing the appropriate Sensor Switch occupancy sensor for your space and application. Each character or group of characters in a Sensor Switch model number indicates a specific feature or option for that particular sensor. The sections of this guide describe the choices available for each of the feature categories. The example below explains the categories that make up the model number CMR-PDT-10-P.



By dividing up any Sensor Switch occupancy sensor model number into the parts described in this guide, the sensor's full functionality can be determined. This guide will also better enable you to build your own model numbers by choosing from each category the features and options your project requires.

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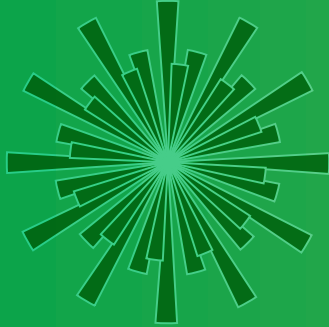
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# ENCLOSURES



Sensor Switch occupancy sensors come in a variety of different enclosure styles that are both functional and attractive while still being easy to mount. The enclosure style for most sensors is indicated by the first few letters in its model number. These letter combinations (shown in bold green) and their corresponding enclosure styles are presented on the following four pages, along with the physical specifications and mounting options for each style.

## Wall Switch Decorator

### WSD

Physical Specs:

Size:

H: 4.20" ( 10.67 cm )

W: 1.80" ( 4.57 cm )

D: 1.50" ( 3.81 cm )

Weight:

5 ounces

Mounting:

Single Gang Switch Box

Color:

White

Ivory

Almond

Gray



# Ceiling Mount

## CM

Physical Specs:

Size:

Diameter: 4.55" ( 11.56 cm )

Depth: 1.55" ( 3.94 cm )

Weight:

6 ounces

Mounting:

Ceiling Tile Surface (Low Voltage)

Round Fixture Box

Single Gang Handy Box

Color:

White



# Recessed Mount

## RM

Physical Specs:

Size:

Width (square): 4.40" ( 11.18 cm )

Weight:

6 ounces

Mounting:

Mounts to/in a 4" square  
junction box (minimum box depth  
2.125")

Color:

White



# Fixture Mount Box

## CMB CMRB<sup>1</sup>

Physical Specs:

Size:

H: 3.63" ( 9.22 cm )

W: 3.63" ( 9.22 cm )

D: 1.50" ( 3.81 cm )

Weight:

6 ounces

Mounting:

Extended chase nipple fits 1/2"  
knockout in fixture or junction box

Color:

White



## HMB HMRB<sup>2</sup>

Physical Specs:

Size:

H: 3.63" ( 9.22 cm )

W: 3.63" ( 9.22 cm )

D: 1.50" ( 3.81 cm )

Weight:

6 ounces

Mounting:

Extended chase nipple fits 1/2"  
knockout in fixture or junction box

Color:

White



<sup>1</sup> CMRB is the Line Voltage Enclosure of the CMB

<sup>2</sup> HMRB is the Line Voltage Enclosure of the HMB

# Surface Mount

## HM HMR<sup>3</sup>

Physical Specs:

Size:

H: 4.96" ( 12.60 cm )

W: 3.10" ( 7.87 cm )

D: 1.70" ( 4.32 cm )

Weight:

7 ounces

Mounting:

Single Gang Handy Box

Color:

White

Ivory

- Buttons used for programming only



## WVR<sup>4</sup> HWR<sup>5</sup>

Physical Specs:

Size:

H: 4.96" ( 12.60 cm )

W: 3.10" ( 7.87 cm )

D: 1.70" ( 4.32 cm )

Weight:

7 ounces

Mounting:

Single Gang Handy Box

Color:

White

Ivory

- Button used for programming only



## LWS LWSH

Physical Specs:

Size:

H: 4.96" ( 12.60 cm )

W: 3.1" ( 7.87 cm )

D: 1.7" ( 4.32 cm )

Weight:

7 ounces

Mounting:

Single Gang Switch Box

Color:

White

Ivory

- Button(s) used for switching and programming



3 HMR is the Line Voltage Enclosure of the HM  
4 WVR is the Line Voltage Enclosure of the WV  
5 HWR is the Line Voltage Enclosure of the HW

# Corner Mount

## WV

Physical Specs:

