Motion Sensing Guide for Outdoor LED Luminaires

In this Document:

Benefits of Sensor Switch® Motion Sensors

The combination of LED technology and fully-programmable 0-10V multi-level motion sensors from Sensor Switch® allows for **substantial energy savings** over HID technology, without sacrificing performance. Adding motion sensors to LED luminaires also **increases luminaire life** because dimmed operation reduces the electrical load and case temperatures on the LEDs and drivers. When dimmed, LEDs generate more lumens per watt, run cooler and last longer. The use of motion sensors also ensures that **lights are not on when they don't need to be**, but also, that they're on when motion is detected, which **enhances site security** in any application.

There are two main advantages to choosing Sensor Switch motion sensors for your next job:

Sensor Switch motion sensors have an **integrated photocell**, which gives the following benefits:

- Integral Daylight Harvesting functionality for increased energy savings

- No need for astronomical time clock

- No need for NEMA twist-lock photocell

- Factory or field programmable

Sensor Switch motion sensors **default to a High/Low occupancy response**, which means they:

- Do not require an additional Bi-level dimming device

- Can work in conjunction with Bi-level or Part Night controls to force high mode response

- Do not require a branch circuit control

- Provide adequate lighting, even in low mode, to meet IES standards, when coupled with Lithonia Lighting fixtures

Additionally, for customers **subject to Title 24 or other regulatory requirements**, Sensor Switch meets the following criteria:

- All installed outdoor lighting, mounted at 24 feet or less must have **automatic lighting controls**:
  - Must have motion sensors or other lighting control systems that automatically controls lighting based on occupancy, complete with auto-on when the area is occupied.
  - Motion sensor must provide multi-level dimming with low setting between 40-80%.
  - Controls no more than 1,500 watts.
- Automatic **photocontrols** must be multi-level, continuous dimming, or ON/OFF.
  - Primary and secondary side daylight zones must be controlled independently and shown on the plans.
  - When daylight area is illuminated above 150%, controls must turn lighting off.
- Occupancy **Controls** should control lighting in parking garages, parking areas, loading, and unloading areas:
  - One control step between 20-50% lighting power reduced when unoccupied.
  - $\leq$ 500W of rated lighting can be controlled as a single zone.
- **EXCEPTION: Metal halide luminaires with a lamp plus ballast system** >75 LPW must be controlled by occupant sensing controls with at least one control step between 20-60% of design lighting power.

Read forward to the next few pages to **learn about which sensors are recommended for each outdoor product**, as well as gain an understanding of more detailed **technical aspects** that customers need to know when selecting their motion sensors.

