B.E.G. LUXOMAT®

Human Centric Lighting with B.E.G. occupancy detector PD4-M-HCL – the innovative solution for biodynamic light

WORLD FIRST – DALI occupancy detector with HCL function for biodynamic light

The PD4-M-HCL is the new DALI occupancy detector with "Tunable White" function for Human Centric Lighting (HCL). Like other DALI occupancy detectors, this detector regulates different lighting groups according to daylight and occupancy, to increase convenience and energy efficiency. A new feature is that the detector can also control the colour temperature in the room if DALI lights with "Tunable White Function" (Device Type 8) are connected.

Preset application profiles can be selected according to the room's current usage. These profiles control the colour temperature and light level in the room as the day progresses. The change in the colour temperature from warm white to cool white and the change in light level conform to human biorhythms. This takes place very slowly, and is hardly apparent to the user. This kind of biodynamic light is proven to increase wellbeing and has positive effects on health. There are numerous applications for biodynamic lighting control in offices and industry.

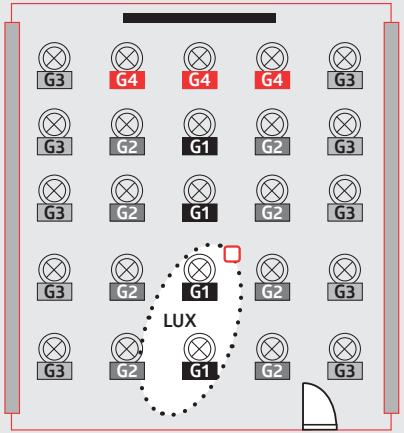
The introduction of this technology into schools and healthcare institutions also achieves positive effects. Biodynamic light is especially good in retirement homes, where it can help regulate the human body clock and significantly improve the quality of sleep.

While other HCL controllers often require a complicated building-wide control system, the B.E.G. detector works completely independently thanks to its integrated real-time clock and DALI controller. This means each room can be individually configured. The detector supports up to 4 DALI lighting groups and 3 pushbutton inputs. The DALI lights are quickly and easily grouped using the bidirectional B.E.G. smartphone app. The PD4-M-HCL is thus ideal for retrofitting or refurbishment work in buildings where there is no bus system. Thanks to a large detection area of 24m, it can be installed effortlessly in areas with up to 64 DALI lights.

Slave units to extend the detection area can easily be connected to the DALI line.

With its unique “PureColour” system, the PD4-M-HCL can even replicate the current daylight with precision. A daylight colour sensor, available as an optional extra, transmits the current daylight colour temperature to the detector via the DALI bus.

Uniform lighting distribution



By using the PD4-M-HCL (□) planners can distribute the lights uniformly across the ceiling, while still achieving consistent, task-appropriate illumination. Using defined DALI groups and the programmable offset values, the lights by the window output less light than those in the centre of the room (G1).

To achieve optimal illumination, the light sensor detection range (LUX) is adjusted to the darkest area of the room, if possible facing away from the blackboard lighting.

Advantages of PD4-M-HCL

The complete solution for HCL in one device

Controller, push-button interface and occupancy detector are integrated into one device. Using the pre-programmed factory setting and the convenient B.E.G. smartphone app, the sensor is ready to use immediately, and can be configured in no time at all. The mechanical switches in the installation can be used via the three pushbutton inputs.

An economical solution for the DALI standard

Thanks to a large detection area and support for up to 64 DALI electronic ballasts, the detector is also suitable for large rooms, and is therefore a very economical solution for HCL with DALI lights which support "Tunable White" (Device Type 8) – see compatibility list.

A fully-featured occupancy detector

The occupancy detector provides occupancy-dependent daylight integration for energy saving and can control up to 4 DALI lighting groups e.g. training rooms, conference rooms or open plan offices. Its offset constant light regulation provides uniform lighting levels in rooms where the daylight falls from one side, thereby contributing to energy savings.

Flexible relay included

The built-in relay can be used to control non-DALI lighting for example. Alternatively, the occupancy information can be forwarded to a BMS. Or, the relay can be used for a "cut-off" function, through which the DALI electronic ballasts are powered down when not being used. Depending on manufacturer, this saves between 0.2 and 1 watt per electronic ballast in standby losses.

