ATTACHMENT
PRESENCE DETECTOR
KNX-301-0X2-IN

CONTENTS

1. OVERVIEW

1.1. OVERVIEW DEVICES

Passive Infrared (PIR) Presence Detector with constant level light or microwave Presence detection with constant level light, the sensitivity degree on the programming status (1 Level ~ 10 Level), According to Movement and Brightness change control, control options including one light group and one HCV channel, Day and night control objects independently. Master/Slave function, constant level light function etc.

1.2. EXEMPLARY CIRCUIT DIAGRAM

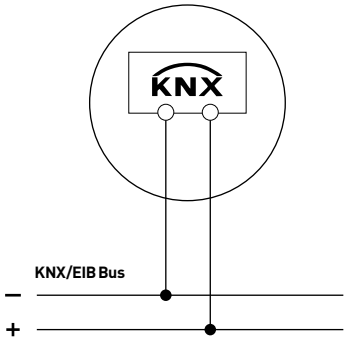

Figure 1: Exemplary Circuit Diagram

1.3. USAGE&AREAS OF USE

The 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.

1.4. DETECTION AREA

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

1.5. 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.

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.

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.

1.6. 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

1.7. 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)

2. COMMUNICATION OBJECTS

2.1. 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.

2.2. 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

3. REFERENCE ETS-PARAMETER

3.1. GENERAL

The following figure shows the submenu for the general settings:

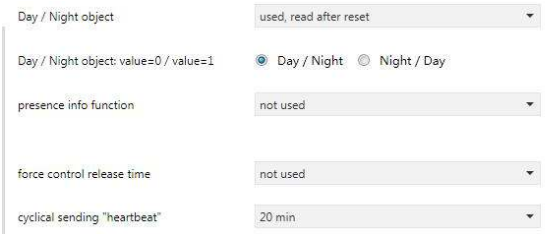

Figure 3: General settings

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.

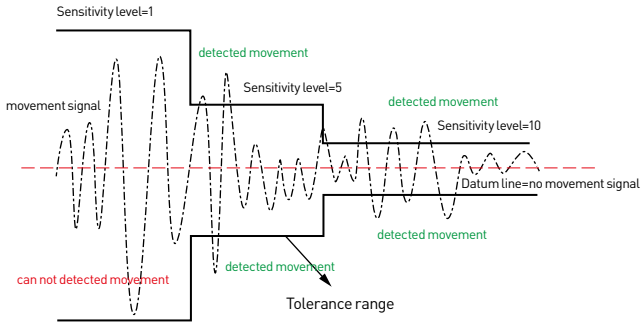

Figure 4: Movement active sensitivity

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.

3.2. 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:

Figure 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 5: Selection parameters group

3.2.1. DETECTOR CONFIGURATION

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

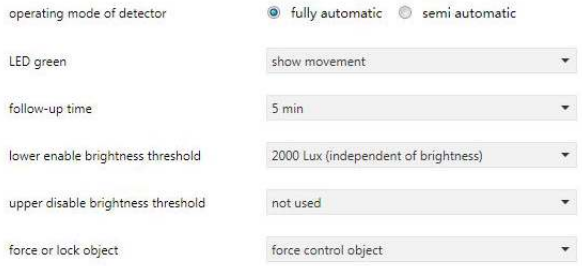

Figure 6: Settings light group

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

Figure 7: 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 6: 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.

- **fully automatic**
  If the presence detector is configured as fully automatic, every detected presence causes power-on of the output.
- **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:

- **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.
- **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.
- **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:

- **Force control ON**
  Same functionality as described at Force Control ON.
- **Force control OFF**
  Same functionality as described at Force Control OFF.
- **Automatic mode**
  The detector switches again to the automatic mode.
- **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.

3.2.2. COMMUNICATION OBJECT SETTINGS

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

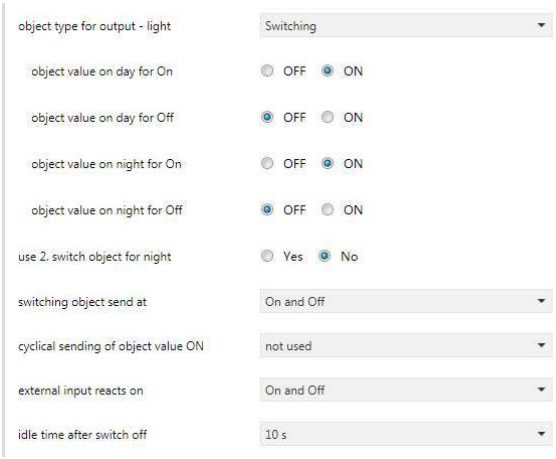

Figure 8:Communication object settings light groups/HCV group

The following table shows the available settings for these parameters:

