

Intelligent Lighting System (BUS)



The Intelligent Lighting System (ILS) is one of the most advanced lighting and energy management systems available today. System intelligence is built into every luminaire, monitoring and reacting to occupancy, pre-selected light levels and changes in ambient daylight levels. Absence functionality is incorporated to maximise energy saving and controls factor compliance with building regulations.

The result is a highly efficient and intelligent system, which is easily re-configured as room layout or usage changes, via a simple hand-held infra-red programmer. Importantly, ILS fully considers the human dimension. Luminaires communicate with each other, allowing selected fittings to switch on together offering a pleasant, safe and correctly illuminated environment. A handy infra-red override unit also provides local control for individuals on a temporary basis. Whatever the application, ILS delivers automatic energy savings combined with outstanding flexibility.

- Energy saving - typically between 50% and 70%
- Occupancy detection, daylight linking and constant illumination
- Absence functionality (manual on, auto off) maximises energy saving and compliance with building regulations and ECA control factors
- Flexible programming via a hand-held unit
- Luminaire communication for high light quality via BUS communication loop
- User infra-red override facility for local control
- Simple to install and set up
- Easy to re-configure when office layout changes
- Groups can be created and controlled together
- Choice of standard 50mm 'cube' or mini head sensor to best suit the chosen luminaire or application
- Designed for use with DALI dimming control gear (DSI or Analogue 1-10V versions to special order)

Standard System Features

ILS is a highly sophisticated and advanced lighting and energy management tool. However, it is easy to install, set up and re-configure, to accommodate the needs of the modern working environment. Intelligence is built into every luminaire, with a wide range of set-up parameters available to configure the system to the exact needs of the installation. All features are set-up via a hand held infra-red master programmer and can be summarised as follows:

- Absence function
- Occupancy detection
- Luminaire communication
- Daylight linking
- Constant illumination
- Illumination control
- System set-up
- Group dimming

Absence Function

Many lighting control systems historically worked on presence detection and would activate the luminaires whenever occupancy was detected. This meant that although the system may have daylight monitoring and account for natural daylight and dim or brighten fittings accordingly, they would be on when in some cases they may not need to be.

Absence detection, as it is often referred to, requires the user to manually demand the lights on, usually by means of a simple wall switch. This can result in further energy savings as the luminaires will only be switched on when they are needed, regulate accordingly during operation, then switch off following the pre set time delay after the sensor last detected occupancy.

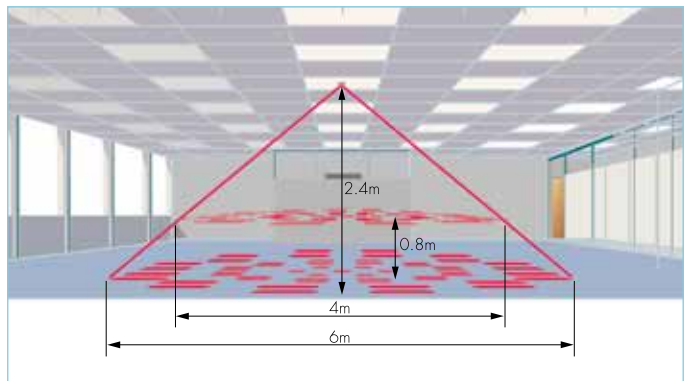
Absence is now an acknowledged energy saver and has been integrated into recommendations for many energy related incentive schemes. The manual 'on' command can be activated by a number of inputs. Please contact our technical department for further information on 01302 303240 or email LightingTechnicalUK@Eaton.com.

Presence / Absence Detection

In a typical office environment, people are away from their workstations between 20% and 40% of the time, during which period luminaires could generally be switched off. ILS uses a passive infra-red (PIR) presence detection system fitted within each luminaire, which turns on the luminaire while people are present, but off shortly after they leave. This can be programmed for absence functionality.

PIR detectors have a sophisticated lens which divides the area into three dimensional zones. Crossing from one zone to another triggers the device. Generally, the closer the person is to the PIR, the closer the zones and therefore a smaller movement is needed to trigger the device.

