

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 putting 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

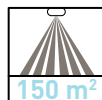
SAVING ON ENERGY**
\$400 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED**
2.9 Ton | CO₂ eq. | year

Legrand lighting management solution for large
partitioned office space – 300 m² based on:
vacancy-based control + daylight-based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

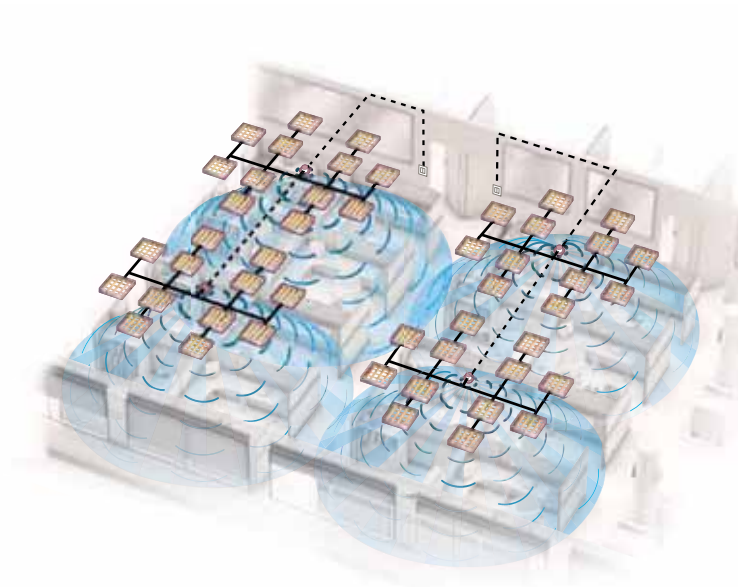
Large office area with partitioned cubicles. A majority of work is done at computers in individual cubicles.
Space : 300 m² - L15 x W20.

CONTROL NEEDS

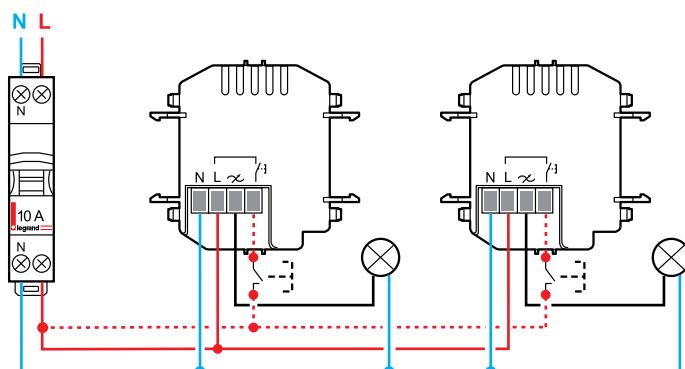
A sensor that can 'see around' obstacles such as cubicle walls, and that has a high sensitivity to detect fine movements such as typing. Two lighting areas are created. They are turned "ON" manually by occupants. Artificial lights are turned "OFF" when daylight is sufficient.

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⁽¹⁾
\$25.70 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED⁽²⁾
198 kg | CO₂ eq. | year

Legrand lighting management solution for an office building with 20 x 15 m² enclosed offices based on:
vacancy-based control + daylight-based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km

APPLICATION DESCRIPTION

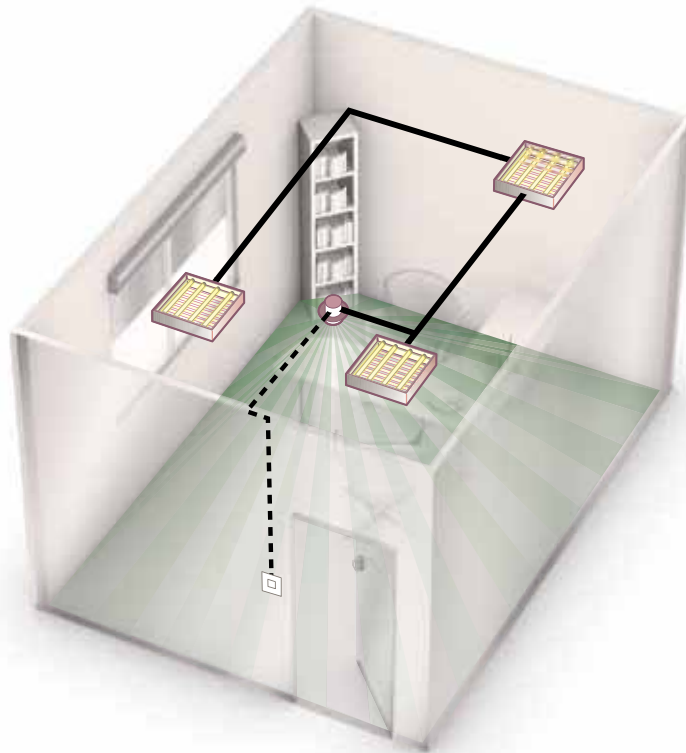
Enclosed single-occupant office with a window. Primary activities are computer work, reading and meetings.
Space : 15 m² - L5 x W3.

