

# Switch Sensors

Application guide

25

PUTTING A STOP TO ENERGY WASTE



# Putting a stop to energy waste

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# Application examples for specific building spaces

**Our vision at Legrand is to provide products and services that make buildings more energy efficient. We are committed to 'put a stop to energy waste'.**

This switch sensors application guide will help you in defining and implementing the optimal lighting management solution for every type of building space. It features applications that illustrate the best lighting management practices. We have identified ten applications examples with specific control needs:

- |                            |                    |            |
|----------------------------|--------------------|------------|
| - Enclosed office          | - Lunch/break room | - Restroom |
| - Conference/training room | - Utility room     | - Lobby    |
| - Classroom                | - Warehouse        |            |
| - Library                  | - Hallway          |            |

Each application includes:

- description of application
- control needs
- lighting management strategy used:
  - occupancy control , vacancy control , daylight set point (light level control) 
- lighting management technology used:
  - PIR technology , ultrasonic technology , dual technology 
- product solution
- lighting plan
- wiring details
- actual energy savings and Green House Gas emissions avoided.

Legrand experts are available for design support and assistance on any lighting management questions. Do not hesitate to call our local office.

## LARGE PARTITIONED OFFICE SPACE

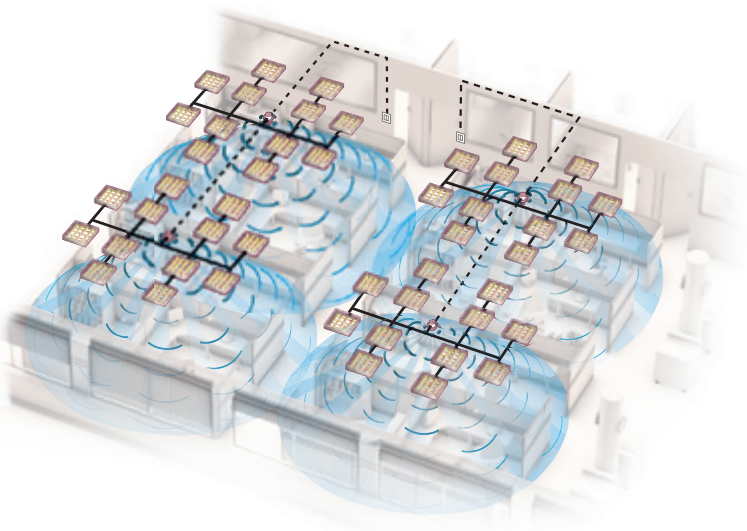
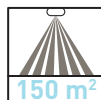
SAVING ON ENERGY\*  
333 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED\*\*  
751 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for large  
partitioned office space ~ 300 m<sup>2</sup> based on:  
vacancy-based control + daylight-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Large office area with partitioned cubicles. A majority of work is done at computers in individual cubicles.  
Space : 300 m<sup>2</sup> - L15 x W20.

### CONTROL NEEDS

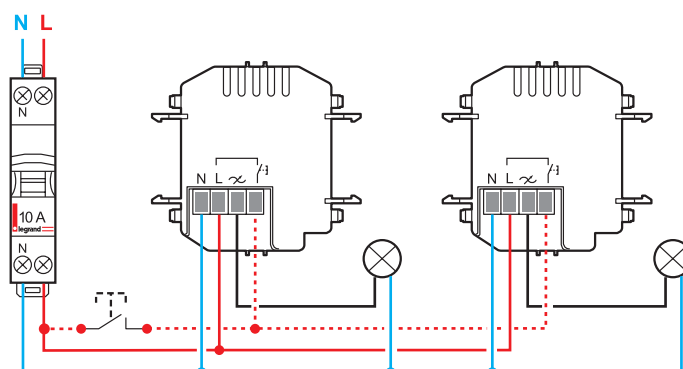
A sensor that can 'see around' obstacles such as cubicle walls, and that has a high sensitivity to detect fine movements such as typing. Two lighting areas are created. They are turned "ON" manually by occupants. Artificial lights are turned "OFF" when daylight is sufficient.

### SOLUTION

Cat.No 488 05: US (ultrasonic technology) ceiling mount switch sensor 360°. This ceiling mount switch sensor detects movements through obstacles so occupants working in cubicles are detected. To ensure each area receive coverage, place the sensors in zones that overlap. Each area has a standard push-button that controls two sensors (one located on windows side and one on corridor side). This sensor is shipped with a time pre-set of 15 minutes and daylight at 500 lux. These settings can be modified with commissioning tools Cat.Nos 882 30/35.



### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.



