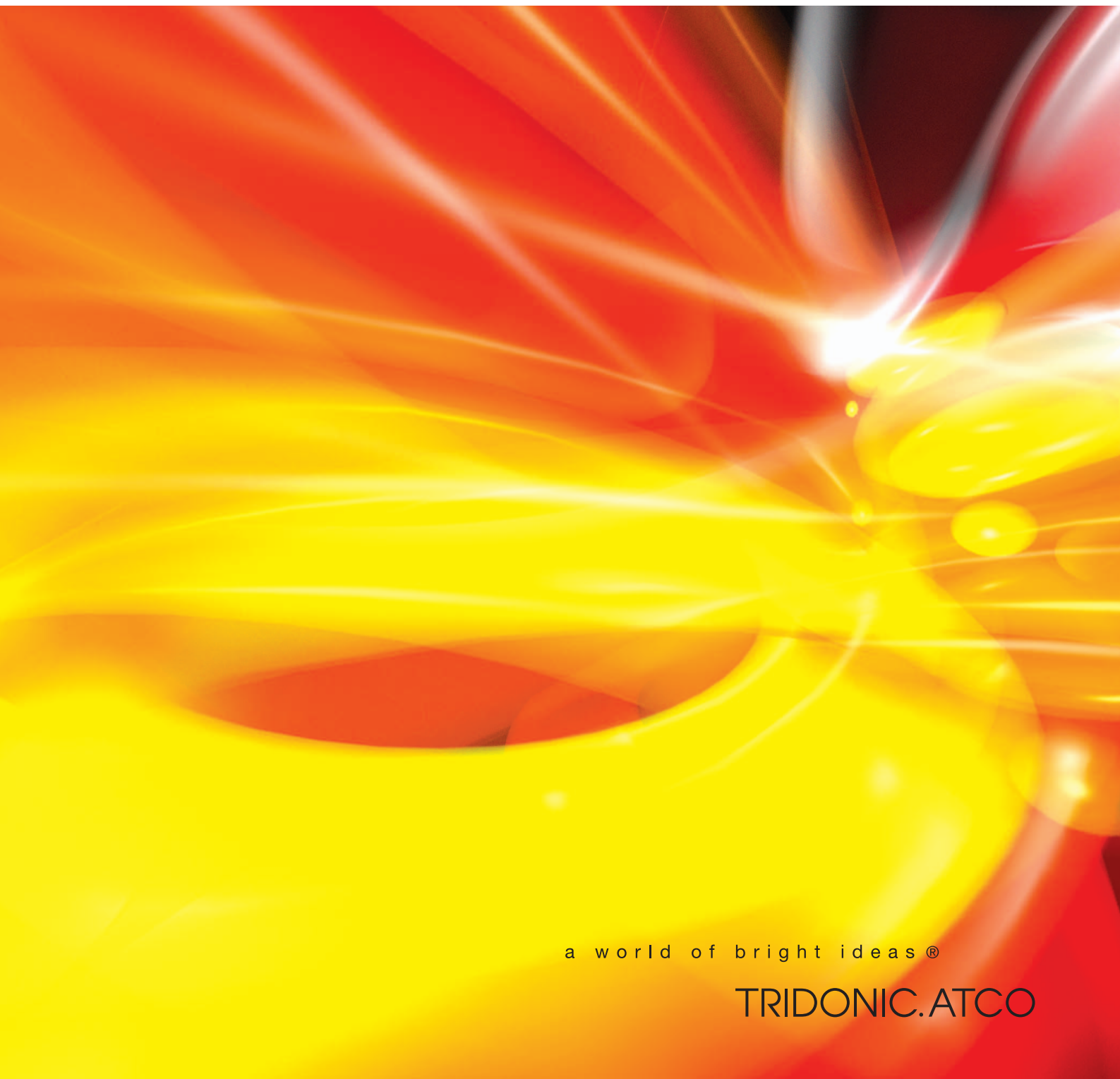


luxCONTROL Lighting Control System

TECHNICAL INFORMATION



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Overview of DALI-MSensor

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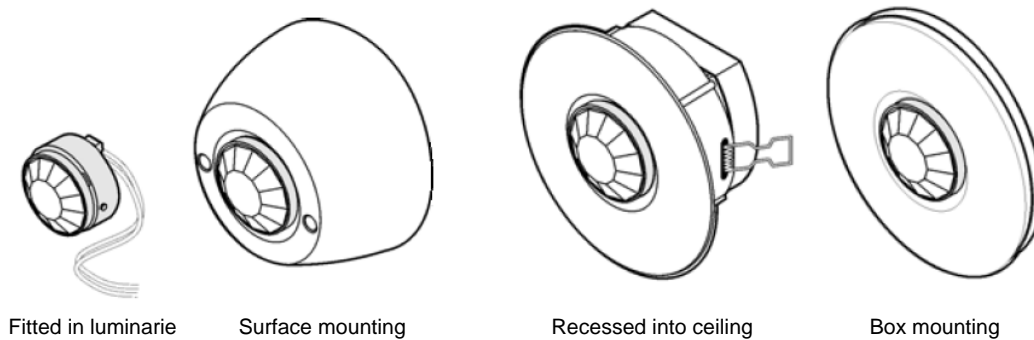
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1. General

The DALI-MSensor is the ideal addition to the comfortDIM series of products as it offers daylight-dependent lighting control, presence detection and remote control.

