



BIDIRECTIONAL INFRARED PEOPLE COUNTING SENSORS

D3 SERIES

Data Sheet

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Description

SensMax D3 series bidirectional infrared people counting sensors are wireless, battery-powered devices designed for precise visitor counting in areas with high pedestrian traffic. The family includes the **SensMax D3 Pro**, **SensMax D3 LR**, and **SensMax D3 SLR** models, as well as real-time versions: **SensMax D3 LR TS** and **SensMax D3 SLR TS**.

The sensors operate on the principle of interrupting an infrared beam. A distinctive feature of the D3 series is the use of **three focused infrared beams**, which allows for highly accurate direction detection – **In (IN)** or **Out (OUT)**.

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. Each interruption of this barrier is registered by the receiver, which instantly determines the direction of passage and saves the data in its internal memory or transmits it further into the system in real time.

Key Advantages:

- **Direction Detection (IN/OUT):** Separate counting of incoming and outgoing visitors for detailed traffic analysis.
- **100% Wireless Operation:** Powered by standard AA batteries, eliminating the need for power or communication cables.
- **Easy Installation:** Mounting takes just a few minutes and can be done on any flat surface using the high-strength double-sided tape included in the package or specialized mounting brackets.
- **Tamper and Blockage Protection:** The devices feature a built-in buzzer and a function to send notifications to the software if the infrared beam is blocked or obstructed by a foreign object for a long period.
- **GDPR & Privacy Compliance:** 100% compliant with privacy laws, as the sensors collect only numerical traffic statistics without video recording or registering personal data.
- **Real-time Occupancy Control (for TS models):** Ability to track the number of people inside the premises in real time (Occupancy Tracking) with data transmission to LED displays (LED-391) and the cloud.

Modifications and Network Architecture

The SensMax D3 bidirectional sensor family is divided into two main groups based on the data transmission mode:

Standard D3 Series (Batch Transmission)

Sensors in this series accumulate hourly visitor statistics in internal memory and automatically transmit them to the data collector (gateway) every 20 minutes. Suitable for standard retail analytical tasks.

- **SensMax D3 Pro:** Operates on the 2.4 GHz frequency with a wireless range of up to 50 meters (in line of sight). Designed for small shops and offices.
- **SensMax D3 LR (Long Range):** Operates on the 868 MHz frequency with a wireless range of 150 to 250 meters. Optimal for supermarkets and multi-story stores.
- **SensMax D3 SLR (Super Long Range):** Operates on the 868 MHz frequency with a wireless range of up to 800 meters (up to 1000 meters in line of sight). Developed for large shopping malls, hypermarkets, and exhibition centers.

D3 TS Series (Real-Time Transmission)

The TS series sensors transmit data on each passage instantly (in real time) or in 5-minute batches. Ideal for real-time occupancy monitoring systems.

- **SensMax D3 LR TS:** Operates on the 868 MHz frequency with a wireless range of up to 150 m.
- **SensMax D3 SLR TS:** Operates on the 868 MHz frequency with a wireless range of up to 800 m.

Features and Advantages of Bidirectional Counting

Unlike unidirectional systems, the D3 sensor family offers deeper analysis due to the separation of traffic directions:

- **Separate counting of Inputs and Outputs:** Enables precise conversion rate assessment, traffic distribution analysis within retail zones, and peak load identification.
- **Real-Time Occupancy Tracking:** The use of D3 TS models in combination with SMX TS gateways allows calculating the number of visitors currently inside the premises in real time.

Applications

Retail stores, supermarkets, shopping centers, libraries, museums, railway stations and airports, public and office buildings, washroom areas. When installed in a specialized IP68 waterproof enclosure, the sensors can be operated outdoors (in parks, on pedestrian streets, ecological trails).

Scope of Delivery

The standard delivery set of SensMax bidirectional sensors includes:

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

Model Comparison

Parameter	SensMax D3 Pro	SensMax D3 LR	SensMax D3 SLR	SensMax D3 LR TS	SensMax D3 SLR TS
Operating Mode	Batch (every 20 min)			Real time / 5 min	
Operating Conditions	Indoor / Outdoor (in IP68 housing)				
Radio Frequency	2.4 GHz	868 MHz			
Communication Range	Up to 50 m	Up to 250 m	Up to 800 m	Up to 150 m	Up to 800 m
Compatible Collectors	SMX PRO	SMX LR	SMX SLR	SMX LR TS	SMX SLR TS
Internal Memory	25 days of hourly data			2000 records	
Infrared Beams	3 beams				
Housing Material	ABS plastic				
Standard Color	Black / White				
Protection Class (IP)	IP54 (IP68 in protective housing)				
Dimensions (one unit)	67×67×25 mm				
Power Source	4 AA batteries (2 pcs. each)				
Battery Life	Up to 1 year				