## ENCLOSED OFFICE

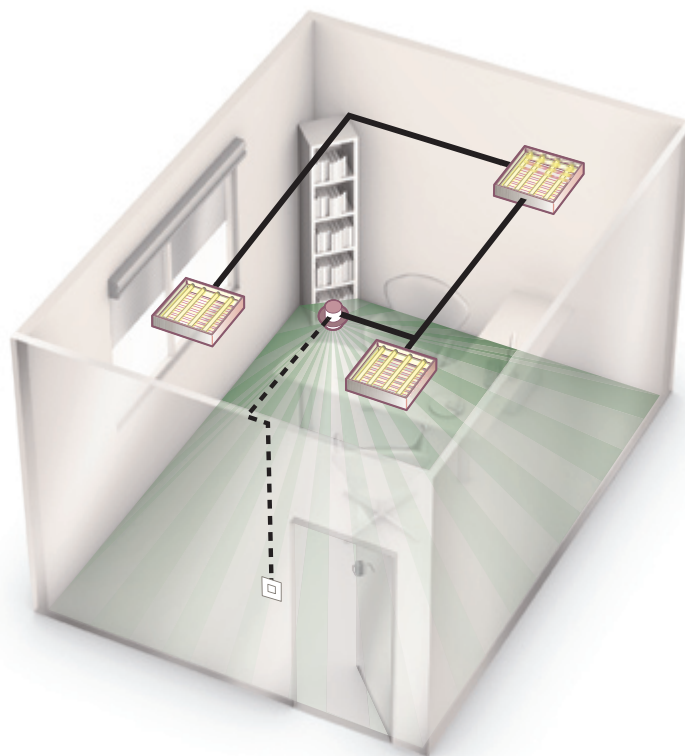
SAVING ON ENERGY<sup>(1)</sup>  
15 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED<sup>(2)</sup>  
33 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for enclosed office – 15 m<sup>2</sup> based on: vacancy-based control + daylight-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Enclosed single-occupant office with a window. Primary activities are computer work, reading and meetings.  
Space : 15 m<sup>2</sup> - L5 x W3.

### CONTROL NEEDS

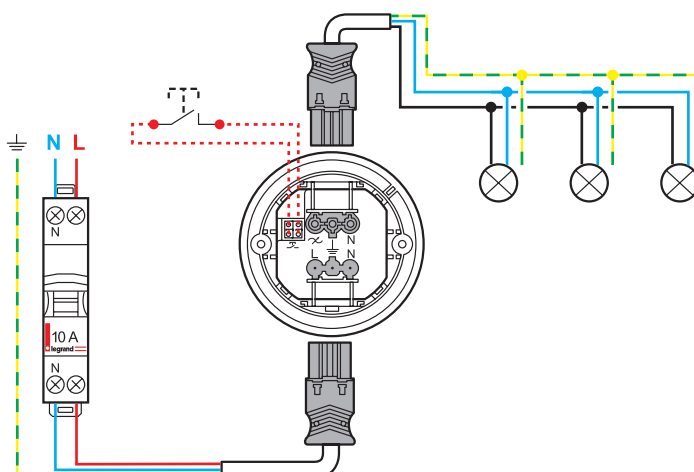
ON/OFF control with light level sensing. The sensor should be able to detect small movements. Light is turned manually "ON" by occupants. Lights are turned "OFF" when daylight is sufficient.

### SOLUTION

Cat.No 488 08 : PIR (passive infrared technology) ceiling mount switch sensor 360°. Linked with a standard push-button to turn light manually "ON". Quick connections is ideal for repetitive actions. The PIR ceiling mount sensor will accommodate the lower levels of activity without creating false trigger as the room controlled is small. This sensor is shipped with a time pre-set of 15 minutes and daylight at 500 lux. These settings can be modified with commissioning tools Cat.Nos 882 30/35.



### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.

## CONFERENCE/TRAINING ROOM

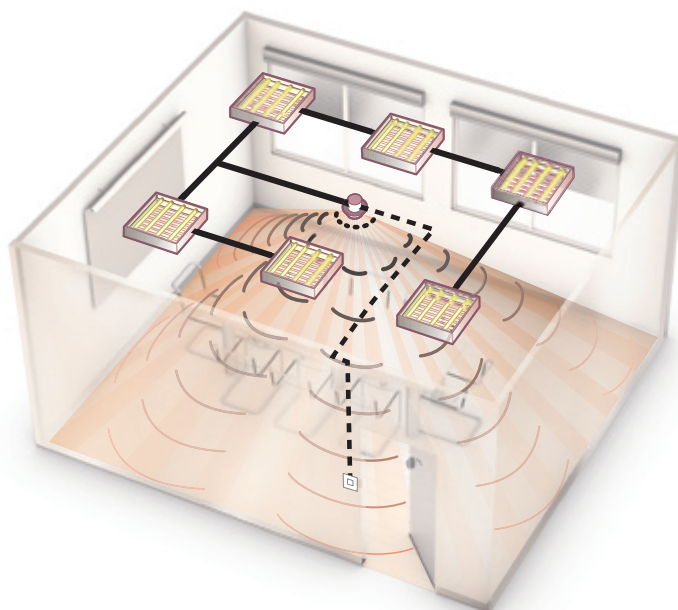
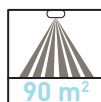
SAVING ON ENERGY\*  
38 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED\*  
85 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for  
conference/training room – 42 m<sup>2</sup> based on:  
vacancy-based control + daylight-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Medium-sized conference rooms that is used for meetings and training.  
Space : 42 m<sup>2</sup> - L6 x W7.

### CONTROL NEEDS

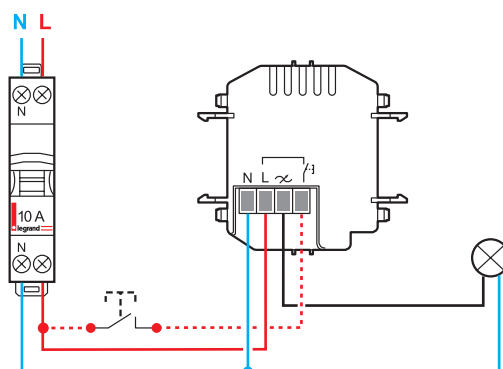
A sensor with ON/OFF control. The sensor should have high sensitivity, as there is often little motion in the room during meetings. Lights need to be capable of staying off during presentations. Light is turned manually "ON" by occupants using a standard push button. Artificial lights are turned "OFF" when daylight is sufficient.

