

DALI-2 CS Mini

Datasheet

Combi Sensor Module



DALI-2 sensor module for
presence detection,
light intensity measurement
and constant light control

Application Controller:

Version with rubber ring:

black: Art.Nr. 86457244

white: Art.Nr. 86457244-W16

Version with thread:

black: Art.Nr. 86457244-GW

white: Art.Nr. 86457244-GW-W16

Version Integration only Instance mode: **-INT**

Version protection class IP65: **-IP65**

DALI-2 CS Mini Multifunctional Sensor Module

Overview

- Sensor Module for DALI and DALI-2 lighting systems
- Movement detection (PIR) instance type 3 (62386-303) and light intensity measurement instance type 4 (62386-304)
- 4 operating modes:
 - Movement triggered
 - Movement triggered with constant light control
 - Constant light control
 - Light control (4 thresholds)
- Operating modes can be changed via scenes and external DALI commands
- Corridor function – second light level before off in case of absence
- Light threshold-controlled regulation for the control of blinds or roller blinds
- The module can be used as a DALI light controller or just as sensor unit for integration in building management systems
- Easy configuration via DALI-Cockpit Software Tool and Lunatone DALI USB interface.
- Multiple sensor modules can be installed within a DALI system.
- Configurable synchronisation of multiple DALI-2 CS modules to control the same effective range
- Supply via the DALI bus, no additional power supply needed
- Suitable for installation in luminaries
- Version for indoor and outdoor use IP65

Specification, Characteristics

Type	DALI CS Mini	DALI CS Mini IP65
Article number	86457244, 86457244-GW 86457244-INT, 86457244-GW-INT 86457244-W16, 86457244-GW-W16 86457244-INT-W16, 86457244-GW-INT-W16	86457244-IP65, 86457244-GW-IP65 86457244-INT-IP65, 86457244-GW-INT-IP65 86457244-W16-IP65, 86457244-GW-W16-IP65 86457244-INT-W16-IP65, 86457244-GW-INT-W16-IP65

Electrical Data:

Power supply	via DALI line
current consumption DALI 16.5V	4.5 mA
current consumption DALI 22.5V	5 mA
Input / Output	DALI

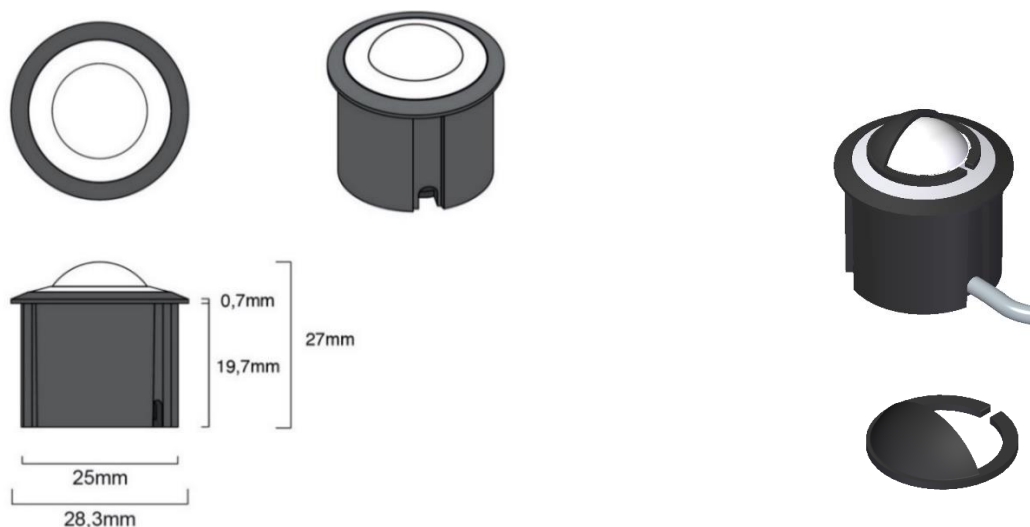
Technical data

Motion Detection (62386 -303) principle	PIR
detection range (at >8°C temperature difference)	2.3m / 3m
typical mounting height	3m
zones	36 / 48
horizontal	±44°/±90°

vertical	$\pm 44^\circ / \pm 90^\circ$
min. temperature difference	$> 4^\circ\text{C}$
details	See Figure 1, page 4
Light sensor (62386-304)	range: 0-2047lux (11bit), resolution: 1lux event: 0-2047lux(10bit), resolution: 2lux
Function	configurable
start up time	390 ms

General data

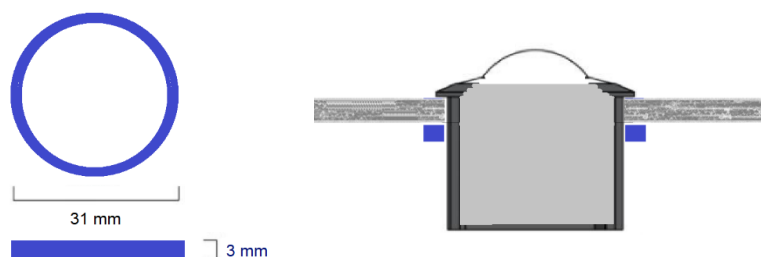
storing and transportation temperature	$-20^\circ\text{C} \dots +70^\circ\text{C}$	
operational ambient temperature	$-20^\circ\text{C} \dots +60^\circ\text{C}$	
Protection class	IP40	IP65
suitable ambient	indoor	outdoor
mounting	luminary built in	
Connection cable length	version with rubber ring: 350mm version with thread (-GW): 150mm	
housing size	28 x 28 x 27mm – details see drawing	
version with rubber ring	28 x 28 x 27mm – details see drawing	
version with thread and counter nut	28 x 28 x 27mm – details see drawing	
Available colours	black or white (RAL 9016) art. nr. extension: “-W16”	


Dimensions sensor with rubber ring

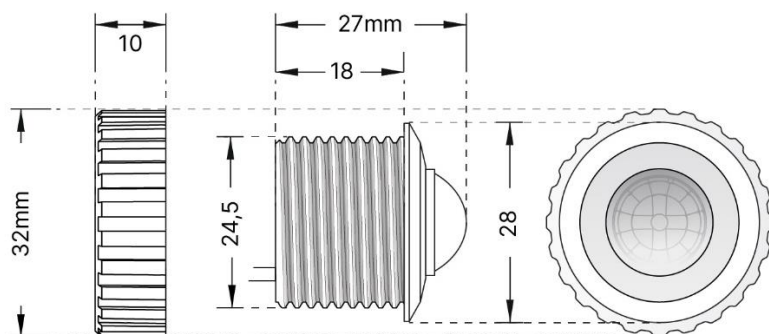
article numbers 86457244, 86457244-IP65, 86457244-INT,
86457244-INT-IP65, 86457244-W16, 86457244 -W16-IP65,
86457244-INT-W16, 86457244-INT-W16-IP65

accessory cover

Art.Nr.: 86457244-Z01
Art.Nr.: 86457244-Z01-W16


rubber ring for mounting

included for article numbers: 86457244, 86457244-IP65, 86457244-INT, 86457244-INT-IP65,
86457244-W16, 86457244 -W16-IP65, 86457244-INT-W16, 86457244-INT-W16-IP65



