SENSORWORX®

LINE VOLTAGE WIDEVIEW & HALLWAY SENSORS

INSTALLATION & OPERATION INSTRUCTIONS

MODELS

MODEL #	PIR	ACOUSTIC	PHOTOCELL	LENS TYPE
SWX-401-2	•			WIDEVIEW
SWX-411-2	•		•	WIDEVIEW
SWX-421-2	•	•		WIDEVIEW
SWX-431-2	•	•	•	WIDEVIEW
SWX-402-2	•			HALLWAY
SWX-412-2	•		•	HALLWAY

ADDITIONAL UNIT OPTIONS

- **HE:** Humid Environment
- **BK:** Black cover and lens
- **HL:** Default High/Low Operation (Available for SWX-40x-2)

OVERVIEW

Sensors detect movement in the infrared energy that radiates from occupants as they move within the device's field-of-view. Once occupancy is identified, the sensor's internal relay switches power on to the connected lighting. If equipped with passive acoustic detection, the unit's microphone is then also enabled to further enhance detection while the lights are on. An internal timer is set to keep lights on during brief periods of inactivity, and is reset every time occupancy is signaled by either the passive infrared or acoustic detection technologies. Additionally, optional daylight detection is available that will turn off controlled lighting whenever there is sufficient ambient light in the space.

APPLICATIONS

Line voltage sensors are self-contained units that directly power from and switch 120/277 VAC. Typically, they are used to control areas where a single sensor's coverage area is sufficient for the entire space. Units can be parallel wired if necessary to increase coverage area for larger areas or longer hallways.

- Classrooms
- Large Offices
- Hallways
- Open Areas
- Conference Rooms

SPECIFICATIONS

ELECTRICAL

OPERATING VOLTAGE
MVOLT (120-277 VAC)

LOAD RATINGS
800W @ 120 VAC
1200W @ 277 VAC

LOAD TYPES
Tungsten
Ballast
LED

DIMMING CAPACITY (-HL OPTION)
50mA

DIMMING COMPATIBILITY
Requires Units with -HL Option
0-10 VDC Ballasts or Drivers
Compliant with IEC 60929 Annex E.2

PHYSICAL

SIZE
2.875" H x 2.75" W x 3.25"D
(7.30 x 6.98 x 8.25 cm)

WEIGHT
4.75 oz.

COLOR
White or Black

ENVIRONMENTAL

OPERATING TEMP
32°F to 122°F (0°C to 50°C) - Standard
-40° F/C (with **-HE** Option)

RELATIVE HUMIDITY
0-95% Non-Condensing, Indoor Use Only

OPERATION

TIME DELAYS
30 sec to 30 min (Typical)
10 Minute Default

TEST MODE
5 sec Time Delay
Expires After 10 min

CODE COMPLIANCE

Sensors can be used to meet ASHRAE 90.1, IECC, & Title 24 energy code requirements

OTHER

LISTINGS
UL/CUL

c UL US LISTED

FEATURES

- **Digital Passive Infrared (PIR) Detection**
- **Passive Acoustic Detection (optional)**
- **Wide View (120°) or Hallway Coverage Pattern Options**
- **Compact Size and Matte Finish**
- **Convenient Test Mode and Adjustable Time Delays**
- **Electronically Timed Switching Designed for LED Fixture Control**
- **Optional Ambient Light Override (Photocell)**
- **Optional High/Low Dimming**

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COVERAGE PATTERNS

WIDE VIEW 120° - PASSIVE INFRARED

- Designed for 8 to 12 ft (2.44 to 3.66 m) high mounting
- Small motion (e.g. hand movements) detection up to 40 ft (12.19 m)
- Large motion (e.g. walking) detection up to 70 ft (21.34 m)
- For hallway applications, install two units (parallel wired) facing each other from hall ends or back to back from center of hall

