B.E.G. LUXOMAT®

PD4-M-HCL 93006/93007

Application description

(to be translated: 08/08/2018)

Content

1. Operation

1.1. General

The PD4-M-HCL is a highly sensitive ceiling-mounted occupancy detector based on passive infrared motion detection, with integrated DALI controller, DALI power supply and push button control.
If people, animals or other heat sources move within the detection area, the detector can dim and switch any DALI-controlled electronic ballast-driven lights, taking account of ambient light levels, such that a predefined room lighting level is constantly maintained. Slave devices, type PD4-S-DAA4G, can be installed to expand the detection area.

1.2. Human Centric Lighting

Human Centric Lighting (HCL) automatically changes the colour temperature and brightness of compatible DALI luminaires (DALI Device Type 8) during the day. This change takes place slowly and imperceptibly in small steps. The lighting is based on natural daylight, which has a positive effect on well-being, performance and the natural sleep rhythm.

1.2.1. HCL Mode

Three modes can be selected under "HCL Mode":

- In "Application Profiles" mode, brightness and light temperature are automatically changed during the day based on a defined curve. The selection of the profile suitable for the application is made in the next point.
- In "outdoor light sensor" mode, the light temperature of the luminaires follows the light temperature outdoors. For this purpose an external light sensor from B.E.G. - which is to be ordered separately - is required. The brightness can be freely selected.
- In "Demonstration Mode", the light temperature changes step by step from warm to cold white. This function is used for test or presentation purposes.

1.2.2. Application profiles

All profiles are designed to activate from morning to afternoon with increasing brightness and colour temperature. During lunchtime and from late afternoon, the activating effect is reduced. The lighting goes into the warm white area and to the lower light level. Overnight, the lighting remains at this setting. The "Application profiles" are optimised for special use. Under "Application profiles" you can choose between three profiles:

- In the "Office" profile, the brightness during the day is controlled from approx. 500 to 650 lux and the colour temperature from approx. 3500 to 5500 Kelvin.
- In the "Industry" profile, the brightness during the day is controlled from approx. 500 to 750 lux and the colour temperature from approx. 3500 to 5500 Kelvin.
- In the "School" profile, the daytime brightness is controlled from approx. 350 to 500 lux and the colour temperature from approx. 3500 to 5500 Kelvin.

1.2.3. Date

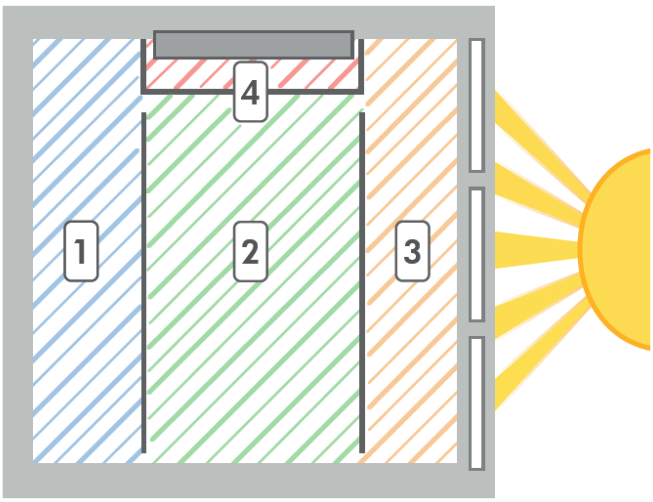
The current date must be transferred from the smartphone to the detector via the app. The integrated real-time clock can then control the application profiles. In the event of a power failure, the real-time clock is powered by an internal battery for at least 48 hours.

1.2.4. Time

The current time must be transferred from the smartphone to the detector via the app. The integrated real-time clock can then control the application profiles. In the event of a power failure, the real-time clock is powered by an internal battery for at least 48 hours.

1.3. Groups and lighting zones

There are three lighting zones (areas for a lighting purpose) available which can be parameterised by means of a predefined grouping principle of the integrated DALI control unit and an operating mode of the integrated relay.