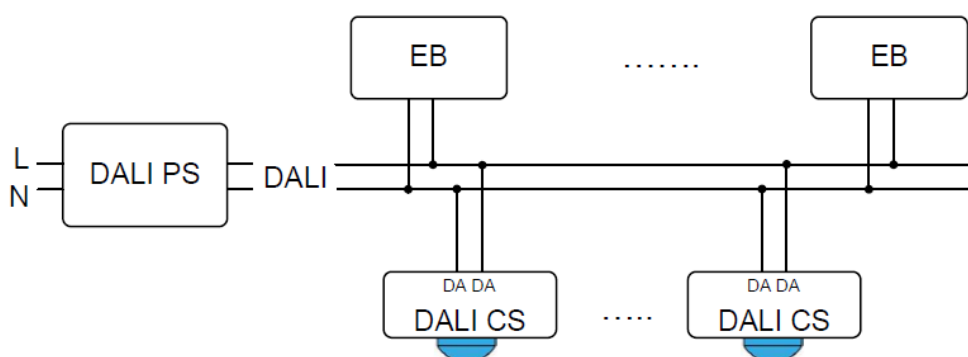
Dimensions sensor with thread

article numbers: 86457244, 86457244-GW, 86457244-INT-GW,
86457244-INT-GW-W16



accessory cover

Art.Nr.: 86457244-Z01
Art.Nr.: 86457244-Z01-W16



Typical application: multiple sensors in one DALI line

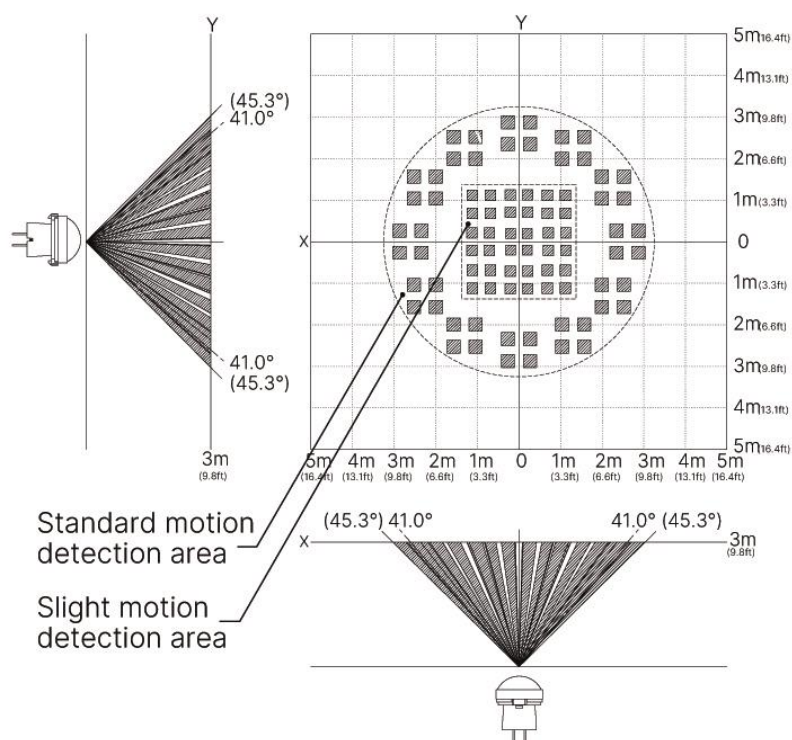


Figure 1 Detection area: **X-Y cross section at 3m** - The rectangular centre zone is optimized detecting smallest movements (e.g. arm movement)

Factory Setting

For simple applications the factory settings are sufficient:

	DALI-2 CS Mini Art. Nr.: 86457244 Art. Nr.: 86457244-GW Art. Nr.: 86457244-IP65 Art. Nr.: 86457244-GW-IP65 Art. Nr.: 86457244-W16 Art. Nr.: 86457244-GW-W16 Art. Nr.: 86457244-W16-IP65 Art. Nr.: 86457244-GW-W16-IP65	DALI-2 CS Mini Integration Art. Nr.: 86457244-INT Art. Nr.: 86457244-GW-INT Art. Nr.: 86457244-INT-IP65 Art. Nr.: 86457244-GW-INT-IP65 Art. Nr.: 86457244-INT-W16 Art. Nr.: 86457244-GW-INT-W16 Art. Nr.: 86457244-INT-W16-IP65 Art. Nr.: 86457244-GW-INT-W16-IP65
DALI-2 Settings	Application Controller – Master Mode	Instance Mode – Slave Mode
Operating Mode	Motion detection without constant light control, an external <i>ON command</i> deactivates motion detection until the next external <i>OFF command</i>	NA
Effective range	Broadcast	NA
ON command (1)	Recall Max	NA
Hold Time (2)	10min	NA
Absence value (3)	none	NA
Hold Time Absence (4)	0s	NA
OFF command (5)	Off	NA
OnCMD threshold	none	NA
Bright Out threshold	none	NA
Power Up behaviour	no action	NA
Constant light control (CLC)	inactive	NA
Front-LED (motion indication)	inactive	inactive
Instance 0 - motion event messages	inactive	inactive
Instance 1 – light intensity event messages	inactive	inactive
Behaviour on DALI Reset command	reset to delivery default settings	reset to delivery default settings

Instance Default Settings

To use the motion sensor instance or light sensor instance in combination with a DALI-2 CS or DALI-2 LS Master the following instance settings are needed, these are set as delivery default, only event messages need to be enabled this is done by the DALI-2 CS Master automatically (it is also possible to enable event messages manually without the DALI Cockpit via the DALI command ENABLE INSTANCE):

Instance Nr 0 – Motion:

Event messages	inactive
Event Schema	device addressing
Event Filter	Occupied Vacant
Deat time	0.00 sec
Report time	not applicable
Hold time	1 sec

Instance Nr 1 – light:

Event messages	inactive
Event Schema	device addressing
Event Filter	illuminance level
Deat time	0.8 sec
Report time	unused
Hysteresis Min	5 Lux
Hysteresis	5 %

Installation

- the DALI-2 CS Mini module is directly connected and supplied by the DALI bus. A DALI bus power supply is required.
- The connection to the DALI terminals can be made regardless of polarity.
- The wiring should be carried out as a permanent installation in a dry and clean environment.
- Installation may only be carried out in a voltage-free state of the system and by qualified specialists.
- National regulations for setting up electrical systems must be followed.
- The DALI wiring can be realized with standard low-voltage installation material. No special cables are required.
- For simple mounting a rubber ring or counter nut depending on the version is included in the scope of delivery.



Attention: The DALI-signal is not classified as SELV circuit (Safety Extra Low Voltage). Therefore, the installation regulations for low voltage apply.



Note: The cross section: the voltage drop on the DALI line must not exceed 2V at maximum length (300m) and maximum bus load (250mA).

Presence Detection

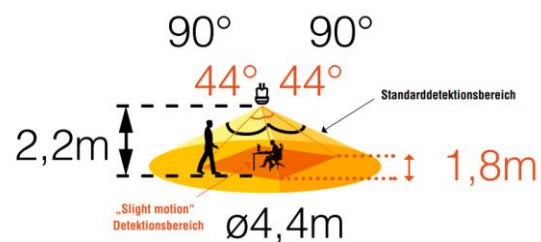
For movement detection a temperature difference between the moving object and environment of at least 4°C is required. Heat sources such as copiers or heaters may have a negative influence on motion detection.

Detection Area

In addition to the standard detection in the outer area, DALI CS Mini has a more sensitive inner detection area for the detection of minor movements.

The rectangular central zone is optimized for detection of the slightest motion. The area has an opening angle of 44° x 44° and 36 detection zones. With a mounting height of e.g. 2.2m, an area of 3.24 m² can be covered. (see table 1).

