EIB KNX Movement Sensor SPHINX 330

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Contents

1 Functional characteristics

The movement sensor switches on the light for a programmable time if a movement is detected within its detection range.
Depending on the parameterization, this function can work in dependence of daylight or permanently.

1.1 The benefits

- Constant light control with dimming telegrams possible
- Teach-in brightness threshold for daylight-dependent switching
- Lock objects for movement sensors and constant light control
- Detects and sends the current brightness
- Very flat design

1.2 Special features

The brightness threshold for daylight-dependent switching and constant light control can be programmed directly via 2 **teach-in objects.**
Either the prevailing brightness is used or a freely defined brightness value can be programmed in as the new brightness threshold.

1.3 Technical data

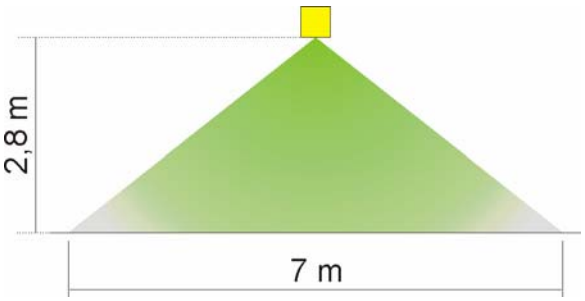
1.3.1 Dimensions

Table 1

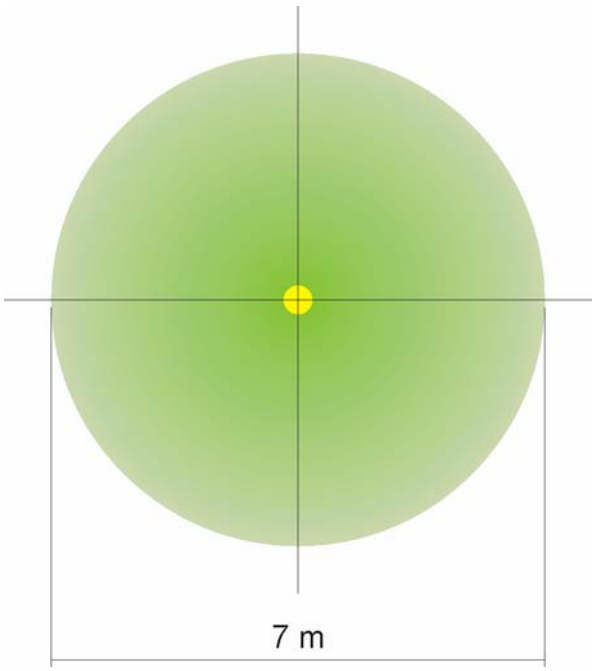
Mounting hole	∅ 64 mm
Front	∅ 76 mm
Installation height	approx. 5 mm
Installation depth	60 mm

1.3.2 Detection range

Detecting angle with a mounting height of 2.8 m



Covered area (at floor height)



Legends

High sensitivity
Low sensitivity

2 The application program "Sphinx 330"

2.1 Selection in the product database

Manufacturer	Theben AG
Product family	Phys. sensors
Product type	Movement sensors
Program name	Sphinx 330 V1.0

The ETS database can be found on our Homepage: www.theben.de

2.2 Parameter pages

Table 2

Name	Description
Movement	Behaviour for movement detection
Constant light control	Selection and setting of constant light function
Brightness value	Settings for the brightness sensor

2.3 Communication objects

2.3.1 Object characteristics

The movement sensor has 11 communication objects.

