PHILIPS

Ledinaire

Small effort. Big savings.

Discover Ledinaire EcoSet for a simple upgrade from regular on-off lighting to an automated solution!

Application manual

Content

1. Ledinaire EcoSet introduction

Ledinaire EcoSet enabled products provide an easy-to-set-up and simple-to-use wireless lighting controls. Aimed to elevate energy savings in parking applications, the core components of the Ledinaire EcoSet system are LED luminaires and an external AC powered sensor.
Overall, the system offers:
(a) easy to install lights and sensors with no prior skill set needed;
(b) energy savings by dimming via motion & daylight sensing and
(c) a comfortable lighting experience for cars & pedestrians via wireless technology.

Wireless communication between luminaires and sensors is enabled by activating the sensor. It then triggers luminaires in its signal range to dim on motion or daylight.

1.1. System offering

Ledinaire EcoSet Parking Products

Ledinaire waterproof EcoSet

Ledinaire parking sensor EcoSet

2. Parking system components

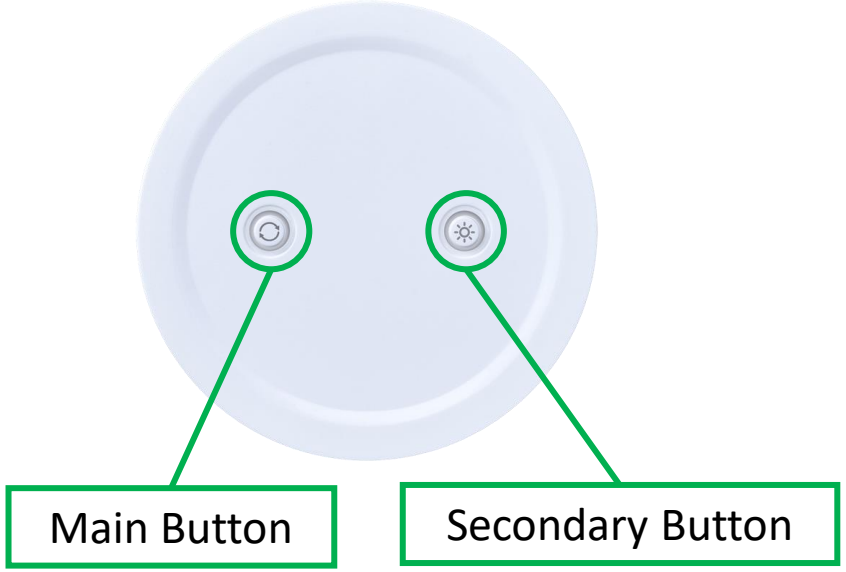
Wireless Luminaire:

Ledinaire EcoSet waterproofs have an integrated wireless module which communicates with the wireless sensors in its range.

2. Parking system components

Wireless Sensor:

The wireless AC powered parking sensor primarily incorporates a motion & daylight sensor coupled with a wireless RF module. It controls the lighting behaviour of luminaires in its range. Multiple parameters such as hold time, background level, signal range, mode of operation & sensitivity are adjustable via dip switches on the rear of the sensor.



Two functional buttons exist on the front face: the left one is main button is used for linking. The secondary button on the right is used to enable/disable sensing functions. A red LED indicator is integrated for feedback.

2.1. System operating behaviour

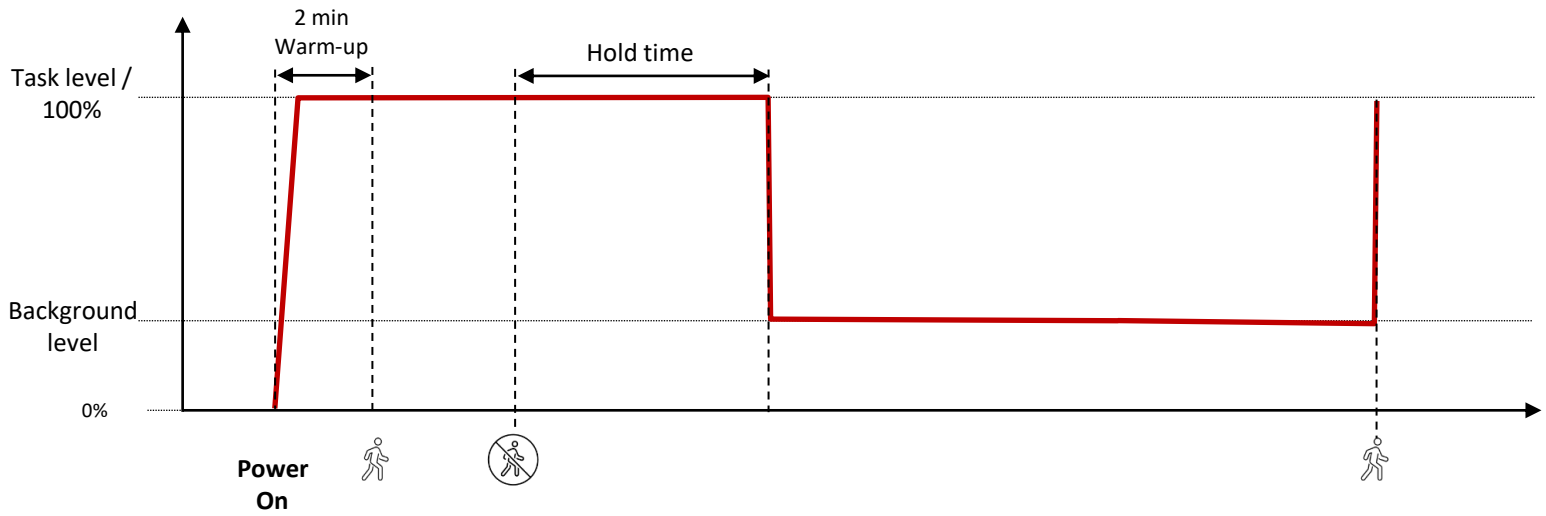
In a Ledinaire EcoSet parking application, grouping action is not required. Upon a simple linking process, the luminaires react to sensor signal within a certain distance range. In addition, a luminaire can be controlled by multiple sensors in proximity.