The outer standard motion detection zone has an opening angle of 90° x 90° and 48 detection zones. With a mounting height of e.g. 2.2m, an area of 15.2m² can be covered. (see table 1).



The recommended mounting height is 3m. The distance between the sensor and the object to detect should not be greater than 3.1m.

h [m]	Standard Detektionsbereich			Slight Motion Detektionsbereich	
	a [m]	b [m]	A1 [m2]	l [m]	A2 [m2]
2,0	4	4	12,5	1,6	2,56
2,2	4,4	4,4	15,2	1,8	3,24
2,5	5	5	19,6	2	4
3,0	6	6	28,2	2,4	5,76

Table. 1 relation of mounting height and detection area

Cycle of Motion Detection

The motion detection is always processed according to the following sequence (Figure 2):

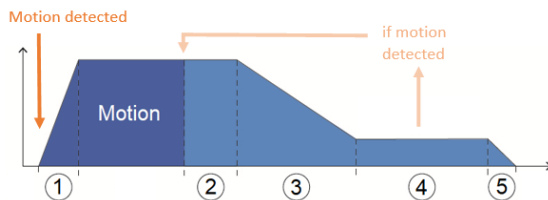


Figure. 2 motion/presence detection sequence

States:

- 1: 1st light level** (with defined fade time)
- 2: Hold Time** (for 1st light level)
- 3: 2nd light level** (with defined fade time)
- 4: 2nd Hold Time** (for 2nd light level)
- 5: off state** (fade out)

When motion is detected the sensor switches to the configured light level **(1)**. While further motion is detected or the hold time is running **(2)** the light level stays on – either on a fix light level or controlled by a constant light control algorithm.

If no further motion was detected, the count down of the hold time starts **(2)**.

After the hold time elapsed the sensor changes to the 2nd light level **(3)** for a defined time **(4)**. This 2nd light level is a user defined value (no constant light control). If motion is detected in this state, the sensor switches to the first light level **(1)**. In case no further motion is detected the Off command **(5)** is sent.

HINT: set the “absence level” to a low value, otherwise it could be higher than the light level set by the constant light control.

Light Sensor

Light measurement

The DALI-2 CS Mini also includes a light sensor. The light sensor measures the reflected illuminance in a range from 0 to 2047 lux. The resolution is 2 lux.

The incident light is rated by the spectral sensitivity of the human eye and thus comparable to the subjective visual perception of brightness.

The incident light is accumulated over the area covered by the lens and can be interpreted as average value in the detection area. A reference to the reflecting surface below the sensor can be established with the help of a reference measurement and adjustable offset value.

Functionality

It is necessary to distinguish between application controller and DALI-2 instances.

The **application controller** gives direct DALI control commands that are immediately executed by the DALI drivers.

DALI-2 instances generate event messages that are interpreted and processed by higher-level control units with DALI connection (e.g. DALI-2 CS in Master Mode, WAGO, Beckhoff,...). General information on the DALI-2 instance mode:

https://www.lunatone.com/wp-content/uploads/2021/10/DALI-2_Instance-Guide_EN_M0024.pdf

The **DALI-2 CS Mini** (Art. Nr.: 86457244 and with art. nr. extensions: -W16, -IP65, -W16-IP65) can be used as either an application controller: *Master Mode*, or in instance mode: *Slave Mode*. For the application controller all operating modes and setting options described in the document are available.

The **DALI-2 CS Mini Integration** (Art. Nr.: 86457244-INT and with art. nr. extensions: -W16, -IP65, -W16-IP65):

does not have an application controller and is always in instance mode. The configuration options are described in section Instances, on page 19.

Operating Modes

DALI-2 CS Mini (Art.Nr.: 86457244, and with extensions: -W16, -GW, -IP65, -W16-IP65, -W16-GW)

The DALI-2 CS Mini offers 4 different operating modes: motion control, motion control with constant light control, sole constant light control or light control via light thresholds.

External commands can also be used to influence the operating behaviour of the sensor (e.g. when operated via another control device). The reaction to such interventions is explained in detail for each operating mode.

Operating Mode 1 – motion control

- Movement activates a fixed light level

If movement is detected the time sequence is activated with a user defined fixed light level in State 2 (see Figure. 2 "Motion detection: sequence" on page 7). The light level stays active until no more movement is detected and the hold time has elapsed. Then the light level will be switched to the 2nd user defined light level.

Additional threshold values can be defined, such that the motion control is only active above or below this defined threshold.

The operating behaviour can be influenced by external on / off / dimming and scene commands. The options for each command are described on page 15

Operating Mode 2 – motion control with constant light control

- Movement activates constant light control
- 2nd light level is user defined and constant

If movement is detected the time sequence is activated with constant light control in State 2 (see figure "Motion detection: sequence" on page 7). The constant light control stays active until no more movement is detected and the "Hold On Time" has expired. Then the light level will be switched to the 2nd light value, which is a fixed user defined value.

Additional threshold values can be defined: such that the motion and light control is only active above or below this defined threshold.

The operating behaviour can be influenced by external on / off / dimming and scene commands. The options for each command are described on page 16

Operating Mode 3 – constant light control

- Constant light Control
- No motion detection

In this operating mode, only the light sensor is used; motion detection is inactive. The constant light control can be switched on and off with DALI commands (e.g. from a control device such as a DALI light switch).

The operating behaviour can be influenced by external on / off / dimming and scene commands. The options for each command are described on page 18.

Operating Mode 4 – light threshold control

- Light control via light thresholds
- No motion detection

Only the light sensor is used in this operating mode. Both motion detection and constant light control are inactive. 4 light thresholds can be defined which trigger a DALI command on either falling below or exceeding the threshold. 2 of the 4 thresholds can be used to send commands repeatedly. The commands are sent at a user-defined interval until the threshold condition is no longer met.

The operating behaviour can be influenced by external scene commands. The options are described on page 19.

Additional Functionality

Response to external DALI commands

The behaviour of the control in the event of external commands (e.g. by a switch) can be configured with the DALI cockpit. Depending on the operating mode, different behaviours are possible. The options are described later in the document.

The following commands sent to the same destination address (1st address) are interpreted as an **ON command**:

RECALL MAX
 RECALL MIN
 ON AND STEP UP
 Light level (DAP)>0%
 GO TO LAST ACTIVE LEVEL (for FW 6.0)
 GOTO SCENE X (if the command was configured to be interpreted as an ON command for the CS)
 GO TO LAST ACTIVE LEVEL (FW ≥ 6.0)

The following commands sent to the same destination address are interpreted as an **OFF command**:

OFF
 Light level (DAP) =0
 GOTO SCENE X (if configured to be interpreted as an OFF command for the CS)

Dimming commands: In addition, it can be specified how the motion control or light control should behave when manual dimming commands (UP/DOWN) to the target address (1. Destination address) occurs.

On and Bright Out threshold

The motion sensor function can be adapted to the ambient light behaviour with the help of the On- and Off-Threshold.

ON Command threshold: The motion detection sequence can be started independent from the actual light level (default) or if the light level is above or below the OnCmd-threshold.

For a running motion sequence the presence detection – retriggering the sequence on motion - can either be set independent from the actual light level or only if the light level is below the **Bright out threshold**.

Bright out- Application example: Car Park lighting, that is set ON during the night (if measured light level < 70lux) but should not be kept ON during the day even though there might be constant detection of motion.