CONTROL NEEDS

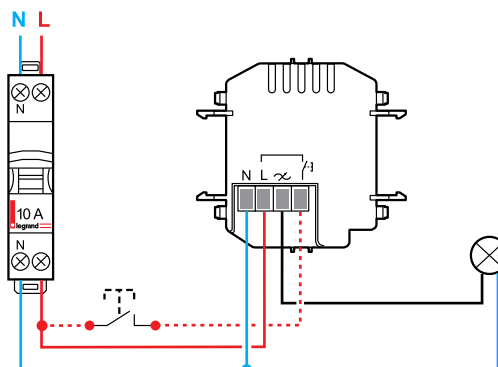
ON/OFF control with light level sensing.
The sensor should be able to detect small movements. Light is turned manually "ON" by occupants. Lights are turned "OFF" when daylight is sufficient.

SOLUTION

Cat.No 488 07 : 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

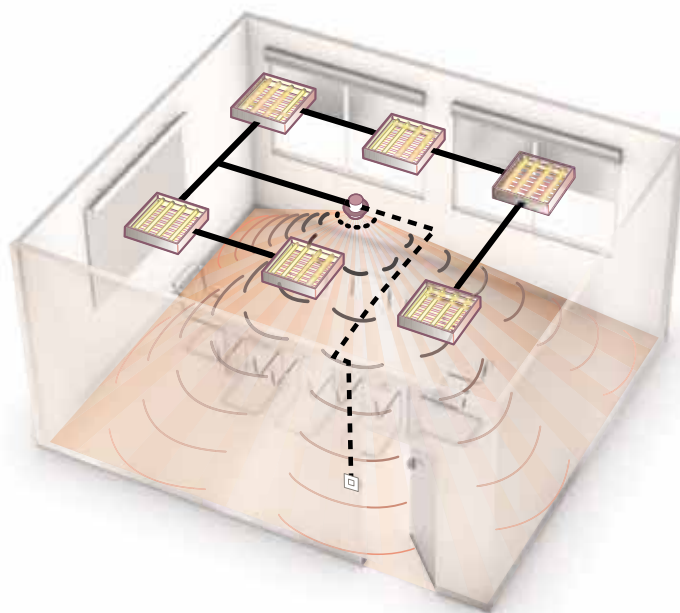
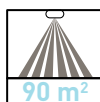
SAVING ON ENERGY⁽¹⁾
\$51.40 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED⁽²⁾
364 kg | CO₂ eq. | year

Legrand lighting management solution for an office building with 5 x 42 m² conference/training rooms based on: vacancy-based control + daylight-based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

Medium-sized conference rooms that is used for meetings and training.
Space : 42 m² - L6 x W7.

CONTROL NEEDS

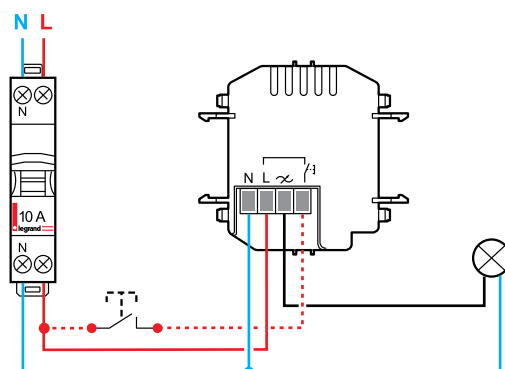
A sensor with ON/OFF control. The sensor should have high sensitivity, as there is often little motion in the room during meetings. Lights need to be capable of staying off during presentations. Light is turned manually "ON" by occupants using a standard push button. Artificial lights are turned "OFF"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