It has been designed for the following principal applications:

- Individual offices
- Open-plan offices
- Training/presentation rooms
- Corridors, passageways and garages



Fitted in luminaire

Surface mounting

Recessed into ceiling

Box mounting

2. Properties of DALI-MSensor:

The DALI-MSensor has the following properties and user interfaces:

- PIR motion sensor
- Ambient light sensor
- 2 different IR remote controls
- Commissioning of basic DALI circuits with the remote control DALI-RC

The DALI-MSensor takes its operating voltage from the DALI bus and is designed so that it can be used together with the DALI components DALI-GC, DALI-SC and DALI-Touchpanel. For this reason the DALI-MSensor can be addressed and grouped like an ECG, making system configuration easier. The DALI-MSensor needs the short address for communication between multiple sensors, and the group for communication with other DALI controllers.

A maximum of 12 sensors can be operated on one DALI circuit. This restriction is due to the permitted data traffic on the DALI circuit. If the DALI-MSensors operate independently of each other the maximum number of sensors per DALI circuit is reduced to eight (see the section on Group concept).

NOTE: In contrast to other DALI controllers, the DALI-MSensor is assigned a short address during the addressing process. This must be taken into consideration when designing the DALI circuit.

The DALI-MSensor can be used to either control all the units on the DALI circuit (“broadcast”) or an individual DALI group.

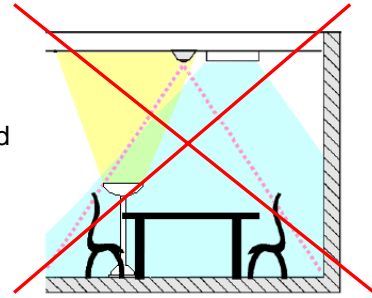
2.1 DALI-MSensor ambient light sensor

The ambient light sensor detects the reflected light at an angle of approx. 70°. If there are multiple DALI-MSensors in the same luminaire groups, lighting control by the sensors is set up so that the light value is raised until it is no longer under the set-point value at any of the sensors. Ambient light control can be activated and deactivated via the DALI-RC and the masterCONFIGURATOR software. Ambient light control is activated ex works.

To achieve the required luminous intensity at the workplace there are a number of points that need to be considered when installing the DALI-MSensor.

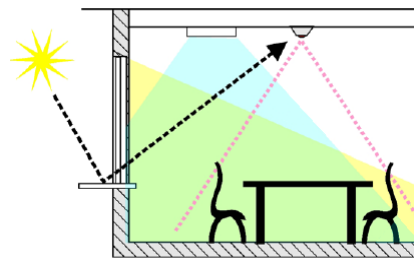
1. Make sure that the detection area of the sensor is in the lighting area of the controlled luminaires.

2. The sensor should not be exposed to direct light. Ambient light sensors measure the reflected light at the workplace. Avoid placing the sensor where it will be exposed to direct light from a light source (e.g. directly by an uplighter)

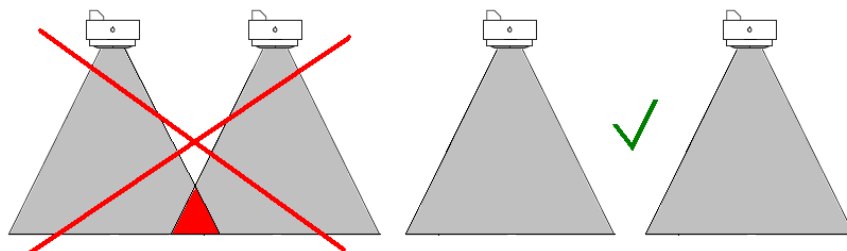


3. The sensor should not be exposed to direct sunlight. This means that the sensor must be far enough away from windows that its entire detection area lies within the room and any reflections from sunlight off shiny surfaces cannot hit the sensor.

IMPORTANT: Reflections of sunlight off glass or metal surfaces may overwhelm the sensor and therefore adversely affect lighting control. If this is the case, the sensor needs to be repositioned.



4. If more than one sensor is being used in a room you should make sure that the detection areas of the various sensors do not overlap. Overlapping detection areas may cause the different control circuits to affect one another, leading to non-uniform lighting in the room.



2.2 DALI-MSensor motion sensor

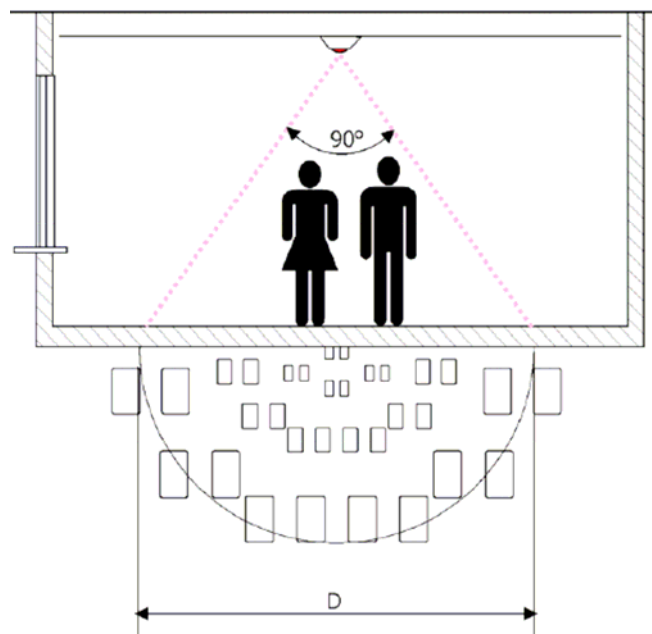
The DALI-RC remote control or the masterCONFIGURATOR software can be used to define various settings for the DALI-MSensor.

