SR-MOW Solar

Solar-Wireless Wall Motion Sensor

thermokon Sensortechnik GmbH

Data Sheet

Subject to technical alteration
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enocean alliance
No Wires. No Batteries. No Limits.

Application

The battery- and wireless wall sensor is designed for movement detection in room or office spaces. Radio telegrams are transferred according to EnOcean standard. Integrated solar energy storage for maintenance-free operation.

Functions of the SR-MOW:

- Wireless transmission of telegrams
- Monitoring of charging voltage of the energy storage
- Motion detection with PIR

Security Advice – Caution

The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Please comply with

- Local laws, health & safety regulations, technical standards and regulations
- Condition of the device at the time of installation, to ensure safe installation
- This data sheet and installation manual

Notes on Disposal

As a component of a 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, hence the Waste Electrical and Electronic Act (WEEE) is not applicable. However, most Thermokon products contain valuable materials that should 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.

In selecting the mounting place sufficient ambient brightness has to be regarded. The minimum illumination of 200 lx should be guaranteed at the mounting place for at least 3 to 4 hours every day. It does not make a difference, if there is artificial light or daylight (the health and safety regulations at work require a minimum illumination of 500 lx for office workplaces). Not sufficiently illuminated recesses in the course of a day should be avoided.

If the solar cell is mounted in window direction, it will normally be more effective. If the device has a temperature sensor, then direct sun radiation (especially occasional) should be avoided as it would lead to falsified measuring values in temperature detection.

With regard to a future use of the room, the mounting place should be selected in that way, that a later shadowing by the user, for example by placement areas or roll-fronted cupboards is avoided.

Perhaps the solar-powered energy storage has 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 is reaching its full operating state after 3 to 4 days at the latest, if the requirements for minimum illumination are met. The sensor will be sending properly in darkness at the latest after this period of time.

Depending on the application it is also possible to operate most of the devices in dark rooms (with brightness <100 lx) charged a battery. In this case the device is equipped with corresponding battery holders. Batteries to be used are listed in accessories.

Operating time when using batteries depends on transmission frequency as well as on the intentional 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 putting batteries into the battery holder.

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 of the following conditions:
(1) this device may not cause harmful interference and
(2) the device must accept any interference received including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly 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 at the latest 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 ($E,H \sim 1/r^2$), 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:

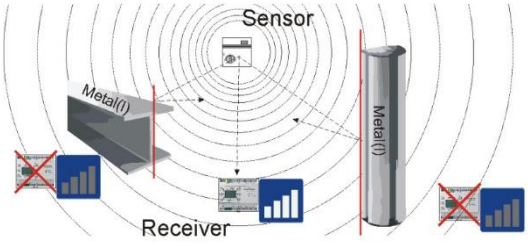
Material	*Penetration*
Wood, gypsum, glass uncoated	90..100%
Brick, pressboard	65.. 95%
Reinforced concrete	10.. 90%
Metal, aluminium pasting	0.. 10%

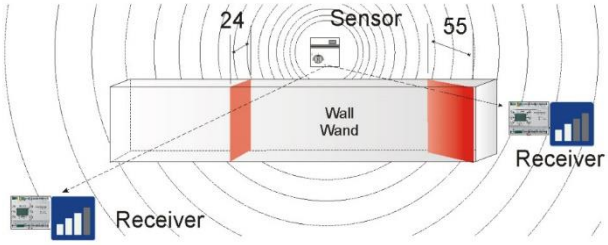
This means that the building material used in a building is of paramount importance for the evaluation of the transmitting range. For an evaluation of the environment, please see guide values listed below:

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.

