SR-MDS Solar

Solar-radio-ceiling-sensor for light and motion

Thermokon
Sensortechnik GmbH

Datasheet

airConfig

enocean alliance
No Wires. No Batteries. No Limits.

Application

The Enocean self powered multi sensor detects light and motion. With battery back up option.

The device has the following functions:

- Motion detection
- Brightness detection
- Wireless radio transmission
- Monitoring the battery charging voltage

Security Advice – Caution

The installation and assembly of the device must be performed by a skilled person.

The device should only be used for the appropriate application. Unauthorised conversions or alteration are prohibited! The modules must not be used in relation with equipment that threatens, directly or indirectly, human health or life or with applications that can result in danger for people, animals or assets.

For devices with controlling units (signal transducers, transmitters, etc.), it is important to make sure that the signal receiving device (actuators, generators, etc.) do not accept damaging or threatening conditions, that may arise from false signals during installation / configuration of the control unit. If necessary, disconnect the signal receiver from any source of power.

Please verify and consult:

- Laws, standards and regulations.
- The current condition of the device at the time of installation, to ensure safe installation.
- The devices technical data and installation manual.

Notes on Disposal

As a component of large-scale fixed installation, Thermokon products are intended to be used permanently as part of a building or a structure at a pre-defined and dedicated location. The Waste Electrical and Electronic Act (WEEE) is not applicable. However, the product may contain valuable materials that should not be recycled rather than disposed as domestic waste. Please note the relevant regulations for local disposal.

Guidelines for Devices with Solar Energy Storage

By means of the energy-optimized EnOcean radio technology used in "EasySens" wireless sensors, supplying themselves with electric energy by solar cell(s), the devices can work without batteries. Due to the elimination of changeable batteries the sensors are almost maintenance-free and environmentally sound.

The device should be mounted in a location with sufficient ambient brightness.The minimum illumination of 200 lx (artificial light or ambient) is required at the mounting place for at least 3 to 4 hours every day. (The health and safety regulations at work require a minimum illumination of 500 lx for office workplaces).

It will be more effective If the solar cell is mounted facing the window direction. If the device has a temperature sensor, then even periodic direct sun radiation should be avoided due to incorrect false temperature readings.

With regard to future use of the room, the mounting position should be selected so that the device will not be obstructed: for example by placement areas or roll-fronted cupboards.

The solar-powered energy storage may have to be recharged after longer warehousing of the radio sensors in darkness. Normally this works automatically during commissioning or during the first operating phase in daylight. If the initial charging is not sufficient in the first operating hours, the sensor will reach its full operating state up to 3 to 4 days, if the requirements for minimum illumination are met, the sensor will be transmit continually in darkness as specified. Depending on the application it is also possible to operate the devices in dark rooms (with brightness <100 lx) with a battery back up option. Batteries to be used are listed in accessories.

Operating time when using batteries depends on transmission frequency as well as the component aging and the self-discharge of the battery used. Normally operating time will be several years. Changing of the device from solar to battery operation is done automatically by adding a battery to the device.

Registration for radio operation

The general registration for the radio operation is valid for all EU-countries as well as for Switzerland.

This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions:
(1) this device may not cause harmful interference
(2) the device must accept any interference received including interference that may cause undesired operation.

Changes or modifications made to this equipment not approved by Thermokon may void the FCC authorization to operate this equipment.

Transmitting Frequency and Measuring Principle

The sensors send event or time controlled telegrams to the receiver.

A: event controlled
By activating the learn button of the device, the internal microprocessor is woken up, the measuring value is detected and a telegram to the receiver is generated and transmitted. Some devices, for example to measure humidity or motion, generate telegrams event controlled to the receiver.

B: time controlled
The internal microprocessor wakes up at a predefined interval according to the settings (T_wake up) and the measuring value is detected. If the status of an input has changed more than 2% (for devices with airConfig this value can be programmed) since the last inquiry, a telegram is produced immediately. If the input value remains unchanged compared to the previous telegram, a telegram is automatically produced after expiration of the fixed sending time (approx. 16 minutes (for devices with airConfig this value can be programmed); T_send).

After a telegram is sent, regardless whether produced by status changes or after expiration of T_send, the times T_wake up and T_intervall are restarted.

A telegram always includes all information (measured data, charging voltage of energy storage,..).

