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Photocell

Application note

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Photocell

What is a photocell?

A photocell is a lighting control strategy that allows to control lighting depending on the level of ambient light, i.e. whether it is dark or bright in the first place. Also, occupancy sensors may be used to adjust the light level when the motion is detected (it is optional).

Typical applications for this lighting control include outdoor lighting, e.g. area lighting, parking lots, parking structures where light is switched on at dawn, and switched off at dusk. This solution can provide significant benefits, including energy and maintenance costs savings.

> **Note**: If you are looking for a lighting control where the light is automatically adjusted based on the availability of daylight while maintaining the desired light level in the space, please see Daylight harvesting.

Required items

To use the photocell scenario in your project, you must have:

- Light sensor
- Occupancy sensor (optional) - if you want to adjust the light level based on the occupancy
- Access to the project in the Silvair Commissioning web & mobile apps
- A lighting zone with the photocell profile selected in Silvair Commissioning

How does it work?

- **Dusk to dawn control**
  When the light level reported by the light sensor decreases below a certain night threshold (dusk), the light switches on to a defined level, e.g. 30%. When the light level increases above the day threshold (dawn), the light switches off (or dims to a certain level) regardless of whether a motion or occupancy is detected or not.
- **Hysteresis**
  Separate day & night threshold levels can be defined in order to prevent light from switching frequently on/off at the transition between day and night.
- **Transition delay**
  The transition between day & night settings is delayed by 60s after the light level reaches the threshold to protect against changes in light due to intense but temporary changes in

light level, e.g. temporary light reflection or lighting of a passing car. The light level needs to remain at least 60s below the day threshold or above the day threshold.

- **Occupancy control**
  The light level during the day or night can be adjusted to a separate level when the motion is detected.
- **Manual override**
  Users can override the setting and adjust the light level using manual controls. Such light level stays until the user changes it, or times out after a defined time (after the zone is vacant).

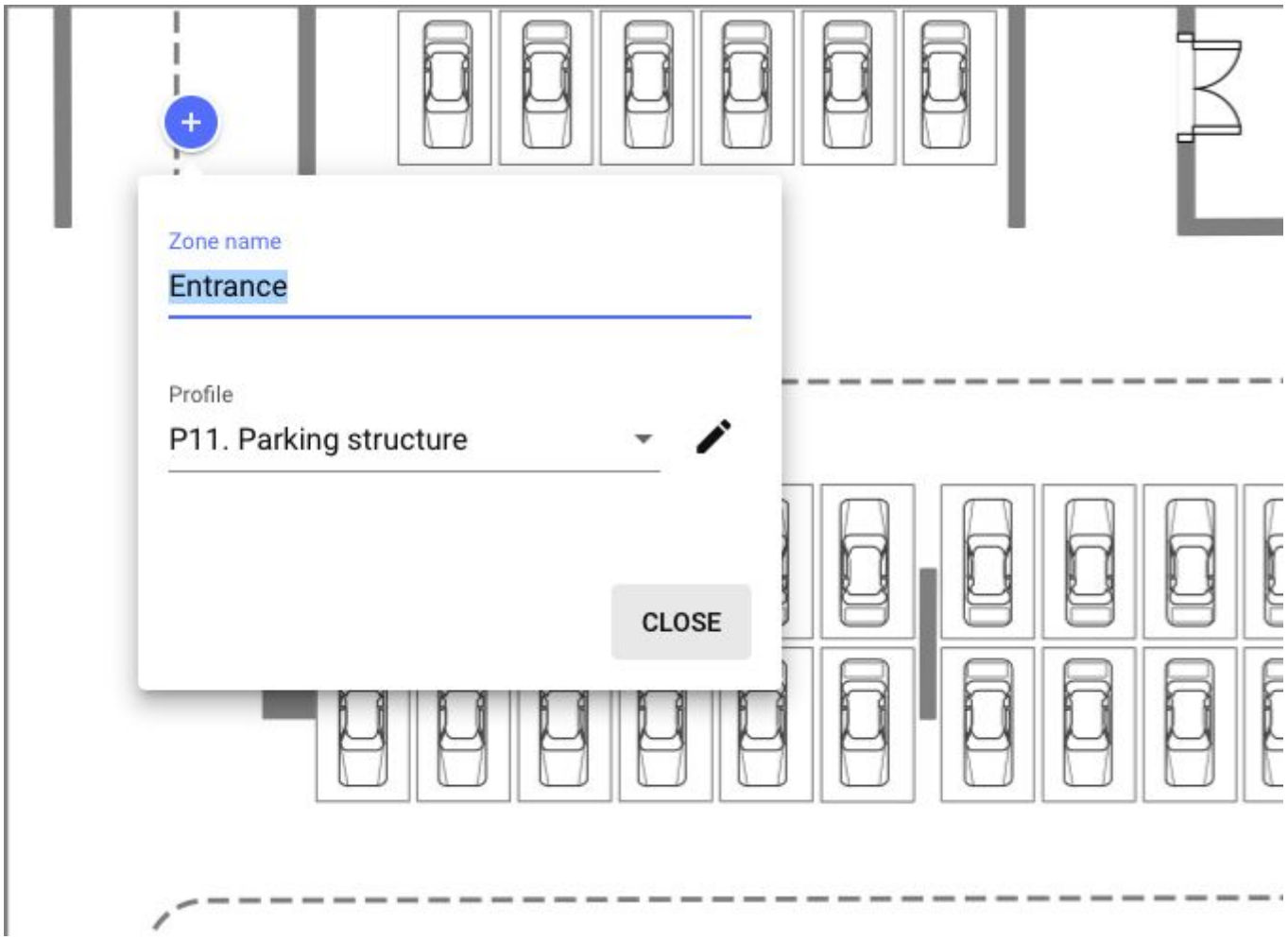
Note: You can configure the light control settings to support the "Reversed Photocell" use case - switching the light ON to a defined level during daytime and OFF at nighttime to meet entrance/exit transition zones requirements for eye adaptation purposes.

