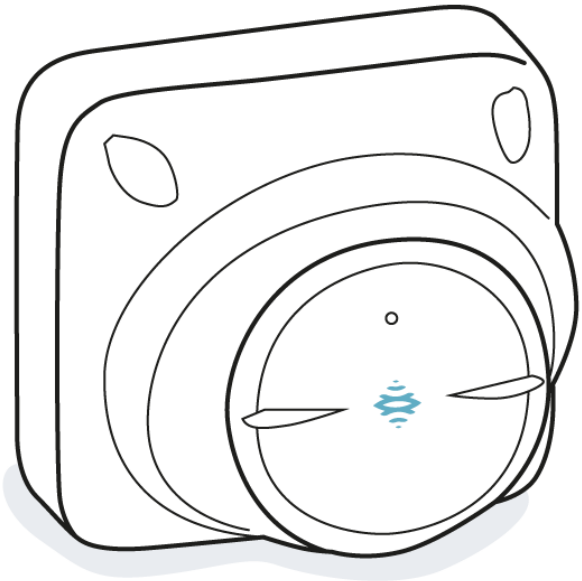
INXPECT

MSK-101

Intelligent motion sensor



Advanced configuration manual
v1.7 - EN

Carefully read this manual in its entirety.
You will find useful information to take full advantage of the product's potential, use it safely and obtain the best results.

Tsec
TECHNOLOGY FOR SECURITY
Exclusive distributor for Europe

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Updates to the instruction manual

Publication date	Code	Updates
OCT 2018	msk-101_advanced-config_en_wo v1.7	Added Inxpect Security PC application Modified United Kingdom and France national restrictions Specified animal tolerance limits Integrated examples of field of vision with animal tolerance limit Corrected field of vision corner dimensions Added list of interfering materials Integrated calibration (automatic and manual) Other minor changes
AUG 2018	msk-101_advanced_config_en_wo v1.6	Modified dongle connection illustration Modified relay voltage
MAY 2018	msk-101_advanced_config_en_wo v1.5	Specified interference with neon tubes Corrected illustrations of examples of the field of vision Specified need for shielded cable
APR 2018	msk-101_advanced_config_en_wo v1.4	Modified and completed application illustrations Added chapter "Useful conventions for requesting assistance" on page 34 Reorganization of contents and titles
MAR 2018	msk-101_advanced_config_en_wo v1.3	Added perforated base dimensions Added calibration procedure
FEB 2018	msk-101_advanced_config_en_wo v1.2	Added flashing blue LED status (sensor initialization phase) Added tampering and masking signal levels Added configurable relay 4 Added barrier assembly accessory (MSK-101-BM) Added Dongle caddy accessory (MSK-101-DH) Changed the name and description of the semi-static objects configuration
JAN 2018	msk-101_advanced_config_en_wo v1.0	First publication

Provided documentation

Document	Code	Date	Distribution format
Advanced configuration manual (this manual)	msk-101_advanced-config_en_wo v1.7	OCT 2018	online manual PDF online
Installation instructions	msk-101_instructions_en_wo v1.7	OCT 2018	PDF online

Intended users of this instruction manual

Designers or installers of anti-theft systems, previously trained by Inxpect. Only this training and the information provided in this manual ensures the designing and installing of effective anti-theft systems.

1

Get to know MSK-101

Contents

This section includes the following topics:

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MSK-101

Description

MSK-101 is an advanced motion sensor for high security intrusion detection systems.

Thanks to a proprietary motion detection motor based on FMCW radar, it can detect intruders while minimizing false alarms triggered by small animals, moving objects or environmental conditions. It signals the presence of intruders through activation of the dedicated relay outputs and LED on the front of the sensor.

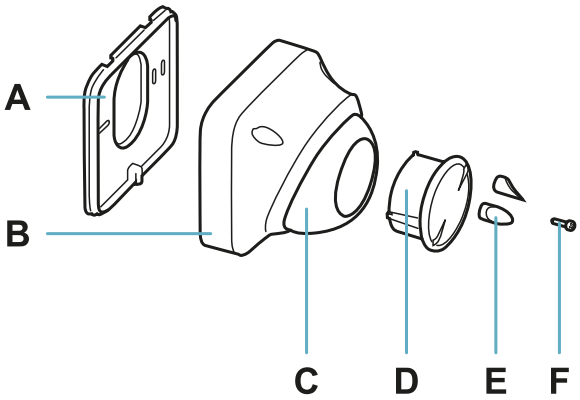
Thanks to IP66 and IP68 protection grade, it is suitable for indoor and outdoor installations.

Special features

The sensor calculates the distance and estimates dimensions of the moving object in real time, permitting advanced configuration possibilities in respect to traditional motion sensors. In particular, it is possible to:

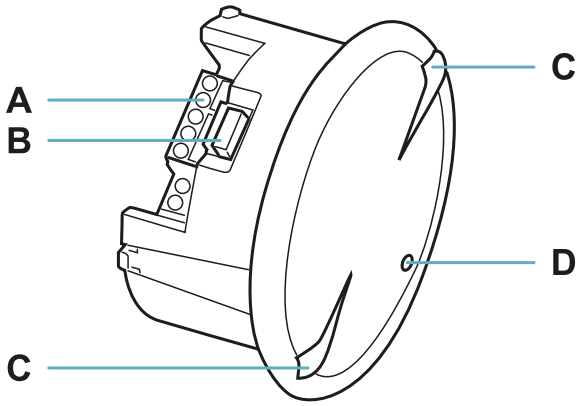
- set a pre-alarm area at the margins of the monitored area for activation of deterrent actions (e.g.: turning on the lights)
- fine set the tolerance level for animals
- exclude any moving objects that would generate continuous false alarms from the monitored area

Main components



Part	Description
A	Perforated housing base for adaptation to the main junction boxes ***IMPORTANT**: the base of the container is, together with the two fastening screws (not provided), an integral part of the sensor anti-removal and anti-tear system.*
B	Sensor housing
C	Adjustable support for the sensor with integrated fastening screws
D	Sensor
E	Caps to cover the fastening screws of the adjustable support
F	Box-base fastening screw ***Note**: the container-base fastening screw is not a part of the sensor anti-removal and anti-tear system.*

Sensor



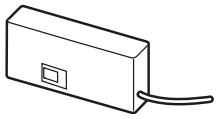
Part	Description
A	Terminal block for connecting power supply and four relays
B	Connector for connecting the dongle
C	Sensor plane indicators (horizontal or vertical)
D	LED

LED

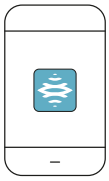
Status	Meaning
Steady red	Motion detected in alarm area
Flashing red	Motion detected in pre-alarm area
Purple	Sensor tampered with, faulty or masked
Flashing purple	Permanent fault. Contact technical assistance to repair or replace the sensor.
Blue	Motion signal processing in progress.
Flashing blue	Sensor initialization phase in progress. Requires a free area of approximately 1 m around the sensor and lasts 10-15 seconds. ***Note**: during the initialization phase, the masking signal is disabled.*

Accessories for configuration

The entire configuration is easily managed through the Inxpect Security application. The application communicates with the sensor through a removable wireless dongle.



Dongle.



Inxpect Security application.

Download the application

www.inxpect.com/stores.php

Relay outputs

Functions of relay outputs

The sensor has four relay outputs pre-configured to signal the following statuses:

- alarm: relay 1
- pre-alarm: relay 2
- tampering by moving or extracting the sensor: relay 3
- fault: relay 4
- masking: relay 1 + relay 4

***Note**: through the application it is possible to configure relay 4 to also signal sensor tampering. With this configuration the sensor no longer complies with standard EN 50131.*

Status of relay outputs

The default status of the relays is closed, which signals the presence of faulty functioning when the sensor is not supplied with power. The normal status of the relays can be changed (Inxpect Security > > **General**).

The status of the relays is indicated in the **Configuration** page of the application to facilitate on-site inspections during the installation phase.

2

Useful information for design

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Applications

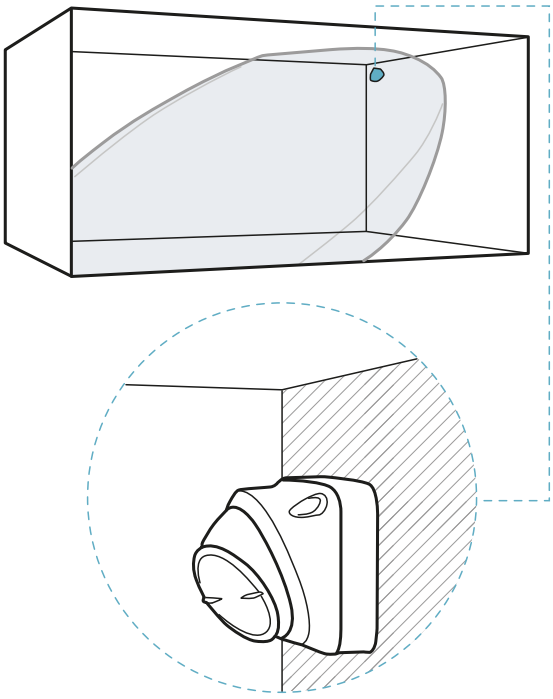
Types of applications

The sensor is suitable for indoor and outdoor installations and can be mounted on the wall or ceiling.

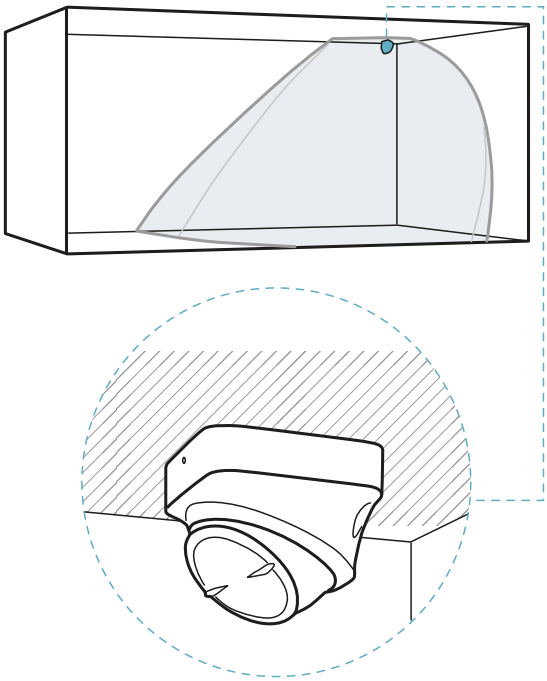
According to the direction, the sensor can be:

- a volumetric sensor to monitor a large area (horizontal direction).
- barrier sensor to monitor a perimeter area, creating a protective barrier against access along a wall or gate (vertical direction).

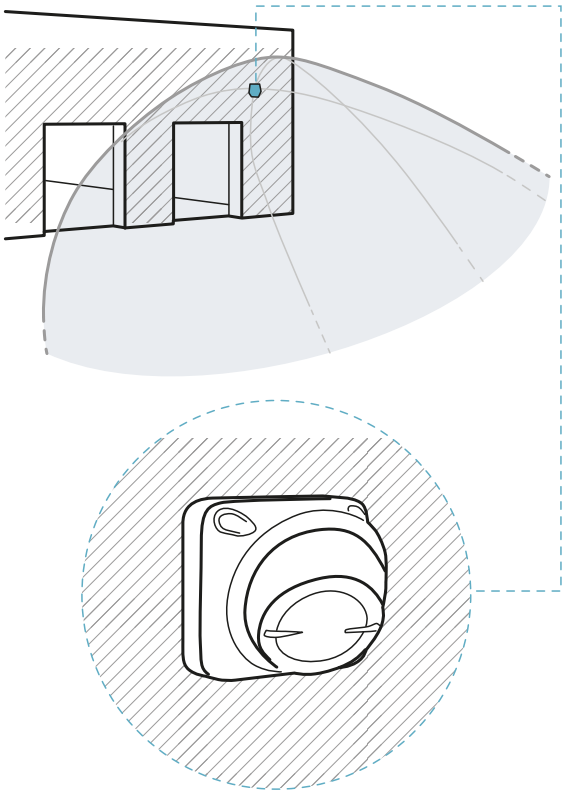
Examples of volumetric sensor installation



Indoor wall installation.