Information about EasySens (Radio)

Transmission Range

As the radio signals are electromagnetic waves, the signal is damped on its way from the sender to the receiver. That is to say, the field strength is removed inversely proportional to the square of the distance between sender and receiver (E,H~1/r²), at twice the distance, only ¼ of the field strength is still present.

Beside these natural transmission range limits, further interferences have to be considered: Metallic parts, e.g. reinforcements in walls, metallized foils of thermal insulations or metallized heat-absorbing glass, are reflecting electromagnetic waves. Thus, a so-called radio shadow is built up behind these parts.

Radio waves can penetrate walls, however signal dampening is increased vs transmitting within the free field.

Penetration of radio signals:

Material	Penetration
Wood, gypsum, glass uncoated	90..100%
Brick, pressboard	65.. 95%
Reinforced concrete	10.. 90%
Metal, aluminium pasting	0.. 10%

This means that the building material used in a building is of paramount importance for the evaluation of the transmitting range. For an evaluation of the environment, please see guide values listed below:

Radio path	Range/penetration
Visual contacts	Typ. 30 m range in passages, corridors, up to 100 m in halls
Plasterboard walls/wood	Typ. 30 m range through max. 5 walls
Brick wall/Gas concrete	Typ. 20 m range through max. 3 walls
Reinforced concrete/-ceilings	Typ. 10 m range through max. 1 ceiling

Supply blocks and lift shafts should be seen as a compartmentalization

In addition, the angle with which the signal sent arrives at the wall is also important. Depending on the angle, the effective wall strength and thus the damping attenuation of the signal changes. If possible, the signals should run vertically through the wall. Recesses should be avoided.
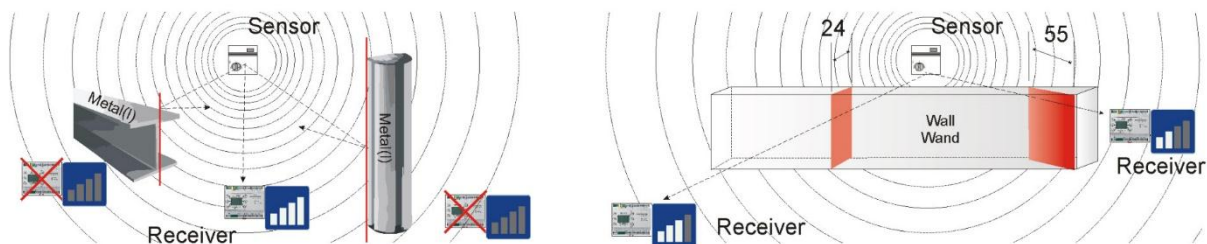
Other Interference Sources

Devices that also operate with high-frequency signals, e.g. computer, audio-/video systems, electronic transformers and ballasts etc. are also considered as an interference source. The minimum distance to such devices should amount to 0,5 m.

Selecting the best Device Mounting Position using field strength measuring instruments (e.g. Thermokon AirScan)

Instruments for measuring and indicating the received field strength (RSSI) of the EnOcean telegrams and interfering radio activity of transmission frequency during the planning phase and enable them to verify whether the installation of EnOcean transmitters and receivers is possible at the positions planned.

For this purpose, a field strength meter, a laptop with the software AirScan for example is placed at the point where the receiver is provided. The USB transceiver from AirScan then logs the messages of the sensors and displays the field strength. Color-coded values indicate the signal quality. By changing the sensor position there can the best possible mounting position located. Refer to the documentation "range planning EnOcean radio systems".

High-Frequency Emission of Wireless Sensors

Since the development of cordless telephones and the use of wireless systems in residential buildings, the influence of radio waves on people's health living and working in the building have been discussed intensively. Due to incomplete measuring results and long-term studies, very often great feelings of uncertainty exist with the supporters as well as with the critics of wireless systems.

A measuring expert certificate of the institute for social ecological research and education (ECOLOG) has confirmed, that the high-frequency emissions of wireless keys and sensors based on EnOcean technology are **considerably lower** than comparable conventional keys.

Even conventional keys send electromagnetic fields, due to the contact spark. The emitted power flux density (W/m²) is 100 times higher than using a wireless switch considering the total frequency range. In addition, a potential exposition by low frequency magnet fields emitted via used wires are reduced due to wireless keys.

