# User Guide: nightDim solution for LED luminaires

## GENERAL DESCRIPTION

The nightDim solution offers the possibility to  set different scenes for dimming the outdoor lighting at night-time. The nightDim concept uses only existing mains wiring for the scene setting. With a simple mains switch it is possible to change the dimming scenes whenever needed, i.e. for seasonal changes, holidays or special events making the solution perfect for refurbishment use. Additionally you can choose when to start the dimming during the night-light.

## KEY CONCEPT FEATURES

- **Maximized energy saving** in outdoor lighting
- **Easy and inexpensive recall of scenes**
- **Perfect for refurbishment** using only existing mains wiring

## PRODUCTS NEEDED

**LED driver** range:

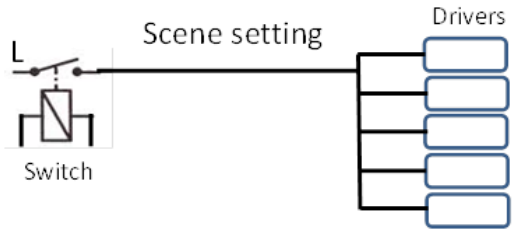
- LL1x20-E-DA-nDim
- LC1x70-E-DA-nDim
- LC1x30-E-DA-nDim

  - IP20 drivers with humidity resisting layer of lacquer
  - Ta: -40°C..+50°C
  - High efficiency
  - High transient protection, 4kV
  - Option to utilize Constant Lumen Output functionality (parameter for luminaire manufacturer)

**Mains rated switch** for scene setting

## CONNECTION FOR SCENE SETTING

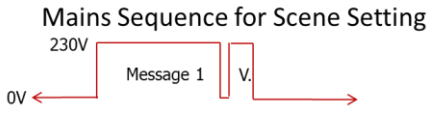
Connect the switch to the mains phase, L, so that the mains voltage provided to the drivers can be cut for the period needed in the description of scene setting (below)




**Note: The switch needs to be mains rated**

## DESCRIPTION OF SCENE SETTING

Different scenes and fixed light levels can easily be recalled over the mains. Scene commands are sent to the driver as pulses of the mains voltage. There are 2 pulses sent: the actual scene message and a verification pulse




The driver recalls a preset scene when the following scene setting sequence is received:

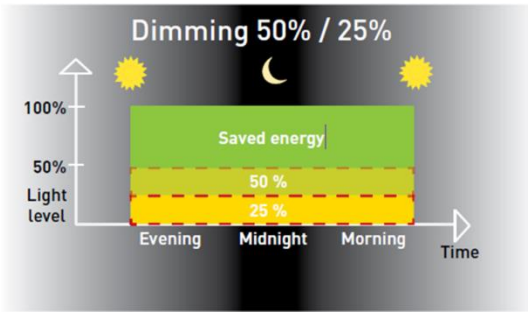
- Message 1 (length of pulse in sec) according to below table followed by a verification pulse of the length 1-5 sec

When the mains is switched ON next time the scene is activated, which is indicated by blinking the light as many times as the scene number. The OFF time between the pulses must be 2 seconds or more.

| scenes | description | operation | | Message 1 (sec) |
|---|---|---|---|---|
| scene 1 | full output | 100% | | 7 +/-2 |
| scene 2 | half light | 50% | | 15 +/-3 |
| scene 3 | save level | 25% | | 25 +/-3 |
| scene 4 | short nightdim | Mid 6hrs: 50%<br>other: 100% | | 35 +/-3 |
| scene 5 | medium nightdim | Mid 7hrs: 50%<br>other: 100% | | 45 +/-3 |
| scene 6 | long nightdim | Mid 8hrs: 50%<br>other: 100% | | 55 +/-3 |

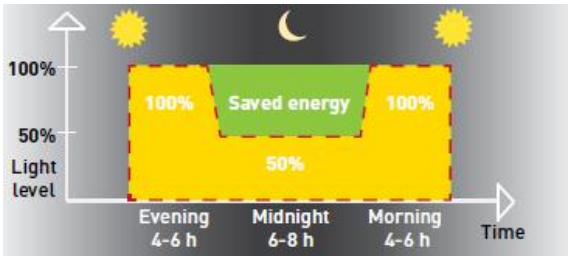
## FEATURES OF THE SCENES

**Scenes 1-3** are fixed light levels (100%, 50% or 25%) through the entire night.




**Scenes 1..3: Fixed light levels**

**Scenes 4-6** go to a 50% light output for 6h, 7h or 8h in the middle of the night. The light level outside of this energy saving period is on 100%. It might happen that the nightlight is shorter than the energy saving period in the chosen scene, in which case the light switches ON directly to the dimmed level and stays there for the entire night. This might be the case for instance during the Nordic summer when the nights are very light and short.