### SOLUTION

Cat.No 488 06: DUAL (passive infrared & ultrasonic technology) ceiling mount switch sensor 360°. This sensor uses both PIR and ultrasonic technologies to sense, resulting in enhanced sensing capability for applications where activity varies greatly. The sensor should be placed in the middle of the room. A manual "OFF" override is useful when lights need to be off during presentations. This sensor is shipped with a time pre-set of 15 minutes and daylight at 500 lux. These settings can be modified with commissioning tools Cat.Nos 882 30/35.



### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.



## CLASSROOM

SAVING ON ENERGY<sup>(1)</sup>  
54 € | year

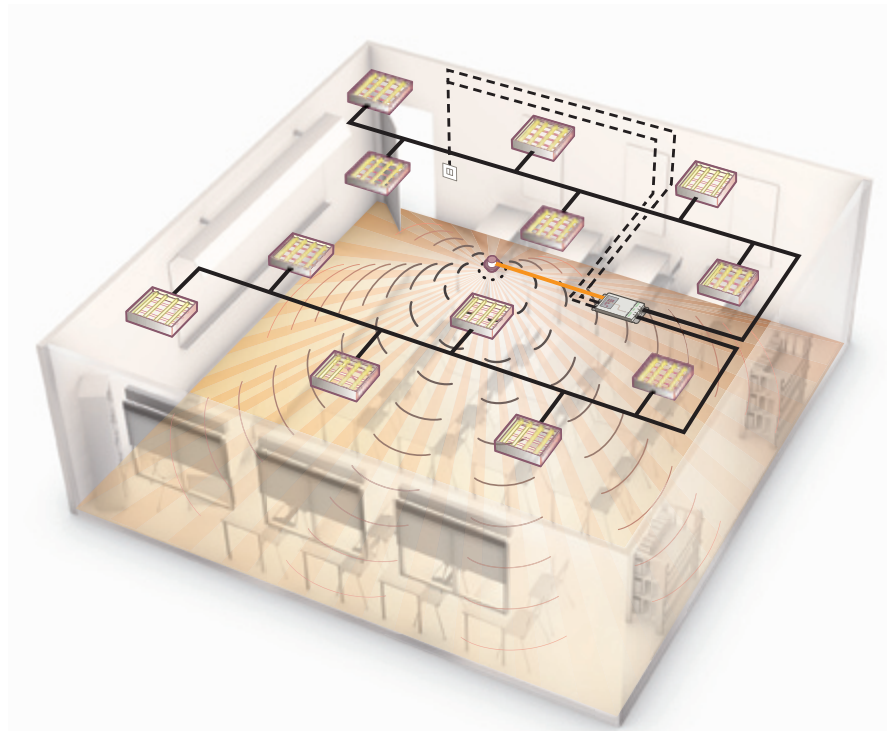
GREENHOUSE GAS (GHG) EMISSIONS AVOIDED<sup>(2)</sup>  
122 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for classroom  
~ 63 m<sup>2</sup> based on: vacancy-based control +  
daylight-based control

(1) based on EN 15 193

(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

High school classroom.  
Space : 63 m<sup>2</sup> - L9 x l7.

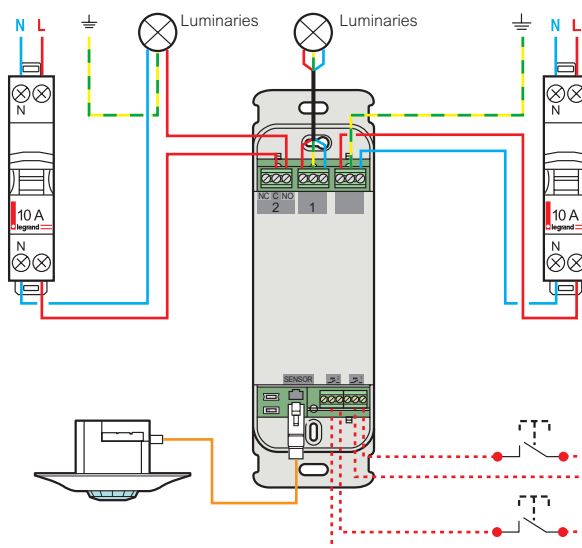
### CONTROL NEEDS

"ON/OFF" control with high sensitivity since occupants sit still for long periods of time. The room is divided into 2 zones. Zone 1 (door side) is not daylight controlled. Zone 2 (windows side) is daylight controlled as it benefits from natural lights.

### SOLUTION

Cat.No 488 22: DUAL (passive infrared & ultrasonic technology) ceiling mount SCS sensor 360°. Cat.No 488 50: Room controller 2 outputs 16A. The dual technology sensor and standard room controller control 2 zones. Daylight function is only activated for output 2 as it controls Zone 2. The sensor should be placed in the middle of the room. Two standard push buttons are used to turn the light "ON" manually and for overriding. Useful when lights need to be turned off during presentations. This sensor is shipped with a time pre-set at 15 minutes and daylight at 500 lux. Use commissioning tool Cat.Nos 882 30 or 882 35 to modify these setting if needed.

### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.