Lithonia Lighting® Outdoor LED Products Available with Motion Sensing

Luminaire Series	Option Nomenclature	Mounting Height	Maximum Detection Range (Radius)	Sensor Component (color/trim specified on order)	Available Downloads
D-Series Area Size 0	PIR	8-15'	30'	**120-277V** SBGR 10 ODP WH 3V **347 or 480V** SBGR 10 ODP HVOLT WH 3V	Specification Sheet Programming Guide
	PIRH	15-30'	20'	**120-277V** SBGR 6 ODP WH 3V **347 or 480V** SBGR 6 ODP HVOLT WH 3V	Specification Sheet Programming Guide
D-Series Area Size 1	PIRH	15-30'	20'	**120-277V** SBGR 6 ODP WH 3V **347 or 480V** SBGR 6 ODP HVOLT WH 3V	Specification Sheet Programming Guide
D-Series Area Size 2	PIRH	15-30'	20'	**120-277V** SBGR 6 ODP WH 3V **347 or 480V** SBGR 6 ODP HVOLT WH 3V	Specification Sheet Programming Guide
D-Series Wall Size 1	PIR	8-15'	30'	**120-277V** SBGR 10 ODP BK 3V **347 or 480V** SBGR 10 ODP HVOLT BK 3V	Specification Sheet Programming Guide
D-Series Wall Size 1	PIRH	15-30'	20'	**120-277V** SBGR 6 ODP BK 3V **347 or 480V** SBGR 6 ODP HVOLT BK 3V	Specification Sheet Programming Guide
D-Series Wall Size 2	PIRH	15-30'	20'	**120-277V** SBGR 6 ODP BK 3V **347 or 480V** SBGR 6 ODP HVOLT BK 3V	Specification Sheet Programming Guide
LED Architectural Sconces	PIR	8-15'	30'	**All voltages:** SFOD 7 ODP BK 3V	Specification Sheet Programming Guide
D-Series Parking Garage	PIR360SS	8-15'	30'	**120-277V** SBOR 10 ODP WH 3V **347 or 480V** SBOR 10 ODP HVOLT WH 3V	Specification Sheet Programming Guide
	PIRH360 SS	15-30'	20'	**120-277V** SBOR 6 ODP WH 3V **347 or 480V** SBOR 6 ODP HVOLT WH 3V	Specification Sheet Programming Guide
Any Pole-Mounted Lithonia Lighting Outdoor Area Luminaire	Order separately through Sensor Switch	8-15'	30'	**120-277V** SBOR 10 ODP -- -V **347 or 480V** SBOR 10 ODP HVOLT -- -V	Specification Sheet Programming Guide
		15-30'	20'	**120-277V** SBOR 6 ODP -- -V **347 or 480V** SBOR 6 ODP HVOLT -- -V	Specification Sheet Programming Guide

Adding a Standalone Motion Sensor to a Pole-Mounted Luminaire
Motion sensor functionality can be added to most pole-mounted Lithonia Lighting LED luminaires using a Sensor Switch® SBOR-xx-ODP Series sensor.

The sensor is ordered separately and is attached to the pole and wired to the luminaire in the field. It can be mounted just below the fixture (allowing installation and wiring from the top of the pole) or lower on the pole (requiring a hand-hole opposite the sensor).

Suitable for use with the following Lithonia Lighting series:
CSX1 LED   MR1 LED   AS1 LED   DSXF3 LED   CSX2 LED   MR2 LED
MRP LED

Note that:
- o For dimming operation, the luminaire to be controlled must contain or be specified with a 0-10V dimming driver.

- o For optimal sensor coverage and performance, the sensor's mounting height should be considered to select the appropriate lens (see preceding chart or sensor specification sheet).

- o In parking areas, the sensor should be mounted 15' or higher above finished grade to prevent tall vehicles from blocking the coverage pattern.

Features & Options
- Sensor has approximately 270° of coverage in this application (90° blocked by pole).
- One sensor can operate up to four LED luminaires per pole (maximum 800W @ 120V; 1200W @ 277V and 1500W @ 347V).
- Sensor is IP66/wet location rated.
- Sensor housing is available in dark bronze, white and black.
- Available for both 120-277V operation and 347-480V operation.
- When multiple sensors are used in parallel for bi-level control, a BL30 or BL50 must be used in coordination with a non-dimming motion sensor or motion sensor dimming wires must be capped.

Installation
The sensor has a 1/2" NPT fitting that can be attached to the pole using a 7/8" non-threaded hole and the supplied lock nut. The mounting hole can be drilled in the field, or specified when ordering a new pole. Wiring connections are then made inside the pole according to the diagram below.
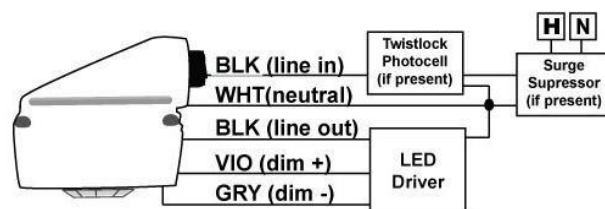
Ordering Examples:

New Construction

Luminaire:
AS1 LED 1 63B530/40K SR3 MVOLT SPA **DMG** DDBXD
Specifies a luminaire with dimming driver with extended leads to connect to the standalone sensor.