Power-On behaviour

It is possible to configure a start-up command to achieve a defined operating state after power on (return of the bus voltage). The start-up command can either be a DALI-command or a fast run of the motion detection sequence.

Multiple sensors in same area

To allow several sensors to control the same effective range (e.g. a corridor with sensors on each end), one of the sensors needs to be defined as master, while the others can be assigned to deliver their sensor values. In the DALI Cockpit software (tab: "Synchronisation") these sensor addresses can be specified for motion detection and light detection.

When setting DALI-2 CS as inputs in the synchronization tab, these device's instances are automatically configured and their event messages are enabled. For a master sensor the application controller is not automatically disabled. If the sensor is not used for a different area, the application controller has to be manually disabled, to turn off conflicting commands.

Backward compatibility for older generation CS is made possible by the option "Backward compatibility with eDALI CS". Definition of the same effective range (target address 1) automatically synchronizes older generation sensors. The parameters of the sensors should be coordinated, especially the hold on times.

Behaviour on DALI Reset

The behaviour in response to a DALI reset command is configurable. The following options are available:

- *Ignore command:* The DALI reset command does not trigger any changes to the device settings.
- *DALI Standard:* DALI-2 instance settings are set to the values defined in the DALI standard. The settings for the Application Controller remain unchanged.
- *Factory settings:* The sensor settings are reset to the Lunatone factory default settings – see the table in the "Factory Setting" section, page 5.

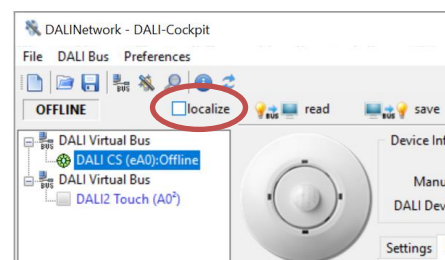
Configuration in DALI-Cockpit

DALI-2 CS Mini (Art.Nr.: 86457244

and with extensions: -W16, -GW, -IP65, -W16-IP65, -W16-GW)

The addressing and configuration of the DALI CS Mini can be done easily with the help of the DALI Cockpit software tool and a suitable interface module (DALI USB, DALI 4Net, DALI SCI RS232). After an address has been assigned the parameters can be configured to fit the application.

The spatial allocation of each sensor can be done by visual localisation. Selection of the "localize" check box in the DALI cockpit will lead to flashing of the red LED of the currently selected sensor.



Configuration of the sensor is possible with the settings of the different tabs, explained in detailed on the following pages.

Tab: "General" – Sensor mode, Operating Mode:

Selection of the fundamental configuration is made on the "General" tab, see Figure. 3. The sensor can be set to Master or Slave Mode.

In *Master-Mode*, the DALI-2 CS takes over control according to the subsequently selected operating mode. The DALI-2 CS *Master* is an **application controller** and gives direct DALI control commands that are immediately executed by the DALI gears.

In *Slave-Mode*, the DALI-2 CS is in **instance mode** and does not send any control commands. Instead, the DALI-2 instances

generate event messages that are interpreted and processed by a DALI-2 CS in *Master* mode or by higher-level DALI control unit (e.g. WAGO, Beckhoff,...). General information on the DALI-2 instance mode: <https://www.lunatone.com/en/dali-2-factsheet/> section: DALI-2 Instancemode) Configuration of the instances is described in section Instances, on page 19.

The Application controller and instances can be active at the same time.



Additional Information: A

deactivated Application Controller is indicated in the DALI Cockpit device tree with: **A**.

A device with active instances is indicated with: **i**

The screenshot shows the 'General' tab of the DALI-2 CS configuration interface. The interface includes several sections: 'Device Description', 'Behavior on DALI Reset Command', 'DALI-2 CS General Properties', 'DALI-2 Control Device Parameters', 'Membership in Groups for DALI-2 Controls', 'Sensor Mode', and 'Operating Mode'. Callouts provide additional information about these settings:

- Adjustable behaviour on DALI Reset Command:** Reset to factory default values, reset to DALI Standard values, or ignore the reset command. (Callout points to the 'Change...' button in the 'Behavior on DALI Reset Command' section.)
- If movement is detected, the red LED on the sensor lights up.** (Callout points to the 'Switch on red LED when moving' checkbox in the 'DALI-2 CS General Properties' section.)
- Backwards compatibility to enable synchronization of motion detection with 1st generation CS.** (Callout points to the 'synchronization with DALI CS (eDALI)' checkbox in the 'DALI-2 CS General Properties' section.)
- Control devices can be assigned to Instance groups. The assignment applies to the light sensor and the motion detector instance simultaneously.** (Callout points to the 'Membership in Groups for DALI-2 Controls' section, which shows a grid of 28 buttons labeled 0 to 27.)
- In master mode – as an application controller, the device takes over the control depending on the operating mode.** (Callout points to the 'Master-Mode: Application Controller enabled' radio button in the 'Sensor Mode' section.)
- In slave mode - instance mode, the DALI-2 CS sends event messages with the measured sensor values, these can be evaluated by a DALI-2 CS master.** (Callout points to the 'Slave-Mode: Event Messages enabled' radio button in the 'Sensor Mode' section.)
- Operating mode: Selection between the four different operating modes of the application controller. - Description of the operating modes see section "Operating modes" on page 8** (Callout points to the 'Operating Mode' section, which includes 'Motion control', 'Motion control with constant light control', 'Light threshold sensor control', and 'Constant Light Control' radio buttons.)

Figure. 3 Tab: "General" – sensor mode, operating mode

Tab: "Effective range" - effective range, external control and power-up behaviour

See Figure. 4. On this tab the effective range of is defined: which DALI-gears are controlled by the CS. In addition, external control addresses can be defined, which the CS also monitors. The behaviour of the CS in case of other

control units sending commands to these addresses can be defined. This way, manual control of lights via a switch can be realised, without interference of the motion detection or constant light control.

Effective Range: the CS can send commands to up to four destination addresses at the same time (devices, groups or broadcast). This setting is used in every operating mode

The external control addresses determine which addresses are monitored by the CS. The behaviour of the CS in the case of external commands (e.g. from a light switch) to these addresses can be defined

The behaviour in case of an external on / off and dimming commands (e.g. from a light switch) can be defined. Different options are available depending on the operating mode - see page 15 and page 18.

defines how the CS behaves during power up: no action, sending a defined command or in operating mode with motion detection: triggering a motion sequence

Figure. 4 Tab: "Effective Range" – destination address and external control address

Tab: "Synchronization" – sensor input and Slaves

See Figure. 5. To include other sensor measurements into the evaluation, additional DALI-2 CS can be selected as sensor inputs. The instance settings of the selected CS are automatically set by the master sensor. If a

sensor in master mode is selected as an input, its application controller is not automatically deactivated.

Important: If the sensor is not used to control another area, the application controller should be manually deactivated to prevent interference commands.

Depending on the operating mode, different sensors input for each sensor-functionality can be defined

for “*Motion detection*”:

- input for movement,
- input for light thresholds

for “*Motion detection with constant light control*”:

- input for movement,
- input for light thresholds,
- input for constant light control

for “*Constant light control*”:

- input for constant light control

for “*Light control*”:

- input for light thresholds.