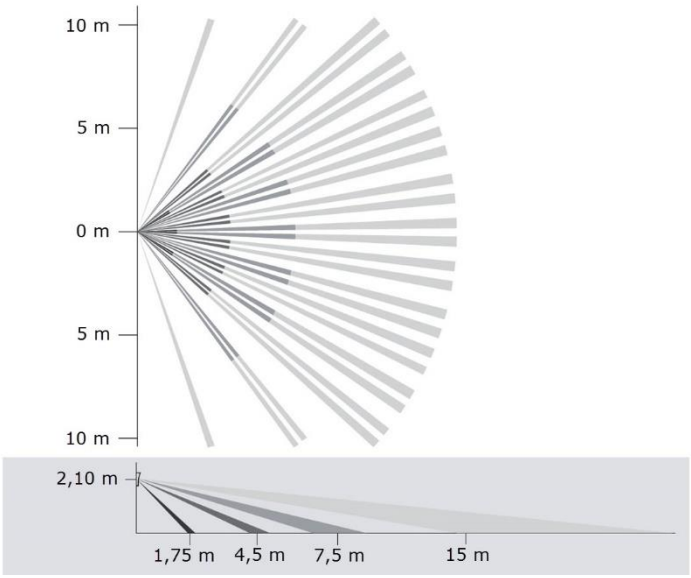
If the radio emission is compared to other high-frequency sources in a building such as DECT-telephones and basis stations, these systems are 1.500 times higher-graded than wireless switches.

Technical Data

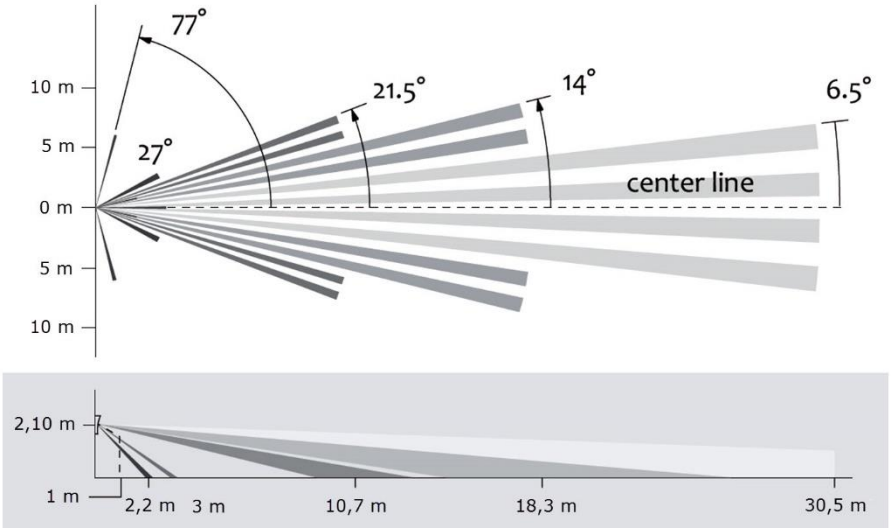
Technology:	EnOcean, IEC 13543-3-10
Transmitting frequency:	868 MHz
Transmitting range:	approx. 15-30 m in buildings
Movement detection:	PIR “passive infrared”
Motion Detection Range:	15 m wide angle, 30 m long range lens
Sending interval:	directly with movement detection Occupied: every 2 min. Unoccupied: After 10 and 30 min. With activated Heartbeat every 1h
Power supply:	Solar cell, internal goldcap, maintenance-free Battery clip: CR 2032 Clamps at 3..5 V =
Enclosure:	PC, colour pearl white, similar to RAL1013
Protection:	IP20 according to EN 60529
Ambient temperature:	+10..+40 °C
Installation type:	Surface mounting, to be mounted flat onto the surface using adhesive foil or screws
Weight:	116 g

Detection range

Wide angle lens



Long range lens



Description of Radio Telegram

ORG	0x00B (EnOcean), EEP A5-07-01
Link telegram	
Data_byte3	0x1C
Data_byte2	0x08
Data_byte1	0x0B
Data_byte0	0x87

Data and heartbeat telegrams	
Data_byte3	Super capacitor voltage lever 0..250 (0..5 V)
Data_byte2	Solar panel reference current 0..127 (0..127 uA)
Data_byte1	0xFF (occupied) or 0x00 (unoccupied and heartbeat)
Data_byte0	0x0B (OSC) or 0x09 (OSW)

Mounting Advices

The sensor is shipped ready for operation. Perhaps the solar-powered energy storage has 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. Please refer to remarks in chapter “Guidelines for Devices with Solar Energy Storage“.