Sensor:
SBOR **6** ODP **BZ 3V**
Specifies a sensor for 15-30' installed mounting height with a dark bronze housing and 3V "low mode" setting.

Pole:
SSA 20 4C DM19**AS 78HOLE 19 B** DDB
Specifies a pole with Aeris drilling pattern, plus a 7/8" mounting hole located 19' feet up on side B, same side as the fixture, to be wired from the top of the pole (no hand-hole).

– OR –

SSA 20 4C DM19**AS 78HOLE 15 B EHH 15 D** DDB
Specifies a pole with Aeris drilling pattern, plus a 7/8" mounting hole located 15' feet up on side B, same side as the fixture. Also specifies an extra hand-hole located 15' feet up on side D, opposite the fixture and sensor, for sensor wiring access.

Retrofit

Existing Luminaire:
DSX1 LED 1 30B530/40K SR3 MVOLT SPA DMG DDBXD
Luminaire has a dimming driver with extended leads to connect to the standalone sensor.

Existing Pole:
SSA 15 4C DM19AS DDB
Pole is 15' high and can be field-drilled to mount the sensor at approximately 14' above the base, and then wired from the top of the pole.
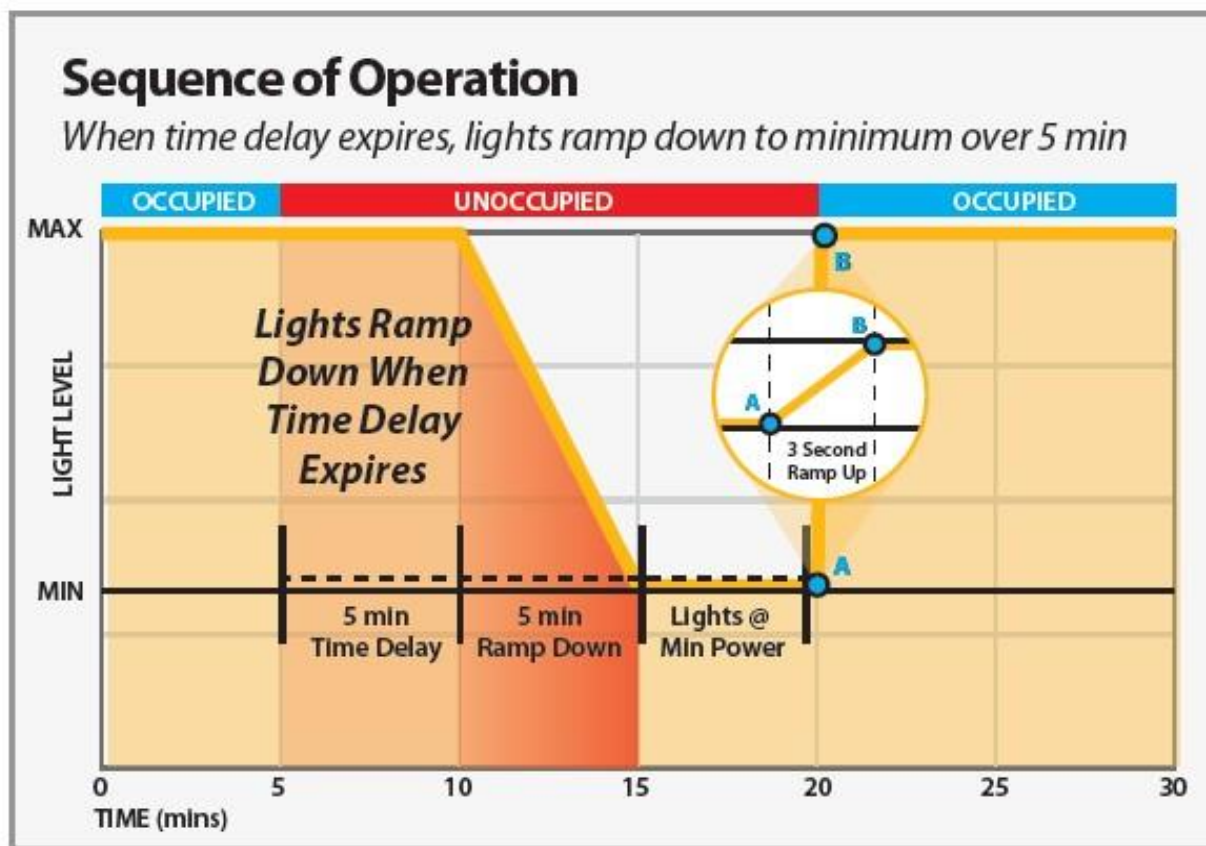
Sensor:
SBOR **10** ODP **BZ 3V**
Specifies a sensor for 8-15' installed mounting height with a dark bronze housing and 3V "low mode" setting.