The screenshot shows the 'Synchronisation' tab with three sections for sensor input selection:

- motion control – slave sensor input – selection:** Includes checkboxes for 0, 1, 2, and 3, each with a corresponding DALI address dropdown. A callout explains that these DALI addresses define which other sensors are evaluated for **motion detection**. It notes that movement detectors supporting instance type 3 (303) are required, and up to 8 inputs can be defined. Nr. 0 is always the current CS itself (*Master*), and other input sensors are automatically configured but not set to *Slave Mode*.
- constant light control – slave sensor input – selection:** Similar to the motion control section, with checkboxes and DALI address dropdowns. A callout explains that these DALI addresses define which sensors are evaluated for **constant light control**. It notes that sensors supporting instance type 4 (304) are required, and up to 8 inputs can be defined. Nr. 0 is always the current CS itself (*Master*), and other input sensors are set to *Slave Mode*.
- light control – slave sensor input – selection:** Similar to the other sections, with checkboxes and DALI address dropdowns. A callout explains that these DALI addresses define which other sensors are involved in **lighting control**. It notes that sensors supporting instance type 4 (304) are required, and up to 8 inputs can be defined. Nr. 0 is always the current CS itself (*Master*), and other input sensors are automatically configured but not set to *Slave Mode*.

Below these sections is the **Sensor Evaluation Mode:** dropdown, currently set to **Average**. A callout explains that with the “*Sensor Evaluation Mode*” it can be defined whether a maximum, minimum or mean value of the various sensor values is used for the evaluation.

At the bottom, there is a **Light sensor calibration...** button. A callout explains that via the “*light sensor calibration*”, the currently measured light value can be read out and if necessary, adjusted with an offset value.

The **Light sensor calibration** dialog box is shown, containing:

- ☒ Current Light Level: 183 Lux
- light value offset: 0 Lux
- Set** and **Cancel** buttons.

Figure. 5 Tab: “Synchronisation” – sensor inputs for measurement evaluation

Tab: "Motion Control"

See Figure. 6, in this tab, the times and light levels of the motion detection sequence, that is triggered by movement, can be defined. As

well as the light thresholds to activate the motion detection depending on the lighting conditions. (operating mode description see page 8 and page 9)

General | **Instances** | **Effective Range** | **Synchronization** | **Motion Control**

Behavior on movement

Sequence

Movement State Transition State Vacant S

III. II. I.

1. 2. 3. 4. 5.

☒ with retriggering

Movement state

1. On Command RECALL MAX LEVEL

Constant Light Control (CLC) Helligkeit Sollwert: 1000 Lux

2. Hold On Time 0 Std. 0 Min. 2 Sek.

Transition state

3. Mid Level Command GOTO SCENE 1

Fade time [0] faste

4. Second Level Hold On Time 0 Std. 0 Min. 2 Sek.

Vacant State

5. Off Command OFF

Light thresholds

☒ Commands are independent of light level

☐ Only send Commands if light value > threshold value

☐ only send Commands if light value < threshold value

☐ Bright Out:
retrigger on motion only if light level < Bright out threshold

Threshold: 800 Lux Hysteresys: 20 Lux Bright-Out Threshold: 400 Lux

Variable Operating Behavior

Activation of variable operating behavior

☒ on Scene Command to same destination address

☐ on Scene Command to defined "external control address"

Scene	Behavior
Scene 0	no action
Scene 1	no action
Scene 2	no action
Scene 3	no action

Display of the currently measured light values of the defined sensor input as a reference.

Settings for the motion detection sequence - (light levels, hold times (2) / (4)) with settings for constant light control depending on the operating mode.

The following commands can be selected as **ON commands (1)**: light level (DAP), RECALL MAX, RECALL MIN, GOTO LAST ACTIVE LEVEL, GOTO SCENE X;

The following commands are available as commands for the **2nd light value (3)**: no action, light level (DAP), RECALL MAX, RECALL MIN, GOTO SCENE X;

The following commands are available for the **OFF command (5)**: light level (DAP) = 0, OFF, GOTO SCENE X;

Switch-on and switch-off threshold : adjustable whether the motion detection is active above or below a threshold value Adjustable: threshold and width of the hysteresis (value range: 0... 1020Lux (step width 4 Lux)).

Bright Out threshold: if this threshold is exceeded the motion sequence is no longer retriggered on movement .
Application example: Parking lot - Ending the motion detection at dawn (crossing of threshold), although the sensor is currently in the movement state and movement is detected.

Via scenes, alternative behaviour to the main configuration can be activated (e.g. alternative destination address). Different options are available depending on the operating mode - see page 15

Figure. 6 Tab: „motion detection control“

When selecting an On-Command for motion control with constant light control, the On-Command should be close to the desired brightness to avoid long control times. Constant light control begins approximately 6 seconds after the On-Command is sent. Since constant light control interrupts the fade process, for dimmers with a longer fade time than 6 seconds, the desired fade time should be set via the On-Command input. This ensures the set fade time is awaited before constant light control starts

Motion Control - Behaviour with external commands

The operating behaviour can be influenced by external commands (e.g. from a DALI-switch). In the Cockpit tab "Effective range", the behaviour of the sensor on ON- / OFF- and dimming commands, sent to the 4 configurable "external control addresses", can be defined.

Additionally, the operating behaviour of the sensor can be changed with scene commands, via the tab "Motion control" -section: Variable Operating Behaviour.

The following settings are available:

Operating mode 1 – motion detection

An external ON command
No influence: the ON command is ignored by the CS. The CS continues to carry out the control as configured
External control: motion control is deactivated (The CS does not send any DALI commands), until manually reactivated by an external OFF command (or power-cycle).
Simulate movement: start the Motion Detection Sequence (Figure. 2, page 7)
An external OFF command
No influence: the OFF command is ignored by the CS. The CS continues to carry out the control as configured

Waiting for motion: change to State 5 and then to OFF state (state 7, Figure. 2), motion detection active - waiting for motion
Disable sensor control: change to state 5 and then to OFF state (state 7, Figure. 2), the motion detection is deactivated until reactivated by an ON command (or power-cycle) <i>"Off Only Function": when the CS should only send an Off command after a manual On (simulating movement) and after the hold time has elapsed.</i>
an external DIMMING command:
No influence: the DIMMING command is ignored by the CS. The CS continues to carry out the control as configured
External control: motion control is deactivated (The CS does not send any DALI commands), until manually reactivated by an external OFF command (or power-cycle).
Change light level until end of sequence: the On command light level (State 2, Figure. 2) is changed by dimming. The new light level is retained for the current movement detection sequence

Variable Operating Behaviour - An external **SCENE** command

No action: the SCENE command is ignored by the CS.
Reset to Default: The CS is set to the basic configuration, all previously forced changes to the operating behaviour are terminated.
Alternative destinations: An alternative destination address (user defined) is used instead of the configured standard destination.
Alternative ON Command Light Level DAP: Instead of the currently configured light level DAP command, the alternatively defined DAP is used in state 2 (Motion Detection Sequence Figure. 2). <i>Only applicable if a light value command is defined as an ON command in the default settings.</i>
Alternative ON Command SCENE Instead of the currently configured scene command, the alternatively defined scene is used in state 2 (Motion Detection Sequence Figure. 2, page 7). <i>Only applicable if a scene command is defined as an ON command in the default settings.</i>
Waiting for motion: go to State 5 and then to OFF state (state 7, Figure. 2), motion detection active - waiting for motion