Technical Specifications

- **Operating Principle:** Interruption of three focused infrared beams (Bidirectional IN/OUT direction detection).
- **Passage Width:**
 - ◆ **Optimal:** 1.0 m – 6.0 m.
 - ◆ **Maximum:** up to 9.0 m.
- **Counting Accuracy:**
 - ◆ **95%** at a passage width of up to 3.0 m.
 - ◆ **Error:** At a passage width of more than 3.0 m, accuracy decreases by approximately **0.6% – 1.0% for each additional meter** (depending on visitor traffic density).
- **Infrared Beam Angle:** Beam divergence is 6°.
- **Serial Number Syntax:** Unique identifier starting with the prefix **"04"** (e.g., 040000123).
- **Tamper Protection:**
 - ◆ If the IR beams are blocked (interrupted) continuously for a long time (usually more than 15 minutes), the receiver unit emits a warning buzzer.
 - ◆ The sensor transmits a blocking flag to the gateway, which triggers a fault warning in the SensMax software.
- **Operating Temperature:** from –20°C to +55°C (extension to –30°C is possible when using high-quality 1.5V lithium batteries, such as Energizer Ultimate Lithium).
- **Enclosure Dimensions:** 67 × 67 × 25 mm (for each TX and RX unit).
- **Weight:** ~65 g per unit (excluding batteries).

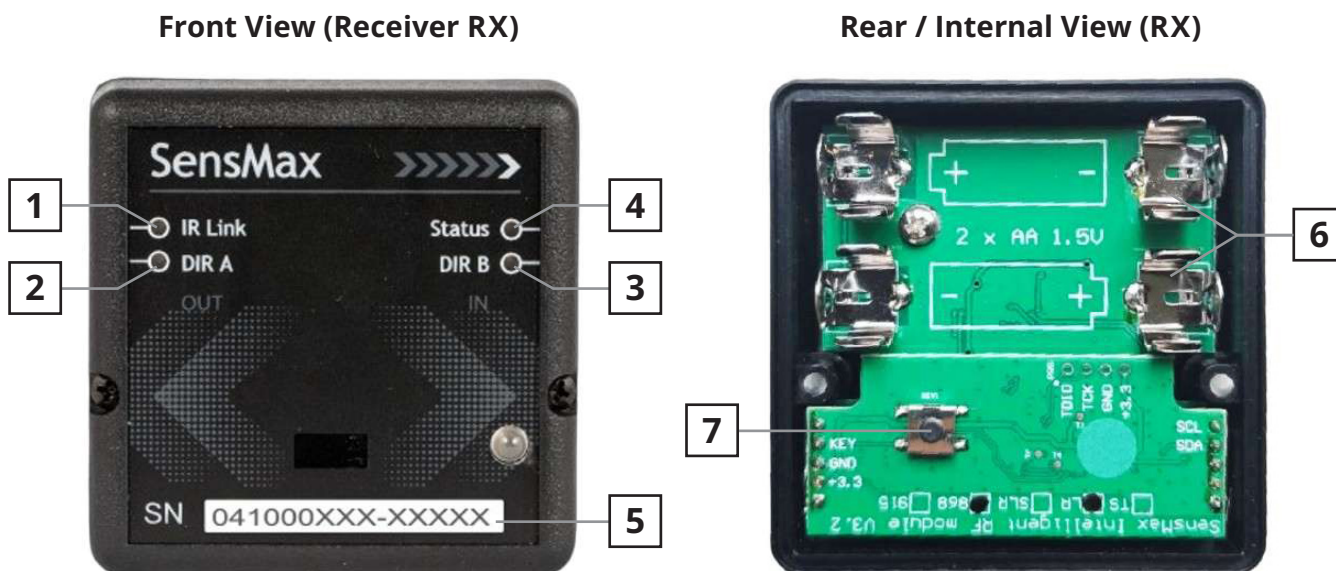
Recommendations for Battery Selection

To ensure stable sensor operation throughout the specified lifespan (from 6 to 12 months), it is recommended to use high-quality power elements:

- **High-quality alkaline 1.5V batteries:** Optimal choice for standard indoor operating conditions.
- **Lithium 1.5V batteries:** Recommended for outdoor installations or unheated spaces. 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 LEDs and buttons for configuration, diagnostics, and testing.



