Technical Manual

SATION Presence Detector

SATION-SS3001.1

SATION-SS3002.1

1 Content

2 Overview

2.1 Overview Devices

The Manual refer to the following devices :

● SATION- SS3001.1 Passive Infrared Detector, 1 sensor
● SATION- SS3002.1 Microwave Presence Detector, 1 sensor

Passive Infrared Detector （PIR） or microwave Presence detection, the sensitivity degree on the programming status （1 Level ~ 10 Level）, switching options for movement and lightness, separate communication object for night, Master/Slave function, Standby‑/Orientation light.

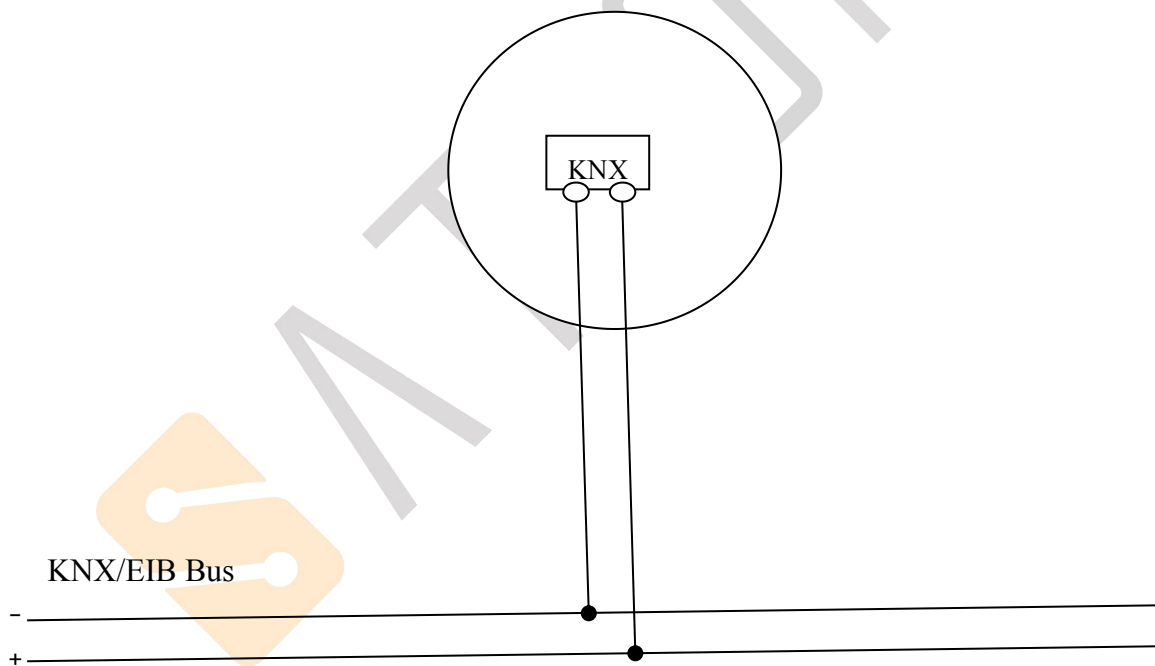## 2.2 Exemplary Circuit diagram

Figure 1 : Exemplary Circuit Diagram

2.3 Usage ＆ Areas of use

The SATION Presence Detector switches the light accordingly to the brightness and presence. It can be used for switching on demand to switch the light economically. Especially in public buildings, but also in rarely used rooms as bath and WC, the presence detector can be used to minimalize the non‐essential switching periods. An additional channel transmits informations about presence in the room to other subsections as Heating‐control, air‐conditioning, ventilation or shutter controlling.So the presence Detector can also be employed in a subsection comprehensive use.Due to it's small outline structure,installed in the ceiling is not easy to be found.

2.4 Detection area

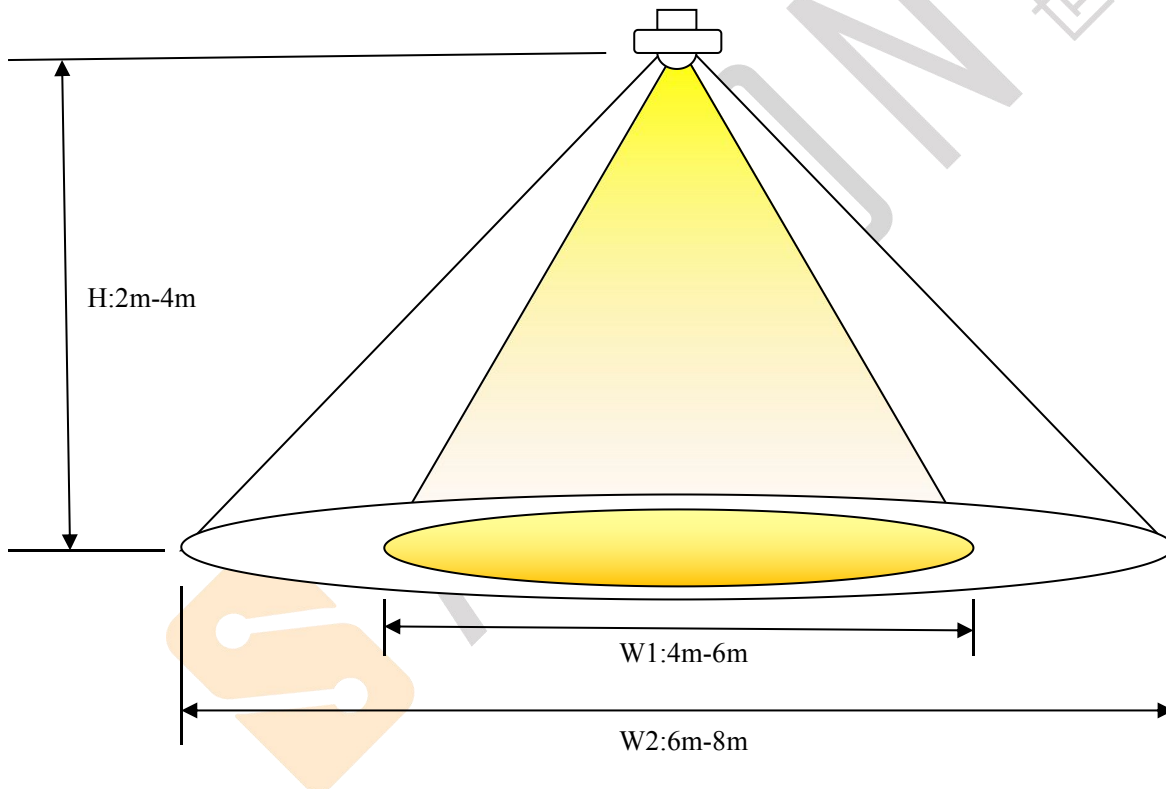The following figure shows the detection area of the presence detector:

