PD00E11KNX	**KNX Presence detector Standard BLE - E-lock interface, lighting control**
PD00E13KNX	**KNX Space BLE - E-lock interface - lighting control, temperature, humidity, sound sensor, occupancy and utilization reporting**

USER MANUAL

Translation of the original instructions

Version: **1.0**

Date: **24/03/2023**

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VERSION	DATE	CHANGES
1.0	**24/03/2023**	**-**

Any information inside this manual can be changed without advice.

This handbook can be download freely from the website:
www.eelectron.com

Exclusion of liability:
Despite checking that the contents of this document match the hardware and software, deviations cannot be completely excluded. We therefore cannot accept any liability for this.
Any necessary corrections will be incorporated into newer versions of this manual.

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1. Introduction to the user manual

This manual is intended for use by KNX installers and describes functions and parameters of the KNX BLE presence sensors and how the settings and configurations can be changed using the ETS software tool.

For the technical data of the device and the compatible accessories, please refer to the datasheet of the device itself.

Meaning of the symbols used

WARNING - The operation or phase described must be carried out in compliance with the instructions provided and with the safety standards.

IMPORTANT NOTE - Details and specifications to be respected for the correct functioning of the device.

2. Product overview

The range of Eelectron presence sensors BLE with E-lock interface is suitable for mounting up to 4 m height.

The **STANDARD BLE, and SPACE BLE** versions include a brightness sensor for environmental lighting control. The SPACE version includes humidity and temperature sensors with the relative control algorithms and a sound sensor that can be used in rooms with parts not totally visible to the infrared sensor.
All versions have a rear connector with 3 digital inputs that can be connected to buttons or switches free of potential and used for on / off commands, dimming, shutters or blinds / scenarios, sequences, step commands, etc.

One of the 3 inputs can be configured as analogue for the connection of NTC temperature probes (see eelectron probes code TS00A01ACC / TS00B01ACC / TS00D01ACC not included) with which to send the temperature measurement on the bus or manage a complete thermostat module. The thermostat manages 2 stages with an integrated PI controller for controlling heating and cooling equipment, valves, 2 and 4-pipe fan coils, etc.

CODE	TYPE	MAIN FUNCTIONS
PD00E11KNX	STANDARD BLE	presence detection e-lock interface lighting control temperature control [1]
PD00E13KNX	SPACE BLE	presence detection e-lock interface lighting control temperature control [2] humidity sensor sound sensor occupation and use reporting

[1]: Only with external temperature sensor/analog probe.

[2]: Also with embedded temperature sensor.

The devices allow integration with the Plug-in wireless door lock system interface (IC01H10DLS) for the detection of door opening / closing data and the management of an automated room KNX. The plug-in can manage up to 8 doors and allows the wiring of the three rear inputs which remain available even if the plug-in is connected to the rear connector.

The devices integrate an antenna with **BEACON BLE (Bluetooth Low Energy)** function. Data format compatible with iBeacon® and Eddystone®The devices allow you to set the transmission frequency and signal strength.
BLE technology allows the sending of messages to mobile devices. These devices must have an app that allows them to retrieve information from BLE beacons.

The humidity sensor (SPACE BLE version) manages the measurement of the ambient relative humidity and allows the control with thresholds and hysteresis of humidification and dehumidification equipments.
Presence detection, based on a passive infrared sensor, has 5 independently configurable channels with different functions that can be activated: presence with or without brightness control and with automatic or semi-automatic detection; constant brightness independent or presence dependent with automatic or semi-automatic activation.

Moreover, **12 logic blocks** are available to implement simple expressions with logical or threshold operator or complex expressions with algebraic and conditional operators; It's possible to use predefined algorithms as proportional controls of temperature and humidity or dew point calculation.

The device also integrates the **"Virtual Holder Logic"**; the field of application is the hotel room: through a magnetic sensor installed on the door and connected to a digital input (also to the sensor itself), accurate presence information is managed. The presence detection solution can deduce the presence of people in the room using one or more dedicated sensors. It also detects an unexpected presence and is able to differentiate more behaviors.

The device manages the ambient lighting based on the measured illuminance; it is also possible to enable the logic called **"Circadian Rhythm"** with which brightness and color temperature are imposed on the basis of predefined curves or on the basis of the real position of the sun during the day with respect to a terrestrial coordinate. This function allows you to recreate lighting comfort in an environment as close as possible to reality.

The measurement of lighting in the environment is carried out indirectly and it is therefore necessary to carry out a calibration. The sensor is installed on the ceiling and the detected brightness may differ significantly from that of the work surface; using the ETS software it is possible to set correction parameters for the device basing on a local measurement using the lux meter.
Avoid direct sunlight or artificial light radiating the sensor directly.

The **SPACE BLE** version integrates the **"Utilization function"** which enables functionalities for mapping space status and related usage/availability (eg occupancy index and % of utilization rates) and the "Occupancy function" that detects useful data for

the processing of information related to the intensity of the activity of the occupants within the monitored areas (to generate a 'heat map' of the building areas).
The sensor allows different sensitivity levels to be set; carefully read the following notes for device installation and sensitivity settings parameters.
The sensor detects the difference between ambient temperature and temperature of moving objects and people; the lower this temperature difference will be, the less sensitive the sensor will be.

3. Installation instructions

The device can be used for permanent indoor installations in dry locations and is intended for ceiling mounting.

WARNING

- Device must be installed keeping a minimum distance of 4 mm between electrical power line (not SELV, for example: mains) and input cables or red / black bus cable.
- The device must be mounted and commissioned by an authorized installer.
- The applicable safety and accident prevention regulations must be observed.
- The device must not be opened. Any faulty devices should be returned to manufacturer.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.
- KNX bus allows you to remotely send commands to the system actuators. Always make sure that the execution of remote commands do not lead to hazardous situations, and that the user always has a warning about which commands can be activated remotely.

Illuminance measurement

Ambient illuminance measurement is performed indirectly, and calibration is therefore necessary.
The sensor is installed on the ceiling and the detected illuminance can differ significantly from that of the work surface; using the SW ETS it is possible to set correction parameters for the device on the basis of an on-site measurement using a lux-meter.
Do not allow sunlight or artificial light to directly irradiate the sensor.

Presence and movement detection

The sensor allows you to set different sensitivity levels; read with care the following notes for correct installation of the device and setting of the sensitivity parameters.