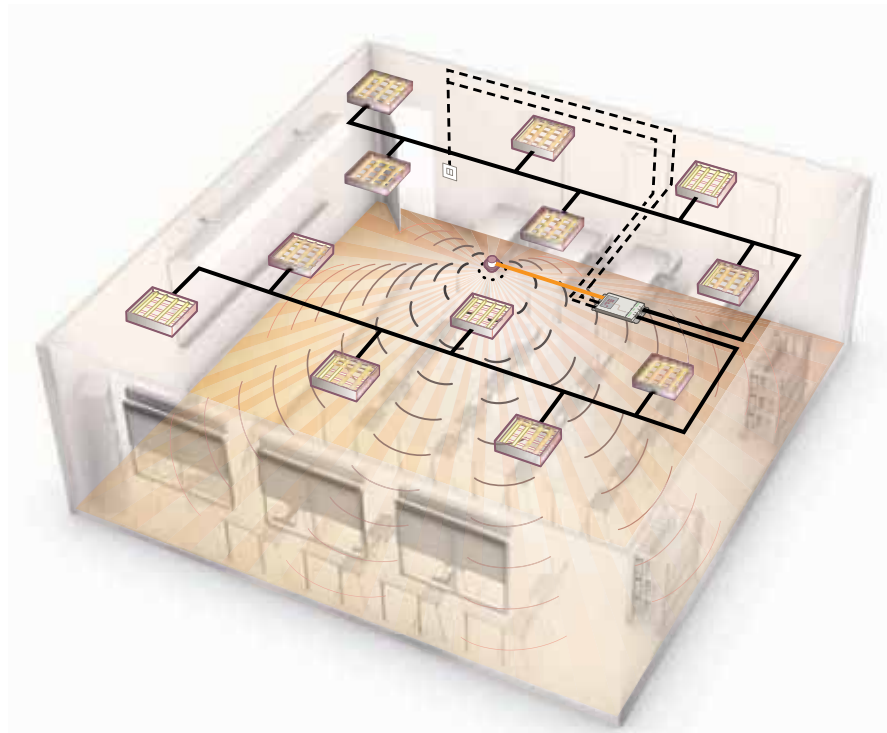
SAVING ON ENERGY™
\$102 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED (2)
729 kg | CO₂ eq. | year

Legrand lighting management solution for a campus
with 5 x 63 m² classrooms based on: vacancy-based
control + daylight-based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

High school classroom.
Space : 63 m² - L9 x l7.

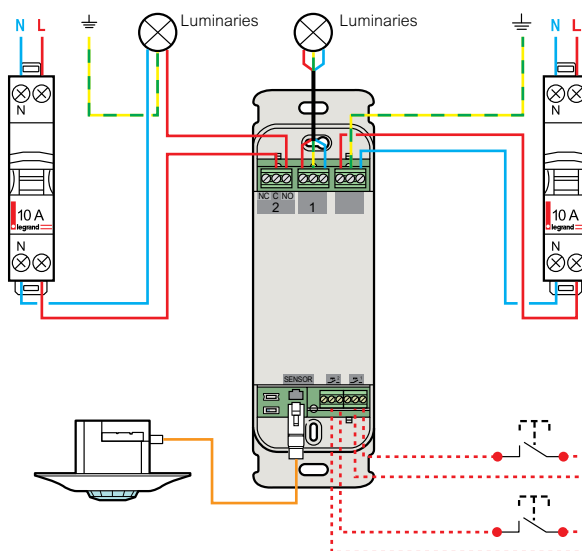
CONTROL NEEDS

"ON/OFF" control with high sensitivity since occupants sit still for long periods of time. The room is divided into two zones. Zone one (door side) is not daylight controlled. Zone two (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.



