VOLTEX LIGHTING

LIGHTING CONTROLS

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LIGHTING CONTROL AND SYSTEMS

ENERGY

Energy is a basic unit for which the electricity utility (Eskom) charges.

In the case of a lighting system:

energy consumed (kilowatthours) = **power** (Watts) x **time** (Hours).

We can reduce both the **power** (Watts) and the **time** (Hours) and hence the **energy** consumed (kilowatthours) through maximising the technology available, i.e. electronic ballasts, occupancy sensors or daylight harvesting.

If we can dim due to the availability of natural light or turn off the lights when occupants are not present, we can reduce energy wastage up to 70% + on a lighting installation.

LIGHTING CONTROLS

Lighting control systems will become a permanent feature in the years ahead, due to the contribution they make in reducing overall energy costs.

Basic ON/OFF solutions through the use of occupancy sensors are readily available and make an immediate impact in reducing electricity costs.

Occupancy sensors, without human intervention, luminaires will automatically switch on or off, based on the occupancy of certain areas.

Most types of sensors utilize multi technologies incorporating both Passive Infrared (PIR) and Ultrasonic i.e. movement and sound. These sensors provide superior occupancy detection compared to a single technology sensor.

Depending on the application a range of sensors from wall switching to ceiling mounted units are available.

Passive infrared (PIR) occupancy sensors

PIR sensors respond to sudden changes in background heat energy by detecting the presence of heat energy at a wavelength emitted by humans. They must be able to have a direct “line of sight” to an occupant to detect his presence. A curved faceted lens defines the field of view as a fan-shaped series of vertical and horizontal “cones” of detection projected from the sensor. The further an occupant is from the sensor, the wider the gaps between these cones. Therefore, the sensor’s sensitivity to motion decreases with distance away from the sensor.

Ultrasonic Occupancy Sensors

These sensors use a quartz crystal that radiates high-frequency (25-40 kHz) sound waves undetectable by the human ear. These waves are emitted into the sensor’s field of coverage, where they bounce off of objects, surfaces and people. When the waves bounce back to the sensor, their frequency is measured. Motion is detected via a slight shift in frequency (Doppler Effect), triggering an occupancy signal. Ultrasonic sensors can “see” around objects and surfaces if the surfaces in an enclosed area are hard enough to bounce back the sound waves for detection.

LIGHTING CONTROL AND SYSTEMS

Dual-Technology Occupancy Sensors

Dual-technology sensors utilize both ultrasonic and PIR technology for maximum reliability and coverage with a minimum of false triggers. Both ultrasonic and PIR signals are required to reliably switch on lights and switch them off

P.I.R

WALL SENSOR

DUAL TECHNOLOGY

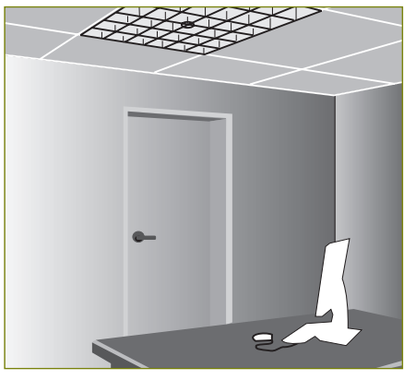
WALL SENSOR

ULTRA SONIC

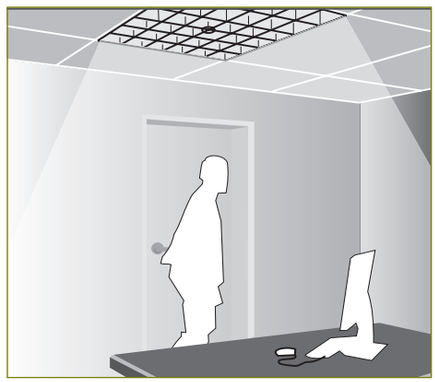
CEILING SENSOR

DUAL TECHNOLOGY

CEILING SENSOR



NO-ONE PRESENT. LIGHTS OFF.



PERSON ENTERS ROOM. LIGHTS SWITCH ON.

Benefits:

- Cost effective use in cellular offices
- Effective in areas which are unoccupied for long periods of time, e.g. storerooms, cloakrooms, toilets
- Additional security by switching on if intruders are detected in an otherwise unoccupied office
- Incorporates an adjustable time delay before switching luminaires off
- Controls a number of fluorescent luminaires up to 1500 Watts

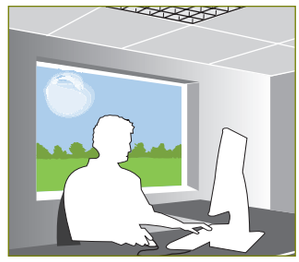
LIGHTING CONTROL AND SYSTEMS

To further reduce energy costs consideration should be given to daylight harvesting.

This can be achieved, depending on the application for either small or extensive lighting applications through using DSI technology (Digital Serial Interface) or the DALI interface protocol (Digital Addressable Lighting Interface) with the appropriate dimmable electronic ballast.

PERSON PRESENT.
INSUFFICIENT DAYLIGHT.
LIGHTS ON.

PERSON PRESENT.
MODERATE DAYLIGHT.
LIGHTS DIM.



PERSON PRESENT.
BRIGHT DAYLIGHT. LIGHTS
DIMMED TO MINIMUM.

All of the above technologies can be adapted into a fully integrated Building Management System (BMS) offering automatic control in addition to lighting, over air conditioning, security systems, blinds and shutters, and audio/vision controls.