1.3.1. Lightning zone A (main lightning)

The PD4-M-HCL allows you to compensate for differences in brightness due to daylight coming from one side of a room fully automatically, using segmented constant light regulation in lighting zone A across 3 groups. Fittings with DALI electronic ballasts are thus grouped as follows:

- Group 1: for areas with little daylight
  areas away from the windows
- Group 2: for neutral areas
  for example the central lighting run
- Group 3: for areas which may have strong daylight
  areas near the windows

Groups 2 and 3 can be set up with a negative offset between 0% and 25%, and will then scale back their lighting output in relation to Group 1. In extreme lighting situations (very bright daylight or no daylight), both offset settings will be automatically reduced to 0%.

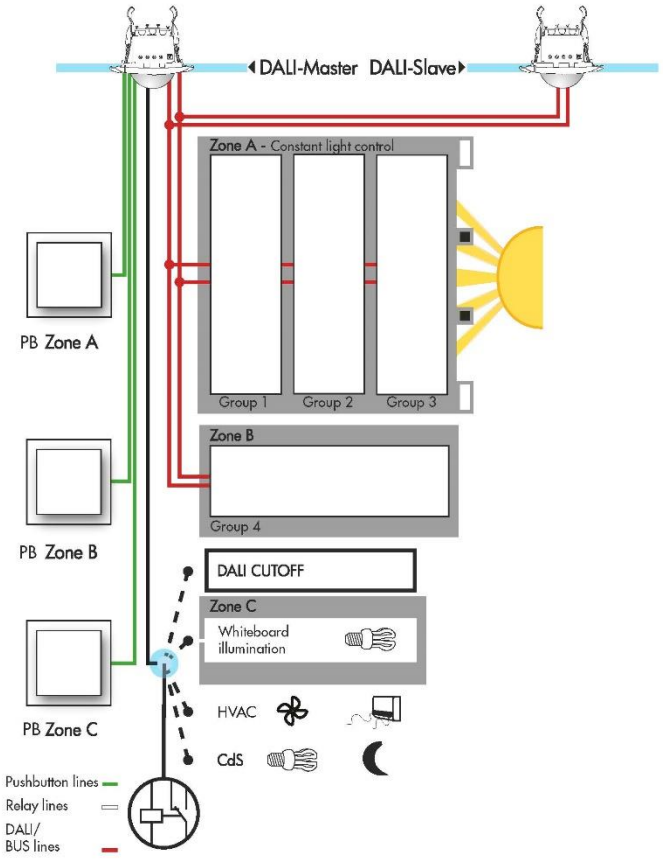
1.3.2. Lightning zone B and C (lectern or blackboard lightning)

For teacher or blackboard lighting, lighting zone B (via DALI group 4) and/or lighting zone C (via integrated relay) are available.
In lighting zones B and C, automatic constant light regulation is disregarded.

1.4. Integrated relay with operating modes

There are 7 different operating modes available on the integrated bistable relay (potential-free, NO). These cannot be combined:

- “Cut-off” – standby current consumption of connected DALI electronic ballasts is automatically minimised
- “HVAC” – heating, ventilation and air-conditioning units are automatically controlled for energy efficiency, depending on motion detection in the room, using a separately-set follow-up time
- “Zone C” – activates lighting zone C with push button input C, for example to provide teacher or blackboard illumination without a DALI electronic ballast. The automatic mode depends on the settings for lighting zone B (Group 4)
- “CdS” – “cadmium sulfide” – relay works as photo electric switch
- “None” for “no function” – relay is not actuated
- “Alarm impulse” (via operating mode HVAC) – The relay only closes for 2.5 seconds if at least 3 movements have been detected during a time period of 9 seconds. This function can be used to display a presence in the room on external visualisations. (Warning: The device does not fulfil the requirements of DIN EN50131-2-2 and therefore cannot be used in professional intrusion detection systems.
- “Impulse function” (via operating mode HVAC) – The impulse function can be used to control external HVAC systems. All 9 s will be set an impulse lasting 2.5 s



1.5. Full automatic / semi-automatic mode

Lighting zones A and B can be set individually to full automatic or semi-automatic mode. Lighting zone C always works with the settings from lighting zone B. In full automatic mode, the light is turned on automatically when motion is detected and ambient light is low enough, and turned off after an adjustable follow-up time and/or when ambient light is bright enough. Semi-automatic mode works in a similar fashion, except that switching on the lights must take place via a push button (manual ON/ auto OFF).