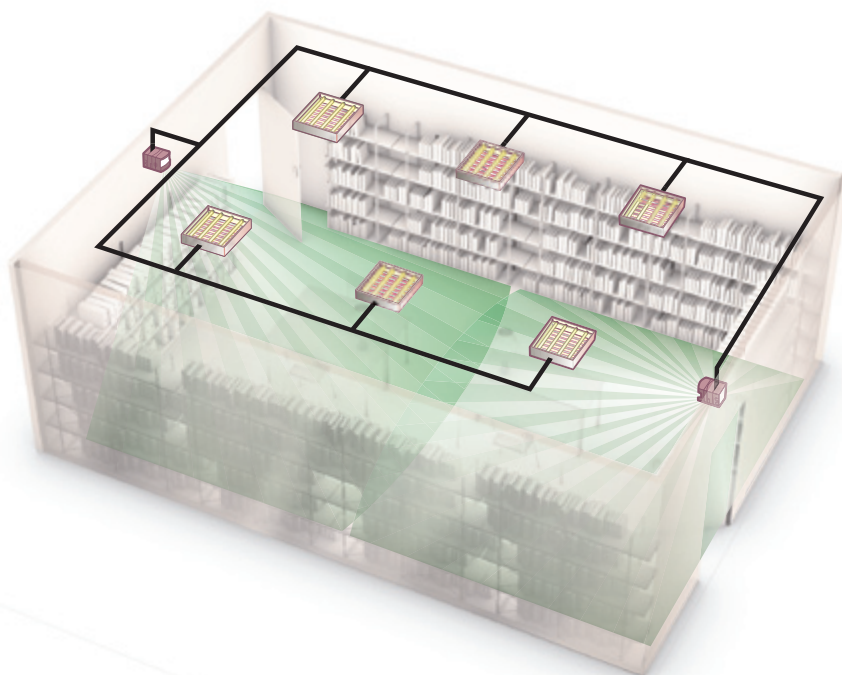
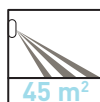
**SAVING ON ENERGY\***  
7 € | year

**GREENHOUSE GAS (GHG) EMISSIONS AVOIDED\*\***  
16 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for library –  
35 m<sup>2</sup> based on: occupancy-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Library book stacks 7 m in length that are occupied intermittently throughout the day.

**NO FALSE CEILING.**

Space : 35 m<sup>2</sup> - L7 x W5.

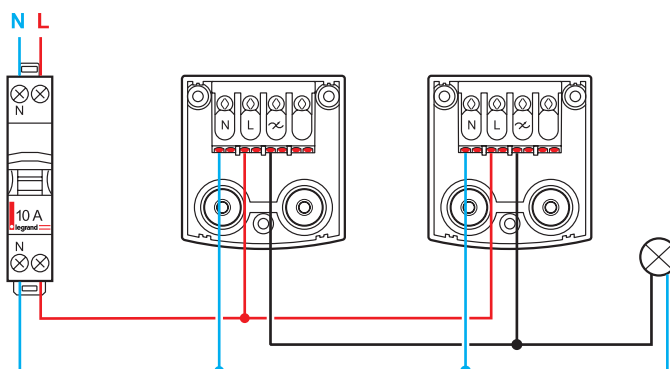
### CONTROL NEEDS

ON/OFF control. Lights should turn "ON" when someone enters the room from either side. Artificial lights are turned "OFF" when room is not occupied.

### SOLUTION

Cat.No 488 11: PIR (passive infrared technology) corner mount switch sensor 180°. Their detection zones overlap to offer a finer degree of detection and to cover the whole zone. The commissioning is done by trim pot to adjust time settings, lux level and sensibility.

### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.





## LUNCH/BREAK ROOM

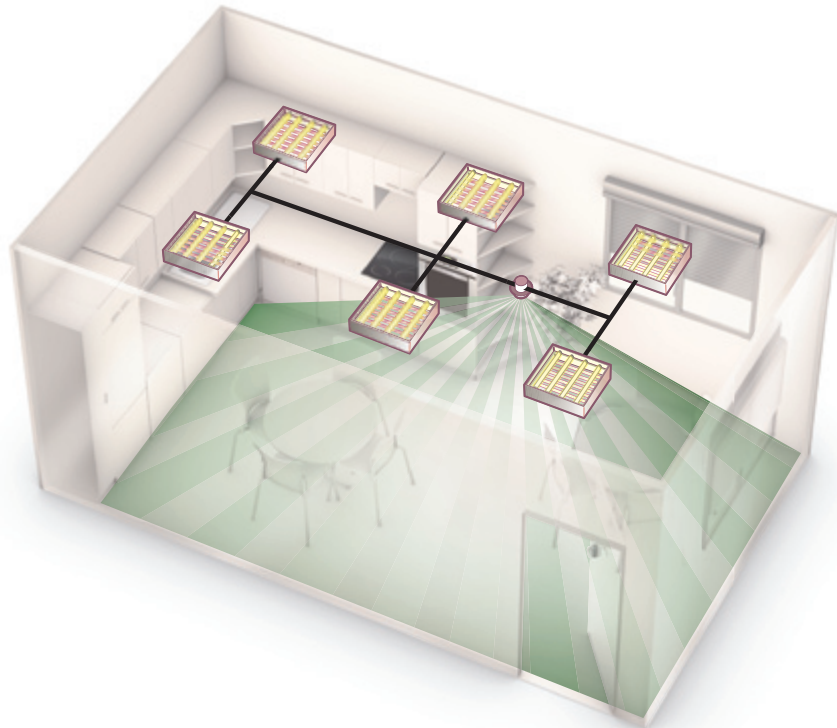
SAVING ON ENERGY™  
13 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED (2)  
29 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for lunch/  
break room – 32 m² based on: occupancy-based  
control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water  
vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane  
(CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are  
measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average  
consumption of 4.5 l/100 km emits 11.8 kg  
of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Large lunch/break room occupied  
intermittently throughout the day.  
Space : 32 m² - L8 x W4.