Figure 2：Detection area

High ： Normal operating range: 2m ~ 4m, Range of sensitivity: 2.5m ~ 3m，recommend: 2.7m;
Angle：Detection angle about 100 °;
Weight 1 ：High sensitivity area， range：4m ~ 6m（PIR：sensibility level 10）;
Weight 2 ：Maximum sensitivity area， range：6m ~ 8m（PIR：sensibility level 10）;

2.5 Function

The functions of the presence detector are divided in the areas general settings, settings for the light control, the HCV‑channel, the sending behavior, the calibration for the brightness value and according to the the hardware type, the constant level light control.

The following menus are shown and can be parametrized further:

- **General**

  The general settings are used for the basic settings of the presence detector. The using of the day/night object, and the presence object as well as the force control release time and a cyclic heartbeat can be configured in this menu.

- **Select light groups**

  One light group and one HVC channel can be activated in this menu.

  O   Lightgroup 1

  The settings for the presence mode can be done here. So the operating mode of the light group, the sending behavior and a brightness threshold can be adjusted.

  O   HCV Channel

  The Heating‑, Ventilation‑, Clima‑channel is the interace of the presence detector to other subsections. The HVC‑channel contains of the same options as the light groups.

- **Brightness**

  Settings fort he sending of the measured brightness value and a treshold value can be adjusted Here.

- **Calibration brightness value**

  The correction of the measured brightness value can be adjusted by a steady parameter or via the Teach-In object.

2.6 Overview Functions

General settings	general	• cyclic heartbeat telegram
		• force control release time
		• Day-/Night-object
Light groups	Detector settings	• Operating mode adjustable
		• LED-display adjustable
		• Follow-Up time adjustable
		• Brightness threshold adjustable
		• Blocking object/ Force control object
	Sending behavior	• Object type adjustable
		• Polarity adjustable
		• Dependency of day/night adjustable
		• seinding filter adjustable
		• cyclic sending
HCV	Detector settings	• Operating mode adjustable
		• LED-display adjustable
		• Follow-Up time adjustable
		• Brightness threshold adjustable
		• Blocking object/ Force control object
	Sending behavior	• Object type adjustable
		• Polarity adjustable
		• Dependency of day/night adjustable
		• Sending filter adjustable
		• Cyclic sending
Brightness value	Sending behavior	• At changes
		• Cyclic sending
		• Threshold adjustable
		• Hysteresis adjustable
		• Object value adjustable
		• Sending filter adjustable
	Calibration	• Via parameters
		• Via Teach-In

Table 1：overview functions

2.7 Starting up

After wiring the allocation of the physical address and the parameterization of every channel follow:

(1) Connect the interface with the bus, e.g. MDT USB interface

(2) set bus power up

(3) Press the programming button at the device(red programming LED lights)

(4) Loading of the physical address out of the ETS-Software by using the interface(red LED goes out, as well this process was completed successful)

(5) Loading of the application, with requested parameterization

(6) If the device is enabled you can test the requested functions(also possible by using the ETS Software)

3 Communication objects

3.1 Overview

The communication objects are divided into the categories of the submenus.

The objects 0-12 are reserved for the lightgroups. The displayed objects and the length of the objects change in accordance of the adjusted settings.

The objects 14 is for the day/night switchover and can be activated via the general settings. Also the object 15- "Presence"can be activated in the general settings.The objects 16 and 17 refer to the menu brightness value and the threshold value.

After these objects, the objects for the Teach-In function follows. The Teach-In function is for the internal brightness compensation, especially for the constant light function.

The object 20 "Output Heartbeat"can be parametrized in the general settings.