1.6. Push button functions

Conventional NO push buttons can be used.
A short press on all three push buttons, A, B and C, turns the light in each lighting zone on or off. A long press (> 2 seconds) on push buttons A and B leads to manual dimming (brightness up or down – another long press reverses the dimming direction).
Special feature in full automatic mode: if you want to use a short press to deliberately switch off the light in the room, for example to show a film or set up a projector, the light remains off until the follow-up time has expired.

1.7. IR-Adapter

Lighting zones can only be parameterised sending infrared signals via Smartphone app. Factory setting of the detector is broadcast mode (white LED shines permanently). So it is possible to check all DALI bus connections and pushbutton connections without parameterising. To send infrared signals via the Smartphone or a tablet, an IR-Adapter (part no. 92726) is required, which must be charged periodically, and has to be plugged in to the audio socket of the Smartphone or tablet.

2. Commissioning without IR-Adapter

2.1. Self-test cycle

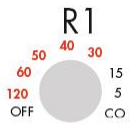
In the first 60 seconds from when the mains voltage is turned on, the detector runs through a self-test cycle. During this period, the device does not react to movement.

2.2. Factory settings

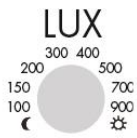
The PD4-M-HCL can also be put into service with basic functionality without changing any settings. Out of the box, the detector works in Broadcast mode (white LED shines permanently), which can only be changed over to Group mode with the remote control (smartphone or tablet + IR-Adapter + app) and the command "UNLOCK". All push buttons are activated in Broadcast mode (switching and dimming).

2.3. Potentiometer and DIP switches

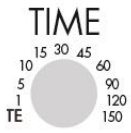
The following settings can be made via potentiometer and DIP switches:



Cut-off (CO): Standby consumption of connected DALI electronic ballasts is automatically minimised / **HVAC (5,10,15)**: light-independent HVAC occupancy control / **HVAC (30,40,50, 60,120)**: light-independent HVAC occupancy control with 5 min. switch-on delay / **OFF**: No relay control



Moon:
Night mode (< 10 lux) / Set value in lux: 100,150,200,300,400,500,700, 900 /
Sun:
Day mode (no constant light regulation, "too dark" detection always active)



Test: Each movement, regardless of ambient light levels, switches the light on for 1 second, then off for 2 seconds (PLEASE NOTE: Test mode is only possible if potentiometer B is not in the "Sun" position) / Follow-up time for lighting zones in minutes: 1,5,10,15,20,25,30,60

Nr.	Parameter/ Function	Description
DIP 1.	**Soft Start**	**ON**: initially to 10% at switch-on, then rising to set value / **OFF**: initially to 100% at switch-on, then falling to set value
DIP 2.	**Init-Light**	**ON**: when voltage is applied to detector, all lights turn on at 100% / **OFF**: when voltage is applied to detector, all lights are off (0%)
DIP 3.	**Auto-ON**	**ON:** full automatic broadcast or lighting zone A / **OFF**: semi-automatic broadcast or lighting zone A

2.4. Factory Reset

Factory settings inclusive Broadcast-modes can be restored at any time in the following manner (warning - all previous settings will be lost):

- Turn on mains supply if not already on
- Turn "TIME" potentiometer to "Test" (if the potentiometer is already in the "Test" position, it must first be turned to another position)
- Turn "LUX" potentiometer to "Sun" (if the potentiometer is already in the "Sun" position, it must first be turned to another position)

When all LEDs blink for approx. 3 seconds, activation of factory settings inclusive Broadcast-Modus has been successfully completed.