The requirement in South Africa is to reduce current electrical consumption by a minimum of 10%. Lighting and lighting controls, offer between 25% - 75% in potential reductions on your lighting load, is immediately implementable and often self funding from the financial savings achieved.

LIGHTING CONTROL AND SYSTEMS

SPACE TYPE	USE PATTERN	IF...	THEN...
Cafeterias or Lunchrooms	Occupied occasionally	Day light	Consider daylight-driven dimming or on/off control
		Occupied occasionally	Consider ceiling-mounted occupancy sensor(s).
Classroom	Usually occupied Occasionally occupied	Multi-tasks like overhead projectors, chalkboard, student note taking and reading, class demonstrations	Consider manual dimming
		Occupied by different students and teachers	Consider ceiling- or wall-mounted occupancy sensor(s) and manual dimming.
		Lights left on after hours	Consider occupancy sensors.

LIGHTING CONTROL AND SYSTEMS

SPACE TYPE	USE PATTERN	IF...	THEN...
Computer Room	Usually unoccupied	Lights are left on all the time	Consider occupancy sensors.
Conference Room	Occupied occasionally	Multi-tasks from video-conferencing to presentations	Consider manual dimming (possibly preset scene control)
		Small conference room	Consider a wall box occupancy sensor
		Large conference room	Consider ceiling- or wall-mounted occupancy sensor(s).
Gymnasium or Fitness	Usually occupied	Requires varied lighting levels for activities	Consider manual dimming and occupancy sensors.
Hallways	Any	Occasionally or usually occupied	Consider occupancy sensors with elongated throw. Be sure that coverage does not extend beyond the desired area.
		Day light	Consider daylight on/off control
Health Care - Examination Rooms	Occasionally occupied	Different lighting needs for examination	Consider manual dimming
		Small areas	Consider a wall box occupancy sensor
Health Care - Hallways	Usually occupied	Day light	Consider automatic daylight-driven dimming
		Requires lower lighting level at night	
Health Care - Patient Rooms	Usually occupied	Different lighting needs for watching television, reading, sleeping and examination	Consider manual dimming. Occupancy sensors may not be appropriate
Hotel Rooms	Occasionally occupied	Use primarily in the late afternoon through evening for sleeping and relaxing	Consider manual dimming
Laboratories	Usually occupied	Day light	Consider automatic daylight-driven dimming in combination with occupancy sensors.
Laundry Rooms	Occasionally occupied	Requires high light levels, yet lights are usually left on	Consider occupancy sensors
Libraries - Reading Areas	Usually occupied	Day light	Consider automatic daylight-driven dimming
		Lights left on after hours	

LIGHTING CONTROL AND SYSTEMS

SPACE TYPE	USE PATTERN	IF...	THEN...
Libraries - Stack Areas	Occasionally occupied	Stacks are usually unoccupied	Consider ceiling-mounted sensor(s)
Lobby or Atrium	Usually occupied but no one "owns" the space	Day lighted and lights should always appear on...	Consider automatic daylight-driven dimming
		It isn't a problem if lights go completely off in high daylight...	Consider automatic daylight-driven dimming or on/off control
		Lights are left on all night long, even when no one is in the area for long periods	Consider occupancy sensors.
Office, Open	Usually occupied	Day lighted...	Consider automatic daylight-driven dimming
		Varied tasks from computer usage to reading	Consider manual dimming
		Lights left on after hours	Consider occupancy sensors.
Office, Private	Primarily one person, coming and going	Day lighted...	Consider manual dimming, automatic daylight-driven dimming, or automatic on/off
		Occupants are likely to leave lights on and occupants would be in direct view of a wall box sensor	Consider a wall box occupancy sensor
		Occupants are likely to leave lights on and partitions or objects could hide an occupant from the sensor	Consider a ceiling- or wall-mounted occupancy sensor
Photocopying, Sorting, Assembling	Occasionally occupied	Lights are left on when they are not needed	Consider an occupancy sensor.
Restaurant	Usually occupied	Day lighted	Consider automatic daylight-driven dimming
		Requires different lighting levels throughout the day	Consider manual dimming (possibly preset scene dimming)
		Requires different lighting levels for cleaning	Consider centralized control

LIGHTING CONTROL AND SYSTEMS

SPACE TYPE	USE PATTERN	IF...	THEN...
Restroom	Any	Has stalls	Consider a ceiling-mounted ultrasonic occupancy sensor for full coverage.
		Single toilet (no partitions)	Consider a wall switch occupancy sensor
Retail Store	Usually occupied	Day lighted	Consider automatic daylight-driven dimming
		Different lighting needs for retail sales, stocking, cleaning	Consider centralized controls or preset scene dimming control
Warehouse	Aisles are usually unoccupied	Day lighted	Consider daylight-driven dimming or daylight on/off control
		Lights in an aisle can be turned off when the aisle is unoccupied	Consider ceiling-mounted occupancy sensors with elongated throw.

A COMPREHENSIVE RANGE OF PRODUCTS AND SYSTEMS ARE AVAILABLE THROUGH VOLTEX LIGHTING

With the introduction of occupancy sensors it is imperative when ordering luminaires, that the type of electronic ballast be specified. In terms of the European standards for electronic ballasts, referred to as CELMA, Electronic ballasts fall into 3 categories i.e.:

A1 = Dimmable

A2 = Warm Start – Allows for frequency of ON/OFF switching

A3 = Instant Start – Restricted in terms of frequency of ON/OFF switching.

In a luminaire installation where switching is controlled by means of occupancy sensors, therefore potentially subject to numerous ON/OFF switching, the luminaires should be supplied with a warm start ballast.