ILS uses a 360° lens which has a high zone density immediately beneath the luminaire to detect small movements, ensuring the luminaire remains lit when reading or writing at a desk. Further away, larger movements are required. As luminaires are usually spaced less than 3 metres apart, people are almost always working in detection zones of high sensitivity.



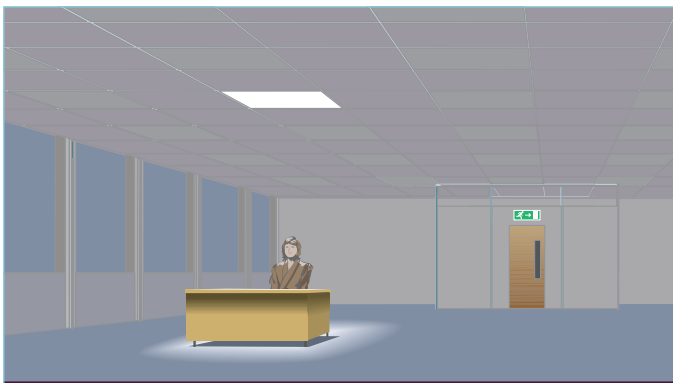
PIR coverage

Luminaire Communication System

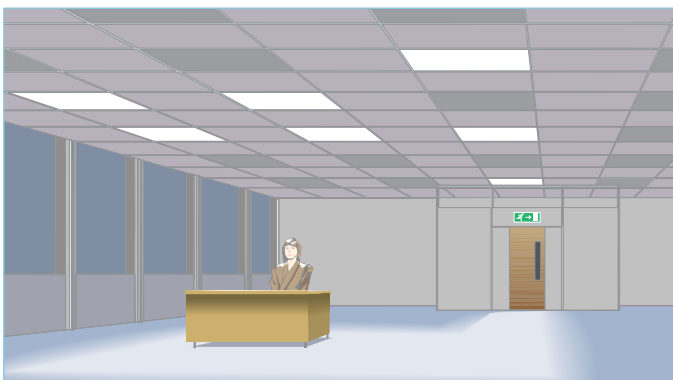
Most commercially available presence detection luminaires act independently and turn off if no one is directly under them. Whilst providing energy savings, it can lead to intimidating circumstances. In addition, individual luminaires generally do not provide the correct illumination level or adequate uniformity. Staff working late could be left sitting in a pool of light, surrounded by intimidating darkness or have to negotiate a dark corridor, where luminaires only switch on as the person passes under them.

ILS solves this problem by enabling luminaires to communicate with each other. Every luminaire can be programmed with up to 4 of 100 available address numbers. When a luminaire is activated, by detecting presence beneath it, a signal is sent out via the 2 wire communication BUS to every other luminaire.

Any sharing the same address number will switch on. As a result selected surrounding luminaires can be instructed to remain on, along with chosen luminaires on a notional walkway or by doors. This ensures the correct level of illumination and recommended uniformity wherever people are working, along with essential circulation lighting.



Luminaires which don't communicate cause small pools of light surrounded by intimidating darkness



ILS luminaires communicate with each other, providing a pleasant, safe and energy saving environment

An additional feature is common zone addresses. Any luminaire can have a common zone address allocated, as one of the 4 addresses. If designated with a common zone address, that luminaire will switch on or stay illuminated if any other luminaire on the BUS is activated. This feature is useful to instruct selected areas, e.g. stairway luminaires to stay on if any person is in the building. Additionally 2 corridor zones can be created to activate a corridor or area triggered by another occupied space.

As building layout or usage is changed, the address numbers allocated to any luminaire can be simply re-programmed via the infra-red master programmer, effortlessly accommodating the ever increasing churn rate experienced in commercial buildings.

For further information contact our technical support and application department on 01302 303240 or email LightingTechnicalUK@Eaton.com.

