

Motion sensor

**SifKNX**

V1.2

# PROGRAMMING MANUAL



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TECHNICAL DEPARTMENT

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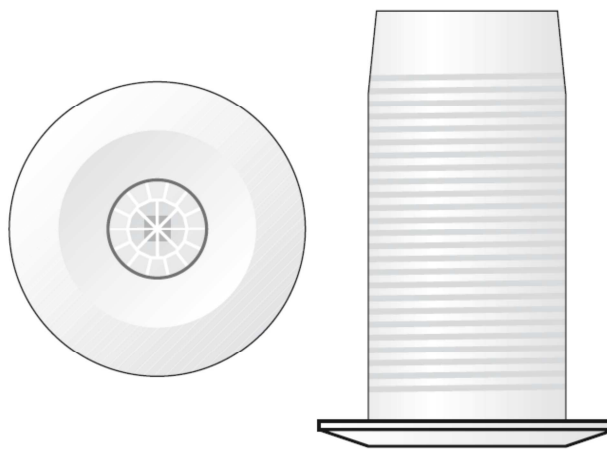
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## 1 GENERAL DESCRIPTION

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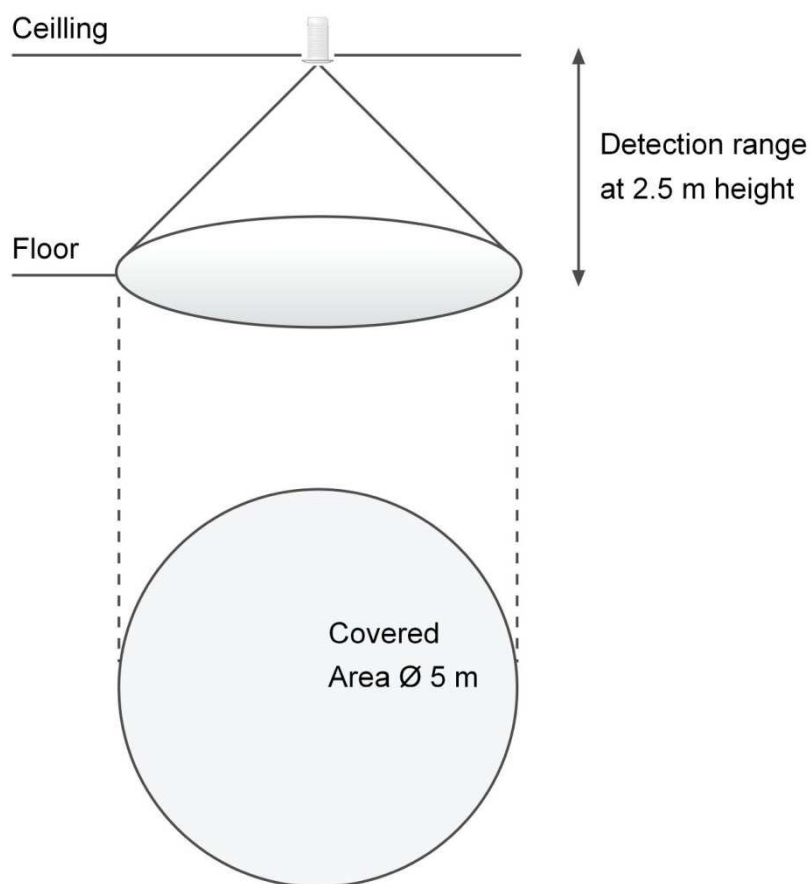
The SIFKNX is a motion detector that has a passive infrared sensor which detects any movement within its detection range. It has a high level of immunity from false alarms, electromagnetic fields and temperature variations. It allows a wide and easy parameterization, being suitable for lighting functions, as well as people detection and intruder control. It also includes an additional channel that can work in dependence of daylight or permanently depending on the parameterization.

These types of detectors are indicated to be placed inside homes, buildings, etc. Avoid installation in places exposed to direct sunlight and drafts. Also, avoid placing these detectors behind large objects as these will reduce their detection range.



## 2 TECHNICAL INFORMATION

- Supply - 24Vdc KNX BUS.
- Consumption - 4mA @ 24Vdc.
- Connections - BUS connection terminal KNX.
- 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 - Ø Embedded: 25mm / Ø Seen: 36mm / Length: 50mm.
- Mounting - Mounted on the ceiling (embedded).
- Norm CE - According to the directives of electromagnetic compatibility and low voltage. •EN 50090-2-2 / UNE-EN 61000-6-3:2007 / UNE-EN 61000-6-1:2007 / UNE-EN 61010-1.
- Detection range - Ø 5 m at 2.5 m 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 bytes	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	2 bytes	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 bytes	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 / Brightness threshold	2 bytes	7.* (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 this object of the master.