- The sensor detects the difference between the ambient temperature and the temperature of moving objects and people; the lower this temperature difference, the less sensitive the sensor will be.
- For a correct coverage of the sensor surveillance area, avoid that walls (including glass) or furniture are an obstacle; if this is not possible, increase the number of sensors in the area for complete coverage.
- Always mount the sensor on a stable site, not subject to vibrations or oscillations that can simulate movement.
- Lighting fixtures placed near the sensor or in the monitored area can cause false detections, avoid this type of interference as much as possible.
- Avoid placing heat-producing appliances such as fan coils, printers, lamps, etc. in the coverage area. or objects that move due to wind or air currents.

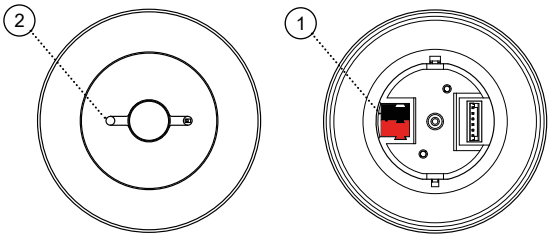
For more information visit: www.eelectron.com

4. Configuration and commissioning

The configuration and commissioning of the device is made with the ETS® (Engineering Tool Software). For the configuration of the device parameters the corresponding application program or the whole eelectron® product database must be loaded in the ETS® program.

The commissioning of the device requires the following steps:

- connect the bus KNX (1)
- turn on the bus power supply
- press the programming button (2); the red programming LED (visible through the device lens) turns ON
- download into the device the physical address and the configuration with the ETS® program



5. General parameters

KNX PARAMETER	SETTINGS
Delay to send telegrams on power up [s]	5 ÷ 15
Through this parameter is possible to set the delay of transmission of telegrams after a power on by selecting the time by which the device is allowed to send telegrams. In large systems after a power failure or shutdown this delay avoids generating excessive traffic on the bus, causing slow performance or a transmission block. If there are different devices requiring sending telegrams on the bus after a reset, these delays must be programmed to prevent traffic congestion during the initialization phase. The input detection and the values of objects are updated at the end of the transmission delay time At the end of ETS programming the device behaves like after a power on.	
Sound sensor	disabled / enabled
Enabling the function shows the dedicated page	

Use Led for sound event	no / yes
Defines if the indicator led blinks when a sound is detected.	
Humidity sensor	disabled / enabled
Enabling the function shows the dedicated page. **This function is not available on the PD00E11KNX sensor**	
Temperature function	Temperature function disabled Temperature sensor Thermostat
Temperature sensor: 2-point temperature control module with hysteresis, selection of the control band variable from the bus, enabling and disabling the module from the bus. Thermostat: complete temperature control module, PI algorithm, dedicated functions for on / off valve management - PWM - continuous - 6-way; fan coil, etc.	
Day/night Object	disabled / enabled
Using this object, it is possible to change the sensitivity of the sensor at different times of the day, for example by increasing the sensitivity during the day and decreasing it at night.	
Use virtual Holder	disabled / enabled
By setting this parameter, it is possible to enable a “virtual holder”, that is a logical function that automatically recognizes the presence of a person in a room. This function can be used in hotels or similar installations and requires connection to other devices (see “Virtual Holder”).	
Temperature alarm object	disabled / enabled
The “temperature alarm” object is used to report alarms relating to the sensor connected to input 3 (if enabled), to the smart sensor (if present), or if surveillance timeout occurs when KNX-Probe (via bus is enabled).	
Use led for presence event	no / yes
Defines whether the indicator LED is lit on to indicate presence detection	
Enable test mode	disabled / enabled
By enabling this parameter will be visible a communication object to enter test mode (see Test Mode)	

KNX PARAMETER	SETTINGS
Use E- Lock	no / yes
It allows interfacing the sensor with the plug-in code IC01H10DLS for detecting door opening/closing data and managing a KNX automated room. **It is recommended to connect the plug-in to the sensor and then turn on the sensor.** **The E-Lock device has a 15 second “warm up” time on startup.**	
E- Lock input 3 type	digital / analog
Only if the E-lock function is enabled, input 3 of the plug-in can be configured as digital (for interfacing buttons) or analog (for interfacing NTC probes).	
Logic 5-8 function	logic e-lock circadian rhythm
With this parameter it is possible to enable the following functions: logic Enable logic functions 5 to 8 e-lock Enable e-lock channels 1 to 4 circadian rhythm Enable circadian rhythm module	
Logic 9-10 function	logic e-lock CO_2 sensor
With this parameter it is possible to enable the following functions: logic Enable logic functions 9 to 10 e-lock Enable e-lock channels 5 to 6 CO2 sensor Enables the CO2 sensor module (CO2 measured value must be sent from a KNX sensor).	
Logic 11-12 function	logic e-lock VOC sensor
With this parameter it is possible to enable the following functions: logic Enable logic functions 11 to 12 e-lock Enable e-lock channels 7 to 8 VOC sensor Enable the VOC sensor module (the VOC measured value must be sent from a KNX sensor).	

KNX PARAMETER	SETTINGS
Input 3	digital analog CO2 sensor VOC + CO2 sensor
Sensor input 3 can be configured as digital (for pushbutton interfacing) / analog (for NTC probe interfacing). **Only in the PD00E13KNX sensor is it possible to configure input 3 for the CO2 sensor (for interfacing the CO2 sensor code SM03E01ACC) or VOC + CO2 sensor (for interfacing the VOC + CO2 sensor code SM03E02ACC).**	
Use CO2 sensor	no / yes
Enable the CO2 module (see “CO2/VOC Sensor”); the CO2 measured value must be sent by a KNX sensor.	
Use circadian rhythm	disabled / enabled
Enable the circadian rhythm module (see “Circadian Rhythm”)	
Use VOC sensor (KNX sensor)	no / yes
Enable the VOC module (see “CO2/VOC sensor”); the VOC measured value must be sent by a KNX sensor.	

6. Beacon BLE

Please refer to the “Beacon” user manual.

7. Test Mode

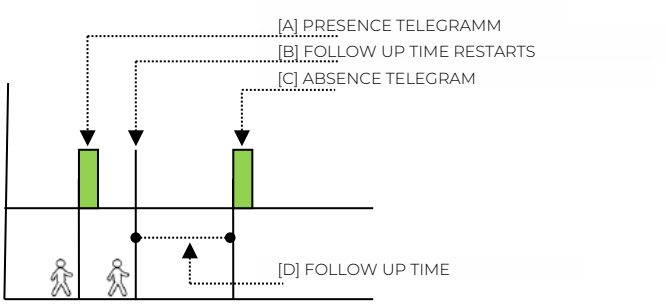
Communication objects involved:

“<General> Test Mode”	1 Bit	CW
Enables test mode when receiving a “1” telegram. The test mode is deactivated upon receipt of a “0” telegram or after a time that can be set in minutes using the “Test time” parameter visible on the “General Parameters” page.		
“<Presence> Output”	1 Bit	CRT
On / Off object subordinated to the presence module		

During installation it is recommended to put the sensor in test mode to check the actual coverage area. With the test it is possi-

ble to check whether the area controlled by the sensors includes, for example, the PC workstations rather than the expected entry points; similarly, it will be possible to verify that the monitored areas do not include unwanted passage areas such as corridors or stairs that would have the effect of activating lights or other appliances without the need for them. In both cases it is recommended to change the position of the sensor and repeat the test.

