ecoPOINT by FOS Lighting

Specification & Commissioning Guide

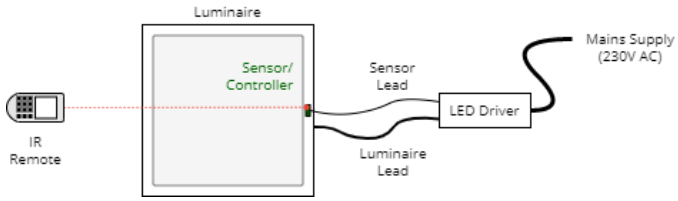
Technology Overview

The sensor-integrated 'Smart' panels from Ecopoint embed simplified but flexible lighting control and automation into high performance luminaires. A brief overview of the proposed technology follows:

1. A discrete combined sensor-controller unit is integrated into the outer frame of the luminaire, which incorporates an occupancy detector (passive infrared), a photocell sensor (for reading ambient light levels), and an IR receiver (for communication with a remote).

2. The sensor/controller is connected to a dimmable driver, drawing a low-voltage power supply from the driver, and providing dimming signals back to the luminaire.

3. Commissioning and/or control of the sensor and luminaire is undertaken point-by-point by a handheld IR remote.



Key Functionality

This sensor-integrated technology offers the following key functions:

* Automated occupancy-based control – the integrated PIR sensor detects activity in the area immediately adjacent to each luminaire and can switch and/or dim lighting accordingly. Occupancy control strategies can enable three strategies: 'on/off', 'on/standby/off', or 'on/standby.'

* Automated daylight harvesting control – the integrated photocell monitors ambient light levels (at the sensor) and can modulate luminaire light output up or down to maintain a set illuminance as natural light contributions fluctuate.

* Manual trimming (dim up/dim down) and switching (on/off)

It is important to understand that this arrangement is non-communicating. The sensors are deployed luminaire-by-luminaire and have no means of communicating with each other, so each luminaire will operate independently of other surrounding luminaires. While this therefore doesn't allow control in coordinated groups, it does allow for very fine resolution of control (sensors reacting to the environment immediately surrounding them) and removes the requirement for a large-scale commissioning process to identify and address luminaires before the system can be made operational.

Integration with other systems

As a stand-alone and self-contained lighting control solution, this sensor-integrated technology can operate with high levels of efficiency and fine-scale spatial resolution without the need for any additional control mechanisms.

However, it can also integrate with circuit-level switching control without loss of functionality, acknowledging that those mechanisms will inevitably sit higher in the control hierarchy than any of the functions of the sensor/controller at the luminaire-level. 'Master' control functions such as time-clocks, BMS-automated switching control (schedules, after-hours overrides etc.), and even local wall switches can offer overall circuit switching control, energising or de-energising the luminaires themselves. When energised, the integrated sensor/controller is then able to take over 'local' control of the luminaire according to its commissioned settings. When circuits are de-energised, the lighting is overridden 'off' and cannot be operated until power is re-applied to the circuit (which can be used, for example, in meeting rooms for AV presentations, where a local wall-switch can be used as a single-point control to override lighting 'off' even when users are present).

The commissioning settings of the sensor are stored in non-volatile memory within the integrated sensor/controller unit, so interruptions to the power supplied to the luminaire—either by power cut or deliberate switching of the circuits—do no require the luminaires to be reprogrammed. When recovering from a power interruption, the sensor-integrated luminaires will briefly come up to 100% output, before settling back to the state they were in previously.

Understanding PIR Detection

It is critical to understand the way Passive Infrared (PIR) detection works, so that the strengths and weaknesses of the technology can be allowed for in the design and commissioning of these integrated-sensing luminaires. Most importantly...

1. PIR is a 'line-of-sight' detection method, and so detection coverage is constrained by obstructions like walls, partitions, and even items like plants. If the sensor cannot 'see' the activity, it will not trigger.

2. Detection is registered by the sensor when it 'sees' changes in the thermal signature of its surroundings — i.e. the sensor triggers when a warm body moves within the detection area. In a building interior, this is usually a human body, but sensors can be triggered by inanimate objects like a warm piece of paper coming out of a photocopier. Because it is 'seeing' thermal signatures of surfaces, a PIR cannot usually 'see' through glass.

3. The thermal signature is monitored in 'beams' originating at the sensor and propagating out across the detection area. To register a change (trigger), the sensor needs sufficient movement across an entire beam. The beams are relatively small close to the sensor, and therefore the necessary movement is relatively small. Further away, the beams are larger and so the movement needs to be larger for a trigger. Detection performance is better for movement 'tangential' to the sensor than it is for movement directly towards the sensor. Depending on your position relative to the sensor, small movements (such as typing at a desk) may not be large enough for detection, but waving a hand will be sufficient.