**Scenes 4..6: Energy saving light reduction**

Following fade times are valid for all scenes:

- Min to Max and Max to Min in 30 min
- Switch ON in 10sec
- Switch OFF in 0 sec

The activated scene is always valid until the following scene is recalled.

Note: After a mains interruption disturbance during ON time the light will go to full level for the next ON time after which it returns to the chosen scene again. This is a precaution to ensure sufficient light levels even during mains disturbances.

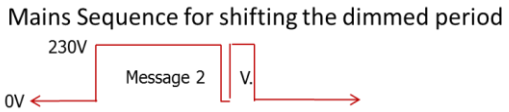
## LENGTH OF THE NIGHTLIGHT

The driver software calculates an estimation for the length of the coming night in order to evaluate where to position the energy saving period. The driver software uses the information of the previous nights for this evaluation.

The **actual length** of the coming nightlight will be determined by the user for ex. by daylight sensing or time control operation.

## SHIFTING THE DIMMING PERIOD

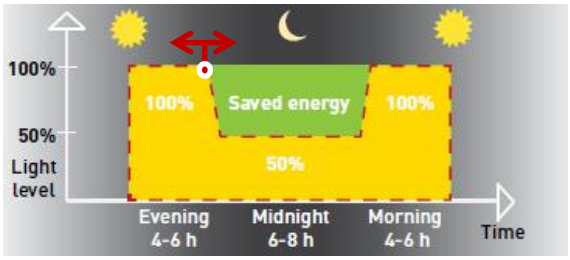
Scenes 4-6 have an additional feature that the dimmed period can be shifted to start earlier or later. Sometimes there might be a need to prolong the evening light on full level for an hour or two. There might on the other hand be a need to start dimming earlier than the original scene would do. In these cases an additional mains sequence can be carried out to shift the start of the dimming. Note that the length of the energy saving period stays intact when it is shifted.




The driver recalls a preset shifting parameter when the following mains sequence is received:

- Message 2 (length of pulse in sec) according to below table followed by a verification pulse of the length 1-5 sec

| shift of dim time | description | | Message 2 (sec) |
|---|---|---|---|
| shift 1 | Shift Earlier 1 hour | | 85 +/-3 |
| shift 2 | Shift Earlier 2 hours | | 95 +/-3 |
| shift 3 | Shift Later 1 hour | | 105 +/-3 |
| shift 4 | Shift Later 2 hours | | 115 +/-3 |




**Shifting the start of the dimming**

The shifting can be programmed as well with DALI commands.

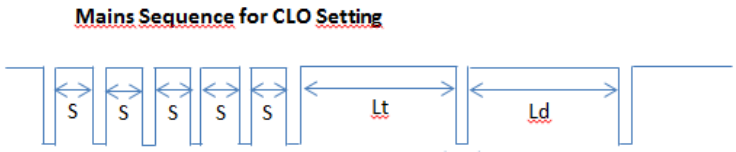
## CONSTANT LUMEN OUTPUT (CLO) SETTING ONLY FOR LUMINAIRE MANUFACTURERS

The light level can be compensated against light depreciation in the luminaire by setting the correct CLO parameters. These parameters are set by the luminaire manufacturers when choosing the LED modules. The CLO parameters can be programmed with DALI commands at any time.

The CLO parameters can as well be set as mains pulses over the mains. This must be done during the first running hour of the driver, after this the CLO setting using mains pulses is deactivated.

There are two parameters to be set:

- Lifetime expectation (Lt) and
- Expected total light depreciation (Ld)




These parameters are set by a sending following sequence of mains pulses to the driver:

- The CLO starting pulses “S”: 5 consecutive pulses of the length 1-2sec
- Lt pulse:
  - 50.000hours: 4 +/-1sec
  - 100.000hours: 7 +/-1sec
- Ld pulse:
  - 10%: 4 +/-1sec
  - 20%: 7 +/-1sec
  - 30%: 10 +/-1sec
  - 40%: 13 +/-1sec
  - 50%: 16 +/-1sec

The verification takes place from the following mains switch ON.

