

# Dual Technology Recessed Ceiling Occupancy Sensor

## Manual & Specification



**PRODUCT MUST BE INSTALLED IN ACCORDANCE  
WITH LOCAL ELECTRICAL CODES**

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## 1. INTRODUCTION

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### 1.1. GENERAL DESCRIPTION

The *Diversa* Occupancy sensors use Passive-Infrared (PIR) and Accurate Detection Intelligence (ADI) Voice sensing technologies to determine the presence of people within a defined region of detection and perform designed control actions when occupancy (or vacancy) is detected.

The WOR Series of sensors are designed to mount on ceilings giving a 360° coverage pattern. The low voltage edition of the sensor gives the capability of operating and controlling the WP-PP20-D power pack and other Diode pulse equipment. The line voltage edition of the sensor gives the capability of operating and controlling 120/277 or 347 VAC circuits.

This manual covers the following part numbers:

#### Low Voltage

WORSDD1-R-N

WORSDD2-N-N

WORSDD2-R-N

WORXDD2-PR-N

WORSDD2-DPR-L

WORXDD2-DPR-L

#### Line Voltage

WORSU1-P-N

WORBU12-P-N

WORSU2-P-N

WORXDU2-P-L

WORS31-P-N

WORS32-P-N

WORXD32-P-N

## 1.2. OPERATIONS

Low voltage sensors are powered by 24VAC from either a *Diversa* Power Pack or a 24VAC transformer. If a single base model sensor is used to operate a relay directly, the sensor can be powered using only the white and red wires.

When in operation the sensor will detect initial motion using PIR. Once motion is detected, the signal to turn on the lights is sent to the power pack. ADI-Voice is then is activated to work alongside PIR to maintain the occupied condition as long as people are within the sensing range.

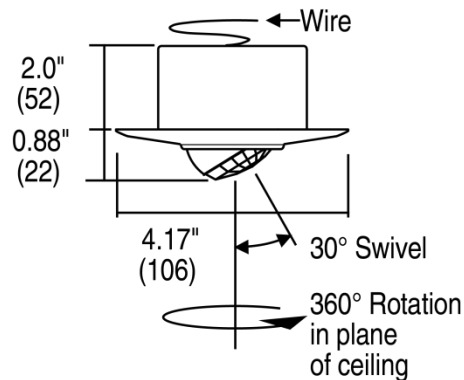
Line voltage sensors draw control power directly from the lighting circuit they are intended to control. When in operation the sensor will detect initial motion using PIR; once motion is detect, the internal contact will close. ADI-Voice is then is activated to work alongside PIR to maintain the occupied condition as long as people are within the sensing range.

There are two LEDs behind the lens: Orange or Amber indicates ADI-Voice detection, Green indicates PIR detection. These indicators can be disabled.

### 1.3. SPECIFICATIONS

#### 1.3.1 Dimensions & Mounting:

Size:	4.17" diameter x 2.88" deep
Weight:	6.44 oz
Mounting:	Recessed into a 2-1/8" deep; octagon junction box.
Color:	Off-white



#### 1.3.2 Power:

<u>Low Voltage:</u>	24 VAC ±25% class 2 source.
Frequency:	60 Hz
Consumption:	9.5 mA      Standard
	14.0 mA      with Auxiliary Relay
<u>Line Voltage:</u>	120/277 VAC or 347 VAC
Frequency:	60 Hz
Consumption:	5.74 mA

#### 1.3.3 Inputs – Low Voltage:

Sensor Link:	24VAC, Maintained/Diode Pulse. Type defines function as explained in the 'sensor link' section.
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#### 1.3.4 Outputs – Low Voltage:

Diode Pulse:	Each output is capable of driving one WP-PP20-D
0-10V Dimming	Use to control up to 50 Ballasts. Connections are polarity sensitive.
Aux Relay	SPDT Form-C contact rated for 1A at 30VDC