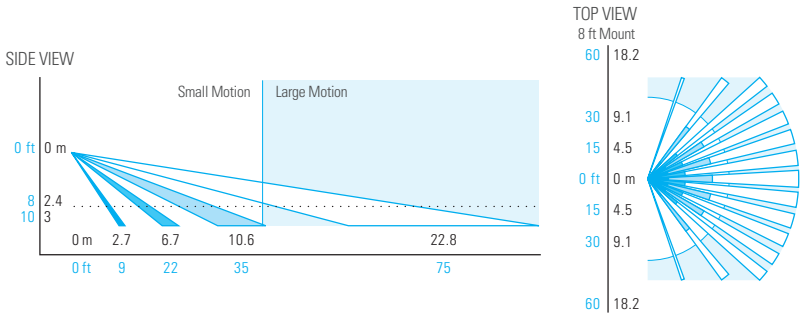
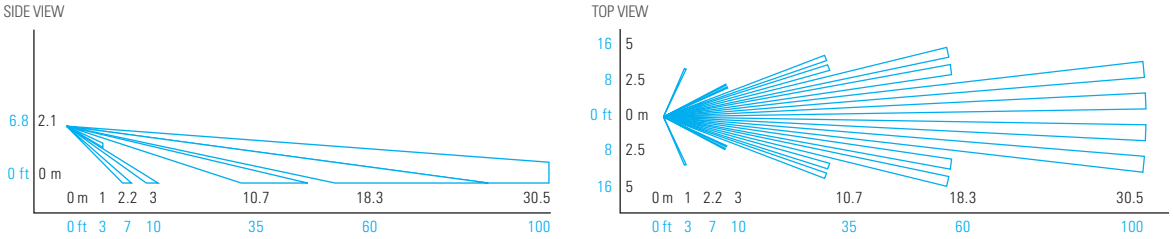


Diagram reflects sensor in first position. Adjust angle downward if mounting above 10 feet or to decrease gap directly under sensor.

HALLWAY (LONG RANGE) - PASSIVE INFRARED

- Designed for 8 to 12 ft (2.44 to 3.66 m) high mounting
- Large motion (e.g. walking) detection up to 100 ft (30.48 m)
- Detection occurs sooner when crossing coverage beams upon entry to a hallway as opposed to entering from the end and walking directly at the sensor



DUAL TECHNOLOGY (PIR/ACOUSTIC)

- Units with dual technology (SWX-421-2 and SWX-422-2) have overlapping acoustic detection of the complete PIR coverage area
- A PIR event is required to initially enable acoustic detection
- Sounds indicating occupancy reset the sensor's time delay while non-occupant noises are filtered out
- Occupant sounds alone will not keep lights on indefinitely, PIR motion must be periodically detected for lights to remain on for an extended time
- After sensor time out expires, acoustic detection remains enabled for 10 seconds to enable voice reactivation of lights for additional convenience and safety

AMBIENT LIGHT OVERRIDE (PHOTOCELL)OPERATION

Sensors with an integrated photocell will turn lights on/off depending on the amount of ambient light detected. This operation makes them ideal for lighting near skylights or windows.

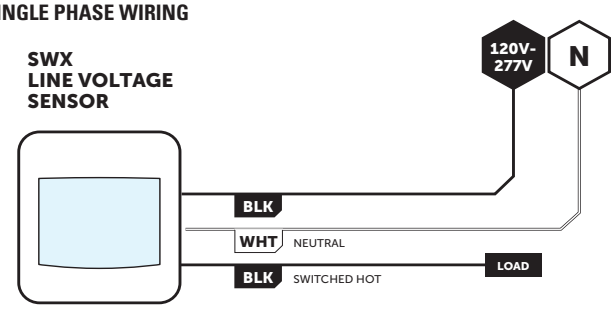
HIGH/LOW DIMMING (0-10V) OPERATION

By default, this option dims lighting to a lower level when the occupancy time delay expires. When occupancy is detected, lights are raised to their full bright level. This operation makes them ideal for stairwell and hallway lighting where lighting commonly is never switched entirely off. High/Low/Off operation can also be achieved by changing the dimming operation via the unit's push-button settings. In that mode lighting would drop to the dimmed level first before switching entirely off after a secondary time delay period.

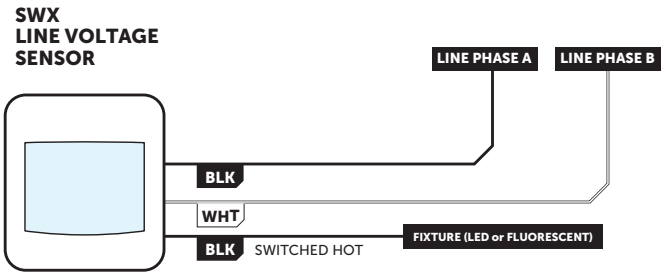
WIRING

- Sensors can be wired in parallel, although the total switching load specification remains the same as it is for one sensor.
- When wired in parallel, both sensors must time out for connected lighting to turn off.
- If wiring in an additional toggle switch for override off control, connect between the sensor and the load.