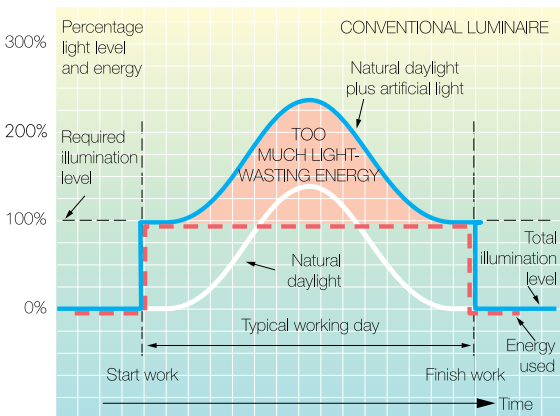
Daylight Linking

Natural daylight can often provide either sufficient or a significant contribution to workplace illumination, particularly in the 5 metre area next to windows known as the window zone. Potential savings due to daylight alone are typically between 50% and 70%, dependent on the size, position and compass direction of windows. However, most people will not turn off the lights and the perceived difference between 100% on and switched off appear to be large. Additionally, turning the lights off will affect everybody, including some who may still require illumination.

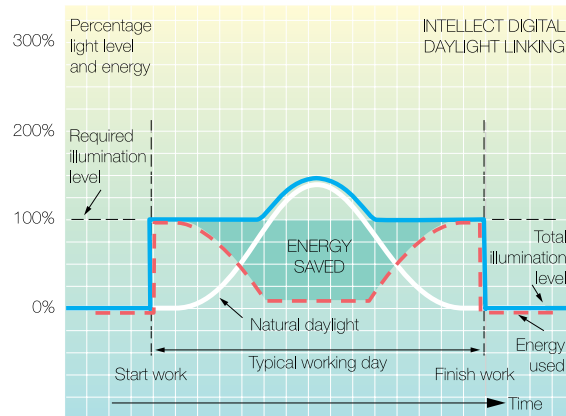
ILS overcomes this by having a built-in light sensitive cell that monitors daylight levels and adjusts lamp output accordingly, so that the pre-set light level is maintained. As daylight becomes available, the luminaires react by dimming the lamps, continuing until minimum output is reached. With continuing or sustained daylight availability, the luminaires can be instructed to stay on and continue to operate at low levels of output, or switch off after a timed period. If daylight decreases, lamps are automatically brightened to maintain the pre-selected light level.

Each luminaire reacts independently, to take into account that the further away from the window it is installed, the influence of daylight decreases. ILS automatically compensates for light received from other luminaires and the use of window blinds or curtains. It also has a built in time delay so that it is unaffected by temporary changes in level due to reflections or clouds passing over the sun. The luminaire provides light according to the actual conditions directly beneath it.