Size:

H: 3.00" ( 7.62 cm )

W: 3.60" ( 9.14 cm )

D: 1.75" ( 4.45 cm )

Weight:

4 ounces

Mounting:

Directly to Corner or to Ceiling  
using WV-BR bracket

Color:

White



# Wall Mount

## HW

Physical Specs:

Size:

H: 3.00" ( 7.62 cm )

W: 3.60" ( 9.14 cm )

D: 1.75" ( 4.45 cm )

Weight:

4 ounces

Mounting:

Directly to Wall or to Ceiling using  
WV-BR bracket

Color:

White



# Ceiling Mount Bracket

## WV-BR

Physical Specs:

Size:

Diameter: 4.70" ( 11.94 cm )

Height: 3.30" ( 8.38 cm )

Weight:

3 ounces

Mounting:

- Ceiling Tile Surface
- Round Fixture Box
- Single Gang Handy Box

Color:

White



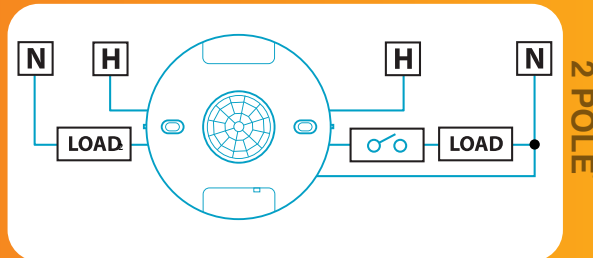
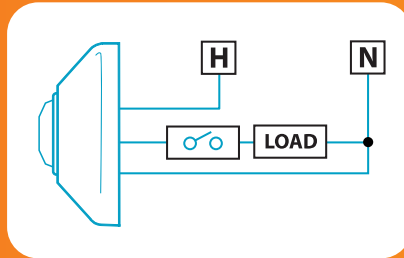
# POWER TYPE

This category specifies how a sensor is powered, as well as its switching capabilities. By default, sensors are powered by Low Voltage and require a Power Pack to switch a circuit; therefore no special characters need to be added to the model number. In contrast, Line Voltage sensors are powered by and can switch Line Voltage without a Power Pack. Line Voltage model numbers have the letter “R” inserted with the enclosure designation (for example: **CMR-R**). Finally, the “IP” prefix before the enclosure designation in the model number indicates that the sensor is internally powered.

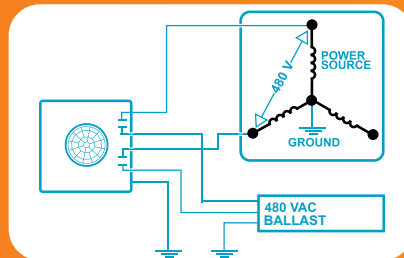
## Line Voltage

- Sensors contain Line Voltage switching Relays
- Ideal for retrofit applications with concrete or inaccessible ceilings
- Interchangeable Line & Load wires (Sensor Switch Patented)
- Sensors capable of switching 2 Poles independently are indicated by adding -2P to the model number (e.g. **CMR-6-2P**)
- Sensors capable of switching 208/480 VAC are indicated by adding -480 to the model number (e.g. **CMR-6-480**)

1 POLE<sup>1</sup>



208/480 VAC<sup>2</sup>



SPECIFICATIONS

### Line Voltage Sensors

- No minimum load requirements
- Load Rating per Pole (1 Phase Only)<sup>2</sup>
  - 800 W @ 120 VAC
  - 1200 W @ 240/277 VAC
  - 1500 W @ 347 VAC
  - 5 Amps @ 208/480 VAC
- 1/4 HP Motor Load
- Frequency 50/60 Hz

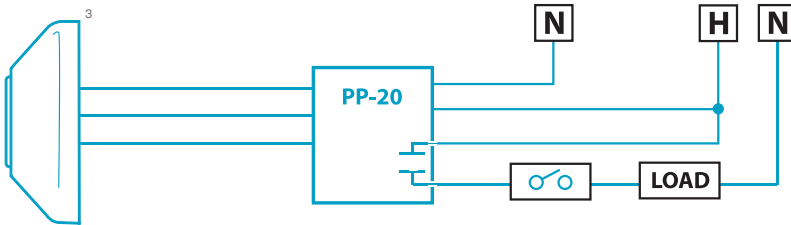
<sup>1</sup> For Fixture Mount Box (CMB) sensors, the “R” is placed before the “B” to indicate Line Voltage (for example CMRB-)