Settings for MSensor:

Motion Detection Active	The light is switched on or off automatically in response to the presence of a person.
Motion Detection Off Only	The sensor switches off if there is no motion detected in the detection area, but does not switch on again even if motion is detected.
Motion Detection Inactive	Motion detection is deactivated. The light must be switched on and off manually.
Motion Detection Never Off	After no motion has been detected the sensor dims to a low light value but does not switch off (this setting is only possible with the masterCONFIGURATOR)

The factory setting is "Motion Detection Active". Other parameters such as delay times, fade ramps and so on can be set with the masterCONFIGURATOR software.

The motion detection circuit in the DALI-MSensor reacts to moving thermal radiation from people. The detection angle is about 90°. When selecting a suitable site make sure that there are no radiators in the immediate vicinity.



NOTE: The recommended maximum room height for office applications is 3 m and for corridor applications 4 m. For values and the formula for calculating the detection area (D) please refer to the product data sheet.

2.3 DALI-MSensor remote control

The DALI-MSensor can be operated with two remote controls.

- IR smartController:
- DALI-RC

2.3.1 IR smartController

The IR smartController is used to operate an assigned luminaire group in the DALI system. This remote control offers the following functions:

- On/off switching of the luminaire group
- Up/down fading of the luminaire group
- Activation of lighting control (Automatic)
- Definition of the setpoint value for lighting control



2.3.2 DALI-RC

The DALI-RC remote control offers further system control options. The DALI-RC is designed as an aid to installation and parametrisation and for operating the system. The remote control can be set for individual groups or "broadcast" with the aid of a code switch (in the battery compartment of the remote control). The parametrisation or installation mode can be changed by means of a pushbutton in the battery compartment. The DALI-RC offers the following functions:

- Operation:

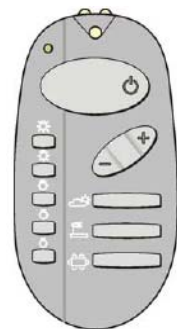
- On/off switching of all the luminaires or the selected group
- Up/down fading of all the luminaires or the selected group
- Activation of lighting control (Automatic)
- Recalling scenes

- Programming:

- Definition of the setpoint value for lighting control
- Programming scenes 1 and 2

- Installation:

- Addressing control units
- Grouping control units
- Activating and deactivating motion sensors
- Activating and deactivating the lighting control mode

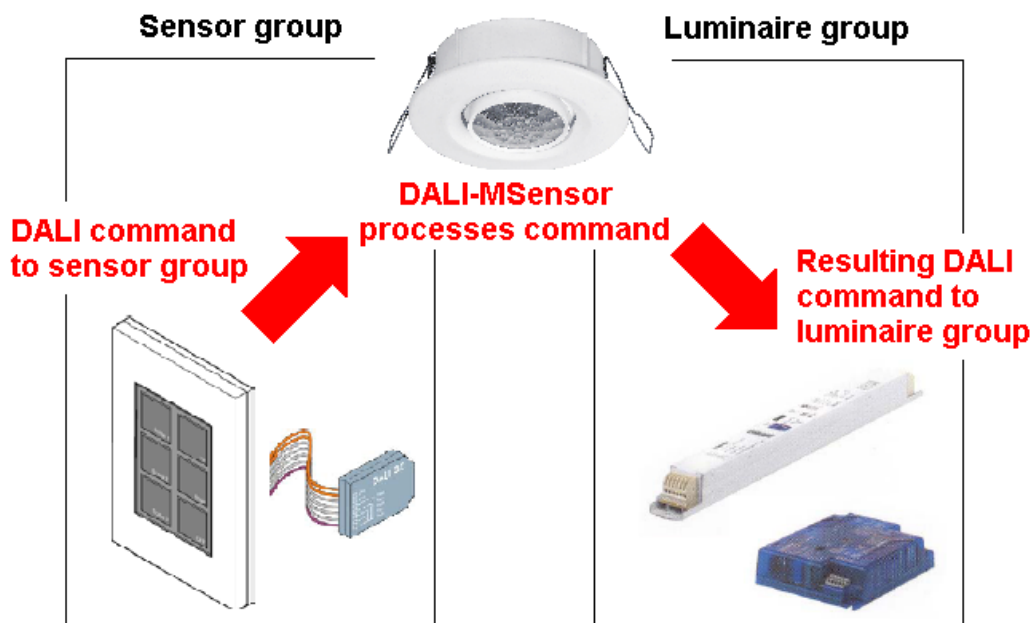


NOTE: With the masterCONFIGURATOR software it is possible to change the assignment of the DALI-RC buttons. In this case, however, the rotary switch in the remote control will no longer have any effect and the commands will apply only for the luminaire group selected on the DALI-MSensor.

