

Motion sensor

SRKNX

V2.1

PROGRAMMING MANUAL



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Index

1	General description	2
2	Technical information	3
3	Programming	4
3.1	Communication objects	4
3.2	Objects description	4
3.3	Parameters	6
3.3.1	General parameters	6
3.3.2	Channel 1/2 Telegrams	8
3.3.3	Channel 1/2 Delays	9
4	Recommendations	11
4.1	Installation	11
4.1.1	Positioning	11
4.1.2	Detection side	14
4.2	Supply	14
4.2.1	Supply using an Auxiliary power supply (recommended)	14
4.2.2	Supply through BUS KNX	14
4.3	Advanced configuration	15
4.3.1	Sensitivity	15
4.3.2	Smoothing and sampling time	16
4.3.3	Saturation	16
5	Application examples	17
5.1	Motion switching with double channel	17
5.1.1	Devices	17
5.1.2	Description	17
5.1.3	Objects links	17
5.1.4	Parameter settings	18
5.2	Master / Slave mode: 1 light and 3 sensors	19
5.2.1	Devices	19
5.2.2	Description	19
5.2.3	Objects links	19
5.2.4	Parameter settings	20
5.3	Manual on and automatic off	21
5.3.1	Devices	21
5.3.2	Description	21
5.3.3	Objects links	21
5.3.4	Parameter settings	22

1 GENERAL DESCRIPTION

The SRKNX is a hidden 360° radiofrequency movement detector for installation above false or technical ceilings. It is also possible to install it in brick walls or plasterboards. This device is oriented to substitute the ceiling 360° passive detectors, clearly overcoming their performances.

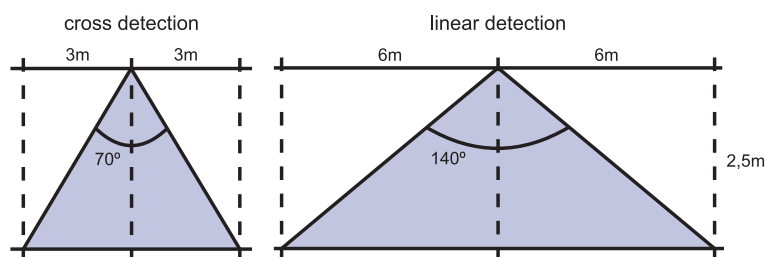
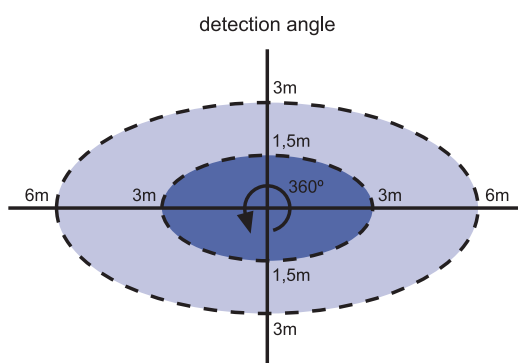
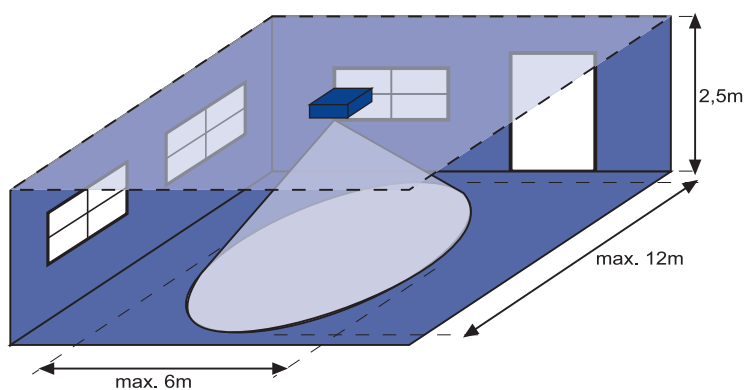
It is based on radio frequency technology, that allows it to pass through any kind of surface, except the metallic ones. Its hidden installation guarantees safety against non desired intrusions or vandalism. Moreover, it combines esthetics and automation in a single installation. It allows a wide and easy parameterization, being suitable for lighting functions, as well as people detection and intruder control.



- Detects movement through solid, non-metallic objects (brick, wood, etc).
- Detects minimum movements.
- Hidden installation in false ceilings or walls.
- Easy to install, adds elegance to the lighting design
- It is immune to vandalism.
- Automatic reset after detection.
- Adjustable timer from pulse to 17min.
- Adjustable sensitivity up to 12m.

2 TECHNICAL INFORMATION

- Supply - 29 Vdc from auxiliary power supply or from KNX BUS.
- Consumption - (depends on source):
 - Auxiliary Power Supply 12-30Vdc (Recommended)
 - 35 mA from auxiliary power supply.
 - 1mA from KNX BUS
 - KNX BUS (Optional)
 - 35mA from KNX BUS
- Connections - Screw terminal (four poles terminal block).
- Type of protection - IP20. Extra low security voltage SELV, 24V direct current.
- Temperature range - Running: -10°C a 55°C / Storage: -30°C a 60°C / Transport: -30°C a 60°C.
- Size / weight - 25x45x65mm. / 115g.
- Mount - over false ceilings or hidden in walls or bricks.
- Standardization - for KNX.
- Detection range: 12 x 6 m (at 2.5 height).



3 PROGRAMMING

3.1 COMMUNICATION OBJECTS

Number of communication objects: 11.

Number of assignments: 33.

