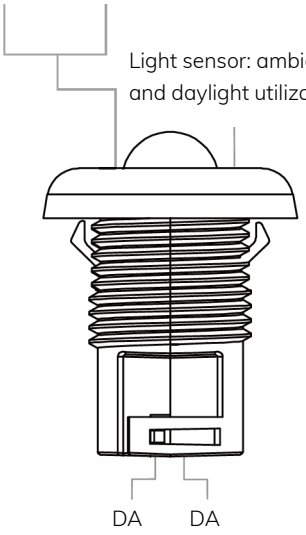
ISOLED®
CUSTOMISED LIGHT SOLUTIONS

OPERATING INSTRUCTIONS

Product information

Motion sensor indicator (red): Flashes once when motion is detected. Remains off if no motion is detected.

DALI signal indicator (green): flashes when a DALI signal is received from the application controller and reports event messages to the application controller.



Product description

The multisensor integrated in the luminaire is a DALI-2 device that combines a motion sensor and a light sensor. The device detects motion and measures the lighting intensity. The DALI-2 multi-sensor can work with DALI LED drivers or luminaires and is integrated directly into the luminaire with a 1/2" cutout. The result is elevated user comfort and significant energy savings that meet the most demanding energy regulations for buildings. The multi-sensor can be supplied with power via the DALI bus and does not require an additional power supply, which means simpler and faster cabling and installation.

Commissioning

The multisensor is a DALI-2 device in accordance with the IEC 62386 (2014) standard and can be integrated into DALI-2 systems from other manufacturers. The DALI-2 multi-sensor supports 2 DALI-standardized instances: the motion detector instance (303) for motion detection and the light sensor instance (304) for light measurement. The multisensor is designed for use in connection with a DALI-2-compliant control center. Each instance can be configured individually.

Warning

» Do NOT install the device under voltage

» DO NOT expose the device to moisture.

Parameters

Physical information	
Dimensions / Weight	See dimensions
Mounting (luminaire drilling)	1/2" standard size (22.2-22.3mm)
Material / Color	ABS / White
Connector/wire cross-section	26-16 AWG (0.2-1.3 mm2)
Length of the strip	7-9 mm

DALI-2 PIR motion/light sensor for luminaire installation

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Electrical information	
power supply	DALI bus
Max. DALI current consumption	6mA
Control	DALI
Marking clamps	DA, DA
Status displays	Red (motion detection) , Green (DALI)

Sensor technology	
Motion detection (62386 - 303)	PIR sensor
Light sensor (62386 - 304)	Event: 0-1000 Lux (10bit), resolution: 10Lux
Mounting height	Recommended height: 2.5 m (8ft)
Angle of coverage	130°
Detection range	ø 5m
Function	Configurable

Environment	
Operating temperature range	0° to 40° (for indoor use only)
Humidity during operation	0-95% (non-condensing)
Safety certification	cULus-listed, CE

Properties

Key features

- DALI-2 & D4i certified
- PIR motion detection
- Motion sensor instance type 3 (303)
- Illuminance measurement
- Light sensor instance type 4 (304)
- Autonomous sensor-based control

Advantages

- Cost-efficient solution for energy savings
- Compliance with energy regulations
- Fits consisting and newly designed luminaires
- Compatible with universal DALI-2-compatible central control units that support sensor input devices

Applications

- Open-plan offices
- Individual offices
- Conference rooms
- Classroom
- Retail stores
- Hospitals
- Lobbies

Application and function

Instances The DALI-2 multi-sensor supports 2 DALI-standardized instances: Presence sensor instance (303) for motion detection and light sensor instance (304) for light measurement

- Instance number 0: Instance type is presence sensor
- Instance number 1: Instance type is light sensor

Instances - Generally 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 instance in the following sections.

Activate/deactivate If the instances are not required, they can be deactivated. In this case, no event messages are sent and the measured values are not updated. However, they can still be queried using a "Query" command, and the DALI-2 configuration commands and queries are still supported.

Event schema

The event schema determines which information is transferred with the event. This information is required to enable the detection and / or 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

Instance group: Up to three instance groups can be assigned for each instance. Only the "PrimaryGroup" 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 defined 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. This allows the device to be uniquely addressed. (Identical short addresses should be avoided.)

Priority of the event

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

Dead time

The dead time can be set for each instance. It determines the time that must elapse 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 reporting time can be set for each instance. It determines the maximum time between a sent event and resending.