In a typical environment, the sensor control distance (default) is around 12-15m. Since the wireless signal is highly influenced by the environment including materials, obstacles and signal interference, the control distance may vary in different application and/or communication conditions.

2.2. System operating behaviour

The illustration below shows the typical occupancy cycle of a luminaire controlled by the motion sensor.

Figure 2.2.1 System operating behaviour



- When there is motion detected the light level will remain at 100% / task level.
- **Hold time**: When motion is no longer detected, the light level will remain constant for the hold time, after which it will dim to the background level.
- **Background level**: The dimmed level when there's no motion detected after the hold time.

2.3. System parameters

Specification	Value	Remarks
Sensing type	Motion & Daylight	Through AC powered Microwave sensor, both motion & daylight sensing is possible
#lums controller by 1 sensor	Based on distance/ max. 50 luminaires	
Control method	Lights operate within the signal range of the sensor and react on triggers from sensors	Zero setup needed. Activate the sensor to enable linking to luminaires.
Control distance		There are four control distance settings (>3m, >5m, >8m, >12m) that can be adjusted through a dip switch. It‘s important to note that the control distance may vary depending on the specific field conditions, such as the direction of the sensor to the luminaire, the presence of walls or other obstacles that may reflect the radio signal, and other environmental factors that may impact the transfer of the radio signal. It could happen that some closer luminaires are not grouped, while luminaires at longer distances are grouped under one sensor.
Startup time	2 min	After manual power on, the luminaire lasts from power on light level (100%) to task light level for 2 minutes for self-check and warm-up.
Hold time (mins)	3*/10/15/30	The time it takes for the luminaire brightness to switch from task light level to background light level when no people or car movement.
	* = default	

2.3. System parameters

Specification	Value	Remarks
Task level (%)	100%	The brightness of luminaire after 2 minutes of power on.
Background level (%)	20*/30/50/70	The low light level at which luminaire dims down when no people/car movement
Working light level	100%* 20% - 100%	The working light level of luminaire when receiving people/car moving signal. The default value of working light level is task light level, which will be overwritten by daylight light level when daylight function is in effect. The priority is: daylight light level > task light level.
Lights off after prolong time (mins)	No	Lights always remain at background level and do not switch off. In other words, prolong time is infinite.
Grace Time	No	There is no transition time for light dimming up or down for parking application
Mode of operation	Normal mode* & Demo mode (10 seconds hold time)	Normal mode corresponds to regular sensor operation. Demo mode is designed for demonstration purposes where 'Hold time' gets reduced to 10s.
Daylight based dimming	Yes, default disabled	When daylight received by sensor exceeds threshold value , the dim level of luminaires is lowered.
Dim level (%) during daylight sensing	20/50*/75	When daylight function is enabled and people/car is detected, the sensor will dim the luminaire to a specific level (20%/50%/75%) if the ambient light is above the threshold. Otherwise, the luminaire will remain at 100% brightness.
	* = default	

