

6 Specific Techniques

6.1 Indoor lighting controls (ILC)

The purpose of Indoor Lighting Controls (ILC) is to provide the right light at the right time and place, saving as much energy as possible, whilst simultaneously providing the comfort expected for any application, such as offices, lecture and conference rooms, school classrooms, sport halls, or in hospitals and supermarkets. Industrial installations may also benefit from the energy savings provided by ILC if fluorescent luminaires such as trunking systems are being used.

In offices up to 40 per cent of the energy used is needed for lighting, within schools this percentage can be even higher. In industrial applications that figure is between 10 and 15 per cent depending on the lighting technology used. Potential energy savings are:

Electronic ballasts + dimming: 30%

Dimming + presence link: 50%

Dimming + presence link + daylight link: 70%

There are many different levels of controls to choose from. These should be chosen to fit the needs and activities within an application and to achieve the required energy saving and comfort.

One of the most basic controls and the first step into manual dimming is "**RotaryDIM**", a very simple recess wall mounted rotary DSI dimmer that can be connected to Thorn High Frequency DSI dimmable (HFD) luminaires, controlling up to 20 DSI ballasts in total. The lighting can be raised, dimmed and dimmed to off, by turning the control knob. This product combines digital dimming with the intuitive operation known from domestic lighting controls.

Thorn Pull **SwitchDIM** (PSWD) luminaires come with integrated pull cord momentary action switches. Typically used in offices lit with suspended luminaires. Using the pull cord momentary action switch the user may manually set the light level from 100% down to 1%, and switch the light on and off.

The easiest way to automate lighting is the use of "**SwitchLite**" presence detectors, installed into recessed ceilings, mounted onto ceilings, into corners or onto walls. These detectors switch the lighting on when movement is detected, and, after a configurable Off delay time, switch it off when vacancy is detected. Different **SwitchLite** presence



Fig. 6.1 RotaryDIM DSI dimmer

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detectors are available suitable for various mounting needs and detection patterns, and using passive infrared (PIR) or microwave technology to detect presence and absence. Some products additionally provide an integrated photocell that can be set so that the detector only switches lighting on when the ambient light level is below a preset level. This kind of presence detection is typically used in spaces such as corridors, staircases, warehouses, storerooms or lavatories, and can reduce the energy usage by up to 90 per cent. Instead of lamps being switched on for the whole day they are automatically switched off when not needed.

Thorn High Frequency **SensaDigital** (HFS) luminaires combine manual dimming with daylight and presence link. These luminaires provide an integrated miniature multi-sensor head. Depending upon the connections provided within the luminaire HFS luminaires may also be used to control standard HFD luminaires in a so-called master and slave arrangement. The number of DSI ballasts incorporated in the master as well as the slave luminaires can be up to four in total: E.g. in an office or a meeting room up to four single-ballast luminaires can be linked to maintain illuminance during the whole day (taking into account the available daylight as well as the ageing of lamps and dirt on the luminaires), and additionally can provide a presence-link function as described above. Alternatively for the control of a larger space with more luminaires, a remote **SensaDigital** head can be used, for example the "SENSA MRE SEND DSI". This multi-sensor head can control a group of HFD luminaires incorporating up to eight DSI ballasts in total, and incorporates the same functionality as described above for the **SensaDigital** luminaires.

This portfolio is called **SensaDigital**. For the manual control of **SensaDigital** an infra-red handheld controller "SENSA SENRC" is available, as well as an infra-red programming tool "SENSA SENP" for the configuration of Off delay time, operation mode, maintained illuminance level and many other settings.

For applications such as classrooms and open plan offices either several remote **SensaDigital** heads connected to standard dimmable luminaires, or several master-slave arrangements of **SensaDigital** luminaires with standard dimmable luminaires can control several luminaire groups individually, reflecting the flow of daylight within a bigger area



Fig. 6.2 Presence detector



Fig. 6.3 HFS luminaire



Fig. 6.4 Handheld controller

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and the presence of people within the different zones lit by the luminaire groups.

For versatile one-room applications the “**SensaModular**” system may be used. This is a Lego-like portfolio consisting of two differently sized control modules, and accessories for automation and operation. Both control modules have DSI/DALI auto detection outputs for the use of either HFD or HFX luminaires (“HFX” stands for High Frequency DALI dimmable). The large **SensaModular** controller shows three digital outputs, the small controller two digital outputs for controlling luminaire groups: Table 6.1 shows the number of ballasts that can be connected:

	3-fold output controller	2-fold output controller
Using DSI ballasts only	50DSI + 50 DSI + 50DSI	50DSI + 50DSI
Using DALI ballasts only	25DALI + 25DALI + 25DALI	25DALI + 25DALI
Using DSI and DALI ballasts	25DSI + 25DSI + 25DALI, or 25DALI + 25DALI + 25DSI	25DSI + 25DALI

Table 6.1 SensaModular Controller Capacity

To keep commissioning and maintenance simple, the addressing feature of DALI is not used with **SensaModular** when DALI ballasts are connected (so called “broadcast” operation). Both controllers show inputs for the connection of standard double, single momentary action or centre-off retractable switches to manually dim, brighten and switch each output individually. The large controller also shows a switch input for the joint operation of all three outputs. A standard 230VAC presence detector, for example a **SwitchLite** detector, can be connected to the controllers, and the Off delay time and operation mode (automatic, semi-automatic or corridor) can be set via integrated rotary switches.