Hysteresis

Not every change to the value leads to the generation of an event. The hysteresis can be used to set the percentage change required to trigger a new transmission. Please note that the hysteresis band is not arranged symmetrically. The following applies:

- Increasing value: The condition for an event is only fulfilled if the next value is less than 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 factor and the next value is smaller than the previous value.

Hysteresis Min

Hysteresis Min is the minimum hysteresis value that cannot be undershot.

Instance 0 - Presence sensor

Instance 0 is an instance standardized by DALI-2 (62386-303) for sensors that detect motion. All settings are implemented in accordance with the standard. The sensor switches between the following states:

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

If the sensor detects motion, it immediately switches to the state: "People in the room and motion". This state is exited after 1 second at the earliest if no additional motion is detected. In this case, it switches to the "People in the room and no motion" state.

Hold time: The hold time is the time that must elapse before the "people in the room and no motion" state changes to the "empty room" state. If motion is detected during this time, the status is changed back to "empty room": "People in room and motion". (min. 1 second)

Query input value: This DALI command can be used to query the current sensor status. The following values are possible: 0x00, 0xAA,0xFF (see paragraph above for the possible states)

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

Name of the event	Information about the event	Description
No motion	00 0000 ---0b	No motion detected. The corresponding trigger is the "No motion" trigger.
Motion	00 0000 ---1b	Motion detected. The corresponding trigger is the "Motion" trigger.
Unoccupied	00 0000 -00-b	The sector has become vacant. The corresponding trigger is the "vacancy" trigger
Still vacant	00 0000 -10-b	The sector is still unoccupied. The event occurs at regular intervals as long as the “vacancy” state persists. The corresponding trigger is the "Repeat" trigger.
Occupied	00 0000 -01-b	The sector was occupied. The corresponding trigger is the "Busy" trigger.
Still occupied	00 0000 -11-b	The sector is still occupied. The event occurs at regular spacings as long as the "Busy" status persists. The corresponding trigger is the "Repeat" trigger.
Motion sensor	00 0000 1---b	The current event is triggered by a motion sensor.
	1x xxxx xxxxb	Reserved.
	01 xxxx xxxxb	
	00 1xxx xxxxb	
	00 01xx xxxxb	
	00 001x xxxxb	
	00 0001 xxxxb	

For additional details, please refer to the IEC62386-303 standard.

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

- Bit0: Busy event active
- Bit1: Vacancy event active
- Bit2: Still empty/occupied event active
- Bit3: Motion event active
- Bit4: No motion event active
- Bit5..Bit7: unused

Report time: The report time can only be set if the event filter “Repeat” is activated and the events “Still unoccupied” and “Still occupied” are activated. The time between the resending of a "still event" is determined by the report time.

Configuring instance 0 - presence sensor

1. Set filter (SET EVENT FILTER): 1 byte, corresponding ratio of the individual BITs and standard value ranges follows: Value of this command: 0x68

Bit	Description	Value	Standard
0	Busy event activated?	"1" = "Yes"	1
1	Unoccupied event activated?	"1" = "Yes"	1
2	Repetition of the event activated?	"1" = "Yes"	0
3	Motion event activated?	"1" = "Yes"	0
4	No motion event activated?	"1" = "Yes"	0
5	Reserved	0	0
6	Reserved	0	0
7	Reserved	0	0

2. Set hold time (SET HOLD TIMER (DTR0))1 byte, (1---255), current value: HOLD TIMER×10 This command value: 0x21
3. Set report time (SET REPORT TIMER (DTR0))1 byte, (0---255), current value: REPORT TIMER×1 This command value: 0x22
4. Set dead time (SET DEADTIME TIMER (DTR0))1 byte, (0---255), current value: DEADTIME TIMER×50M This command value: 0x23
5. Querying the sensor sensitivity (SET sensitivity (DTR0))1 byte, (0---100), This command value: 0x2b
6. Querying the instance resolution (QUERY RESOLUTION) The resolution of the input value of the occupancy sensor is 2, This command value: 0X81
7. Query the current input value of the instance (QUERY INPUT VALUE) Input values of the occupancy sensor (4 values: 0, 0x55, 0xaa, 0xff), this command value: 0x8c

Instance 1 - Light sensor

Instance 1 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 via a “query” command or automatically provided by the sensor via an event.