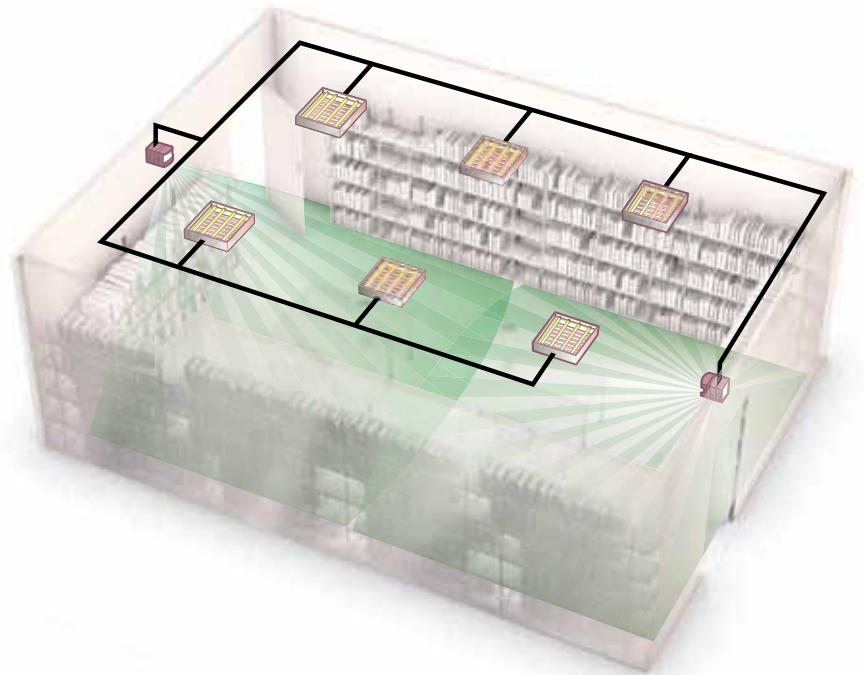
SAVING ON ENERGY*
\$51 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED**
364 kg | CO₂ eq. | year

Legrand lighting management solution for a campus
with 10 x 35 m² libraries based on: occupancy-
based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

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

NO FALSE CEILING.

Space : 35 m² - L7 x W5.

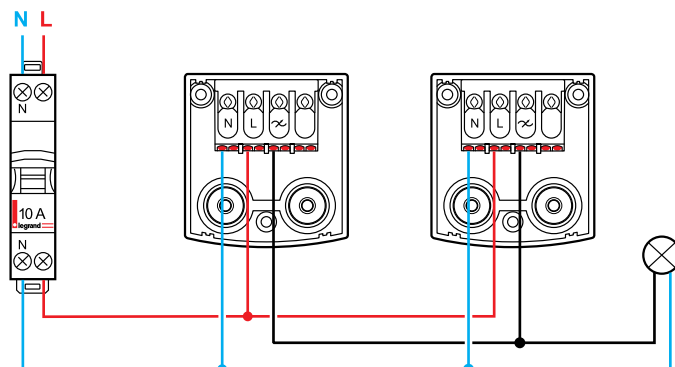
CONTROL NEEDS

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

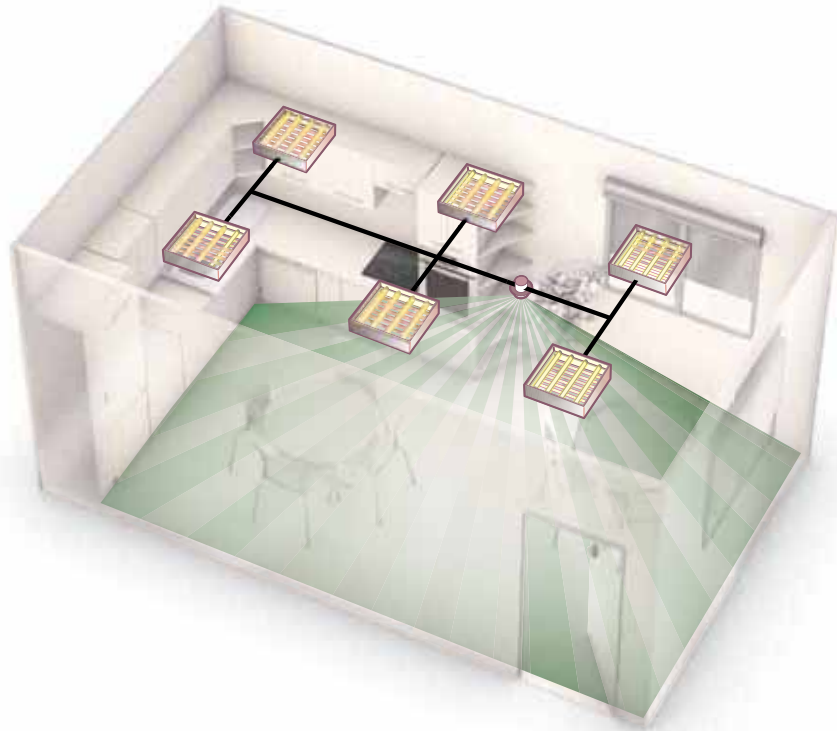
SAVING ON ENERGY™
\$51 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED (2)
364 kg | CO₂ eq. | year