### 1.3.5 Contact Ratings Line Voltage:

Load Rating / Pole:

Voltage	Standard Ballasts	Electronic Ballasts
120V	800W	800W
277V	1800W	1200W
347V	1500W	1500W

### 1.3.6 Operation Temp:

32°F to 104°F (0° to 40°C)

Low temp and high humidity option [-L] products: PCB conformal coated for resistance to damp environments and operation to -40°C/F

### 1.3.7 Storage temp:

-14° to 140°F (-25° to 60°C)

### 1.3.8 Approvals:

Certified to UL 508, UL244A, CSA C22.2#14, Title 24.

Low Voltage: FCC

## 1.4. OPERATIONS

Series	Range	Tech	Voltage	Poles	Options	Environmental
WOR	S = Standard X = Extended B = Hi-Bay	D = Dual I = PIR Only	D = Diode Pulse U = 120/277V 3 = 347V	1 2	-N = None -P = Photo -D = Dimming -R = Aux. Relay	-N = None -L = Low Temp

### Range:

Standard (S)	Designed for installations with a 24ft diameter at 8ft mounting
Extended (X)	Designed for installations with a 50ft diameter at 8ft mounting
Hi-Bay (B)	Designed for installations with a 40ft diameter at 40ft mounting <b>*Hi-Bay is not available with ADI Voice technology</b>

### Technology:

Dual (D)	Utilizes PIR and ADI-Voice technology
PIR Only (I)	Utilizes PIR Only

### Voltage:

Low Voltage	Sensor is powered from 24VAC Class 2 power source
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### Poles:

1	Single pulse output
2	Two pulse outputs

### Options:

Photo (P)	Photo Sensor controlled loads.
Dimming (D)	The sensor regulates a 0-10VDC dimmable ballasts to maintain a constant light level even if natural ambient light changes.
Aux. Relay (R)	Auxiliary contact relay for interfacing with other systems. An isolated SPDT form-C contact is provided for signaling.

### Environmental:

Low Temp and High Humidity (L)	The device is designed to operate in damp environments and continue operation to -40°C
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## 1.5. ACCESSORIES

WIR-3110	IR setting unit. The WIR-3110 setting unit is used for touchless programming of the sensor.
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\* Application and Performance Specification Information Subject to Change without Notification.

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## 2. INSTALLATION & WIRING DIRECTIONS

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### 2.1. Installation

Mounting of the device requires a 2-1/8" deep or more, octagonal junction box. Install by recessing the device into the octagon box; lining up the mounting holes and securing it using the screws provided. If too shallow, use the spacer ring is provided.

To enhance the performance of your *Diversa* Occupancy Sensors with Accurate Detection Intelligence (ADI-Voice) please review the following installation guidelines carefully. Following these guidelines as closely as possible will improve the closed loop operation of the sensor, result in better set point selection and allow for greater range of dimming (on models with Dimming option):

- Consult product manual for coverage pattern and ranges for the specific model to be installed
- The microphone works best when it is pointed at the space to be occupied
- Ensure that the sensor is at least 30" away from air handlers/registers and not pointed directly at windows
- Check that you are installing the right product (check the product model number) as per the drawings
- Outside the direct cone of light from fixtures & between 3 and 12 feet from a Window
- As close as possible to the fixture being controlled
- Above the least illuminated space in the work area
- Away from lighting that is not being controlled by the sensor

The room dynamics will change when people and furniture are actually occupying the space, some sensors may need to be tuned to specific rooms after move in. Occupants should expect some adjustment and fine tuning.