During the test, the front LED is always enabled, and its lighting indicates that a movement has been detected. During the test, the 1-bit telegram associated with the following object is also sent on the bus:



If it is necessary for the sensor to detect “small” movements such as a person working on a desk, it is recommended to check the detection also in relation to the sensitivity value set. The higher the sensitivity set, the greater the sensor’s ability to detect “small” movements. High sensitivity values can lead to false detections caused by “thermal noise”: carefully read the warnings to reduce the possibility of false detections.

(see “ **Presence and movement detection**”).

8. Presence

The presence module provides a parameter for setting the sensitivity of the PIR sensor, this parameter will also affect detection for channels 1 to 5 that use presence; the remaining parameters are connected only to this module.

KNX PARAMETER	SETTINGS
Sensor sensitivity	Very high sensitivity high sensitivity normal sensitivity low sensitivity very low sensitivity
Use low sensitivity values when the sensor is placed in “thermally noisy” environments, for example in the presence of sources of hot or cold air emissions (see installation suggestions); high sensitivity values can be used when the sensor must detect “small” movements such as those of a person working at a desk.	
Sensor sensitivity day	If the day-night switching object is enabled (general parameter), it will be possible to diversify the sensitivity at different times of the day
Sensor sensitivity night	
Presence sensor	send absence only send presence only send both absence/presence
For the basic module it defines in which cases to send the 1 bit telegram.	
Presence telegram	OFF is presence ON is presence
Defines the value of the 1-bit telegram per presence; the opposite value will be used for absence.	
Follow up time **Hours** **Minutes** **Seconds**	 0..24 0..59 0..59
Sets the follow up time	
Output cyclic send time	No cyclic sending 15 s … 12 h
Set the period of cyclical sending.	

Follow up time

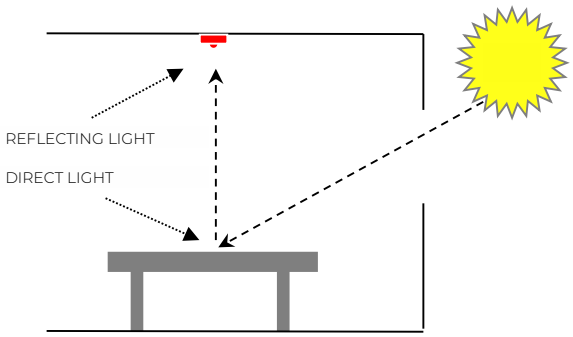
The presence telegram is sent in the presence module when the sensor detects presence [A]; the device waits for the follow up time to elapse before sending the absence telegram [C]; if a new movement [B] is detected during the monitoring time, the follow up time restarts. The absence telegram is sent only when the follow up time ends without any movement being detected [D]

9. Illuminance

In this module the parameters relating to the brightness sensor are configured.

Adjustment of the illuminance sensor

It is very important to carry out a correct and precise calibration of the illuminance sensor; in fact, the sensor must measure the illuminance on the desk but it’s usually placed in a different position (on the ceiling). The sensor receives reflected light and the reflection depends on the reflective capacity of the floor or furniture and the distance from the windows.



The calibration is to make the value of reflected light as similar as possible to direct light.

There are 3 calibration methods available.

- MANUAL
- 1 POINT
- 2 POINTS

- ADVANCED

Manual adjustment

Manual calibration is done by setting two ETS parameters:

PARAMETRO KNX	IMPOSTAZIONI
Coefficiente di correzione [*0.01]	1 … 1023
Imposta il fattore da moltiplicare per il valore misurato espresso in centesimi, il valore 100 equivale ad non applicare alcun valore di correzione; valori superiori a 100 fanno si che il valore di luminosità misurata aumenti (200 = il doppio, 250 = 2.5 volte; 300 = il triplo); valori inferiori a 100 fanno si che il valore di luminosità misurata diminuisca (50 = la metà, 25 = un quarto, 10 = un decimo).	
Offset di correzione [*10 Lux]	-128 … +127
Imposta un valore fisso da sommare o sottrarre al valore misurato dopo aver applicato il coefficiente di correzione; il valore di Offset impostato è in decine di lux pertanto impostando il parametro al valore +10 darà come risultato quello di sommare 100 Lux (10*10=100) al valore misurato, al contrario impostando il parametro al valore -8 darà come risultato quello di sottrarre 80 Lux (-8*10=-80) al valore misurato. Il valore 0 equivale a non applicare alcun offset.	

1 point adjustment

The 1-point calibration uses the correction offset which is calculated directly by the sensor; requires setting of 2 ETS parameters:

KNX PARAMETER	SETTINGS
Measured value ceiling [*10 Lux]	0 .. 255
Measured value desk [*10 Lux]	0 .. 255

To set the correct values of the parameters, use a lux meter to detect the brightness and follow the procedure described below; if possible, carry out the procedure in the dark hours or with the shutters down, in any case avoid situations in which the external light enters the room directly because in this case the result could be distorted.

STEP	DESCRIPTION
1	Place the lux-meter on the work surface for which you want to have accurate brightness control,
2	Change the intensity of the lamps until the desired lighting value is obtained: if, for example, the desired value is 500 Lux, adjust the lighting until this measurement is obtained on the lux-meter located on the desk.
3	Read the brightness value measured by the sensor and available on object 8 <Illuminance> Output
4	Set in ETS the parameter " Measured value ceiling " with the value sent by the sensor (divided by 10) and the parameter " Measured value desk " with the value measured by the lux meter (divided by 10)

2 Points Adjustment

The 2-point calibration uses both the correction offset and the correction coefficient and both are calculated directly by the sensor; requires setting of 4 ETS parameters:

KNX PARAMETER	SETTINGS
Measured value ceiling PT1 [*10 Lux]	0 .. 255
Measured value desk PT1 [*10 Lux]	0 .. 255
Measured value ceiling PT2 [*10 Lux]	0 .. 255
Measured value desk PT2 [*10 Lux]	0 .. 255

To set the correct values of the parameters, use a lux meter to detect the brightness and follow the procedure described below; if possible, carry out the procedure in the dark hours or with the shutters down, in any case avoid situations in which the external light enters the room directly because in this case the result could be distorted.