<sup>2</sup> Load Ratings not applicable for LWS and WVR series sensors

<sup>3</sup> Actual Wire Colors are not represented in diagrams

# Low Voltage

- Powered via Power Pack or other low voltage source
- Used with a Power Pack to enable complete 20 Amp circuits to be switched
- Enables multiple sensors to be used together to cover space
- Allows sensor mounting without a junction box and utilizes convenient Low Voltage wiring



## SPECIFICATIONS

### Low Voltage Sensors

- Operating Voltage 12-24 VAC/VDC
- Output: Drives up to 200 mA of connected load
- Current Draw
 

Standard Sensor	4 mA
w/ -R option	16 mA
- Wire lead connections are Class II, 20 AWG

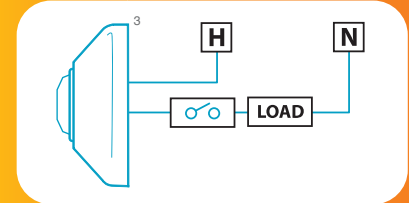
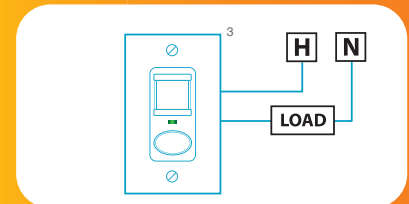
### Power Packs

- Operating Voltage 120 / 277 VAC (PP-20) or 347 VAC (PP-20-3)
- Load Rating (Max): 20 Amps
- Motor Load (Max): 1 HP
- Wiring:
  - Low Voltage, Class II 20 AWG
  - Line Voltage, 16 & 18 AWG
- Plenum Rated
- Powers up to 14 sensors
- Patented Relay Circuit Protection up to 400K Cycles (Except MP-20 & MSP-20 Series)

# IP

## Internally Powered

- No minimum voltage or ground required
- No external power required
- No minimum load required
- 2-Wire sensors



## SPECIFICATIONS

### Internally Powered Sensors

- Load Ratings
  - 10 A @ 30 VDC
  - 800 W @ 120 VAC
  - 1200 W @ 240/277 VAC
  - 1500 W @ 347 VAC
- Frequency 50/60 Hz

# PIR + MICROPHONICS™

All of our sensors utilize **Passive Infrared (PIR)** technology to detect changes in the infrared energy given off by occupants as they move within the field-of-view. Each sensor has a dual element detector located behind a multi-segmented **Fresnel Lens**. Each lens segment generates a pair of collector beams. As heat given off by the human body moves in and out of the beams, the detector “sees” this and triggers the occupancy mode. Our lens designs create a continuous array of beams that provide an even coverage. Additionally, we fine-tune our sensors to detect small motions even at great distances, while still preventing “*false trips*”.

**Microphonics™** technology uses a microphone inside the sensor in order to “hear” sounds indicating occupancy in rooms with obstructions, such as bathrooms with stalls or open office cubicle areas. By using **Automatic Gain Control (AGC)**, the sensor can dynamically self-adapt to its environment by filtering out constant background noise and detecting only leading edge noises typical of human activity.