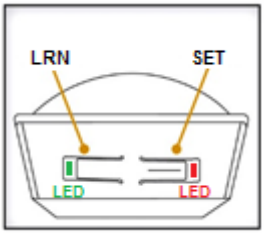
When mounting the device please regard, that the mounting place has sufficient ambient brightness, that the detection range covers the needs and that the radio signal to the receiver is convenient.

Walk Test

Use the walk test to confirm that motion is within the sensor’s detection range.

Note: Before starting the test, you should recharge the sensor for 1.5 hours with bright light (2000 lux). Alternatively, put a battery into the battery holder or charge the sensor temporarily using 3..5 V =.

If stored energy is too low, it is not possible to start the test mode. If the LED doesn´t turn to ON or if the red LED flashes when pressing SET button, the device doesn´t have enough energy.



1. Press and hold the Set button for 5 seconds.
   -> Red LED flashes several times to confirm, that walk test is active.
2. Step in and out of the sensor‘s range to determine the area of detection.
   -> The red LED at the sensor and the LEDSs beyond the lens flash several times, if the sensor detects motion.
3. Move your hands from outside into the range of detection to see, if the movement is detected
4. The walk test will be terminated automatically after 3 minutes or by pressing LRN button for 5 seconds.

NOTE: Ensure the sensor is not activated by activities outside of the desired area or by other heating or motion sources. In those cases it is possible to adjust the sensitivity changing the switch next to the battery slot from “REG” to “LOW”.

Light Test

Use the light test to measure real-time light levels and confirm whether the occupancy sensor has sufficient light.

1. Create realistic lighting condition (the test measures the real-time light level)
2. Press and hold Set button for 10 seconds
   -> red and green LED will flash confirming, that light test is active
3. Watch the LED flash rate to determine the light strength:
   - 5x flashing — light condition is perfect (200 lux or more).
   - 4x flashing — light condition is good
   - 3x flashing — light condition is sufficient
   - 2x flashing — light condition is low – please look for a better position
   - 1x flashing — light condition is too low – sensor will not work without battery backup
   - No flashing — No solar contribution - sensor will not work without a backup battery or power supply
4. The test will terminate automatically after 3 minutes or by pressing the LRN button for 5 seconds.

Check radio signal strength

For testing the radio signal strength, place AirScan or a similar tool at the receiver. Send telegrams by (multiple) activating the LRN button and measure the field strength at the receiver position.

Mounting Height

The mounting height has direct influence on the detection range of the occupancy sensor. Best mounting height will be between 1,8..2,5 m. Other heights will have effect on detection range.

Fixed Installation

The occupancy sensor has to be mounted on a solid ground, as every motion of the sensor itself leads to accidental releases.

Distance to Switched Lamps

In order to avoid unintended switch-on of the lamp triggered by the occupancy sensor, the lamps should not be mounted in the detection range of the sensor. Also the sensor should not be installed above a lamp. The heat radiation of the lamp can affect the functionality of the occupancy sensor and might probably cause a faulty release due to the PIR.

Distance to Sources of Interferences

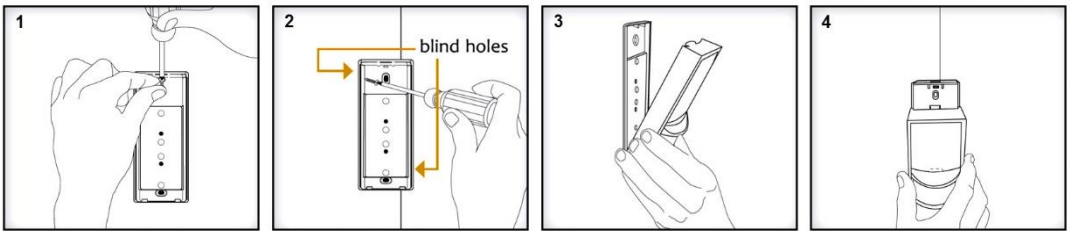
In order to avoid any faulty releases, sources of interferences such as heat radiators, lamps, air exits of air-conditioning systems etc. should be outside the detection range. Direct sun should be avoided.

Assembly

The mounting plate can be installed flush to the wall or angled in a corner.