3. LED Indication

Nr.	Indication	white	green	red
1	Self-test cycle (factory setting)	Blinking	Blinking	Blinking
2	Self-test cycle (not programmed)	-	-	Blinking
3	Self-test cycle (programmed via IR)	-	-	Fast blinking
4	Self-test cycle (not programmed + double locked)	-	Blinking	-
5	Self-test cycle (programmed via IR + double locked)	-	Fast blinking	-
6	Too bright	-	Blinking	-
7	IR signal OK	Short ON	-	-
8	DALI configuration mode / grouping process	ON	ON	ON
9	DALI autoaddressing	Fast blinking	Fast blinking	Fast blinking
10	Broadcast mode	ON	-	-
11	Unlocked (parameters + commands)	-	ON	-
12	Movement detected	-	-	Short ON

4. Bidirectional Smartphone App

4.1 Preparing smartphone (Android Samsung, iOS)

Please install the app “B.E.G. BiRC”, available in the respective App Store. Depending on the end device it can be necessary to update the operating system. For current system requirements see application description.

4.2. Preparing IR-Adapter

The IR-Adapter has an integrated rechargeable battery for power supply. Please charge the adapter first by means of the micro USB cable (included in delivery). The battery being charged. The red LED switches off when battery is full.

4.3. Connect Adapter with smartphone

Plug the adapter in to the audio socket of your Smartphone or tablet. You must ensure that the IR-Adapter is fully inserted into the socket.
Please note that covers or cases may partially block a correct insertion of the adapter into the audio socket.
Set the volume of the audio socket to maximum in order to ensure a sufficient transmission range of the IR signal.

5. Smartphone App Parameters

5.1. General

LEFT BUTTON
Select function of the right button

READ OUT
Read out bidirectional product

SEND
Send selected parameters to the device

SEND ALL
Send all parameters to the device
(PLEASE NOTE: all set parameters will be overwritten, e.g. also the brightness threshold)

5.2. Device

Software Version

Device PIN

Lock device

DALI Address

Sensitivity
A high (detection) sensitivity being selected, even smaller movements will be detected and larger surfaces will be monitored.

Reflection factor

Status LEDs
The status LEDs indicate – for example - movement. PLEASE NOTE: In opened state and in test mode the status LEDs are ACTIVE.

INI light
The INI-ON / INI-OFF function defines if the light is on (INI-ON) or off (INI-OFF) during self-test cycle (60s after mains supply). Factory setting is INI-ON.

Start Burn In Function
Before the lamp can be dimmed, the dimming function has to be suppressed for a certain time in order to burn in the lamps.
T5 fluorescent lamps: 80 h
T8 fluorescent lamps: 100 h
During this time, the detector only switches the light ON or OFF. A dimming to the set value does not take place.

5.3. Human Centric Lighting

HCL Mode
Human Centric Lighting (HCL) can synchronise the internal clock in rooms with low daylight supply and sustainably strengthen the well-being. By changing the brightness and the light temperature during the day, the dynamics of daylight are brought into the building. This is done by application profiles or via an external light sensor. A demonstration mode is available for testing purposes.

Application profiles

- The "office" profile provides motivating light. During the day, the brightness ranges between approx. 500 and 650 lux and the colour temperature between approx. 3500 and 5500 Kelvin.
- The "Industry" profile provides concentration-increasing light. During the day, the brightness ranges between approx. 500 and 750 lux and the colour temperature between approx. 3500 and 5500 Kelvin.
- The "School" profile offers motivating light that supports learning. During the day, the brightness ranges between approx. 350 and 500 lux and the colour temperature between approx. 3500 and 5500 Kelvin.

Date
Current date in the device. The current date from the mobile is used when sending this parameter.

Time
Current time in the device. The current time from the mobile is used when sending this parameter.

5.4. Lighting

Follow-up Time
This time period starts upon detected movement and defines the duration for the connected load to stay on.