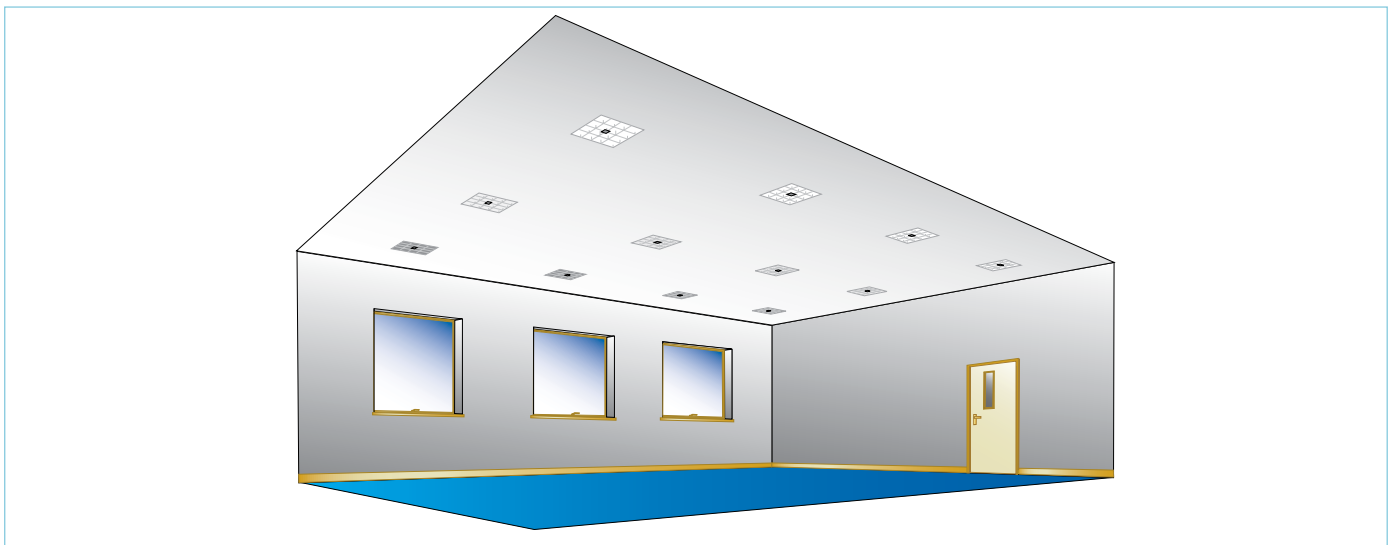
9



Using a conventional luminaire, artificial light is needed at the start and end of the day, but provides too much light for most of the day (because of daylight) thus wasting energy



ILS daylight linking feature reduces light output and energy used but ensures that the installation has enough light



Typical office showing luminaires by the window automatically dimmed to low level but increasing in brightness when moving away from the windows, delivering even illumination

Constant Illumination

Light output from all luminaires reduces over time, as lamps age and the optics get dirty. Room surfaces also accumulate dust and dirt. Standard lighting design practice compensates for this depreciation by increasing initial illumination levels, according to maintenance and cleaning plans. When the installation is new or following maintenance and re-lamping, this leads to overlighting and energy wastage with conventional luminaires.

ILS automatically compensates for this, dimming the lamps initially so that the designed, pre-set level is achieved when lamps are new. As lamps age and optics accumulate dirt, the luminaire automatically increases power to the lamps to maintain the desired illumination level. This delivers substantial energy savings over a conventional installation, typically between 10% and 20% dependent on maintenance intervals. A further benefit is improved visual comfort, as over lighting is eliminated.

Illumination Control

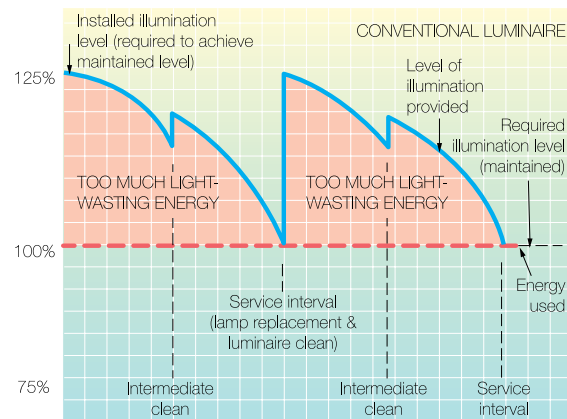
The problem with most conventional lighting systems is that:

- They deliver a fixed illumination level
- They are expensive to reconfigure if the office layout or use changes
- They cannot be dimmed if the light level is higher than required
- They cannot be brightened if more light is required