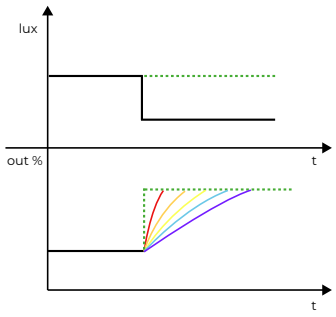
STEP	DESCRIPTION
1	Place the lux-meter on the work surface for which you want to have accurate brightness control,
2	Change the brightness of the lamps until you get the lighting value lower than the desired one: if for example the desired value is 500 Lux, modulate the lighting up to read 100/200 Lux on the lux-meter placed on the desk.
3	Read the brightness value measured by the sensor and available on object 8 <Illuminance> Output
4	Set in ETS the parameter "Value measured on the ceiling PT1" with the value sent by the sensor (divided by 10) and the parameter "Value measured on the desk PT1" with the value measured by the lux-meter (divided by 10)
5	Change the brightness of the lamps until obtaining the lighting value higher than the desired one: considering a desired value of 500 Lux, modulate the lighting up to read 700/900 Lux on the lux meter placed on the work surface.
6	Read the brightness value measured by the sensor and available on object 8 <Illuminance> Output
7	Set in ETS the parameter "Value measured on the ceiling PT2" with the value sent by the sensor (divided by 10) and the parameter "Value measured on the desk PT2" with the value measured by the lux-meter (divided by 10)

Advanced

Communication objects involved:

"<Illuminance> Calibration Setpoint"	1 bytes	CRT
"<Illuminance> Calibration Action"	1 byte	CRWT
"<Illuminance> Command/Status Lamp"	1 byte	CRWT

The advanced calibration is managed by the specific external software "eSensorCalibration" propriety of Eelectron S.p.A, and it's suitable for areas with high contribute of natural light.

KNX PARAMETER	SETTINGS
Avarage lux algorithm	Very fast fast normal slow very slow
Defines the response speed of the controlled output after a measured ambient brightness variation (see figure below).  When there is a sudden change in illuminance (in the example the lux is reduced) the system reacts by increasing the control value%, the red slope corresponds to the “very fast” algorithm, the purple one (softer) corresponds the “very slow” algorithm.	
Minimum output value [*10 Lux]	0 … 255
Maximum output value [*100 Lux]	5 … 255
Values below the minimum value will be forced to the minimum value, values greater than the maximum value will be forced to the maximum value.	
Send on variation [Lux]	Do not send, 5 .. 75
Minimum difference in the measurement in Lux compared to the previous value which triggers the immediate sending of the value	
Cyclic send time	No cyclic sending, 15 s .. 12 h
Period of cyclical sending of the illuminance measurement	

When there is a sudden change in illuminance (in the example the lux is reduced) the system reacts by increasing the control value%, the red slope corresponds to the “very fast” algorithm, the purple one (softer) corresponds the “very slow” algorithm.

10.Remote presence

Communication objects involved:

“<Remote precence x> Input”	1 Bit	CW

The sensor can also receive presence information from other sensors (remote sensors) which therefore act as “slaves” of the main sensor acting as “master”. The “slave” sensors are used to increase the detection area. When a sensor acts as a “slave” it can still also act as a “master” for the area it covers.
The settings relating to the management of the slaves can be set in the “Remote Presence” section. The device can receive up to 4 x 1-bit telegrams on 4 different addresses from “slave” sensors, for each “slave” it is possible to define whether presence is detected with telegram “0” or “1”.
As will be seen later, in the section relating to the sensor channels, each channel can be a “master” of all the defined slaves or only a part of them; this allows to define complex behaviours.
For example: in an area covered by 5 sensors the “master”, to which 4 “slaves” are connected, is able to regulate a group of lights which must be turned on when at least one slave detects the presence while other 5 groups of lights can be each associated with a single sensor.

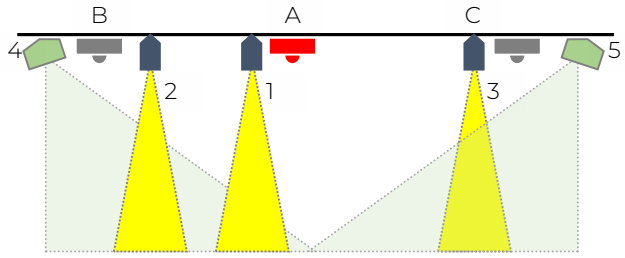
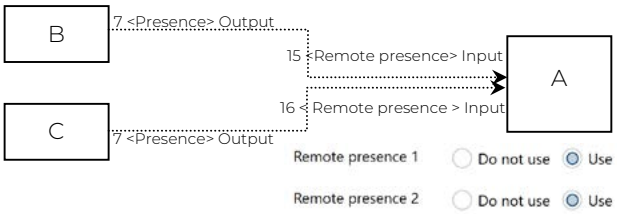


Fig.

In the figure above the sensors A, B, C regulate the lamps 1,2,3 respectively. A second channel of sensor A regulates lamps 4 and 5, which must both remain on as long as presence is detected by one of the 3 sensors (A or B or C). The second channel of sensor A considers the telegrams of remote sensors B and C.



11.Use of remote presence

To use the presence information from remote sensors, the following parameters are available within the configuration page of each channel; it is necessary to have enabled and connected the communication objects as described in the previous chapter.

KNX PARAMETER	SETTINGS
Use remote presence	no/yes
Choose yes to consider data from other sensors for this channel	
Presence	do not use/use
Choose “use” to use the information of the presence channel of the device itself.	
Remote presence 1 (2.4)	do not use/use
Choose “use” to consider the presence data coming from the remote sensor 1 (2,3,4)	

12.Remote illuminance

Communication objects involved:

“<Remote illuminance x> Input”	2 Byte	CW

The sensor can receive the illuminance value from other sensors and use it to obtain a weighted average. Each sensor channel has its own parameters to select which external lighting values to consider and with what weight.
It is possible to activate up to 4 remote brightness channels, for each channel the following parameters are available.