Brightness set value
The brightness set value is the luminance value to which the brightness in the room is regulated. To define the set value, the desired brightness can be adjusted using the BRIGHTER/DARKER button and can be stored with the EYE button. Fine tuning can be achieved using the +/– buttons. The value is stored automatically.

5.5. DALI groups 1-3: lighting zone A

Automatic
The operation mode of the detector can be selected. FULL: In this operating mode, the lighting switches automatically on and off for increased comfort, depending on presence and brightness. SEMI: In this operating mode, the light turns on only after a manual switching, for an increased savings success. Switching off is automatically or manually.In case motion is detected within the 10sec. after elapse of the follow-up time, the detector switches the light on again and the follow-up time starts again. If there is no motion detected within the 10s after elapse of the follow-up time, the light has to be turned on manually.

Offset group 2
Damping of group 2 relative to group 1 in %

Offset group 3
Damping of group 3 relative to group 1 in %

Soft Start
Dim up to LUX set value for lighting zone A and broadcast

5.6. DALI groups 4: lighting zone B

Automatic
The operation mode of the detector can be selected. FULL: In this operating mode, the lighting switches automatically on and off for increased comfort, depending on presence and brightness. SEMI: In this operating mode, the light turns on only after a manual switching, for an increased savings success. Switching off is automatically or manually.

5.7. Orientation Light

Follow-up Time
The time period starts after the main light is switched off and defines the duration for the orientation light to stay on.

Brightness value
This value defines the brightness of the orientation light.

5.8. Relay

Automatic
The operation mode of the integrated relay can be selected

- Cut off: Power consumption of EBs in standby is minimised.
  HVAC: Upon detected movement, the interface is switched on for the selected follow-up time (brightnessindependent).
- CdS: Der Melder schaltet das Licht bewegungsunabhängig bei Unterschreiten der eingestellten Einschaltschwelle ein. Abhängig von der eingestellten Einschaltschwelle ist eine Ein-/Ausschaltverzögerung aktiv.
- Zone C: The interface behaves the same as DALI group 4.
- Off: no function

Follow-up Time
This time period starts upon detected movement and defines the duration for the connected load to stay on.

6. Smartphone App Commands

6.1. DALI

Open DALI
Starts DALI configuration mode

Close DALI
Finished DALI configuration mode

BROADCAST RESET
Sets the DALI ballasts to default values (except short address). Recommended before carrying out an addressing procedure.

NEW
Applies to all connected DALI ECG: Deletes old addressing / groupings launches new auto-addressing, then switches automatically to the group assignment process.

Add
Only applies to all connected, factory-new DALI ECG (Factory-new = With short address "FF"): Starts Auto-addressing, then switches automatically to the group assignment process.

6.2. DALI group assignment

Previous
Starts group assignment process of all addressed DALI ECG
In the group assignment process:
Finds previous DALI ECG to be grouped.

Next
Starts group assignment process of all addressed DALI ECG
In the group assignment process:
Find the next to be grouped DALI ECG

Groups 1-4
Show / Check groupings
In the group assignment process: Saves selected group of flashing DALI ECG

- Group 1 for light zone A dark areas (wall side)
- Group 2 for light zone A neutral regions
- Group 3 for light zone A light areas (window)
- Group 4 for light zone B Blackboard lighting

6.3. Device

Reset / Factory settings
In closed state: The device switches off the connected load and restarts without self test cycle.
In opened state: The device is reset to factory settings when the potentiometers are set to TEST and SUN, otherwise to potentiometer settings. The settings made during self test cycle remain valid.

Test mode
The test mode is for determining the detection area. Upon each detected movement the light is switched on

HCL test mode
The test mode is used to check the colour temperature. The luminaires change from warm to cold white in quick succession.