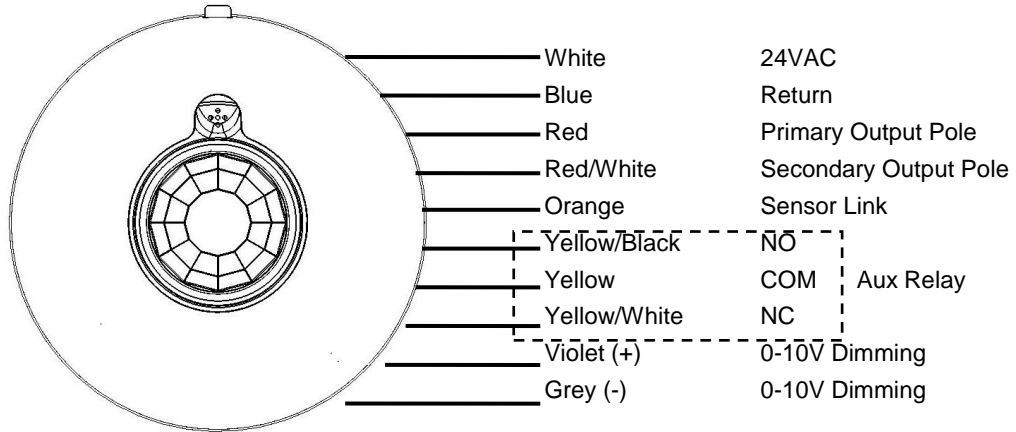
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### 2.2. Wiring

The WOR Series Low Voltage sensors are equipped with plug-in harness for easy installation. This harness has #18 AWG leads. Use appropriate sized wire-nuts to connect the wires to the incoming load terminations.