**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 this object of the master.

### Object 11: Channel 2 –Remaining time / Brightness threshold

This object can have two functions depending on the initial brightness threshold parameter:

- **Brightness threshold = 0:** the channel will work as motion sensor (brightness independent).

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

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

- **Brightness threshold ≠ 0:** the channel is configured as brightness dependent.

Read function: the object answers the current brightness level measured by the sensor (in %).

Write function: Threshold for brightness dependent switching of channel 2 (7.\* 2-bytes unsigned value)

1) High byte = 0: Teach-in function.

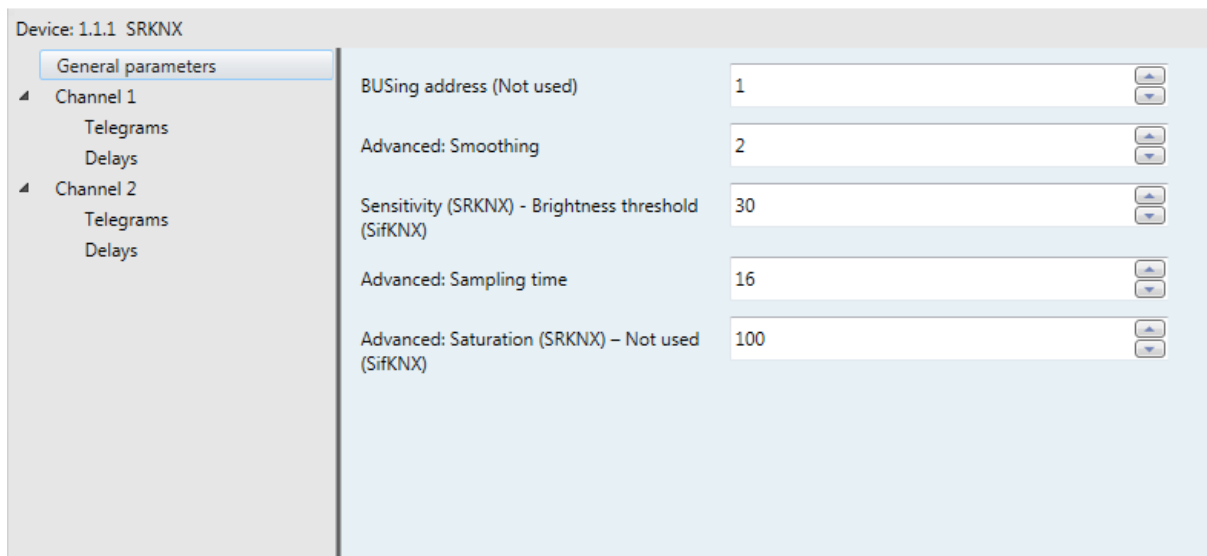
To set the threshold with the current brightness value send 2 bytes raw [0 0] to object. The brightness value is stored and overwrites the previous one.

2) High byte = 1: Manual brightness setting.

To set the threshold manually send 2 bytes raw [1 X] to object, being X the new brightness value from 0-100%.

