SensMax®
Sense your business

UNIDIRECTIONAL INFRARED PEOPLE COUNTING SENSORS

S1 SERIES

Data Sheet

Document version v1.3

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Description

SensMax unidirectional infrared people counter sensors are wireless, battery-powered devices designed for visitor counting in areas with defined pathways for pedestrian traffic. The family includes the **SensMax S1 Pro, SensMax S1 LR,** and **SensMax S1 SLR** models.

The sensors operate on the principle of infrared beam interruption. Each sensor structurally consists of two physical units—a **Transmitter (TX)** and a **Receiver (RX)**—installed directly opposite each other on the walls or frames of corridors, doors, or entrances. The Transmitter emits an invisible, focused infrared barrier, and each interruption of this barrier (a person passing through) is registered as a crossing and stored in the receiver's internal memory.

Since these sensors use a unidirectional counting algorithm, they record any beam crossings without separating the direction of movement (i.e., they do not distinguish between incoming and outgoing visitors). To estimate the total visitor traffic volume in reports, the registered total number of crossings is typically divided by two.

Key Advantages:

- **100% wireless operation:** Powered by standard AA batteries, eliminating the need for power or communication cables.
- **Easy installation:** Mounting takes just a few minutes on any flat surface using the heavy-duty double-sided tape included in the package or specialized mounting brackets.
- **Tamper and blockage protection:** The devices are equipped with a built-in buzzer and a feature that sends a notification to the software if the infrared beam is blocked or covered by an object for an extended period.
- **GDPR and privacy compliance:** 100% compliant with personal data protection laws, as the sensors collect only numerical crossing statistics without recording video or registering personal data.
- **Automatic data collection:** Automatic transmission of accumulated data over a radio channel in real time or in batches to SensMax SMX data collectors.

Product Modifications and Network Architecture

The SensMax S1 family of unidirectional sensors is designed for automatic data transmission. The receiver unit periodically transmits the accumulated hourly statistics over a wireless radio channel to a stationary SensMax SMX data collector (gateway) located within range. The gateway then sends the data to a central database or cloud reporting portal via Wi-Fi or Ethernet.

The family includes the following models:

- **SensMax S1 Pro (Standard):** Operates at 2.4 GHz with a wireless range of up to 50 meters (line of sight). Ideal for small shops and offices.
- **SensMax S1 LR (Long Range):** Operates at 868 MHz with a wireless range of up to 150 meters (up to 250 meters in open spaces). Suitable for supermarkets and multi-story stores.
- **SensMax S1 SLR (Super Long Range):** Operates at 868 MHz with a wireless range of up to 800 meters (up to 1000 meters in open spaces). Designed for large shopping malls, museums, and industrial facilities.

Features and Benefits of Unidirectional Counting

SensMax unidirectional sensors are the optimal choice for most small and medium-sized commercial facilities (retail stores, pharmacies, service salons, offices).

Key Solution Benefits:

- **Simple and clear reports:** The sensor records every crossing of the IR beam. In the SensMax software, this data is displayed as a single, simple, and intuitive line on a chart. This eliminates confusion with “in/out” directions, which users often experience when analyzing bidirectional systems.
- **Mathematical accuracy (Divide by 2):** In single-entrance rooms (where entry and exit occur through the same door), every visitor crosses the beam twice—upon entering and upon leaving. The SensMax software automatically divides the total number of registered crossings by 2, providing the business owner with accurate statistics on the actual number of visitors.
- **Configuration flexibility for transit areas:** If the sensor is installed in a transit (walk-through) area where people move in one direction only without returning, the “divide by 2” function can easily be disabled in the SensMax software settings.

Using a unidirectional model allows for clean, representative visitor statistics without unnecessary complexity in report configuration.

Applications

Retail stores, shopping malls, libraries, museums, restrooms, office buildings, public exhibition areas (and outdoor areas when using a special protective enclosure).

Package Contents

The standard package of SensMax unidirectional sensors includes:

- Transmitter unit (TX) — 1 pc.
- Receiver unit (RX) — 1 pc.
- 1.5V AA alkaline batteries — 4 pcs.
- L-type mounting brackets — 2 pcs.