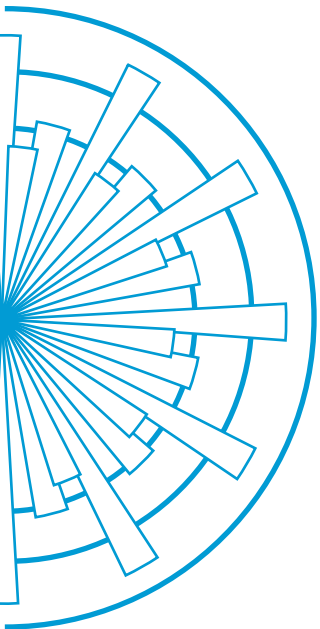


# = PDT

PASSIVE DUAL TECHNOLOGY

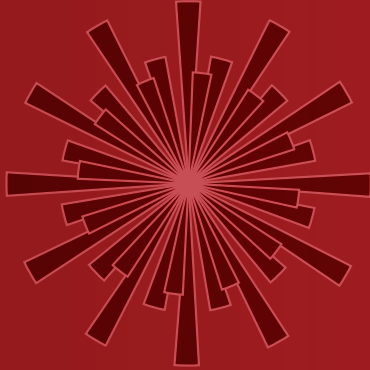
**Passive Dual Technology (PDT)** combines both of these detection technologies. It requires sensors to first “see” motion using **Passive Infrared** and then engages the **Microphonics™** to “hear” sounds that indicate continued occupancy. Patented by **Sensor Switch**, Passive Dual Technology using **PIR** and **Microphonics™** provides a more reliable and completely passive alternative to active ultrasonic methods of detection.

All sensors utilize **PIR** technology by default. Including the suffix “**-PDT**” after the enclosure model number adds **Microphonics™** detection to the sensor.



# LENS TYPE

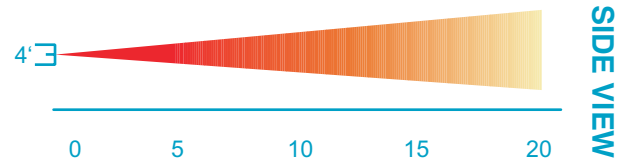
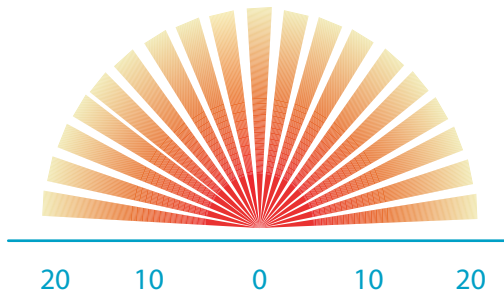
## Passive Infrared



It is important to select a lens type with a PIR coverage pattern that not only accommodates the space's area requirements, but also its application. The following pages diagram the PIR coverage pattern of each lens style and describe the applications for which they are best suited.

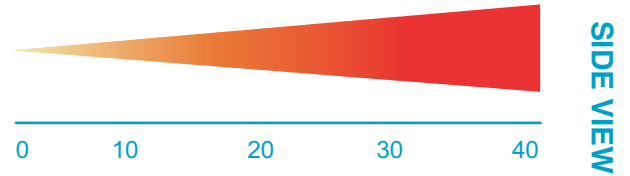
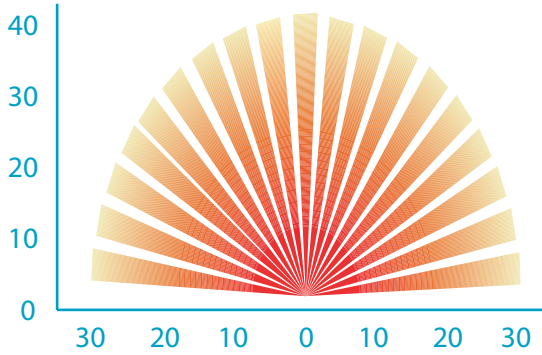
### WSD Wall Switch Decorator Lens

- Small motion (e.g. **hand movements**) detection up to 20 ft
- Large motion (e.g. **walking**) detection up to 50 ft
- Wall-to-Wall coverage
- Vandal resistant option (-V) decreases range by 50%



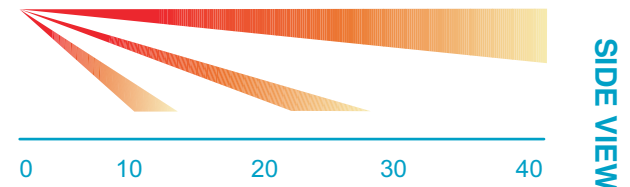
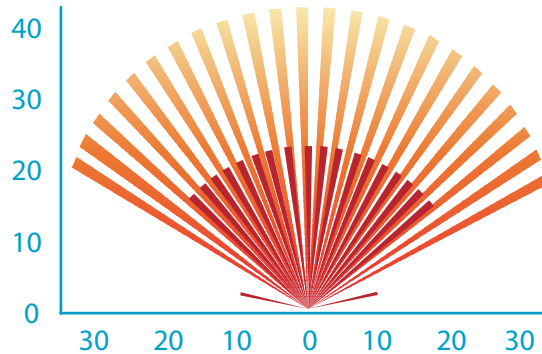
## LWS Large Area Wall Switch