3.2 Default-setting of the communication objects

The following table shows the default settings of the communication objects:

Default settings					
No.	Name	Function	Purpose	Type of data point	Read/Write
0	Output – Lightgroup 1	Switch	light group switching control	DPT 1.001	Read
0	Output – Lightgroup 1	Dimming absolute	Absolute value dimming	DPT 5.001	Read
0	Output – Lightgroup 1	Scene	Scene control of light group	DPT 17.001	Read
1	Output – Lightgroup 1 Night mode	Switch	Night mode light group switching control	DPT 1.001	Read
2	External Input – Lightgroup 1	Switch	Output control light group（indicate object of button or actuator）	DPT 1.001	Write
3	Input external Movement -Lightgroup 1	Switch	Output to control light group（The second detector）	DPT 1.001	Write
4	Input – Lightgroup 1	Force control	Manual control object	DPT 2.001	Write
4	Input – Lightgroup 1	Lock	Lock object（general）	DPT 1.003	Write

5	Input – Lightgroup 1	Lock object On	Lock object（1 command）	DPT 1.003	Write
7	Output - HCV	Switch	HCV switching control	DPT 1.001	Read
7	Output - HCV	Dimming absolute	HCV absolute value adjustment	DPT 3.001	Read
7	Output - HCV	Scene	HCV scene control	DPT 17.001	Read
9	External Input - HCV	Switch	Output control HCV （indicate object of button or actuator）	DPT 1.001	Write
10	Input external Movement -HCV	Switch	Output control light group（The second detector）	DPT 1.001	Write
11	Input - HCV	Force control	Manual control object	DPT 2.001	Write
12	Input - HCV	Lock	Lock object（general）	DPT 1.003	Write
13	Input - HCV	Lock object On	Lock object（1 command）	DPT 1.003	Write
14	Input Day/Night	Switch	Day/night switch	DPT 1.002	Read
15		Switch			
16	Threshold switch brightness	Switch	Brightness threshold switch toggle	DPT 1.001	Read
17	Brightness value	Brightness value	Brightness value	DPT 9.004	Read
18	Input TeachIn	Start calibration	Start the calibration（logic 1）	DPT 1.001	Write
20	Output heartbeat	Status	Heartbeat state	null	Read

Table 2:Default settings communication objects

4 Reference ETS-Parameter

4.1 General

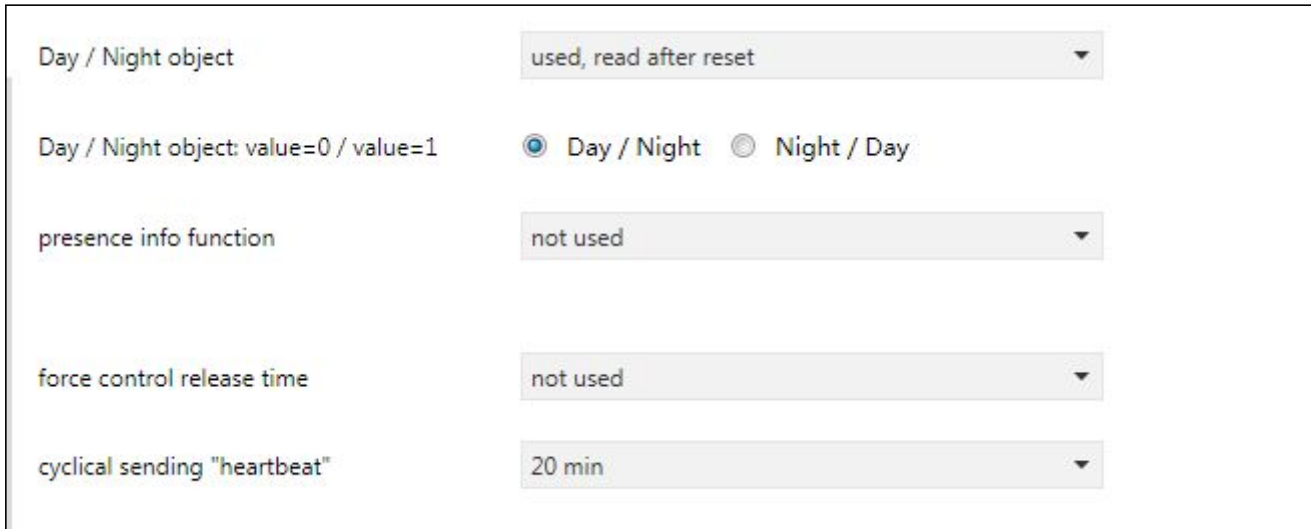The following figure shows the submenu for the general settings:

Figure 3: General settings

The following table shows the available settings for this submenu:

ETS-Text	Dynamic range [Default value]	Comment
Day / Night object	● not used ● use ● **use ,read after reset**	Adjustment if a day/night object shall be used and definition of the usage after reset
Day / Night object value = 0 / value = 1	● **Day / Night** ● Night / Day	Polarity of the Day / Night object
movement active sensitivity (1 = min,10 = max;def. = 5)	1 — 10 **[5]**	Movement active sensitivity，1 level to 10 level
Force control release time	● **not used** ● 5 min – 12 h	Time which must ran out until the detector changes to the automatic mode again
Cyclical sending "heartbeat"	● **not used** ● 2 min – 24 h	Shows object for the cyclic observation of the detector

Table 3: Dynamic range general settings

The functions are described at the following：

● **Day / Night object**

By using the day/night object, the presence detector can be switched into a day or night mode. So extended functions in the submenus are available for configuring the presence detector for a day and a night mode. For example different dimming levels can be adjusted for day (e.g. 100%) and night (e.g. 30%) or a orientation light can be switched on via a second switching object at night.