Table 3

No.	Object name	Function	Type	Behaviour
0	Movement	Switches on movement	EIS 1 1 Bit	Send
1	Movement sensor lock	Locks movement sensor	EIS 1 1 Bit	Receive
2	Master trigger	Input / output	EIS 1 1 Bit	Send Receive
3	Call / save brightness threshold	Call = 01_{dec} (01_{hex}) Save = 129_{dec} (81_{hex})	DPT. 18.001 1 Byte	Receive
4	Brightness threshold for movement-dependent switching	Setpoint value	2 Byte EIS 5	Send Receive
5	Constant light control	Dim	EIS 2 4 Bits 1 Byte	Send
6	Constant light control lock	Constant light control lock	EIS 1 1 Bit	Receive
7	Brightness value for control	Setpoint value	EIS 5 2 Byte	Send Receive
8	Call / save brightness threshold	Call = 01_{dec} (01_{hex}) Save = 129_{dec} (81_{hex})	DPT. 18.001 1 Byte	Receive
9	Brightness value	Brightness value	EIS 5 2 Byte	Send
10	Start-up mode	Input	EIS 1 1 Bit	Receive

Table 4

No. of communication objects:	11
No. of group addresses:	45
No. of associations:	46

2.3.2 Object description

- **Object 0 “Movement“**

Object for movement-dependent light switching:
0 = No movement
1 = Movement detected

- **Object 1 “Movement sensor lock“**

1 = Set lock
0 = Cancel lock
The behaviour on setting and cancelling the lock is configured on the “Movement“ parameter page

- **Objekt 2 “Master trigger“**

in Master mode
Receipt of a 1 causes the same reaction as when a movement is detected.
When the light is switched off, i.e. at the end of the switch-off delay, the object sends a 0 to the slave to prevent it from being switched on again when the light is switched off.
The master does not send “1” telegrams”.

in Slave mode
The object sends a 1 every 10 s for as long as movements are detected.
If movements are not detected, no telegrams are sent, i.e. the slave does not send “0” telegrams.

If a 0 is received, the slave no longer reacts to movements for the configured “time between on and off” as it is not switched back on when the light is switched off.

See also Appendix: Der Master / Slave Betrieb

- **Object 3 "**Call / save brightness threshold**"**

Teach-in via read out value

This object can be used to overwrite or deselect the programmed brightness value setting.

During teach-in (81_{hex}), the brightness value currently being measured is imported as a new value for the brightness threshold. This overwrites previously programmed value.

To check the setting, the value 01_{hex} is sent to the object and this in turn sends the currently programmed brightness threshold from object 4 to the bus.

- **Object 4 "Brightness threshold for brightness-dependent switching"**

Teach-in via setpoint value
This object enables the new setpoint value for the brightness threshold to be programmed in directly as an EIS5 brightness value. This overwrites the previously programmed value.

- **Object 5 "Constant light control"**

Output object for the dimmer control if the "constant light control function" has been activated.
Depending on parameterisation, this object can sent telegrams in 4-bit format for relative dimming (lighter/darker) or in 8-bit format for absolute dimming
(dimming value in 0%).

- **Object 6 "Disabling the constant light control"**

The lock acts on object 5.
Depending on parameterisation, the lock status is triggered with a 1 or a 0.
The lock status can be cancelled again with an inverted telegram.
The behaviour on setting the lock is set on the "Constant light control" parameter page.
Once the lock is cancelled, the constant light control continues to run as normal.

If the control is set to "yes", i.e. independent of the movement detection, this object can be used to switch the controlled light on and off.

- **Object 7 “Brightness value for control“**

Teach-in via setpoint value
This object enables the previously programmed setpoint value for the constant light control to be overwritten by a new value (teach-in value).

Note:

Quotient $\frac{\text{Teach-in value}}{\text{Calibration factor for brightness sensor}}$ may be a max. of 700 lx.

Higher values are limited internally to (700lx . calibration factor).

Table 5 : Examples

Calibration factor	Maximum teach-in value
1	700 lx
2	1400 lx
3	2100 lx
4	2800 lx
etc.	…

- **Object 8 “Call / save brightness threshold“**

Teach-in via readout value
This object enables the programmed setpoint value for the brightness control to be overwritten or deselected.

During teach-in (81_{hex}), the brightness value currently being measured is imported as a new value for the brightness threshold. This overwrites previously programmed value.

To check the setting, the value 01_{hex} is sent to the object and this in turn sends the currently programmed setpoint value from object 7 to the bus.

- **Object 9 “Brightness value“**

Depending on the parameterisation, sends the measured brightness value either if there is a change in brightness
and / or cyclically taking into account the calibration factor.
Sending occurs after reset in dependence of the “Sending brightness value” and “Cyclically sending brightness value” and when the brightness control threshold is reached.