3. Group concept

The DALI-MSensor features a special DALI group concept. This is based on the requirement that the lighting control point can be changed with other DALI controllers such as the DALI-GC or the DALI TOUCHPANEL. Each DALI-MSensor therefore needs two groups, the luminaire group and the sensor group.

- Luminaire group:**
 This DALI group contains the DALI control units (electronic control gear, electronic transformers, etc.). All the units in this group are controlled via the appropriate DALI-MSensor. If another DALI controller sends a command to the luminaire group the DALI-MSensor switches to manual; in other words lighting control is deactivated. The group address of the luminaire group is set on the DALI-MSensor via the rotary switch at the back of the sensor.
- Sensor group:**
 The sensor or sensor input group is the group via which it is possible to influence the sensor. It is used for communication between the DALI-MSensor and other DALI controls. If for example a DALI GC sends a DALI command to this group the command is evaluated by the DALI-MSensor and the luminaire group is controlled accordingly. The sensor group is the group immediately following the luminaire group. Example: Switch position = $p \Rightarrow$ Luminaire group = p , Sensor group = $p+1$)



NOTE: A DALI-MSensor requires two successive groups, the luminaire group and the sensor group. This must be taken into consideration when designing the DALI circuit and when setting up the groups.

Luminaires may not belong to more than one DALI group. Otherwise the sensors will not detect the commands sent to the luminaires and will therefore not react as required.

On the basis of the group concept a maximum of eight independently controlled groups can be set up. In other words, the maximum number of independent DALI-MSensors per DALI circuit is eight.

3.1 DALI-MSensor in conjunction with other DALI controls

The DALI-MSensor is designed so that it can be combined with other DALI controls. In the case of some products, however, the group concept for the sensor means there are certain restrictions or certain points need to be considered.



3.1.1 DALI-GC

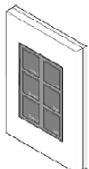
Depending on the group (luminaire group or sensor group) to which the DALI-GC is assigned, different actions are performed in connection with the DALI-MSensor.

DALI-GC action	Command to luminaire group	Command to sensor group
Short press (lighting off)	On at MAX ⇒ MSensor: Lighting control is deactivated (manual operation)	On at MAX ⇒ MSensor: Lighting control is activated (automatic operation)
Short press (lighting on)	Off	Off
Long press	Dimming of the light value: ⇒ MSensor: Lighting control is deactivated (manual operation)	Dimming of the light value: ⇒ MSensor: The current light value is used as the control setpoint. (Setpoint adjustment)



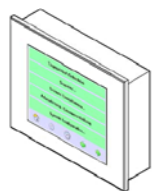
3.1.2 DALI-SC

Calling up a lighting scene via the DALI-SC deactivates DALI-MSensor lighting control. This means that the lighting scene remains unchanged until either the lighting control circuit of the DALI-MSensor is activated again or it is changed via the DALI-SC itself.



3.1.3 DALI TOUCHPANEL

See relevant points under DALI-GC and DALI-SC



3.1.4 DALI x-touchBOX/PANEL

There are serious restrictions on using DALI x-touchBOX/Panel together with the DALI-MSensor because the group concept and the associated assignment of two successive groups have an adverse affect on the x-touchBOX/Panel.

NOTE: Calling up a scene with the DALI-SC, the DALI-TOUCHPANEL or the x-touchBOX/PANEL always deactivates control of all the sensors in the DALI circuit.

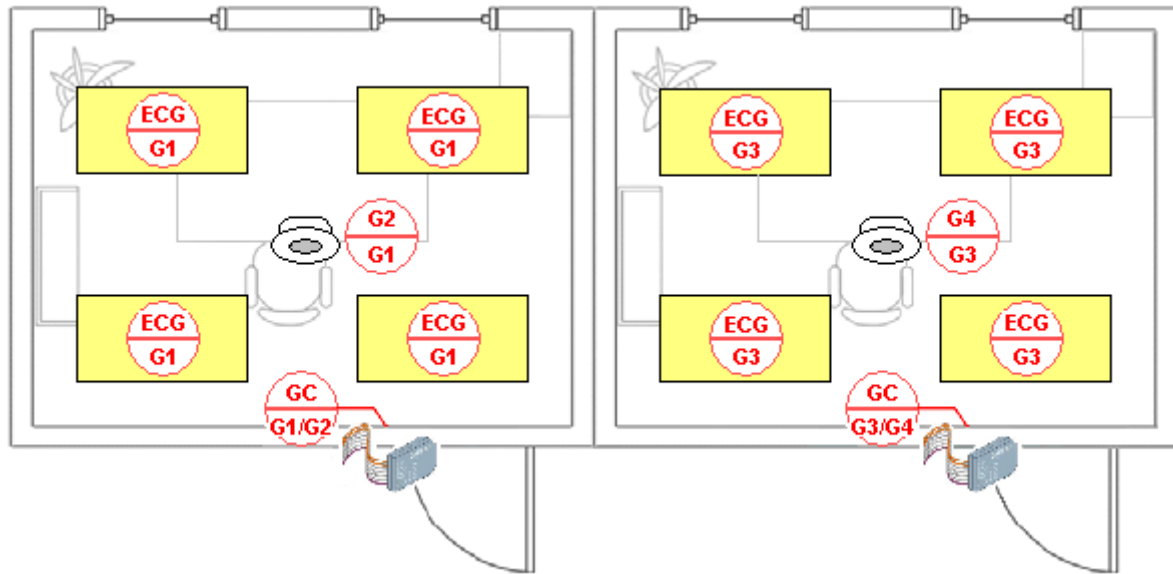
If the system is switched off manually the motion sensor is deactivated. At the end of a delay (“Manual Off”) if motion has not been detected the motion sensor is activated again. If the sensor detection motion during this delay, the time will be reset to the start. The delay can be set in the masterCONFIGURATOR software.