If the radio emission is compared to other high-frequency sources in a building such as DECT-telephones and basis stations, these systems are 1.500 times higher-graded than wireless switches.

Commissioning

If the measured values of the sensors are evaluated correctly at the receiver, it is necessary to learn in the devices in the receiver. This is done by means of a "learn button" (LRN) on the sensor.

Connect and disconnect a presence detector
1. Set the learning mode according to the receiver description.
2. Press once on the sensor LRN button to generate a connect / disconnect wireless telegram.

Walk Test – Functional- / walk test
Used to check the walk test, for optical range of the sensor. The sensor must be fitted with a backup battery. During the walk test, no radio telegrams are sent, but the detected movement is indicated by multiple flickering of the LED.

1. Press and hold the LRN button for 3 seconds.
   ➔ The red LED flashes to confirm that the walk test for 5 min. is enabled.
2. Move inside and outside of the sensor detection range to determine the coverage area.
   ➔ The LED flickers multiple times when the unit senses movement.
3. Move within the range of the sensor to see if the movement triggers a reaction.
4. Pressing of the LRN button again ends the walk test. After max. 5 minutes of the walk test is automatically terminated. The red LED lights up briefly to confirm.

Note: Make sure that the sensor is not falsely triggered by activities outside the desired zone, or from other sources of heat and motion.

Configuration with airConfig

EasySens airConfig commissioning tool is available free of charge for download from the download centre of www.thermokon.de.

To run airConfig a Windows operated PC with Java and Flash Player is required as well as an EasySens USB transceiver, e.g. same as supplied with the Field Test Tool airScan. Alternatively EnOcean's USB300 may also be used. AirConfig does not require any licenses.

Please also consult the airConfig manual in addition to this data sheet. airConfig offers further explanations of each parameter using guide notes when hovering the mouse above each parameter.

Place the USB stick in one of your computer's USB ports and start airConfig. The driver should be installed automatically from Windows website. In case the driver of the USB transceiver has not been installed properly, this window will appear:

USB transceiver not found!
Please plug-in compatible device and restart.
OK

In this case please check in your WINDOWS Device manager whether the USB transceiver has been detected properly and the driver is installed. If the driver is missing, you may download the appropriate driver for your system from http://www.ftdichip.com/Drivers/VCP.htm

The airConfig Screen

For configuring airConfig, you move from the left side to the right (as an example, see the display in the picture below). After airConfig started and the USB transceiver has been detected, click on the device`s icon in the driver list and select "Request devices", or press F11. AirConfig sends a telegram to all devices within the transmission range, to request all IDs of all devices of the selected type.
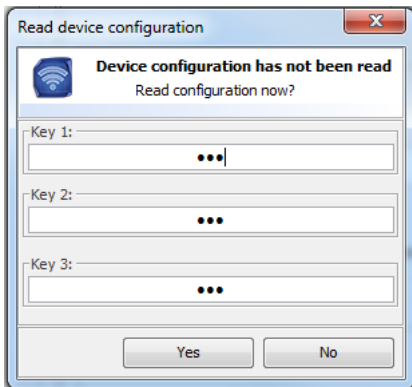
Note for all sensors: To send and receive configuration-data, must be pressed the "learning"-button so that the device is "visible".

Product type

IDs of selected Product type

Parameters of product selected by ID

EnOcean telegrams received for pairing

Each product is listed with its EnOcean ID in the device list. To configure a specific device, right click on the icon of the device and select "Request configuration", or press F5.

When airConfig realizes the data being received via a repeater, it is shown on the top edge of the screen, since multiple repetitions occupy the radio channels and may interfere with the configuration.

AirScan will request the PIN which protects the configuration of the device. Fill in the PIN and choose "Yes" to have a look at the devices' configuration. To work with standard settings, select "No".

Configuration takes place through the dialogue field in the centre of the screen. Values that can not be changed are illustrated in grey.

Attention: For all **solar-powered sensors**, make sure, the power state is deposited in "green" (for example the red arrow in the chart below). Especially transmission and reception of configuration data consumes a lot of energy, which can not be guaranteed after unpacking the product from the transportation package. Therefore, a buffer battery should always be inserted for the duration of the configuration, so the sensor is supplied with sufficient energy to send and receive new parameters.