● Force control release time

 The force control release time defines the time which must expirate until the presence detector changes from the manual mode into the automatic mode.

● Cyclical sending "heartbeat

 The function Cyclical sending "heartbeat"shows an object, which can be used for the cyclically observation of the presence detector. By using superior control, it can be supervised if the presence detector is still on the bus or not. Especially in complex systems, the cancellation of lines or devices can be detected automatically.

● Movement active sensitivity

 Setting movement active sensitivity , 1 level to 10 level , the lowest sensitivity level is 1. The highest sensitivity level is 10. Sensitivity more higher the detection area more bigger. Set low sensitive can prevent mistake trigger for microwave detector.

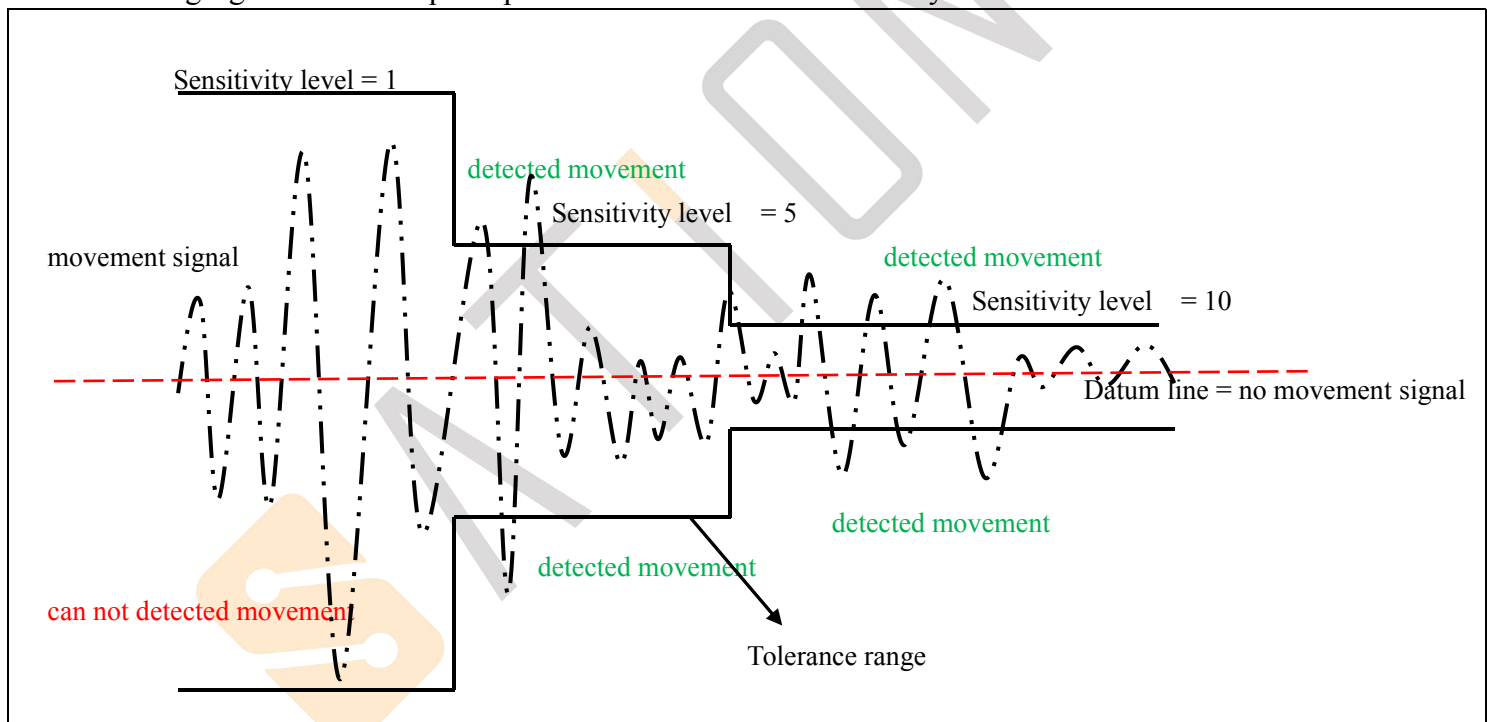The following figure shows the principle of movement active sensitivity.

Figure 4：Movement active sensitivity

The above figure shows different sensitivity level have different effort for movement signal. Red dashed is a datum line of detection signal. (in the case of without movement signal) , the range of signal within 10 level is signal fluctuation without movement signal, to prevent trigger operation.

The following table shows each sensitivity level detection range.

Sensitivity level	Microwave detector detection range	PIR detector detection range
1 level	Diameter range：6m；high 3m；	Diameter range：3m；high 2.7m；
2 level	Diameter range：7m；high 3m；	Diameter range：3.5m；high 2.7m；
3 level	Diameter range：8m；high 3m；	Diameter range：4m；high 2.7m；
4 level	Diameter range：8.8m；high 3m；	Diameter range：4.6m；high 2.7m；
5 level	Diameter range：10.5m；high 3m；	Diameter range：5.2m；high 2.7m；
6 level	Diameter range：11.5m；high 3m；	Diameter range：5.7m；high 2.7m；
7 level	Diameter range：16.5m；high 3m；	Diameter range：6m；high 2.7m；
8 level	Diameter range：18m；high 3m；	Diameter range：6.6m；high 2.7m；
9 level	Radius range：about 12m；high 2.7m；	Diameter range：7.2m；high 2.7m；
10 level	Radius range：about 18m；high 2.7m；	Diameter range：7.6m；high 2.7m；

Table 4：sensitivity level detection range

From the date of above table, microwave detector's detection range more bigger than PIR detector detection range, choosing the lower sensitivity level can prevent mistake trigger in practical application. 9 level and 10 level can be used in special occasions, such as underground garage, warehouse etc.