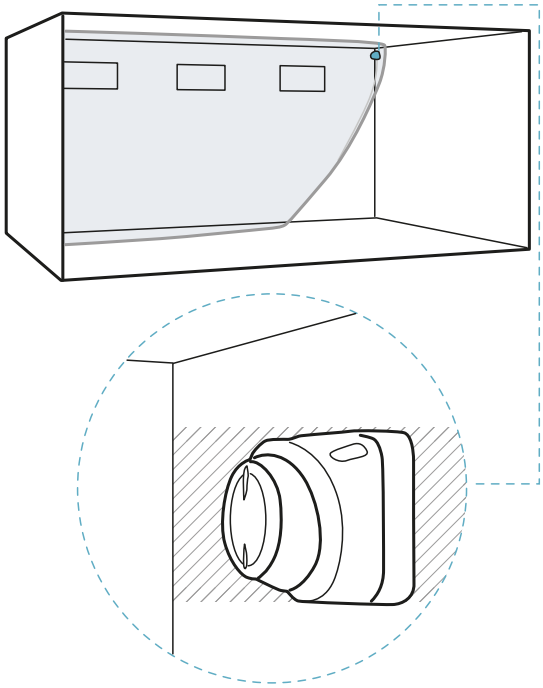


Indoor ceiling installation.

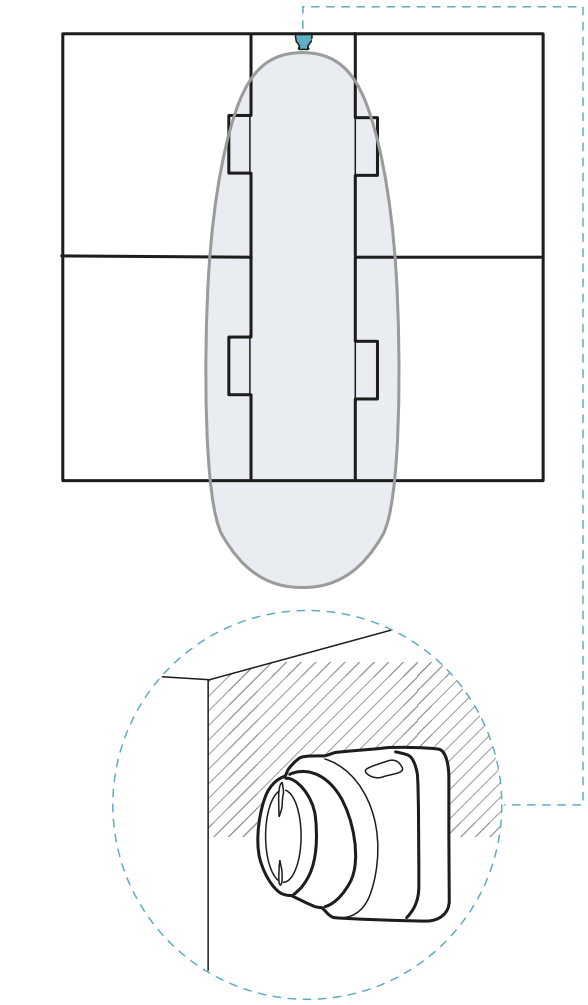


Outdoor installation.

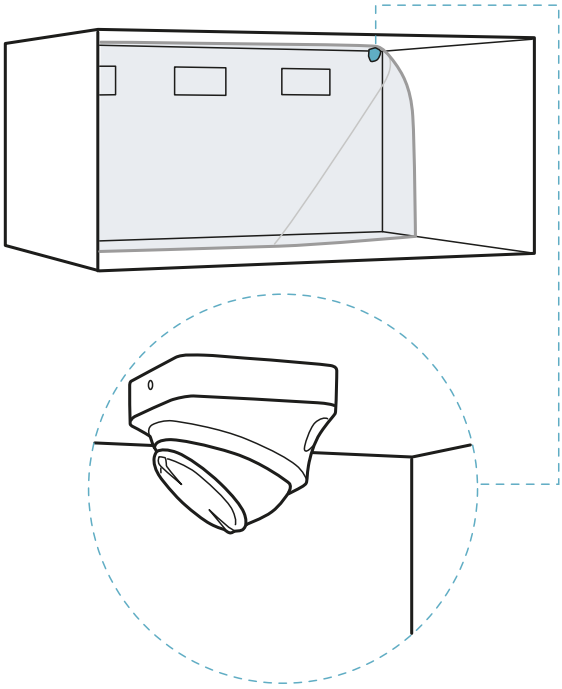
Examples of barrier sensor installation



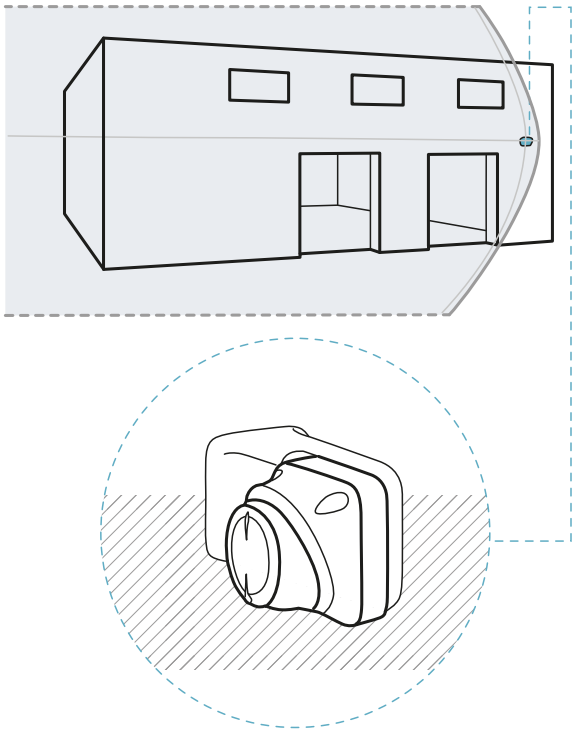
Indoor wall installation.



Indoor hallway installation.



Indoor ceiling installation.

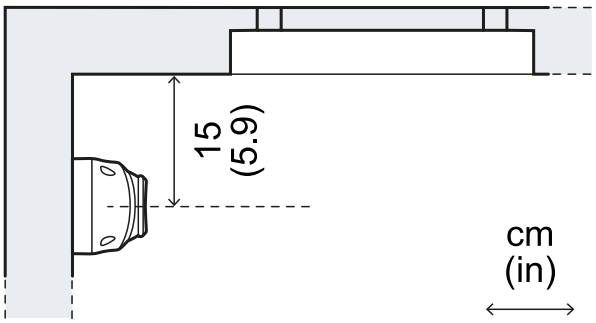


Outdoor installation with adapter.

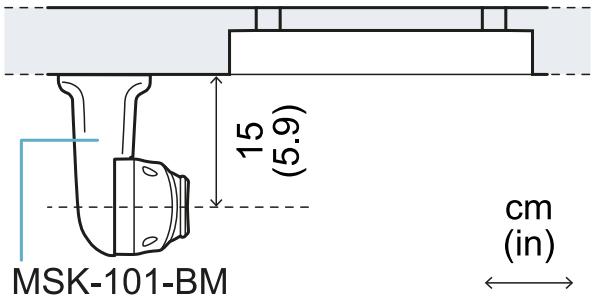
Barrier configuration

Adapter for barrier assembly

Barrier installation for protection of a wall or window requires the sensor to be installed at approximately 15 cm (5.9 in) from the same wall. If other adequate supports are not available, an adapter is necessary for assembling the barrier (product code: MSK-101-BM.



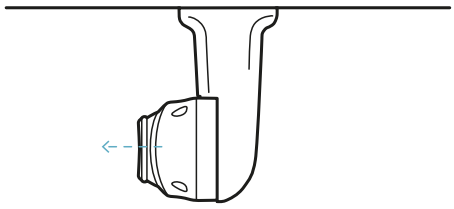
Example of installation without adapter.



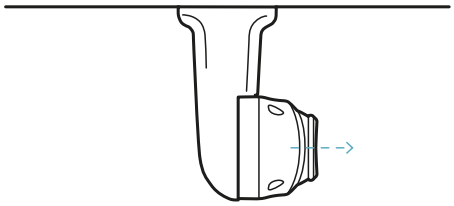
Example of installation with MSK-101-BM adapter.

Sensor direction

The MSK-101-BM adapter, according to the installation method, allows directing the sensor to the left or the right.



Sensor directed towards the left.

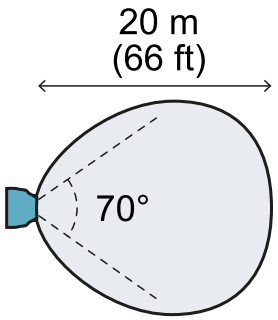


Sensor directed towards the right.

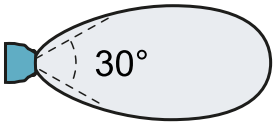
Field of vision

Range of the field with horizontal sensor direction (volumetric)

In this installation the visual field of the sensor is approximately 70° along the horizontal plane and 30° on the vertical plane. It extends for a maximum of 20 m, following the radiation pattern of the antenna.



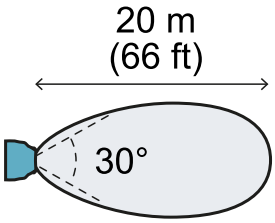
Top view.



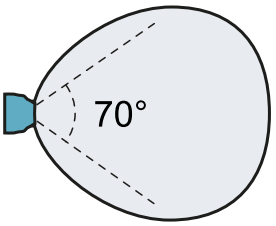
Side view.

Range of the field with vertical sensor direction (barrier)

In this installation the visual field of the sensor is approximately 30° along the horizontal plane and 70° on the vertical plane. It extends for a maximum of 20 m, following the radiation pattern of the antenna.

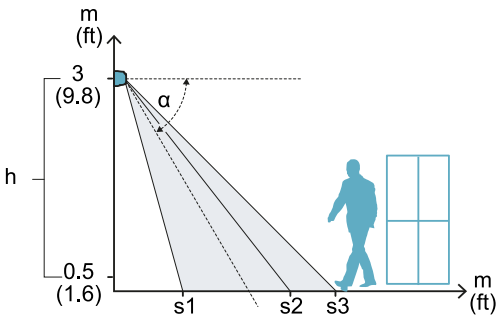


Top view.



Side view.

Calculation of the field of vision



The actual field of vision of the sensor (detection start and end - **s_1** e **s_3**) depends on:

- sensor installation height (**h**)
- sensor direction (horizontal or vertical)
- sensor inclination (**α**)

Within the field of vision, discernment of animals is guaranteed up to a certain distance from the sensor (**s_2**). For details about discerning animals, see "Set the tolerance level for animals" on page 26.

Based on a specific installation height, there are direction and inclination combinations that guarantee optimum performance. Some examples to better explain the effects of height and inclination are presented as follows.

Sensor installation height

The sensor can be installed at any distance from the plane to be monitored, from 0.5 and 3 m (from 1.6 to 10 ft). For example, it can be installed at 2 m from the floor or 0.5 m from the jamb of the window frame.

When installing the sensor, consider the risk of a blind spot: if the sensor is too high, it must be tilted downwards to reduce the undetected area. However, this also reduces the maximum detected distance. If the sensor is too low, the blind spot is minimal, but it increases the risk of masking caused by accidental passage of people.