3. Setting up parking spaces

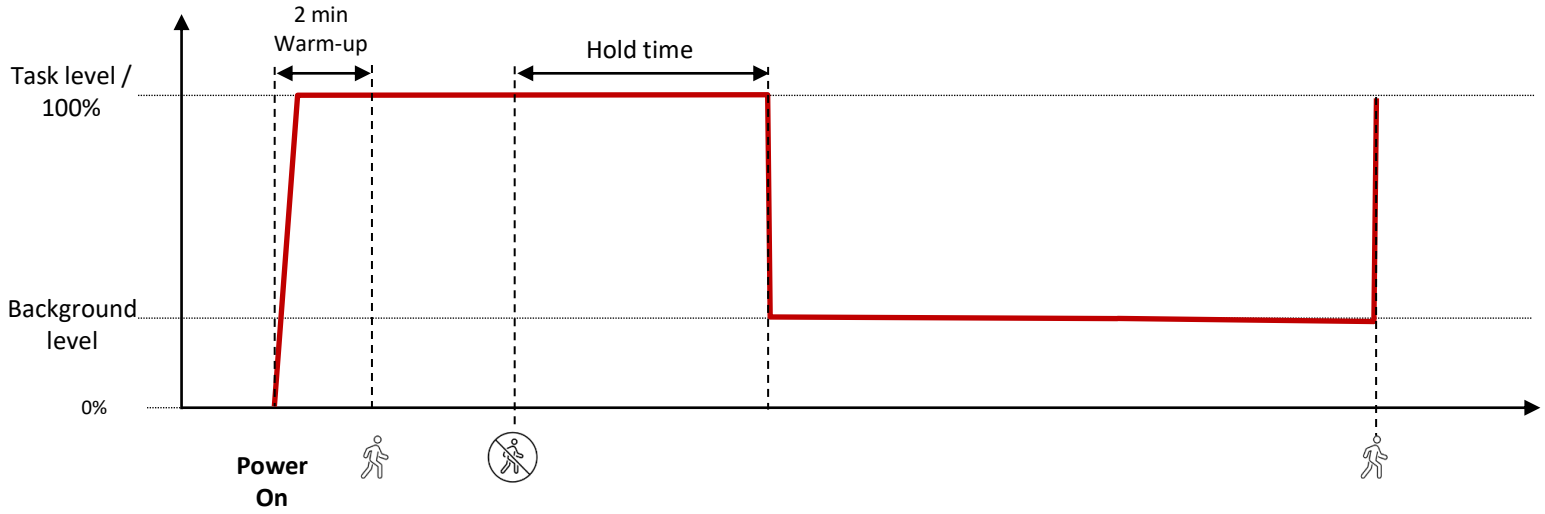
3.1 Luminaire placement

For parking, the luminaires are installed in a line on top of parking spots and in the middle of the driveway.

3.2 Luminaire activation

When the luminaires are powered initially, the default behaviour is 100% light level. The light level will remain at 100% until the moment a sensor is linked. After linking, the luminaires follow the occupancy cycle as shown in Fig 3.2.1

Figure 3.2.1 System operating behaviour



Notes:

Upon power cycle, the luminaires need 2 mins as warm up time. Within these 2 mins, occupancy triggers from sensors are not received.

In case of sensor failure for more than 24 hours, luminaires will revert to 100% brightness.

3. Setting up parking spaces

3.3 Sensor placement

Sensors can be placed with respect to 3 main parameters:

- Detection area
- Control distance (distance to farthest luminaire)
- Environment obstacles such as walls, metal pipes, ventilation ducts, Zigbee routers, etc.

3. Setting up parking spaces

3.4 Application guidelines:

- For optimal performance w.r.t. detection and wireless communication, 1 sensor per 4 luminaires is recommended (assuming a typical parking setup where waterproof luminaires placed 4-5m apart and signal range of sensor is set to Max high: 12-15m). Important to note that parking environment is a challenging space for wireless communication and increase in #luminaires per sensor might result in sub-optimal performance.

- For optimal detection, it is advised to install sensors in the middle of driveway. Additional sensors may be required at key entrance/exit or intersection areas.

- Impact of daylight is visible on sensors installed at the car entrance areas

- Prior to installation, make sure to adapt settings via dip switches on the rear of the sensor (if needed).
  Refer section 4.1 for details.

Note: For further details and warnings on installation of sensors, please refer section 8.

3. Setting up parking spaces

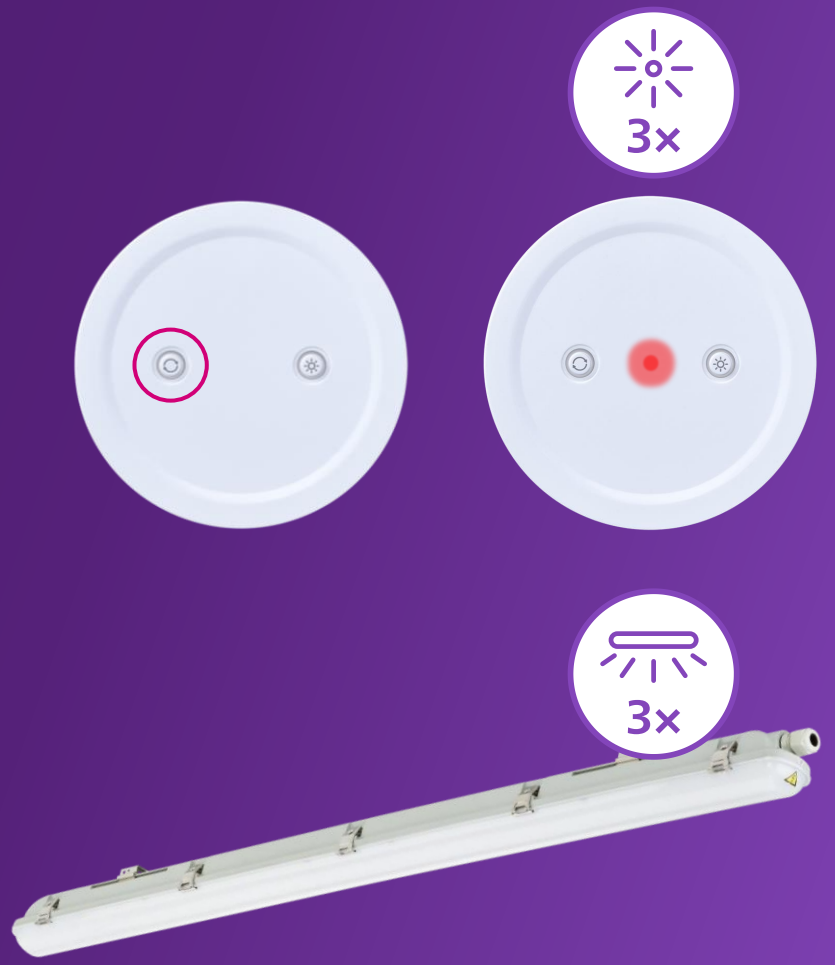
3.5 Linking luminaires to sensors

- Ensure that luminaires and sensors are powered ON for > 30s before sensor can be activated.