4.2 Light　/ HCV

One lightgroup and one Heating, Cooling, Ventilation (HVC) can be switched by the presence detector.

There are two choice in the following table:

select groups	⦿ One light group
	○ One light group and climate (HCV)

Table 5：Selection Lightgroups

Function description:

Parameter name	Range [Default value]	comment
Select Groups	● **One light group** ● One light group and climate(HCV)	Define presence detector should switch which groups

Table 6: Selection parameters group

4.2.1 Detector configuration

The following illustration shows the available settings for detector at a light group：

Figure 5：Settings light group

At the HVC Mode the brightness treshold is replaced by the parameter "number of monitoring time slot" and "length of monitoring time slots":

Figure 6：Settings HVC

The following chart shows the available settings for these parameters:

ETS-Text	Dynamic range [Default value]	Comment
Operating mode of detector	● **full automatic** ● semi automatic	Adjustment of the operating mode
LED green (only at light group 1)	● Off ● **Show movement** ● Show movement on day only	Definition of the switching behavior of the green LED
Follow-up time	1s – 4h **[5 min]**	Definition of the On-period
Lower enable brightness threshold(only at light groups)	0–2000 Lux **[400 Lux]**	Adjustment below the detector shall work; the sensor is not active at greater brightness values.
Upper disable brightness threshold(only at light groups)	**not used**, 10 – 2000 Lux	Adjustment at which upper value the detector is disabled
Number of monitoring time Slot(only at HCV)	0 – 32 **[3]**	Definition how much motions must be detected before the presence detector switches on
Length of monitoring time Slot(s)(only at HCV)	0 – 30000s **[30s]**	Adjustment oft he length of the monitoring time slot
Force or lock object	● **Force control object** ● Lock object universal ● Lock object universal and Force object ON	Adjustment if a force control object or a lock object shall be used

Table 7：Setting detector

The parameters are described in detail as follows:
● **Operating mode**
   The operating mode is divided into fully automatic and semi automatic. So the presence
   detector can be configured for greater rooms as Maser/Slave. The Master/Slvae mode is
   described in detail in an extra chapter.
   O fully automatic
    If the presence detector is configured as fully automatic, every detected presence causes power-on of the
    output.
   O semi automatic
    At the semi automatic mode, the output is only switched on if the detector detects a presence
    and the object External Input – light group 1/2 /HCV receives an on-signal at the same time.
● **Follow-up time**
   The follow-up time defines the power-on time. The detector switches on at detected presence until the
   adjusted follow-up time runs out.
● **Sensor activation/-deactivation**
   The sensor activation is only available at light groups.By using this setting, the detector can get a determined working zone.

The parameter"Lower active brightness threshold"defines the brightness threshold, no motion will be detected. The sensor is not switched off upper this threshold.This behavior can be achieved by using the parameter"Upper disable brightness threshold".This value should not be adjusted to low, because this could effect a steady switching of the output.

● **Monitoring time slots**

The Monitoring time slots are only available fort he HCV channel. This setting causes that a longer detzection is necessary for switching the detector on. For switching the channel on, in every time slot a at least one motion must be detected.

● **Force control / Lock object**

The object can be used as well as force conbtrol object or as lock object. The force control object has 3 different states:

O   Force control ON (control = 1,value = 1)

At this mode an on-command is sent to the output. The evaluation is stopped and the follow-up time starts. If no command is received at the force control object after the follow-up time, the detector switches back into the normal mode.

O   Force control OFF(control = 1,value = 0)

At this command an off-command is sent to the output. The evaluation is stopped and the follow-up time starts. If no command is received at the force control object after the follow-up time, the detector switches back into the normal mode.

O   Force control AUTO (control = 0,value = 0)

After sending this command, the normal mode of the detector starts.

The lock object can be used with the following settings for the activation and deactivation:

O   Force control ON

Same functionality as described at Force Control ON.

O   Force control OFF

Same functionality as described at Force Control OFF.

O   Automatic mode

The detector switches again to the automatic mode.

O   Lock(actual state)

The detector is locked in the current state.

Additional a second lock object can be shown for the lock object, the lock object ON. This object switches the output continuous ON.