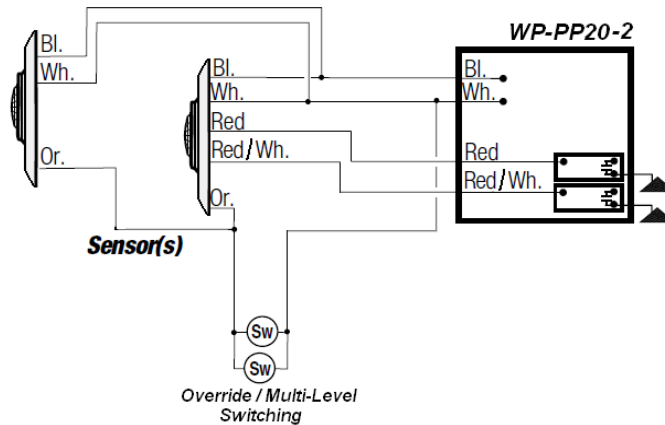
## 2.3. Electrical Connections

### Wire Legend – Low Voltage

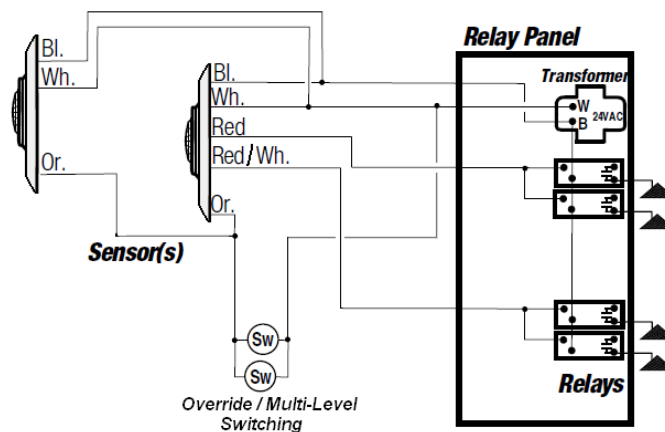


\*Not all wires are used for all models

### Wiring to a Power Pack



### Wiring to a Relay Panel

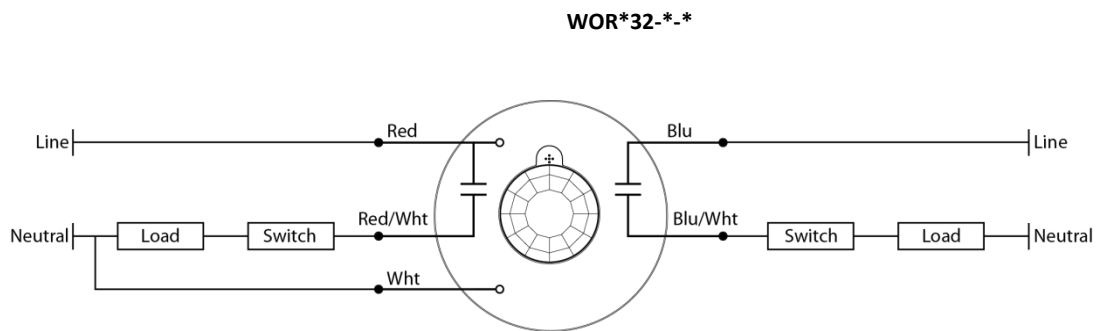
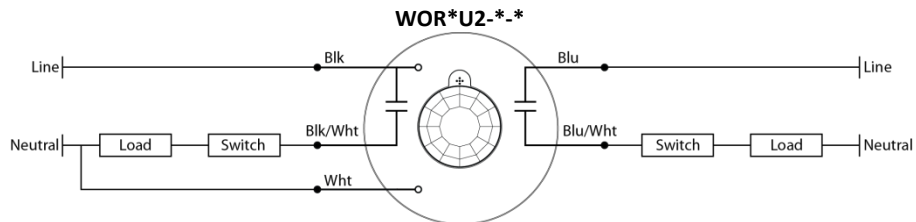
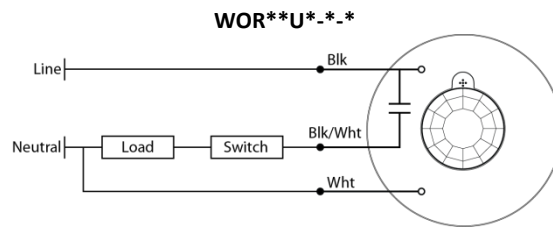




**⚡ CAUTION ⚡**  
**TURN POWER OFF AT THE CIRCUIT BREAKER BEFORE WORKING WITH OR NEAR HIGH VOLTAGE**

The WOR Series Line Voltage sensors are equipped with #14 AWG stranded leads. Use appropriate sized wire-nuts to connect the wires to the incoming load terminations. For installation with field-installed conductors of 60°C minimum rating.

Wire Legend – Line Voltage



### 3. FEATURES AND OPTIONS

#### 3.1. DIP Switches

WOR ---- '-N' & 'RN'				
Dip #	Function	On	Off	Default
1	Voice Detection	Disabled	Enabled	OFF
2	Motion Detection Sensitivity	High	Normal	OFF
3	Detection LED	Disabled	Enabled	OFF
4	Auto or Manual ON	Occupancy (auto on)	Vacancy (Manual On)	ON
5	Not Used	n/a	n/a	OFF
6	Not Used	n/a	n/a	OFF
7	Manual Override Button	Disabled	Enabled	OFF
8	Settings Input	IR Setting Unit (WIR-3110)	Manual Dips/Dials	ON

WOR ---- '-P' & 'PR'				
Dip #	Function	On	Off	Default
1	Voice Detection	Disabled	Enabled	OFF
2	Motion Detection Sensitivity	High	Normal	OFF
3	Detection LED	Disabled	Enabled	OFF
4	Auto or Manual ON	Occupancy (auto on)	Vacancy (manual on)	ON
5	Photo Sensor Inhibit*	Disabled	Enabled	OFF
6	Photo Sensor Control*	Inhibit Primary Pole Only	Inhibit Both Poles	OFF
7	Manual Override Button	Disabled	Enabled	OFF
8	Setting Input	IR Setting Unit (WIR-3110)	Manual Dips/Dials	ON