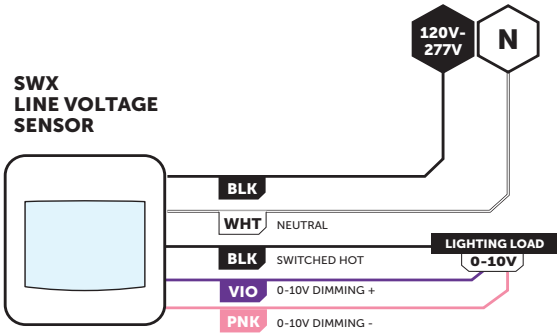
SINGLE PHASE WIRING



2-PHASE WIRING (208 VAC)



HIGH/LOW WIRING



** Default operation is High/Low only, but High/Low/Off can be achieved via a setting change (see instructions).

WIRING NOTES

For supply connections, use wires rated for at least 75°C or equivalent.

WARNING: TURN POWER OFF AT THE CIRCUIT BREAKER BEFORE WIRING

INSTALLATION OPTIONS

MOUNTING INSTRUCTIONS

1a. Mount bracket directly to a junction box using included chase nipple and plastic flange nut or,

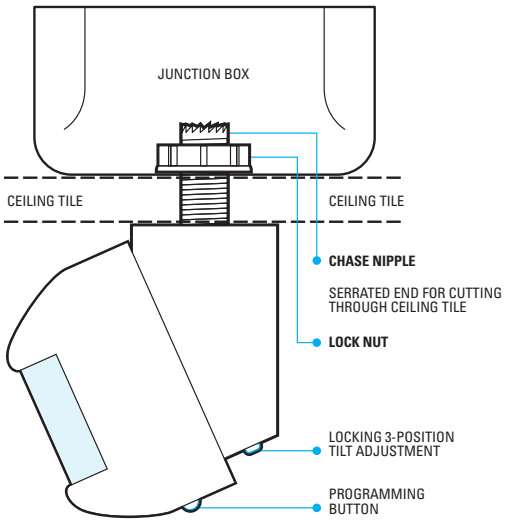
1b. If ceiling tiles are present, use serrated end of chase nipple to cut hole in tile. Then mount junction box above ceiling tile so that a 1/2 knockout aligns with hole in tile. See diagram below.

2. Align latches at top of sensor to slots on bracket. Thread sensor wires through chase nipple and terminate inside junction box.

3. Push in bottom of sensor until bottom locking adjustment engages.

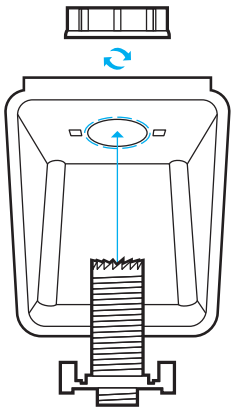
4. To adjust sensor angle, depress locking adjustment and slide sensor to desired position.

SENSOR & MOUNTING BRACKET THROUGH CEILING TILE TO JUNCTION BOX

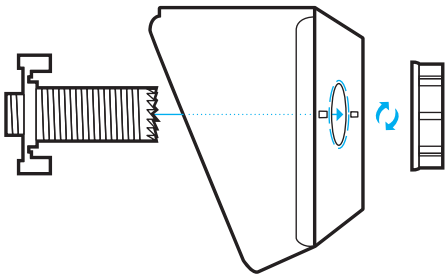


ADDITIONAL MOUNTING DIAGRAMS

TOP INSTALLATION



REAR INSTALLATION



GENERAL CONFIGURATION SETTINGS

FUNCTION #2 - TIME DELAY CONFIGURATION

The length of time after the last detected occupancy event that the sensor will stay in the occupied state.

CHANGING TIME DELAY SETTINGS:

1. Read through the Time Delay Settings list on the right and note the number of the desired time delay setting (e.g., default is 4 = 10 minutes).
2. Press and release the unit's pushbutton twice, then wait 2 seconds. The white LED will blink back the number of the current setting.
3. At any time after blink back starts, enter number of new setting (from Time Delay Settings table on right).
4. New setting is saved after white LED blinks new number back 3 times. If blue LED double flashes at any time, start process over.