Object	Name / Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel 1 - Detection event: Bit	1 bit	1.001	•	•		•	
1	Channel 1 - Detection event: Byte	1 byte	5.010	•	•		•	
2	Channel 1 - Detection event: Temperature	2 byte	9.001	•	•		•	
3	Channel 1 - Enable / disable channel	1 bit	1.001	•		•		
4	Channel 1 - Force remote detection	1 bit	1.001	•		•		
5	Channel 1 - Remaining time (seconds)	2 byte	7.005	•	•		•	
6	Channel 2 - Detection event: Bit	1 bit	1.001	•	•		•	
7	Channel 2 - Detection event: Byte	1 byte	5.010	•	•		•	
8	Channel 2 - Detection event: Temperature	2 byte	9.001	•	•		•	
9	Channel 2 - Enable / disable channel	1 bit	1.001	•		•		
10	Channel 2 - Force remote detection	1 bit	1.001	•		•		
11	Channel 2 - Remaining time (seconds)	2 byte	raw	•	•		•	

3.2 OBJECTS DESCRIPTION

Object 0: Channel 1 - Detection event: Bit

Channel 1 detection communication object in 1 bit format. When a motion is detected and the sensor is triggered, it sends the correspondent parameter On. When the countdown finishes (switch-off delay) it sends the correspondent parameter Off.

Object 1: Channel 1 - Detection event: Byte

Channel 1 detection communication object in 1 byte format. When a motion is detected and the sensor is triggered, it sends the correspondent parameter On. When the countdown finishes (switch-off delay) it sends the correspondent parameter Off.

Object 2: Channel 1 - Detection event: 2 Bytes

Channel 1 detection communication object in 2 bytes format. When a motion is detected and the sensor is triggered, it sends the correspondent parameter On. When the countdown finishes (switch-off delay) it sends the correspondent parameter Off.

Object 3: Channel 1 - Enable / disable channel

1 = Motion detection enabled.

0 = Motion detection disabled (stand-by mode).

Object 4: Channel 1 - Force remote detection

1 = Forces a remote detection.

0 = Forces a remote end of detection.

Used for Master-Slave mode. It allows to emulate a detection without any motion. By sending 1, the detector is activated remotely performing the start detection event. Slave sensors emulate Master detections: link bit detection event of the slave with

Object 5: Channel 1 - Remaining time (seconds)

0 – 65535 = Remaining time in seconds for end of detection event.

The remaining time of the countdown after motion detection can be read by this communication object.

Object 6: Channel 2 - Detection event: Bit

Channel 2 detection communication object in 1 bit format. When a motion is detected and the sensor is triggered, it sends the correspondent parameter On. When the countdown finishes (switch-off delay) it sends the correspondent parameter Off.

Object 7: Channel 2 - Detection event: Byte

Channel 2 detection communication object in 1 byte format. When a motion is detected and the sensor is triggered, it sends the correspondent parameter On. When the countdown finishes (switch-off delay) it sends the correspondent parameter Off.

Object 8: Channel 2 - Detection event: 2 Bytes

Channel 2 detection communication object in 2 bytes format. When a motion is detected and the sensor is triggered, it sends the correspondent parameter On. When the countdown finishes (switch-off delay) it sends the correspondent parameter Off.

Object 9: Channel 2 - Enable / disable channel

1 = Motion detection enabled.

0 = Motion detection disabled (stand-by mode).

Object 10: Channel 2 - Force remote detection

1 = Forces a remote detection.

0 = Forces a remote end of detection.

Used for Master-Slave mode. It allows to emulate a detection without any motion. By sending 1, the detector is activated remotely performing the start detection event. Slave sensors emulate Master detections: link bit detection event of the slave with

Object 11: Channel 2 - Remaining time (seconds)

0 – 65535 = Remaining time in seconds for end of detection event. The remaining time of the countdown after motion detection can be read by this communication object.

3.3 PARAMETERS

3.3.1 GENERAL PARAMETERS

Device: 1.1.1 SRKNX

General parameters	
Channel 1	
Telegrams	
Delays	
Channel 2	
Telegrams	
Delays	

BUSing address (Not used)	1
Advanced: Smoothing	2
Sensitivity (SRKNX) - Brightness threshold (SifKNX)	30
Advanced: Sampling time	16
Advanced: Saturation (SRKNX) – Not used (SifKNX)	100

General parameters allow to set the detection characteristics of the sensor and are described as follows:

BUSing Address

Values	From 0 to 255
Description	Not used

Advanced: smoothing	
Values	From 0 to 10
Description	<p>Is the value that represents the persistence of the detected movement. This value can range between 0 and 10. The greater value, the more continuous the movement must be for activation to occur. This value must be lesser than or equal to half the Sampling time parameter.</p> <p>Recommended values depending on usage:</p> <ul style="list-style-type: none"> – Movement detection (example: activate lighting): 2. – Intrusion detection: 8.
Sensitivity	
Values	From 0 to 100
Description	<p>This is the sensitivity percentage value with which the SRBUS detects movements, i.e., it increases or decreases the detection area. This value can range between 0 and 100%, where 100% is the maximum sensitivity.</p> <p>It is not recommended to enter values over 80%, which could make the SRBUS extremely sensitive to vibrations (in the zone installed) whatever their origin may be.</p> <p>Recommended values depending on usage:</p> <ul style="list-style-type: none"> – Movement detection (example: activate lighting): 40-60% (lower value for smaller rooms). – Intruder: 20%.
Advanced: sampling time	
Values	From 0 to 255
Description	<p>This value ranges between 0 and 255, but it is not recommended to be over 64. It represents the number of samplings taken to evaluate a detection. The greater the value, the slower the device response (it is measured in microcontroller cycles, not seconds).</p> <p>Recommended values depending on usage:</p> <ul style="list-style-type: none"> – Movement detection (example: activate lighting): 16. – Intrusion detection: 64
Advanced: saturation	
Values	From 0 to 100
Description	<p>Is the value that represents the level of movement with which the device is activated, independently of the Sampling time and Smoothing. If it is not used, it must be set to 100%.</p>