NOTE: It is easier to link the sensor before it is mounted onto the wall. Refer to the Linking section.

Remove the mounting plate from the sensor assembly by pressing the release tab located on the top of the sensor. Decide which of the two installation options is appropriate:

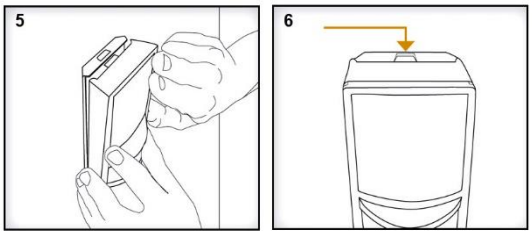


Flush to the wall (1)

- Orientate the mounting plate using the pencil marks. Mark the two mounting screw drill points.
- Drill two holes with a 3/16” bit and insert wall anchors.
- Insert the first screw loosely and level the mounting plate.
- Insert the second screw, then hand-tighten the first screw.

Angled in a Corner (2)

- Orientate the mounting plate using the pencil marks.
- Carefully drill through two of the four blind holes on the angled sides of the mounting plate (one on each side).
- Mark the two mounting screw drill points and drill two pilot holes with a 3/16” drill bit and insert the wall anchors.
- Insert the two screws and hand-tighten them.
- Fit the sensor into the groove at the bottom of the mounting plate (3) and close the top (4). The sensor snaps into the tab at the top (5/6).



Commissioning

Learning-in and out of the motion sensor

In order to connect the sensor to a receiver, the receiver has to be ON, has to be located within transmission range and has to be ready for learning in. Details can be found in the software documentation of the receiver.

By pressing the LRN button, a "learn" telegram is transmitted and the sensor and the receiver will get connected. The receiver stores the sensor mapping information permanently. If the device is learned in again, then normally the old connection information will be overwritten automatically.

NOTE: The LRN button is only used for connecting and testing. Parameterizing as possible delay times can be done at the receiver, if supported.

Optional settings

Two other settings can be configured on request. Both settings consume energy. Therefore they are not recommended for installations with non-optimal lighting conditions. No problems with battery or DC supply.

LED flashing when detecting motion: The red LED beyond the Fresnel lens flashes, when movement is transmitted (default is deactivated).

To change the setting, press and hold the LRN button for 3 seconds until the green LED flashes briefly. Activated status is shown by flashing of the red or green LED:

green LED flashes 3 times	activated
red LED flashes 3 times	disabled

Heartbeat Transmission

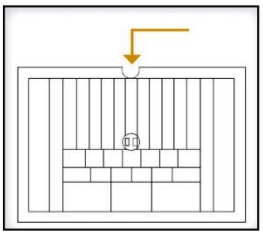
The presence detectors regularly transmits the status “occupied” to the transceiver. Status “unoccupied” is transmitted only 10 and 30 minutes after the last detected movement. To tell the connected receiver/gateway, that the sensor is still available and working, heartbeat can be enabled. This unoccupied heartbeat message will be sent every hour without motion (defaublt is deactivated).

To change the setting, press and hold the LRN button for 5 seconds until the both LEDs flash briefly. Activated status is shown by flashing of the red or green LED:

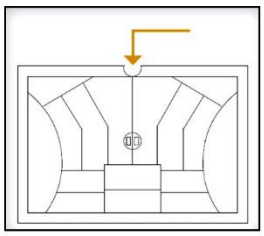
green LED flashes 3 times	activated
red LED flashes 3 times	disabled

Changing the Lens

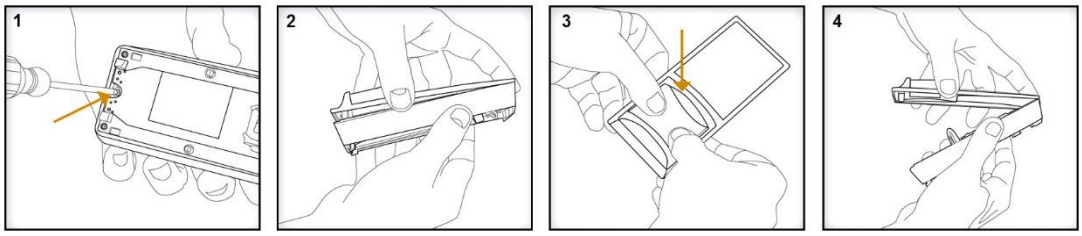
The occupancy sensor package contains two lenses: a wide angle lens and a long range lens. The wide angle lens is installed by default and can be distinguished from the long range lens by the pattern.