Commissioning

To be able to use the photocell, you must use the Silvair commissioning web and mobile apps.

Silvair web app

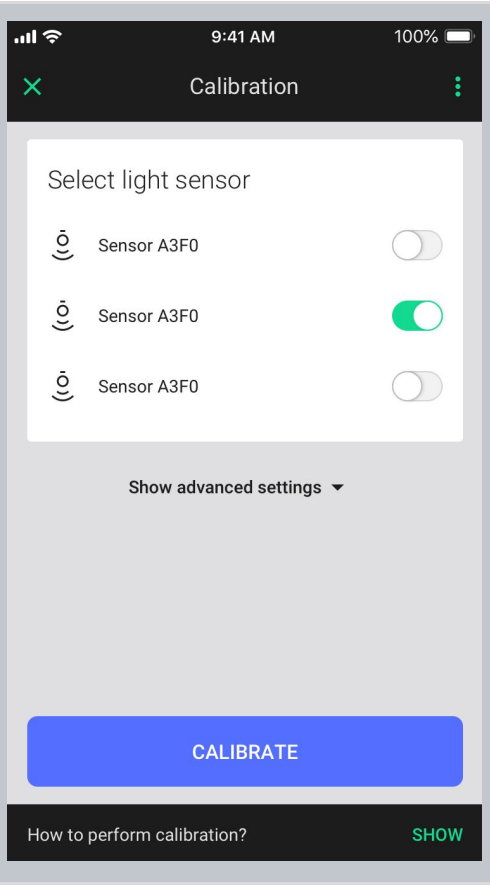
1. Define appropriate lighting zones
2. The profile selected for the zone needs to have a photocell scenario applied.
3. To create a profile based on the photocell scenario, press **NEW PROFILE** on the list of profiles.
4. You may also select one of the available photocell based profiles and click the **"EDIT"** pen icon to open the profile customization options.



5. Adjust the profile settings (see Profile settings section for details) and click **SAVE.**

Silvair mobile app

1. Go to the space where you will be using the photocell based light control.
2. Open the project, select the desired area and zone with the Silvair mobile app.
3. After adding all devices to the zone, you must perform calibration. You can calibrate devices by pressing the **CALIBRATE** button in the **DEVICES** or in the **SETTINGS** tab.