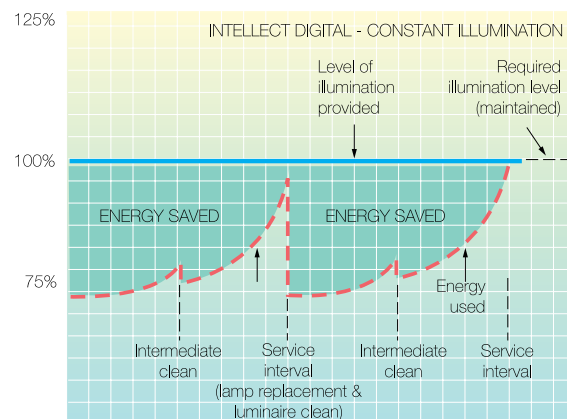
These problem areas are solved by using ILS luminaires, as they can be set to operate at any light output within their range, either individually or as a whole. This is set up using the infra-red master programmer, to provide illumination that achieves the recommended level to perform general or specific tasks. Light levels can be accurately set, as the programmer can instruct each luminaire to operate at any value setting between minimum and maximum output of the ballast. If the usage of an area changes on a long term basis, the master programmer can be used to quickly re-configure the pre-set level. The luminaires will then continue to react automatically to changes in ambient daylight and compensate for lamp ageing, to maintain the set level.

Temporary dimming or brightening of luminaires can be achieved by a simple push button, hand held controller or switch plate on the BUS loop. They can be used to individually dim luminaires for presentations, or to brighten levels for detailed work. Luminaires can also be turned on or off. Adjustment using these controllers fixes the light level and prevents automatic regulation. When the area is vacated, the luminaire switches off and automatically returns to its original settings. Luminaires can also be reset into automatic mode by pressing one button on the controller.

For further information contact our technical support and application department on 01302 303240 or email LightingTechnicalUK@Eaton.com.



Conventional luminaires overlight to allow for luminaire or lamp depreciation, causing discomfort and wasting energy



ILS provides only the level of light required, thus saving energy and still allowing for luminaire or lamp depreciation

System Set-up

System set-up is carried out after installation. A portable infra-red programmer is required, which transmits all set-up instructions to a receiver within the luminaire. Once programmed, the luminaire will retain its settings, even in the event of a power failure. Re-programming is easy - new instructions are simply transmitted to the luminaire. Eaton provide a commissioning service, during which the programming procedure is demonstrated to the designated individual responsible for adjustments to system settings after the installation is complete. A full specification of required settings is needed prior to commissioning.

The following parameters can be set:

- **Light Levels**

Luminaires can be set to the same or different levels according to the task needs. They then automatically compensate for contribution from daylight and surrounding luminaires.

- **Luminaire Communication**

Up to 4 addresses can be programmed, from 100 available channel numbers. Luminaires with common addresses are all turned on if any one luminaire with the same address detects presence via the built-in PIR detector.

Up to 2 common zones can also be programmed addresses within the maximum of 4 addresses which turn on the luminaire if any other sensor connected to the BUS is activated, which is useful for corridors, toilets and circulation areas.

Common zone 1 can operate across the communication spine between BUS power supplies. Common zone 2 is local to one BUS power supply only.

- **Time Delay**

Sets time span between last detected movement and luminaire switch off. Adjustable between 30 seconds (for testing) and 96 hours. Continuous operation can also be selected, requiring a means of isolation or use of a hand-held controller to switch on or off.

- **Background Light Mode**

Normally when an area is vacated, luminaires switch off after a selected period of time. This can lead to poor lighting quality and unacceptable uniformity for anybody left working alone in the area, particularly in open plan offices. At night this can also be intimidating, if sat in a pool of light surrounded by darkness.

The background light mode overcomes these issues offering a choice of states for the luminaire to adopt once occupancy is no longer detected. The options are to switch off or:

- 1) Dim to the ballast minimum
- 2) Go to a specific level by selecting 'scene 6' (default 5% but can be re programmed)
- 3) Regulate to a maximum of 25% of ballast output

For each of the 3 options above, the luminaire can remain at that state, or remain at this level for 3 hours (some sensors remain at the level for 3x the preset time delay, not 3 hours) then switch off, or maintain that level until the building is vacated (ILS or ISM communicating version only)

- **Power up mode**

Instructs luminaires to either turn on when power is first applied, or remain off until movement is detected. Important for large installations, to reduce start-up load following power failure, whilst allowing selected luminaires to power up immediately, such as on stairways or in circulation areas.