Legrand lighting management solution for an office building with 5 x 32 m² lunch/break rooms based on: occupancy-based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

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

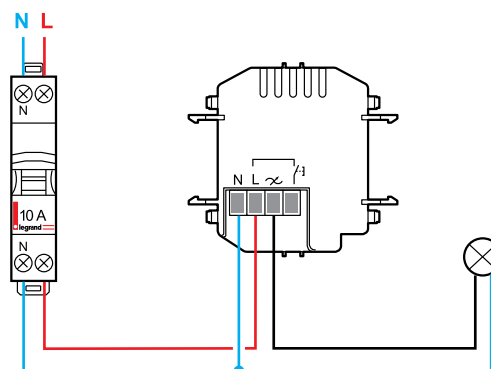
CONTROL NEEDS

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 sensibility.

LIGHTING PLAN



WIRING DETAILS

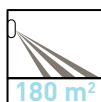


Note: please refer to Legrand "switch sensors design & installation guide" for more technical information.

EXTERIOR



EN 15 193 not applicable
for exterior applications



APPLICATION DESCRIPTION

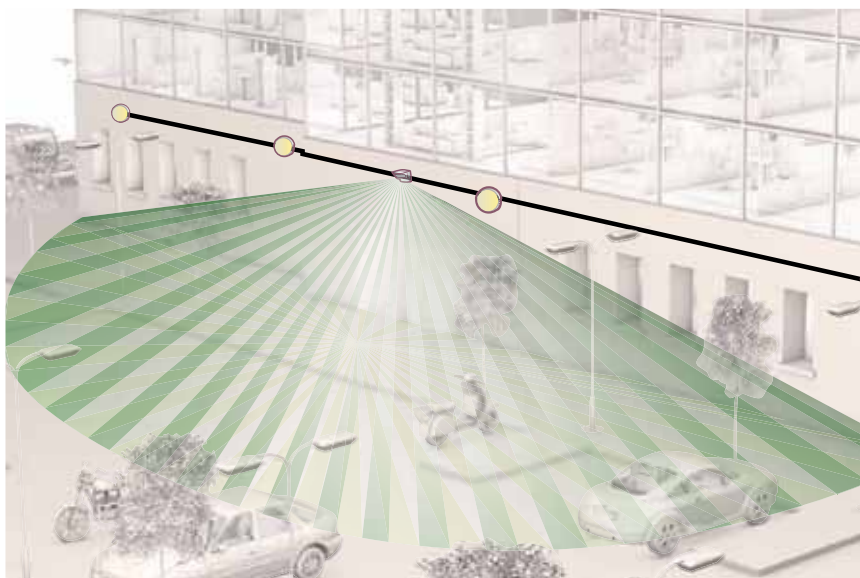
Exterior of a building.

CONTROL NEEDS

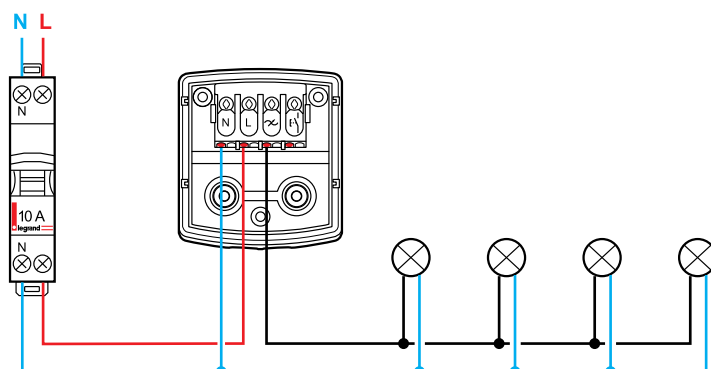
ON/OFF control and light level sensing.
The sensor should also provide a large
coverage area in length and in width.