## 3.3 PARAMETERS

### 3.3.1 GENERAL PARAMETERS



Device: 1.1.1 SRKNX

Parameter	Value
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

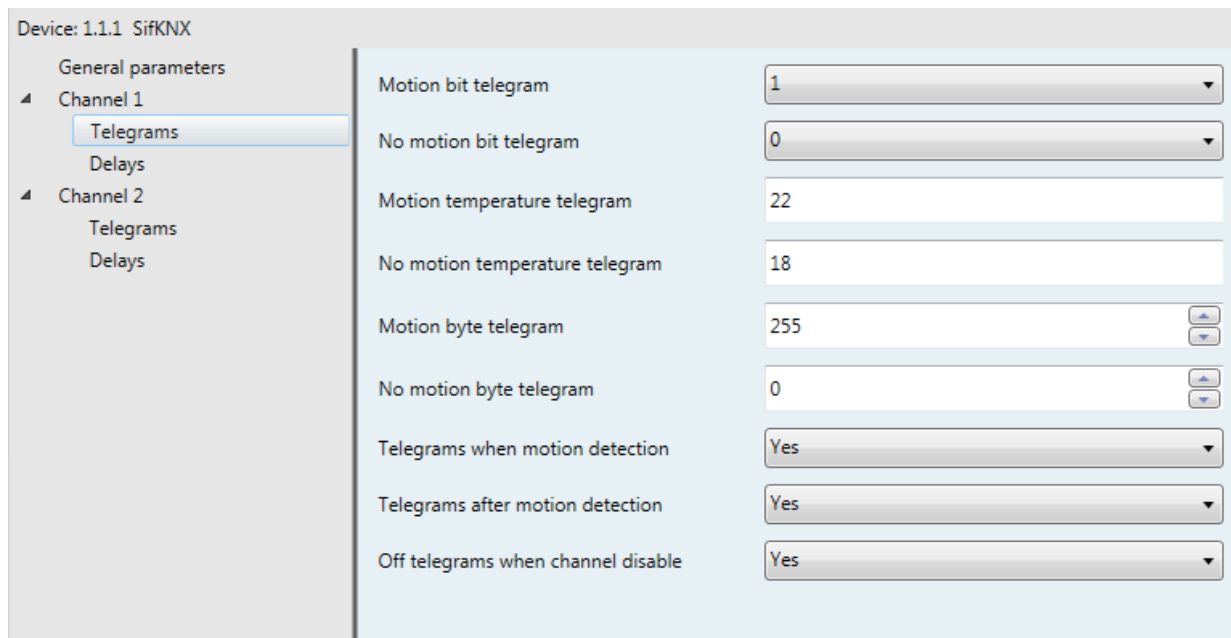
General parameters allow to set the detection characteristics of the sensor and are described as follows:

<b>BUSing Address</b>	
Values	From 0 to 255
Description	Not used
<b>Advanced: smoothing</b>	
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 Control Cycles parameter.</p> <p>Recommended values depending on usage:</p> <ul style="list-style-type: none"> <li>– Movement detection (example: activate lighting): 2.</li> <li>– Intrusion detection: 8.</li> </ul>
<b>Brightness threshold.</b>	
Values	From 0 to 100
Description	Initial threshold for brightness dependent switching of channel 2.
<b>Advanced: Sampling time</b>	
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"> <li>– Movement detection (example: activate lighting): 16.</li> <li>– Intrusion detection: 64</li> </ul>
<b>Advanced: Saturation</b>	
Values	From 0 to 100
Description	Not used.



### 3.3.2 CHANNEL 1/2 EVENTS

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:



Device: 1.1.1 SifKNX

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

Configuration parameters for Channel 1:

- 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

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 SifKNX

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

Channel enable delay (sec.)	<input type="text" value="0"/>	▲ ▼
Channel disable delay (sec.)	<input type="text" value="0"/>	▲ ▼
Channel switch off delay (retrigger)	<input type="text" value="0"/>	▲ ▼

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.

<b>Channel disable delay</b>	
Values	From 0 to 65535
Description	The channel keeps detecting motion until the disable delay time set has elapsed.
<b>Channel enable delay</b>	
Values	From 0 to 65535
Description	The channel does not respond until the enable delay time set has elapsed.
<b>Channel switch-off delay</b>	
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

### 3.4 ADVANCED CONFIGURATION

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#### 3.4.1 BRIGHTNESS THRESHOLD

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The SifKNX incorporates a brightness sensor that is able to measure ambient brightness from 0 to 6000 luxes approximately. The values introduced by the programmer are percent values from 0 to 100% following a linear proportion with this range of luxes.

Manual configuration: use the communication object number 11: "Channel 2 – Brightness threshold" to read the current brightness value measured by the sensor once installed in order to set a correct threshold for the lightning switching.