Examples of the field of vision with horizontal sensor direction (volumetric)

***NOTICE**: the detection start and end values do not guarantee detection of a standing person. The reported values may slightly vary based on the installation conditions.*

***Note**: only some heights are reported, but every intermediate value is allowed and guarantees optimum performance.*

The dimensions of the field of vision expressed in meters and feet are as follows.

h (m)	α (°)	s_1 (m)	s_2 (m)	s_3 (m)
1	0	0.5	*	20
1.5	0	0.5	20	20
2	-15	2.5	16	16
2	-30	2	7.5	10
2.5	-15	3	17	17
2.5	-30	2.5	7	10
2.5	-45	2	6.5	6.5
3	-30	2.5	7	10
3	-45	2	4.5	6.5

h (ft)	α (°)	s_1 (ft)	s_2 (ft)	s_3 (ft)
3.2	0	1.6	*	65
4.9	0	1.6	65	65
6.5	-15	8.2	52	52
6.5	-30	6.5	25	32
8.2	-15	9.8	55	55
8.2	-30	8.2	23	32
8.2	-45	6.5	21	21
10	-30	8.2	23	32
10	-45	6.5	15	21

***Note** *: discernment of animals is not guaranteed in the entire field of vision.*

Examples of the field of vision with vertical sensor direction (barrier)

***NOTICE**: the detection start and end values do not guarantee detection of a standing person. The reported values may slightly vary based on the installation conditions.*

***Note**: only some heights are reported, but every intermediate value is allowed and guarantees optimum performance.*

The dimensions of the field of vision expressed in meters and feet are as follows.

h (m)	α (°)	s_1 (m)	s_2 (m)	s_3 (m)
1	0	0.5	*	20
1.5	0	0.5	20	20
2	-15	2	20	20
2	-30	1	16	16
2.5	-15	2	20	20
2.5	-30	1	20	20
2.5	-45	1	16	18
3	-15	2	20	20
3	-30	1	20	20
3	-45	1	12	15

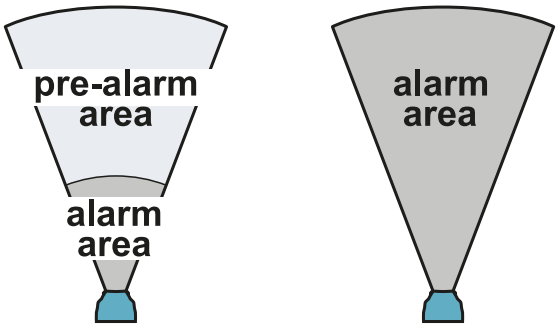
h (ft)	α (°)	s_1 (ft)	s_2 (ft)	s_3 (ft)
3.2	0	1.6	*	65
4.9	0	1.6	20	65
6.5	-15	6.5	20	65
6.5	-30	3.2	16	52
8.2	-15	6.5	20	65

h (ft)	α (°)	s_1 (ft)	s_2 (ft)	s_3 (ft)
8.2	-30	3.2	20	65
8.2	-45	3.2	16	59
10	-15	6.5	20	65
10	-30	3.2	20	65
10	-45	3.2	12	49

***Note** *: discernment of animals is not guaranteed in the entire field of vision.*

Alarm and pre-alarm areas

Within the sensor field of vision, the alarm and possible pre-alarm areas define the area that is actually monitored by the sensor. If a pre-alarm area is not defined, the alarm area corresponds to the entire monitored area.



Motion in the alarm area triggers an alarm and excitation on relay 1, motion in the pre-alarm area triggers a pre-alarm and excitation on relay 2.

***Note**: not all motions occurring in the pre-alarm or alarm area are signaled. It depends on the level of tolerance set for animals and possible semi-static objects.*

For outdoor installations, the pre-alarm area is especially useful for implemented security operations (e.g.: turning on the lights, activating a surveillance video camera) in the presence of motion in the marginal areas of the monitored area.

The configuration of the pre-alarm area in barrier installations is usually not very useful, except for protection in hallways, where the pre-alarm area could be useful for detecting the presence of an intruder in the area that is farthest from the sensor.

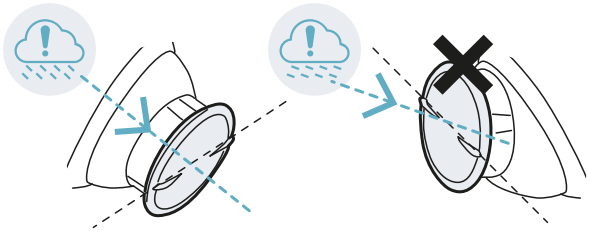
Interferences

Introduction

The MSK-101 sensor is different from other traditional motion sensors. It is important to know what factors interfere in its correct functioning, to properly install, configure it and to obtain optimum performance.

Warnings relative to precipitation

- Unusually intense rain (heavy storms with intensities exceeding 20 mm/h (0.80 in/h)) can reduce the field of vision by up to 50%.
- Hail may cause false alarms.
- If exposed to precipitation, install the sensor parallel to the usual direction of the precipitation.



Precautions

- The sensor has been designed for installations on the wall or ceiling: do not install it on moving or vibrating objects, like poles or fences.
- Hiding the sensor behind objects may impact the sensor performance, even significantly. To learn about the most interfering materials, see "Interfering materials" on the next page.
  ***NOTICE**: hiding the sensor is not a foreseen use. Checking correct functioning is the responsibility of the installer.*
- Do not install it in the presence of large reflective objects (e.g.: metallic objects) that could influence correct detection.
- In the presence of fluorescent tubes, tilt down the sensor by 15°/30°, or install it at a minimum distance of 20 m from the tube.
- In the presence of other MSK-101 sensors, maintain the minimum indicated distances, see "How to install several sensors" on the next page.
- In the presence of other MSK-101 sensors, assign each sensor to a different channel, see "How to configure several sensors" on the next page.
- The sensors that use the same frequency (e.g. *Blind Spot Detection* devices on automobiles, with radar at 24 GHz) interfere with proper functioning and may cause false alarms. Do not point the sensor directly towards a parking area.
- The sensor can detect motion beyond glass, walls, and thin floors, for example in drywall. Via the Inxpect Security application, limit the monitored area to only the specific area of interest, and perform tests to prevent false alarms.
- In the presence of neon tubes, respect the minimum sensor inclination indicated so that the tube does not interfere with the sensor:

Sensor direction	Minimum inclination (α)*
Horizontal	- 15°
Vertical	- 30°

Note *: see "Examples of the field of vision with horizontal sensor direction (volumetric)" on page 12 and "Examples of the field of vision with vertical sensor direction (barrier)" on page 12.*

Interfering materials

Below is a list of materials that could impact the sensor performance if they hide it:

- surfaces having metal-based paints or carbon-based paints
- tinted windows
- surfaces having EMI/RFI glasses or mirrors
- surfaces with water pipes, cables
- tiles having metal-based glaze including blue cobalt
- metal screen foil
- foil-backed insulation materials (e.g. foil)
- foil moist materials (e.g. cork)

Factors that do NOT interfere

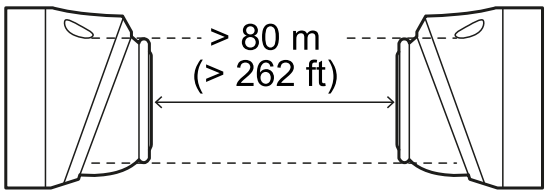
A list of factors that in contrast to traditional motion sensors do NOT interfere with the normal functioning of the sensor is presented as follows:

- direct exposure to the sun or windows that face the exterior
- thin plasterboard walls or polystyrene or stiferite panels
  NOTICE*: the composition of materials used for walls and panels is not sufficiently known to ensure the foreseen performance of the sensor. Checking correct functioning is the responsibility of the installer.*
- rapid temperature fluctuations
- smoke, dust, or strong air currents (e.g.: air conditioners, fans)
- water sprays, vaporized water or mist
- electrical fields (e.g.: electrical motors, high voltage devices)
- moving objects (e.g.: fans, pulleys, conveyor belts, trees and shrubs). See "Manage semi-static objects" on page 26.
- small animals or pets. See "Set the tolerance level for animals" on page 26.

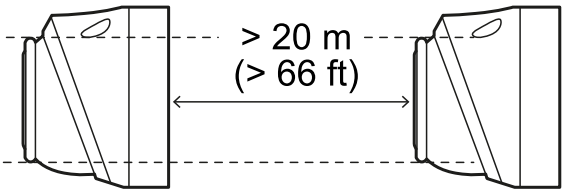
How to install several sensors

Three possible combinations of sensor installation and the minimum distances to maintain between the sensors with the sensors aligned are presented as follows. Respecting these distances guarantees the performance levels indicated in section "Field of vision" on page 11.

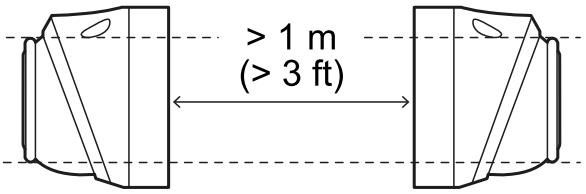
NOTICE*: other combinations are possible, but their performance must be validated in the field.*



Front-front combination



Front-back combination



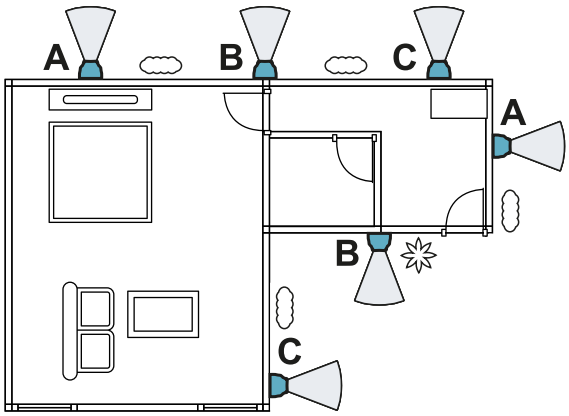
Back-back combination

Note*: the blind spot created in this combination is very wide. If possible, use the back-front configuration.*

How to configure several sensors

To reduce interference between the sensors present in the same area, assign a different channel to each one. Up to three channels are available (channel A, B, C).

An example of an installation with nine sensors and relative channel assignments is presented as follows.



3

Installation and use

Contents

This section includes the following topics:

Before installation 16
Install and configure the sensor 16
Use the application 22
Calibrate the sensor 23
Set the tolerance level for animals 26
Manage semi-static objects 26
Other operations 27

Before installation

Necessary components and tools

- Wi-Fi dongle (product code: WSYNC-RJ-WIFI or WSYNC-RJ-WIFI-US).
- Android or iOS device with Wi-Fi enabled and the Inxpect Security application installed (see "MSK-101" on page 6).

  ***IMPORTANT**: to ensure correct functioning, allow all requested permissions for the application.*

- Only for barrier applications and if necessary, adapter for assembly (product code: MSK-101-BM) (see "Barrier configuration" on page 11).
- Two screws up to M4 (No.6) for fastening to the wall or to the junction box.
- Screwdriver, wire stripper and fastening tools not provided.

Configuration without Wi-Fi

If you cannot use Wi-Fi devices, the following components are required:

- Wi-Fi dongle firmware version 1220 or higher (product code: WSYNC-RJ-WIFI or WSYNC-RJ-WIFI-US).
- USB cable with micro-USB port.
- PC with Windows 7 or higher operating system with Inxpect Security PC application installed.

To download the application, visit the website www.inxpect.com/security/tools

Prepare for installation

***NOTICE**: to ensure effective functioning, the sensor must be installed in the best possible position and configured correctly. Carefully follow the instructions below.*

Before installing the sensor, perform the following operations:

1. Define the sensor application type (see "Applications" on page 9).
2. Define the installation position, considering possible interferences (see "Interferences" on page 13).
3. Define the height of installation for the sensor to obtain the desired field of vision (see "Field of vision" on page 11).
4. Run a shielded cable with the necessary conductors from the alarm control unit to connect the sensor (power supply and relay outputs).
5. Only for installations with MSK-101-BM adapter, define the direction of the sensor (see "Barrier configuration" on page 11).

Warnings

***NOTICE**: damage to the device. Do not let dust or water near the sensor during installation.*

Install MSK-101

1. Assemble the sensor:

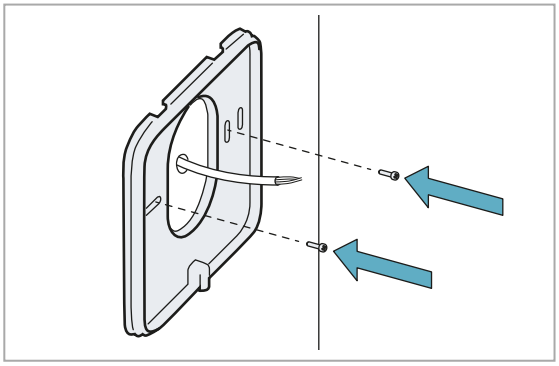
For...	And...	See...
barrier applications with adapter MSK-101-BM	sensor directed to the right	"Assemble the sensor with the MSK-101-BM adapter (sensor directed to the right)" on the facing page
barrier applications with adapter MSK-101-BM	sensor directed to the left	"Assemble the sensor with the MSK-101-BM adapter (sensor directed to the left)" on page 18
all other cases	-	"Assemble the sensor" below

2. "Connect the sensor to the alarm control unit" on page 19.
3. "Direct the sensor" on page 19.
4. "Connect the dongle (with Wi-Fi) " on page 20 or "Connect the dongle (without Wi-Fi)" on page 20.
5. "Configure the sensor" on page 21
6. "Fasten the sensor" on page 21.