System set-up is carried out using the Infra-Red Master Programmer

- **Bright-out Mode**

If bright-out is selected, the luminaire switches off if the ambient daylight levels rise to 25% or more of the pre-programmed required light level. The PIR continues to monitor movement, so that when ambient levels fall, the luminaire switches back on if the area is still occupied. Bright-out has active priority, so if anyone enters an area with sufficient natural light, the luminaire will not come on until daylight falls to the level set in the luminaire by the programmer. If bright-out is not selected, luminaires will remain at minimum output during periods of occupancy and high ambient levels.

System Components

- **Luminaires**

All ILS luminaires are supplied with digital high frequency dimming control gear and a built-in ILS detector, which contains all system controls and intelligence in an unobtrusive housing. Product pages indicate if ILS variants are available.

- **2-Way Digital Programmer: LCSQSP**

Hand held commissioning device with key pad and LCD display. Required for performing all programming functions, by authorised personnel. Menus are accessed and data selected using the previous, next and select buttons, prompted by clear screen messages. Send button used to programme luminaire with selected functions. Read button to interrogate and download luminaire settings. A timesaving feature is the ability to upload or download all setting parameters in one go allowing settings to be copied from one sensor to the next.

LCSQSP



- **Infra-Red Controller: LCSQC**

The LCSQC hand held controller can be used to set basic parameters on the Intelligent Lighting System. It is also compatible with the stand alone sensors. It provides simple day-to-day actions such as on/off override and light level adjustment.

LCSQC



- **Quick Set Remote Controllers: LCSQS**

Compact ergonomically designed unit with soft-touch push buttons. Provides users with on, off and dim, brighten functions for individual and groups of luminaires. Additional buttons allow for changing of time delay settings on absence or presence detection.

LCSQS



- **BUS Communication Cable**

A standard mains insulated 2 core unscreened twisted pair cable of 1.5mm² cross-sectional area is recommended. Installed between all luminaires to provide communication link. The cable may be run in a radial, star, tee or ring format. A ring circuit provides a higher degree of integrity, with communication fully retained if a single point of interruption is experienced. Cable length should not exceed 1500m, subject to topology. Polarity must be observed when connecting the BUS cable to each luminaire.

- **BUS Power Supply**

There is a choice of power supplies to drive the BUS loop, the larger BPS200 can power up to 200 devices on the loop, with the smaller BPS100 unit operating up to 100 devices. On larger systems the BPS200 can be linked to another BUS loop powered by a second BPS200.

BPS100



BPS200



- **Wall Plate**

The manual wall plate LCSWP3S is a useful addition to the system enabling local control of those luminaires assigned to the same zone address as the wall plate.

It connects to and draws its power from the BUS loop and occupies 2 device nodes on the system.

3 pre-set scenes can be selected as well as providing the ability to dim, brighten and switch off the luminaires as required. The bezel cover plate is available in a range of colours (ordered separately), please contact us for more information.