4.2.2 Communication object settings

The following chart shows the available settings for the communication objects of the light groups/HCV


Figure 7:Communication object settings light groups/HCV group

The following table shows the available settings for these parameters:

ETS-Text	Dynamic range [Default]	Comment
Object type for output-light	• **Switching(On/Off)** • Dimming absolute(0%—100%) • Scene(1—32)	Adjustment oft he switching object of the light group output
Object type for output-Climate(HCV)	• **Switching(On/Off)** • Send value(0%—100%) • Scene(1—32)	Adjustment oft he switching object of the HCV output
Object value on day for On	• **On**/Off • 0-100%**[100%]** • Scene 1-32**[5]**	Adjustment of the sending at this state
Object value on day for Off	• On/**Off** • 0-100%**[0%]** • Scene 1-32**[6]**	Adjustment of the sending at this state
Object value on night for On	• **On**/Off • 0-100%**[100%]**	Adjustment of the sending at this state

	● Scene 1-32[7]	
Object value on night for Off	● On/**Off** ● 0-100%[0%] ● Scene 1-32[8]	Adjustment of the sending at this state
Use 2. Switch object at night (only at light groups and Object type switch)	● Yes ● **No**	shows a second switching object fort he night mode, e.g. for switching an orientation light
Standby/Orientation light (only at light groups and Object type dimming absolute)	● Used ● **not used**	Activation of a standby function, which starts after expiration of the follow-up time
Standby time on day/night	● no delay ● 1s – 60min	Adjustment of the duration of the standby time
Standby dimming Value on day/night	1-100% [1%]	Adjustment of the dimming value for the standby function
Switching object send at (only at object type switching)	● Send nothing ● Only ON ● Only OFF ● **ON and OFF**	Send filter for output object
Cyclical sending of object Value ON	● not used ● 1min – 60min	Activation of cyclic sending
External input reacts on	● Send nothing ● Only ON ● Only OFF ● ON and OFF	Input filter for the object External Input – light group 1/2/HCV
Idle time after switch off	1s – 60s [10s]	Time, which must expire after swiotching off for detecting a new movement

Table 8：Communication object setting presence function
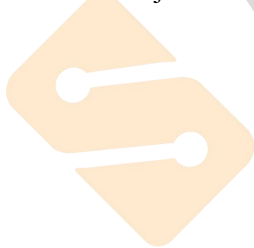
The following chart shows the relevant communication objects for the light group:

Number	Name	Length	usage
0	Output – light group 1	1 Bit/ 1 Byte	Output for the first light group; Length and type depends to the parameter Object type for output
1	Output –light group 1 night mode	1 Bit	Output for the orientation light at night mode
2	External input – Light group 1	1 Bit	External input for Push Buttons/Indication object of an actuator for switching the light
3	Input external movement - light group 1	1 Bit	External input for second detector
4	Force control	2 Bit	Force control object; switches the detector as described above
4	Lock	1 Bit	Lock object; switches the detector as the adjusted settings
5	Lock object ON	1 Bit	Lock object, which switches the detector on with a 1-command

Table 9：Communication objects light

If a second light group is activated, the same communication objects with the same functionality are shown. The following table shows the relevant communication objects for a HCV channel:

Number	Name	length	Usage
7	Output – climate(HCV)	1 Bit/ 1 Byte	Output for the HCV group; Length and type depends to the parameter Object type for output
9	External input – climate(HCV)	1 Bit	External input for Push Buttons/Indication object of an actuator for switching the HCV group
10	Input external movement - climate(HCV)	1 Bit	External input for second detector
11	Force control	2 Bit	Force control object; switches the detector as described above
11	Lock	1 Bit	Lock object; switches the detector as the adjusted settings
12	Lock object ON	1 Bit	Lock object, which switches the detector on with a 1-command

Figure 10：Communication objects HCV

4.3 Brightness

4.3.1 settings brightness

The following figure shows the available settings for the brightness detection:

send brightness on change of	50 Lux ▼
cyclical sending of light value	not used ▼
value for switching the threshold switch	300 Lux ▼
hysteresis of threshold switch	30 Lux ▼
object value on day for On	○ OFF ● ON
object value on night for On	○ OFF ● ON
object value for Off	● OFF ○ ON
send on day only	On and Off ▼
send on night only	On and Off ▼

figure 8：Settings brightness

The following table shows the available settings for these parameters:

ETS-Text	Dynamic range [Default value]	Comment
Send brightness on change of	● not used ● 20 Lux – 1800 Lux [**50 Lux**]	Minimum rate of change for sending the current brightness
Cyclical sending of light value	● **not used** ● 5s – 30min	Adjustment of a determined time span for sending the current brightness
Value for switching the Threshold switch	60 Lux – 1000 Lux [**300 Lux**]	Adjustment of the threshold for switching
Hysteresis of threshold switch	5 Lux – 200 Lux [**30 Lux**]	Distance between value for switching ON and OFF
Object value on day for On	● **ON** ● OFF	Adjustment of the polarity
Object value on night for On	● **ON** ● OFF	Adjustment of the polarity

Object value for Off	● ON ● **OFF**	Adjustment of the polarity
Send on day only	● Send nothing ● Only ON ● Only OFF ● **ON and OFF**	Sending filter at day mode
Send on night only	● Send nothing ● Only ON ● Only OFF ● **ON and OFF**	Sending filter at night mode