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

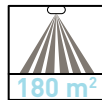
SAVING ON ENERGY™
\$48 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED (2)
340 kg | CO₂ eq. | year

Legrand lighting management solution for an office building with 5 x 75 m² hallways 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 (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

Office building hallway with walls on both sides. The hallway has windows, but has doors along each side.
Space : 75 m² - L25 x W3.

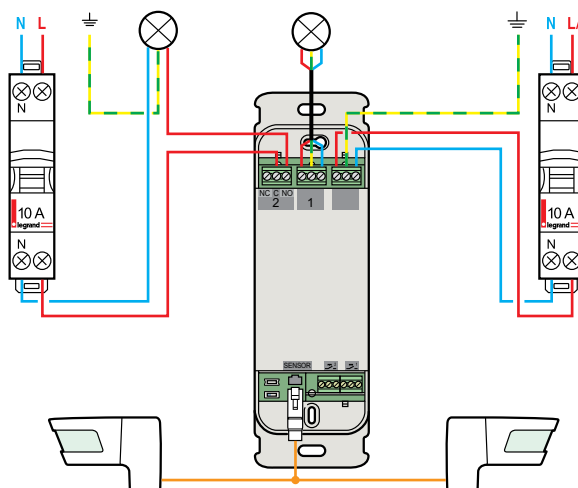
CONTROL NEEDS

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 two different circuits.

SOLUTION

Cat.No 488 30: PIR (passive infrared technology) corner mount SCS sensor 270°. Cat.No 488 50: Room controller two 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

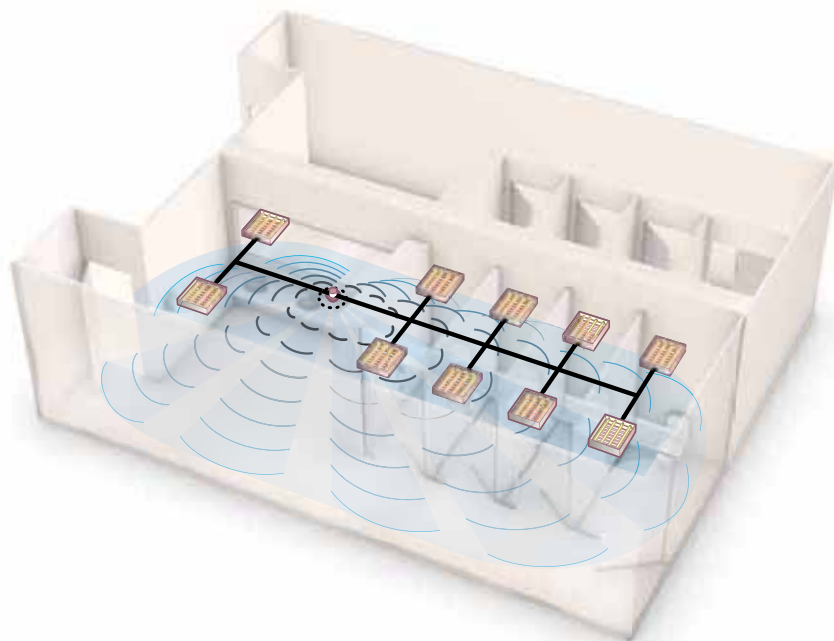
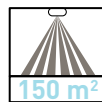
SAVING ON ENERGY™
\$68 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED™
486 kg | CO₂ eq. | year

Legrand lighting management solution for an
office building with 20 x 36 m² restrooms based on:
occupancy-based control

(1) based on EN 15 193
(2) Greenhouse Gases (GHGs) include water vapour, ozone, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km



APPLICATION DESCRIPTION

Public restroom with four
partitioned stalls.

Space : 36 m² - L12 x W3.

CONTROL NEEDS

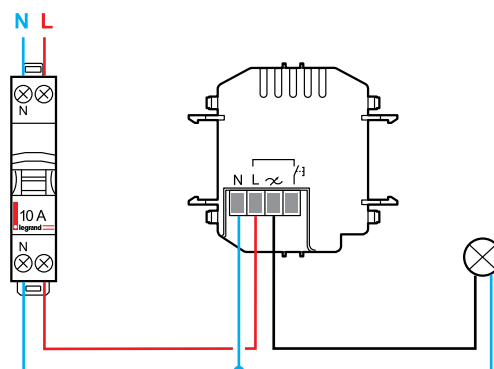
ON/OFF control with technology that can
see around obstacles.