WOR ---- '-DPR-L'				
Dip #	Function	On	Off	Default
1	Voice Detection	Disabled	Enabled	OFF
2	Motion Detection Sensitivity	High	Normal	OFF
3	Detection LED	Disabled	Enabled	OFF
4	Auto or Manual ON	Occupancy (auto on)	Vacancy (manual on)	ON
5	Photo Sensor Inhibit*	Photo Sensor Disabled & Fixed Dim Level	Photo Sensor Enabled & Auto Dim Level	OFF
6	Photo Sensor Control*	Inhibit Primary Pole Only	Inhibit Both Poles	OFF
7	Manual Override Button	Disabled	Enabled	OFF
8	Setting Input	IR Setting Unit (WIR-3110)	Manual Dips/Dials	ON

\*Only available for 2 pole models

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### **3.2. Programming - IR / Manual Setting**

Programming can be done either with the DIP switches and dials on-board the device or with the WIR-3110 setting unit. For more details and additional options please see the “WIR-3110 Manual”

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### **3.3. Detection (Dual or PIR Only)**

When in operation, the sensor will detect initial motion using Passive Infrared; once motion is detected the ADI-Voice is then activated to work alongside the PIR to maintain occupancy. The ADI-Voice can be disabled on any dual tech sensors.

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### **3.4. Automatic Timeout**

By setting the timeout dial to maximum, the sensor will be put into automatic mode which will adjust the time out automatically to maximize energy savings and occupant comfort. The “Auto Timeout LED” will be lit to indicate that this mode is activated.

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### **3.5. Smart Sensing**

When vacancy occurs, sensitivity of the ADI-Voice technology transitions from maximum to zero over an adaptively determined time period, based on occupancy tendencies. During this period, ADI-Voice can turn the lights back on immediately, even with no line-of-sight to the sensor, assuring the best combination of user convenience and energy savings.

Energy consumption due to false triggers is minimized by the automatic walk-through mode. This feature turns the lights off after 3 minutes if no occupancy detection occurs in the first 30 seconds after initial turn on.

If the PIR detection is not triggered after 2 hours, the lights will turn off regardless of the ADI-Voice status. This compensates for situations such as a radio being left on.

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### **3.6. Vacancy Sensor**

The sensor can be selected as a vacancy (OFF only) sensor. This provides additional energy savings by forcing the user to turn the lights on manually.

The sensor has a built-in override input; this allows for the sensor to be operated as a vacancy sensor by giving the ability to a switch to turn the lights on. For two pole sensors, it provides multi-level control capability.

If it is setup for occupancy ON/OFF control, the switch input may be used for manual control of the lights. Reset (to auto ON/OFF control) occurs when occupancy is no longer detected and the timeout expires.

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### 3.7. Photo Sensing (-P)

Photo-switching control can be enabled or disabled.

When enabled, occupancy alone will not trigger the output state to on. If occupancy is detected AND there is a deficiency of natural light, the output is triggered on. An increase in natural light will not force the lights off but as the ambient light level drops the lights will turn on automatically.

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### 3.8. Multi-Level Photo Sensing (2-Pole with Photo Option)

Photo sensing on a 2-pole sensor can be configured to either restrict both poles (factory default setting) or the secondary pole only; if set to "Secondary Pole Only", the primary pole will trigger based on occupancy, regardless of the photo setting.

Factory default setting is that both poles will be limited to prevent switching by a manual switch when adequate light is present.

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### 3.9. Manual Switching

The WOR Sensor is equipped with a front panel button for the purpose of manually overriding the occupancy and/or photo controlled outputs. This allows for immediate testing of a sensor to verify installation.

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### 3.10. Low Temperature & High Humidity (-L)

This feature allows the device to be installed in such areas as a Parking Garages and Refrigerated Warehouse. By utilizing PCB conformal coating, the device is designed to operate in damp environments and continue to operate at temperatures as low as -40°C

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### 3.11. Sensor Link – Low Voltage

The low voltage sensor is equipped with a connection which facilitates communication between sensors. The sensor link (orange wire) allows multiple sensors to coordinate their signals and act together as a cohesive zone.