Wall Plate LCSWP3S



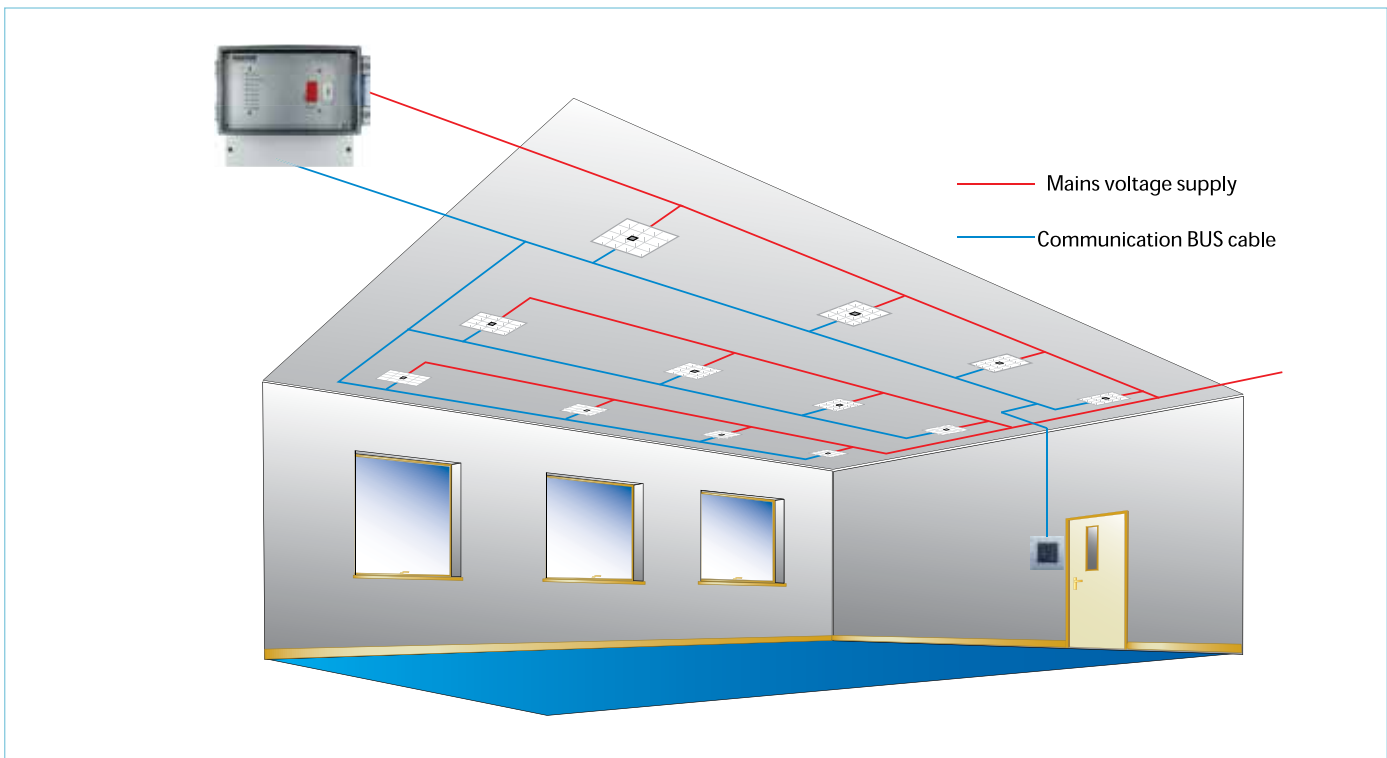
System Design and Installation

- ILS lighting design is carried out exactly as a conventional system would be, selecting available luminaires fitted with ILS controls. Page 429 indicates the ranges available with the intelligent lighting system.
- A recognised means of isolation is required to facilitate maintenance and re-lamping.
- A mains power supply is connected in the normal way to luminaires and the BUS power supply.
- An additional 2 core BUS cable is required to allow luminaires to communicate with each other. Although only a low voltage signal (15V) is carried, a 1.5mm² mains voltage insulated unscreened twisted pair cable is recommended, for complete electrical safety and to allow the cable to share trunking or conduit with mains voltage supply cables. Polarity must be observed when connecting the BUS cable to each luminaire.
- When using the BUS communication cable to link the sensors, any switchplates or the accessories on the loop, a Bus Power Supply is required. Two power supply options are available. (See system components section).
- The luminaires are set-up after installation, using the hand held Infra-Red Master Programmer.
- Eaton can offer a full commissioning service, including a full demonstration of programming to a designated individual.
- Contact our technical support and application department for advice on design or system application, on LightingTechnicalUK@Eaton.com

Luminaire Compatibility

Luminaire ranges particularly suited to this integrated mini-sensor and BUS communication include recessed, surface and continuous systems such as: Lechenti, Combiform, Laserline, Synthesis, ACoustic SYStem, Crompack 5 and other fluorescent luminaires requiring a small sensor with the features described.

For further information contact our technical support and application department on 01302 303240 or email LightingTechnicalUK@Eaton.com.



Simple wiring schematic