ETS-Text	Dynamic range **[Default value]**	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%]** Scene 1-32 **[7]**	Adjustment of the sending at this state
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 7: Communication object setting presence function

The following chart shows the relevant communication objects for the light group:

NO.	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 8: 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:

NO.	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 9: Communication objects HCV

3.3. BRIGHTNESS

3.3.1. SETTINGS BRIGHTNESS

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

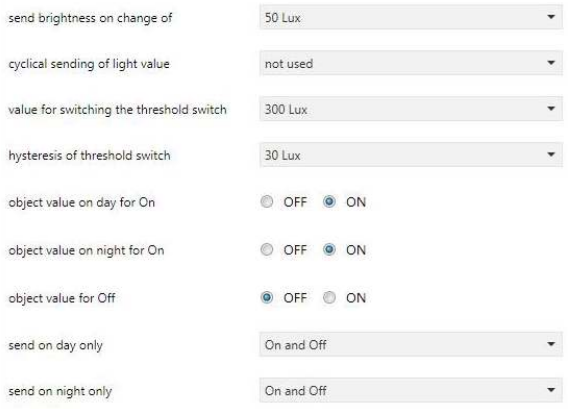

Figure 9: Settings brightness

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 10: Settings brightness

3.3.2. 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:

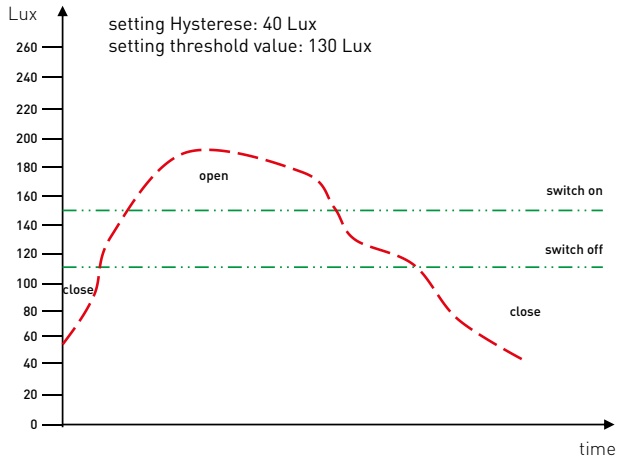

Figure 10: Hysteresis brightness threshold

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:

NO.	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

3.4. CALIBRATION BRIGHTNESS VALUE

3.4.1. CALIBRATION BRIGHTNESS VALUE

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

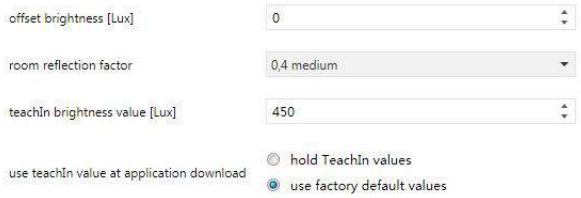

Figure 11: Calibration brightness value

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 12: 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 13: List of reflection factors

If no TeachIn is performed, the measured brightness can be corrected with the reflection factor. If a TeachIn isperformed, 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.

3.4.2. APPROACH AT TEACH-IN WITH CONSTANT LEVEL LIGHT

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. Mostly 400-500 Lux are used
2. Adjust the Parameter "Use TeachIn value at application download" from "Use factory default values" to "hold TeachIn values".den gewünschten Wert.
3. Make the desired settings fort he constant light function. (have a look at chapter 4.5) Aktivieren Sie die Regelung mit den gewünschten Einstellungen
4. Connect the communication objects fort he different light groups with the objects oft he dimming actuator
5. Connect the object "19-Status absolute dimming value" with the status object of the dimming actuator for the light group in the middle.
6. 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.
7. Download the application.
8. The room must be darkened or the measurement must be performed in the twilight. The presence detector teaches the brightness and dimming values via the Teach-In function. If the Teach-In is performed at day-/sunlight the measurement is disturbed and the saves wrong values.
9. Activate the Teach-In function by sending a logical 0 to the object 18. The green LED in the presence detector starts flashing with a 1s rhythm. Sending a logical 0 again causes an interruption of the Teach-In process.
10. Change the brightness value by sending dimming values (absolute or relatrive) until the Luxmeter swhows the adjusted value (TeachIn brightness value) at the desired height.
11. Now send a logical 1 to the object 18. The red and green LED flashes alternating.
12. The presence detector adjusts now the brightness measurement, teaches the appropriated dimming value and learns the brightness value at different dimming values.
13. After successful end of the Teach-In process, the green LED flashes fast for 10 seconds. The control is started again automatically and adjusts the brightness to the reference value. If an error occurs, the process is aborted and the red LED flashes fast for 10 seconds. This can occur if for example no valid dimming value is available (status). Check point 5 and start the process again.
14. If the parameter "use switch on dimming value" is adjusted to "calculate switch on value", the switch on value is calculated automatically now.