3.3.2 CHANNEL 1/2 TELEGRAMS

Device: 1.1.1 SRKNX

General parameters

- Channel 1
 - Telegrams
 - Delays
- Channel 2
 - Telegrams
 - Delays

Motion bit telegram: 1

No motion bit telegram: 0

Motion temperature telegram: 22

No motion temperature telegram: 18

Motion byte telegram: 255

No motion byte telegram: 0

Telegrams when motion detection: Yes

Telegrams after motion detection: Yes

Off telegrams when channel disable: Yes

The configuration of the sensor behavior when there is a motion detection and when it finishes is done here. The working mode and parameterization of both channels is done in the same way and they have similar parameters that are explained next:

Channel 1 / 2 - Motion bit telegram	
Values	From 0 to 1
Description	Value sent in object 0/6 (DPT1.00X) when a motion is detected.
Channel 1 / 2 - No motion bit telegram	
Values	From 0 to 1
Description	Value sent in object 0/6 (DPT1.00X) after switch-off delay.
Channel 1 / 2 - Motion temperature telegram	
Values	From -1000 to 1000 °C
Description	Value sent in object 2/8 (DPT9.002) when a motion is detected.
Channel 1 / 2 - No motion temperature telegram	
Values	From -1000 to 1000 °C
Description	Value sent in object 2/8 (DPT9.002) after switch-off delay.

Channel 1 / 2 - Motion byte telegram	
Values	From 0 to 255
Description	Value sent in object 1/7 (Byte) when a motion is detected.
Channel 1 / 2 - No motion byte telegram	
Values	From 0 to 255
Description	Value sent in object 1/7 (Byte) after switch-off delay.
Channel 1 / 2 - Telegrams when motion detection	
Values	Yes / No
Description	If this parameter is enabled, after a motion detection, the sensor sends ON telegrams in objects 0,1,2 for channel 1 and objects 6,7,8 for channel 2.
Channel 1 / 2 - Telegrams after motion detection	
Values	Yes / No
Description	If this parameter is enabled, if there is no motion within the switch-off delay, the sensor sends OFF telegrams in objects 0,1,2 for channel 1 and objects 6,7,8 for channel 2.
Channel 1 / 2 - Off telegrams when channel disable	
Values	Yes / No
Description	If this parameter is enabled, after a channel is switched off with objects 3 or 9, the OFF events are sent by objects 0,1,2 for channel 1 and objects 6,7,8 for channel 2.

3.3.3 CHANNEL 1/2 DELAYS

Device: 1.1.1 SRKNX

- General parameters
- Channel 1
 - Telegrams
 - Delays**
- Channel 2
 - Telegrams
 - Delays

Channel enable delay (sec.)
Channel disable delay (sec.)
Channel switch off delay (retrigger)

These parameters allow to configure time delays when enabling or disabling the sensor and the time that the light is on when the sensor is programmed for lightning control.

Channel disable delay	
Values	From 0 to 65535
Description	The channel keeps detecting motion until the disable delay time set has elapsed.
Channel enable delay	
Values	From 0 to 65535
Description	The channel does not respond until the enable delay time set has elapsed.
Channel switch-off delay	
Values	From 0 to 65535
Description	This parameter is the time between the last motion detection and the sending of switch-off events. In lightning control, the switch-off delay determines how long after a motion is detected the light is to be switched off again. With every motion, the sensor is retriggered and the countdown is re-started, so the light is not switched off until there is no motion within the delay time