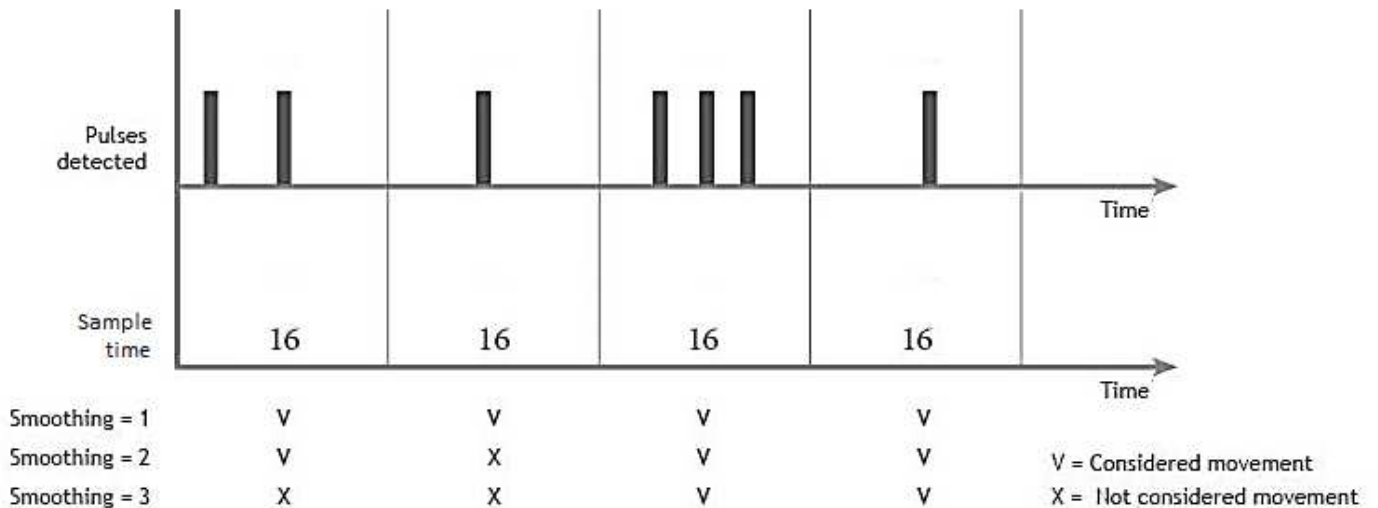
Auto configuration: use the teach-in function by sending [0 0] to object number 11 to set the current brightness level as the new brightness threshold.

See 3.2 Objects description for further information.

### 3.4.2 SMOOTHING AND SAMPLING TIME

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

The SifKNX behavior depending on the parameters configured is shown in the next figure:



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 APPLICATION NOTES

### 4.1 MOTION AND BRIGHTNESS-DEPENDENT SWITCHING

#### 4.1.1 DEVICES

SifKNX: Motion/Brightness double channel sensor.

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


#### 4.1.2 DESCRIPTION

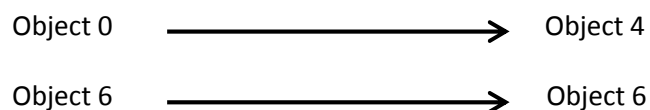
Light 1 and 2 are connected to outputs 1 and 2 (Z1 and Z2) of the 6E6S-KNX actuator.

The SifKNX controls the light number 1 by motion detection (15 seconds on). The light number 2 will be controlled by motion (20 seconds on) but only when the current brightness value is higher than the threshold.

#### 4.1.3 OBJECTS LINKS

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

SifKNX –  Object 6 ->  Object 6 – 6E4S-KNX



#### 4.1.4 PARAMETER SETTINGS

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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
	Brightness threshold	20
	Sampling time	16
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 3.4 Advanced configuration for further information.

## 4.2 MASTER / SLAVE MODE: 1 LIGHT AND 3 SENSORS

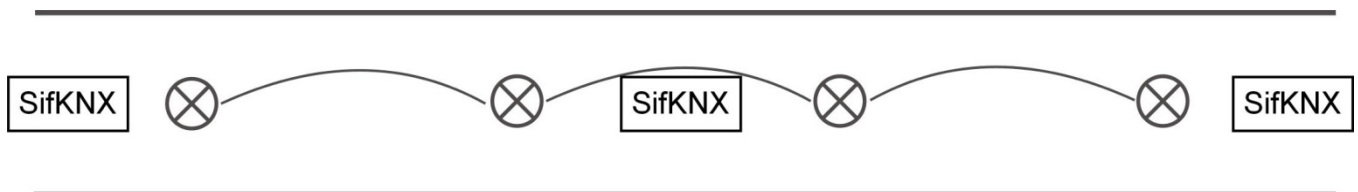
### 4.2.1 DEVICES

3 x SifKNX: Motion/Brightness double channel sensor.

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

### 4.2.2 DESCRIPTION

A circuit is connected to output 1 (Z1) of the 6E6S-KNX actuator and lights are placed along a corridor. Three SifKNX 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.