Configuration of SR-MDS (Solar)
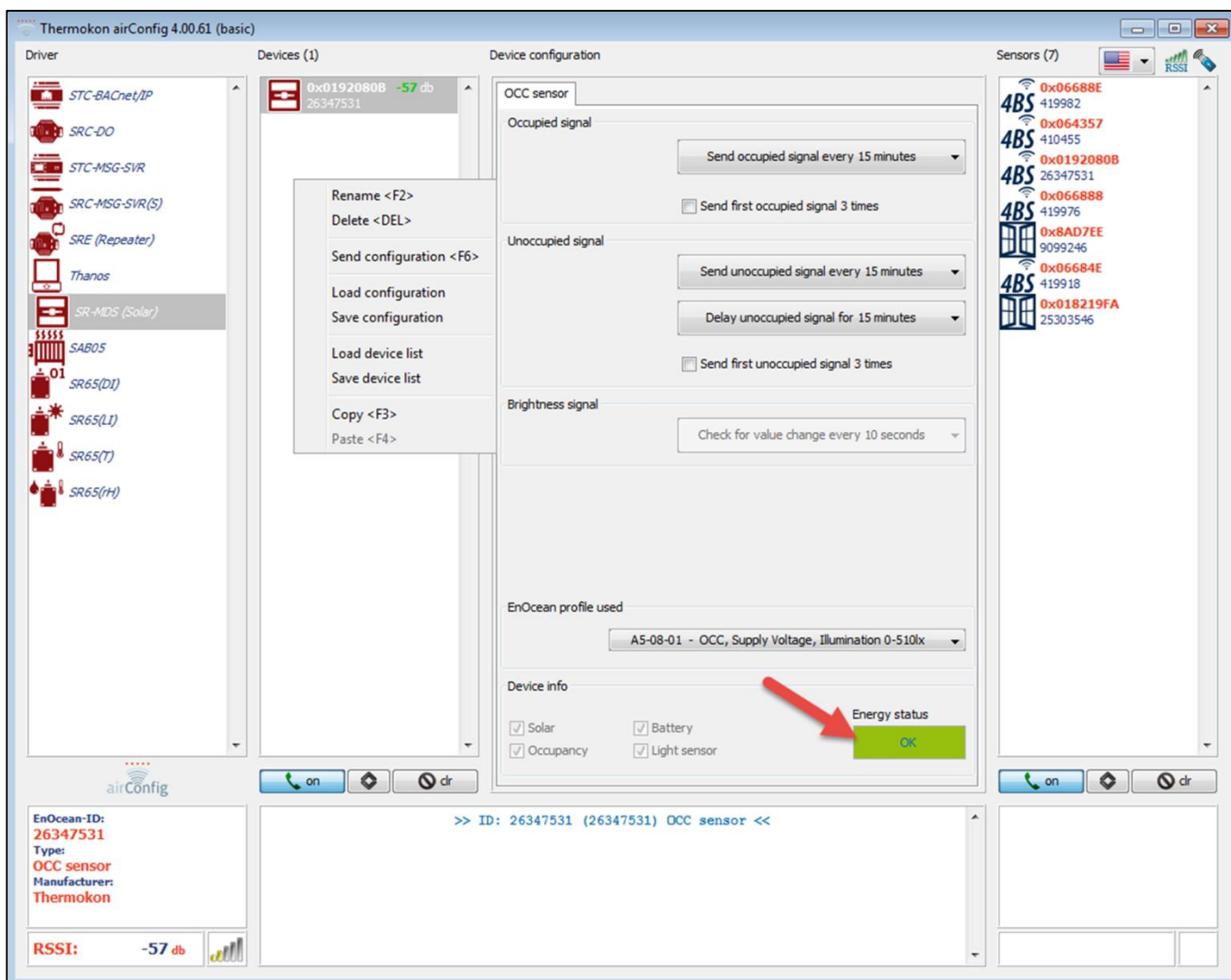
In general the desired EEP must be chosen via the drop down menu "Used EnOcean Equipment Profile". Depending on the EEP type, parameters for motion or illumination can be selected. Immediately after detecting motion a telegram stating "occupied" is sent. Further motion will not result in sending more telegrams, because the status doesn't change. Using the drop down menu "Presence signal", you can select, how often the not changing telegram "occupied" shall be send. If no motion is being detected, the Sensor generates an "unoccupied" telegram and sends it to the receiver after the signal delay as previously set in the drop down menu "Absence signal". You can also select the frequency of not changing telegrams in that menu. It is possible to send a telegram with changing statuses (unoccupied -> occupied / occupied -> unoccupied), three times with random interruptions in between, by activating the corresponding check box. This may not be mixed up with the three EnOcean specific repeated sub telegrams. If you also count these telegrams, a change of status is send nine times all together.