## PRACTICAL APPLICATION OF A REFURBISHMENT PROJECT WITH THE NIGHTDIM SOLUTION

The property owner wishes to refurbish the old metal halide lighting of the parking area next to the office building. The area consists of 40 pole luminaires, each with a need to provide roughly 2500 lm light output.

The lighting system has been controlled by an outdoor light sensor switching the lights ON in the evening when it gets dark and OFF in the morning when it gets lighter again. The building owner wants to change the lighting system into an energy saving, modern site quickly and with minimum investment. Therefore the facilities manager suggests to stick with existing wiring and light sensor but to modify the luminaire into a modern LED solution with selectable energy saving lighting scenes.

The activity in the parking area normally starts at 6 o'clock in the morning and continues until 9-10 o'clock in the evening. The proposal is to toggle between 2 different scenes during the year and to have the readiness to select lighting scenes for special occasions as well. CLO as an additional feature is suggested by the luminaire manufacturer.

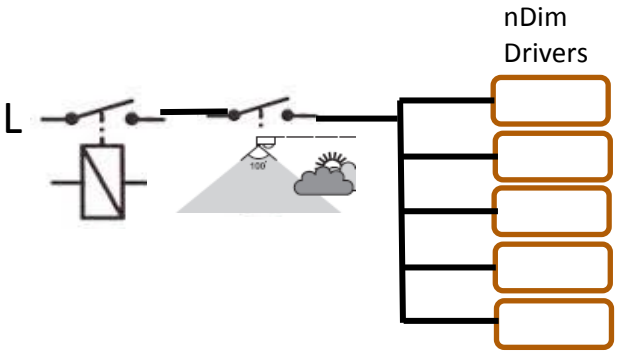
The luminaire chassis is IP65 protected and can fit Helvar's LC1x30-E-DA-nDim driver with suitable module. The driver can withstand a temperature down to -40C and is moisture protected with a layer of lacquer, making it perfect for the refurbishment application. By programming of the CLO parameters the luminaire manufacturer has reduced the initial light level with 30% to compensate for initial over illumination.

### Products needed:

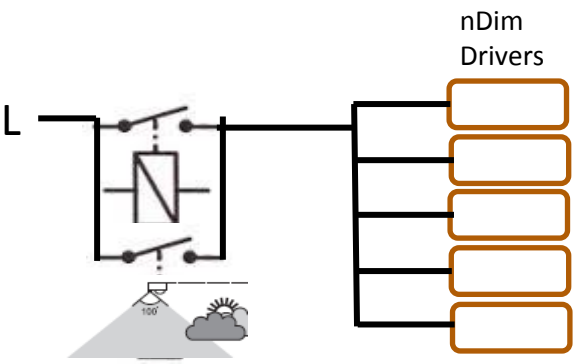
- Pole luminaires: 40 new chassis' equipped with nightDim drivers + suitable modules
- Scene setting: 1 mains rated switch + a clock with a display for seconds
- Daily use: as before, nothing needed

### Connections:

The mains rated switch can be connected to the mains phase either in series with the light sensor (for ex. in the electrical cabinet) or parallel to the sensor.




**Series connection: Scene setting at night time**




**Parallel connection: scene setting at day time**

## Scene setting:

After installation of a serial connection the facilities manager recalls the summer scene of the luminaires. The FM recalls scene 6 by switching OFF the mains and ON again for a period of 55 seconds (+/- 3 sec). This command is verified with just a short ON-OFF pulse. When the FM leaves the switch closed the luminaires acknowledge the scene setting by blinking the lights 6 times.

Now the system is set up for a summer scenario switching the light to a power saving mode roughly 4 hours before the mid of the night and switching it back to full level ca 4 hours after the mid of the night. If the FM wants to prolong the evening with full light output for an hour it can be done by sending a similar pulse sequence of 105 seconds to the luminaires. As a result the power saving mode will be connected one hour later.

This mode is valid always when switching the nightlight ON until another scene is recalled.