4. Examples

4.1 Several independent small office rooms

Requirement

- Lighting to be switched on by means of a switch
- Lighting to be switched off by means of a motion sensor (Off-only function)
- Daylight-dependent control of illuminance
- Lighting setpoint to be adjusted by means of a switch



Grouping:

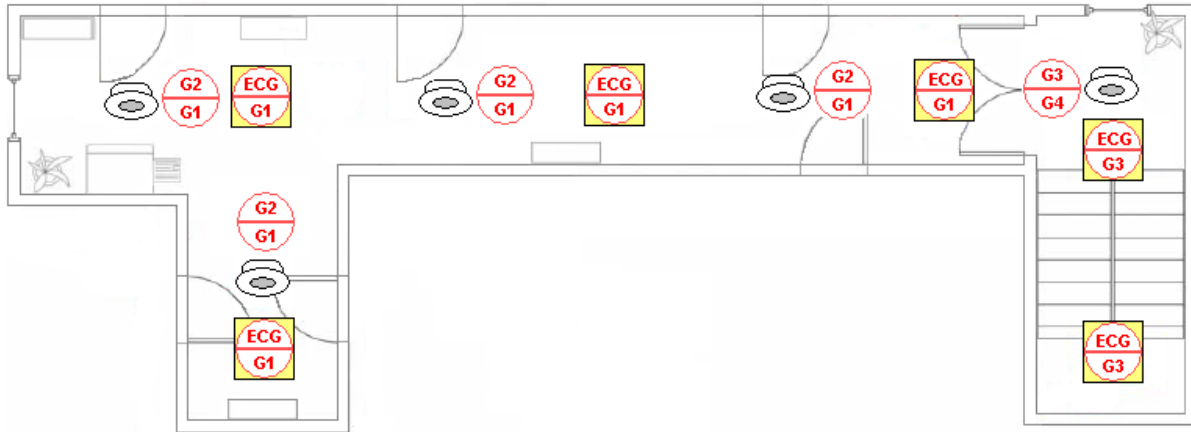
	Room A	Room B
MSensor luminaire group	Group 1 (switch position 1)	Group 3 (switch position 3)
MSensor sensor group	Group 2 (switch position 1 + 1)	Group 4 (switch position 3 + 1)
DALI GC	The DALI GC is used for setting the lighting setpoint and for switching on the control circuit ⇒ DALI commands to the sensor group (Group 2) Switch position 1 (Group 1+2): Group 1 ⇒ not used Group 2 ⇒ Switch	The DALI GC is used for setting the lighting setpoint and for switching on the control circuit ⇒ DALI commands to the sensor group (Group 4) Switch position 3 (Group 3+4): Group 3 ⇒ not used Group 4 ⇒ Switch

Note: You must make sure that a DALI-MSensor covers two groups. If for example the luminaire group in room B is set to group 2 instead of group 3, the sensor group of the sensor in room A and the luminaire group in room B will overlap, leading to malfunctions in the lighting control system.

4.2 Corridor

Requirement

- On/off switching via the motion sensor
- Daylight-dependent control of illuminance
- The corridor and staircase are controlled separately.



Grouping:

	Corridor	Staircase
MSensor luminaire group	Group 1 (switch position 1)	Group 3 (switch position 3)
MSensor sensor group	Group 2 (switch position 1 + 1)	Group 4 (switch position 3 + 1)

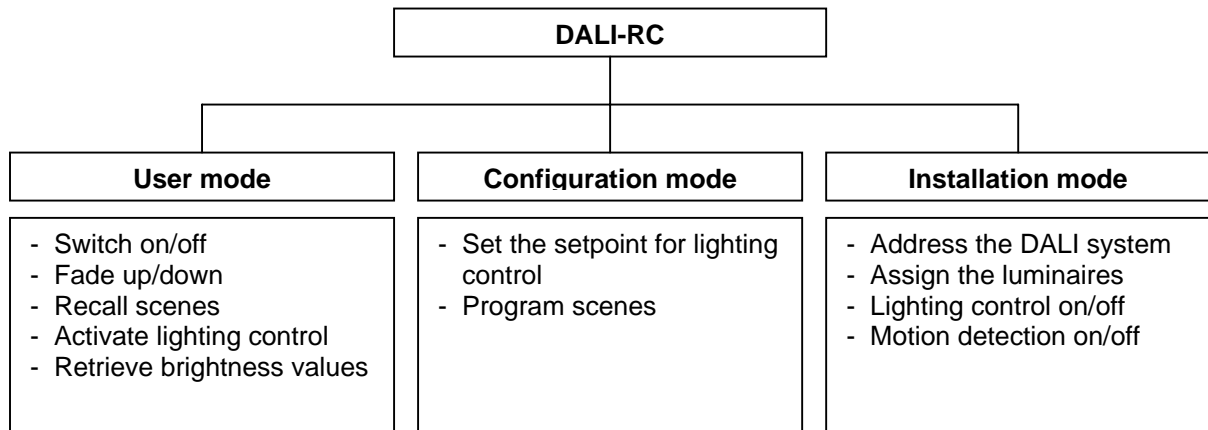
Note: To enlarge the presence detection area, several DALI-MSensors are installed in the corridor. All these sensors must be assigned to the same luminaire group.