One must consider: The more frequent a device wakes up, measures data and repetitively sends, the more energy is being consumed, which can eventually not be covered through ambient illumination.

For finishing the configuration, right click on the sensor in the device list and chose "Send data" in the content window to send new parameters to the device.
For accepting parameters of the configuration, the learn-button must be pushed. The green deposit of the sensor symbol disappears, after the configuration has been transmitted successfully. A red deposit displays an error in the transmission of the configuration.

Technical Data

Technology:	EnOcean, (IEC 14543-3-10)
Transmitting frequency:	868 MHz
Object distance:	Max. 12 m.
Detection range:	Ø=5 m at a mounting height of 2,8 m
Detection range (horizontal and vertical) (PIR sensor):	102 °x 92°
Sensor type:	PIR (passive infrared)
Interval:	Configured via airConfig
Measuring range light:	A5-06-02 → 0..1020 Lux
(configured via airConfig)	A5-07-03 → 0..1000 Lux
	A5-08-01 → 0..510 Lux *
	A5-08-02 → 0..1020 Lux
Power supply:	Solar cell, internal goldcap, maintenance-free
	Battery: LS14250 (optional)
Min. light intensity for charging:	40 lux
Standard transmission interval:	15 min (Configurable via airConfig software)
Enclosure:	PC, Colour pure white
Protection:	IP50 according to DIN EN 60529
Ambient temperature:	0..+50 °C
Installation type:	Surface mounting
Dimensions (LxWxH):	102 mm x 81 mm x 75 mm
Weight:	Approx. 112 g

* Default settings

Description Radio Telegram

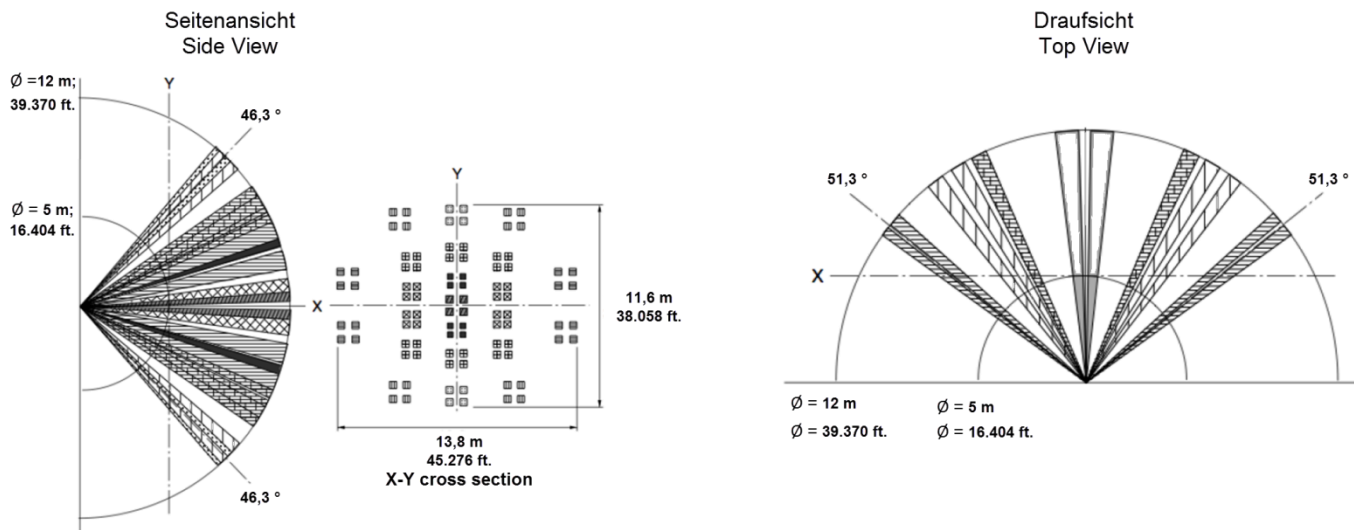**Overview of airConfig selectable radio telegrams.**