This connection provides additional control functions as described below.

**Diode Pulse:** When a Douglas (pulse) switch is connected to the sensor link it provides manual control. This can be used to toggle the lights ON/OFF. In the case of two pole sensors, it provides optional multi-level sequencing control. Please see the "WIR-3110 Manual".

**Maintained AC:** If a maintained AC signal is applied to the sensor link, the sensors will be in an override mode. By default the sensor will turn the lights ON when disabled by this override. This is adjustable via the IR setting unit.

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### **3.12. Low Voltage Multi-Level Switching (2-Pole without Photo Sensing option)**

A switch on the sensor link can be used to either trigger both poles simultaneously (default), if required sensor step through a multi-level sequence. Please see the “WIR-3110 Manual”

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### **3.13. Photo Sensing (-P)**

Photo-switching control can be enabled or disabled. The photo sensing option can be configured for 2 types of functionality. Please see “WIR-3110 manual section 2.8”

#### **3.13.1 Type: Inhibit**

When enabled, occupancy alone will not trigger the output state to on. If occupancy is detected **AND** there is a deficiency of natural light (as determined by a programmable set point off), the output is triggered on. Once on, the output remains on until a vacancy condition is determined by expiration of the vacancy timer. An increase in natural light will not force the lights off. Inhibit function can be configured to inhibit override switch as well.

#### **3.13.2 Type: On/Off**

If occupancy is detected **AND** there is a deficiency of natural light (as determined by a programmable set point), the output is triggered on. Once on, the output remains on until a vacancy condition is determined by expiration of the vacancy timer. An increase in natural light will allow the lights to turn off and as the ambient light level drops the lights will turn on automatically.

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### **3.14. Daylight Harvest Dimming (0-10V Output) (-D)**

This section ONLY describes the dial functionality for DPR models.

In P and PR models, the dial is used to set the threshold at which the relays will be inhibited by excessive ambient light. Set the dial closer to “Lo” if you want to keep the lights from turning on, even if there is only a small amount of ambient light. Set the dial closer to “Hi” if you want the lights to always come on except in the case of very bright ambient light.

The 0-10V output can operate up to 50 ballasts. This output can be used for either a fixed tuned lighting level or a fully active daylight harvesting.

When set to fixed dim the dial can be used to raise or lower the light level. When set for photo dimming the dial is used to select top trim. This dial is used to set the maintained light level by initiating a photo capture.

To trigger a photo capture from the device:

1. First adjust the light level using the dimming dial to the desired level.
2. Set the “Button Enable/Disable” Dip Switch (#7) to Disable.
3. Hold down the manual button
4. While holding down the button, set the “Button Enable/Disable” dip switch (#7) to enable. At this point the yellow LED will blink for 1 second.
5. Release button and step away from the sensor.

6. Wait 15 seconds. The yellow LED will blink; the device photo captures the current light level.
7. 15 seconds after this, the dimming override will expire and the sensor will return to normal.
8. Raise the dimming dial to the set the top trimmed level and flip the manual button override dip (#7) for to normal operation.
9. After 30 seconds the light will regulate.

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### **3.15. Low Voltage Multi-Level Photo Sensing (2-Pole with Photo Sensing Option)**

This feature will inhibit manual switching, if adequate light is present.

Photo sensing on a 2-pole sensor can be configured to inhibit both poles or only the primary pole. In either case, the manual override button will also be inhibited if ambient light exceeds the setpoint. This functionality can be changed using the WIR-3110 setting unit.

Please see the “WIR-3110 Manual”.