Real-time biodynamic colour profiling

Different application profiles can be selected, e.g. for retirement homes, healthcare institutions and circadian lighting. The system runs autonomously thanks to its built-in real-time clock. But HCL can also be deactivated or pre-configured with a customer-specific profile.

World first – Pure Colour

Instead of simulating changes in daylight through the day, an optional external daylight sensor detects the actual daylight colour temperature and uses this information to control the HCL. This has the advantage of exactly replicating actual daylight colour temperature.

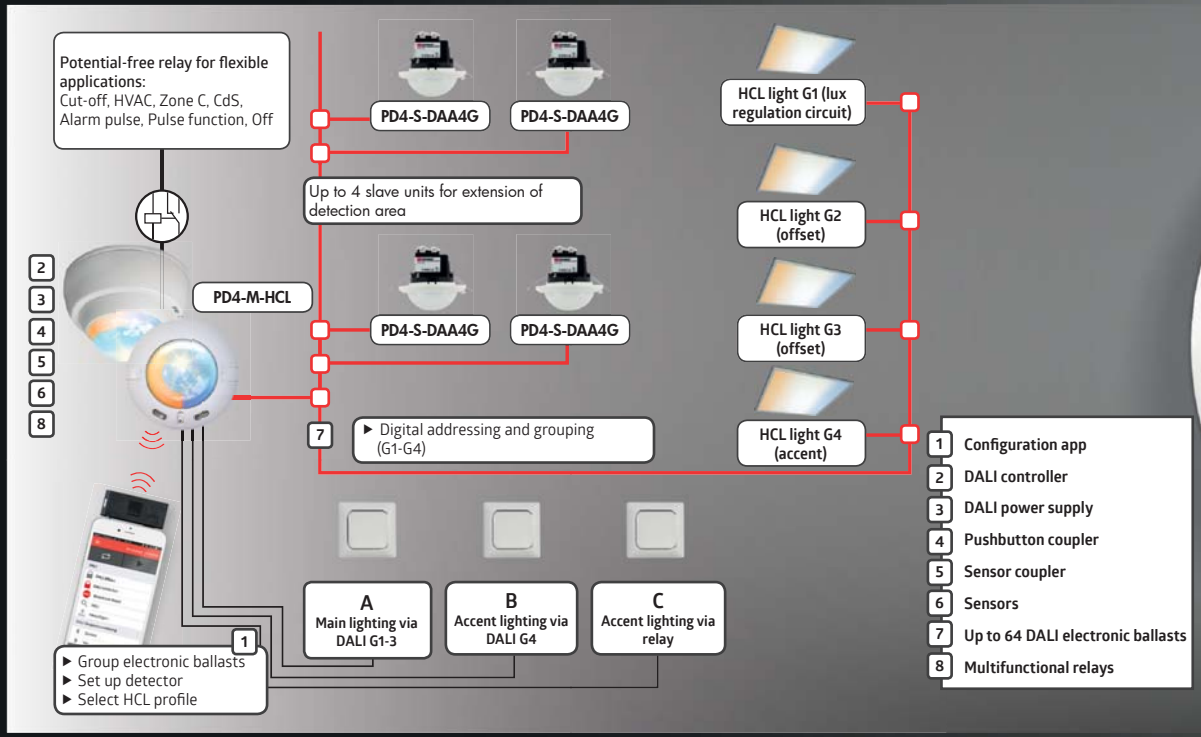
Orientation light

The “orientation light” function can be activated, and operates after the follow-up time previously configured. It limits the maximum output level of connected lights to an adjustable value. This means that areas with a safety requirement are not completely dark, but energy is still saved compared to full illumination.

Simple to extend

Up to 4 additional slave units can easily be connected via the DALI bus, enabling economical extension of the detection area.

Complete DALI HCL control in one device



Multisensor as master PD4-M-HCL

- High-sensitivity occupancy detector with the ability to address up to 64 DALI electronic ballasts automatically, with segmented control via 4 groups
- Rapid commissioning and maintenance processes with smartphone/tablet app (Android, iOS) – PC tool not required
- 3 lighting zones:
  A for the main lighting with segmented constant light regulation across 3 DALI groups and offset control, B for accent lighting via a separate DALI group, C for accent lighting via the built-in relay
- Manual switching and dimming available with conventional pushbuttons
- HCL function for DALI lights (DT8, Tc) can be activated.