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
2m 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

LIGHTING PLAN



WIRING DETAILS



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

LOBBY

SAVING ON ENERGY⁽¹⁾
\$116 | year

GREENHOUSE GAS (GHG) EMISSIONS AVOIDED⁽²⁾
826 kg | CO₂ eq. | year

Legrand lighting management solution for lobby –
220 m² 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 (CO₂), methane (CH₄), and nitrous oxide (N₂O). They are measured in CO₂ equivalent units

Note: A vehicle with an average consumption of 4.5 l/100 km emits 11.8 kg of CO₂/100 km i.e. 0.118 g of CO₂/km

APPLICATION DESCRIPTION

Lobby with high ceilings (four metres) and windows.

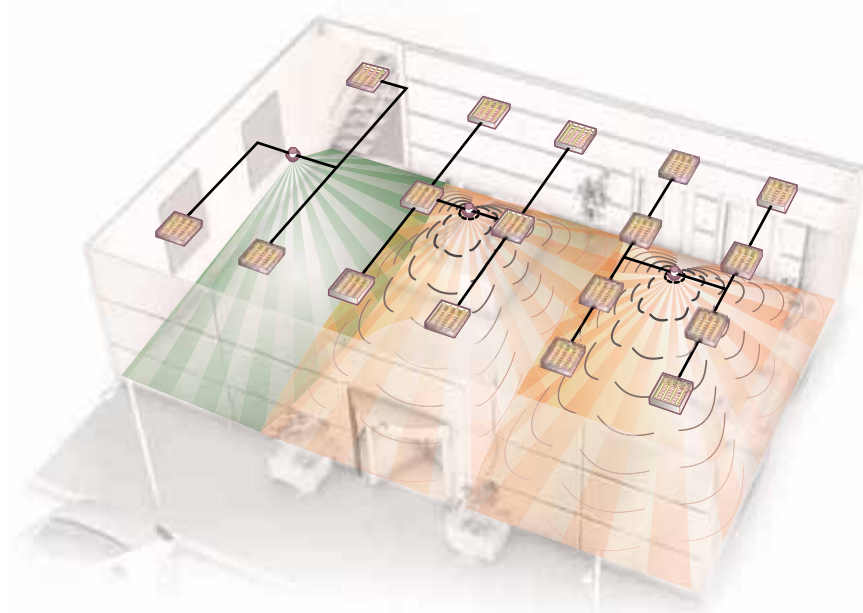
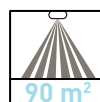
Space : 220 m² - L22 x W10.

CONTROL NEEDS

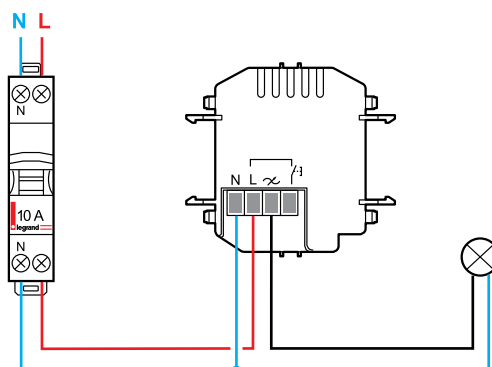
ON/OFF control and light level sensing. The sensor should also provide accurate coverage at greater heights and a defined cut-off. Artificial lights are turned "OFF" when daylight is sufficient.

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 two dual tech sensors are placed above low motion areas: reception desk and waiting area. These two 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 &



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 user 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 recognised and provides a calculation methodology on energy savings according to the type of solution installed, the type of building and the type of room.

In Australia, the Building Code of Australia (BCA) sets the minimum technical and mandatory requirements affecting buildings.

The BCA specifies that artificial lighting must not exceed a certain illumination power density (W/m^2) applicable to each building type. The maximum illumination power density can be increased when using lighting control devices such as movement sensors. Refer to www.abcb.gov.au for further details.

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 literature.

Voluntary programs

Green Building programs

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 programs are voluntary, consensus-based programs that provide guidelines. These programs 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.

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.

Don't hesitate to contact us.



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