- **Object 10 “Start-up mode“**

If a "1" is sent to this object, the movement sensor function always switches independent of brightness. The switch-off delay is a fixed 3 sec. and the retrigger function is inactive.

2.4 Parameters

2.4.1 Movement

Table 6

Designation	Values	Meaning
Master/Slave	**Master**	The device receives telegrams from slave devices and assumes the light on/off function.
	Slave	The device signals detected movement to the master. See Appendix: Der Master / Slave Betrieb
Show other parameters? *(only in slave mode)*	**No**	Only detect movement and signal to master device.
	Yes	Slave signals movement to master and sends a switching telegram to its own light group.
Retrigger		Behaviour on detecting a movement while the configured switch-off delay is running.
	ON	With each detected movement within the switch-off delay time, this is re-started and the light is not switched off until there is no movement within the delay time.
	OFF	The light is switched on when the first movement is detected and switched off again at the end of the switch-off delay.

Continued

Designation	Values	Meaning
Switch-off time delay time basis	**Seconds** Minutes	The switch-off delay determines how long after a movement is detected the light is to be switched off again. To determine the delay time, the time basis is multiplied by the switch-off delay factor.
Switch-off time delay factor (0..120) (0 = no OFF telegram)	Manual input 0..120	Enables delay times from 1 to 120 seconds and/or 1 to 120 minutes. When the device is set to 0, only an ON telegram is sent. This enables a staircase light timer, for example, to be actuated.
Time between off and on	0.5..2 s in 0.1 s increments	As the functional principle of a PIR movement sensor is based on thermal radiation measurement, a light switch-off may be interpreted as movement and trigger switch-on. In order to avoid this effect, movement sensor detection is deactivated for a fixed time with this parameter on switch-off.
Brightness-dependent switching *(only in master mode)*	 no **yes**	When is the movement sensor to be active? Always Only if the ambient brightness is below the configured brightness threshold.
Brightness threshold after download in 10 lx (1..100)	Manual input 1..100	Brightness threshold for brightness-dependent mode. Example: 50 = (50 . 10 lx) = 500 lx

Continued:

Designation	Values	Meaning
Behaviour when setting the lock	**Send no telegram**	The device will not send telegrams while the lock object is set.
	Switch-off	Send OFF telegram
	Switch-on	Send ON telegram
Behaviour when cancelling the lock		Restore normal mode and:
	Send no telegram	Send no additional telegram.
	Switch-off	Send OFF telegram
	Switch-on	Send ON telegram

2.4.2 Constant light control

Table 7

Designation	Values	Meaning
Constant light control	**No**	No control
	Yes	The light is permanently controlled to the configured value and can be switched on and off via the lock object.
	Only on movement	The light is controlled and switched on and off by movement.
Object type for control		Type of dimmer actuation:
	4-bit object (relative dimming)	Brighter / darker
	8-bit object (absolute dimming)	Percentage values 0...100%
Brightness threshold after download in 10 lx (20.0.255)	Manual input 20 ...255	Setpoint value for constant light control Example: 80 = (80 x 10 lx) = 800 lx
Hysteresis for brightness threshold	10 % **20 %** 30 % 40 % 50 %	No further correction takes place while the brightness is within the hysteresis (e.g. ±20%). This prevents frequent reactions after slight changes in brightness.
Behaviour when no movement is detected		Behaviour at end of switch-off delay:
	Send no telegram	the light stays on
	Dim darker	up to 0% dimming
	Dim brighter	up to 100% dimming
Lock telegram*	Lock with OFF telegram	0 = lock 1 = cancel lock
	Lock with ON telegram	0 = cancel lock 1 = lock
Behaviour when setting the lock	**Send no telegram**	The control will not send telegrams while the lock object is set.
	Dim darker	The light is dimmed down to 0.
	Dim brighter	The light is dimmed up to 100%.