Operating Mode 2 – motion detection with constant light control

An external ON command	
No Influence: the ON command is ignored by the CS. The CS continues to carry out the control as configured	
External control: Constant light control and motion control are deactivated (The CS does not send any DALI commands). until they are reactivated by an external OFF command (or power-cycle).	
Simulate movement: start the Motion Detection Sequence (Figure. 2, page 7)	
Simulate movement without constant light control: Starts the motion detection sequence (State 1, Figure. 2) and deactivates the constant light control. The sent ON command is executed instead of constant light control. The constant light control is temporarily deactivated until the OFF-state (state 7, Figure. 2) is reached.	
Constant Light Control: The motion detection is deactivated and constant light control is permanently active until it is cancelled by an OFF command (or power-cycle). Standard behaviour is thereby reactivated	
An external OFF command	
No Influence: the OFF command is ignored by the CS. The CS continues to carry out the control as configured	
Waiting for motion: Got to OFF state - go to State 5 and then to OFF state (state 7, Figure. 2), motion detection active - waiting for motion	
Disable sensor control: change to state 5 and then to OFF state (state 7, Figure. 2) , the motion detection is deactivated until reactivated by an ON command (or power-cycle). <i>„Off Only “: if the CS should only send an off command after a manual on (simulate movement) after the hold time has expired</i>	
an external DIMMING command:	
no influence: the DIMMING command is ignored by the CS. The CS continues to carry out the control as configured	
External control: Constant light control and motion control are deactivated (the CS does not send any DALI commands) until they are reactivated by an OFF command (or power-cycle).	

Disable constant light control until end of sequence (end of 1 st hold time): constant light control is deactivated temporarily during Motion Detection Sequence (State 2). Automatic reactivation of constant light control after end of sequence
Change constant light control reference light level until end of sequence (end of 1 st hold time): the reference light level for constant light control is changed by dimming. If no dimming process is detected for 2 seconds, the current light value is adopted as the new setpoint for the constant light control. The new setpoint is only retained for the current movement detection sequence (as long as movement is detected).
Change constant light control reference light level: the reference light level for constant light control is changed by dimming. If no dimming process is detected for 2 seconds, the current light value is adopted as the new setpoint for the constant light control.

Variable Operating Behaviour -

An external **SCENE** command

No action: the SCENE command is ignored by the CS
Reset to defaults: The CS is set to the basic configuration, all previously forced changes to the operating behaviour are terminated.
Alternative destinations: An alternative destination address (user defined) is used instead of the configured standard destination.
Alternative ON Command Light Level DAP: Instead of the currently configured light level DAP command, the alternatively defined DAP is used in state 2 (Motion Detection Sequence Figure. 2). <i>Only applicable if a light value command is defined as an ON command in the default settings.</i>
Alternative ON Command SCENE Instead of the currently configured scene command, the alternatively defined scene is used in state 2 (Motion Detection Sequence Figure. 2, page 7). <i>Only applicable if a scene command is defined as an ON command in the default settings.</i>
Alternative constant light control reference light level: Instead of the current reference value an alternative user defined light level is used
Disable Constant Light Control until end of sequence (end of 1 st hold time): constant light

control is deactivated temporarily during Motion Detection Sequence (State 2). Automatic reactivation of constant light control once no more movement is detected.

external control: Constant light control and motion control are deactivated. The CS does not send any DALI commands, until reactivated by a respective command (or power cycle).

Waiting for motion: Got to OFF state - go to State 5 and then to OFF state (State 7, Figure. 2) motion detection active - waiting for motion

Tab: „Light Control“

Depending on the selected operating mode:

Operating mode: Constant light control

See Figure. 8. The tab “light control” contains the settings for constant light control (CLC) if the Operating mode: "constant light control" was selected.

Operating mode: Light threshold control

See Figure. 7. If the Operating Mode: "Light-controlled" was selected the light sensor control functions as a threshold switch. A maximum of 4 thresholds can be defined. The defined DALI commands will be executed if the values are exceeded or fallen below of. 2 of the 4 available thresholds can also be used to send commands periodically. The commands are sent at a user-defined interval until the threshold condition is no longer met.

Display of the currently measured light values of the defined sensor input as a reference.

Predefine the two following two thresholds as hysteresis

Activate / deactivate the respective threshold

Setting the threshold value, the DALI command and whether this should be carried out when the threshold is exceeded or fallen below of. (Threshold (0... 1020 lux, step size 4lux), hysteresis: is the difference between the two set thresholds (0 ... 255 Lux))

2 of the 4 threshold values can be sent with repetition, by choosing the time between repetitions greater than zero. (With 0h, 0min, 0sec no repetition is carried out). The respective commands are sent with the selected interval until the set condition is no longer met. *Application example: closing blinds when the incidence of light is too strong.*

Via scenes, alternative behaviour to the main configuration can be activated (e.g. alternative destination address). Different options are available depending on the operating mode - see page 19.

Figure. 7 Tab: „Light Control“ -Operating Mode: light threshold control

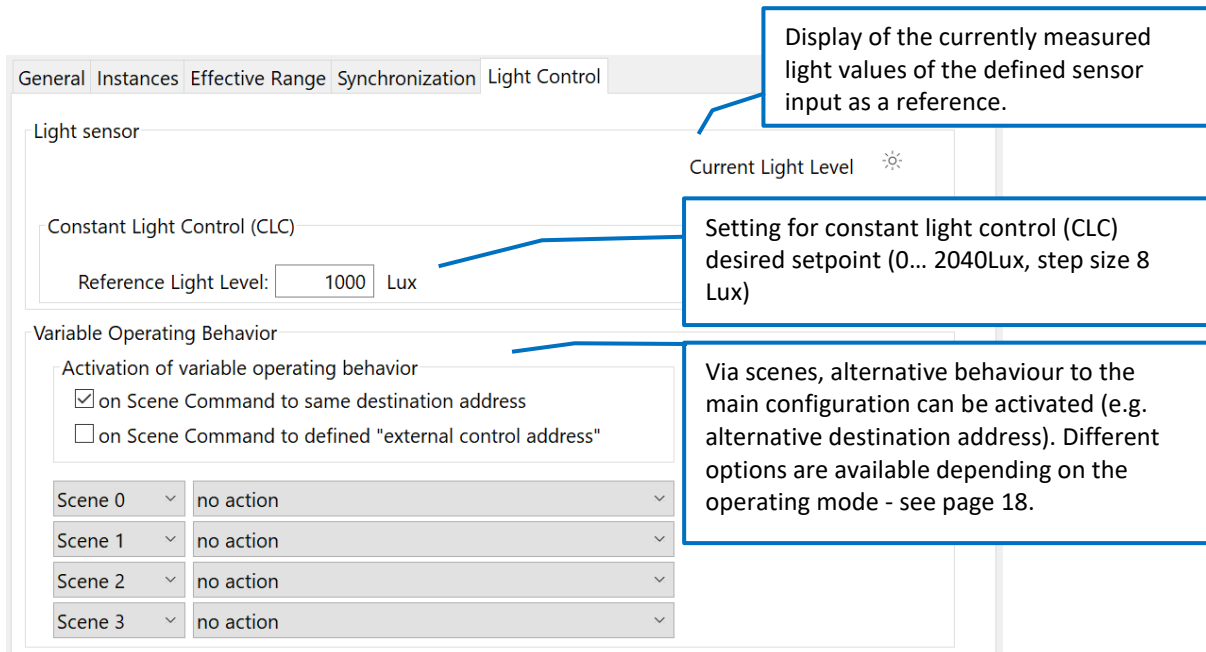


Figure. 8 Tab: „Light Control“ – Operating Mode : constant light control

Light Control - Behaviour with external commands

The operating behaviour can be influenced by external commands (e.g. from a DALI-switch). In the Cockpit tab "Effective range", the behaviour of the sensor on ON- / OFF- and dimming commands, sent to the 4 configurable "external control addresses", can be defined.