- Activate the sensor
  - **Press and hold** the main button on the sensor for **5-8 seconds**.
  - The LED in the sensor unit blinks 3 times to indicate that the linking process has started.
  - The linked luminaires will blink 3 times within 2 minutes.

- Luminaires in the signal range of the sensor are automatically linked
  - It takes up to 2 minutes for the luminaires to link to a sensor.
  - Wait for the linked luminaires to respond before activating the next sensor.

- The setup can be tested by walking out of the sensor coverage area.
  - Lights will dim to background level after hold time.

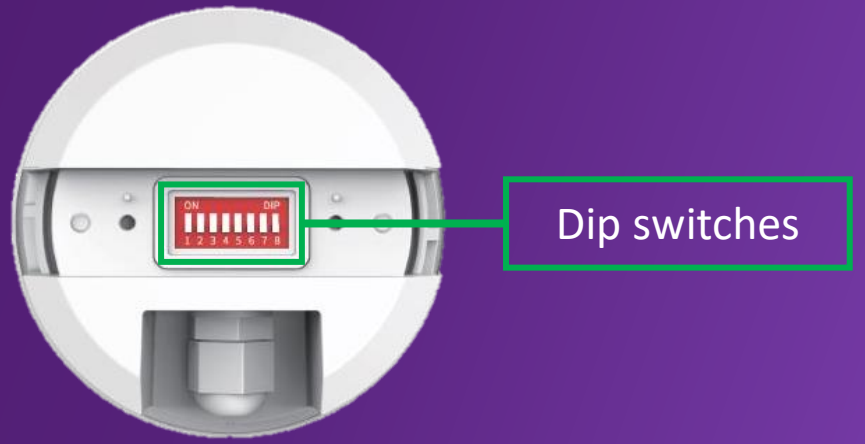


4. Setting up parking spaces – configuration

4.1. Set parameters via Dip Switches (1/2)

		Dip switch position							
		1	2	3	4	5	6	7	8
Hold time	3min ± 18s (default)	●	●	–	–	–	–	–	–
	10min ± 1min	●	▲	–	–	–	–	–	–
	15min ± 1.5min	▲	●	–	–	–	–	–	–
	30min ± 3min	▲	▲	–	–	–	–	–	–
Dim/ background level	20% ± 2% (default)	–	–	●	●	–	–	–	–
	30% ± 3%	–	–	●	▲	–	–	–	–
	50% ± 5%	–	–	▲	●	–	–	–	–
	70% ± 7%	–	–	▲	▲	–	–	–	–
Signal range	Max high (default)	–	–	–	–	●	●	–	–
	High	–	–	–	–	●	▲	–	–
	Middle	–	–	–	–	▲	●	–	–
	Low	–	–	–	–	▲	▲	–	–
Mode of operation	Auto (default)	–	–	–	–	–	–	●	–
	Demo	–	–	–	–	–	–	▲	–
Sensitivity	Normal (default)	–	–	–	–	–	–	–	●
	Low	–	–	–	–	–	–	–	▲

▲= On ●= Off



Refer table to set dip switches for desired settings. Default settings are also indicated.

Hold time - Dip Switches 1 & 2

To adjust the Hold time. It is the amount of time it takes to switch from task light to background level once vacancy (i.e. no people or car movement) is observed by the sensor.

Background level - Dip Switches 3 & 4

To adjust the background level of the luminaires. It is the low light level at which luminaires dim down in case of no car/people movement.

4. Setting up parking spaces – configuration

4.1. Set parameters via Dip Switches (2/2)

		Dip switch position							
		1	2	3	4	5	6	7	8
Hold time	3min ± 18s (default)	●	●	–	–	–	–	–	–
	10min ± 1min	●	▲	–	–	–	–	–	–
	15min ± 1.5min	▲	●	–	–	–	–	–	–
	30min ± 3min	▲	▲	–	–	–	–	–	–
Dim/ background level	20% ± 2% (default)	–	–	●	●	–	–	–	–
	30% ± 3%	–	–	●	▲	–	–	–	–
	50% ± 5%	–	–	▲	●	–	–	–	–
	70% ± 7%	–	–	▲	▲	–	–	–	–
Signal range	Max high (default)	–	–	–	–	●	●	–	–
	High	–	–	–	–	●	▲	–	–
	Middle	–	–	–	–	▲	●	–	–
	Low	–	–	–	–	▲	▲	–	–
Mode of operation	Auto (default)	–	–	–	–	–	–	●	–
	Demo	–	–	–	–	–	–	▲	–
Sensitivity	Normal (default)	–	–	–	–	–	–	–	●
	Low	–	–	–	–	–	–	–	▲

▲= On ●= Off

Signal Range – Dip Switches 5 & 6

There are 4 control distance settings that can be adjusted through dip switches.