4. Select a light sensor by switching the toggle next to the light sensor to the right.
5. Confirm by pressing the **CALIBRATE** button.

HINT: After pressing the sensor icon a device starts blinking. This helps to quickly identify the luminaire.

NOTE: Once the calibration process is completed, it will restore automatic control only in a zone where calibration is performed; all other linked zones go to their occupancy light level.

Profile settings

Segment	Parameter	Description
Night (light level settings during the night)	Night starts below	Threshold of the light level reported by the light sensor, below which the lighting is switched to the night settings. The night light level threshold must be less than the Day threshold. **HINT:** Make sure that the difference between night and light levels is sufficient to prevent light from switching frequently at the transition between day and night. **HINT:** If the controlled light is affecting the light sensor, please see the Troubleshooting section.
	Default	The light level to which the lighting is switched on when it gets dark (if the occupancy level is specified, this will trigger only when the space is vacant).
	Occupied	The light level to which the lighting is switched on when occupancy is detected. The "Adjust light when occupied" option needs to be selected.
Day (light level settings during the day)	Day starts above	Threshold of the level reported by the light sensor, above which the lighting is switched to the day settings. It must be greater than the night threshold. **HINT:** Make sure that the difference between day and light levels is sufficient to prevent light from switching frequently at the transition between day and night. **HINT:** If the controlled light is affecting the light sensor, please see the Troubleshooting section.
	Default	The light level to which the lighting is switched on when it gets bright (if the occupancy level is specified, this will trigger only when the space is vacant).
	Occupied	The light level to which the lighting is switched on when occupancy is detected. The "Adjust light when occupied" option needs to be selected.
Occupancy timeout	Duration	The time for which the light is maintained at the defined level after

		occupancy is detected. Available only when the “adjust light when occupied” option is selected for Day or Night settings.
Fade time	Duration	The time in which a particular light level is reached when transitioning between day & night or vacant & occupied levels.
Manual override timeout	Time	Makes lighting return automatically to default settings. When disabled, the automatic operation needs to be restored manually.
Power up behavior	Keep light off	The light will remain off on power-up.
	Restore	The light will return to the last level before the power failure.
	Defined light level	The light will come on at this brightness on power-up.
Low/high-end trim	Min	The minimum light level that can be achieved can be adjusted automatically or manually (e.g. with a wall switch).
	Max.	The maximum light level that can be achieved automatically or manually (e.g. with a wall switch).