SENSOR SPECIFICATIONS:

Sensor Type	Passive Infrared
Mounting Height	3 — 4 m (recommended)
Detection Area	6 m dia. @ 100% sensitivity (75%, 50% and 25% opt.)
Programming/Commissioning	Remote Control (IR)
Occupancy Hold Time	Variable; 5 sec to 60 min
Stand-by Time / Settings	Variable; 0 sec to 60 mins (or never off) / 10 to 50%
Daylight Type / Settings	Dimming; modulation based on detected ambient light
Input Power	Driver auxiliary output (12-24V DC / ≥ 8 mA)

RECOMMENDED OPERATING CONFIGURATIONS:

Designing with 'Smart' panel luminaires

These 'Smart' luminaires are built as an extension of Ecopoint's proven Edge-lit and Back-lit panel platforms, and they retain all of the same photometric, colourimetric, and thermal performance specifications as the standard products. Lighting design can therefore follow the same process as the standard products, including the derivation of maintenance factors, selection of luminaire power and flux packages, and positioning of luminaires to achieve the desired lighting performance.

However, there are a few additional items which should be considered when specifying the sensor-integrated 'Smart' panels in a lighting design:

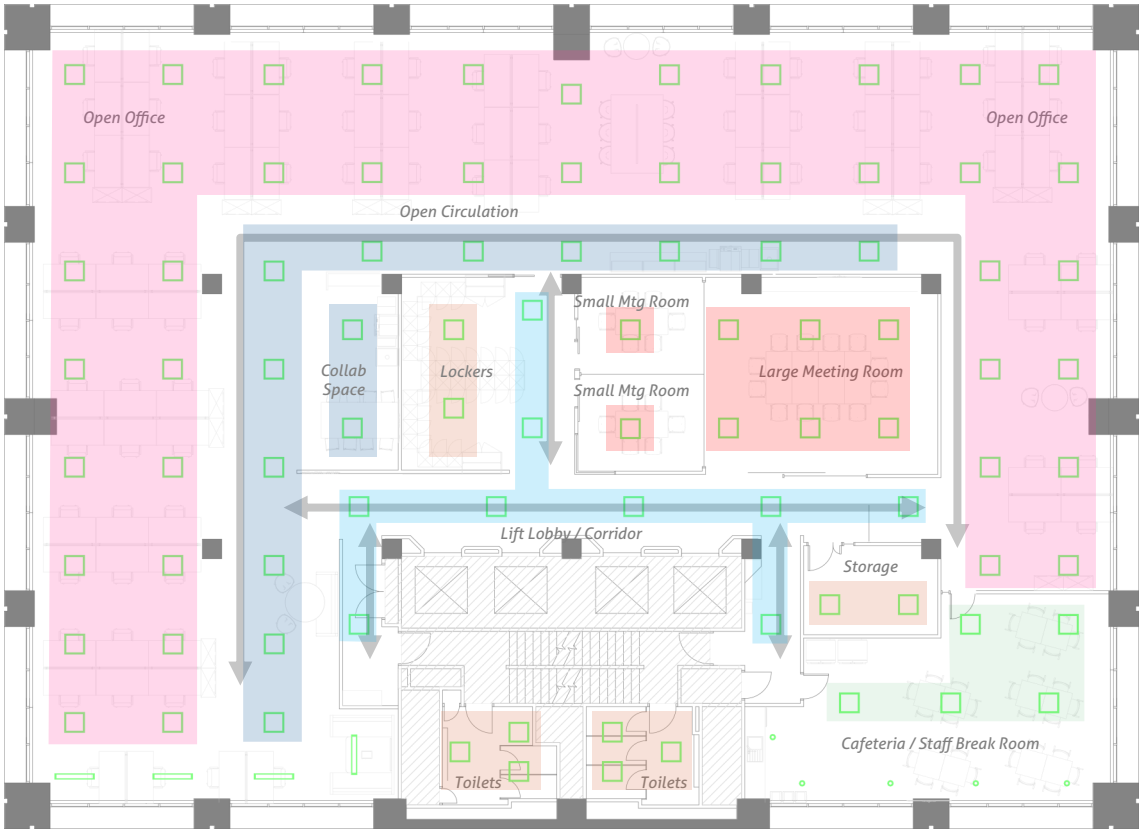
* Verify that the proposed luminaire mounting height is compatible with the maximum recommended sensor height (see overleaf). This should not be a problem for most commercial office spaces, where mounting heights typically range from 2.5 to 3.5 m above floor level.
* Verify that the proposed luminaire layout, and therefore the resulting sensor positioning, will provide sufficient PIR detection coverage for the expected task areas below. The nominal sensor range at full sensitivity is noted in the table overleaf (based on typical mounting heights) and this will normally provide adequate coverage on typical luminaire spacings of up to 3.0 m x 3.0 m (centre to centre).