The following table shows the relevant communication objects:

NO.	Item	Length	Usage
18	Calibration start	1 Bit	Starts the alignment via Teach-In
19	Status absolute dimming value	1 Byte	Must be connected to the status value of the dimming actuator

Table 14:Communication objects Tech-In

3.5. CONSTANT LEVEL LIGHT

By using the new proportional Master/Slave Constant level light regulation,the light of the room canbe controlled intelligent so that outer light has no influence to the light in the room. Up to three light groups can be controlled in a way that the brightness all over the room has the same level indepent of outer infunces of the sun or other lights. The light control helps saving energy.
Notice: The light groups should be set to one light group or one light group and HCV. A Constant level light regulation of to light groups/zones is not reasonalble.
The following figure shows the principal oft he constant level light control:

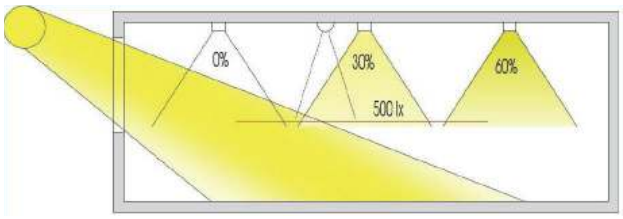

Figure 12: Overview proportional zone control

3.5.1. GENERAL SETTINGS/MAIN PRINCIPLE REGULATION

The following figure shows the available settings for the general setting of the constant level light regulation:

Figure 13: General settings constant level light regulation

The following table shows the available settings for configuring the constant level light regulation:

ETS-Text	Dynamic range **[Default value]**	Comment
Constant light control	**disabled** enabled	Activation/Deactivation of the constant level light regulation
Control out sunlight	**normal** few very few	Defines the influence of the solar radiation to the regulation
Selection light band	1 light group light group main + wall light group main + window **light group main + wall + window**	Selection of the light bands,which shall be controlled
Influence proportional wall control	no change (x1) very low (x0.9) low (x0.8) **medium (x0.7)** high (x0.6) very high (x0.5)	Defines the influence of the light group wall to the constant level light regulation
Influence proportional window control	no change (x1) very low (x1.2) low (x1.4) **medium (x1.6)** high (x1.8) very high (x2)	Defines the influence of the light group window to the constant level light regulation

Table 15: General settings of the constant level light regulation

The parameter "Influence proportional zone control" indicates the influence of the light group to the constant light control. The setting "no change" (x1) switches the linearity of the regulation off and all light groups light always with the same brightness. The setting "very high" (x0,5 at window and 2 at wall) deactivates means that the difference between the absolute dimming values of wall and window is very high.
If a room shall be controlled via the constant level light control, it is recommended to use the TeachIn function to get best results.
The influences of the light groups wall and window must be adapted to the specific conditions in the room. Simplified you can say as larger the room as greater must be the difference of the controlling parameter to 1. But is tis recommended to check the parameters always locally and adapt them if necessary.
The regulation can be aligned via the parameter "Control out sunlight". If the presence detector compensated solar radiation too strong, the value of this parameter should be set to few or very few. An alternative method is installing the presence detector more into the middle of the room.
The following diagram shows the dimming behavior fort he 3 light groups at different solar irradiation. The TeachIn value is achieved, at this example, at an absolute dimming value of 80% with 450Lux. The influences are both set to medium.