KNX PARAMETER	SETTINGS
Remote illuminance sensor	unused / used
Activates the remote brightness channel, makes a communication object visible and also the following parameters.	
Illuminance after download [*10 Lux]	0 .. 255
Defines the value that the communication object assumes after downloading, ie before valid data is received from the remote sensor.	
Correction coefficient [*0.1]	1 .. 255
Set the factor to be multiplied, expressed in hundredths, by the measured value, the value 10 is equivalent to not applying any correction value; values greater than 100 cause the received brightness value to increase (20 = double, 25 = 2.5 times; 30 = triple); values less than 100 cause the measured brightness value to decrease (5 = half, 1 = one tenth).	
Correction offset [*10 Lux]	-128 … +127
Sets a fixed value to be added or subtracted from the measured value after applying the correction coefficient; the Offset value set is in tens of lux therefore setting the parameter to the value +10 will result in adding 100 Lux (10 * 10 = 100) to the measured value, on the contrary setting the parameter to the value -8 will result in that to subtract 80 Lux (-8 * 10 = -80) from the measured value. The value 0 is equivalent to not applying any offset.	
Correction output limits	
Minimum [*10 Lux]	0 .. 255
With this parameter you set the minimum value that the external component can take after applying the coefficient and the correction offset (the set value is multiplied by 10 Lux).	
Maximum [*100 Lux]	0 .. 255
This parameter sets the maximum value that the external component can take after applying the coefficient and the correction offset (the set value is multiplied by 100 Lux).	

Use of remote illuminance

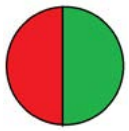
To use the illuminance information from remote sensors, the following parameters are available within the configuration page of each channel; it is necessary to enable and connect the communication objects as described in the previous chapter (function not available on the BASIC model).

KNX PARAMETER	SETTINGS
Usa remote illuminance	no / yes
Choose yes to use brightness values from other sensors for this channel.	
Weight illuminance	da 1 a 15
Weight remote illuminance 1	Do not use, da 1a 15
Weight remote illuminance 2	
Weight remote illuminance 3	
Weight remote illuminance 4	
Choose “use” only if the communication object is connected, otherwise choose “do not use”. It is possible to apply a different weight to each sensor to give greater importance to the value read by one sensor than another.	

Example 1:
consider the contribution of a second sensor.

To give the same weight to the value of each sensor set the parameters as:

Weight illuminance	1
Weight remote illuminance 1	1



The total weight is 2 (1+1) and each sensor weighs in equal parts: 1/2 of the total, i.e. 50%

To give one sensor twice the weight of the other, set the parameters as:

Weight illuminance	2
Weight remote illuminance 1	1

The total weight is 3 (2+1) the internal sensor weighs 2/3 of the total (66%), the external one 1/3 (33%)

Example 2:
consider the contribution of 2 other sensors.

To give the same weight to the value of each sensor set the parameters as:

Weight illuminance	1
Weight remote illuminance 1	1
Weight remote illuminance 2	1

Il peso totale è 3 (1+1+1) e ciascun sensore pesa in parti uguali: 1/3 del totale cioè pesa al 33%

Example 3:
consider the contribution of 2 other sensors.

To give a sensor twice the weight of each of the other two, set the parameters as:

Weight illuminance	2
Weight remote illuminance 1	1
Weight remote illuminance 2	1

The total weight is 4 (2+1+1) the internal sensor weighs 2/4 of the total (50%), the remote sensors 1 and 2 weigh 1/4 each (25%)

13.Sound sensor

Communication objects involved:

“<Sound Sensor> Output”	1 Bit	CRT
“<Sound Sensor> Enable”	1 Bit	CRT

The **PD00E13KNX** model is equipped with a sensor capable of detecting sounds and measuring their intensity. Using this sensor it is possible to send the value in decibels relative to the sound level of the room via bus: this measurement, together with those of brightness, relative humidity and temperature, is used for the control and certification of buildings (see Leed®, Breeam certifications ® and Well®).
The sound sensor is also used in environments where there are parts not visible to the infrared sensor, such as bathrooms.
Using ETS parameters and communication objects it is possible to configure actions related to the detection of sounds or, after the device has detected movement through the passive infrared sensor, it is possible to prolong the switching on of the lights also on the basis of the detected sounds.
At the end of the follow-up time, after the light has been automatically turned off, the sound sensor can listen for a set period so that the light can be reactivated by the sounds even after turned off. The sensor can be configured with different sensitivity values (from very high to very low); it is important to select the appropriate value based on the intended use of this sensor.

The sound sensor detects sounds or noises whose intensity differs from the average value of the environment in which it is located; in other words, the sensor uses an adaptation algorithm to avoid false detections if the background noise changes slowly.

The sound sensor can be enabled or disabled from the bus via a 1-bit communication object, it is therefore possible to keep it enabled at the times when you want to obtain the maximum performance of the device in terms of sensitivity and disable it when it is not necessary (for example in work environments may be active during working hours and not active in other hours).

KNX PARAMETER	SETTINGS
State after download	disabled / enabled
Defines whether the sound detection function is enabled or disabled at the end of the download, the function can also be enabled or disabled from the bus.	
Enable telegram	telegram“0”/telegram“1”
Select the value of the 1 bit telegram to enable / disable	
Sensitivity	Very high high normal low very low
Select the sensitivity of the sound sensor	
Sensitivity – day	As in the previous parameter: if the day-night switching object is enabled, it will be possible to diversify the sensitivity at different times of the day
Sensitivity - night	
Output type	off/on decibel intensity [w/m^2]
The sound sensor can be used to manage ON / OFF commands or to communicate to the supervisory systems the sound intensity value detected in dB or in W / m2	
Telegram when sound event detected [if output type = off/on]	off/on
If the one-bit telegram is selected, this parameter defines the value of the telegram to be sent when sound is detected (start event).	
Send only detection event	no/yes
Choose “no” to send the telegram of opposite value to that of detection (end of event), at the end of the follow-up time	
Detection retention time	1 s. .. 2 hours
If no sound is detected the telegram related to the end of the event is sent at the end of this time.	
Correction offset [if output type = decibel]	-7 .. +7
Correction offset of the value in dB	
Sending interval	never, 1 minute … 2 hours
Periodical sending time	
Send on variation [if output type = decibel]	never, 2 dB … 14 dB
Value of deviation from the previous value that generates the sending of the data.	
Send on variation [if output type = Intensity]	never, 2*10-9 .. 8.19 * 10-6
Value of deviation from the previous value that generates the sending of the data.	

14.Channels configuration

The device has 5 independently configurable channels, below we see the possible settings and functions, they are the same for each channel.
The possible types of functions are as follows; not all functions are possible for all models, the BASIC model does not provide any function related to brightness:

The PD00E11KNX model does not include any function related to brightness.

- No action
- Simple presence
- Automatic presence, illuminance depending
- semi-automatic presence
- semi-automatic presence, illuminance depending
- Constant illuminance
- Constant illuminance, presence depending
- Constant illuminance, presence depending, semi-automatic

Some settings are recurring and may appear on more than one function, these settings will be described below.