The measuring range is 0Lux ... 1000Lux. The resolution differs between queries and generated events; a query supports an event resolution of 10Lux (10Bit).

Hysteresis: For information about hysteresis, see section Instances - General: Hysteresis

Hysteresis Min: set in lux. For general information on Hysteresis Min, see section Instances -General: Hysteresis Min

Event Filter: The light instance generates only one event with 10-bit resolution (0... 1000 lux, increment10lux). If the filter is deactivated, no events are sent.

Event: The lighting intensity is transmitted by event. The following event information is available:

Name of the event	Information about the event	Description
Report on lighting intensity	Lighting intensity event	An illuminance measurement report that relays the actual lighting intensity.

For additional details, please refer to the IEC62386-304 standard.

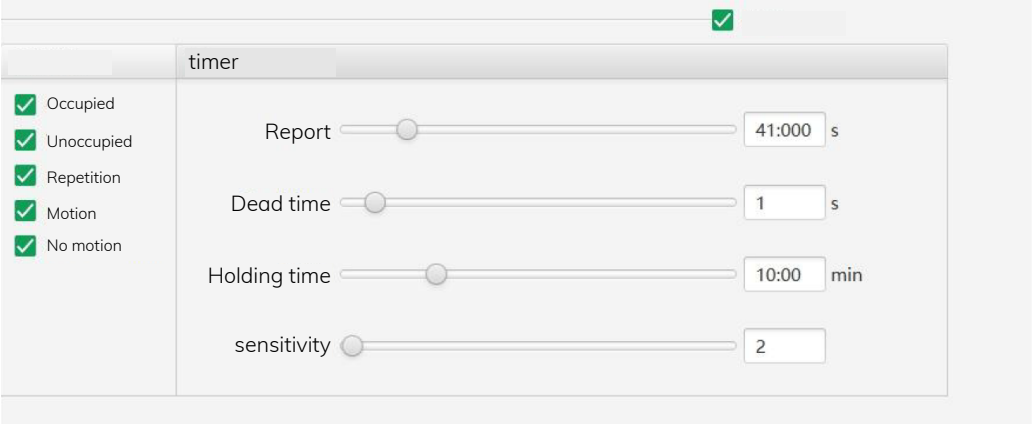
Configuring instance 1 - light sensor

1. Set filter (SET EVENT FILTER): 1 Byte, only 1 BIT used, corresponding relationship and default value are as follows: Value of this command: 0x68

Bit	description	Value	standard
0	Event “Lighting intensity” activated?	"1" = "Yes"	1
1	Reserved	0	0
2	Reserved	0	0
3	Reserved	0	0
4	Reserved	0	0
5	Reserved	0	0
6	Reserved	0	0
7	Reserved	0	0

2. Set report time (SET REPORT TIMER (DTR0))1 byte, (0---255), current value: REPORT TIMER×1 This command value: 0x30
3. Set dead time (SET DEADTIME TIMER (DTR0))1 byte, (0---255), current value: DEADTIME TIMER×50M This command value: 0x32
4. Set hysteresis (SET HYSTERESIS (DTR0))1 byte, (0---25%), current value: HYSTERESIS ×current value of the lighting intensity This command value: 0x31
5. Set hysteresis minimum (SET HYSTERESIS MIN (DTR0))1 byte, (0---255) This command value: 0x33
6. Query the instance resolution (QUERY RESOLUTION)The resolution of illuminace is 10, this command value: 0x81
7. Query of the current instance value (QUERY INPUT VALUE) Current value of the lighting intensity (0-1000), This command has the following value: 0x8c
8. Query the current latch value of the instance (QUERY INPUT VALUE LATCH) This command has the following value: 0X8d