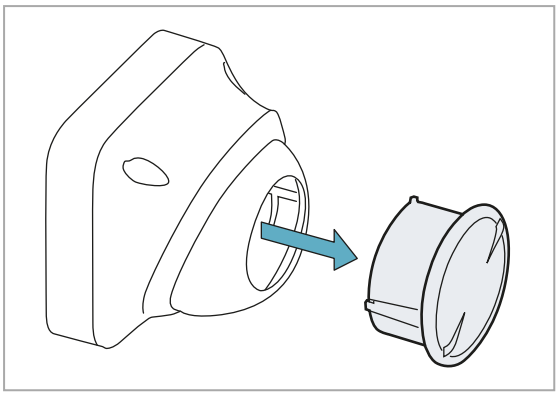
Install and configure the sensor

Assemble the sensor

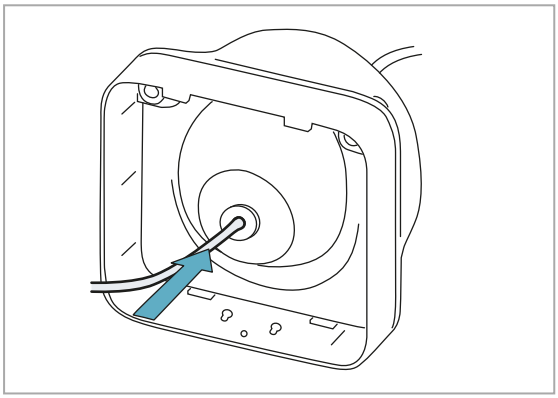
1. Using the prepared holes, fasten the base to the wall or to the junction box with two screws (not provided). See "Perforated base dimensions" on page 35.



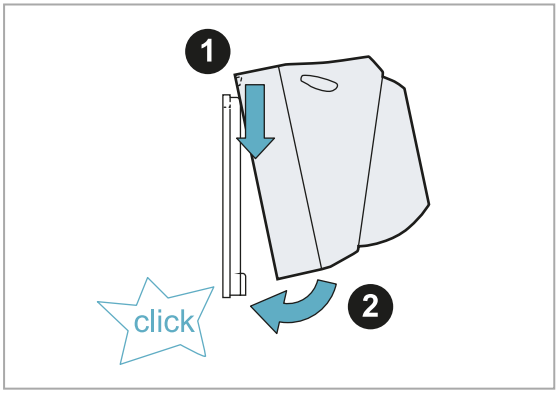
2. Extract the sensor from the adjustable support.



3. Pass the cable with the wires coming out of the alarm control unit into the sensor housing.

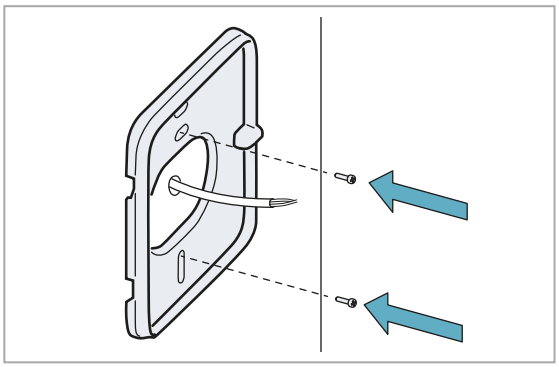


4. Fasten the sensor housing to the base.

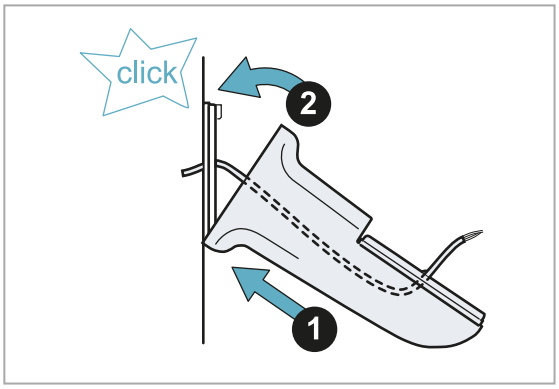


Assemble the sensor with the MSK-101-BM adapter (sensor directed to the right)

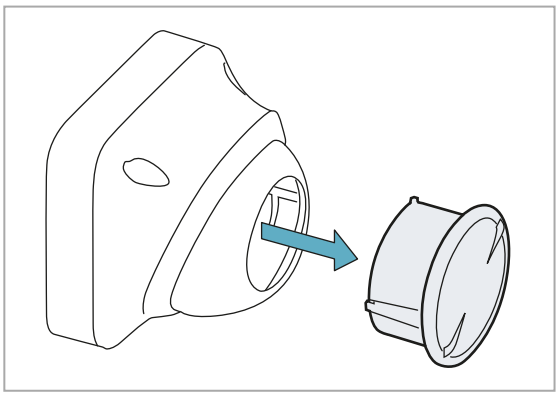
1. Using the prepared holes, direct the base of the sensor as shown in the figure and fasten it to the wall or to the junction box with two screws (not provided). See "Perforated base dimensions" on page 35.



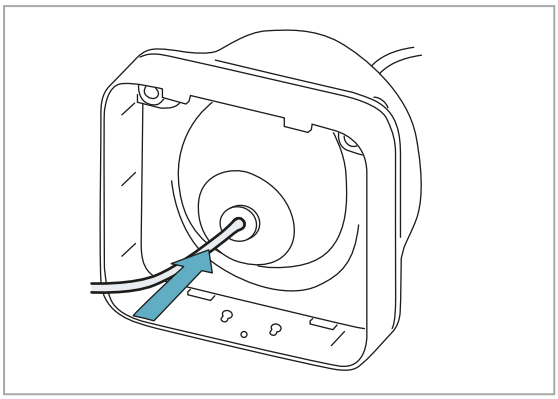
2. Assemble the adapter to the base, passing the cable with the wires coming out of the alarm control unit into the adapter.



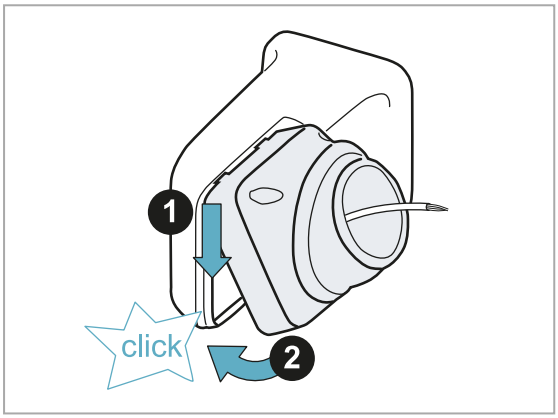
3. Extract the sensor from the adjustable support.



4. Pass the cable into the sensor housing.

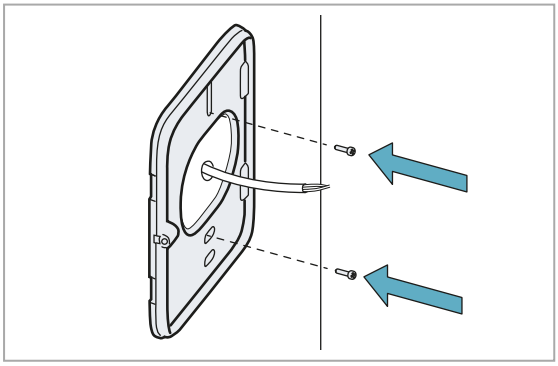


5. Assemble the sensor housing to the adapter.

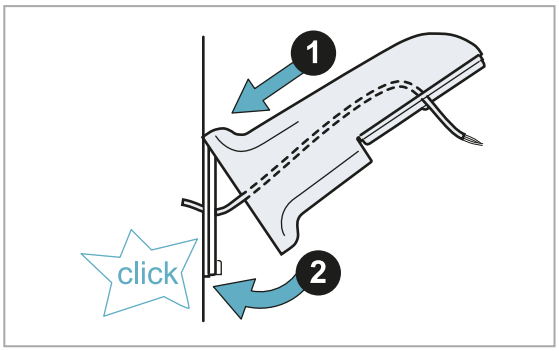


Assemble the sensor with the MSK-101-BM adapter (sensor directed to the left)

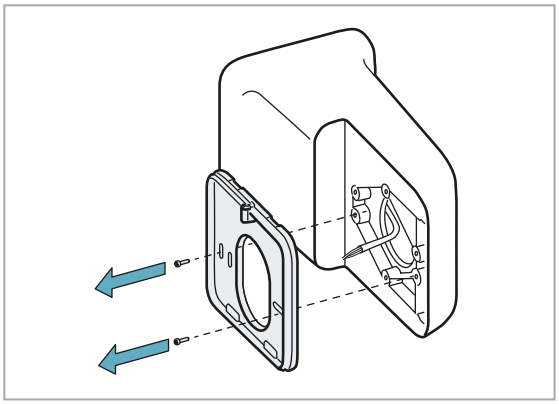
1. Using the prepared holes, direct the base of the sensor as shown in the figure and fasten it to the wall or to the junction box with two screws (not provided). See "Perforated base dimensions" on page 35.



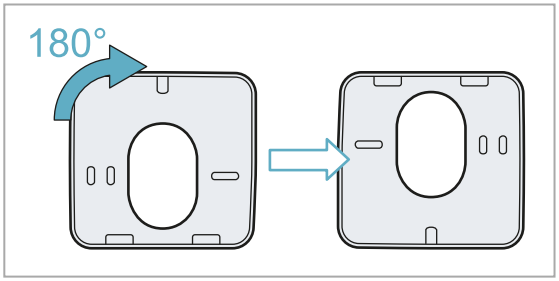
2. Assemble the adapter to the base, passing the cable with the wires coming out of the alarm control unit into the adapter.



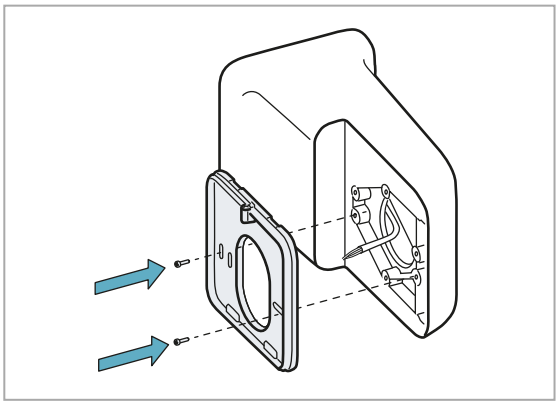
3. Unscrew the fastening screws on the pre-assembled base of the adapter.



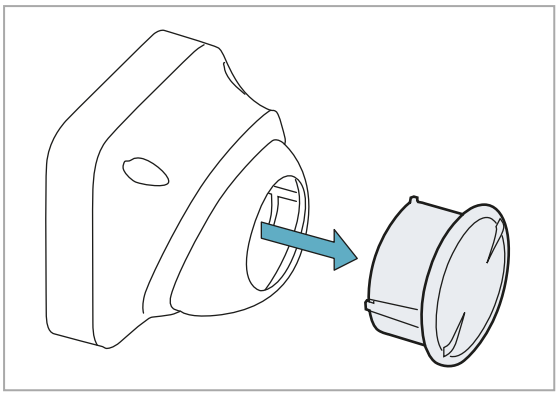
4. Turn the base 180°.



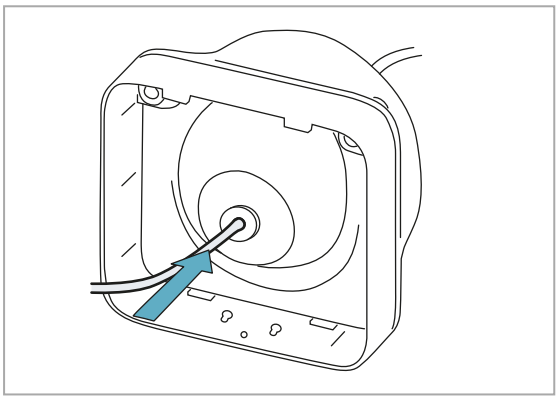
5. Tighten the screws.



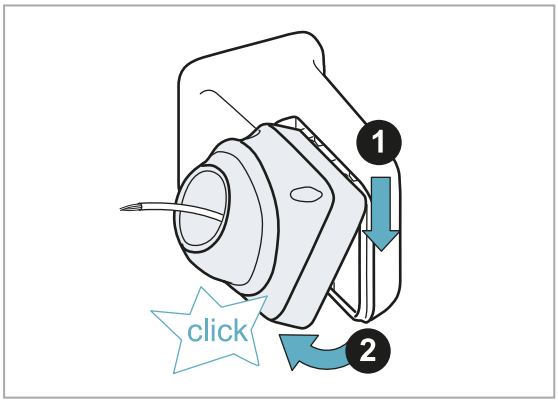
6. Extract the sensor from the adjustable support.