Model Comparison

Parameter	SensMax D3 Pro	SensMax D3 LR	SensMax D3 SLR
Operating environment	Indoor / Outdoor (in a special protective enclosure)		
Data collection method	Automatic wireless		
Radio frequency	2.4 GHz	868 MHz	
Communication range	Up to 50 m	Up to 250 m	Up to 800 m
Compatible collectors	SMX PRO	SMX LR	SMX SLR
Internal memory	25 days of hourly data		
Infrared beams	1 beam		
Enclosure material	ABS plastic		
Standard enclosure color	Black or White		
Protection class (IP)	IP54 (IP68 in a special protective enclosure)		
Dimensions (single unit)	67×67×25 mm		
Power source	4 AA batteries (2 pcs per TX/RX unit)		
Battery life	Up to 2 years		

Technical Specifications

- **Operating principle:** Interruption of a focused infrared barrier (Unidirectional).
- **Passage width:**
  - **Optimal:** 1.0 m – 5.0 m.
  - **Maximum:** up to 10.0 m.
- **Counting accuracy:**
  - **95%** at a passage width of 2.0 m to 3.0 m.
  - **Margin of error:** At passage widths greater than 3.0 m, the counting accuracy decreases by approximately 0.6% – 1.0% per additional meter (depending on pedestrian traffic density).
- **Infrared emission angle:** Beam divergence is 6°.
- **Serial number syntax:** A unique identifier starting with the prefix **"03"** (e.g., 030000123).
- **Tamper protection:**
  - If the infrared beam is blocked (interrupted) continuously for an extended period (typically more than 15 minutes), the receiver unit emits a warning audio signal.
  - S1 series sensors transmit a blockage flag to the gateway, triggering a malfunction warning display in the SensMax reporting software.
- **Operating temperature:** –20°C to +55°C (can be extended down to –30°C when using high-quality 1.5V lithium batteries, such as Energizer Ultimate Lithium 1.5V).
- **Enclosure dimensions:** 67 × 67 × 25 mm (for each Transmitter and Receiver unit).
- **Weight:** ~60 g per unit (without batteries).

Battery Recommendations

To ensure stable sensor operation over the entire declared battery life (up to 2 years), it is recommended to use only new, high-quality batteries:

- **High-quality alkaline 1.5V batteries:** The optimal choice for standard indoor operating conditions.
- **1.5V lithium batteries:** Recommended for outdoor installations or unheated rooms. 1.5V lithium batteries maintain stable operating voltage at low temperatures (down to –30°C) and have a long shelf life.

Sensor Elements and LED Indicators

The receiver and transmitter units are equipped with status LED indicators and buttons for configuration, diagnostics, and testing.

Front View (Receiver RX)

Rear / Internal View (RX)

[1] IR Link LED - Orange
[2] Crossing LED - Red
[3] RF Link LED - Green
[4] Battery LED - Red

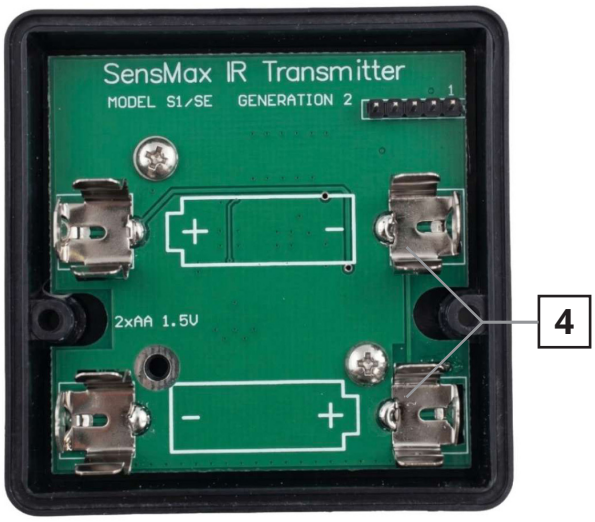
[5] Device serial number
[6] Battery compartment
[7] Pairing button

RX Receiver Indicator Table

Element / LED	Type / Color	State	Description
[1] Link LED	LED / Orange	Flashing	Indicates that the transmitter and receiver units are properly aligned with each other and the IR barrier is active.
[2] Crossing LED	LED / Red	Flashes once	Lights up at each crossing of the IR beam by a pedestrian (walk registration).
[3] RF Link LED	LED / Green	Flashing	Indicates an active radio communication session with the gateway.
[4] RF Link LED	LED / Green	Flashing	Slow periodic flashing indicates that the device is powered on and operating normally.
[5] Battery LED	LED / Red	Flashing	Indicates low battery level. Batteries must be replaced in the near future.
[6] Battery compartment	Hardware	N/A	Located inside the enclosure. Holds 2 AA batteries for each unit (Transmitter and Receiver).
[7] Pairing button	Button	Press once	Internal button for pairing the receiver with the SMX gateway and testing the communication quality.