FUNCTION #2 - TIME DELAY SETTINGS

SETTING #	DESCRIPTION	
1	Test Mode*	
2	30 sec	
3	5 min	
4	10 min	(default)
5	15 min	
6	20 min	
7	30 min	

* 5 SEC TIME DELAY, EXPIRES AFTER 10 MIN

EXTENDED TIME DELAYS**

SETTING #	DESCRIPTION
8	1 hr
9	2 hr
10	4 hr
11	8 hr

** EXTENDED TIME DELAYS GREATLY REDUCE ENERGY SAVINGS

FUNCTION #6 - MICROPHONE (ACOUSTIC DETECTION)

Dual technology sensors prevent non-occupant sounds from resetting the time delay by dynamically reducing the microphones sensitivity at specific frequencies. In some environments, decreasing the sensitivity across all frequencies so that lights go off sooner, may be preferred. A unit's microphone can also be disabled (effectively changing sensor to a PIR only version).

TO CHANGE MICROPHONE SETTINGS:

1. Press unit's pushbutton 6 times, then wait two seconds. The white LED will blink back the number of current setting (from table on right).
2. At any time after blink back starts, enter number of new setting by pressing the button equal times to choice from table on right.
3. New setting will be saved after white LED blinks back new number 3 times. If blue LED double flashes at any time, start process over.

FUNCTION #6 - MICROPHONE

SETTING #	DESCRIPTION	
2	Normal Operation	[default]
3	Reduced Sensitivity	
4	Disabled	

FUNCTION #7 - LED INDICATION

By default, the sensor blinks its white LED whenever it detects PIR motion. A unit with dual technology will also blink the LED white when it acoustically detects occupancy. The intensity of this LED can be increased or disabled. Additionally, the LED can be enabled to blink white for only PIR events and blue for an acoustic event.

CHANGING LED INDICATION SETTINGS:

1. Press unit's pushbutton 7 times, then wait two seconds. The white LED will blink back the number of current setting (from table on right).
2. At any time after blink back starts, enter new setting by pressing the button equal times to numbered choices.
3. New setting will be saved after white LED blinks back new number 3 times. If blue LED double flashes at any time, start process over.

FUNCTION #7 - LED INDICATION SETTINGS

SETTING #	DESCRIPTION	
2	White LED for all occupancy, normal brightness	(default)
3	White LED for all occupancy, increased brightness	
4	Disable LED	
5	White LED for PIR, blue for Acoustic, normal brightness	
6	White LED for PIR, blue for Acoustic, increased brightness	

PHOTOCELL CONFIGURATION

Along with occupancy based control, units with an integrated photocell can provide on/off or inhibit-only control of lighting based on the amount of ambient light present. Descriptions of modes are below.

ON/OFF PHOTOCELL CONTROL

- Recommended for public spaces (hallways, entryways, etc) where fully switching of lighting off and on will not cause distraction of occupants.
- Lights are switched off if ambient light level surpasses threshold and back on if level drops.

INITIAL INHIBIT ONLY PHOTOCELL CONTROL

- Lighting is held off if sufficient ambient light level is present upon initial occupancy.
- Lighting will turn on if light level drops below setpoint.
- Once on, lighting will only turn off from vacancy or a manual switch, never from daylight.

PHOTOCELL CONFIGURATION (CONT.)

FUNCTION #3 - PHOTOCELL OPERATIONAL MODES

To change the operation of the photocell (in equipped units), use the following procedure:

CHANGING THE PHOTOCELL OPERATIONAL MODE:

1. Press and release the unit's pushbutton 3 times, then wait 2 seconds. The white LED will blink back the number of the current setting (repeats 3 times before exiting).
2. At any time after blink back starts, enter number of new setting from table on right (e.g., 4 for Occupancy + Initial Inhibit Photocell Control).
3. New setting is saved after white LED blinks back new number 3 times. If blue LED double flashes at any time, new setting was not saved and process must be repeated.

FUNCTION #3 - PHOTOCELL OPERATIONAL MODES

SETTING #	DESCRIPTION	MODEL # NOTES
2	Occupancy + On/Off Photocell Control (Photocell Enabled)	Default for SWX-411-2 & SWX-431-2. **See on/off operation notes below.**
3	Unused	
4	Occupancy + Initial Inhibit Photocell Control (Photocell Enabled)	Default for SWX-401-2-HL & SWX-402-2-HL
5	Occupancy only (Photocell Disabled)	Default for SWX-40x-2 & SWX-42x-2

ON/OFF PHOTOCELL OPERATION NOTES

- During periods of occupancy, when the measured light level is high enough for 5 min. such that turning the lights off will not drop the level below the selected setpoint, the sensor will turn connected lighting off.
- During this 5 min. transition time the LED will blink blue at 0.5 second intervals.
- After lights are turned off, the sensor's LED double blinks blue every 15 seconds as an indication that sufficient ambient light is the reason the lights are being held off.
- If the ambient light level falls below the setpoint for more than 30 seconds, lights will switch back on. During this transition time the LED also will blink blue at 0.5 second intervals.