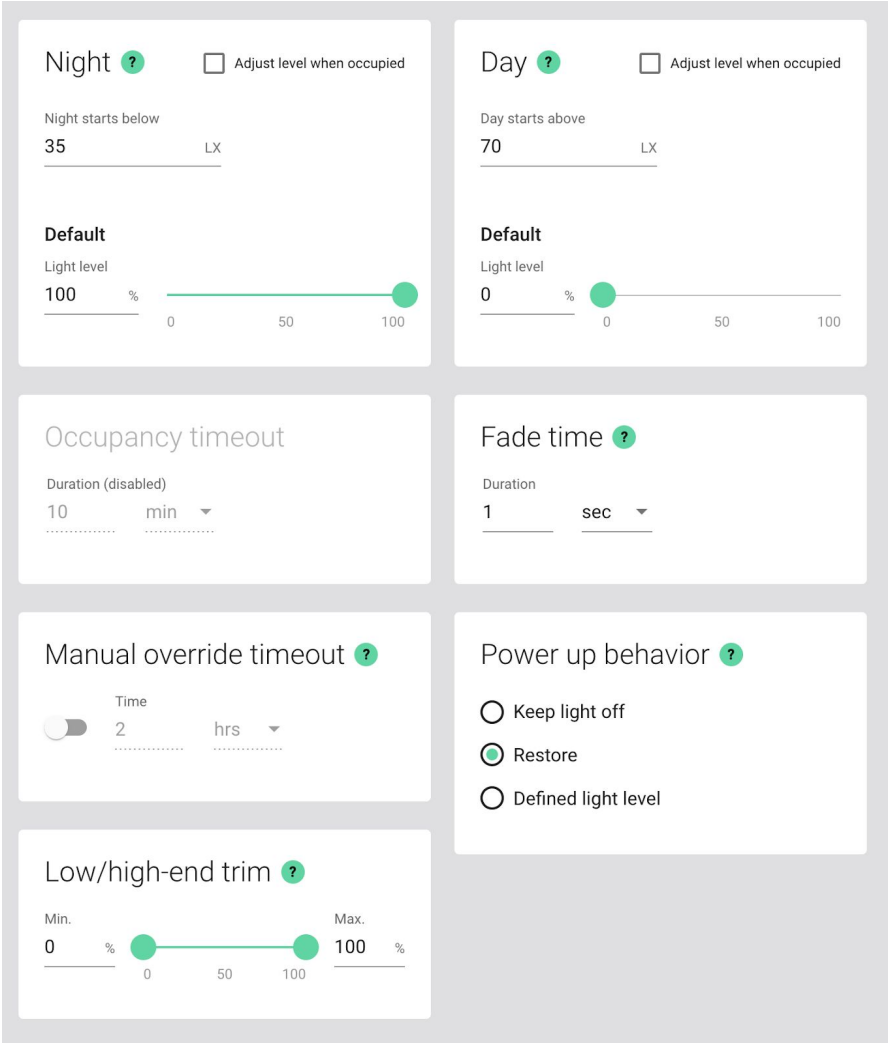
Example applications

Simple photocell profile for Outdoor lighting

Sequence of operation

- The light is switched ON to 100% at dusk (when the light level reported by the light sensor falls below 35 lux)
- The light is switched OFF at dawn (when the light level reported by the light sensor exceeds 70 lux)
- The manual override can be used for special events. Automatic operation has to be restored manually.