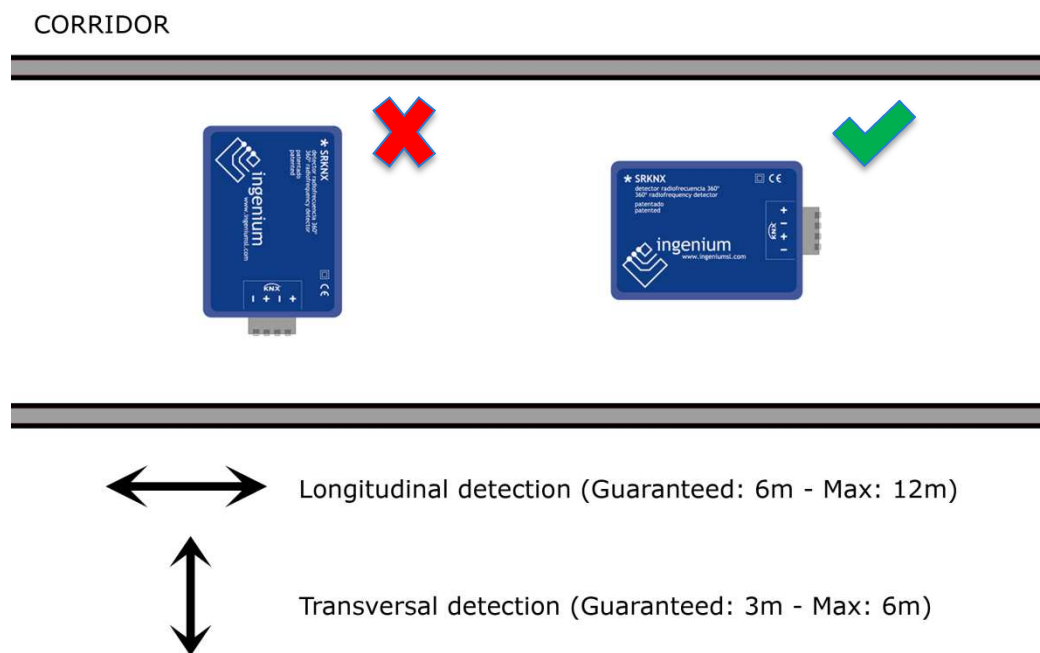
4 RECOMMENDATIONS

4.1 INSTALLATION

4.1.1 POSITIONING

The SRKNX could be installed in a false ceiling or behind walls of any non-metallic material. Its hidden installation ensure safety unwanted intrusions or vandalism to not be accessible.

For longitudinal places like corridors, it is important to place the SRKNX in the correct position. The correct solution is to place it lengthwise, with the length of the device parallel to the length of the room. Next image shows the detection directions and the area detection on each one, estimated for place the SRKNX at 2.5m from the floor.

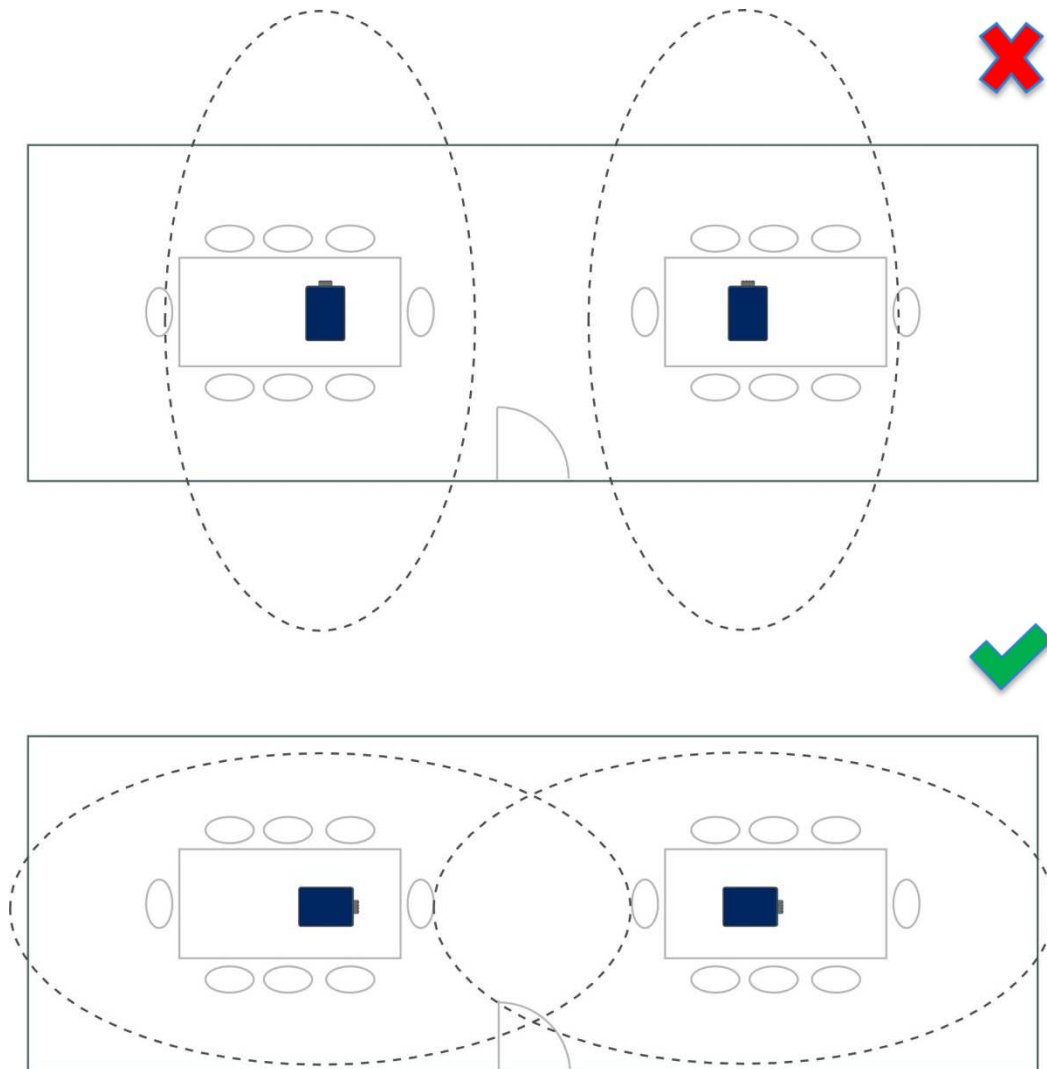


The detection area (placing the SRKNX at 2.5m from the floor) is:

- Guaranteed: 6x3 m.
- Maximum: 12x6m.

These values could change if the SRKNX positioning height changes. The beam detection angle is 140° in longitudinal direction and 70° in transversal direction.