7. Pass the cable into the sensor housing.

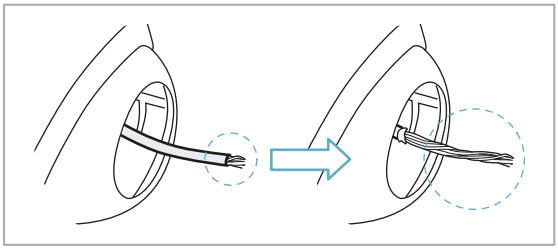


8. Assemble the sensor housing to the adapter.

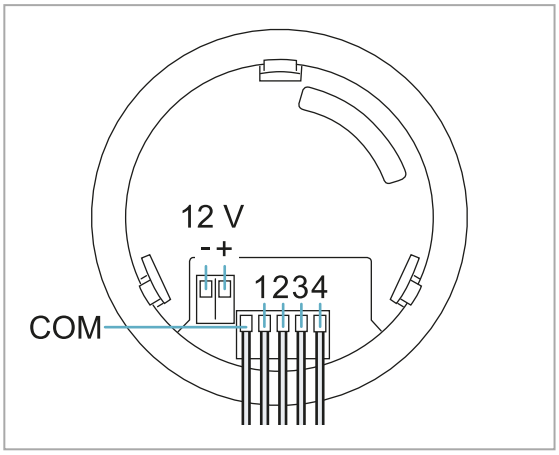


Connect the sensor to the alarm control unit

1. Remove the sheath and the hose by at least 5 cm (2 in).

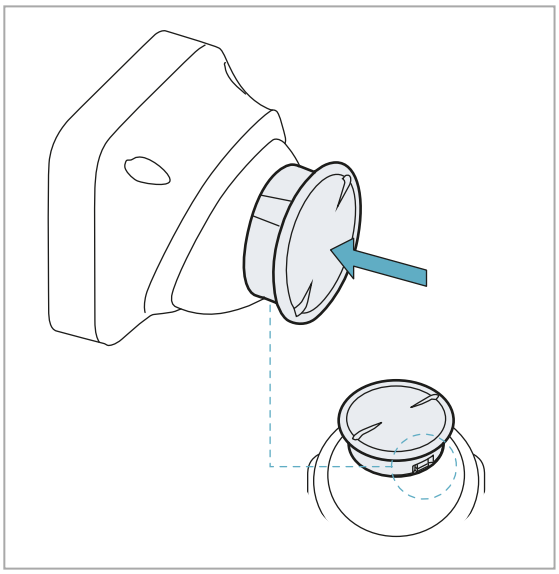


2. Connect the power supply and relay outputs. It is recommended to connect relay 3 (tampering) and 4 (fault) to a 24 h line from the alarm control unit.

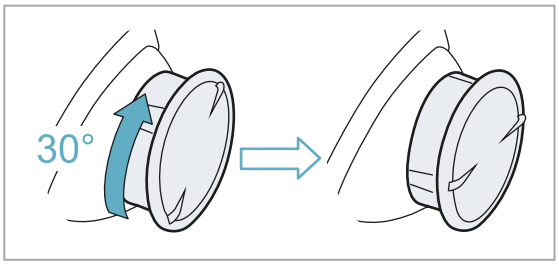


Direct the sensor

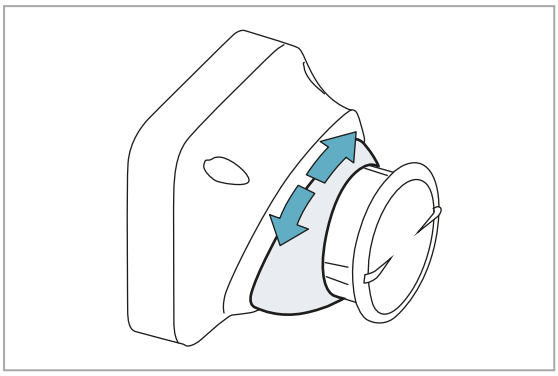
1. Insert the sensor into the adjustable support, leaving the connector in sight.



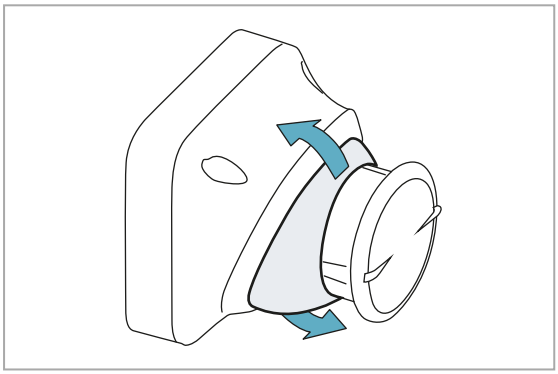
2. Turn the sensor to lock it into the adjustable support.



3. Turn the adjustable support to orient the sensor direction vertically (barrier application) or horizontally (volumetric application).

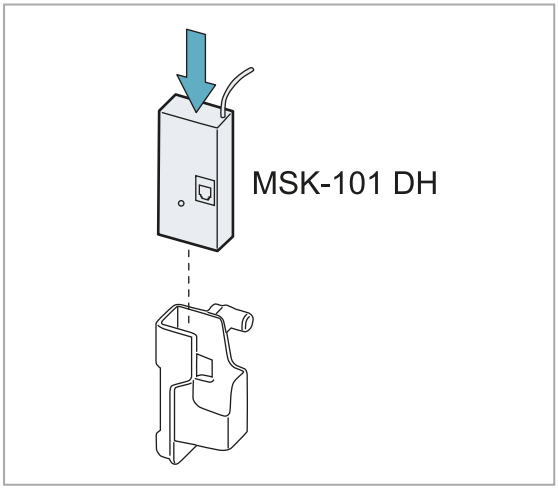


4. Tilt down the adjustable support to reach the desired sensor inclination.

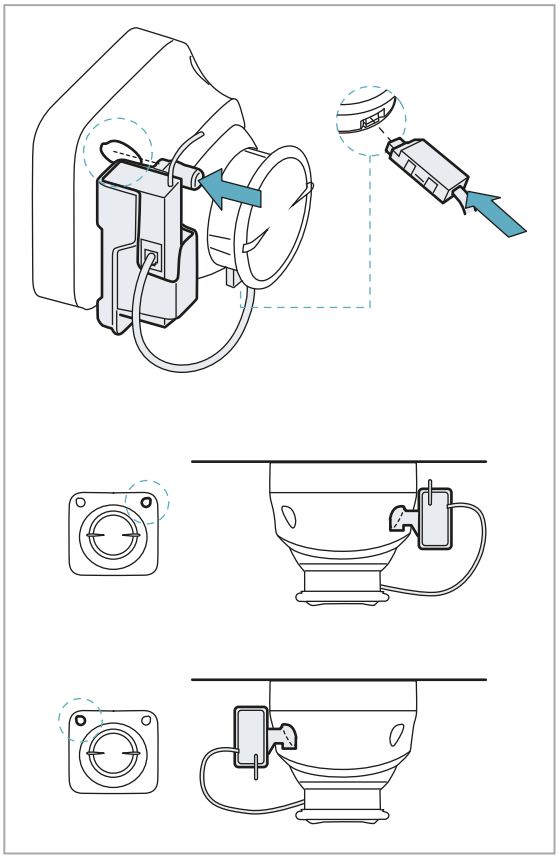


Connect the dongle (with Wi-Fi)

1. Insert the dongle into its caddy.



2. Connect the dongle and fasten it to the sensor. For 45° sensor inclinations downwards, see "45° downward inclination" below. It can be fastened to the right or left of the sensor.

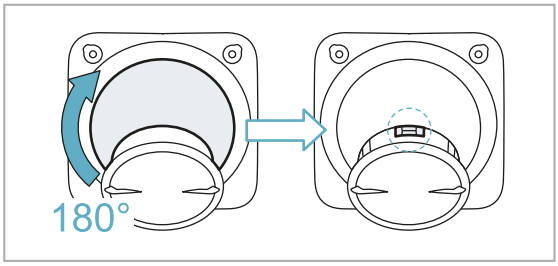


Connect the dongle (without Wi-Fi)

1. Insert the dongle into its caddy. Connect the dongle and fasten it to the sensor. See steps 1 and 2 of "Connect the dongle (with Wi-Fi) " above.
2. Take the USB cable and insert the micro-USB connector into the dongle and the USB connector into the USB port of the PC.
3. Start the Inxpect Security PC application and follow the instructions provided to configure the sensor.

45° downward inclination

To make the connector for connecting the dongle accessible, turn the adjustable support by 180°.

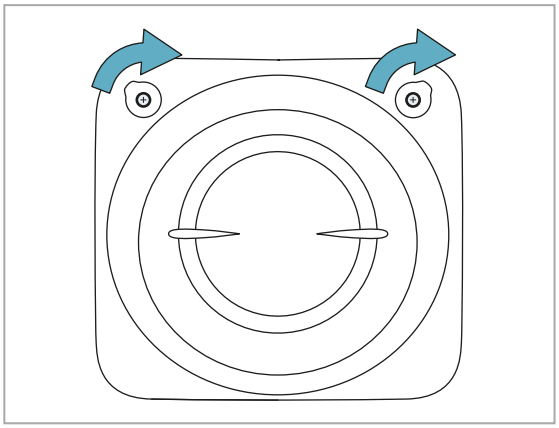


Configure the sensor

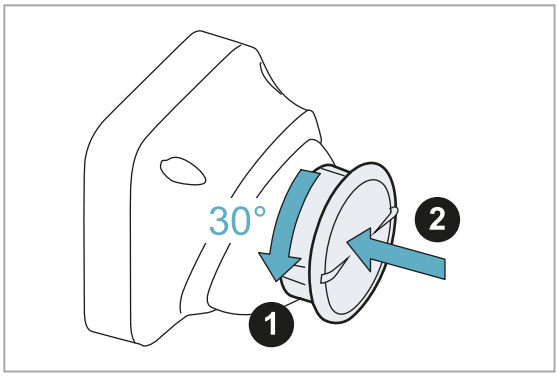
1. Connect the sensor to the power supply.
2. Start the Inxpect Security application.
3. Select the Wi-Fi network of the dongle connected to the sensor.
   *Note**: if necessary, enable the Wi-Fi connection of the mobile device.***
4. If required, enter the access password for the dongle (see the dongle instruction sheet for the default password).
5. Change the country of installation proposed by the application, if necessary.
   ***Note**: correctly setting the country avoids violating national restrictions on radio frequency allocation.*
6. If other sensors are present in the area, assign a specific channel to the sensor, or select "None".
7. Insert the installation height. If the installation height exceeds 3 m (11 ft), insert the height as 1 m (3 ft) (e.g. protection for skylights or windows in a warehouse).
8. Check that the detected direction corresponds with the set direction and compare the detected inclination with the optimum recommended value. If necessary, adjust the position of the adjustable support accordingly.
9. Save the installation settings: the **Calibration** page appears.
10. To guarantee the maximum detection performance, perform the calibration procedure (see "Calibrate the sensor" on page 23). Upon conclusion, the **Configuration** page appears.
11. To define the area to be monitored (alarm area and possible pre-alarm area), physically move near the area limit and move on site. Based on the displayed motion indicator, adjust the area dimensions.
12. To check correct functioning, move around the set areas and check that the alarm and pre-alarm LEDs turn on properly.
    ***Note**: to disable the pre-alarm area, coincide the alarm and pre-alarm thresholds.*
13. On the menu set the tolerance level for animals and the presence of any semi-static objects in the field of vision.
14. Return to the **Calibration** page, select the button and disconnect the dongle.
15. Proceed with the procedure described in section "Fasten the sensor" below.

Fasten the sensor

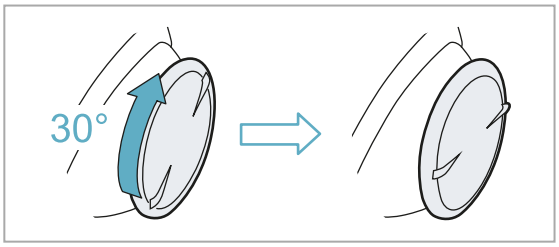
1. Tighten the screws to fasten the adjustable support. Check in the application that the adjustable support has not moved.