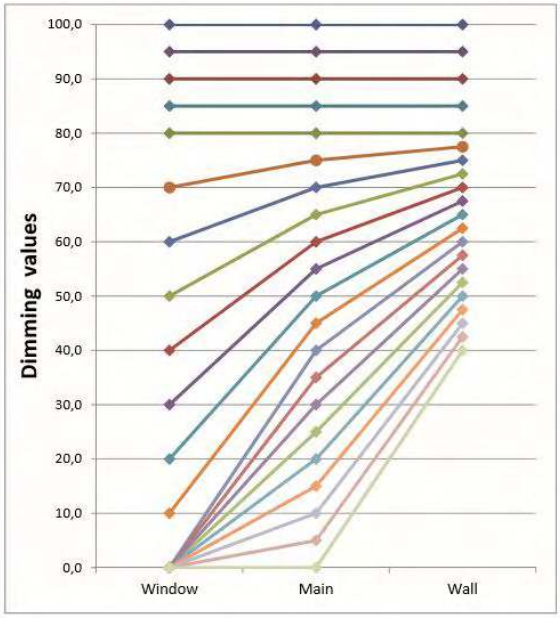

Figure 14: Behavior proportional zone control

The diagram shows that the light at the window is dimmed more than the light at the main band and the wall. If the solar irradiation decreases, all light bands will be dimmed again to 80%.
If the illumination is set from e.g. 450Lux to 300Lux (via relative dimming, absolute dimming or scene), the comprehension of the control factor will automatically set at the right dimming value. In this case, e.g at 50%. Without solar irradiation the three light bands regulate to 300 Lux with a dimming value of 50%. With solar irradiation, the dimming values below 50% shift appropriate.
By using the new "proportional Master/Slave Constant level light regulation" all disadvantages of the commercially available "Offset Master/Slave Constant level light regulation"with constant offset are fixed.
The following diagram shows the influence of the different control parameters to the regulation:

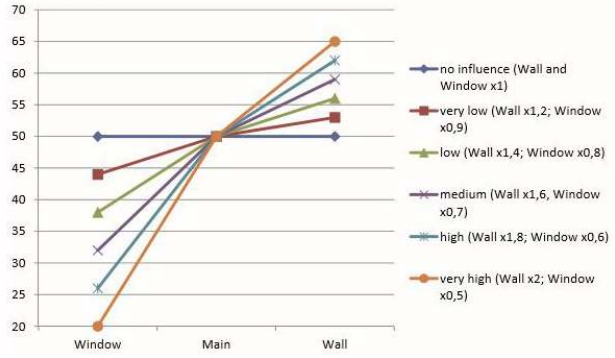

Figure 15: Influence control parameters

3.5.2. AVAILABLE SETTINGS

The following figure shows the available specific settings for the constant level light control:

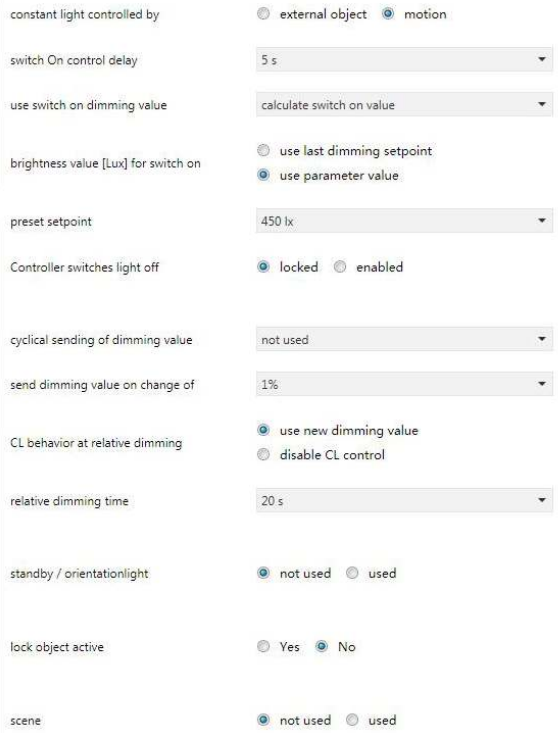

Figure 16: Available settings constant light control

The following table shows the available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Setting switching behavior/Regulation		
Constant light controlled by	external object **motion**	Adjustment of the switch on behavior
Switch on control delay	1s–5 min [5s]	Adjustment of the delay between activation and start of regulation
Use switch on dimming value	Parameter(select dimming value) TeachIn(teached dimming value) **Calculate switch on value**	Adjustment of the power up value
Brightness value [Lux] for switch on	Use last dimming setpoint **Use parameter value**	Adjustment if the setpoint shall be calculated from relative dimming, the secenes or being load from the parameters
Preset setpoint	100–750 Lux **[450 Lux]**	Preset setpoint of Brightness
Controller switches light off	**Locked** enabled	Adjustment if the controller may switch the light off at a strong sun radiation
Settings for the dimming behavior		
Cyclical sending of dimming value	**not used** 12s–10 min	Defines the time for the cyclic sending the dimmming value
Send dimming value on change of	1%–5 % **[1%]**	Defines the minimal change for sending the dimming value
CL behavior at relative dimming	**Use new dimming value** Disable CL control	Adiustment if regulation stays active at relative dimming
Relative dimming time	5–60 s **[20s]**	Defines the time for dimming from 0 to 100%