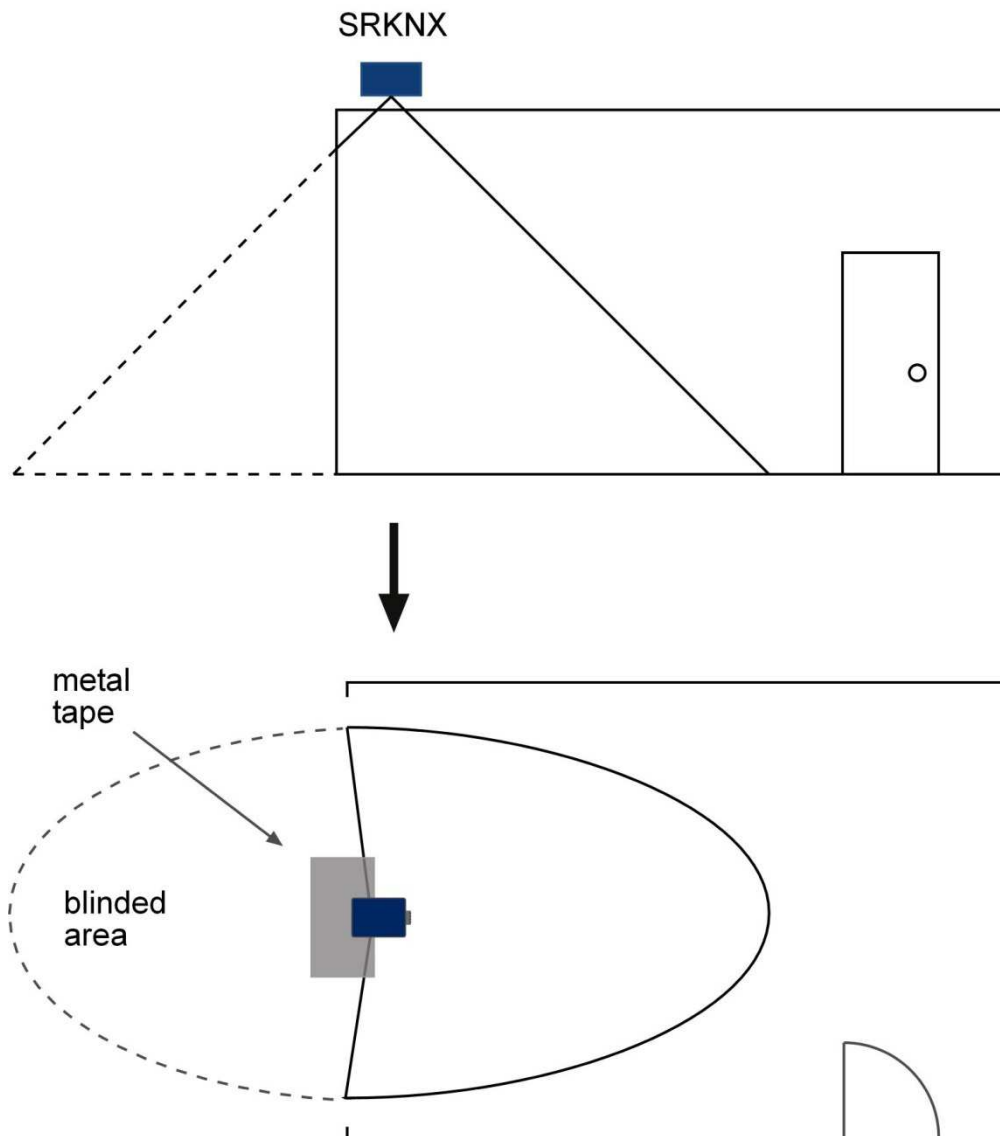
The best position of the sensor depends on the shape of the room where it is installed, for example a meeting room with long shape:



The first positioning may cause problems with false detections outside the meeting room or non-detections in some areas of the room.

The second positioning is the best because the detection area of the sensors fits better with the shape of the room.

The SRKNX can be partially blinded with metal tape to cancel detection in a zone/direction. For example, when it has to be installed in one side of the room, it is recommended to reduce the detection area with metal tape in order to avoid false detections by movements behind the wall.



In addition, the SRKNX must be firm fixed to the surface it will be installed on to avoid false detections and also it is very important no to install the device in locations susceptible to vibrations or over fluorescents lights for example.

4.1.2 DETECTION SIDE

The SRKNX detects by the silk screened side, so it should be placed with this side faced to the movement.



For example, when using the sensor in ceilings, if it is installed with the wrong side faced to the room area it won't detect anything or it can detect movements in the upper floor.

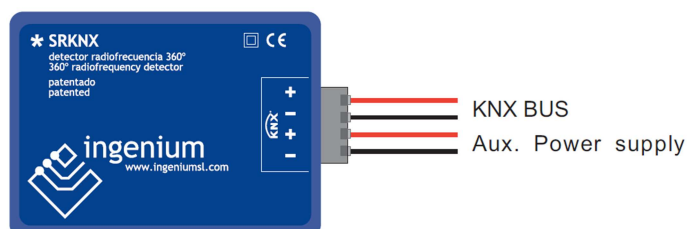
4.2 SUPPLY

It is possible to choose between two different options to supply the SRKNX: using an auxiliary power supply (recommended) or through BUS KNX.

4.2.1 SUPPLY USING AN AUXILIARY POWER SUPPLY (RECOMMENDED)

The consumption for this option is 30 mA from the auxiliary power supply (12-30Vdc) and 1 mA from the BUS KNX.

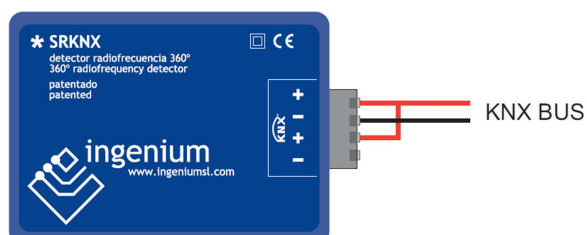
To supply the SRKNX device using an auxiliary power supply, instead of the KNX BUS, the wiring connection should be:



4.2.2 SUPPLY THROUGH BUS KNX

The consumption for this option is 30 mA from the BUS KNX.