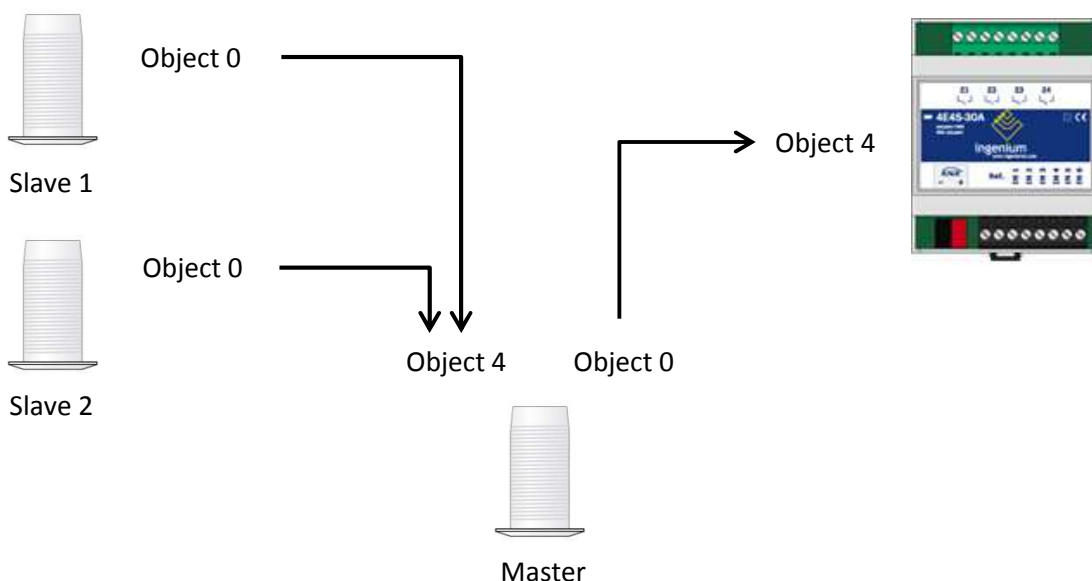


### 4.2.3 OBJECTS LINKS

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

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

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



#### 4.2.4 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
	Sampling time	16
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 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.



## 4.3 MANUAL ON AND AUTOMATIC OFF

### 4.3.1 DEVICES

SifKNX: Motion double channel sensor.

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

KNX Pushbutton

### 4.3.2 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.

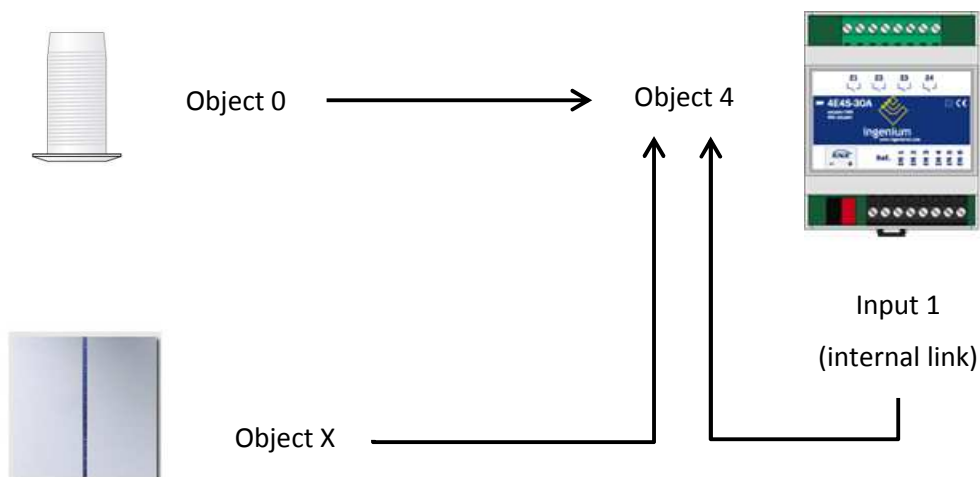
The light of the room is connected to the output 1 (Z1) of the 6E4S-KNX actuator and it should be switched on manually as required with the input of the device (I1) or any other KNX push-button.

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.

### 4.3.3 OBJECTS LINKS

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

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



#### 4.3.4 PARAMETER SETTINGS

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

<b>Parameter name</b>		<b>Recommended setting</b>
General parameters	Smoothing	2
	Sampling time	16
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 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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