Table 11：Settings brightness

4.3.2 Brightness threshold

At the Menu brightness the sending behavior for the measured brightness value can be adjusted. The measured brightness value can be send at determined changes or at determined times. Additional a treshold can be defined. This threshold can be adjusted with a hysteresis for preventing of frequently switching. The effect of the hysteresis shows the following figure:
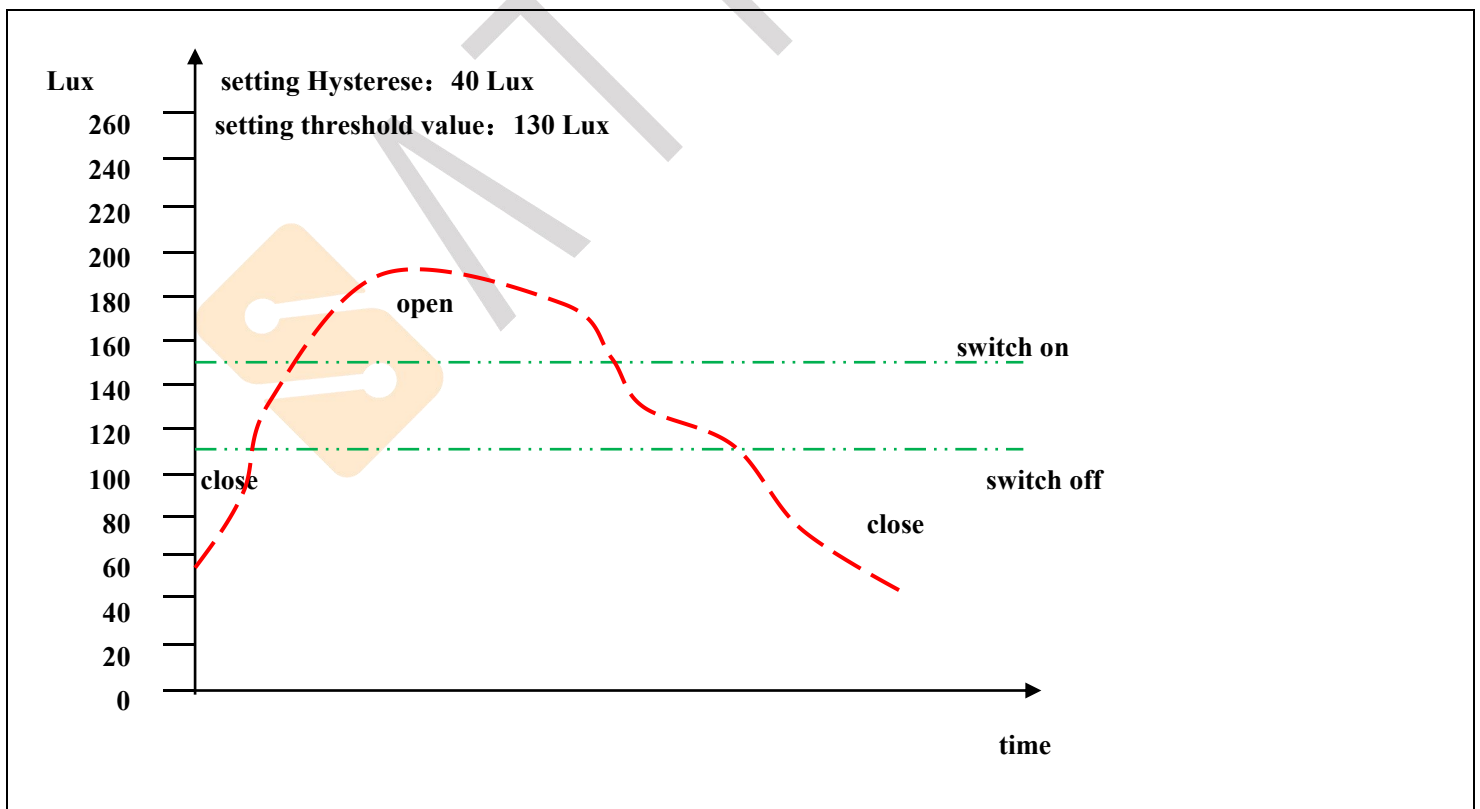

Figure 9：Hysteresis brightness threshold

Further more the polarity and the sending behavior can be adjusted by the parameters object value for day/night/off and "send on day /night only".

The following table shows the relevabt communication objects:

Number	Name	length	Usage
16	Threshold switch brightness	1 Bit	sends the adjusted value at exceedance or undercut
17	Brightness value	2 Byte	measured brightness value

Table 12：Communication objects brightness

4.4 Calibration brightness value

4.4.1 Calibration brightness value

The following figure shows the available settings for the calibration oft h e brightness value:
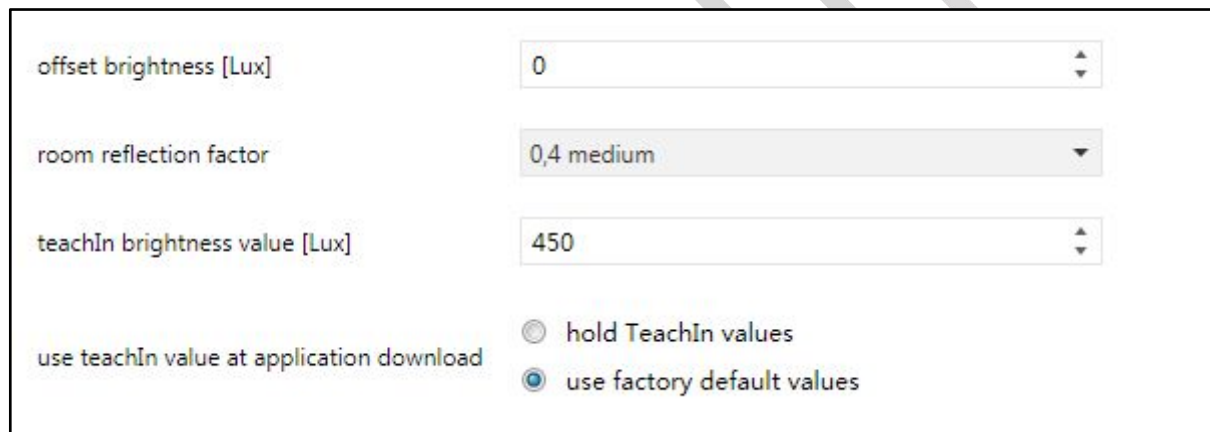
Figure 10：Calibration brightness value