- Small motion (e.g. **hand movements**) detection up to 40 ft
- Wall-to-Wall coverage
- 30 to 48 inch high mounting



## LWSH Large Area Wall Switch

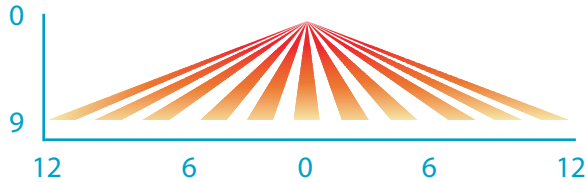
- Small motion (e.g. **hand movements**) detection up to 40 ft
- Wall-to-Wall coverage
- 48 to 84 inch high mounting



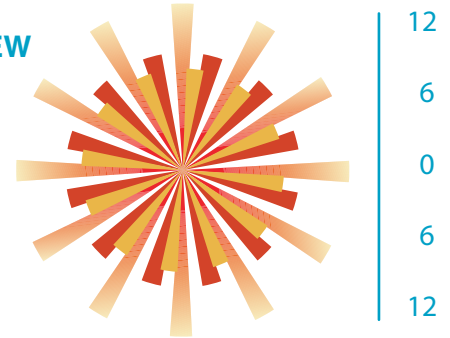
## 9 Standard Range 360° Lens

- Best choice for small motion (e.g. **hand movements**) detection
- Viewing angle of 56° in a 360° conical shaped pattern
- Provides 12 ft radial coverage when mounted to standard 9 ft ceiling
- 8 to 15 ft mounting heights provide 10 to 20 ft radial coverage

SIDE VIEW



TOP VIEW



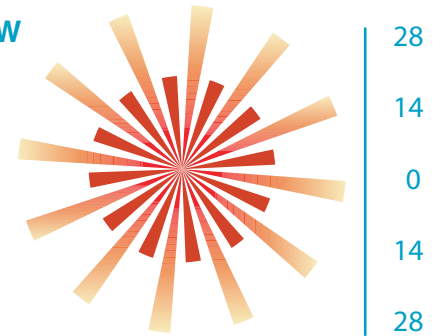
## 10 Extended Range 360° Lens

- Best choice for large motion (e.g. **walking**) detection
- Viewing angle of 67° in a 360° conical shaped pattern
- Provides 28 ft radial coverage when mounted to standard 9 ft ceiling
- 7 to 15 ft mounting heights provide 16 to 36 ft radial coverage

SIDE VIEW



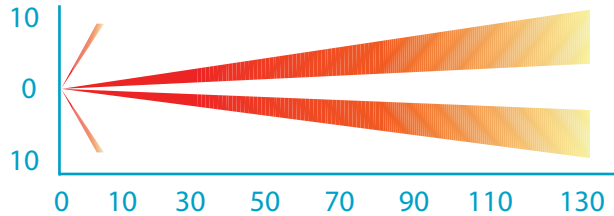
TOP VIEW



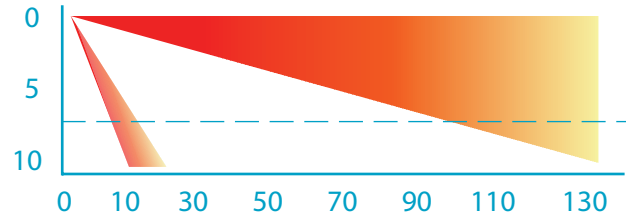
## 13 Hallway View Lens

- Large motion (e.g. **walking**) detection up to 130 ft
- Designed for 7 ft high mounting at end of hall