Max High: 12-15m
High: 8-12m
Middle: 5-8m
Low: 3-5m

Important Note: Typical maximum control distance is based on an indoor parking environment, without impact on sensor wireless signal performance (e.g. wireless interference, metal shielding etc.). It‘s important to note that the control distance may vary depending on the specific field conditions, such as the direction of the sensor to the luminaire, the presence of walls or other obstacles that may reflect the radio signal, and other environmental factors that may impact the transfer of the radio signal.
It could happen that some closer luminaires are not linked, while luminaires at longer distances are linked to one sensor.

Mode of operation – Dip switch 7

Auto mode is for standard operation. Demo mode should only be used for demonstration purposes prior to installation.
Note: Demo mode hold time is 10 seconds.

Sensitivity – Dip switch 8

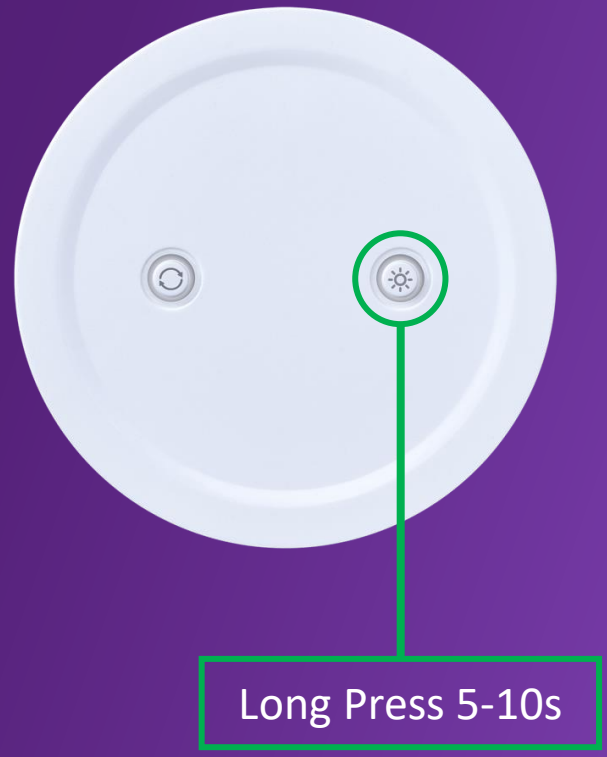
It is to tune the sensitivity to occupancy triggers. Keep ‘normal’ mode for regular operation.
In case of high false triggers occurring due to environmental impact, switch to ‘low’ mode.

4.2. Daylight step dimming – enable/disable

The daylight function is triggered when the sensor detects the ambient light level 2-3 times higher than the light in a typical parking application light (500 lux with a sensor installation height of 3m).
When the ambient light reaches this threshold, the luminaire will dim down to the preset daylight dim level. If the ambient light drops to
1-1.5 times the typical parking application light, the luminaire(s) will return to 100% brightness.

To enable the daylight feature of the sensor, perform a long press (hold for 5-10 seconds) on the Button. The sensor indicator will blink 3 times to confirm.

To disable the daylight feature, perform another long press (hold for 5-10 seconds) on the Button. The sensor indicator will blink 2 times.



4.3. Daylight step dimming - dim level setting

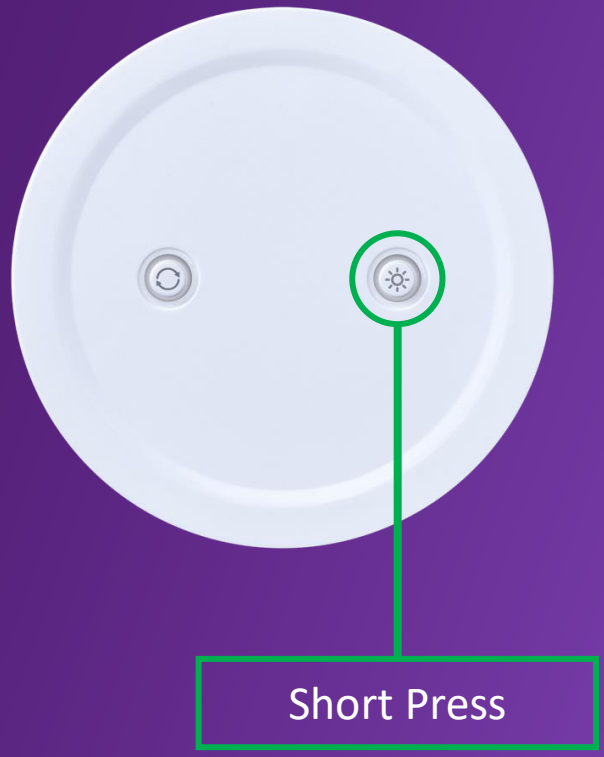
After enabling the sensor's daylight feature, you can adjust the daylight dim level i.e. the light level that sensor dims down to in case of excess daylight.

This dim level can be adjusted by a short press on Button.
The default value is set to 50%. Each press will cycle through the following levels: 50% → 20% → 75% → 50%.

The number of times the LED on the sensor blinks indicated the currently set dim level:

50% = 1x (default)
20% = 2x
75% = 3x

Note: When motion is detected, the luminaires linked to the sensor will light up at the default daylight level.