Setting standby/orientation light		
Standby/ Orientationlight	**not used** used	Setting if the light shall stay on after switching off
Standby setpoint	100–750 Lux **[200Lux]**	Value for the standby mode
Standby time	1s–60 min **[10s]**	Length of standby mode
Settings lock object		
Lock object active	Yes **No**	Activates the force control
Lock object value=1	**Off** On(100%) No change(hold value) **Select value**	Adjustment of the action at deactivation
Value set	0–100% **[0%]**	Defines the value for active force control
Lock object value=0	Off On(100%) No change(hold value) **Restore previous state**	Adjustment of the action at deactivation

Table 16: Settings Constant light control

The parameters are described below:

Adjustment switching behavior/Regulation

The general settings for the constant level light regulation can be done here.

The parameter "Constant light controlled by" defines whethter the constant light shall be switched via presence or an external object, which could be connected to push button, etc. The parameter "Use switch on dimming value" defines the start-up value of the regulation. It can be calculated directly by the internal calculating routine or power up with a fixed value. Also the time between powering up and starting calculation can be defined. The parameter "Brightness value [Lux] for switch on" defines if the regulation shall work with the parameterized value or the last setpoint, which can be set by a relative or absolute dimming value or via the scene function. Further more the regulation can be parameterized with different values for day and night via the parameter "Use day/night object". The parameter Controller switches light off" defines if the controller switches the light off at a strong sun radiation. If the parameter is set to locked, the output will not be set to 0% even if the sun radiation is strong enough. The output is set to a minimum value. This setting is very useful in offices or workrooms, because a switch-off of the lights is felt as annoying for most people. However, the energy saving aspects is still valid, because at dimming to e.g. 20%, 80% of the normal energy consumption is saved.

Settings dimming behavior

The dimming value can be sent as well cyclical as at a fixed percental rate of change.

The parameter "CL behavior at relative dimming" defines if the regulation shall be switched off at relative dimming or work with the new value.

Settings standby/orientation light

The standby/orientation light defines shading of the room after cutout of the constant light control.

That means, that the controller does not switch the lights off, but switches to the adjusted value.

Settings lock object

This parameter activates an additional lock object, which locks the constant level light control and switches the output in a fixed state.The following states are available:

Off: The output is switched off (0%).
On: The output is switched on (100%):
No change: The current absolute value is hold.
Select value(only at lock): The adjusted absolute value is called.
Restore previous state(only at unlock): The absolute value which had the constant light before locking is called again.

The following table shows the relevant communication objects for the constant light control:

NO.	Name	Length	Usage
20	Switch on/off	1 Bit	external object for activating the regulation
21	Dimming relative	4 Bit	manual adjustment of the current brightness
22	Dimmin absolute	1 Byte	Adjustment current brightness of new absolute value
24	Lock object	1 Bit	Locking the regulation
26	Output dimming absolute main	1 Byte	Output for main group
27	Output dimming absolute wall	1 Byte	Output for wall group
28	Output dimming absolute window	1 Byte	Output for window group

Table 17: Communication objects constant light control

3.5.3. SCENES

The following figure shows the available settings for the scene function of the constant light control:

Figure 17: Scene function constant light control

The constant light control can get a new setpoint via the scence function, by sending the scene number at the communication object for the scenes. The regulation takes the adjusted value as new setpoint.

The following table shows the communication object for the setpoint of the scene function:

NO.	Name	Length	Usage
25	Scene	1 Bit	Reading in of the scene

Table 18: Communication object scene function

3.5.4. APPROACH AT START-UP

For activating the constant level light regulation, the following steps are necessary:

1. Parameterizing the presence detectors as desired including teachin fuction (Submenu Calibration brightness value), Constant light and General.
2. Connecting of all necessary objects
3. Run Teahin function as described in 3.4.1 Approach at Teach-In
4. Now the constant light control is adjusted completely

3.6. TEMPERATURE

The following table shows the available settings for temperature detection.

Figure 18: Settings sending temperature

Function:

Item	Range **[Default value]**	Comment
Cyclical sending of temperature	**not used** 5s–30min	Adjustment for sending time cycle of current temperature value.

Table 19: Settings sending temperature

The following table shows relative objects of communication.

NO.	Item	Length	Usage
29	Temperature value	2 Byte	Measuring temperature value

Table 20: Temperature communication object

3.7. MASTER/SLAVE

3.7.1. 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
  Parameter: Cyclical sending of object value ON
  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.

3.7.2. 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.