TOP VIEW

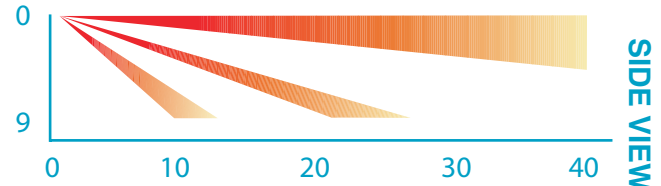
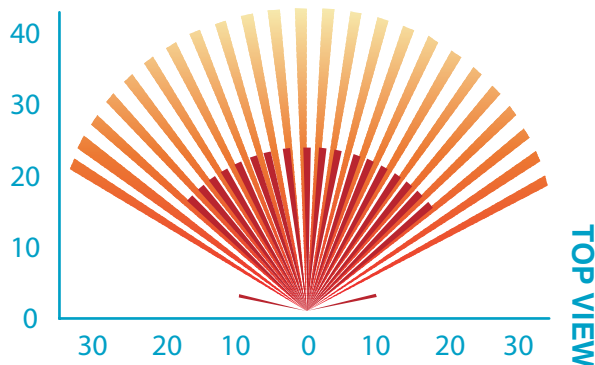


SIDE VIEW



## 16 Wide View Lens

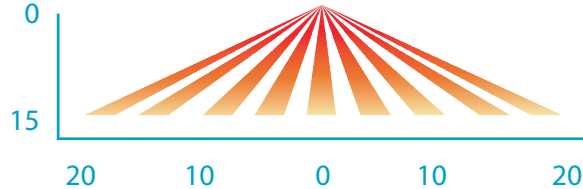
- Small motion (e.g. **hand movements**) detection up to 40 ft
- Large motion (e.g. **walking**) detection up to 70 ft
- Designed for 8 to 10 ft high mounting in room corner



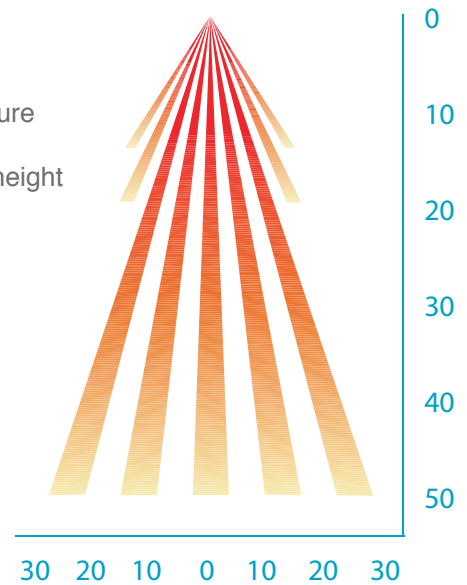
## 6 High Bay 360° Lens

- Best choice for 15 to 45 ft mounting heights
- 15 to 20 ft radial coverage overlaps area lit by a typical high bay fixture
- Large Motion (e.g. **walking**) detection up to a 35 ft mounting height
- Extra Large Motion (e.g. **forklifts**) detection up to a 45 ft mounting height

LOW VIEW



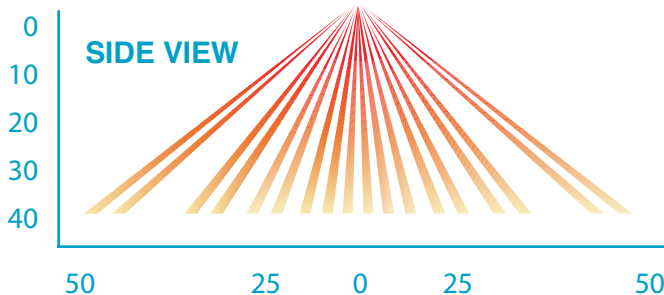
HIGH VIEW



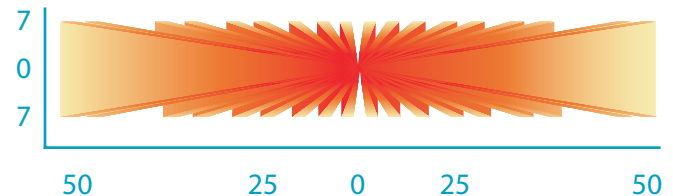
## 50 High Bay Bi-Directional Aisleway Lens

- Provides 50° bi-directional and 10° wide coverage pattern
- 1.2x mounting height equals approximate detection range in either direction
- Typical 40 ft mounting detects 50 ft in either direction