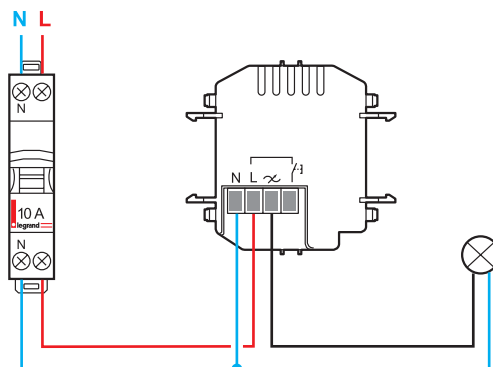
### CONTROL NEEDS

ON/OFF control that can detect a variety  
of activity levels.

### SOLUTION

Cat.No 488 03: PIR (passive infrared  
technology) ceiling mount switch sensor  
360°. This reference ensures lights  
come on when someone enters the  
room. Place the sensor above the main  
activity area for complete coverage.  
The commissioning is done by trim pot  
to adjust time settings, lux level and  
sensitivity.

### LIGHTING PLAN



### WIRING DETAILS



Note: please refer to Legrand "switch sensors design & installation guide" for more  
technical information.

## UTILITY ROOM

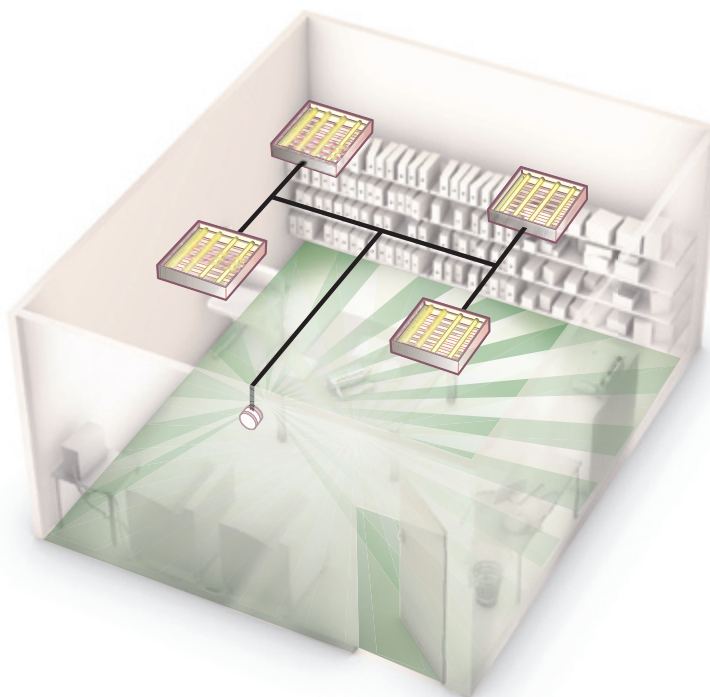
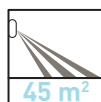
SAVING ON ENERGY\*  
7 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED\*\*  
15 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for utility room – 24 m<sup>2</sup> based on: occupancy-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Small utility room used sporadically during the day.  
Space : 24 m<sup>2</sup> - L4 x W6.  
Waterproof needed.

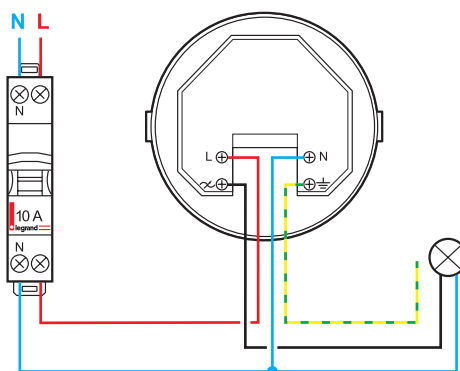
### CONTROL NEEDS

ON/OFF sensor that ensures lights come on as soon as the door opens.

### SOLUTION

Cat.No 697 40: PIR (passive infrared technology) outdoor switch sensor 360°. This sensor should not have obstacles that block coverage, as PIR technology cannot see around objects. The "head" of the sensor is adjusted to ensure lights turn "ON" as soon as the door opens. Use trim pot adjustment to set the time delay.

### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.

