

## Selecting Occupancy Sensors for LEDs



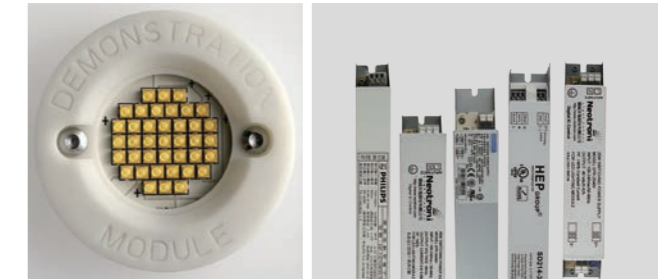
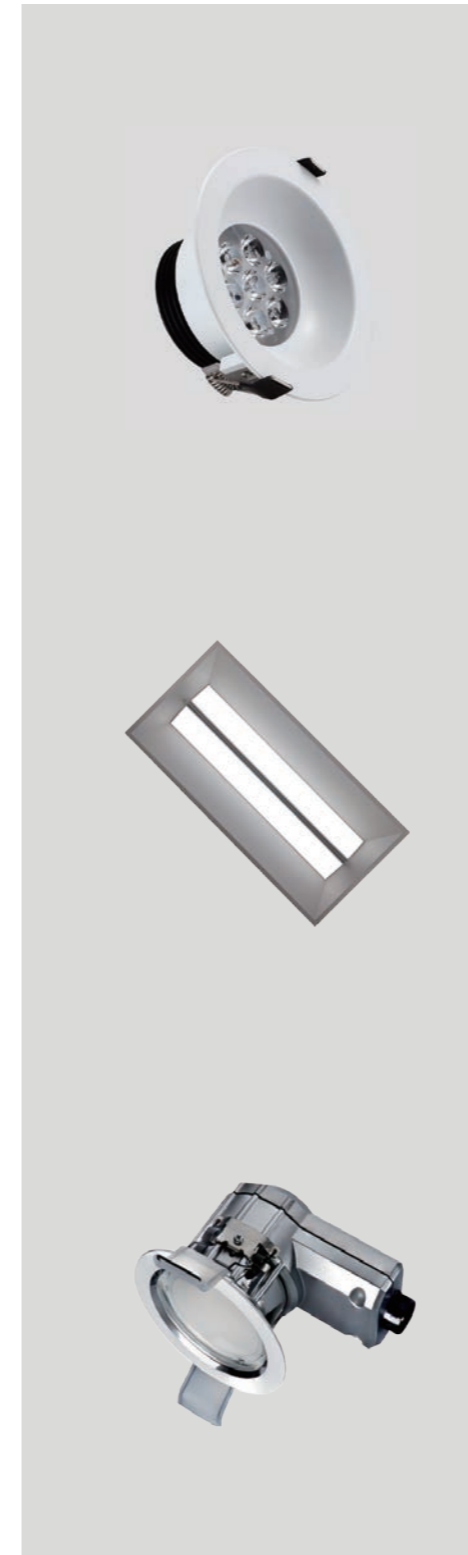
### OVERVIEW

LED lighting, also known as Solid State Lighting (SSL), is widely considered as the first major revolution of lighting technology in the 21st century. Unlike traditional light sources that use vacuum or gas filled tubes, such as incandescent, halogen, fluorescent, and HID lighting, LEDs produce light solely by rapid movement of electrons through a semiconductor chip. Thus, LEDs draw less power with more luminance per watt, and generate less heat output than traditional light sources. This results in a significant reduction for two main energy consumers in our working and living environments: [HVAC](#) and [Lighting](#).



In addition to the known fact of superior energy efficiency, LEDs also provide a longer service life than traditional light sources. To maximize the advantage of LED lighting already stated, adding occupancy sensing control creates the ultimate in savings. For some traditional gas filled tubes or discharging light sources, such as fluorescent or HID lamps, frequent switching could significantly shorten their service life unless they are properly controlled with programmed ballast. Due to the nature of Solid State Lighting, frequent switching will not shorten, but on the contrary prolong the service life of LEDs.

Easy dimming is another great advantage of LEDs for lighting. Control specialist in need of certain dim levels of lighting that may be required due to safety, security or scenery concerns can achieve those easily now. Through proportionally regulating the power supply from driver, the LEDs can easily be dimmed to the desired level. With less power flowing through the chips, the service life of dimmable LEDs will be further prolonged compare to non-dimmable light sources.



### BASICS OF LED LIGHTING

In general, the LED lighting consists of an LED module and a DC power supply which is commonly known as the "driver". The main function of driver is to provide constant DC power for the operation of LED module.

The LED module is an array of multiple LED chips assembled in various form factors. The designs of LED lighting are virtually limitless in form factor, so the LED module can be designed in any shape.

#### Yes, in any shape!

Depending on the fixture design and electrical specification, the LED module can be powered by either [Constant Voltage \(CV\)](#) or [Constant Current \(CC\)](#) types of drivers. In order to fulfill the demands of the various LED modules in the market today, a variety of LED drivers are available with different voltage (CV), current (CC) and wattages.

Though the majority of drivers are non-dimmable, we see a growing number of industrial/commercial LED lighting fixtures being designed with 0-10V dimmable drivers to meet the increasing demand of dimming control. By feeding a 0-10V control voltage through two wires, the DC power output of LED driver will be proportionally regulated, thus the LED module is dimmed.

## SELECTING SENSOR for LED CONTROL

Being a specialist of occupancy sensor solutions, IR-TEC has developed a wide range of occupancy sensors which are ideally suitable for LED lighting control. IR-TEC can provide sensors for either ON-OFF switching, bi-level, multi-level, continuous dimming control, or full daylight harvesting.