Technical Data

Operating voltage:	110 - 240 V AC 50 / 60 Hz
Power consumption:	0.4 W
Mounting height min./ max./recommended:	2 m / 10 m / 2.5 m
Dimensions:	SM= Ø 124 x 85 mm FC = Ø 117 x 100 mm
Degree / class of protection:	SM = IP20 / class II FC = IP20 / class II
Ambient temperature:	-25 °C to +50 °C
Detection area:	360°
Range:	max. Ø 24 m across max. Ø 8 m towards max. Ø 6.4 m seated activities

Better light for better quality of life

Light is good for you. We all experience this every year as spring comes: as the days become brighter, we feel more active, in a better mood and with better concentration than in the dark months of winter. Therefore vision is not the only
reason that people need light. Light also regulates the human "body clock" – a complicated control system which coordinates and organises the functions of the body to a 24-hour rhythm.

This regulation system has to be resynchronised by daylight every day. If the required light stimulus, an important timer, is missing, the body clock goes off track. This can lead to people feeling listless and tired, with mood swings or even a weakened immune system. Around the turn of the millennium, scientists identified photoreceptors in the eye's retina which are not for vision – instead they set the body clock by activating various hormones.

These cells react extremely sensitively to light with a high proportion of blue. This means that well-tuned lighting can significantly improve people's quality of life.

Light controls our body clock

Human beings control the light – but the light also controls human beings: In 2002, scientists identified a third light receptor in addition to rods (twilight vision) and cones (colour vision). These ganglion cells are photosensitive, but non-visual. They only react on the ambient brightness and regulate biological processes accordingly – for example hormone production and pupillary reflex.

Only around one to three percent of ganglion cells are non-visual photoreceptors. In this type of cell, researchers discovered the light-sensitive protein melanopsin. Light is therefore the definitive regulator of the human body clock: when there is less blue in the light, the pineal gland produces the sleep hormone melatonin in the evening. This makes you feel tired. In the morning, the melatonin level drops again.

At about 3 a.m., the stress hormone cortisol is produced. It stimulates the metabolism and programs the body for daytime activity.

The first light of morning suppresses production of melatonin, and at the same time, the body produces increasing amounts of the mood-enhancing hormone serotonin.

In rooms, a lighting with non-visual effects can support the effects of natural daylight. Especially in our “around-the-clock” societies it can assist in stabilising the biological rhythm of human beings.

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Sample application

Hospitals

As a rule, staying in hospital means that patients' movements are restricted. Depending on the condition, patients generally have to stay in bed and only rarely get to go outdoors. Not every bed provides sufficient daylight. HCL lighting can support the healing process, by stabilising patients' circadian rhythms and improving their sleep.

Retirement homes

As the population becomes ever older, it is important that older people in retirement homes are cared for in the best way possible. With age, people's vision deteriorates, and when people stay for a long time in enclosed rooms, it is possible for their body clock to get out of sync and for residents to wake up in the night more often. HCL solutions help to reset residents' body clocks and support a better quality of sleep.

Pleasant warm white

Neutral light

Stimulating blue white

Circadian illumination – The sun of your office

Circadian (circa, meaning „around“, and diēm, meaning „day“, around the day) illumination imitates the natural day night rhythm having a cycle duration of 24 hours. A biologic effective illumination (HCL = Human Centric Lighting) should be adapted to the user's circadian rhythm. It should support natural active times and resting periods. The PureColour detectors for well-being bring the vitality of daylight into rooms thanks to their ability to control the non-visual effects of artificial light. They are able to improve the effectivity and well-being of persons.

In the course of the day the biologic effective illumination changes. The colour temperature changes from warm white to daylight white and the illumination intensity from 500 to 1500 lux and therefore adapts to the circadian rhythm of human beings. The dimming of the individual lights is continuous and harmonious so that the change is not directly visible – but the effectiveness is permanent.

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Pleasant warm white

Neutral light

Stimulating blue white

PD4-M-HCL
The wellbeing detector

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