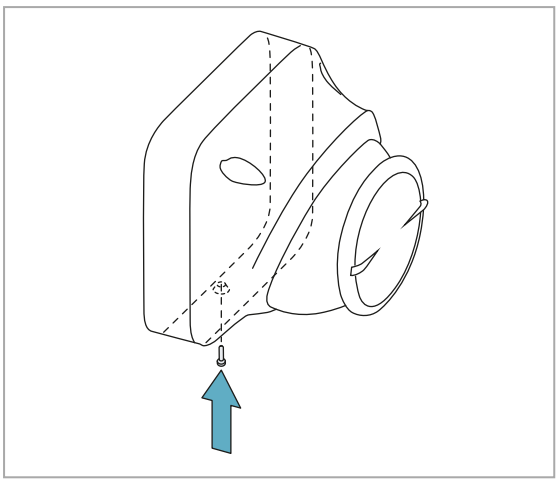
2. Disconnect the dongle. Hold the adjustable support firmly and completely insert the sensor.



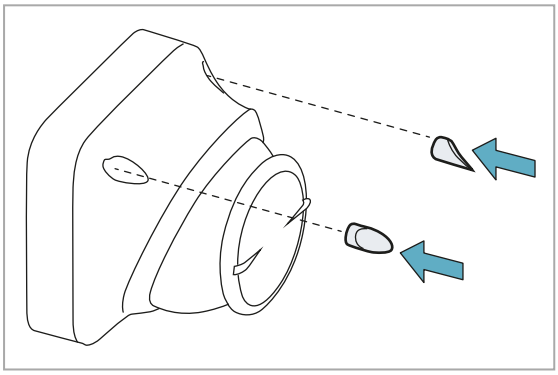
3. Turn the sensor to bring it back to the horizontal/vertical position.



4. Fasten the body of the sensor to the base using the provided screw.



5. Insert the provided caps.



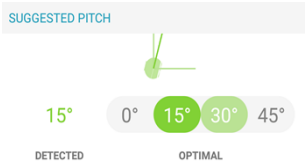
Use the application

Define the inclination of the sensor

Configuration page > ☰ > *Installation*

The inclination of the sensor is essential for determining the visible area of the sensor and reducing the blind spot.

To facilitate this operation, the application helps to identify the optimum inclination for the set height and direction. An example where the optimum recommended values are 15° and 30° and the current value is 15° is presented as follows.



For more information, see "Field of vision" on page 11.

Change the set configuration

Procedures for changing the sensor configuration after the first installation are provided as follows:

Change	Procedure
Alarm and pre-alarm thresholds	1. Connect the dongle to the sensor. 2. Start the Inxpect Security application and connect the mobile device to the dongle: the **Configuration** page with the alarm and pre-alarm areas appears. 3. Change the dimensions of the areas as desired, see "Define the alarm and pre-alarm areas" below.
Installation settings after moving the sensor	1. Connect the dongle to the sensor. 2. Start the Inxpect Security application and connect the mobile device to the dongle: the **Configuration** page with the alarm and pre-alarm areas appears. 3. Select ☰ > **Settings**.
Calibration after moving the sensor	Select ☰ > **Calibration**. See "Calibrate the sensor" on the facing page.
Channel after adding new sensors to the area	1. Connect the dongle to the sensor. 2. Start the Inxpect Security application and connect the mobile device to the dongle: the **Configuration** page with the alarm and pre-alarm areas appears. 3. Select ⚙ > **General**.

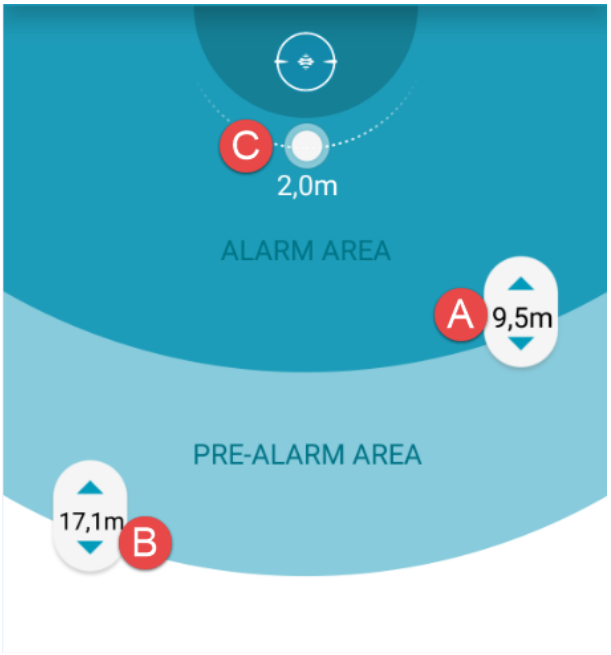
Define the alarm and pre-alarm areas

Configuration page

The application allows for easily setting the alarm and pre-alarm areas, by dragging the relative cursor (**[A]** for the alarm area, **[B]** for the pre-alarm area) up to the desired distance.

***Note**: to disable the pre-alarm area, coincide the alarm and pre-alarm thresholds.*

The first moving object is detected **[C]**. By moving within the monitored area it is possible to use your own position to facilitate definition of the area distances.



Set the tampering signal level

Configuration page > > *General*

The tampering signal level can be: aggressive, standard, disabled.

The signal is based on the deviation perceived by the anti-removal system devices (accelerometer or magnetometer). The aggressive level guarantees the maximum security level: if the detected deviation of both devices is significant, tampering is always signaled. With the standard level, tampering is signaled only if detected simultaneously with the presence of motions in proximity of the sensor.

***Note**: with the tampering signal level set to **Disabled**, the sensor does not comply with standard EN 50131. The tampering signal is disabled automatically if the dongle is connected.*

Set the masking signal level

Configuration page > > *General*

The tampering signal level can be: aggressive, standard, disabled.

The aggressive level guarantees the maximum security level. Nevertheless, in outdoor installations with the sensor exposed to weather conditions, the aggressive level generates false alarms when it rains. Therefore, the aggressive level is recommended for indoors or if the sensor is protected from rain.

***Note**: with the masking signal level set to **Disabled**, the sensor does not comply with standard EN 50131. The masking signal is automatically disabled during the sensor initialization phase (flashing blue LED).*

Calibrate the sensor

Calibration

The calibration procedure calibrates the sensor according to the environment where it is installed and defines the reference for the maximum tolerance level for animals (see "Set the tolerance level for animals" on page 26). The calibration must be performed during the first configuration of the sensor or at each new installation.

Calibration types

The available calibration types and when they are performed are presented as follows.

Type	Performing conditions
Standard automatic	Always
Automatic by area	If following standard automatic calibration areas are detected within the monitored area with inhomogeneous sensitivities. For examples of inhomogeneous environments, see "Examples of inhomogeneous environments" below
Manual	If it is not possible to perform automatic calibration, for example in areas in front of the sensor: • less than 6 m (20 ft) • with stairs • with ramps or sloping ground

Examples of inhomogeneous environments

Some examples of inhomogeneous environments that could cause inhomogeneous sensitivities with standard automatic calibration are presented as follows.

For barrier application:

- wall to protect with "holes" (e.g. wall only at the start or at the end, central area missing)
- floor not always parallel to the sensor direction

For volumetric application:

- monitored area with medium/large size metallic object
- floor not always parallel to the sensor direction

Perform standard automatic calibration

Configuration page > > *Calibration*

***NOTICE**: for complete and efficient calibration, set the alarm area to at least 5-6 m and walk slowly up to the limit of the alarm zone.*

1. Select **Start calibration**.
2. Follow the instructions provided by the application.

***Note**: for an illustrative explanation of the main direction of the sensor, see "Examples of main direction" below.*

3. Return to the **Configuration** page and check that a motion generates an alarm in the entire monitored area (see "Check the calibration" below).

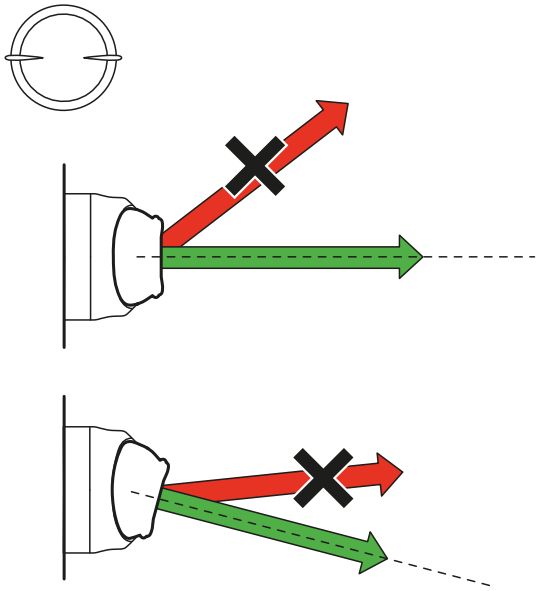
Perform automatic calibration by areas

Configuration page > ☰ > *Calibration*

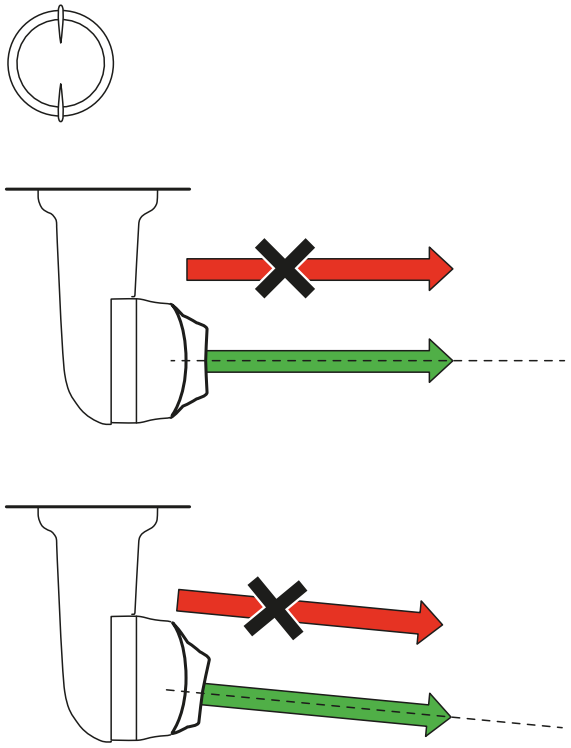
***NOTICE**: for complete and efficient calibration, set the alarm area to at least 5-6 m and walk slowly up to the limit of the alarm zone.*

1. Select **Start calibration**.
2. Enable the **Areas calibration** option.
3. Follow the instructions provided by the application.
   ***Note**: for an illustrative explanation of the main direction of the sensor, see "Examples of main direction" below.*
4. Return to the **Configuration** page and check that a motion generates an alarm in the entire monitored area (see "Check the calibration" below).

Examples of main direction



Sensor with horizontal direction (volumetric).



Sensor with horizontal direction (volumetric).

Perform manual calibration

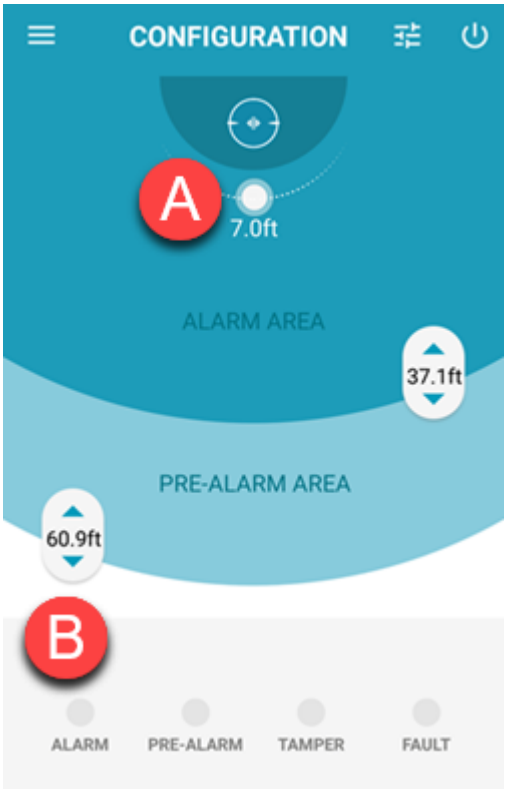
1. On the **Configuration** page, select ☰ > **Pet tolerance level**.
2. Set the maximum tolerance level and enable the **Fixed level steps** option.
3. Select **Save**: the **Configuration** page appears.
4. Select ☰ > **Calibration**.
5. On the ⋮ menu, select **Manual**.
6. Set a high calibration value (recommended value: 35) and select **Save**.
7. Check that a motion generates an alarm in the entire monitored area (see "Check the calibration" below).
8. To avoid excessively sensitizing the sensor, set and check the calibration value until identifying the highest value that ensures correct detection. Save the value.