To supply the SRKNX device through BUS KNX, the wiring connection should be:

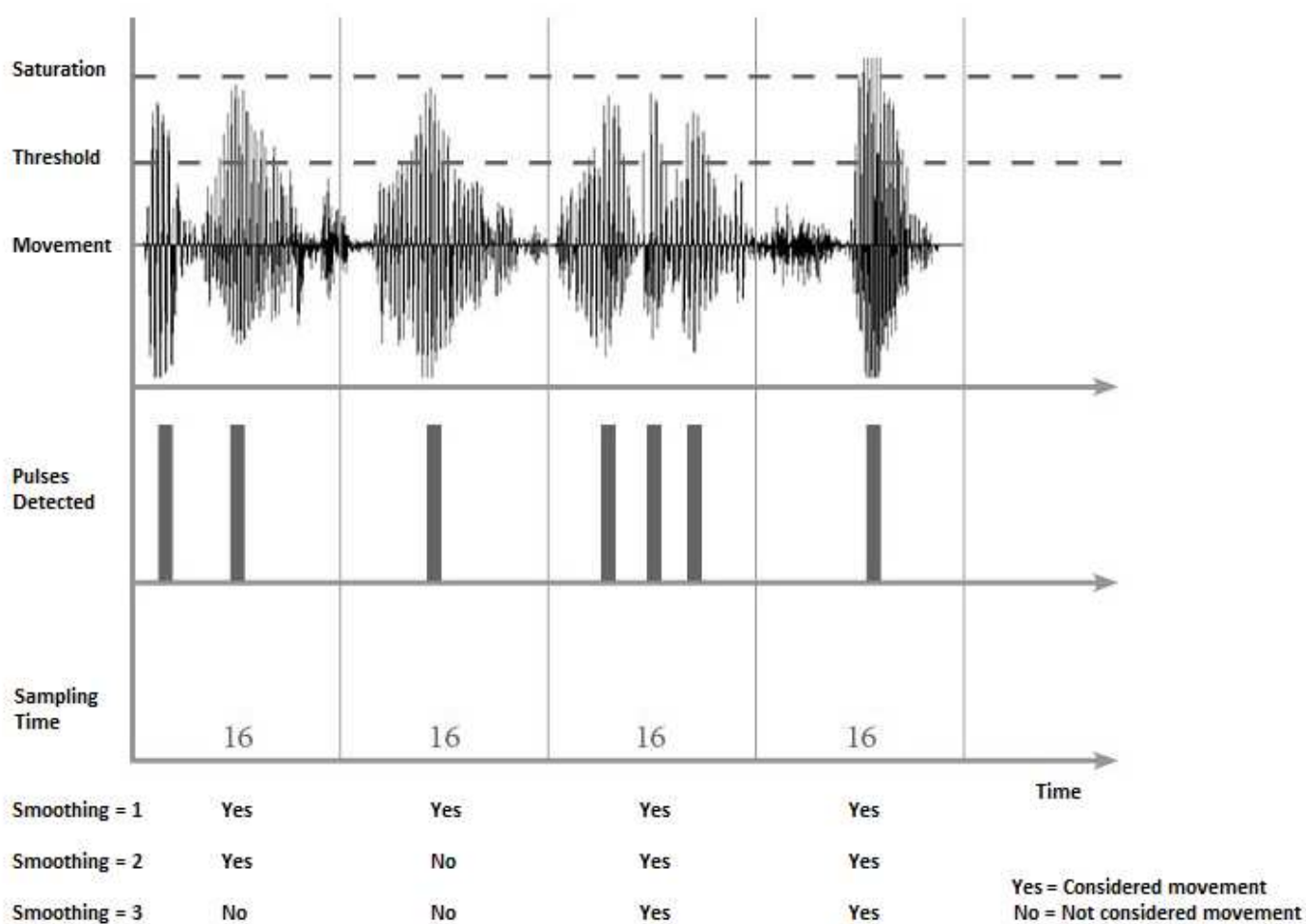


4.3 ADVANCED CONFIGURATION

4.3.1 SENSITIVITY

The SRKNX emits a detection beam of high intensity, being of greater or lesser scope depending on the **sensitivity** for which it has been programmed from ETS parameters. When the sensitivity is 100%, the detection range of the sensor covers an area of 12 x 6 m approximately at 2.5 height. If we reduce the sensitivity we will reduce the detection range proportionally so this parameter must be configured according to the size of the room or area that should be covered.

In the next figure is shown what is the SRKNX behavior depending on the advanced parameters configured:



4.3.2 SMOOTHING AND SAMPLING TIME

The SRKNX is constantly emitting radio frequency signals. The movement detection is based on the change that any body, material or thing makes in the radio signals reflected. These signals are filtered, processed and considered as a “motion detection” depending on parameters.

Any movement that generates a number of pulses higher than the **smoothing**, within a given sampling time, is considered a “motion detection” by the sensor. For the same sampling time, increasing the smoothing means that the movement should be faster and higher to generate a “motion detection” because more pulses are necessary.

The telegrams executed by the sensor when there is a motion detection are sent after every **sampling time**, so increasing the sampling time makes the sensor response slower. If the smoothing does not change, the movement needed to generate a “motion detection” can be the same, but the sensor does not switch on the light after the sampling time.