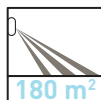




## EXTERIOR



EN 15 193 not applicable  
for exterior applications



### APPLICATION DESCRIPTION

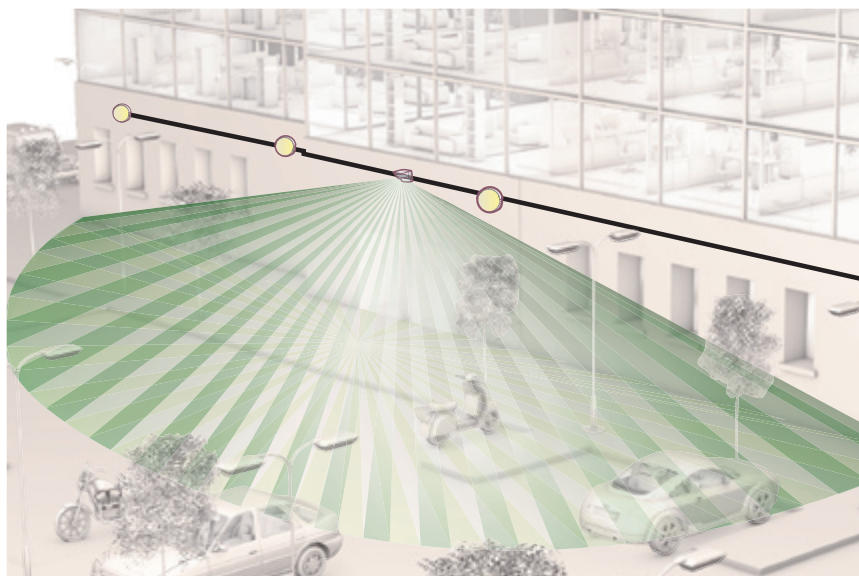
Exterior of a building.

### CONTROL NEEDS

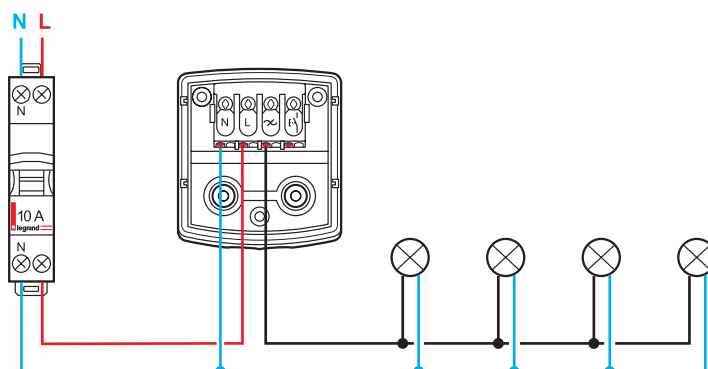
ON/OFF control and light level sensing.  
The sensor should also provide a large  
coverage area in length and in width.

### SOLUTION

Cat.No 488 10 :PIR (passive infrared  
technology) outdoor switch sensor 270°. Its  
double lens will ensure a finer degree of  
detection and the coverage of a large  
area: 180 m². This Sensor is shipped with  
a time pre-set of 15 minutes and daylight  
at 300 lux. These settings can be modified  
with commissioning tools Cat.Nos 882 30  
& 882 35.



### LIGHTING PLAN



### WIRING DETAILS



Note: please refer to Legrand "switch sensors design & installation guide" for more  
technical information.

## HALLWAY

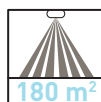
SAVING ON ENERGY\*  
39 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED\*\*  
89 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for hallway  
— 75 m<sup>2</sup> based on: occupancy-based control +  
walk-through mode + daylight-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

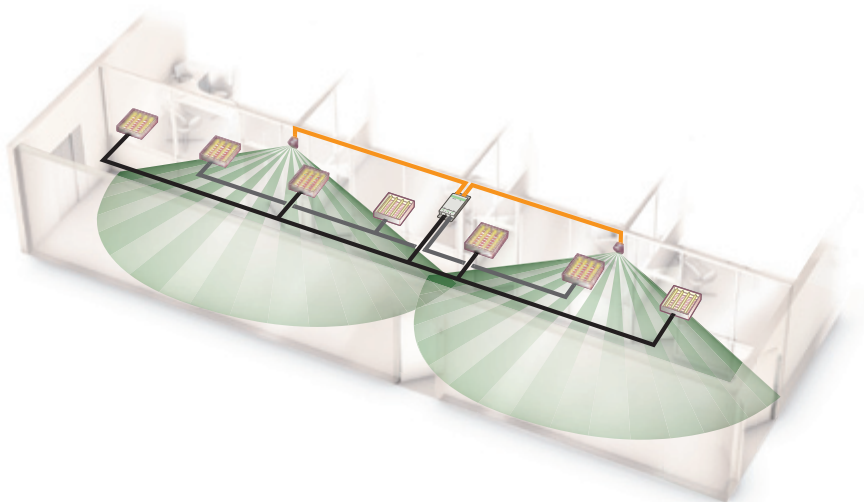
Office building hallway with walls on both sides. The hallway has windows, but has doors along each side.  
Space : 75 m<sup>2</sup> - L25 x W3.

### CONTROL NEEDS

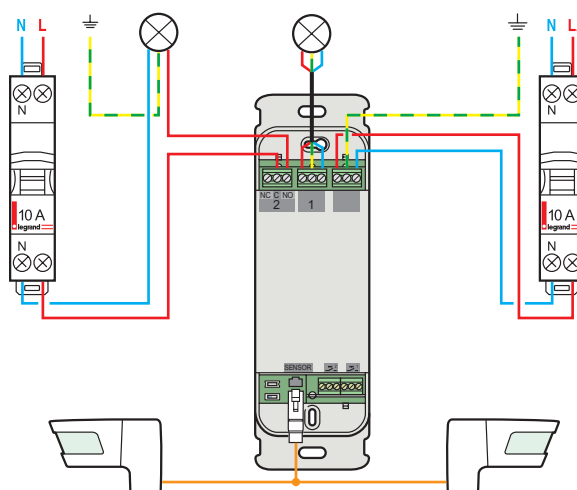
ON/OFF control that ensures lights come "ON" immediately when someone enters the hallway from either side or from a doorway. Artificial lights are turned "OFF" when daylight is sufficient. For security reasons light must be powered by 2 different circuits.