Sequence of Operation and Attribute Options

Motion Sensing Sequence

The Sensor Switch® motion sensors incorporated in our Outdoor LED luminaires utilize 100% digital passive infrared (PIR) technology that is tuned for walking-size motion while preventing false tripping from the environment.

After motion is no longer detected in the space, the specified time delay duration begins. Once the time delay has expired, the luminaire begins dimming down to the specified "low" level over the course of the set ramp down time. Light levels remain at the low setting until new motion is detected, at which point the luminaire ramps back up to the specified "high" level over the set ramp up time. This cycle repeats once there is no motion in the space again.

Dimming Sequence

When ordered with a motion sensor option, Lithonia Lighting Outdoor LED products automatically include a dimming driver. These drivers have 0-10V dimming leads (grey and violet) that accept a signal from the control device. The 0-10V signal changes the driver output to the LED module, resulting in a change in light output and total wattage draw.

While the combinations of various drivers and modules will result in slightly different "dimming responses", approximate values are as follows:

Sensor: 0-10V Signal	Luminaire: % of Input Watts	Luminaire: % Lumen Output
10	100%	100%
9	100%	100%
8	97%	98%
7	84%	87%
6	71%	75%
5	58%	63%
4	46%	50%
3*	34%	37%
2	23%	23%
1	14%	11%
0	14%**	11%**
OFF	0%	0%

* Default "low" setting for motion control devices ordered with luminaire.
** Lithonia Lighting LED architectural wall sconce family is >2W input and 0% output at 0V

Given these typical values, utilizing motion sensors can save up to 86% in energy usage over standard LED luminaire operation when in the dimmed state, depending on your settings.

Ambient Sensing Sequence

The motion sensors' integral photocell feature can provide additional energy savings during daytime periods when sufficient daylight exists. This photocell function eliminates the need for astronomical or time clocks.

Attribute Options

Sensor Switch® motion sensors are fully programmable devices that allow for customization of nine key attributes:

Programmable Attribute	Factory Default Setting	Programmable Range
High Output (when triggered)	10V	0 – 10V (1V increments, must be greater than Low Output)
Low Output (dimmed state)	3V	0 – 10V (1V increments, must be lower than High Output)
Time Delay (before Ramp Down)	5 minutes	30 seconds to 20 minutes
Ramp Down Period	5 minutes	Instant to 60 minutes
Ramp Up Period	3 seconds	Instant to 60 seconds
Integral Photocell Operation	High/Off	High/Off, High/Low, Disable
Photocell Time Delay (before "off")	5 minutes	45 seconds to 25 minutes
Photocell Ambient Set Point	5 fc	1 fc – 200 fc
Photocell Time Delay (before "on")	45 seconds	45 seconds to 25 minutes

Default settings for sensors ordered with Outdoor LED luminaires are as noted in the preceding table.

Programming is achieved through sensor push-button sequencing; the Programming Guide is included with all luminaires ordered with motion sensing and is also available online at http://www.sensorswitch.com/instructionfiles/IC014-003.pdf.

Custom settings can be factory-programmed for orders of more than 100 pieces; contact your Acuity Brands representative for details.