- [1] IR Link LED - Orange
- [2] DIR A LED - Red (OUT direction)
- [3] DIR B LED - Red (IN direction)
- [4] Status LED - Green

- [5] Device serial number (starts with "04")
- [6] Battery compartment (2 x AA)
- [7] Pairing button

Receiver RX Indicator Table

Element / LED	Type / Color	State	Description
[1] Link LED	LED / Orange	Flashing	Indicates that the transmitter and receiver units are properly aligned and the IR barrier is active.
[2] DIR A LED	LED / Red	Flashing	Lights up for each visitor counted in the OUT direction.
[3] DIR B LED	LED / Red	Flashing	Lights up for each visitor counted in the IN direction.
[4] Status LED	LED / Green	Flashing	Flashes slowly (once every 10 sec) in standby mode. Flashes rapidly (once per second) when a visitor passes (fast scanning mode to determine direction).
[7] Pairing Button	Button	Press once	Internal button to pair the receiver with the SMX gateway and test communication quality.

Front View (Transmitter TX)



[1] Status LED - Green

Rear / Internal View (TX)



[2] Battery compartment (2 x AA)
[3] Passage width selector (AISLE WIDTH)

Transmitter TX Indicator Table

Element / LED	Type / Color	State	Description
[1] Status LED	LED / Green	Flashing	Flashes slowly (once every 10 sec) in standby mode. Flashes rapidly (once per second) when a visitor passes (fast scanning mode to determine direction).
[3] AISLE WIDTH	Selector / Switch	Configuration	Infrared beam power switch corresponding to the passage width. For details, see the "Beam Power Configuration (AISLE WIDTH)" section.

Supported Data Collectors and Gateways

Sensor D3 family requires 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):**
Serves up to 5 D3 Pro sensors with a communication range of up to 50 meters.
- **SensMax SMX LR Gateway (868 MHz):**
Serves up to 30 D3 LR sensors with a communication range of 150-250 meters.
- **SensMax SMX SLR Gateway (868 MHz):**
Serves up to 30 D3 SLR sensors with a communication range of up to 800 meters.
- **Backward Compatibility:**
Standard D3 sensors are also backward compatible with previous generation TCPIP (Pro/LR/SLR) and 3G (Pro/LR/SLR) collectors serving up to 5 (Pro) or 30 (LR/SLR) bidirectional sensors per device.

For real-time sensors (D3 LR TS, D3 SLR TS):

- **SensMax SMX LR TS Gateway (868 MHz):**
Serves up to 20 real-time sensors with a communication range of up to 150 meters.
- **SensMax SMX SLR TS Gateway (868 MHz):**
Serves up to 20 real-time sensors with a communication range of up to 800 meters.

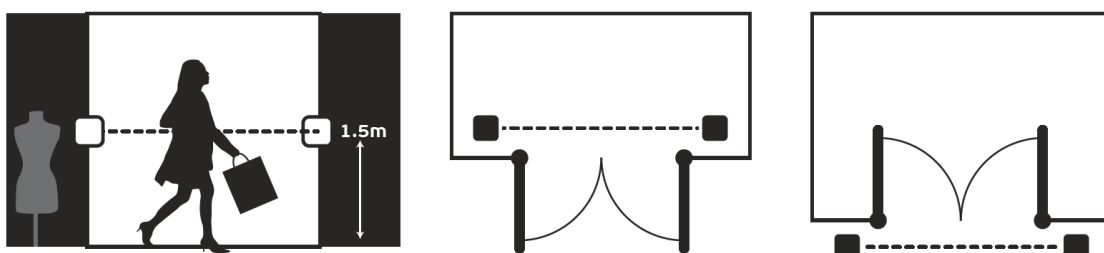
Physical Installation and Alignment

Height and Positioning

Recommended Height: Install sensors at a height of **1.5-1.6 meters** from the floor level. This is the optimal height for capturing passages by the body of an adult or a child, eliminating false triggers from bags, packages, or small animals.