### SOLUTION

Cat.No 488 30: PIR (passive infrared technology) corner mount SCS sensor 270°. Cat.No 488 50: Room controller 2 outputs 16 A. This sensor is shipped with a time pre-set of 15 minutes and daylight at 300 lux. These settings can be modified with commissioning tools Cat.Nos 882 30 & 882 35.



### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.





## RESTROOM

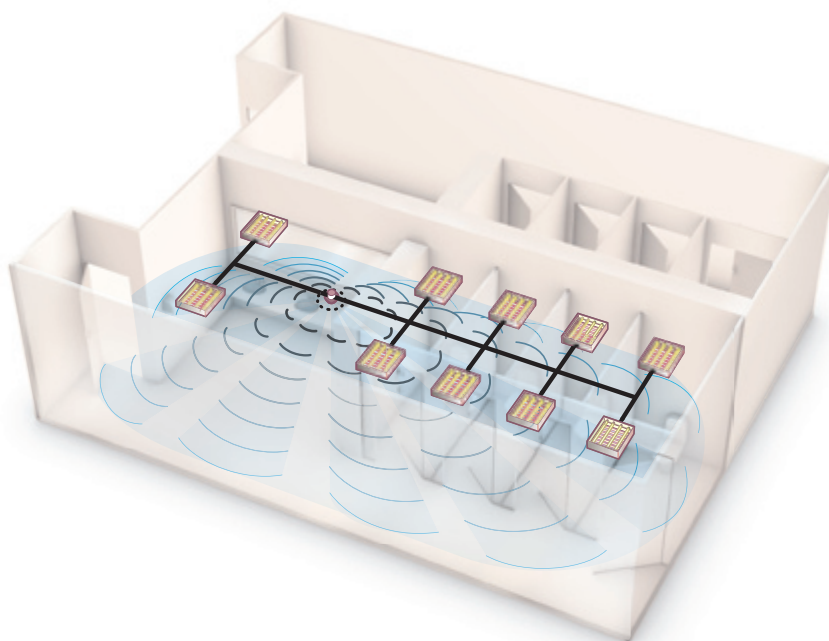
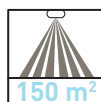
SAVING ON ENERGY™  
4 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED (2)  
29 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for restroom  
— 36 m<sup>2</sup> based on: occupancy-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Public restroom with 4 partitioned stalls.  
Space : 36 m<sup>2</sup> - L12 x W3.

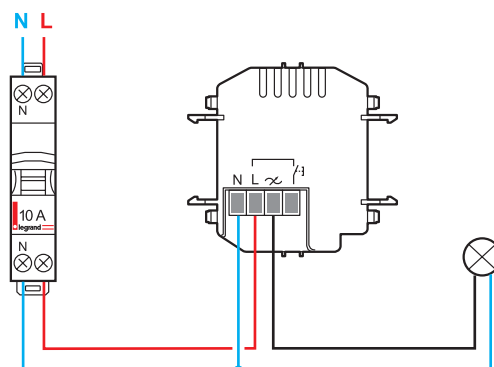
### CONTROL NEEDS

ON/OFF control with technology that can see around obstacles.  
Artificial lights are turned "OFF" when room is not occupied.

### SOLUTION

Cat.No 488 05: US (ultrasonic technology) ceiling mount switch sensor 360°. Place the sensor close to the stalls, about 2 m out from the entrance door so the sensor has the best opportunity to detect presence in the entire restroom. Special attention should be given to farthest stalls to ensure they are well covered. This sensor is shipped with a time pre-set 15 minutes and daylight at 500 lux.

### LIGHTING PLAN



### WIRING DETAILS



Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.

## LOBBY

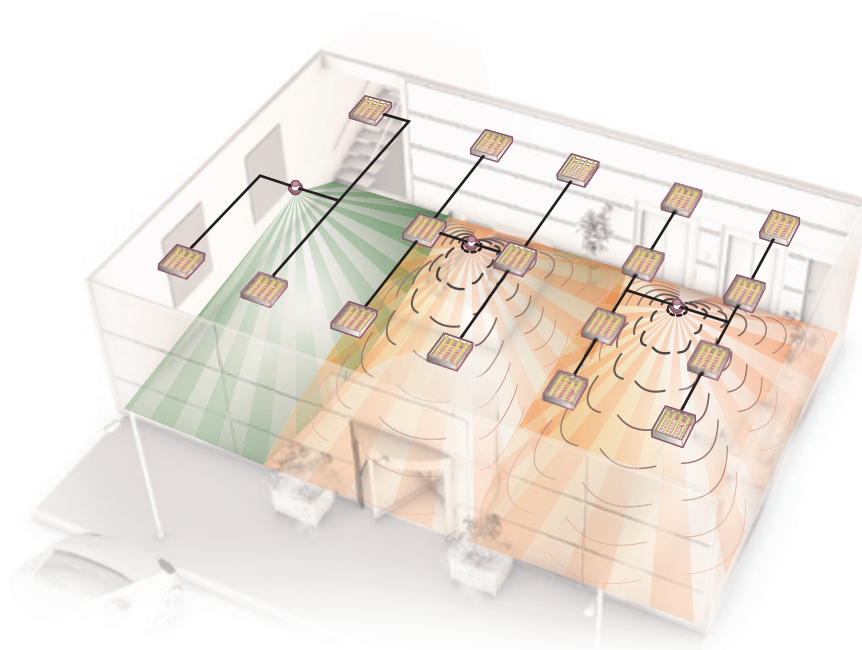
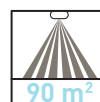
SAVING ON ENERGY\*  
138 € | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED\*  
89 kg | CO<sub>2</sub> eq. | year

Legrand lighting management solution for lobby –  
220 m<sup>2</sup> based on: occupancy-based control + mode  
+ daylight-based control

(1) based on EN 15 193  
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). They are measured in CO<sub>2</sub> equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO<sub>2</sub>/100 km i.e. 0.118 g of CO<sub>2</sub>/km



### APPLICATION DESCRIPTION

Lobby with high ceilings (4 metres) and windows.