Check the calibration

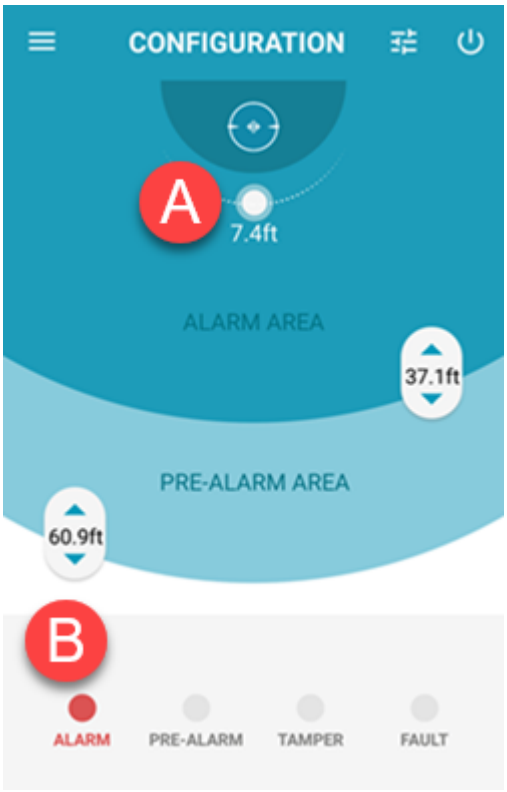
At the end of the calibration check that:

- the sensor has the same detection sensitivity level in the entire monitored area
- the sensor has the correct sensitivity level to detect all and only those motions that must be detected

On the **Configuration** page it is possible to check correct calibration considering the detection of a motion **[A]** and the alarm signal **[B]**.



Wrong calibration. Calibration value too high.



Correct calibration.

Troubleshooting calibration

Problem	Solution
The sensitivity is inhomogeneous within the monitored area	Perform automatic calibration by areas (see "Perform automatic calibration by areas" on the previous page)
The sensitivity level is homogeneous but too high/low	Refine the calibration value (see "Perform manual calibration" on the previous page)

Set the tolerance level for animals

Tolerance for animals

The sensor can discriminate between motion by people and pets or small animals (e.g.: mice, birds).

The ability to discern is greater in proximity of the sensor and less at the margins of the field of vision, see "Examples of the field of vision with horizontal sensor direction (volumetric)" on page 12 and "Examples of the field of vision with vertical sensor direction (barrier)" on page 12. Furthermore, if the objects to be discerned have similar dimensions, the capability to discern them is reduced.

Tolerance level

The tolerance level of the sensor can be configured. A low tolerance level guarantees a higher level of security, but simultaneously increases the risk of false alarms. It is suitable for scenarios where no motion is allowed in the monitored area (e.g.: in a museum).

A high tolerance level is suitable for outdoor installations where the probability of false alarms caused by animals or other moving objects is very high.

An intermediate tolerance level ignores motion of a pet, for example, but correctly signals motion of people walking.

***NOTICE**: a person crawling or kneeling is comparable to the dimensions of an animal for the sensor. The tolerance level must be lowered to detect people who are not standing up.*

Set the level

Configuration** page > > **Pet tolerance level

The tolerance for animals can be set in two ways:

- at three levels: minimum, medium, maximum
- fine tuning: a value from 0 to 100

The maximum tolerance level is the recommended level to minimize outdoor false alarms.

The graphic illustrates how to set this value. The following is an example where the sensor detects the presence of a standing or kneeling person or a large dog and signals an alarm, while smaller animals are ignored.



Manage semi-static objects

Immunity to semi-static objects

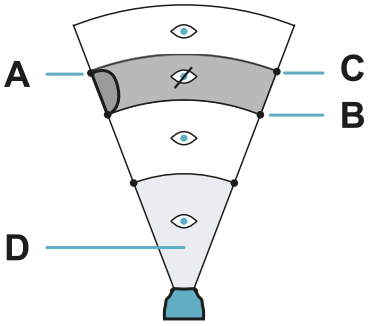
Objects moving within the monitored area may generate false alarms. If the objects oscillate or move within a limited space (semi-static objects), they can be recognized by the sensor and ignored.

Identification of semi-static objects

A semi-static object **[A]** is identified through the distance between the sensor and the start of the object **[B]** and the distance between the sensor and the end of the object **[C]**.

It is possible to define a maximum security area near the sensor **[D]**, in which semi-static objects cannot be configured.

***NOTICE**: configuration of semi-static objects reduces the security level: in the area impacted by the semi-static object, no motion is detected while the semi-static object moves.*



***Note**: for indoor installations, consider that the motion of the semi-static object may create projections on walls and/or reflective objects. If necessary, set two semi-static objects: one for the object and one for its projection on the wall.*

Examples of semi-static objects

- Wet fabrics or plastic films, for example patio umbrellas or awnings exposed to rain
- Air conditioner motors or fans
- Fans
- Plants in the wind

Define the semi-static objects

Configuration page > > ***Semi static***

Semi-static objects can be configured as follows:

Mode	Description	Settings
Automatic (aggressive)	Automatic detection of the position of the semi-static objects for a maximum security level.	Maximum security area distance
Automatic (standard)	Automatic detection of the position of the semi-static objects for a standard security level.	
Semiautomatic	Automatic detection of the position of the semi-static objects	Number Maximum size of semi-static objects
Manual	Manual insertion of a maximum of four objects	Number Distance from the start and end

Set the distance for semi-static objects

Configuration page > > ***Semi static***

The distance can be set in two ways:

- manually.
- moving in proximity of the start and end of the object and pressing the button: the field is automatically filled in with the current distance.

Check the setting of semi-static objects

1. Display the **Configuration** page.
2. Move near the semi-static object or move the semi-static object.
3. Check that the detected moving object appears on the screen, and that the alarm/pre-alarm LED stays off.

Other operations

General settings

On the menu > **General** it is possible to:

- set the normal relay status (default: normally closed)
- enable/disable the LED
- to set the masking signal level, see "Set the masking signal level" on page 23
- to set the tampering signal level, see "Set the tampering signal level" on page 23
- set the Country of installation (default: Country automatically detected by the device in use)

Operations on the sensor

On the menu > **Settings** > **Sensor** it is possible to:

- update the firmware
- reset factory default settings

Operations on the dongle

On the menu > **Settings** > **Dongle** it is possible to:

- update the firmware (only Wi-Fi dongle)
- change the access password
- change the name
- reset factory default settings

Operations on the application

On the menu > **Settings** > **App** it is possible to:

- set the measurement system (Imperial or Metric)
- set the language

4

Maintenance and diagnostics

Contents

This section includes the following topics:

Diagnostics and troubleshooting 29
Updates 29
Maintenance 30

Diagnostics and troubleshooting

Troubleshooting

Problem	Cause	Remedy
The sensor does not turn on	Poor or incorrect electrical power supply connection Wrong power supply voltage	Check the electrical connection and polarity. Check that the power supply voltage is in the vicinity of 12 V dc.
The purple LED turns on unexpectedly	Tampering, fault or masking detected	If the dongle is disconnected, make sure that the sensor is completely inside of the support. Extract and reinsert the sensor into the support. Check that there are no objects in the first 50 cm (20 in) of the sensor field of vision.
The relays open and close unexpectedly	Normal status incorrectly set	Change the normal status of the relays (Inxpect Security application > > **General**)
False alarms	There are moving objects in the monitored area	Reduce the alarm and/or pre-alarm areas until the moving objects are eliminated (Inxpect Security application > **Configuration** page). Define the semi-static objects present in the monitored area (Inxpect Security application > > **Semi static**)
	Animals have entered the monitored area	Adjust the tolerance level for animals (Inxpect Security application > > **Pet tolerance level**)
It is impossible to connect the application to the sensor	Sensor not powered	Check the electrical power supply connection. Power the sensor.
	The dongle is not connected to the sensor	Extract the sensor from the support and connect the dongle. Check that the dongle connector is completely inserted into the sensor.
	Dongle not working (red LED steady or flashing)	Disconnect and reconnect the dongle. If the problem persists, contact technical assistance.
	Application not working	1. Close the application: • on iOS devices: double tap on the Home button and drag the application upwards. • on Android devices: tap the recent Applications button and drag the application out of the screen. 2. Only on Android devices, disable: 1. in the Wi-Fi settings, among the Wi-Fi preferences, the high quality automatic connection to public networks. 2. in the battery settings, the energy saving that disables Wi-Fi after a certain period of inactivity 3. Restart the application.

Updates

Update management

At each start-up the application will check for and download any possible update for the application, dongle and sensor. The updates are saved locally for subsequent installation.

Download updates and display saved updates

Select the button on the application homepage.

Install downloaded updates

On the ☰ menu > **Settings**, select ⌄ to select the item to be updated and start installation.

***Note**: updating the sensor requires approximately 2 minutes. Upon conclusion of updating, the sensor restarts and must be reconnected to the mobile device.*

Update sequence

To guarantee compatibility between the application, dongle and sensor, perform updates in the following order:

1. Application
2. Dongle
3. Sensor

Maintenance

Cleaning

Remove any dust or dirt from the outside of the sensor and housing using a slightly damp cloth. Do not use abrasives or solvents.

Check correct functioning after cleaning.

5

Appendix

Contents

This section includes the following topics:

Technical data 32
Disposal 32
Conformity and restrictions 32
Service and warranty 33
Useful conventions for requesting assistance 34
Perforated base dimensions 35

Technical data

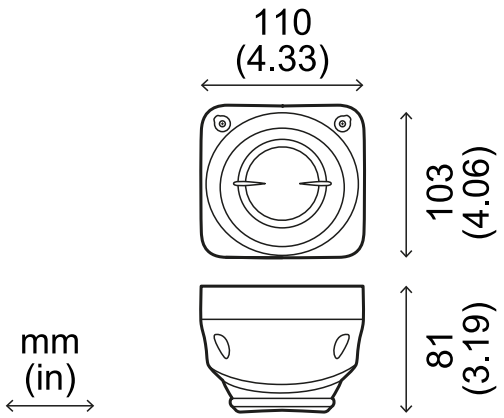
General specifications

Detection method	Inxpect motion detection motor based on FMCW radar
Frequency	Working band: 24-24.25 GHz Transmission power: ≤ 13 dBm Modulation: FMCW
Detection interval	From 0.5 to 20 m (from 2 to 66 ft), depending on the installation conditions. Configurable in 30 cm (1 ft) increments.
Field of vision	Sensor horizontal plane: 90° Sensor vertical plane: 30° Height: from 0.5 to 3 m (from 1.6 to 10 ft)
Detection speed	> 0.05 ms (2 in/s)
Relays	4 solid state relays, each max. 400 mA, 40 V dc(NO or NC configurable, default NC)
Power supply	12 V dc *
Absorption	max. 100 mA
Electrical protections	Inverted polarity Overcurrent through integrated fuse (max. 5 s @ 3 A)
Dimensions	103 x 110 x 81 mm (4.06 x 4.33 x 3.19 in)
Material	Technopolymer
Operating temperature	From -40 to +70 °C (from -40 to +158 °F)
Degree of protection	IP66 and IP68
Cable diameter	4-7 mm (0.16-0.27 in)
Approvals	CE Contains FCC ID: UXS-SMR-3X4 Compatible with EN50131-2-3 class IV grade 3 and UL639**

***Note** *: the device has been designed to be supplied by an external power supply unit for alarm systems, internally protected by a short-circuit.*

Note*: the instructions presented in this manual are sufficient for meeting the requirements of standard UL639. Installations not consistent with these instructions could also comply with the standard.*

MSK-101 dimensions



Perforated base dimensions

See "Perforated base dimensions" on page 35.

Disposal

MSK-101 contains electrical parts. Dispose separately using the relative recycling centers specified by the government or local public authorities.

Correct disposal and recycling will contribute to the prevention of potentially harmful consequences to the environment and population.

Conformity and restrictions

Declaration of conformity and certifications

The manufacturer, Inxpect SpA, declares that the type of radio equipment MSK-101 complies with the directive 2014/53/EU. The full EU declaration of conformity text is available on the company's website at the address www.inxpect.com.

At the same address all updated certifications are available for download.

FCC Certification

MSK-101 complies with FCC CFR title 47, part 15, subpart B. It contains FCC ID: UXS-SMR-3X4.

Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation

***NOTICE**: changes or modifications made to this equipment and not explicitly approved by Inxpect SpA may void the FCC authorization to operate this equipment.*

National restrictions

MSK-101 is a short range device in class 2 in accordance with the directive 2014/53/EU (RED - Radio equipment) and is subject to the following restrictions:

	UK	FR

In Regno Unito e in Francia, l'allocazione nazionale delle frequenze non permette il libero uso dell'intera banda 24-24,25 GHz. Impostare correttamente il paese nell'applicazione Inxpect Security e la banda autorizzata verrà automaticamente selezionata.