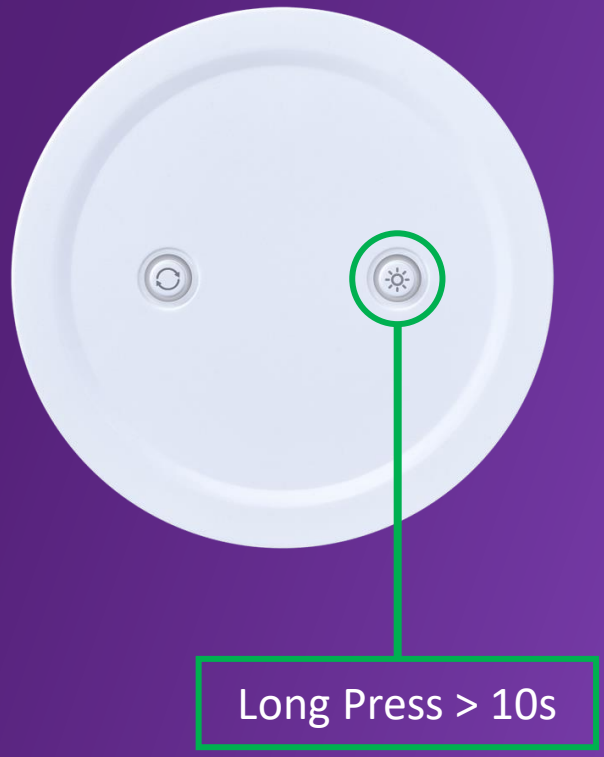


4.4. Disable motion sensing via sensor

To disable the motion feature of the sensor, perform a long press (>10 seconds) on the Button. The sensor indicator will blink 5 times, and then flashes once every 30 seconds to indicate that the motion feature is disabled.

To enable the motion feature again, perform another long press (>10 seconds) on the Button. The sensor indicator will blink 4 times.

Note: Only the motion-enabled sensors will react to motion detection and automatically dim the luminaires when there is no motion.

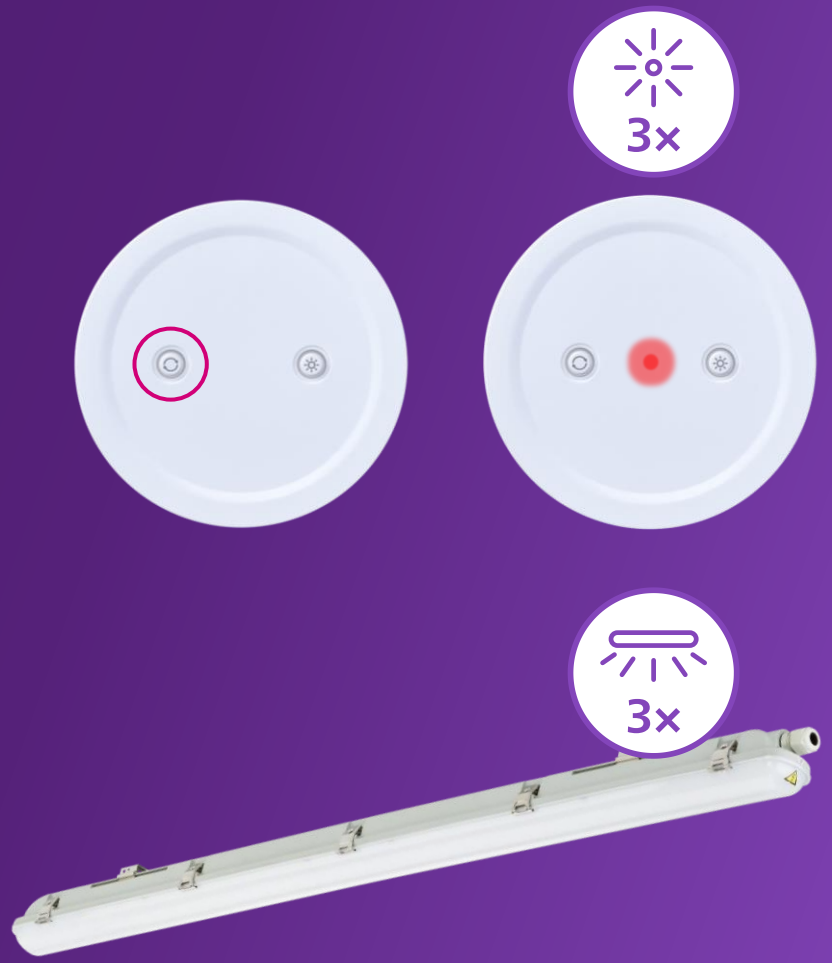


5. Re-linking luminaires & sensors

In circumstances where linking did not result in desired manner or in the instance when modifications in the installation occur, e.g. new luminaires get added, sensor position changes, etc. it is advised to re-link the luminaires to sensors.