Needs Analysis

The development of an effective and efficient commissioning plan starts with building an clear understanding of the current (or expected) operations of the building. Working through space-by-space, ensure you understand...

1. Tasks undertaken in the space, and the visual requirements of those tasks across a typical day.
2. Occupancy patterns, including the types of occupants, dwell times, and the normal hours of activity.
3. Potential for non-standard activities (i.e. occasional after-hours occupancy, spaces which occasionally serve different purposes to their routine uses).
4. Availability of natural light, in relation to the normal occupancy patterns.
5. Requirements for manual over-ride or manual adjustment.

Compiling a space-by-space functional description for the lighting automation is typically a useful step in communicating the intended controls operation to all stakeholders prior to commissioning, and once agreement is reached that document can then be adapted into a final commissioning plan.



A: **Open Plan Office Task Areas**

B: **Open Circulation / Collaboration Spaces**

C: **Lift Lobby / Internal Corridor Areas**

D: **Meeting Rooms**

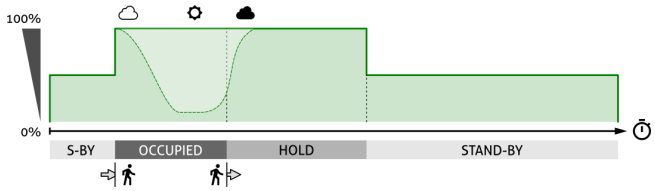
E: **Cafeteria / Staff Break Room**

F: **Storage / Lockers / Toilets**

A: Open Plan Office Task Areas

The recommended configuration for open plan office task areas seeks to balance energy efficiency optimisations with minimising the potential for nuisance for users. The 'never-off' 50% stand-by mode when vacant ensures a minimum level of background light is maintained even in areas where users are absent. A generous daylight control level maintains good light levels without sacrificing efficiency.

Parameter	Setting
Detection Range	100%
Hold-Time	15 mins
Stand-by Level	50%
Stand-by Period	Infinite (never off)
Daylight Sensor	300 lux

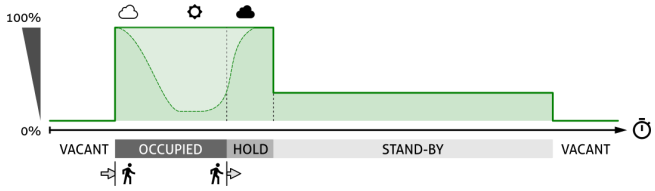


B: Open Circulation / Collaboration Spaces

The recommended configuration for these areas acknowledges that activity is typically intermittent, and automating the control of lighting based on occupancy can harvest good efficiencies. This is balanced, however, by a comfortable stand-by mode to ease the transitions.

Where the luminaires in a circulation area are obviously contributing to functional lighting for an adjacent office task area, they should be commissioned as the lighting for the office task area.

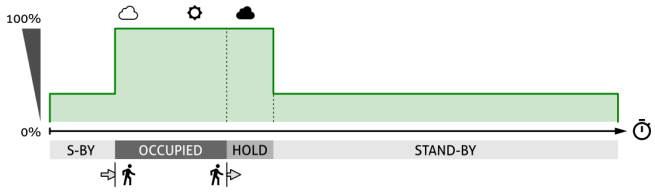
Parameter	Setting
Detection Range	100%
Hold-Time	5 mins
Stand-by Level	30%
Stand-by Period	30 mins
Daylight Sensor	100 lux



C: Lift Lobby / Internal Corridor Areas

These areas differ from open circulation areas in that they generally do not enjoy much contribution of natural light, and so it is important to maintain safe background levels of lighting at all times. They are often also key entry-exit points for users, so again, maintaining background levels of lighting aids orientation and supports a feeling of safety, especially for users who are not necessarily familiar with the space. A short hold-time reflects the fact that activity is usually brief and transient.