Space : 220 m<sup>2</sup> - L22 x W10.

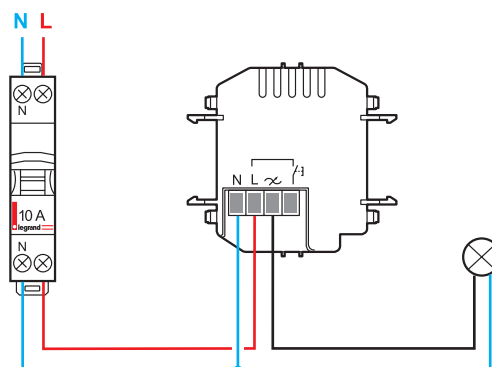
### CONTROL NEEDS

ON/OFF control and light level sensing. The sensor should also provide accurate coverage at greater heights and a defined cut-off. Artificial lights are turned "OFF" when daylight is sufficient.

### SOLUTION

Cat.No 488 06: DUAL (passive infrared & ultrasonic technology) ceiling mount SCS sensor 360°. Cat.No 488 07: PIR (passive infrared technology) ceiling mount switch sensor 360°. The 2 dual tech sensors are placed above low motion areas: reception desk and waiting area. These 2 sensors will cover the whole space while detecting small movements. The PIR ceiling mount sensor Cat.No 488 07 is placed above the "stairs" area. To cover the entire space detection zone overlap mount all sensors at the same height as luminaires so that sensors' view is not blocked. These sensors are shipped with a time pre-set at 15 minutes and 500 lux. These settings can be modified with commissioning tools Cat.Nos 882 30 & 882 35.

### LIGHTING PLAN



### WIRING DETAILS

Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.



# Putting a stop to energy waste

**Our vision at Legrand is to provide products and services that make buildings more energy-efficient. We are committed to 'putting a stop to energy waste'.**

Legrand offers two types of solutions and proposes related services to ensure that your lighting management project saves energy and helps the environment.

## Switch sensors

100-240 Vac 50/60 Hz



## BUS/SCS systems

BUS | SCS 27 V



## WHY IMPLEMENT LIGHTING MANAGEMENT ?

Lighting is a significant consumer of energy in commercial buildings.

- **20%** of total site energy is **consumed by lighting** in commercial buildings.
- **Lighting** is the first electricity end-user in a commercial building with up to **40% electricity consumed\***.

Each year, more organisations implement lighting management because they recognise its wide range of benefits:



Energy savings



Economic savings



Code compliance



Sustainability building practice

## REQUIREMENTS FOR IMPLEMENTING LIGHTING MANAGEMENT

### Mandatory requirements

#### Standards on energy savings

European Standard EN15193 provides a guideline for the energy performance of lighting systems. Legrand has chosen this standard as a basis to demonstrate the energy performance of its lighting solutions. This standard is widely recognized and provides a calculation methodology on energy savings according to the type of solution installed, the type of building and the type of room.

#### Putting a stop to energy waste

Legrand is committed to providing customers with comprehensive, transparent information on actual savings for its lighting management solutions: saving on energy + Green House Gas (GHG) emissions avoided.

Look for this information in our best practice literatures.



### Voluntary programmes

#### Green Building programmes

Green Building is an approach to building that considers the overall environmental impact of a building as well as the health and well-being of its occupants.

Green Building programmes are voluntary, consensus-based programmes that provide guidelines. These programmes generally have an associated rating tool for assessing the environmental performance of the building and certifying its compliance with the standard.

Green Building certification is awarded to differentiate sustainable building projects and give them credibility. Major Green Building programmes include LEED, BREEAM, HQE and GREEN STAR.



## HOW TO IMPLEMENT LIGHTING MANAGEMENT ?

### Lighting management strategies

Lighting management strategies refer to the basic method that will be used to control lighting systems. This will include automatic operation of the lighting, taking into account the needs of the space's occupants :



Occupancy-based control



Scheduled control



Daylighting level control



Vacancy-based control



Dimming control

### Lighting management technologies

Lighting management technologies refer to the actual device that will be used to implement a specific strategy and the method the device will use to operate (passive infrared, ultrasonic or dual technology sensors, timers or dimmers).



PIR technology



Ultrasonic technology



Dual technology

## LIGHTING MANAGEMENT PRODUCTS & SYSTEMS

### Switch sensors

1 output



2 outputs



### BUS/SCS systems

controls



dimmers & actuators



room controllers



software & accessories



sensors



radio & zigbee accessories



## RELATED SERVICES

### Local support

Our sales representatives are available to assist with all aspects of a lighting management projects. Services include building walk-through, training, payback analysis reports and product demonstrations.

### Technical support

Telephone technical support from our dedicated team offers personal

guidance for application-related questions, installation assistance or troubleshooting.

### Field services


Factory-trained assistance during the critical startup and commissioning stages to ensure optimal system performance.

Don't hesitate to contact us.





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