Restrictions in UK. In the United Kingdom, the national allocation of frequencies does not allow the free use of the whole band 24-24.25 GHz. Set the country correctly in the Inxpect Security application and the authorized band will be automatically selected.

Restrictions en FR. En France, la répartition nationale des fréquences ne permet pas la libre utilisation de la bande entière 24-24,25 GHz. Définissez le pays correctement dans l'application Inxpect Security et la bande autorisée sera automatiquement sélectionnée.

Service and warranty

Customer service

TSec SpA
Traversa di via Gavardina, 74
25081 Bedizzole (BS) - Italy
Tel: +39 030 57 85 302
Fax: +39 012 3456789
e-mail: supporto@tsec.it
website: www.tsec.it

How to return the product

If necessary, **pay to ship the product in its original packaging** to the area distributor, or directly to the exclusive distributor.

Area distributor	Exclusive distributor for Europe
Note distributor information here:	TSec SpA Traversa di via Gavardina, 74 25081 Bedizzole (BS) Italy T. +39 030 57 85 302 F. +39 012 3456789 supporto@tsec.it www.tsec.it

Service and warranty

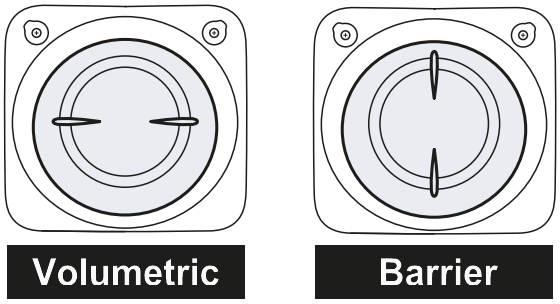
To find out about the terms of the warranty, exclusions and cancellation of the warranty, refer to the website www.tsec.it.

Useful conventions for requesting assistance

Conventions

Some useful conventions to communicate with Inxpect SpA technical assistance are provided below.

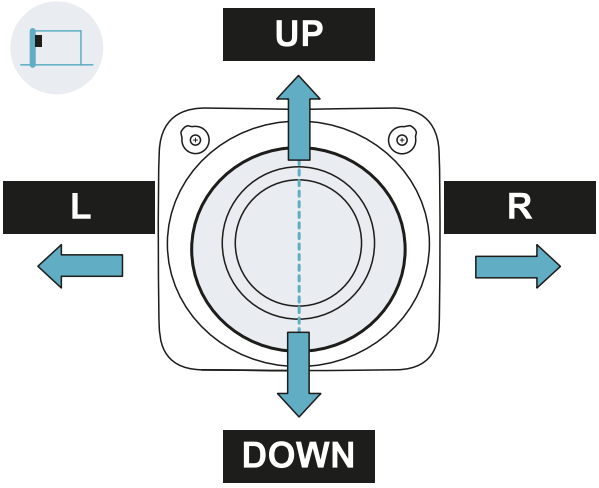
Type of application

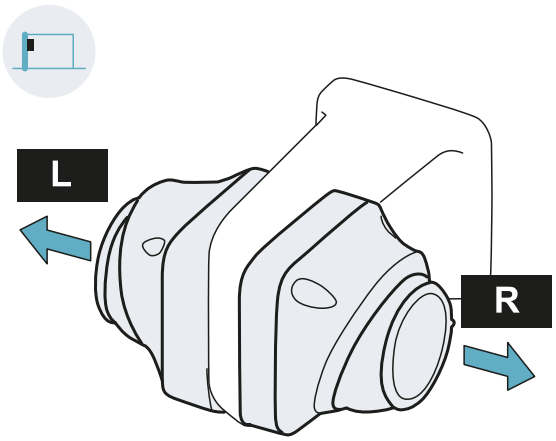


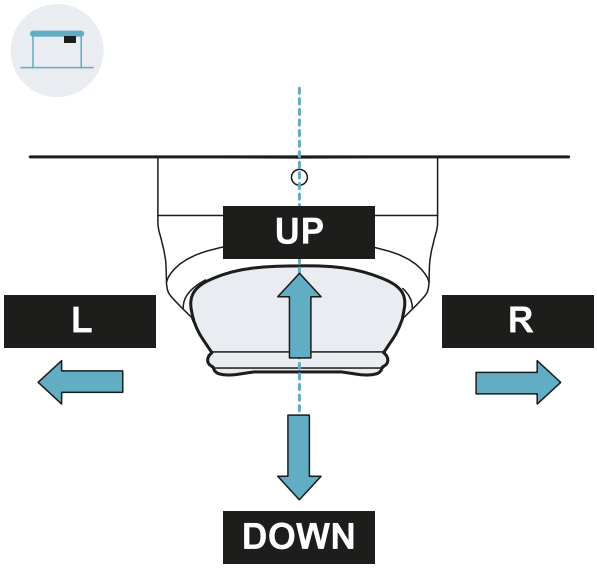
Spatial direction

Legend

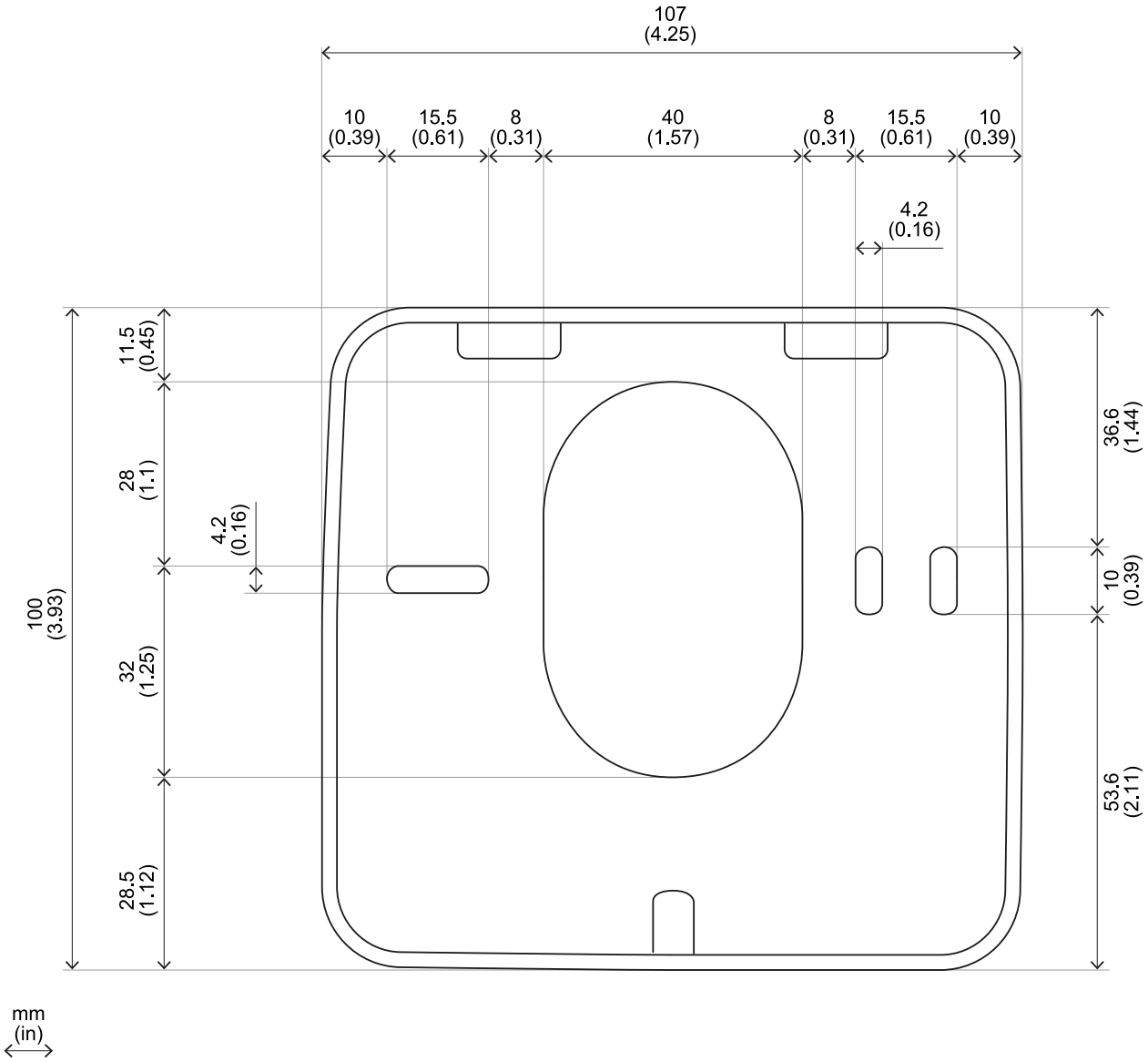
Icon	Description
	Wall installation
	Ceiling installation

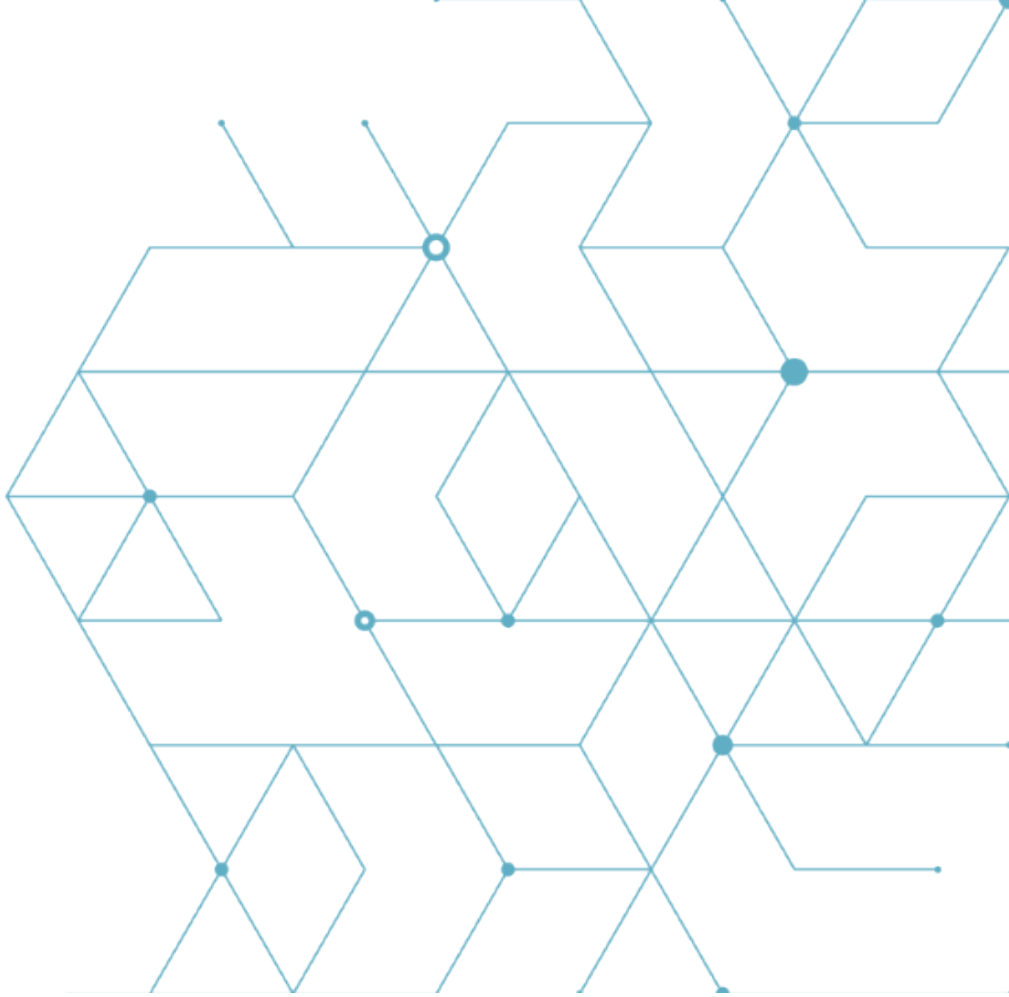






Perforated base dimensions





Exclusive distributor for Europe:
TSec SpA
Traversa di via Gavardina, 74
25081 Bedizzole (BS)
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www.tsec.it
info@tsec.it
+39 030 57 85 302

Manufacturer:
Inxpect SpA
Via del Serpente, 91
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www.inxpect.com
security@inxpect.com
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MSK-101
Advanced configuration manual v1.7
OCT 2018
msk-101_advanced-config_en_wo v1.7
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