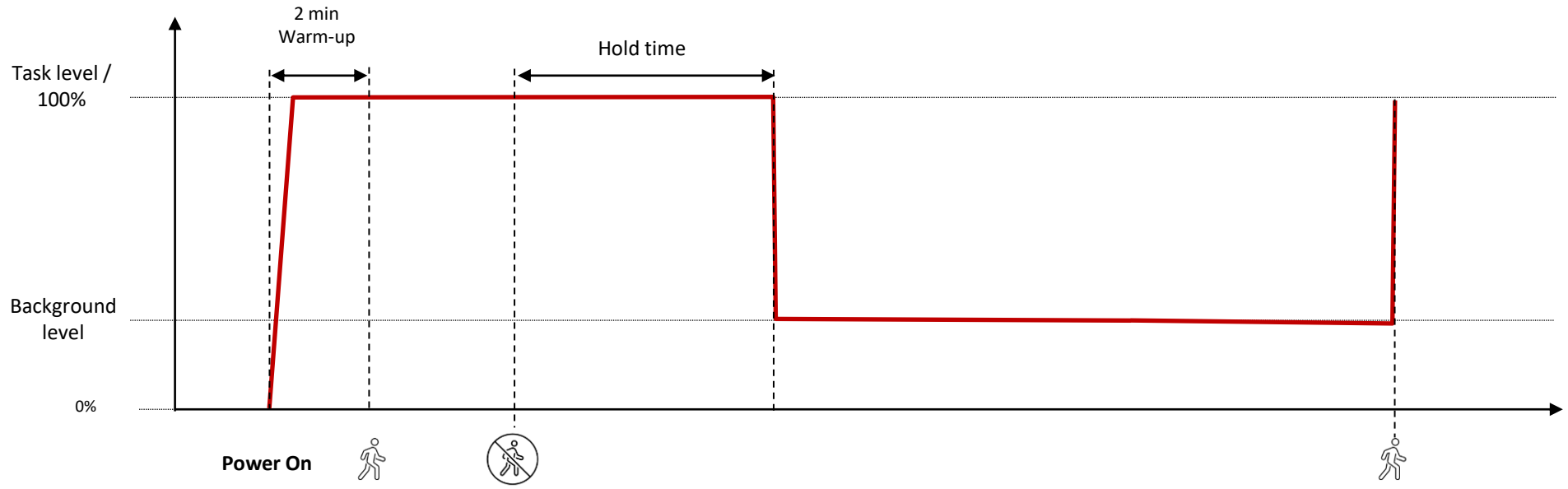
The process remains same as linking the luminaires, and listed as below:

- Ensure that luminaires and sensors are powered ON for > 30s before re-activation.
- Re-activate the sensor
  - **Press and hold** the main button on the sensor for **5-8 seconds**.
  - The LED in the sensor unit blinks 3 times to indicate that re-linking process has started.
  - The re-linked luminaires will blink 3 times within 2 minutes.
- Luminaires in the signal range of the sensor are automatically linked
  - It takes up to 2 minutes for the luminaires to link to a sensor.
  - Wait for the linked luminaires to respond before re-activating the next sensor.



6. System behavior after setup

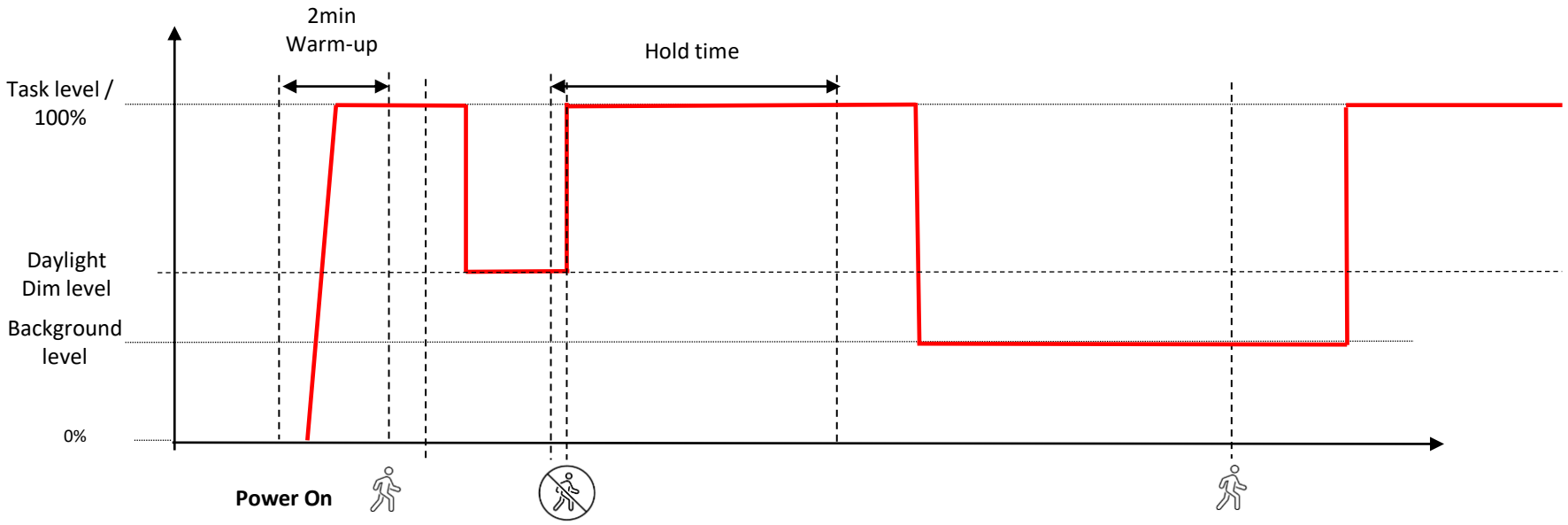
Figure 6.1. System sensing behaviour



- Luminaires will go to 100% light level when motion is detected.
- Luminaires will dim to the background level after the hold time where no motion has been detected. They remain at background level and don’t switch off.