Additionally, the operating behaviour of the sensor can be changed with scene commands, via the tab "Light control" -section: Variable Operating Behaviour.

The following settings are available:

Operating Mode 3 – constant light control

An external ON command

No influence: the ON command is ignored by the CS. The CS continues to carry out the control as configured

External control: the constant light control is deactivated. (the CS does not send any DALI commands), until reactivated by an external OFF command (or power-cycle).

Enable constant light control: The constant light control is activated.

An external OFF command

No influence: the OFF command is ignored by the CS. . The CS continues to carry out the control as configured

Disable constant light control: The constant light control is deactivated, until reactivated by an external ON command (or power-cycle).

an external DIMMING command:

No influence: the DIMMING command is ignored by the CS. The CS continues to carry out the control as configured

Disable constant light control temporarily: constant light control is deactivated until the next OFF command (or power-cycle).

Change constant light control reference light - temporary: the reference light level for constant light control is changed by dimming. If no further dimming process is detected for 2 seconds, the current light value is adopted as the new setpoint for the constant light control. The new setpoint is only retained until the next OFF command.

Change constant light control reference light level -general: the reference light level for constant light control is changed by dimming. If no dimming process is detected for 2 seconds, the current light value is adopted as the new setpoint for the constant light control.

Variable Operating Behaviour - An external SCENE command
No action: the SCENE command is ignored by the CS
Reset to Default: The CS is set to the basic configuration, all previously forced changes to the operating behaviour are terminated.
Alternative destinations: An alternative destination address (user defined) is used instead of the configured standard destination.
Alternative constant light control reference light level: Instead of the current reference value an alternative user defined light level is used
Enable constant light control: The constant light control is activated.
External Control: The constant light control is deactivated (the CS does not send any DALI commands), until reactivated by a respective command (or power cycle).

Operating Mode 4 – light threshold control

Variable Operating Behaviour - An external SCENE command
No action: the SCENE command is ignored by the CS
Reset to Defaults: The CS is set to the basic configuration, all previously forced changes to the operating behaviour are terminated.
Alternative Destinations: An alternative destination address (user defined) is used instead of the configured standard destination.
External control: the light threshold control is deactivated (the CS does not send any DALI commands), until reactivated by a respective command (or power cycle).

Instances

The DALI-2 CS Mini and DALI-2 CS Mini Integration support 2 instances standardized according to DALI: motion detector instance (303) for motion detection and light sensor instance (304) for light measurement. In *Slave mode*, the DALI-2 CS is automatically in instance mode. The factory settings are designed for use in conjunction with a DALI-2 CS Master.

- Instance Nr. 0: Type motion detector
- Instance Nr. 1: Type light sensor

Instances – General

Each instance can be configured individually. Some settings have the same functionality for all sensor instances and are therefore described in this section. Instance specific settings are explained for each individual instances in the following respective sections.

enable/disable

If instances are not required, they can be deactivated. In this case, event messages are not sent, and the measured values are not updated. They can, however, still be queried via a "Query" command, and the DALI-2 configuration commands and queries are still supported.

Instance group

Up to three instance groups can be assigned for each instance. Only the "Primary Group" is used for the event.

Instance type

The instance type defines which DALI-2 standard is valid for this instance. (The different instance types are specified in the DALI-2 standard.)

Instance number

Each instance in a device has a unique instance number.

Device group

The device can be assigned to up to 32 device groups (0...31). The lowest device group is used for the event.

Device address

A device address (or short address) (0..63) can be assigned to each device. With this the device can be clearly addressed. (Identical short addresses should be avoided.)

Event Scheme

The event scheme determines which information is transferred with the event. This information is required, to enable recognition and / filtering of events on the bus. The following 5 options are available:

- Instance addressing:
instance type and instance number
- Device Addressing:
device address and instance type
- Device/Instance Addressing:
device address and instance number
- Device Group Addressing:
Device group and instance type
- Instance Group Addressing:
Instance group and instance type

Event priority

The event priority determines the order in which events are sent when they occur simultaneously on the bus. Priority 2 = highest and 5 = lowest.

Dead Time

The dead time can be set for each instance. It determines the time that must pass before an event can be sent again. This also applies if the event information (measured value) changes.

If no dead time is required, it can be deactivated.

Report Time

If the event information does not change, the event is sent cyclically with the report time. The report time can be set for each instance. It determines the maximum time between a sent event and resending.

Hysteresis

Not every change in value leads to an event being generated. The hysteresis can be used to set which percentage change is necessary to trigger a new transmission. Attention, the hysteresis band is not arranged symmetrically. The following applies:

Increasing value

The condition for an event is only fulfilled if the next value falls below the previous value minus the hysteresis or if the next value is greater than the previous value.

Decreasing value

the condition for an event is only fulfilled if the next value exceeds the previous value plus the hysteresis or the next value is smaller than the previous value.

Hysteresis Min

Is the minimal hysteresis value that cannot be fallen below of.

Instance 0 – Motion

Is an instance standardized by DALI-2 (62386-303), for sensors that detect motion. All settings are implemented according to the standard. The instance is DALI-2 certified.

The sensor switches between the following states:

- People in the room and movement (0xFF)
- People in the room and no movement (0xAA)
- Empty room (0x00)

If the sensor detects movement, it immediately changes to the state: "people in the room and movement". This state is exited after 1 second at the earliest if no further movement is detected. In this case it changes to the state "People in the room and no movement". After the hold time has expired it changes to the state "Empty room"- Vacant.

Report Time: can only be set if the event filter "Repeat" is activated and the events: "Still Vacant" and "Still Occupied" are enabled. The time between sending a "Still-Event" again is determined by the Report Time.

Hold Time: Is the time that must pass before the state "people in the room and no movement" is changed to the state "empty room". If movement is detected during this time the state is changed back to: "People in the room and movement". (min. 1 second)

Query: The current sensor state can be queried using the DALI command "Query input value". The following values are possible: 0x00, 0xAA, 0xFF
(see paragraph above for the possible states)

Event: the sensor status is transmitted by events. The following event information is available:

- Bit0 = 0: No Movement
- Bit0 = 1: Movement
- Bit2/Bit1 = 00: Vacant
- Bit2/Bit1 = 10: Still Vacant
- Bit2/Bit1 = 01: Occupied
- Bit2/Bit1 = 11: Still Occupied
- Bit3 = 1: Movement Sensor
- Bit5..Bit9 = 0: unused

More details can be found in the standard 62386-303.

Event filter: The event filter defines for which status change an event is generated.

Filter arrangement:

- Bit0: Occupied Event active
- Bit1: Vacant Event active
- Bit2: Still Vacant/Occupied Event active
- Bit3: Movement Event active
- Bit4: No Movement Event active
- Bit5..Bit7: unused

Example events during the movement sequence:

1: Movement detected:

Event filter "Movement", event filter "Occupied":
→ Event data: 0x0B

2: Continued movement: with set report time,
event filter "Still Occupied/Vacant": → Event data: 0x0F

3: Movement stops: event filter "No Movement":
→ Event data: 0x0A

4. Expiry of set hold time:

Event filter "Vacant": → Event data: 0x08

5. Still no movement: with set report time: event filter "Still Occupied/Vacant"
→ Event data 0x0C

Instance 1 – Light intensity

is an instance standardized by DALI-2 (62386-304). All settings are implemented according to the standard. The instance is DALI-2 certified.

The current light value (lux) is measured by the sensor and can either be queried using a "Query" command or can be automatically provided by the sensor using an event.