If there are multiple DALI-MSensors in a group, then the light value is raised until it is no longer under the setpoint value at any of the sensors.

5. DALI-RC remote control

As mentioned in Section 2.3.2, the DALI-RC remote control, in addition to the user mode, enables DALI installations to be addressed and configured. There is a choice of three different control modes.

5.1 Concept

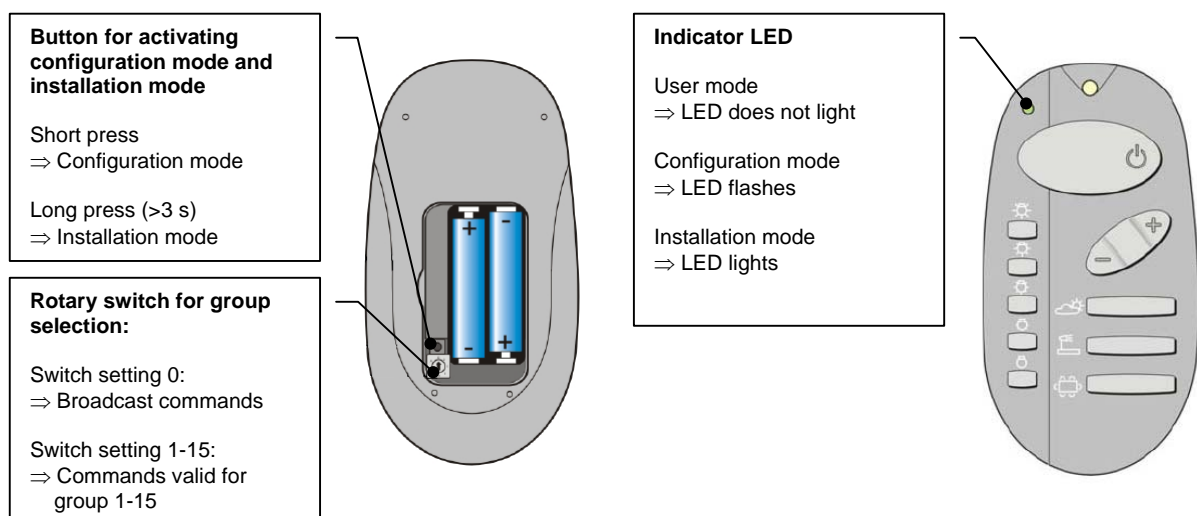


5.1.1 Activating the different modes:

The user mode is active as the default option. The other two modes are activated by means of a miniature switch in the battery compartment of the remote control. Briefly pressing the switch activates the configuration mode. The LED indicator on the front of the remote control flashes to show that the configuration mode has been selected. Holding down the button for more than 3 seconds activates the installation mode. This mode is indicated by a steady light from the LED on the front. If no action is taken for three minutes after activation of either mode or if the button in the battery compartment is pressed again, the DALI-RC will revert to user mode.

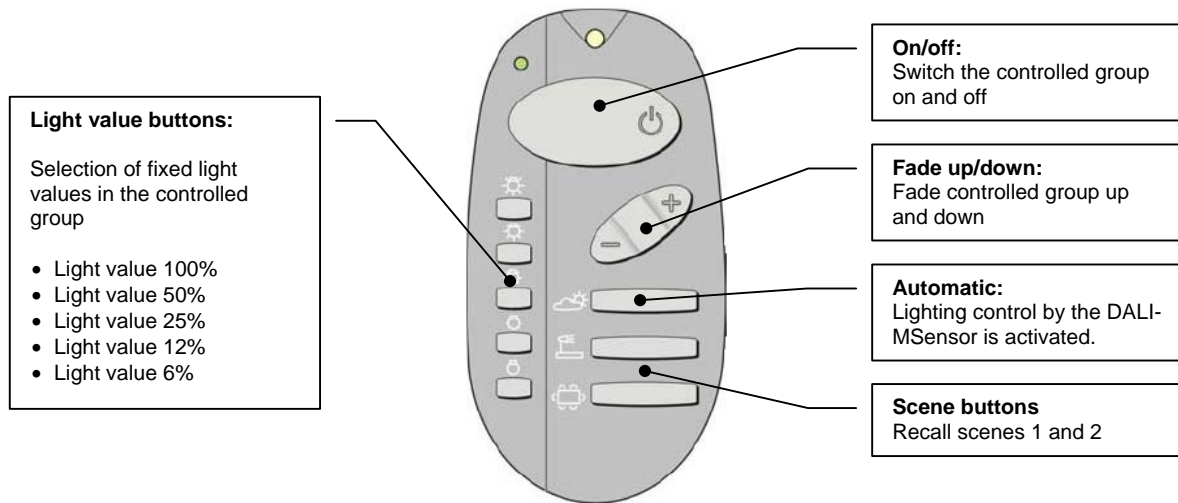
5.1.2 Group setting:

The rotary switch in the battery compartment of the remote control is used for setting the group to be controlled by the remote control. Position 0 means that the commands apply to all the DALI groups (Broadcast); in positions 1-15 the commands apply only to the specific group.