Configuration interface events and timer configuration



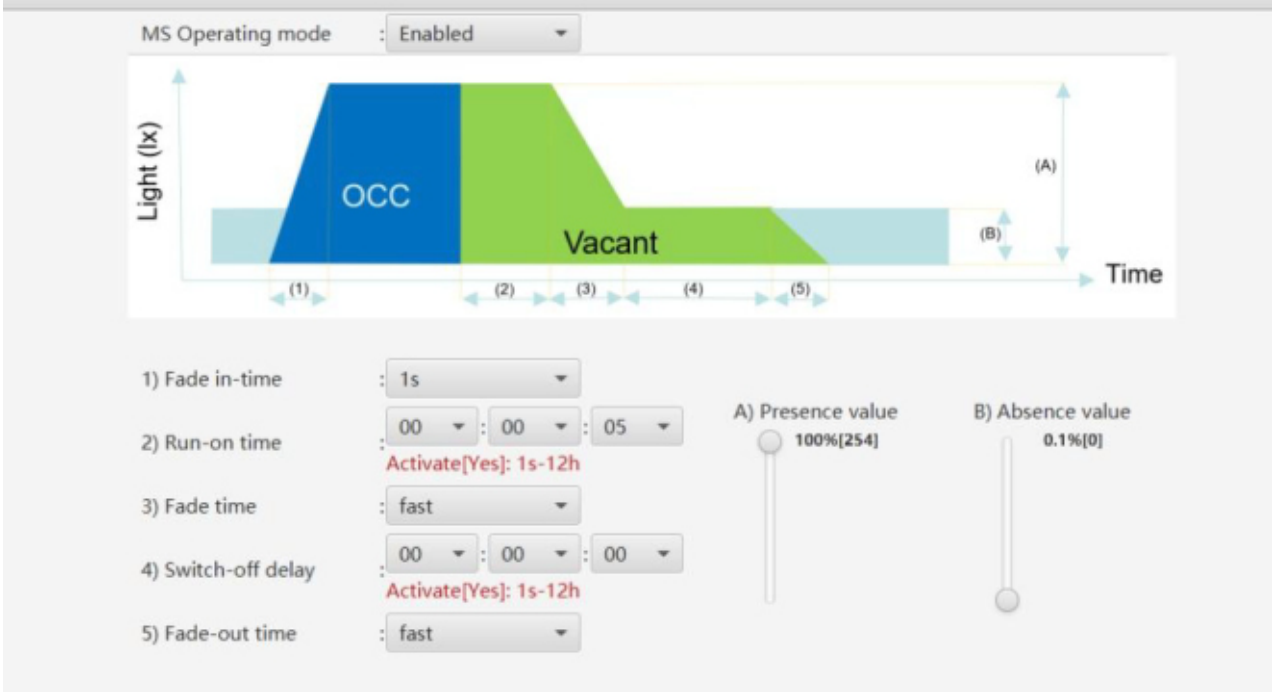
Report: This means report time, if the event information does not change, the event is sent cyclically with the report time. The reporting time can be set for each instance. It determines the maximum time between a sent event and resending.

Dead time: This means dead time can be set for each instance. It determines the time that must elapse before an event can be sent again. This also applies if the event information (measured value) changes. If dead time is not required, it can be deactivated.

Hold: This means hold time is the time that must elapse before the "people in the room and no motion" state changes to the "empty room" state. If any motion is detected during this time, the status returns to "People in the room and motion".

Sensitivity: this means the sensitivity of the motion detection, please ignore this parameter, as the sensitivity of the PIR motion sensor cannot be set, this parameter is invalid.

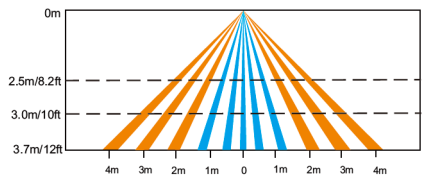
Configuration of delay time, fade time and brightness

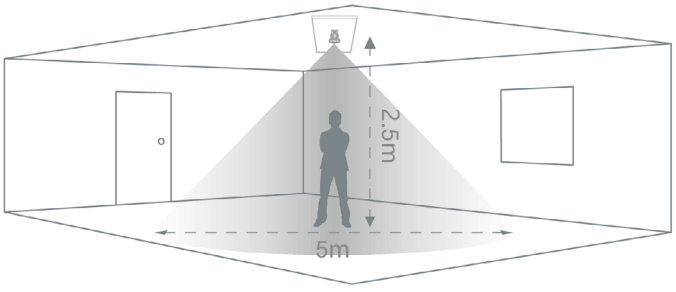


1. Fade in time: this means the time that the destined DALI luminaires take to fade from current state to the configured state when the movement detected and the room is occupied. OCC area: this area means "occupied and movement" (people in the room and movement) is triggered. Then report timer is re-triggered, during the report time, no movement detected, after report time expired, the “occupied and no movement” (people in the room and no movement) is triggered.
2. Run on time: this means hold time, which will be triggered when “occupied and no movement” (people in the room and no movement) state is reported, only after the hold time expired, the state “vacancy” (empty room) can be triggered.
3. Fade time: this means the time that the destined DALI luminaires take to fade from the configured state when the room is occupied to the configured state when the room is empty.
4. Switch-off delay: This means how long the configured state of the specific DALI luminaires lasts when the room is empty.
5. Fade-out time: This means the time required for the specific DALI luminaires to transition from the configured state when the room is empty to the off state.
6. (A) Occupancy value: This is the configured state of the specific DALI luminaires when the room is occupied (people in the room).
7. (B) Absence value: This is the configured state of the specifi