The measuring range is 0Lux ... 2046Lux. The resolution differs between queries and generated events. A query supports a resolution of 1Lux (11Bit) and an event a resolution of 2Lux (10Bit). This means that the values obtained from an event must be multiplied by 2 to determine the light level in lux.

Query: the light level can be queried using the commands "Query input value" and "Query Input value latch". 11 bits are taken from the returned data, which correspond to the light level in lux:

Query Input Value → answer: 0x6C
Query Input Value Latch → answer: 0x9B

0x6C = **0110 1100**

0x9B = **1001 1011**

→ **0110 1100 100** = 868 Lux

Hysteresis: For information on the hysteresis see section Instances -General: *Hysteresis* page 20.

Hysteresis Min: set in lux. For general information on the hysteresis min see section Instances – General: *Hysteresis Min* page 20

Event Filter: The light instance generates only one event with 10-bit resolution (0... 2047 lux, step size 2lux). If the filter is deactivated, no events will be sent.

Cockpit - Instances

The settings for the instances can be made in the Cockpit – tab “Instances”.

Example for settings of instance 0 – motion see Figure. 9. Example for settings of instance 1 – light intensity see Figure. 10

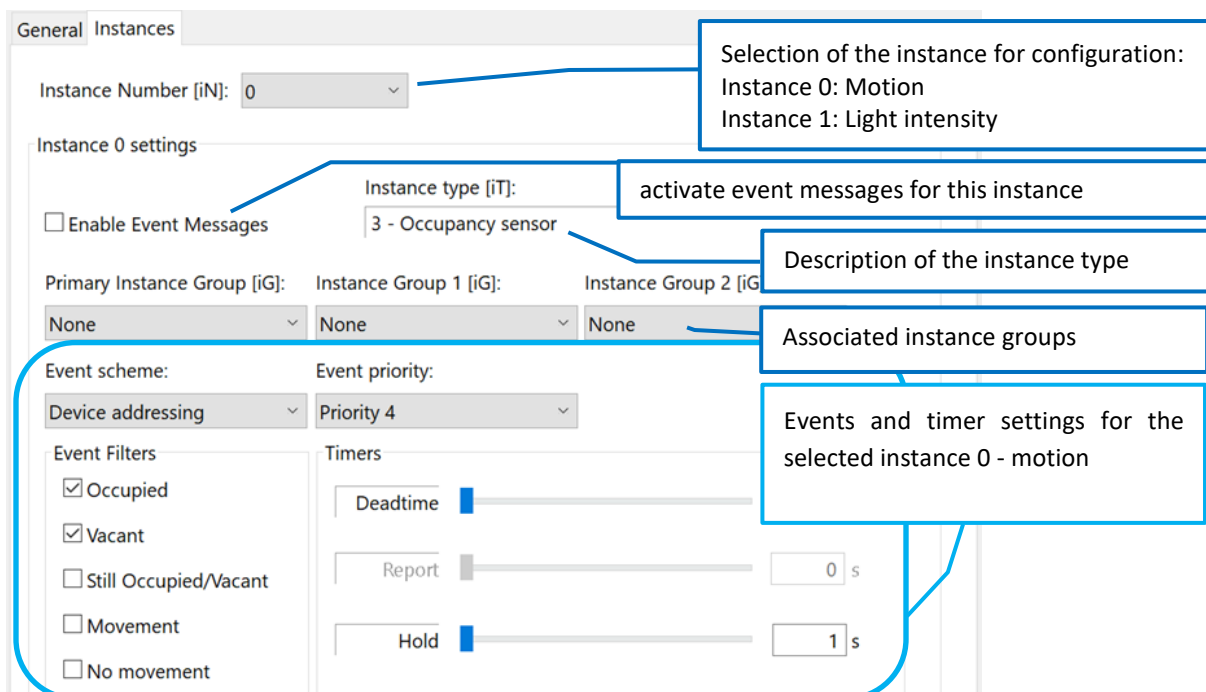


Figure. 9 tab: „Instances“ – motion detector instance

General | **Instances**

Instance Number [iN]: 1

Instance 1 settings

☐ Enable Event Messages

Instance type [iT]: 4 - Light sensor

Primary Instance Group [iG]: None | Instance Group 1 [iG]: None | Instance Group 2 [iG]: None

Event scheme: Device addressing | Event priority: Priority 4

Event Filters: ☒ Illuminance level

Timers: Deadtime, Report, Hysteresis Band, Hysteresis Min, Hysteresis

Light sensor calibration...

Selection of the instance for configuration: Instance 0: Motion
Instance 1: Light intensity

activate event messages for this instance

Description of the instance type

Associated instance groups

Events and timer settings for the selected instance 1 - light intensity

Enables light sensor calibration via an offset value

Figure. 10 tab: "instances" – light sensor instance

Purchase Order Information

Version Application Controller

housing with rubber ring	housing with thread and counter nut
Art.Nr. 86457244: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, black, housing with rubber ring 28x28x27mm	Art.Nr. 86457244-GW: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, black, housing with thread and counter nut, 28x28x27mm
Art.Nr. 86457244-W16: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, white RAL9016, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-W16: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, white RAL9016, housing with thread and counter nut, 28x28x27mm
Art.Nr. 86457244-IP65: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, for outdoor use IP65 , black, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-IP65: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, for outdoor use IP65 , black, housing with thread and counter nut, 28x28x27mm
Art.Nr. 86457244-W16-IP65: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, for outdoor use IP65 , white RAL9016, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-W16-IP65: DALI-2 CS Mini sensor module (motion/brightness), presence detection 2.5m, constant light control, for outdoor use IP65 , white RAL9016, housing with thread and counter nut, 28x28x27mm

Version Integration for integration in systems with central control unit

housing with rubber ring	housing with thread and counter nut
Art.Nr. 86457244-INT: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, black, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-INT: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, black, housing with thread and counter nut, 28x28x27mm
Art.Nr. 86457244-INT-W16: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, white RAL9016, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-INT-W16: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, white RAL9016, housing with thread and counter nut, 28x28x27mm
Art.Nr. 86457244-INT-IP65: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, for outdoor use IP65 , black, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-INT-IP65: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, for outdoor use IP65 , black, housing with thread and counter nut, 28x28x27mm
Art.Nr. 86457244-INT-W16-IP65: DALI-2 CS Mini IP65, sensor module (motion/brightness), Instancemode for integration, for outdoor use IP65 , white RAL9016, housing with rubber ring, 28x28x27mm	Art.Nr. 86457244-GW-INT-W16-IP65: DALI-2 CS Mini, sensor module (motion/brightness), Instancemode for integration, for outdoor use IP65 , white RAL9016, housing with thread and counter nut, 28x28x27mm

Accessory:

86457244-Z01- Cover for DALI-2 CS Mini to restrict the detection area, black

86457244-Z01-W16 Cover for DALI-2 CS Mini to restrict the detection area, white RAL9016

Additional Information and Equipment

DALI-Cockpit – DALI system configuration tool, free when using a Lunatone interface device
<https://www.lunatone.com/en/product/dali-cockpit/>

Lunatone DALI products
<http://www.lunatone.at/en/>

Lunatone datasheets and manuals
<http://lunatone.at/en/downloads/>

Contact

Technical Support: support@lunatone.com

Requests: sales@lunatone.com

www.lunatone.com



Disclaimer

Subject to change. Information provided without guarantee.
The datasheet refers to the current delivery.

The function in installations with other devices must be tested for compatibility in advance.