Due to the variety of fixture/driver combinations, it is important to first confirm the type of driver used and desired control mode in order to select the appropriate occupancy sensor for LED control.



### 1. ON-OFF SWITCHING

ON-OFF switching is the most common control mode for occupancy sensor based lighting control. The table below outlines IR-TEC sensors available for ON-OFF switching, non-dimmable control.

Model No.	Tech	ALS	Power	Output	HS*	Connection	Feature & Control
<b>LOS-500Nxx</b>	PIR		100-277 VAC	SLV		Wire Lead	All time ON/OFF switching
<b>LOS-510Nxx</b>						Push-in Terminal	
<b>LOS-500Sxx</b>	PIR	●	100-277 VAC	SLV	●	Wire Lead	ON/OFF switching with ALS override
<b>LOS-509Sxx</b>						Push-in Terminal	
<b>LOS-510Sxx</b>							
<b>LC-366</b>	PIR	●	120/230/277 VAC	SLV	●	Push-in Terminal	ALS control ON/OFF switching Sensor for fixture integration
<b>LC-366E</b>	PIR	●	120/230/277 VAC	SLV	●	Push-in Terminal	All time ON/OFF switching Sensor for fixture integration
<b>POM-946MEW</b>	PIR		12-48 VDC	PWM		Wire Lead	All time ON/OFF switching Fixture integrated sensor module
<b>LBS-700Nx</b>	PIR		100-277 VAC	SLV	●	Wire Lead	Occupancy/vacancy sensing All time ON/OFF switching wall switch
<b>LBS-700Sx</b>	PIR	●	100-277 VAC	SLV	●	Wire Lead	Occupancy/vacancy sensing ON/OFF switching wall switch
<b>BBS-700Sx</b>	PIR	●	12-24 VDC	IDC		Wire Lead	Occupancy/vacancy sensing ON/OFF switching wall switch
<b>LDS-700Sx</b>	PIR HFD	●	100-277 VAC	SLV	●	Wire Lead	Occupancy/vacancy sensing ON/OFF switching wall switch
<b>BDS-700Sx</b>	PIR HFD	●	12-24 VDC	IDC		Wire Lead	Occupancy/vacancy sensing ON/OFF switching wall switch
<b>LBT-700Nx</b>	PIR		100-277 VAC	SLVx2	●	Wire Lead	Occupancy/vacancy sensing Bi-level control available
<b>LBT-700Sx</b>	PIR	●	100-277 VAC	SLVx2	●	Wire Lead	Occupancy/vacancy sensing Bi-level control available
<b>BBT-700Sx</b>	PIR	●	12-24 VDC	IDCx2		Wire Lead	Occupancy/vacancy sensing Bi-level control available
<b>LDT-700Sx</b>	PIR HFD	●	100-277 VAC	SLVx2	●	Wire Lead	Occupancy/vacancy sensing Bi-level control available
<b>BDT-700Sx</b>	PIR HFD	●	12-24 VDC	IDCx2		Wire Lead	Occupancy/vacancy sensing Bi-level control available

## 2. DIMMING CONTROL

Many case studies have proven that dimming control, or daylight harvesting, is the optimum energy efficient solution for low/uncertain occupancy for public areas, such as stairwell or parking garage.

The table below outlines IR-TEC sensors available for bi-level, multi-level, or continuous dimming control for dimmable LED lighting.



Model No.	Tech	ALS	Power	Output	HS*	Connection	Feature & Control
<b>LOD-500Sxx</b>	PIR	●	100-277 VAC	SLV AO		Wire Lead	8 control modes selectable 0-10V bi-level dimming control
<b>LOD-509Sxx</b>	PIR	●	100-277 VAC	SLV AO	●	Wire Lead	8 control modes selectable SmartDIM continuous dimming control
<b>LRD-509Sxx</b>	PIR	●	100-277 VAC	SLV AO	●	Wire Lead	Multi mode, multi-level/SmartDIM dimming control via remote programmer
<b>BOA-516Sxx</b>	PIR	●	12-24 VDC	AO		Push-in Terminal	8 control modes selectable 0-10V bi-level dimming control
<b>BOA-517Sxx</b>	PIR	●	12-24 VDC	AO DO		Push-in Terminal	0-10V bi-level dimming control with 30% low dim
<b>BOM-514Sxx</b>	PIR	●	5-12 VDC	DO2		Push-in Terminal	For multi-channel bi-level or daylight harvesting control with, or without BEMS
<b>BOM-515Sxx</b>			12-24 VDC				
<b>BOS-515Nxx</b>	PIR		12-24 VAC/DC	IDC		Push-in Terminal	For occupancy based lighting, HVAC, or BEMS control
<b>BOS-515Sxx</b>	PIR	●	12-24 VAC/DC	IDC		Push-in Terminal	For occupancy based lighting and BEMS control
<b>COS-516Sxx</b>	PIR	●	12-48 VDC	RDP		Push-in Terminal	8 control modes selectable For LED lighting with CV driver
<b>POM-946MBW</b>	PIR	●	12-48 VDC	PWM		Wire Lead	Bi-level dimming control Fixture integrated sensor module
<b>POM-946MCW</b>	PIR	●	12-48 VDC	PWM		Wire Lead	Bi-level dimming with Time Off Fixture integrated sensor module
<b>POM-946MDW</b>	PIR		12-48 VDC	PWM		Wire Lead	All time bi-level dimming control Fixture integrated sensor module

\*HS denotes sensor with Hybrid Switching

#### Legends

SLV: Switched Line Voltage  
DO: Digital Output  
PWM: Pulse Width Modulation

AO: Analog Output (0-10V)  
DO2: Digital Output x 2

IDC: Isolated Dry Contact  
RDP: Regulated DC Power