SIDE VIEW

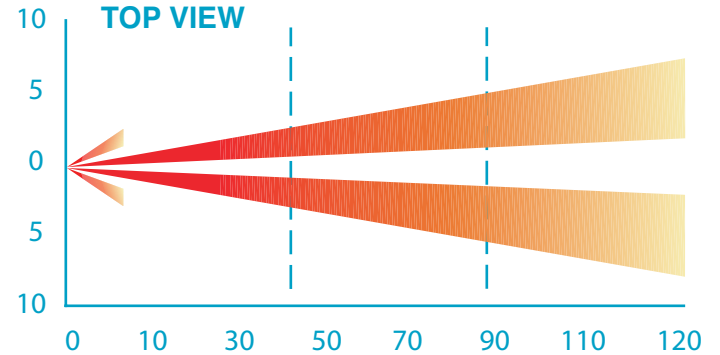
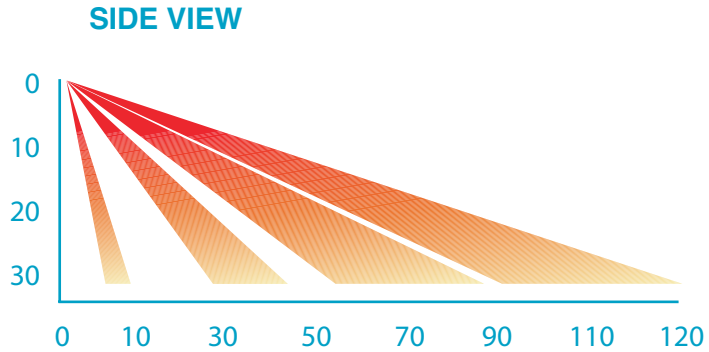


TOP VIEW



## HM-10 High Bay End-of-Aisle Lens

- Detects motion from the end of aisles up to 110 ft long
- Designed to mount 30 ft high and 10 ft back from end-of-aisle



# OPTIONS

The previous sections of this guide define the portion of the model number referred to as a sensor's "Series" number. Following this series number, there may be additional characters in the model number that define the optional features included on the sensor. This section describes each option and their model number character suffix. The datasheet for each sensor series lists its available options.

## R

### Isolated Low Voltage Relay Option

- Enables low voltage sensors to interface with a building management system
- Provides dry contact closure via a SPDT, 1 Amp, 40 Volt relay
- The relay is energized when ALL connected sensors register "Unoccupied"
- When using multiple sensors, only one sensor per zone needs to have a relay

*Note: Sensor must have power at all times for the relay to function.*

## P

### On-Off and/or Inhibit Photocell

- Ideal for public areas like vestibules, corridors, or restrooms

#### On/Off Mode

- Full ON/OFF control of lighting based on daylight conditions during periods of occupancy

#### Inhibit Mode

- Prevents lights from turning on during periods of occupancy with adequate daylight
- Once the lights are needed and turn on, they stay on until the occupancy sensor timer expires

## ADC Automatic Dimming Control Photocell

- Perfect for classrooms and private offices
- Allows sensor to control level of 0-10 VDC dimmable ballasts
- Provides two user selectable time-out periods that enable the lights to go to a dim setting after one time-out and then turn fully off after a second time-out

## DZ Dual Zone Photocell Option

- Provides more advanced daylighting control for 2 Pole Line Voltage occupancy sensors
- Single shared set-point is used for both poles

### Stepped Dimming (DUO) Mode

- Ideal for A/B (also called inboard/outboard) switching applications
- Determines the necessary On/Off combination of the two poles in order to maintain adequate lighting

### Percentage Offset (Dual Zone) Mode

- Ideal for classrooms with individually controlled parallel rows of lights
- Uses a relative set-point for the second pole that is a percentage of the first pole's set-point

## 3 347 VAC Option

- Allows sensor to be powered from and switch 347 VAC
- Used primarily in Canada

## SH Start-to-High

- Designed for use with HID Bi-Level Fixtures
- Provides 20 minute warm-up timer during which sensor stays in ON state

## LT Low Temperature / High Humidity Option

- During manufacturing, the circuit board goes through a conformal coating process making it corrosion resistant from moisture
- Enables operating temperatures down to -40° F (-40° C) for PIR sensors and -4° F (-20° C) for PDT sensors
- Ideal for cold storage applications or bath/shower rooms with condensing steam



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