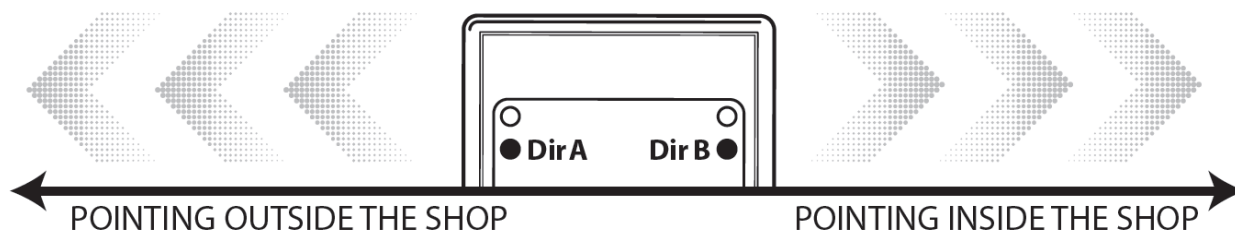
Horizontal Alignment: The Transmitter (TX) and Receiver (RX) units must be located **strictly opposite each other** on the same horizontal axis. Since D3 sensors use 3 beams, the accuracy of horizontal and vertical alignment is critical for correct detection of passage directions.

Surface Preparation: The surface before installation must be cleaned of dust and degreased. Mounting is carried out using the high-strength double-sided tape included in the package or using screws.



Direction Orientation (DIR A / DIR B)

Proper orientation of the sensor units during installation is critical for correct registration of visitor movement directions (In / Out):



- **DIR A LED** (on the RX receiver unit) and its corresponding IR beams must be oriented **towards the outside of the shop** (facing the street, shopping gallery, or corridor). Crossing the beams from the DIR A side is registered by the system as **Entrance (IN)**.
- **DIR B LED** (on the RX receiver unit) and its corresponding IR beams must be oriented **towards the inside of the shop** (facing the sales area or premises). Crossing the beams from the DIR B side is registered as **Exit (OUT)**.

Note: If unit orientation is swapped during mounting, the statistics in SensMax reports will be inverted (entrances will be shown as exits, and vice versa). The counting direction can be manually adjusted in the SensMax software settings; however, to avoid confusion and extra steps, it is recommended to initially install DIR A facing outwards and DIR B facing inwards.

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.

Green Status LED modes during alignment:

- **Standby Mode:** When alignment is correct and there are no visitors in the passage, the **green Status LED flashes slowly (once every 10 seconds)**. This is the normal energy-saving state.
- **Scanning Mode:** When a person passes, the sensor enters fast scanning mode to determine the direction of movement, and the **green LED flashes quickly (once per second)** during the passage and for a few seconds afterwards.
- **Alignment Error:**

Warning If the green Status LED **flashes quickly and continuously**, it means that the RX and TX units have poor visibility of each other or are inaccurately aligned. In this state, the sensor operates in continuous scanning mode and cannot switch to the energy-saving standby mode. This will lead to **extremely rapid battery drain**.

Adjust the position of the units until the Status LED returns to flashing slowly (once every 10 sec.).

Beam Power Configuration (AISLE WIDTH)

The **AISLE WIDTH** switch on the transmitter (TX) board allows adapting the infrared beam power to the actual passage width.

This is particularly relevant for passages with a large amount of glazing, shop windows, or mirror partitions. With excessive radiation power, the IR beam can reflect off such surfaces, which may affect the accuracy of passage registration. Setting the selector to the position corresponding to the passage width optimizes the signal level and ensures maximum accuracy of the counting system.

Additional Mounting Accessories

When mounting in difficult conditions (uneven walls, angled passages, outdoor installation), the following proprietary accessories are used:

- **V-type Rotating Bracket:** Allows rotating the sensor units up to 180° horizontally for precise alignment.
- **L-type Corner Bracket:** A 90-degree bracket for mounting perpendicular to the wall.
- **Outdoor Housing:** A sealed protective box (IP68) made of ABS plastic with a transparent window for outdoor installation under the open sky.

Commissioning and Pairing

Each sensor receiver of the D3 series must be paired (linked) to its data collector before starting operation:

1. **Turn on the gateway:** Connect the SensMax SMX data collector to the power source.
2. **Power the sensors:** Insert 2 AA batteries into the transmitter TX and 2 AA batteries into the receiver RX.
3. **Start search mode on the collector:**
 - ◆ Locate the pairing button on the collector housing (located on the end side next to the USB port).
 - ◆ Briefly press the button using a thin object (pencil, paperclip).
 - ◆ The **Radio Link LED** on the collector will start flashing, indicating transition to sensor search mode.
4. **Start pairing on the sensor:**
 - ◆ Open the RX receiver housing.
 - ◆ Press the internal **Pairing Button** once.
 - ◆ The receiver will send a pairing packet to the gateway.
5. **Pairing confirmation:**
 - ◆ Upon successful pairing, the collector registers the sensor and synchronizes its built-in real-time clock.
 - ◆ The indicator on the gateway will return to normal operation mode.
 - ◆ The sensor will start counting based on the precise 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 web interface:** Open the built-in collector settings webpage in your browser.
2. **Go to the device list:** On the **Home** tab, click **Edit device list**.
3. **Add the sensor:** Click the add button and enter:
 - ◆ **Sensor Serial Number (Serial number):** printed on the device housing (starts with prefix "04").
 - ◆ **Security Code:** printed on the device housing next to the serial number.
4. **Complete pairing:** Save settings. The collector will establish connection with the sensor via radio channel and synchronize the system time automatically. This can take from 5 to 20 minutes depending on the sensor type.