5.2 User mode

To ensure that users can use the remote control straight away without any complicated set-up procedure the buttons are pre-programmed with a basic setting. The functions of the buttons in user mode are as follows:



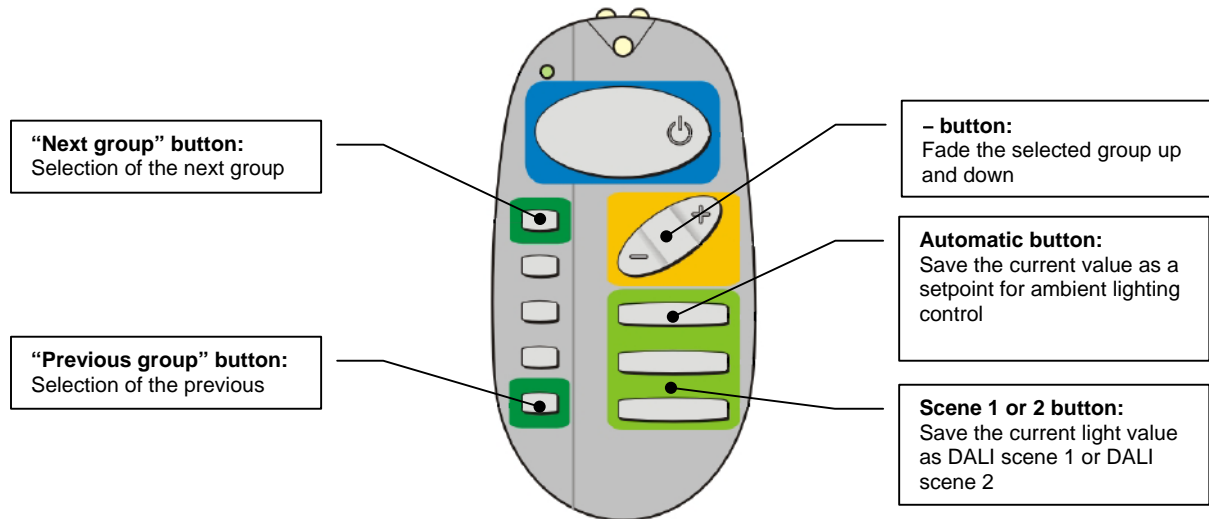
NOTE: The masterCONFIGURATOR software can be used to customise the button assignments. In this case, however, the rotary switch in the remote control will no longer have any effect and the commands will apply only for the luminaire group selected on the DALI-MSensor.

5.3 Configuration mode

In configuration mode it is possible to set or configure the brightness setpoint value of for ambient lighting control and the light values for the scene buttons.

To access the configuration mode you need to press a button in the battery compartment. To indicate this mode the LED on the front of the remote control will flash. The configuration mode remains active until either three minutes elapses without the remote control being used or the button in the battery compartment is pressed again. (See Section 5.1.1)

5.3.1 Button assignment in configuration mode



5.3.2 Setting the brightness setpoint

Once the DALI-RC is in configuration mode the – button can be used to set the required brightness. Pressing the Automatic button stores the illuminance currently measured by the sensor as the new nominal value. To indicate that the light value has been stored as the new setpoint the luminaire group briefly fades up and down.

5.3.3 Programming scenes

Once the DALI-RC is in configuration mode the – button can be used to set the required brightness of the selected group. The group is selected with the [Next Group] or [Previous Group] button. Pressing the scene button stores the current brightness value as a scene in the control units. Holding down the scene button for more than three seconds will delete the scene (MASK programming). The system confirms the save operation by fading up and down.

5.3.4 Step-by-step configuration

Storing the brightness value	Programming scenes
<ol style="list-style-type: none"> 1. Use the [Next Group] or [Previous Group] button to select the required group. The relevant group will light. 2. Use the – button to set the required luminous intensity of the group. 3. Press the Automatic button to save the required light value as a setpoint for lighting control. 4. The system confirms the save operation by fading up and down. 	<ol style="list-style-type: none"> 1. Use the [Next Group] or [Previous Group] button to select the required group. The relevant group will light. 2. Use the – button to set the required luminous intensity of the group. 3. Repeat steps 1 and 2 until all the groups have been processed. 4. Press [Scene 1] or [Scene 2] to store the relevant scene. 5. The system confirms the save operation by fading up and down.