Parameter	Setting
Detection Range	100%
Hold-Time	5 mins
Stand-by Level	30%
Stand-by Period	Infinite (never off)
Daylight Sensor	Disable

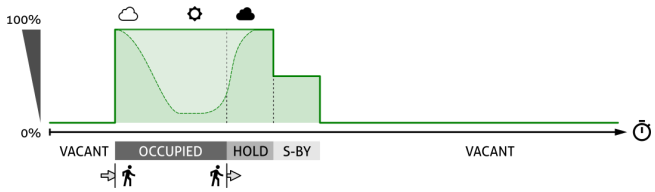


D: Meeting Rooms

Meeting rooms typically experience periods of concentrated activity, separated by long periods of vacancy. A relatively short hold-time allows the room to quickly revert to its 'off' state after being vacated, with a brief stand-by period to reduce nuisance switching/ dimming.

Depending on the size and use of the meeting room, it may be useful to incorporate a manual light switch on the wall to over-ride lighting off (to help with AV/presentations).

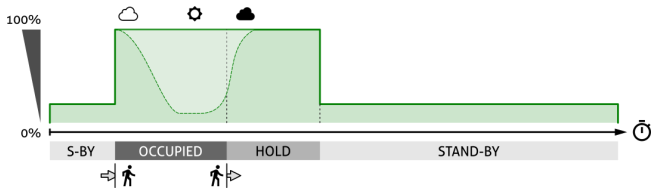
Parameter	Setting
Detection Range	100%
Hold-Time	5 mins
Stand-by Level	50%
Stand-by Period	5 mins
Daylight Sensor	300 lux



E: Cafeteria / Staff Break Room

While these areas can be vacant for extended periods, they can also be occupied without much accompanying movement (while users rest/relax). It is important, therefore, to provide a ensure that a comfortable stand-by mode is always provided in case sensors time out while users are still present.

Parameter	Setting
Detection Range	100%
Hold-Time	10 mins
Stand-by Level	20%
Stand-by Period	Infinite (never off)
Daylight Sensor	200 lux

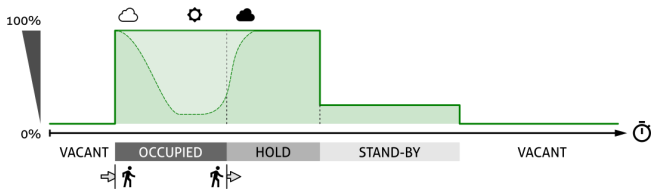


F: Storage / Lockers / Toilets

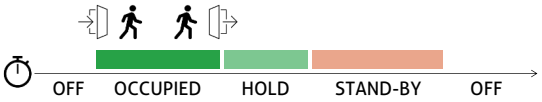
Activity in these spaces is typically intermittent, but dwell-times can vary significantly and daylight is often limited.

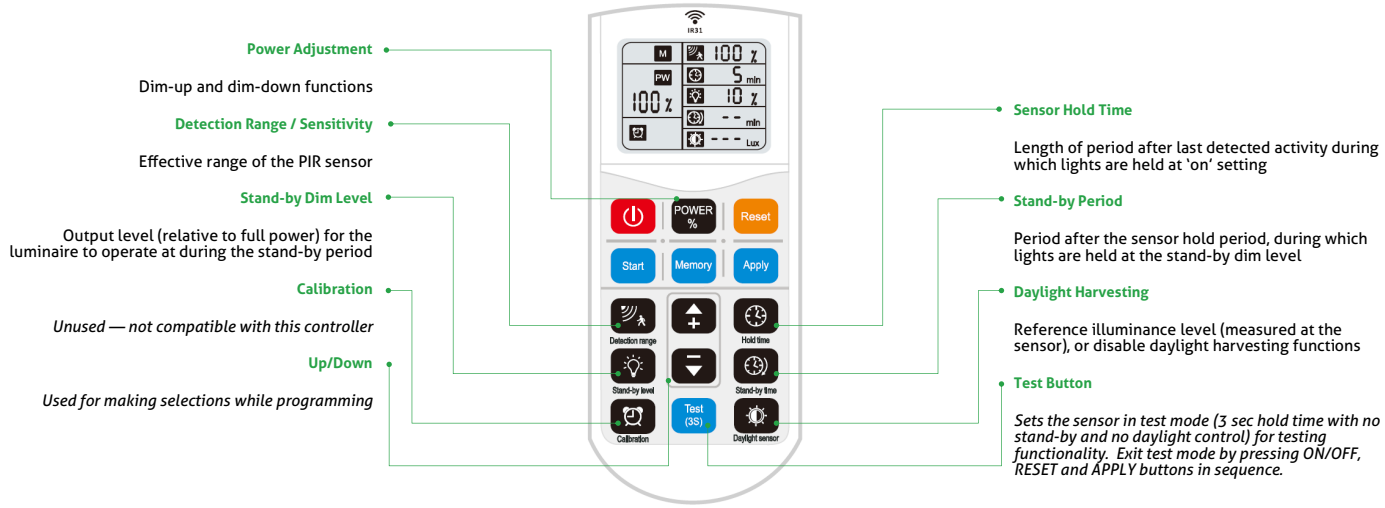
It is particularly important to carefully consider the location of sensors in toilets where detection areas may be obstructed by partitions and/or walls. If coverage cannot be guaranteed, err on the side of longer hold-times and consider infinite stand-by (never off) for some or all luminaires to ensure users are never left in darkness while still being present in the space.