Testing Radio Communication Quality with the Collector

After pairing, it is recommended to test the radio signal stability directly at the future equipment installation site:

1. **Place the collector** in its permanent operating location.
2. **Bring the receiver (RX)** to the proposed mounting point.
3. **Start the communication test:**
 - ◆ Press the **Pairing** button on the RX receiver board.
 - ◆ The sensor will send a test radio packet and display the result:
 - **Connection OK:** The sensor will emit **two short beeps** and flash the **green LED**.
 - **No Connection:** The sensor will emit **one low long beep** and flash the **red LED**.
4. **Adjustment:** In case of unstable connection, adjust the position of the collector or sensor. The test can be run an unlimited number of times.

Time Synchronization

For the correct generation of hourly and real-time reports, the accuracy of the sensors' internal clock is critical.

Time synchronization is performed completely automatically during pairing and during each communication session of the sensor with the gateway. The gateway reads the exact time (NTP) and transmits it to the sensors.

Important: Please note that the sensor will not start counting visitors (and the LED indicators will not flash when crossing the beams) until the current date and time are set on the device. Initial synchronization of time with the gateway is a mandatory condition for starting the sensor operation.

Certification and Compliance

SensMax sensors are manufactured in accordance with strict international quality and environmental safety requirements:

- **CE (Conformité Européenne):** Compliance with EU safety, electromagnetic compatibility, and radio frequency spectrum standards.
- **RoHS (Restriction of Hazardous Substances):** Products are manufactured without the use of harmful and hazardous substances.
- **GDPR Compliant:** Full compliance with European privacy laws. The sensors perform solely mathematical quantitative counting of passages without collecting biometric, personal, or video data of visitors.

Ordering Information

Bidirectional Sensors (Batch Transmission)

Model / Part Number	Description	Compatible Collector
SensMax D3 Pro	Wireless bidirectional counting sensor (2.4 GHz, up to 50 m)	SensMax SMX PRO
SensMax D3 LR	Wireless Long Range bidirectional counting sensor (868 MHz, up to 150 m)	SensMax SMX LR
SensMax D3 SLR	Wireless Super Long Range bidirectional counting sensor (868 MHz, up to 800 m)	SensMax SMX SLR

Bidirectional Sensors (Real-Time)

Model / Part Number	Description	Compatible Collector
SensMax D3 LR TS	Wireless real-time bidirectional sensor (868 MHz, up to 150 m)	SensMax SMX LR TS
SensMax D3 SLR TS	Wireless Super Long Range real-time bidirectional sensor (868 MHz, up to 800 m)	SensMax SMX SLR TS

Data Collectors (Gateways)

Model / Part Number	Description	Compatible Collector
SensMax SMX PRO	Wireless data collector 2.4 GHz (Ethernet/Wi-Fi AP)	SensMax D3 Pro
SensMax SMX LR	Wireless Long Range data collector 868 MHz (Ethernet/Wi-Fi AP)	SensMax D3 LR
SensMax SMX SLR	Wireless Super Long Range data collector 868 MHz (Ethernet/Wi-Fi AP)	SensMax D3 SLR
SensMax SMX LR TS	Wireless real-time data collector 868 MHz (Ethernet/Wi-Fi AP)	SensMax D3 LR TS
SensMax SMX SLR TS	Wireless Super Long Range real-time data collector (Ethernet/Wi-Fi AP)	SensMax D3 SLR TS

Accessories

Model / Part Number	Description	Compatible Collector
V-type Rotating Bracket	Plastic rotating bracket (up to 180° horizontally)	All D3 series sensors
L-type Corner Bracket	90-degree bracket for perpendicular mounting	All D3 series sensors
Outdoor Housing	Sealed waterproof protective enclosure (IP68)	All D3 series sensors



[+371 67553110](tel:+37167553110)



office@sensmax.lv



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