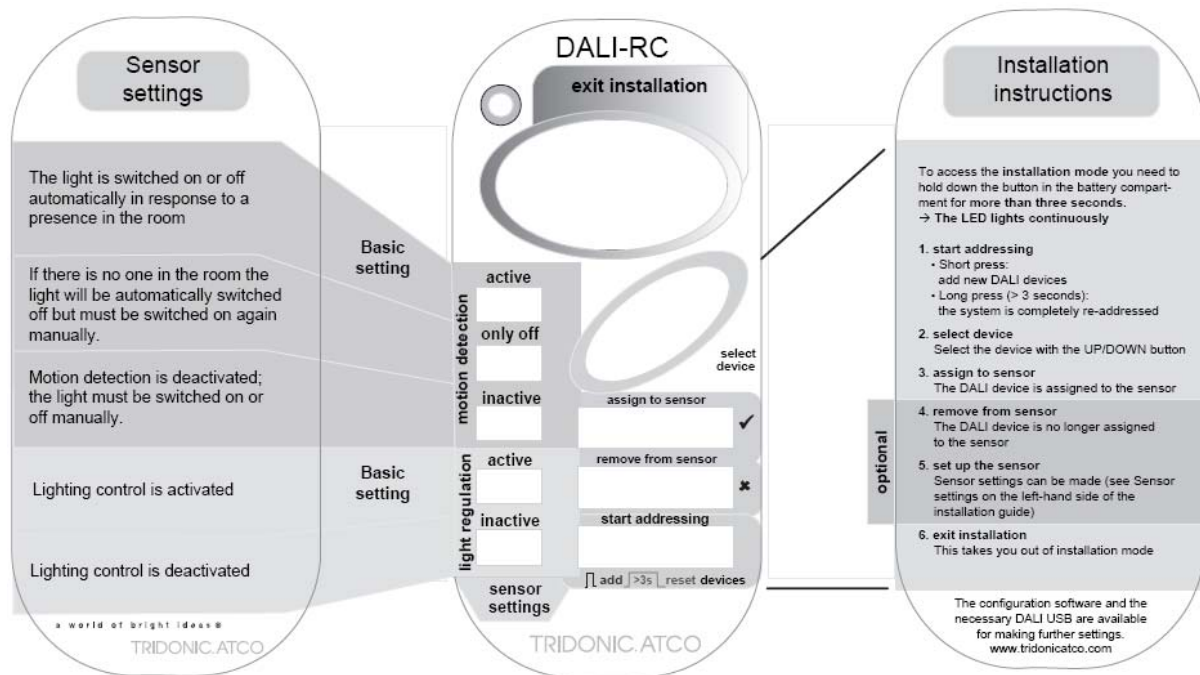
5.4 Installation mode

In installation mode the DALI system can be initialised and the DALI control devices can be assigned to the relevant DALI-MSensor.

To access the installation mode you need to hold down the button in the battery compartment for at least three seconds. The LED on the front indicates that the installation mode is active. The installation mode remains active until either three minutes elapses without the remote control being used or the button in the battery compartment is pressed again. (See Section 5.1.1)

5.3.1 Button assignment for installation mode

The DALI-RC accessories includes a programming aid so you can easily find the extended functions during installation or programming. It can simply be placed over the keypad:



5.4.2 Addressing and grouping

With the DALI-RC in installation mode, press the “start addressing” button (meeting symbol) to begin the addressing process. Press the button briefly for additional control devices, or hold it down for more than three seconds to completely re-address the entire system. The LED on the DALI-MSensor will flash throughout the addressing process. During this process every control device found will be faded to 100%. When the entire system has been addressed all the control devices will be dimmed to the minimum value and the first new address will light up at 100% brightness. The individual control devices can be selected with the “select device” button. You can then assign the selected control devices to the luminaire group of the relevant sensor by pressing the “assign to sensor” button (sun/cloud symbol). To leave the installation mode, press the Exit button (ON/OFF). The LED on the DALI-RC remote control will go out.

5.4.3 Sensor settings

In installation mode you can make the following settings:

- Motion (on/off, off only, inactive)
- Light regulation (active, inactive)

Transfer of the setting to the DALI-MSensor is signalled visually by fading the luminaire group up and down.

Possible options:

Motion detection active (Basic setting)	The light is switched on or off automatically in response to the presence of a person.
Motion detection off only	If there is no one in the room the light is automatically switched off. It must be switched on again manually.
Motion detection inactive	Motion detection has been deactivated. The light must be switched on and off manually.
Light regulation active (Basic setting)	Lighting control is activated
Light regulation inactive	Lighting control is deactivated

5.4.3 Installation step by step

Addressing and grouping	Sensor settings
<ol style="list-style-type: none"> 1. Press the "start addressing" button <ul style="list-style-type: none"> • Short press: add new DALI device • Long press (> 3 seconds): complete re-addressing 2. Select the DALI device with the – button 3. Assign the DALI device to the DALI-MSensor with the "assign to sensor" button 4. Repeat steps 2 and 3 until all the devices have been assigned to the sensor 5. Quit installation mode with the ON/OFF button 	<ol style="list-style-type: none"> 1. Set up the motion sensor: Use the buttons on the left of the remote control to enter the settings according to the programming aid; the system confirms the save operation by fading up and down. 2. Set up lighting control: Use the buttons on the left of the remote control to enter the settings according to the programming aid. The system confirms the save operation by fading up and down. 3. Quit installation mode with the ON/OFF button