SR-MDS-Solar:

EEP F6-02-01
EEP A5-06-02
EEP A5-07-01
EEP A5-07-02
EEP A5-07-03
EEP A5-08-01 *
EEP A5-08-02
EEP A5-08-03

> **i**
>
> **EEP:**
> A detailed description of the radio telegrams (EnOcean Equipment Profiles (EEP)) is available for download under http://www.enocean-alliance.org/eep/ available

Optical detection range

Mounting Advice

Install the mounting plate with screws above the area to be detected.
The sensor is supplied in a functioning condition incl. backup battery. Remove the insulating strip between the battery and the contact before assembly. After prolonged storage of the wireless sensors in darkness the internal solar energy storage is automatically reloaded during the first operating hours in daylight. See notes "solar energy storage.
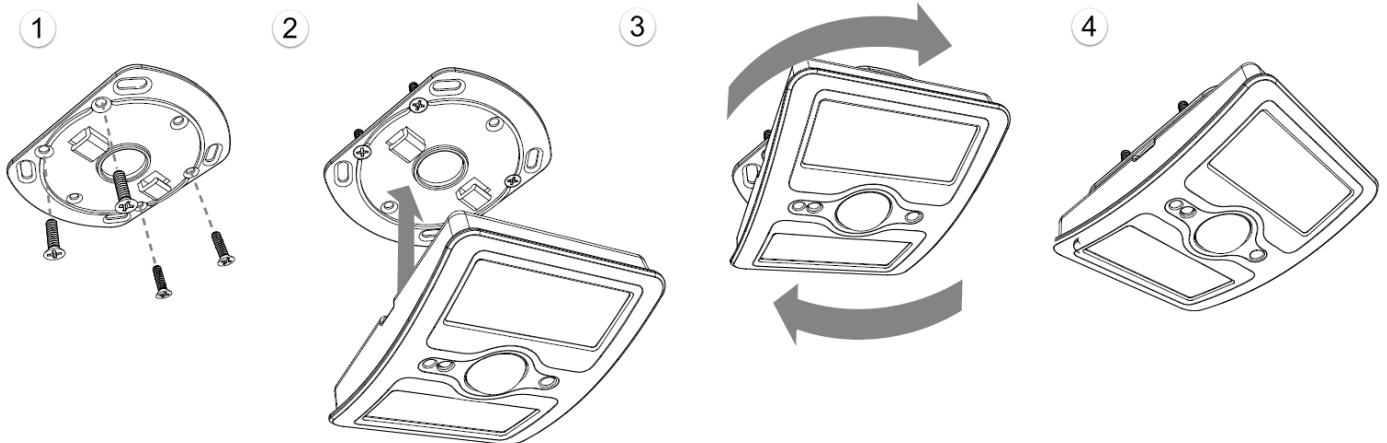
Mounting height

The mounting height has a direct influence on the range of the motion detection. The optimum height is 2.40 - 3:00 m. All deviating mounting heights will have some effect on the coverage range.

Fixed mounting

The motion sensor should be mounted on a solid flat surface, as any movement of the sensor leads to a false readings.