Using the intelligent interface - a polarity-free 2-pole connection - the system can be extended. To link the luminaire groups to the incoming daylight, **SensaModular** provides three possibilities, all reflecting the daylight flow:

- Either one look down multi-sensor head per group, ideal in larger and zoned applications such as open plan offices, or
- one multi-sensor head for all groups, ideal for smaller applications such as single offices, or

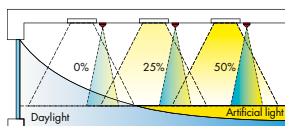


Fig. 6.5 Look down sensors

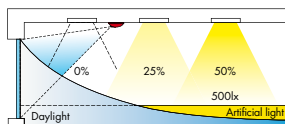


Fig. 6.6 Look out sensors

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- one look out photocell for all groups, ideal for applications comprising rows of luminaires and not requiring infrared control, such as classrooms and sports halls, but especially any application with ceiling heights above 3m.

Both the multi-sensor head and the photocell are part of the **SensaModular** offer. Different illuminance levels for the two or three luminaire groups can be set and stored. With the multi-sensor heads the luminaire groups are not only linked to daylight, but also to presence and absence. The configuration of Off delay time and operation mode happens the same way as when a standard detector is used (described above).

With the **SensaModular** infra-red handheld controller the multi-sensor heads are allocated to the luminaire groups. This remote control can also be used to set and recall three scenes, and to switch, dim and brighten each luminaire group individually.

Alternatively, or additionally, the **SensaModular** recess wall mounted scene plate enables manual control of the luminaire groups and the setting and recall of three scenes as well, and the active scene is visualised via LED indicators.

In some countries Thorn offers the **“SensaAdvanced”** portfolio, one of the most versatile systems on the market, allowing the control of up to 99 luminaire, blind and screen groups, in up to 99 rooms, and the possibility to create up to 20 scenes per room. This portfolio works with any type of luminaire and provides different DSI, DALI, relay outputs and phase dimmers. Blinds, blackout blinds and projection screens may also be controlled using **SensaAdvanced**. Different operation and commissioning units, such as wall mounted scene plates and touch panels are available, as well as infrared control and software to use a PC or laptop for recalling scenes. Time automation enables the installation to be switched at

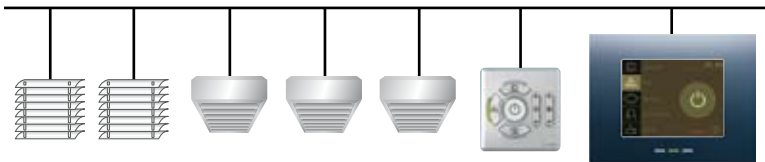


Fig. 6.7 SensaAdvanced components

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certain times and days and, with sequence automation, dynamic changes of light levels, direction and colour can be achieved. Partition management enables the system to adapt to partition walls being closed or opened, and enables the individual or joint control of the adjacent areas. Scheme design and commissioning of **SensaAdvanced** is available as a service, please contact your Thorn representative where applicable.

In some countries Thorn offers the **"SensaLink"** portfolio, enabling the linking of several groups of multi-sensors, either remote sensors or sensors integrated into HFL luminaires ("HFL" stands for high frequency **SensaLink**) within a larger space, throughout the floor of a building or through the whole building. The sensor groups work as described for **SensaDigital** above. Additionally these groups can be linked such that a group listens to other groups. This feature is used to keep lights on in corridors or notional corridors, and in staircases and common zones while one of the adjacent areas reports presence. Blackout blinds and projection screens may also be controlled via **SensaLink**. Different operation units are available such as wall mounted scene plates and infrared control, allowing storing and recall of up to six scenes. A versatile infra-red commissioning tool is used to configure and address the system. This portfolio also provides relay outputs for switchable luminaires. During commissioning DSI outputs can be changed to DALI broadcast outputs if required. The partition management functionality enables the system to adapt to partition walls being closed or opened, and enables individual or joint control of the adjacent areas. Scheme design and commissioning of **SensaLink** is available as service, please contact your Thorn representative where appropriate.

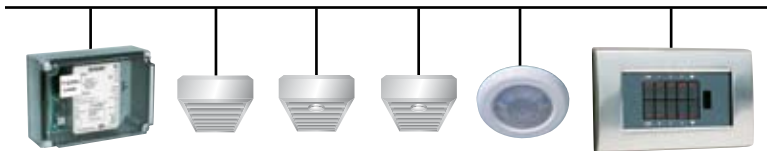


Fig. 6.8 SensaLink components

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Instead of HFD luminaires containing DSI ballasts, DSI compatible transformers and phase dimmers are available and can be connected to any DSI output:

- **Phase dimmers** allow the dimming of luminaires with high voltage incandescent or tungsten halogen lamps, as well as luminaires incorporating low voltage tungsten halogen lamps plus electronic or magnetic transformers.
- **Electronic transformers** allow the control of luminaires incorporating low voltage tungsten halogen lamps without transformers.

Using these DSI controllable devices the connected luminaires can be part of any scheme incorporating Indoor Lighting Controls, can be daylight linked, can contribute to lighting scenes and much more.



Fig. 6.9 A phase dimmer



Fig. 6.10 An electronic transformer