Front View (Transmitter TX)

Rear / Internal View (TX)



[1] Power LED - Green
[2] Battery LED - Red

[3] IR Emitter
[4] Battery compartment

TX Transmitter Indicator Table

Element / LED	Type / Color	State	Description
[1] Power LED	LED / Green	Flashes once every 10 seconds	Indicates that the device is operating.
[2] Battery LED	LED / Red	Flashing	Indicates low battery level. Batteries must be replaced in the near future.

Supported Data Collectors and Gateways

The S1 family sensors require a stationary data collector (gateway) to receive and forward statistics:

For standard sensors (D3 Pro, D3 LR, D3 SLR):

- **SensMax SMX PRO Gateway (2.4 GHz):**
  Supports up to 5 S1 sensors with a communication range of up to 50 meters.
- **SensMax SMX LR Gateway (868 MHz):**
  Supports up to 30 S1 LR sensors with a communication range of up to 250 meters.
- **SensMax SMX SLR Gateway (868 MHz):**
  Supports up to 30 S1 SLR sensors with a communication range of up to 800 meters.
- **Note on legacy collectors:**
  The S1 family is also backward compatible with legacy TCPIP (Pro/LR/SLR) and 3G (Pro/LR/SLR) data collectors, which support connections for up to 10 (Pro) or 60 (LR/SLR) sensors.

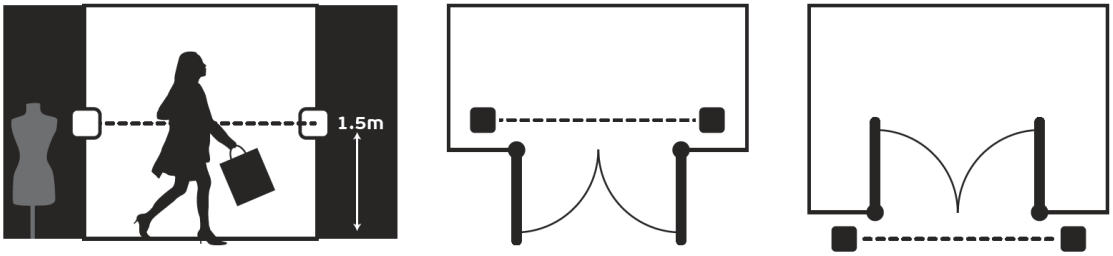
Physical Mounting and Alignment

Height and Positioning

Recommended height: Install the sensors at a height of **1.5 – 1.6 meters** from the floor level. This height is optimal for detecting crossings by a person's torso while preventing false triggers from low-hanging bags, packages, or small pets.

Horizontal alignment: The Transmitter (TX) and Receiver (RX) units must be installed **directly opposite each other** along the same horizontal axis.

Surface preparation: The surface of walls or door frames must be cleaned of dust and degreased before installation. For quick mounting, use high-quality double-sided tape.



Alignment Verification

1. Install batteries in both units and mount them opposite each other.
2. Check the indication on the front panel of the Receiver (RX).
3. The **orange Link LED** should flash periodically. This indicates that all 3 IR beams of the transmitter are successfully received by the receiver.

Optional Mounting Accessories Available

In areas where walls are uneven, angled, or have ledges, use SensMax proprietary mounting brackets:

- **Rotatable plastic V-type bracket:** Allows rotating the units up to 180° horizontally for precise alignment on wide or angled passages.
- **L-type corner bracket:** A 90-degree bracket for installing the units perpendicular to the wall.
- **Outdoor operation:** Use a special waterproof, sealed plastic enclosure with transparent glass (IP68 protection class) to protect the sensors when operating outdoors (in parks, gardens, etc.).

Commissioning and Pairing (S1 Family)

Each S1 series sensor receiver must be paired (linked) to its data collector before starting operation:

1. **Power on the gateway:** Connect the SensMax SMX data collector to the power supply.
2. **Power the sensors:** Insert 2 AA batteries into the S1 transmitter and 2 AA batteries into the S1 receiver.
3. **Start search mode on the collector:**
   - Find the pairing button on the collector's enclosure (located on the side panel near the USB port).
   - Using a thin object (pencil, paperclip), press the button briefly.
   - The **Radio Link LED** on the collector will start flashing, indicating that the gateway is in search mode for new devices.
4. **Start pairing on the sensor:**
   - Open the S1 receiver enclosure.
   - Press the internal **Pairing button** once.
   - The receiver will send a pairing request to the collector.
5. **Pairing confirmation:**
   - Upon successful connection, the collector registers the sensor in its memory and automatically synchronizes the current time and date with it.
   - The Radio Link LED indicator on the collector will stop flashing rapidly and return to normal operation.
   - The sensor will start recording statistics based on the synchronized clock.