wide angle lens



long range lens



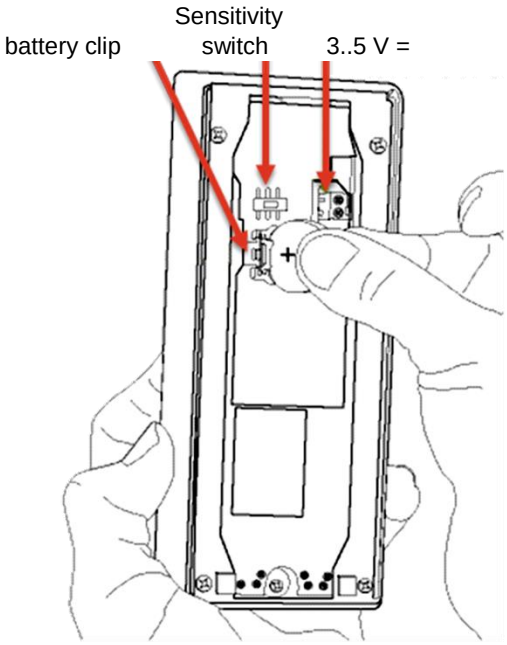
Press the top tab and remove the sensor from the mounting plate. Unscrew the small screw on the back at the bottom (1) and remove the front cover (2). Remove the installed lens by gently squeezing it to ease one side out of its groove, and then the other (3). Insert the lens you want to use by aligning the notch with the top on the front cover. Orientate the smooth side facing out, and the textured side facing the sensor. Hold both edges of the lens, flex it gently and push until it pops into the grooves. Make sure the edges are flush (4).

Note: The lens has to be located at the correct position. Otherwise the sensor will not detect activity properly.

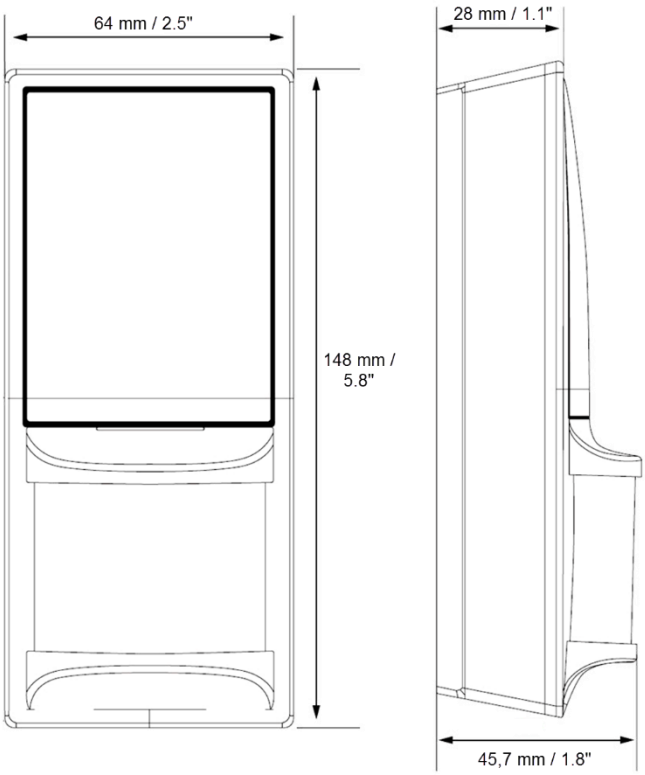
Place the front cover to the back part and fix the screw. Ensure that antenna is seated properly before fixing the front cover. Remount sensor to the base plate.

Maintenance

Battery change (optional power supply according to technical data)



Dimensions (mm / in.)



Accessories

Coin cell CR2032	Art. No. 347013	
Rawlplugs and screws (2 pcs. each)	Art. No. 102209	(included)