FUNCTION #4 - PHOTOCELL SETPOINT

The minimum overall light level that is to be maintained in a space by the sensor is referred to as the "setpoint". This value is user selectable or can be chosen by the Auto-Setpoint function that is built into the sensor.

SETPOINT CONFIGURATION

1. Read through the below setpoint values list and note the number of the desired setpoint (e.g., default is 7 = 25 fc).
2. Press and release the unit's pushbutton 4 times, then wait 2 seconds.The LED will blink back the value of the current setting in two alternating digits:
   Blue LED = 10's digit (1-12 blinks or rapid blink for 0)
   White LED = 1's digit (1-9 blinks or rapid blink for 0)
3. At any time after blinking starts, enter number of new setting (from Setpoint Value Table).
4. New setting is saved after white LED blinks new setting back 3 times. If blue LED double flashes at any time, an error condition exists and process must be repeated.

FUNCTION #4 - SETPOINT VALUE TABLE

SETTING #	DESCRIPTION	
2	Run Auto-Setpoint*	
3	2.5 fc	Manual Setpoint Options
4	5.0 fc	
5	10.0 fc	
6	15.0 fc	
7	25 fc (default)	
8	35 fc	
9	50 fc	
10	75 fc	
11	100 fc	

*AUTO-SETPOINT SELECTION DETAILS

A Once setting 2 "Run Auto-Setpoint" has been selected (by following above steps 1-4), the sensor's LED will alternate blue and white for 30 seconds. During this time user should move away from sensor.

B Lights will then be cycled in order for sensor to calculate the controlled (artificial) light level. This is done by subtracting the light level with the lights off (relay open) from the light level with the lights on (relay closed).

C A setpoint will then be chosen using the following conditions:
- If controlled level is less than 3 fc, the application is considered open loop and the setpoint will be set to 25 fc.
- If controlled level is between 3 and 100 fc, setpoint will be set to that level times 1.25.
- If controlled level is greater than 100 fc the setpoint will be set to 125 fc.

D Unit will immediately start operating with new setpoint (i.e. blue LED may begin flashing indicating it will transition lights soon)

E To check auto selected setpoint, press and release button 4 times. Setpoint will be blinked back in two alternating digits:
Blue LED = 10's digit (1-9 blinks or rapid blink or 0)
White LED = 1's digit (1-9 blinks or rapid blink or 0)

HIGH/LOW DIMMING CONFIGURATION (FOR -HL MODELS)

FUNCTION #3 - OPERATIONAL MODE CONFIGURATION (FOR -HL MODELS ONLY)

Sensors equipped with dimming have additional operational modes and different defaults than standard sensors. To change between modes, use the following procedure:

1. Read through the FUNCTION #3 - OPERATIONAL MODE table on the right and note the number of the desired operational mode.
2. Press and release the unit's pushbutton 3 times, then wait 2 seconds. The white LED will blink back the number of the current setting.
3. At any time after blinking starts, enter number of new setting (e.g., 2 for OCCUPANCY - ON/OFF) from OPERATIONAL MODES table.
4. New setting is saved after white LED blinks new setting back 3 times. If blue LED double flashes at any time, an error condition exists and process must be repeated.

FUNCTION #3 - OPERATIONAL MODES

SETTING #	DESCRIPTION	MODEL # NOTES
2	Occupancy - On/Off (photocell disabled if present)	
3	Occupancy + On/Off Photocell Control **See on/off operation notes below.**	
4	Occupancy - High/Low (photocell disabled if present)	Default for SWX-40x-2-HL
5	Occupancy - High/Low/Off (photocell disabled if present)	

OCCUPANCY HIGH/LOW/(OFF)

- Sensors drop the lighting level to a low setting after the occupancy time delay (Function #2 - Time Delay) expires.
- If set to High/Low/Off mode, after a second time delay (Function #9 - Secondary Time Delay) the sensor will switch the fixture off completely for the duration of the unoccupied period.
- Alternatively, leaving the sensor's relay disconnected will cause the fixture to stay at the full dim setting (but never turn completely off) for the duration of the unoccupied period.