Follow-up time

Communication object involved:

"<Channel x> Follow-up Time"	2 bytes	CW

The follow-up time defines how long the device, after the detection of a presence, must consider the PRESENCE status valid even if it has not detected other movements. If a new movement is detected during the follow-up time, it is restarted. At the end of this time, the device goes into the ABSENCE state.

KNX PARAMETER	SETTINGS
Follow-up time	
Hours	0 .. 24
Minutes	0 .. 59
Seconds	0 .. 59

KNX PARAMETER	SETTINGS
Follow-up time object	disabled / enabled
By enabling the object "<Channel x> Follow-up Time" it is possible to modify the time with a BUS command.	

It is possible to use the information of the sound sensor to extend the follow-up time (in this case the sound is considered as a new presence detection). It is also possible to define a time at the end of the follow-up within which the detection of a sound reactivates the follow-up time even if this has expired..

KNX PARAMETER	SETTINGS
Use sound sensor event during follow-up time	no/yes
If you select yes the sound sensor will be considered for the whole follow-up time.	
Sound sensor reaction time on absence	0 .. 255 s. [0=no reaction]
At the end of the follow-up time the sensor goes into the ABSENCE state, within the time defined by this parameter it can return to PRESENCE and reactivate the follow-up time upon detection of a sound whose intensity differs from the average value of the environment in where it is.	

Light status object

KNX PARAMETER	SETTINGS
Light status object	disabled / enabled
It enables the communication object "<Channel x> Light Status" wich indicates the status of the lamps (on/off).	
Dead time [s]	0 ... 255
When a command of OFF is sent on the object "<Channel x> Light Status" it is enabled the Dead Time, which is the interval time during which the sensor doesn't detect any precence.	

Objects A,B,C - presence/absence

The channels in which the behavior of the device is linked to the presence always have 3 communication objects associated with it.

The configurations of these objects are present in a dedicated page <Channel x> Outputs
Objects A and B are 1-bit objects; for each of them it can be defined which telegram is linked to presence ("1" or "0") and whether the presence, absence or both telegrams must be sent.

KNX PARAMETER	SETTINGS
Output A (same parameters for Output B)	
Execute presence action	no/yes
Execute absence action	no/yes
Presence telegramma	telegram "0" / "1"
Activates the stand-by function whose parameters are configurable in a dedicated page for each channel.	

Object C can be configured with different data points: 1 byte (signed or unsigned), 2 bytes (signed or unsigned), 2 floating bytes; in this way it is possible to use each channel to send scenario, percentage, HVAC, temperature, brightness, etc. setpoint values on the presence, absence or both events.

KNX PARAMETER	SETTINGS
Output C	
Output C - type	none 1 byte signed 1 byte unsigned 2 byte signed 2 byte unsigned 2 byte floating point
Definisce il tipo di dato da inviare sull'oggetto C	
Delay Output C	0, 100 ms, 200ms, 500 ms, 1 s, 2 s, 5 s, 10 s
Delay for sending object C respect to objects A and B.	

Stand-by function (corridor function)

The stand-by function is connected to presence detection; by activating this function the device, at the end of the follow-up time, does not turn off the lights but still keeps them on, typically at a lower brightness level to save energy but avoiding that the area remains completely in the dark.
A typical application concerns the lighting of corridors. If there are offices with an adjacent corridor it is possible to manage the corridor lighting without installing a dedicated sensor. A channel of one of the sensors located in the offices will control the corridor lights and use the sensors located in the other offices as remote sensors. When at least one of the offices is occupied the light in the corridor remains on, when instead all the offices remain empty the corridor can go into stand-by remaining with the light on at a reduced brightness level to facilitate the passage of people who have to walk through it. If the light is controlled in on / off mode with a one-bit object, it is possible to keep the light on during standby time and activate (optionally) a warning of entry into standby time with a short (1 sec.) switching off and on of the light.

KNX PARAMETER	SETTINGS
Stand-by function	disabled / enabled
Activates the stand-by function whose parameters are configurable in a dedicated page for each channel.	
Stand-by time	
Hours	0 .. 24
Minutes	0 .. 59
Seconds	0 .. 59
Output A (same parameters for Output B)	
Execute warning action	no/yes
Activates the warning function for channels with 1-bit output, i.e. those channels the constant lighting function is not configured depending on presence.	
Execute Stand-by	Only for output C
Value entry field dependent on the type of data chosen for object C.	
Stand-by value	Only for channels configured with “constant illuminace”
For these channels, a value (%) of lights is usually configured to facilitate orientation, typically in the corridors.	
Sound sensor cofiguration	
Use sound sensor event during stand-by time	no/yes
If you select yes, the sound sensor will be considered for the whole stand-by time; if a sound is detected (intensity must differs from the average value of the environment in which it is located) sensor exits the stand-by state to return to presence.	

Lock function

The function allows to block (disable) a device channel; each channel has a communication object to activate / deactivate the block via bus. The selection of the block function enables in ETS a page dedicated to its parameters: **<Channel x> Block.**

KNX PARAMETER	SETTINGS
Telegram for lock activation	telegram “0” / “1”
Defines which telegram enters the device in “lock”	
Lock state after download	unlocked / locked
Assigns the status of the lock function after the ETS download is complete	
Lock state at power-on	unlocked / locked / state before power-off
Assigns the status of the block function at the end of the power-on sequence	
Automatic unlocking time	0 .. 255 [0=no automatic unlock]
It is possible to set a time after which the block function is automatically disabled	
Output behaviour when locked	Disable sensor and don’t send telegram Disable sensor and send telegram
Output A (B)	nothing / off / on
Output C	nothing / value
Value	Only for output C enabled: value entry field dependent on the type of data chosen for object C.

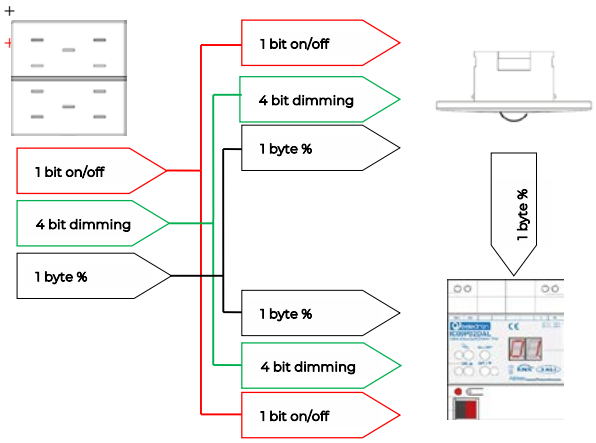
If the “disable sensor and send telegrams” behavior is selected, it will be possible to define which telegrams and values to send before the block so that the ligths controlled by the sensor can remain in the chosen state for as long as the channel is disabled.