Alternative Pairing Method (via Collector Web Interface)

If the sensors are already mounted or you want to avoid dismantling the receiver housing to press the button, pairing can be performed programmatically via the SensMax SMX data collector web interface:

1. **Connect to the collector's web interface:** Open the built-in collector settings web page in a browser.
2. **Go to the device list:** On the Home tab, click the Edit device list button.
3. **Add the sensor:** Click the add button and enter:
   - **Serial number:** printed on the device enclosure (starts with the prefix "03").
   - **Security code:** printed on the device enclosure next to the serial number.
4. **Complete pairing:** Save the settings. The collector will establish a connection with the sensor via the radio channel and synchronize the system time automatically. This process may take from 5 to 20 minutes, depending on the sensor model.

Radio Connection Quality Test with the Collector

After successful sensor pairing, it is recommended to test the stability of the radio channel directly at the planned installation point before final mounting:

1. **Place the collector:** Install and connect the SensMax data collector at its permanent location (e.g., server room, network cabinet, or office).
2. **Go to the sensor installation point:** Bring the paired receiver (RX) to the planned mounting point (e.g., passage or entrance group).
3. **Run the connection test:**
   - Press the **Pairing** button on the board inside the open receiver enclosure.
   - The sensor will send a test radio packet to the collector and indicate the connection result via visual and audio signals:
     — **Connection is OK:** The sensor will emit **two short beeps** and flash the **green LED** (RF Link LED). This confirms stable two-way data exchange.
     — **No connection:** The sensor will emit **one long low-pitched beep** and flash the **red LED** (Crossing LED / Battery LED).
4. **Testing details:** The connection test button can be pressed an unlimited number of times. This allows you to precisely determine the optimal mounting location, test radio signal propagation through closed doors and other obstacles, and adjust the position of the collector or sensor in case of weak reception.

Time Synchronization

The accuracy of hourly reports directly depends on the precision of the devices' internal clocks.

Time synchronization for S1 family sensors is performed completely automatically. During pairing and during each communication session, the gateway reads the exact network time (via NTP or from a server) and writes it to the connected sensors.

Important: Please note that the sensor will not start counting visitors (and the LED indicators will not flash when the IR beam is crossed) until the current date and time are set on the device. Initial time configuration (synchronization) is a prerequisite for the sensor to start operating.

Certification and Compliance

SensMax sensors are manufactured in compliance with strict quality, safety, and environmental standards adopted in international markets:

- **CE (Conformité Européenne):** Full compliance with European Union directives on electromagnetic compatibility, electrical safety, and radio frequency spectrum.

- **RoHS (Restriction of Hazardous Substances):** Products are manufactured without hazardous substances (lead, mercury, cadmium, etc.) in compliance with EU environmental directives.
- **GDPR Compliant:** The sensors comply fully with the EU General Data Protection Regulation. They record only quantitative, anonymized statistics (number of IR beam crossings), do not collect personal data, do not use video cameras, and 100% protect visitor privacy.

Ordering Information

Unidirectional Sensors (Batch Mode)

Model / Part Number	Description	Compatible Collector
SensMax S1 Pro	Wireless unidirectional people counter (2.4 GHz, up to 50 m)	SensMax SMX PRO
SensMax S1 LR	Wireless unidirectional people counter Long Range (868 MHz, up to 150 m)	SensMax SMX LR
SensMax S1 SLR	Wireless unidirectional people counter Super Long Range (868 MHz, up to 800 m)	SensMax SMX SLR

Data Collectors (Gateways)

Model / Part Number	Description	Compatible Collector
SensMax SMX PRO	Wireless data gateway 2.4 GHz (Ethernet/Wi-Fi AP)	SensMax S1 Pro
SensMax SMX LR	Wireless data gateway Long Range 868 MHz (Ethernet/ Wi-Fi AP)	SensMax S1 LR
SensMax SMX SLR	Wireless data gateway Super Long Range 868 MHz (Ethernet/Wi-Fi AP)	SensMax S1 SLR

Accessories

Model / Part Number	Description	Compatible Collector
Rotatable bracket V-type	Plastic rotatable mounting bracket (up to 180° horizontal)	All S1 series sensors
Corner bracket L-type	90-degree bracket for perpendicular wall mounting	All S1 series sensors
Outdoor housing	Sealed waterproof plastic enclosure (IP68 protection class)	All S1 series sensors

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