ADDITIONAL DETAILED DIMMING SETTINGS

The settings listed in the below function tables can be adjusted using the following programming procedure.

1 From the below tables of detailed functions, note the number (#) of the function to be modified. For example, the **HIGH TRIM** setting is #5.

3 To access a particular function, press and release the programming button the number of time of the chosen function. For example, press the button 5 times to access the **HIGH TRIM** function.

4 The LED will flash back white the setting number of the current value as it appears in each function's detailed table below. For example, the default **HIGH TRIM** is setting #2 (10V)

5 To change the setting number, press and release the button the number of times equal to the new setting #. For example, 3 times (for 9V).

6 The LED will flash back white the new setting number as confirmation and will be saved after three confirmations. If LED double flashes blue at any time, start process over.

DETAILED DIMMING FUNCTION TABLES

FUNCTION #5 - HIGH TRIM

The maximum voltage to which the sensor is allowed to raise its dimming output in the full bright state.

SETTING #	VALUES		NOTES
2	~10 VDC	(default)	
3	~9 VDC		Light output at each voltage level depends on driver/ballast and luminaire.
4	~8 VDC		
5	~7 VDC		
6	~6 VDC		
7	~5 VDC		

FUNCTION #6 - LOW TRIM

The minimum voltage to which the sensor is allowed to reduce its dimming output when measuring high levels of ambient light (or when unoccupied in an Occupancy - High/Low operational mode).

SETTING #	VALUES		NOTES
2	~0 VDC		
3	~1 VDC		Light output at each voltage level depends on driver/ballast and luminaire.
4	~2 VDC		
5	~3 VDC	(default)	
6	~4 VDC		
7	~5 VDC		

DETAILED DIMMING FUNCTION TABLES CONT.

FUNCTION #9 - SECONDARY TIME DELAY

For sensors in Occupancy - High/Low/Off operational mode, the amount of time the dimming voltage will stay at the low trim level before turning the lights completely off (assuming space remains unoccupied).

SETTING #	DESCRIPTION
2	0 Sec
3	30 Sec
4	2.5 Minutes
5	5 Minutes* (default)
6	10 Minutes

FUNCTION #10 - TURN OFF SCHEME

The method by which a sensor with dimming turns off connected lighting.

SETTING #	VALUES	NOTES
2	Drop to Off	Dimming output drops to low trim level & relay opens.
3	Fade to Off (default)	Dimming output fades to low trim & relay opens.
4	Fade to 0V	Dimming output fades to low trim level and then drops to 0 volts (e.g. below a connected driver's electronic off level). Unit's relay remains closed.
5	Fade to Low Trim	Dimming output fades down to low trim level. Unit's relay remains closed.
6	Drop to Low Trim	Dimming output drops down to low trim level. Unit's relay remains closed.
7	Drop to 0V	Dimming output drops to 0 volts (e.g. below a connected driver's electronic off level. Unit's relay remains closed.

FUNCTION #11 - FADE OFF TIME

Adjustable time interval for lights to ramp down to off (or low trim).

SETTING #	VALUES
2	0.75 Sec
3	1.5 Sec (default)
4	3 Sec
5	5 Sec
6	15 Sec
7	Disabled

FUNCTION #12 - FADE ON TIME

Adjustable time interval for lights to ramp up when sensor is in the occupied state.

SETTING #	VALUES
2	0.75 Sec
3	1.5 Sec (default)
4	3 Sec
5	5 Sec
6	15 Sec
7	Disabled

TESTING & TROUBLESHOOTING

TEST MODE

A test mode with a 5 second time delay is provided in order to efficiently perform walk testing. The sensor will blink white on a detected PIR event and blue on detected Acoustic event, although its time delay will only be reset by a PIR event. Note that while in test mode all LED activity related to ambient light override (photocell) functionality is overridden.

TO PUT A SENSOR IN TEST MODE FOR 10 MINUTES:

- Press sensor's pushbutton 2 times, then wait two seconds
- Press button 1 time to start test mode. After 10 minutes, the sensor's time delay will revert to previous setting

PHOTOCELL MOUNTING

Do not mount sensor such that it is directly viewing into the lights it is controlling. This will cause the measured level of controlled/artificial light to be extremely high, thus preventing the sensor from ever turning lights off from ambient light.

FACTORY RESET

To restore factory settings, press and release the pushbutton 8 times, wait 2 seconds, then press and release the pushbutton 3 times again. The unit will flash back 3 sets of 3 white blinks followed by a rapid double flash indicating a successful reset.