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### **3.16. Low Temperature & High Humidity (-L)**

This feature allows the device to be installed in such areas a Parking Garages and Refrigerated Warehouse. By utilizing PCB conformal coating, the device is designed to operate in damp environments and continue to operate at temperatures as low as -40°C

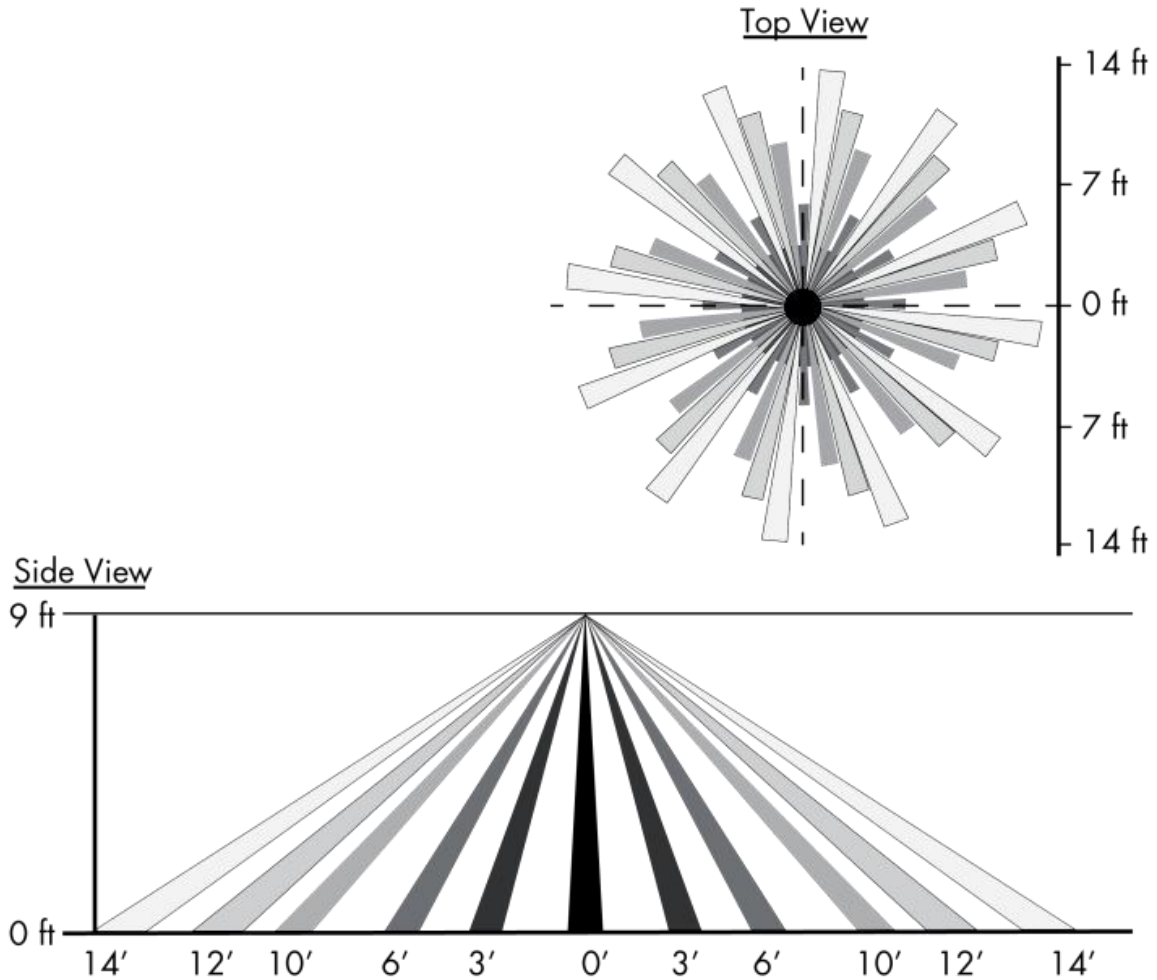
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## 4. COVERAGE PATTERNS