4.3.3 SATURATION

The **saturation** is the level of reflected signal with which the device considers a “motion detection”, independently of the sampling time and smoothing. This means that, for a given sampling time and smoothing, if the signal level received by the sensor is higher than the saturation, it generates a “motion detection” even if there was not any movement.

5 APPLICATION EXAMPLES

5.1 MOTION SWITCHING WITH DOUBLE CHANNEL

5.1.1 DEVICES

SRKNX: Motion double channel sensor.

6E4S-KNX: On/Off actuator with 6 digital inputs and 4 digital outputs.

5.1.2 DESCRIPTION

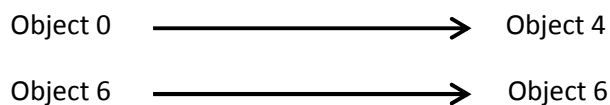
Light number 1 and number 2 are connected to outputs 1 and 2 (Z1 and Z2) of the 6E4S-KNX actuator.

The SRKNX controls the lights by motion detection. Light number 1 will be controlled by the first channel of the sensor and will be switched on for 15 seconds and the Light number 2 will be controlled by the second channel and will be switched on for 20 seconds.

5.1.3 OBJECTS LINKS

SRKNX –  Object 0 ->  Object 4 – 6E4S-KNX

SRKNX –  Object 6 ->  Object 6 – 6E4S-KNX



5.1.4 PARAMETER SETTINGS

The following parameter setting is generally recommended for this example. The ideal parameters may change depending on the application or installation.

Parameter name		Recommended setting
General parameters	Smoothing	2
	Sensitivity	30
	Sampling time	16
	Saturation	100
Ch1 Event values	Bit event on	1
	Bit event off	0
	Detection event notification	yes
	End of detection event notification	yes
Ch1 Delays	Channel enable delay	0
	Channel disable delay	0
	Switch-off delay	15
Ch2 Event values	Bit event on	1
	Bit event off	0
	Detection event notification	yes
	End of detection event notification	yes
Ch2 Delays	Channel enable delay	0
	Channel disable delay	0
	Switch-off delay	20

A Smoothing = 2 and Sampling time = 16 are generally recommended for normal lightning control by motion detection. The sensitivity depends on the detection area desired so it must be configured according to the area that should be covered. About the Saturation function, if it is not used it should have a value of 100. See 4.3 Advanced configuration for further information.

5.2 MASTER / SLAVE MODE: 1 LIGHT AND 3 SENSORS

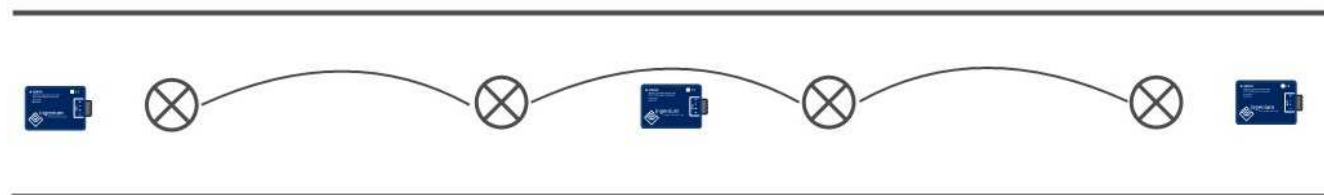
5.2.1 DEVICES

3 x SRKNX: Motion double channel sensor.



6E4S-KNX: On/Off actuator with 6 digital inputs and 4 digital outputs.



5.2.2 DESCRIPTION



A circuit is connected to output 1 (Z1) of the 6E4S-KNX actuator and lights are placed along a corridor. Three SRKNX sensors, one in the middle and another two placed on each side of the corridor will control the lights by motion detection. The lights will be switched on for 15 seconds.

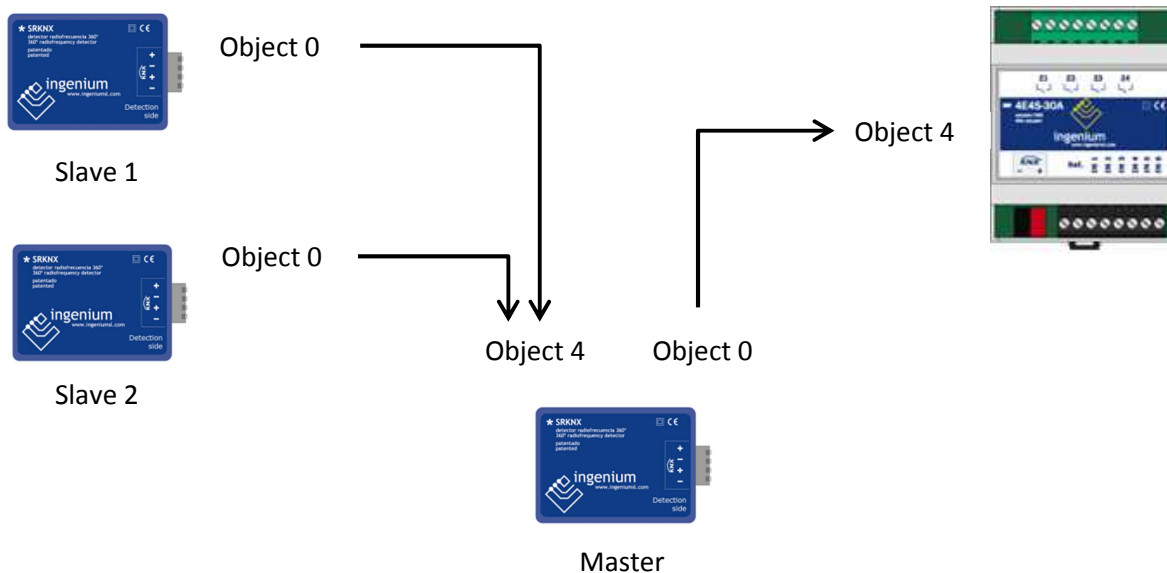


5.2.3 OBJECTS LINKS

Slave 1 SRKNX –  Object 0 ->  Object 4 – Master SRKNX

Slave 2 SRKNX –  Object 0 ->  Object 4 – Master SRKNX

Master SRKNX –  Object 0 ->  Object 4 – 6E4S-KNX



5.2.4 PARAMETER SETTINGS

The following parameter setting is generally recommended for this example. The ideal parameters may change depending on the application or installation.