The following chart shows the availbale settings for this parameter:

ETS-Text	Dynamic range [Default value]	Comment
Offset brightness [Lux]	-100 — 100 [0]	Increasing/Decreasing by the adjusted value
Room reflection factor	● 1 ● 0.7 very high ● 0.5 high ● **0.4 medium** ● 0.3 low ● 0.25 low ● 0.2 very low	Reflection factor of the environment; indicates how much light is reflected bach (1=100% / 0=0%)

Teach In brightness value[Lux]	200 — 1000 **[450]**	Comparison value for external import
Use TeachIn value at Application download	● Hold TeachIn values ● **Use factory default values**	Adjustment if the presence detector shall keep the TeachIn values after a download or use the factory default values

Table 13：Calibration brightness value

Consecutively the parameters are described in detail:

● **Offset brightness**

The correction of the brightness value is a simple offset of the measured brightness value. So at a value of -50, the measured value is reduced by 50. By this setting the presence detector would send at a value 0f 400 at measured value of 450.

● **Reflection factor**

The reflection factor indicates how much of the emitted light is reflected by the environment back to the light source. The value 1 means that 100% of the emitted light is reflected back to the light source. At dark floors, a value of 0,25, is recommended. Die nachfolgende Tabelle dient als Orientierung um den Reflexionsfaktor an Ihren Raum anzupassen:

Metalle, Farbanstriche, Baustoffe	Reflexionsgrad
Aluminium，High gloss	0.80—0.85
Aluminium，Matt	0.50—0.70
Stahl, poliert	0.50—0.60
white	0.70—0.80
Light yellow	0.60—0.70
Light green，light red，light blue，light gray	0.40—0.50
Beige，Ochre，orange，medium gray	0.25—0.35
Dark grey，crimson，navy blue	0.10—0.20
Gesso, white	0.70—0.85
Gesso	0.70—0.80
concrete	0.30—0.50
Brick red hue	0.10—0.20
Clear glass	0.05—0.10

Table 14：List of reflection factors

If no TeachIn is performed, the measured brightness can be corrected with the reflection factor. If a TeachIn is performed, the brightness value is corrected automatically. The TeachIn must not be changed after the TeachIn process. The Adjsutment via TeachIn is especially for the constant light function important. The approach is described at the following chapter.Oft werden in der Lichtplanung folgende Standardwerte verwendet: Decke: 0,7 Wand: 0,5 Boden: 0,3

4.4.2 Approach at Teach-In

For using the whole advantages oft he intelligent constant light control, the presence detector must be adjusted once via the Teach-In process. Therefore a luxmeter is needed. The approach is as follows:

1. Adjust the parameter "Teachin brightness value"to the desired brightness value. The best way doing the Teach-In process is to darken the room and switch the artificial lights on. Now the brightness must be measured via a luxmeter and the measured value must be set for the parameter"Teachin brightness value".

2.Adjust the Parameter"Use Teachin value at application download"from "Use factory default values"to "hold Teachin values"

3. Connect the object "18-Calibration start"with a new group address,if the calibration shall be activated via the ETS (Group monitor)or with a push button.

4.Download the application.

5.Active the Teach-In function by sending a logical 1 to the object 18.

6. Now the presence detector has adopted the adjusted value as new measurand and corrects its measurement from now according to the Teachin value.

4.5 Master/Slave

4.5.1 Light groups

In large rooms often more than one presence detector is required. For detecting presence all over the room, presence shall cause always the same settings independent of the place of detection.In this case one detector operates as Master and a arbitrary number of presence detectors work as slave. The settings for the Master/Slvae mode can be done in the submenu "light groups".
The slaves must be configured as follows:

- Adjustment to fully automatic (every movement shall be sent)
- Set follow-up time tot he same value as the Master
- Activate cyclic sending for the output
  - O Parameter: Cyclical sending of object value ON
  - O Guidance value: 1min, at greater Follow-up time, e.g. 15min, the cyclical sending can be set up to a greater value, e.g. 5min, for minimzing the bus load
- Brightness value for "lower active brightness threshold"to maximum value
- Brightness value for "upper disable brightness threshold"to not used

The Master can be parameterized as desired as fully automatic or semi automatic. For the follow-up time a value of 10 min is recommended.

The connection of the objects must be done as follows:
- all output objects of the Slaves (object 0) must be connected withe the object external movement (object 3) of the Master.

Now the Master evaluates every degtected presence of itself and the detected presence of every Slave and switches the light according to its settings, regardless which presence detector has detected a movement.

4.5.2 HCV

The Master/Slave circuit can alos be used for HCV channels. In this case, the slave must be adjusted in the same way as the slaves for the light groups. But the settings for the brightness values have not to be applied. The settings for the monitoring time slots must be maded according to the individual desires.

The connection of the communication objects must be done as follows:

● All output objects of the slaves (object 0) must be connected to the object external movement (object 10) of the Master.