Parameter	Setting
Detection Range	100%
Hold-Time	10 mins
Stand-by Level	20%
Stand-by Period	15 mins
Daylight Sensor	100 lux



IR REMOTE PROGRAMMING AND COMMSSIONING:





Override ON/OFF function
Use this button to override the sensor and switch luminaire ON or OFF. While programmed in the override ON mode (i.e. sensor disabled), the central up and down buttons will manually brighten or dim the luminaire output.

When programmed in the override ON mode, that mode will be retained after power is interrupted. However, when programmed in the override OFF mode, the mode will *not* be retained (i.e. the luminaire will revert to its automated program after power is reapplied).

Power Adjustment button
Use this button to set the luminaire output level when the luminaire is in the OCCUPIED or HOLD state. After pressing this button, use the central up and down buttons to select the preferred option.

Selections: 10% to 100% (in 5% increments).

Reset button
Use this button to reset all functions back to factory defaults and activate automated mode.

Default settings are: Detection range = 100%, Hold-Time = 5 min, Stand-by Dim Level = 10%, Stand-by Period = Infinite and Daylight Sensor = disabled

Detection Range / Sensitivity
Use this button to set the desired detection range. After pressing this button, use the central up and down buttons to select the preferred option.

Selections: 25%, 50%, 75%, 100%

Hold-Time
Use this button to set the desired hold-time period — the time beyond the last detected activity during which the luminaire stays at 'full' output. After pressing this button, use the central up and down buttons to select the preferred option.

Selections: 5, 30, 90 sec, 5, 10, 15, 30, 60 min

Stand-by Dim Level
Use this button to set the desired output level when the luminaire is in the STAND-BY state. After pressing this button, use the central up and down buttons to select the preferred option.

Selections: 0%, 10%, 20%, 30%, 50%.

Stand-by Time
Use this button to set the desired stand-by period — the time beyond the end of the HOLD period during which the luminaire stays in it's STAND-BY state. After pressing this button, use the central up and down buttons to select the preferred option.

Selections: 0, 10, 30 sec, 1, 5, 10, 30, 60 min, infinite

Note that the infinite stand-by setting means that the luminaire never switches off completely as part of it's normal automated cycle, even after extended periods of vacancy.

Daylight Sensor
Use this button to set the desired daylight harvesting reference point — the level which the controller uses to control the automated dimming/ modulation of light output based on available daylight.

Selections: 5, 25, 50, 100, 200, 300, 400, 500, 600, 800, 900 lux, disabled

Note that the illuminance levels are measured at the sensor (i.e. at ceiling level), and are intended as 'nominal' values only. After pressing this button, use the central up and down buttons to select the preferred option.

One-touch Commissioning

1. Press the 'Start' button to enter the one-touch mode, and then progressively programme all of the desired settings (ensuring no more than 30 sec elapses between button presses).
2. Press the 'Memory' button to commit the settings into the remote's memory storage. All of the confirmed settings should be displayed on the screen of the remote.
3. Point the remote at each of the sensor/controllers to be commissioned with the memorised settings, and then press 'Apply' to transfer those settings to each luminaire.

NOTES

1. When a function button is pressed, the corresponding function icon on the remote screen will flash to indicate that it is awaiting a selection using the up/down buttons. After flashing uninterrupted for five seconds, the setting will be saved.
2. The luminaire will 'blink' as a confirmation that a signal from the remote control has been successfully received.
3. The display screen on the remote will automatically switch off after 30 minutes of no use. Pressing any button will 'wake' the remote.

FOS Lighting Limited
2 Jarden Mile
Ngauranga, Wellington 6035
PO Box 12646

Thorndon, Wellington 6144
P: +64 4 499 3636
E: info@foslightingnz.co.nz
W: www.foslightingnz.co.nz