6. System behavior after setup

Figure 6.2. System sensing behaviour with daylight dimming



- When daylight exceeds threshold, luminaires dim to pre-defined dim level.

7. Parking – system behavior after power cycle

In case of power cycle of luminaires, the luminaires need 2 mins of warm up time before normal operation resumes. Within these 2 minutes, sensor triggers will not work.

After 2 mins, the lights resume normal behaviour. Previously linked functionality is maintained after power cycle unless re-linking is performed.

8. Sensor installation warnings

- The sensor product is only for indoor use where waterproof luminaires are typically used. Outdoor use may be false triggered by wind, rain and surrounding moving objects.
- It is recommended that sensors be installed at a ceiling height of 3m to ensure motion coverage and detection range, the distance between the two sensors should be greater than 1.5 meters.
- If using products with relays, power-on/power-off switching time should be more than 5s, to avoid the use of products during the relay has not yet fully recovered.
- The principle of microwave sensor is to detect the signal of object movement, therefore, the sensor installation position should be avoided around the fan, curtains, ventilation ducts, air conditioning vents and other equipment that can easily lead to movement or vibration, so as not to cause the sensor false trigger.
- Sensors should be avoided from being installed on a metal plane, as the metal plane will reflect the radiation from the AC part of the sensor, causing greater power frequency radiation interference to the microwave radar inside the sensor, resulting in false trigger of the sensor.

8.1. Safeguarding measures for sensor installation

- Sensors have a certain degree of penetration through thinner wooden boards and glass materials, and these two factors should be considered when installing and arranging position.
- When there is a large area of glass and smooth ceramic tiles on the decorative surface within the detection range of the sensor, the reflection of electromagnetic waves will be strengthened, which may lead to a longer sensing distance.
- The electromagnetic waves emitted by microwave sensors in practical application environments may have different sensing ranges due to the different reflectivity of obstacles, which is a normal phenomenon. For example, in corridors and spacious areas, there may be slight differences in sensing distance.
- The sensor should be installed away from large equipment where strong electromagnetic radiation and surges may interfere with or damage the sensor.
- If the sensor is installed in a windy location such as a doorway or window, wind blowing other objects may cause the sensor to be false triggered.

8.1. Safeguarding measures for sensor installation

- Keep sensors away from routers and other signal devices (Zigbee, WIFI, etc.), >1.5m.
- If too much dust accumulates on the detection probe, it will affect the detection distance. It is recommended to wipe the lens gently with a soft, dry cloth.
- Do not collision lens with hard objects. Do not press the lens by hand. If the lens is deformed, contact the dealer to replace it.
- Avoid storage and use in corrosive environments or environments containing hazardous substances such as sulphides, halogens, phthalates, etc.
- Do not cover the sensor. Do not use metal objects to cover the antenna on sensor to avoid affecting the transmission distance of wireless signals.
- Considering the influence of metal structure on wireless signals, ensure that sensors are far away from surrounding metal pipes, concrete steel structures, etc. during site installation, to reduce the negative influence on wireless communication. If there are metal pipes, concrete, wireless signals will be reduced.

9. Frequently asked questions

Is it possible to switch off lights in parking setup?

No, it is only possible to dim lights in EcoSet parking setup. We have designed this to ensure safety and good visibility at all times.

After several attempts to link luminaires with sensor, some luminaires still have not joined the targeted sensor. What happened?

The wireless communication between the sensor and the luminaire is highly influenced by the environmental conditions. When the signal between luminaire and sensor is blocked, the luminaire may not join the sensor group. Please try to link the luminaires with another neighboring sensor. In worst case, the luminaire will keep on 100% light level ensuring safety and visibility in a parking area.

A luminaire is linked to a sensor; can it react from other sensors nearby?

Yes, a luminaire can be linked to multiple sensors, upto a maximum of 50 sensors.

What happens if sensor loses power? Will the luminaires always remain at background level?

When no sensor triggers are received due to faulty or power loss at the sensor, the luminaire will dim to background level after hold time. And remains dimmed unless power cycle occurs, after which the luminaire goes back to 100%.

9. Frequently asked questions

Is daylight calibration needed for daylight step-dimming?

No calibration needed as this is covered with the assumption of an average reflection coefficient for the parking environment. This implies that in different environments the moment of dimming up and down might be at slightly different lux-levels but ensures simplicity of the required setup while still allowing daylight energy savings.

Can I choose luminaires for daylight dimming?

No. All lights dim to set dim level when daylight exceeds the threshold value seen at the parking sensor.

If the location of linked luminaire(s) or sensor(s) changes, do I need to reset them?

No, reset is not needed. You need to re-link luminaires to nearby sensors in the adapted setup. Refer <section 5> on details to re-link luminaires and sensors.

What is the guidance for optimum lighting plan for sensors?

For optimal performance w.r.t. detection and wireless communication, 1 sensor per 4 waterproof luminaires is recommended (assuming a typical parking setup where waterproof luminaires placed 4-5m apart and signal range of sensor is set to Max high: 12-15m). Important to note that parking environment is a challenging space for wireless communication and increase in #luminaires per sensor might result in sub-optimal performance.

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