Distance to Lighting devices

Lights emit IR (heat) radiation, no lights should be mounted in the detection range of the sensor, mounting above a luminaire is also not recommended
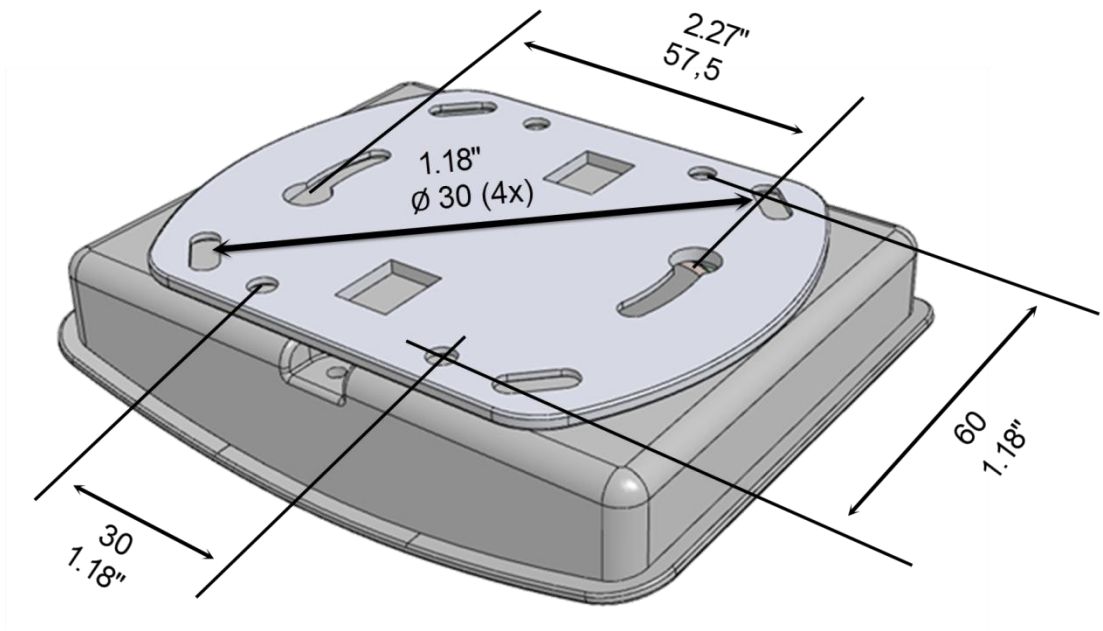
Distance from sources of interference

To avoid false alarms, ensure interfering sources such as Heaters, lamps, air outlets of air conditioners, etc. are out of the detection range of the sensor. Mounting in Direct sunlight should also be avoided.

Dimensions (mm)

81 mm (3.2")
102 mm (4")
75 mm (3")

LRN Taste
LRN Button

Licht Sensor
Light Sensor

LED
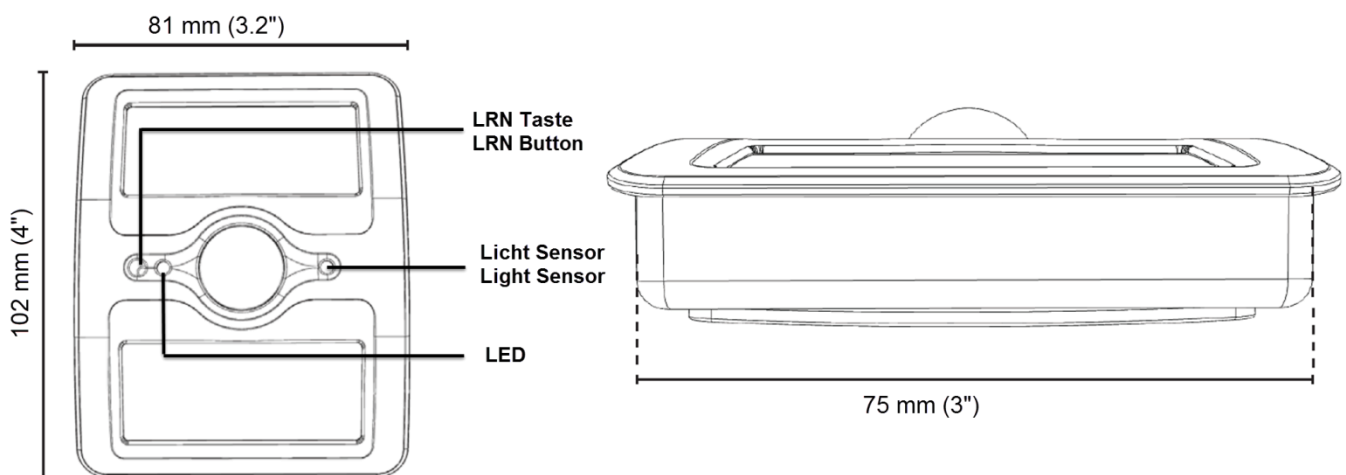
Optional Accessories

(D+S)	1 Set (each 2 pieces) rawl plugs and screws	
(LS14250)	Battery EasySens LS14250, 1,1Ah / 3,6V / 1/2AA	Art.-No. 315098