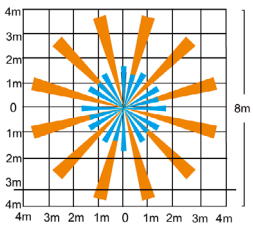
Detection range

Cover side view





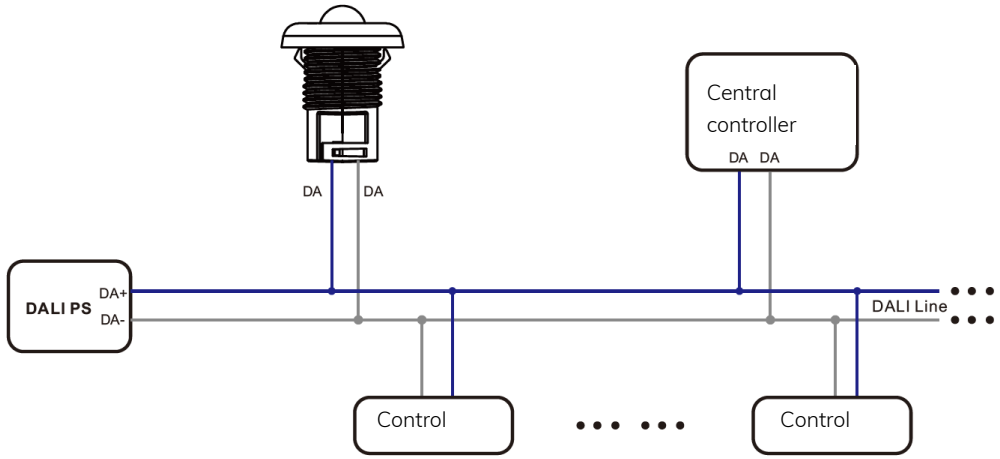
Cover top view



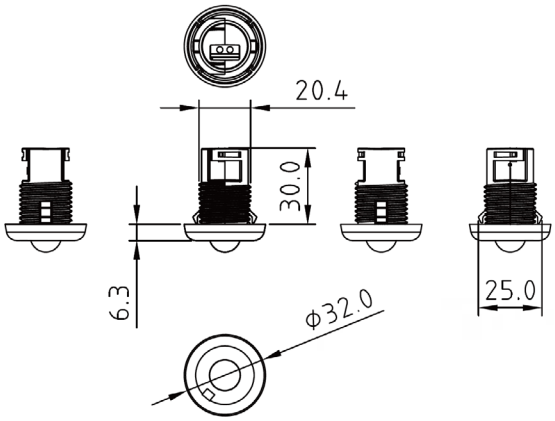
The detection area for the motion sensor can be roughly divided into two sectors:

Slow motion (person moves < 0.3m/s)Fast motion (person moves > 0.4m/s)

Wiring



Dimensions



Precautionary measures during installation

- Avoid sectors with frequent temperature fluctuations: Stay away from air conditioners, fans, refrigerators, ovens and other objects that cause rapid temperature fluctuations. The detection effectiveness of PIR motion sensors is closely related to temperature fluctuations, and ventilation openings or heat sources can lead to false alarms.
- Avoid sectors with strong airflow.
- Avoid looking directly at glass doors and windows: 1) Do not look directly at glass doors and windows to avoid interference from strong light. 2) Avoid complex environments away from doors and windows, such as direct sunlight, crowds and moving vehicles.
- Avoid installation opposite large, constantly moving objects: Large objects that move a lot can cause sudden changes in the airflow in the detection area, resulting in false alarms. PIR motion sensors for outdoor use should not be installed opposite large trees or tall bushes.
- Avoid sectors with screens, furniture, large potted plants or other obstacles within the detection range.
- Avoid sectors that are exposed to direct sunlight.