Settings

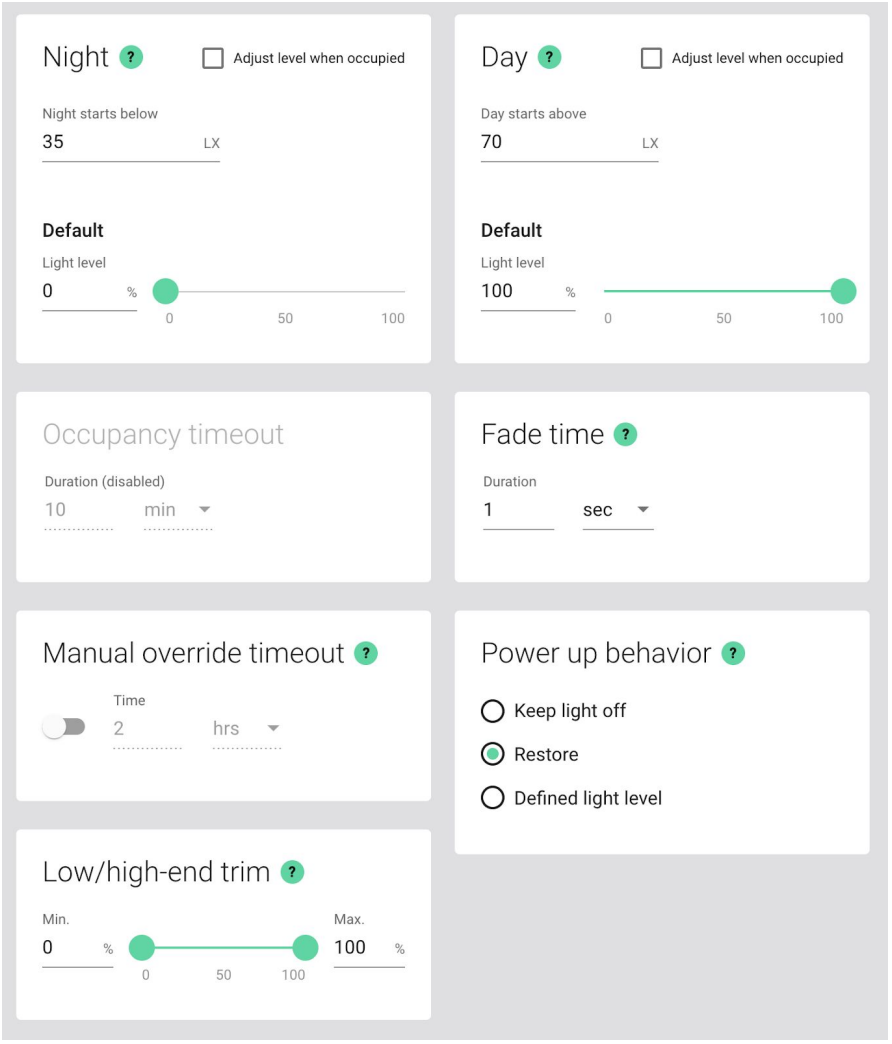


Reversed Photocell for Entrance/Exit zones

Sequence of operation

- The light is ON to 100% during the day (when the light level reported by the light sensor exceeds 70 lux).
- The light is switched OFF during the night (when the light level reported by the light sensor falls below 35 lux).
- The manual override can be used for special events. Automatic operation has to be restored manually.