Stop function

The stop function is used to temporarily deactivate the sensor by changing the brightness of the environment with a manual command, for example with a KNX button or by using a sensor input. The KNX button will be connected directly to the light actuator and the group addresses must also be connected to the sensor so that it can receive the commands that are imposed by the user on the lights.
Sensor objects to be connected to the manual control:

“<Channel x> Stop 1 Bit”	1 bit	CW
“<Channel x> Stop 4 Bit”	4 bit	CW
“<Channel x> Stop 1 Byte”	1 Byte	CW

Example of connection between button, sensor and actuator: the objects that connect the button to the actuator are also connected to the sensor to give information that the command has been manually forced.



A typical application of the stop function is to force the lights to turn off in a room during a projection or to force the lights to turn on in an environment where the detected brightness is greater than the set threshold.

For as long as the device detects the presence of people, the adjustment will be disabled considering the manual selection of the user as a priority. The sensor will return to directly control the lights only at the end of the follow-up time.
It is possible to set the parameter “Automatic restart time”; it defines the duration of the sensor adjustment disabling time, when it expires the sensor resumes its automatic behavior.

These communication objects are also available:

“<Channel x> Restart”	1 bit	CW
“<Channel x> Activated/Stopped”	1 bit	CRT

The first CO force to exit from the stop state upon receipt of a “0” or “1” telegram; the second sends the active / stop status on the bus with telegram “0” or “1”.

KNX PARAMETER	SETTINGS
Stop state after download	activated / stopped
Defines whether the device is in Stop or not after download	
Stop state after power on	activated / stopped / state before OFF
Define the status of the stop function on power-up	
Telegram for restart	telegramma “0” / “1”
Defines which telegram determines the exit of the sensor channel from the manual forcing status (stop)	
Telegram for activated	telegramma “0” / “1”
Defines which telegram is sent on the bus to indicate that the sensor channel is active again (not in stop), the opposite telegram will signal the manual forcing status (stop)	
Automatic restart time (0=un-limited) [min]	0..255
If different from zero, this parameter defines after how long the sensor channel exits the manual forcing (stop) and returns to automatic mode.	

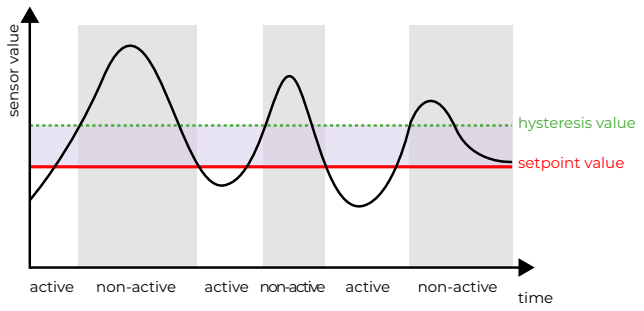
Utilization function

Function available only on product code PD00E13KNX sensor.

The utilization function is associated with each channel which includes the presence detection function, the function can be enabled on the channel pages. Using the utilization function, it is possible to calculate the percentage of time in which the presence of people in the area monitored by the sensor is detected.
An ETS parameter defines the evaluation time which can vary from 1 minute to 4 hours; it is recommended to keep monitoring time values from 5 to 60 minutes in order to make data collection as granular as possible and leave it to the supervisor to process it.
The usage data, expressed as a percentage, is sent at the end of each surveillance period using a 1 byte object. Another 1-bit object is used to force the sending of the percentage data as well as to synchronize the different sensors of the building so that the transmitted data can be compared. The ability to manage the sending of data on request is also useful for collecting data with variable frequencies throughout the day.

OFF hysteresis

KNX PARAMETER	SETTINGS
OFF hysteresis (1% -> 0%) [Lux]	0 ... 255
The Hysteresis defines a lux-window wherein nothing happens. The OFF command (0%) is effective when the measured value is higher than the set point value + the hysteresis value.	



Occupancy function

Function available only on product code PD00E13KNX sensor.

The occupancy function detects data to be used to process information related to the intensity of the activity of people within the areas monitored by the sensor, this activity is proportional to the number of people present and allows you to generate a “heat map” of the areas of the buildings. The heat map, usually correlated to the hours of the day, identifies which areas of the buildings are used during the various hours of the day and with what intensity by providing precise information to the building manager. The analysis of the occupancy data of a building in fact highlights any planning errors of energy resources as well as possible optimizations of the use of individual and common spaces.

KNX PARAMETER	SETTINGS
Monitor function	disabled / enabled
If enabled, the sensor activates the monitoring of presence events.	
Monitor cyclic time [min]	0 .. 255 (0 = never)
Defines the sending period of the movement counter; each time the counter is restarted from zero.	

Simple presence

In this mode, the sensor acts as a simple presence detector without taking into account the contribution of the brightness sensor. There are 3 communication objects that can send data on the bus when the presence or absence condition is detected, channels A and B are 1 bit, channel C is configurable.

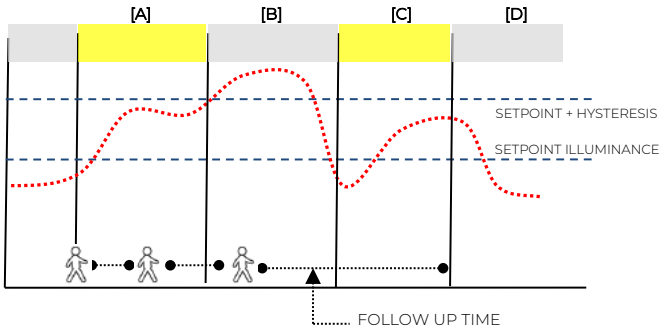
<Channel x> Output A	1 bit	CRT
< Channel x> Output B	1 bit	CRT

< Channel x> Output C	1 bit	CRT
	1 byte signed	
	1 byte unsigned	
	2 byte signed	
	2 byte unsigned	
	2 byte float	

For channels A, B, C it is possible to set the cyclical repetition of the command; if activated the command is sent periodically, in presence and absence for all 3 objects.

Automatic presence, illuminance depending

In this mode the sensor works taking into account the contribution of the brightness sensor.
The parameters, functions and communication objects are the same seen in the settings of the simple presence mode plus some specific parameters for the management of the on / off control of the light.