Light ON/OFF
Switches zone A ON/OFF

Brighter
Closed: Fast dimming up to MAX
Open: Slow dimming up to MAX

Darker
Closed: Fast dimming down to MIN
Open: Slow dimming down to MIN

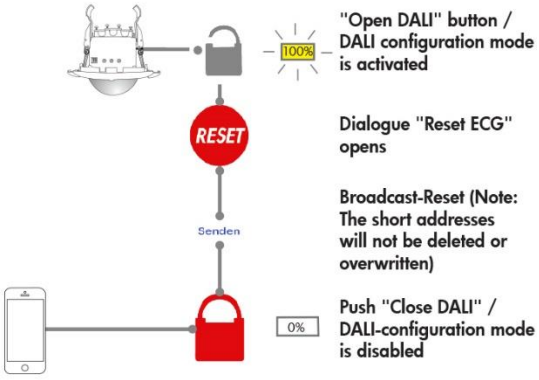
Save Brightness
Closed: Closed dimming
Open: Saves the current light level

7. Addressing and formation of groups

Before groups are formed, it is recommended that you draw up a plan showing the grouping of all DALI electronic ballasts in the room.

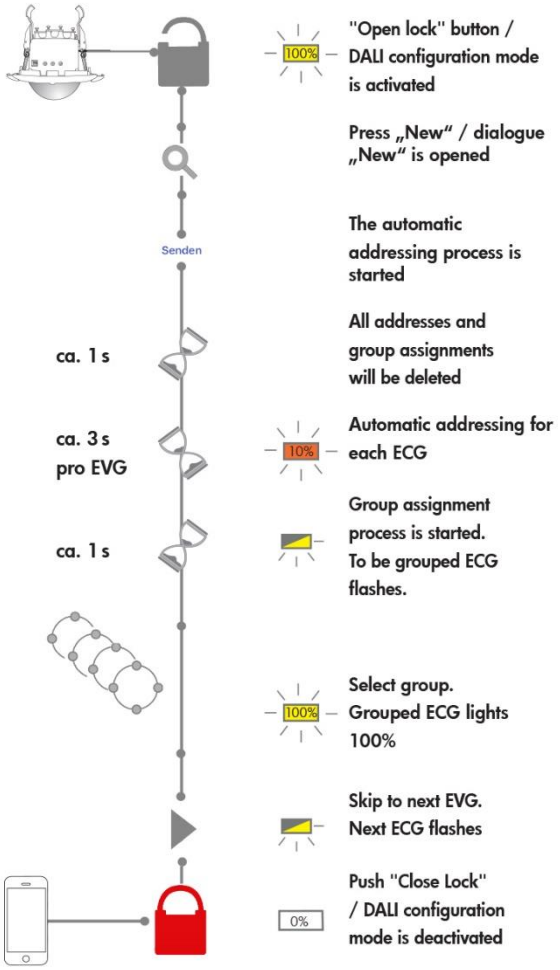
7.1. Step 1: Broadcast Reset

To ensure that all connected DALI electronic ballasts with identical basic settings are used, we recommend that you first perform a broadcast reset.

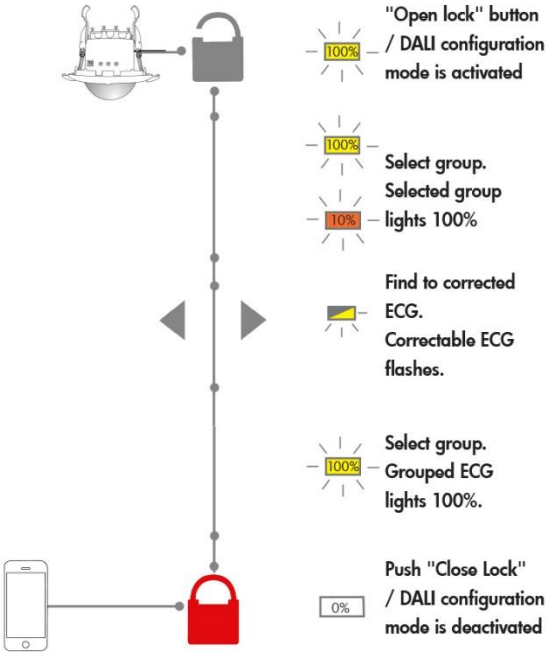


7.2. Step 2: New addressing process

Important note for slave operation: connect slave devices only after setting up addressing, or else ensure that, while auto-addressing takes place (all LEDs blinking quickly), no-one remains in any slave device's detection area, so that no motion detection events are sent to the master.