Parameter name		Recommended setting
Master / Slave General Parameters	Smoothing	2
	Sensitivity	30
	Sampling time	16
	Saturation	100
Master Ch1 Event values	Bit event on	1
	Bit event off	0
	Detection event notification	yes
	End of detection event notification	yes
Master Ch1 Delays	Channel enable delay	0
	Channel disable delay	0
	Switch-off delay	15
Slave 1 Ch1 Event values	Bit event on	1
	Bit event off	0
	Detection event notification	yes
	End of detection event notification	yes
Slave 1 Ch1 Delays	Channel enable delay	0
	Channel disable delay	0
	Switch-off delay	5
Slave 2 Ch1 Event values	Bit event on	1
	Bit event off	0
	Detection event notification	yes
	End of detection event notification	yes
Slave 2 Ch1 Delays	Channel enable delay	0
	Channel disable delay	0
	Switch-off delay	5

A Smoothing = 2 and Sampling time = 16 are generally recommended for normal lightning control by motion detection. The sensitivity depends on the detection area desired so it must be configured according to the area that should be covered. About the Saturation function, if it is not used it should have a value of 100. See 4.3 Advanced configuration for further information.

The switch-off delay of the master is the time that the light is on. The switch-off delay of the slaves should be less in order to send their detections quickly to the master. If there is a huge amount of telegrams in the bus because of the slaves, their sampling times and switch-off delays can be increased.

5.3 MANUAL ON AND AUTOMATIC OFF

5.3.1 DEVICES

SRKNX: Motion double channel sensor.

6E4S-KNX: On/Off actuator with 6 digital inputs and 4 digital outputs.

KNX Pushbutton.



5.3.2 DESCRIPTION

This function is useful in lobbys, meeting rooms, waiting rooms, etc. If the room is occupied for only a short time no light is required but when the light is switched on it must be guaranteed to switch off when the room is left.

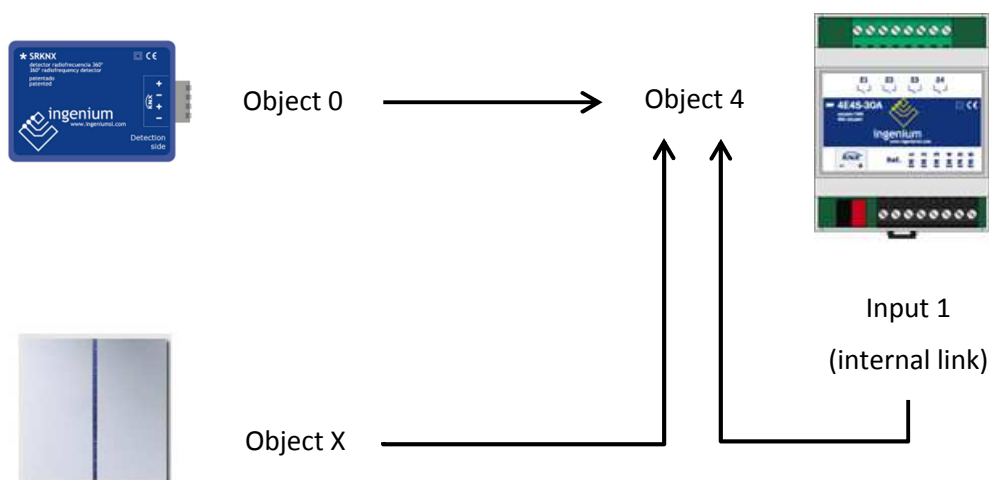
The light of the room is connected to the output 1 (Z1) of the 6E4S-KNX actuator and it should be switched on manually as required with the input of the device (I1) or any other KNX pushbutton.

The SRKNX controls the lights by motion detection but its sole purpose is to switch off the light after 30 seconds with no movement in the room.

5.3.3 OBJECTS LINKS

SRKNX –  Object 0 ->  Object 4 – 6E4S-KNX

KNX Pushbutton –  Object X ->  Object 4 – 6E4S-KNX



5.3.4 PARAMETER SETTINGS

The following parameter setting is generally recommended for this example. The ideal parameters may change depending on the application or installation.

Parameter name		Recommended setting
General parameters	Smoothing	2
	Sensitivity	30
	Sampling time	16
	Saturation	100
Ch1 Event values	Bit event off	0
	Detection event notification	No
	End of detection event notification	yes
Ch1 Delays	Channel enable delay	0
	Channel disable delay	0
	Switch-off delay	30

A Smoothing = 2 and Sampling time = 16 are generally recommended for normal lightning control by motion detection. The sensitivity depends on the detection area desired so it must be configured according to the area that should be covered. About the Saturation function, if it is not used it should have a value of 100. See 4.3 Advanced configuration for further information.

The detection event notification should be disabled because we do not want the sensor to do anything when motion is detected; we only want to switch of the light after 30 seconds without any movement in the room.



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