Settings

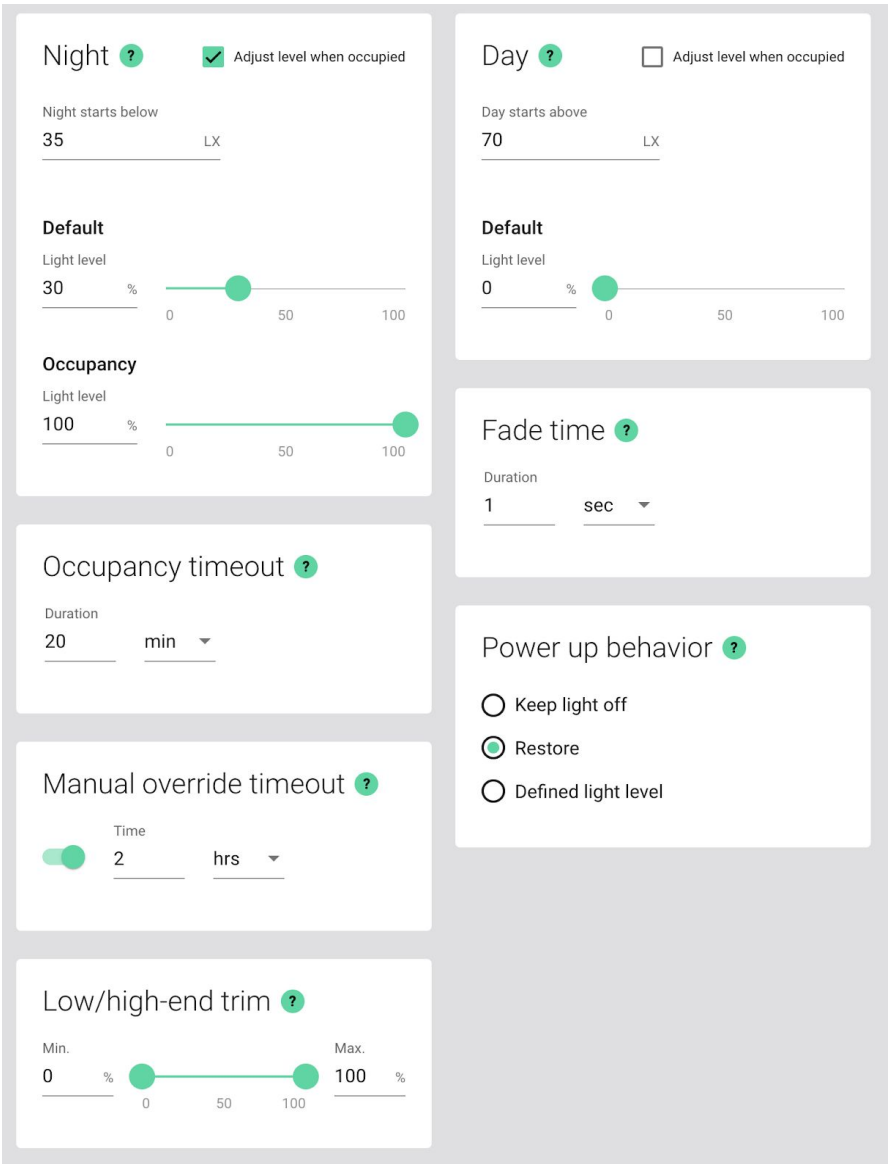


Photocell with occupancy for Parking lot

Sequence of operation

- The light is switched ON to 30% at dusk (when the light level reported by the light sensor falls below 35 lux).
- The light level during the night is raised to full output when occupancy is detected and dims back to 30% after 20 minutes.
- The light is switched OFF at dawn (when the light level reported by the light sensor exceeds 70 lux).
- The manual override can be used for special events and return to automatic operation 2hrs after the space is vacant.

Settings



Troubleshooting

Light from the controlled lights is affecting the sensor

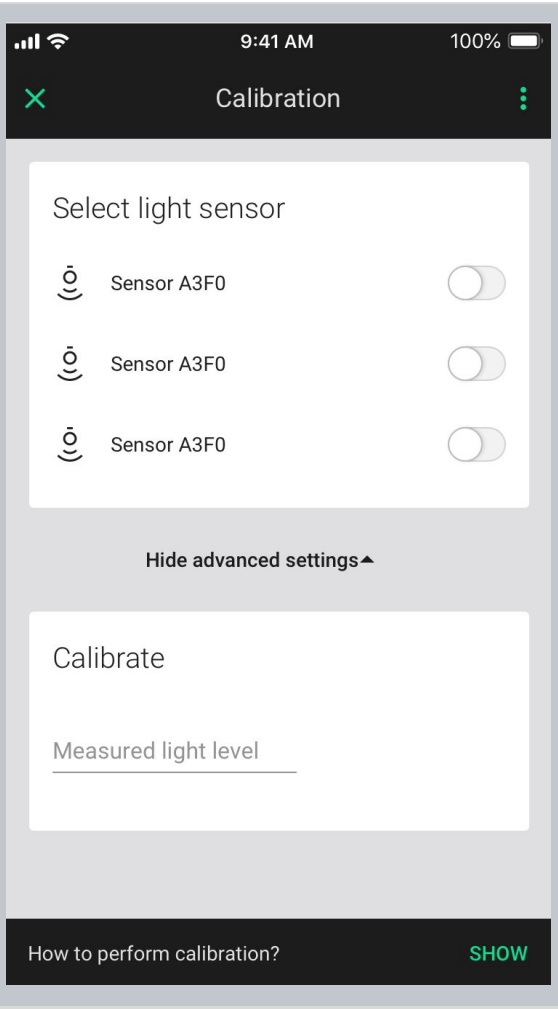
If you have issues with the light that is controlled in a photocell scenario that affects the light sensor and causes the light to switch off immediately after it is switched on, please adjust the day & night thresholds to include the hysteresis:

1. Go to the Zone with the Photocell based profile in the mobile app
2. Open the Test tab
3. Switch the light ON to full output and check the lux level reported by the sensor on the sensors panel (Lux_{HIGH})
4. Switch the light OFF and check the lux level reported by the sensor on the sensors panel (Lux_{LOW})
5. Make sure that the day and night threshold values meet the following formula: **Day threshold - Night threshold < Lux_{HIGH} - Lux_{LOW}**

Issues with the light sensor

If you have issues with the accuracy of the light sensor, you may use the calibrate section in the advanced settings. During the calibration process, the selected sensor is being configured to control the light in the zone. This is important in cases where there are more than one light sensor as we can use only one of them to control the light.

The calibration process can be also used to adjust the response of the light sensor, especially if the sensor is not reporting the light level reaching it accurately. This is valuable in case you have some issues with the sensor accuracy or the sensors in the field are not calibrated, every single one reports different values in similar conditions.



Calibration:

- Use a light meter to measure the light level where the light sensor is installed.
- Enter the LUX value measured by the light meter in the **Measured light level** field.
  NOTE: If you don't input any lux level the response of the sensor won't be adjusted.
- After entering the "Measured light level" LX value in the input field provided, tap the CALIBRATE button to confirm.
- The calibration of the light sensor will start immediately.

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