[A]	The detector identifies a movement and activates presence because the illuminance is lower than the setpoint (the light is turned on)
[B]	The illuminance exceeds the setpoint value + the hysteresis and the sensor goes into the absence state (the light is turned off)
[C]	The illuminance becomes lower than the setpoint, the presence status is still active (the light is switched on).
[D]	The FOLLOW UP time expires without any new presence detected, the sensor goes into the absence state (the light is turned off)

KNX PARAMETER	SETTINGS
Average lux algorythm	Very fast Fast Normal Slow Very slow
It defines the calculation speed of the average illuminance value, the faster the algorithm and the faster it reacts to a change in lux level. The “very fast” selection can lead to very frequent switching on and off of the light, the “very slow” selection can introduce delays in switching the light on or off.	
Upper threshold illuminance [*10 Lux]	0…255
Identifies the illuminance threshold to be set as a limit value for switching on the light when presence is detected (for higher illuminance values the light is not switched on)	
Ignore illuminance threshold on presence event	no / yes
This parameter defines whether, when detecting presence with brightness above the threshold, the sensor must turn on the light before starting the regulation (parameter = yes) or not turn on the light (parameter = no).	
Illuminance hysteresis	50..500 Lux
It defines the hysteresis band used for switching the light on and off, with values that are too low the band will be narrow and the light could be on and off more frequently.	

Semi-automatic presence

In semiautomatic modes, presence is activated by a manual command (button); the sensor receives this telegram and triggers the command to switch on the lights. There is a 1-bit object for telegram reception.

“<Channel x> Command for semiautomatic”	1 Bit	CW

KNX PARAMETER	SETTINGS
Manual command activation telegram	telegram “0” / “1”
This parameter selects which telegram activates the sensor.	

Let’s assume that telegram “1” is selected as the manual activation telegram; when this telegram is received, the light switches on.

- If the opposite telegram (“0”) is sent, the sensor:
- turns the light off if in the time elapsed between the reception of telegram “1” and telegram “0” it has not detected any presence or movement.
- ignores the telegram if in the time elapsed between the reception of telegram “1” and telegram “0” has already detected a presence or movement.
- ignores the telegram if it is the first telegram it receives (telegram “0” has not been sent previously).

The functions and parameters of this mode are the same as in the Simple Presence mode.

Semi-automatic presence illuminance depending

In this mode, the sensor is activated by a manual command, i.e. a 1 bit telegram which is sent on the bus and received by the sensor.

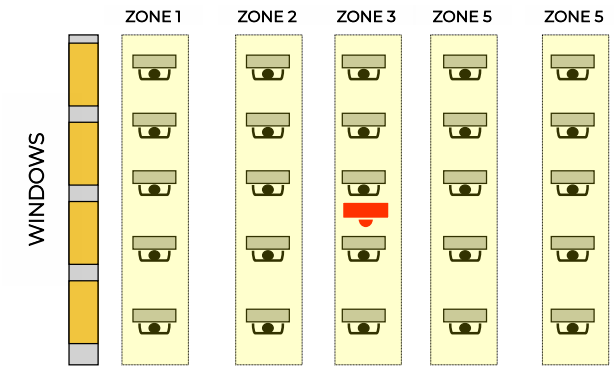
The functions and parameters of this mode are the same as those for **automatic presence Illuminance depending.**

Constant illuminance

This channel is independent of presence detection and manages the constant lighting of the environment in which it is installed.
The desired lux level is set with a setpoint value that can be changed from the bus while the brightness is managed by objects with % format:

“<Channel x> Illuminance setpoint”	1 bytes	CW
“<Channel x> Output brightnees Zone 1”	1 byte	CRT

The environment in which the detector performs constant brightness control can be divided into zones.
The sensor is typically placed in the center of the room and detects the brightness at that point, the controlled environment could have greater lighting in the areas near the windows and less in the more distant areas.
Assuming that in the environment there are lights arranged in parallel rows, it is possible to group the lights of the same row up to a maximum number of 5 rows (zones).
In ETS it is defined which is the “master” zone, that is the one where the sensor is located. For each other zone it is possible to define an offset to be applied to the command calculated for the master zone. The Offset value ranges from -100% to + 100% and indicates the percentage to adjust the lighting level control. In the hypothesis that the sensor is placed in the center of the room and that the windows are on one side only (as in the figure); the areas near the windows will have a negative offset because the contribution of external light will be greater than the central area, those away from the windows will have a positive offset.
The brightness control always respects the set offset as long as the adjustment reaches the level set for the “master” zone; when the level of this zone is not sufficient then the level of all the zones is increased anyway up to bringing all the zones to 100%.



Offset management can be enabled and disabled dynamically with a 1 bit communication object.

<Channel x> illuminance setpoint	1 Bit	CW

KNX PARAMETER	SETTINGS
Minimum output telegram delay	2s .. 20s
Defines the minimum time that must elapse between sending a regulation telegram and the next.	
Number of controlled zones	1 .. 5
Defines the number of zones in which to divide the controlled area.	
Zone x Offset	-100% .. + 100% [x] = from 2 to 5
Defines the offset to be applied to the controls for that area (the parameter is for zones 2 to 5).	
Zone 1 minimum value	0% .. 50%
Defines the minimum value to be sent on that zone (the parameter is for zones 1 to 5)	
Zone 1 maximum value	51% .. 10%
Defines the maximum value to be sent on that zone (the parameter is for zones 1 to 5)	
Offset after download	disabled / enabled
Defines whether offset management is active after download	
Offset at power on	disabled / enabled / before power off
It defines the state of the management of the offsets at power on, it can be active / deactivate or remain in the state before the power off.	

Constant illuminance presence depending

This configuration is similar to the previous one as the sensor makes the lighting level of the controlled environment constant. Unlike the “Constant lighting” mode, the adjustment is made only if there is a presence in the controlled area, when the sensor goes in the absence state sets the brightness to a predetermined value (typically 0%). For this mode, the parameters already described relating to the follow-up time and the use of the sound sensor can be set (if present).

KNX PARAMETER	SETTINGS
Send initial brightness when over setpoint	no/yes
If the sensor detects presence, it can send the command to switch on the lights even if the brightness is higher than the setpoint; the adjustment algorithm will cause the lights to go out if they do not need to be on.	

Constant illuminance presence depending, semi-automatic

The channel configuration is identical to that described in the previous paragraph (**Constant lighting presence depending**). The sensor is activated by a manual command, i.e. a 1 bit telegram which is sent on the bus and received by the sensor.

15.Inputs

Please refer to the “Digital input” user manual.

16.CO2 and VOC sensor

Please refer to the “CO2 and VOC sensor” user manual.

17.Virtual Holder

Please refer to the “Virtual Holder” user manual.

18.E-Lock

Please refer to the “E-lock” user manual.

19.Circadian Rhythm

Please refer to the “Circadian Rhythm” user manual.

20.Thermostat

Please refer to the “Thermostat and additional probe” user manual.

21.Logics

Please refer to the “Logics” user manual.

In the devices described, the logical expression can have a maximum of 24 characters