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### 4.1. Standard Lens

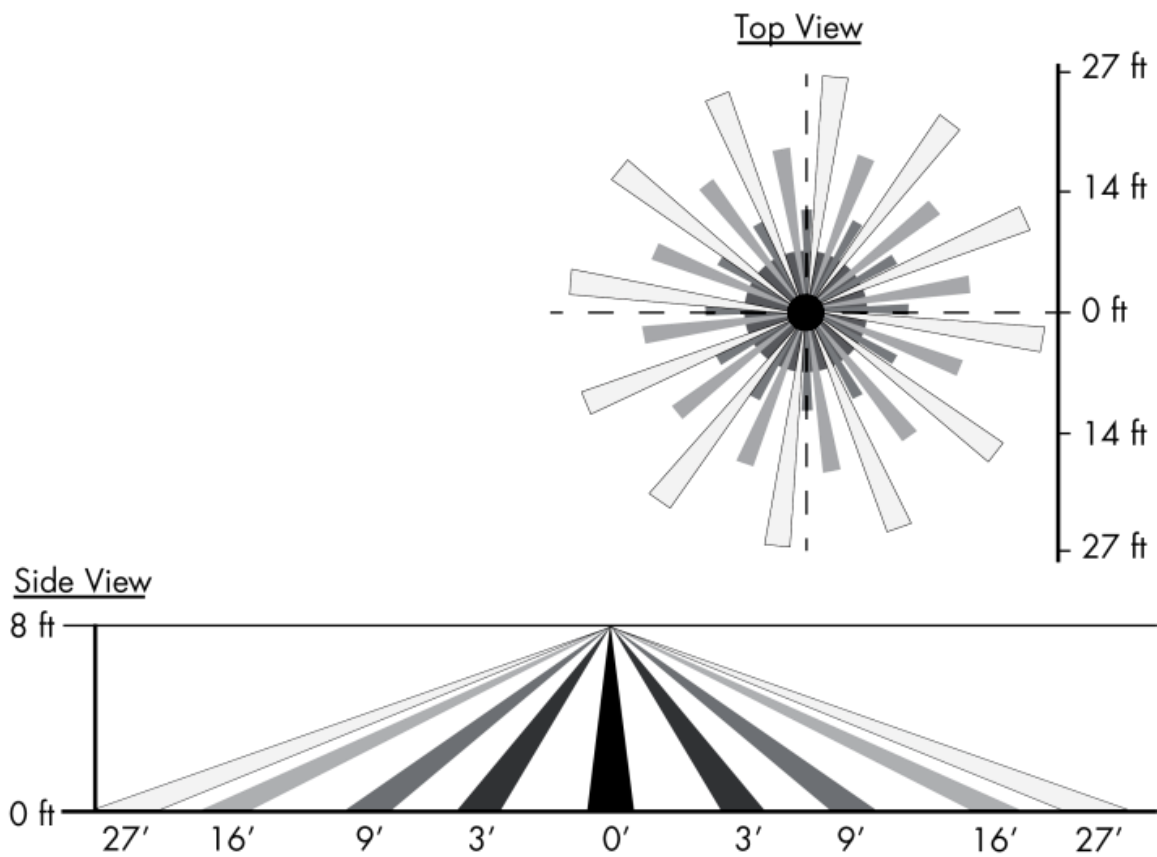
- Optimal usage is to detect small motions such as hand movements
- Designed for a mounting height of up to 8ft
- ADI-Voice can detect around corners that PIR cannot to maintain occupancy





**4.2. Extended Lens**

- Optimal usage is to detect large motions such as walking
- Designed for a mounting height of up to 8ft
- ADI-Voice can detect around corners that PIR cannot to maintain occupancy



**4.3. Hi-Bay Lens – Line Voltage**

- Optimal usage is to detect large motions such as walking
- Designed for a mounting height of up to 40ft
- PIR Only