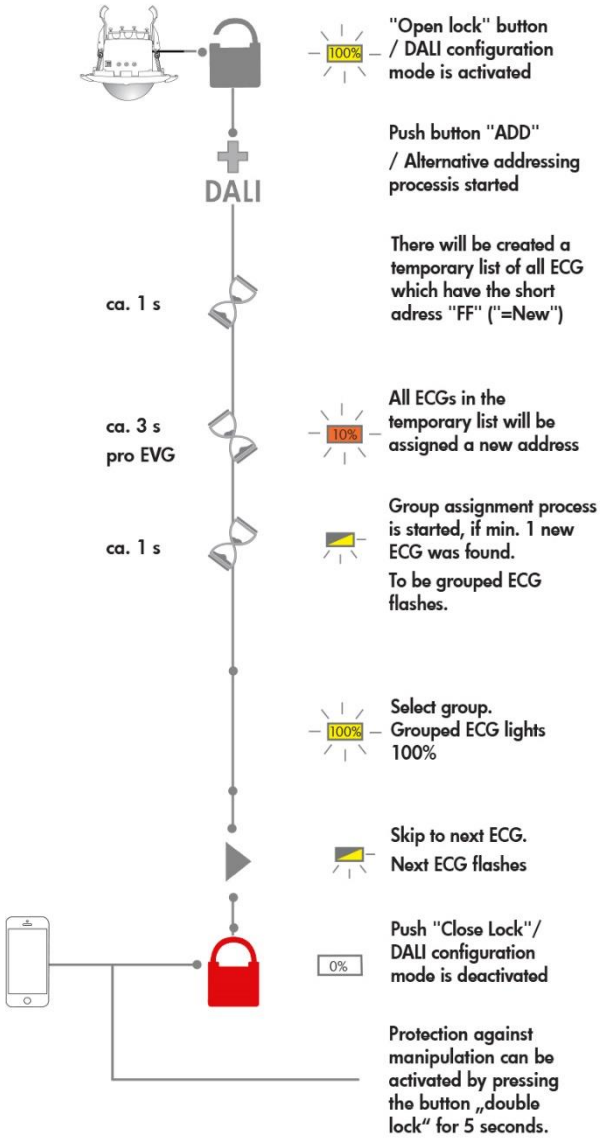


7.3. Step 3: Check grouping and change if necessary



8. Adding or replacing electronic ballasts

For cases where individual DALI electronic ballasts are to be replaced, or others added, there is a DALI maintenance mode. In DALI maintenance mode, only DALI electronic ballasts with a short address of “FF” have their addresses reset and released for grouping. This short address is saved as a factory setting on all new DALI electronic ballasts.



9. Set Lux setpoint

9.1. Alignment

Always align the light sensor towards a lighting area belonging to Group 1. For this, the sensor can be angled vertically at 30° from the floor towards the wall.

9.2. Default settings

To adjust a desired target value more easily, it is recommended to pre-set a value using the app and the parameter LUX or via potentiometer which serves as basis for adjusting the desired target value.

9.3. Process description

- Step 1: Darken the room. There should be only light available, which can be implemented via the device connected to the detector lighting system.
- Step 2: Place a calibrated light meter in the field of group 1
- Step 3: Use the manual dimming and eyes button in the smartphone app in the tab „command“, to store the desired setpoint LUX. It may take up to 2 minutes, until the new adjustment shows effect.
- Step 4: Use the + / - buttons in the smartphone app for minimal corrections

10. Article

Type	Part.-Nr.
PD4-M-HCL-FC	93006
PD4-M-HCL-SM	93007
IR-Adapter	92726
Accessory (optional)	
PD4-S-DAA4G-FC	92721
PD4-S-DAA4G-SM	92759