Continued:

Designation	Values	Meaning
Set control	**via pre-defined values (recommended)** with internal values	Enables simple setting of the control speed. For special applications.
Control speed*	slow (telegrams every 9 sec.) **average (telegrams every 7 sec.)** fast (telegrams every 5 sec.)	How fast should the dimmer actuate the new value? See Appendix: Die Konstantlichtregelung: Regelgeschwindigkeit
Parameters for setting the control with internal values		
Control telegram increments 0 = small, 7 = large	Manual input 0 ..0.7	How fine is the differential (increments and/or percentage value) between 2 control telegrams?
Control telegram distance (0 .. 31, 0 = 1 sec, 1 = 2 sec, …)	Manual input 0 ..0.31	Defines after how many seconds a new dimming value is reached and send as required.

* The “lock telegram” parameter appears only when the “Constant light control” parameter is set to “yes”.

2.4.3 Brightness value

Table 8

Designation	Values	Meaning
Brightness sensor calibration factor	0.50…8.00	Compensates any unfavourable orientation of the brightness sensor. Calculation: Factor = Actual brightness / Measured value If, for example, the sensor measures 500 lx with an actual brightness of 1000 lx, a factor of 1000/500 = 2.00 is derived
Send brightness value on change	Do not send On change by 10 % **On change by 20 %** On change by 30%	Do not send on a change, send only cyclically where applicable. Send if the value has changed by 10%, 20% or 30% since it was last sent.
Send brightness value cyclically	**Do not send** Every minute Every 2 min. Every 3 min. Every 5 min. Every 7 min. Every 10 min. Every 15 min.	How often should the brightness value be sent?

3 Appendix

3.1 Master / Slave mode

3.1.1 Principle

Long or winding corridors, for example, often have only one common lighting circuit. The existing detection range, however, cannot be covered by one single movement sensor.
In this case, several devices are required.

3.1.2 Functionality

To control the lights, one movement sensor is covered as the master and all others will function as slaves.
The sole function of these slaves is to send a telegram to the master as soon as they have detected a movement.
A slave device sends a 1-telegram to the master every 10 s, as long as a movement is detected.

The master device controls the light via the object 0 (movement).
All devices communicate with each other via Objekt 2 (Master Trigger).

3.2 The constant light control

3.2.1 Principle

The ambient brightness is measured and the control sends telegrams to a dimmer so that the required brightness is reached and maintained.
Important:

- **Object 0 must not be connected to the dimmer!**
- The device must be positioned so as to guarantee a reliable light measurement.

3.2.2 Functionality

The constant light control can be configured in 2 different ways, i.e. dependent or independent of movement.

Table 1

Constant light control	Function	Comment
Yes	The light control is decoupled from the movement sensor and switched on and off solely by the lock object (obj. 6) (independent of movement).	Object 5 is connected to a dimmer. Object 6 can, e.g. be controlled via a push button.
Only on movement	The light control is coupled to the movement sensor. The light is switched on when a movement is detected (controlled) and switched off again when the configured switch-off delay has lapsed.	Object 5 is connected to a dimmer.

3.2.3 Control speed

The new dimming value is determined taking into account the differential between the current actual value and the brightness setpoint value.
The larger the differential, the greater the variance from the old dimming value.
The control telegram increments influence this calculation.
A value of 0 denotes a smaller variance between old and new dimming value than a value of 7.
A low value therefore results in a slow control and a high value (7) to a fast control.
To great a value, however, can cause overshoots.

3.3 The teach-in function

3.3.1 Principle:

As brightness is difficult to gauge, the configured brightness thresholds are taught-in locally. Both the current ambient brightness and also a fixed default value can be used as reference.

3.3.2 Functionality

Example: Teach-in threshold for brightness-dependent switching.

3.3.2.1 With the current ambient brightness

i.e. if the ambient brightness has the exact value required for activating the movement sensor: send 81_{hex} (= 129_{dec}) to object 3.
The current brightness value is stored and overwrites the previous one.

3.3.2.2 With a fixed value

The required value is sent in EIS 5 format (2 Byte brightness) to object 4.

3.3.2.3 Checking

As soon as the teach-in procedure is complete, the new taught-in value is automatically sent from object 4 to the bus.
Furthermore, the new value can be checked at any time via a request.
This involves sending the value 01_{hex} to object 3.

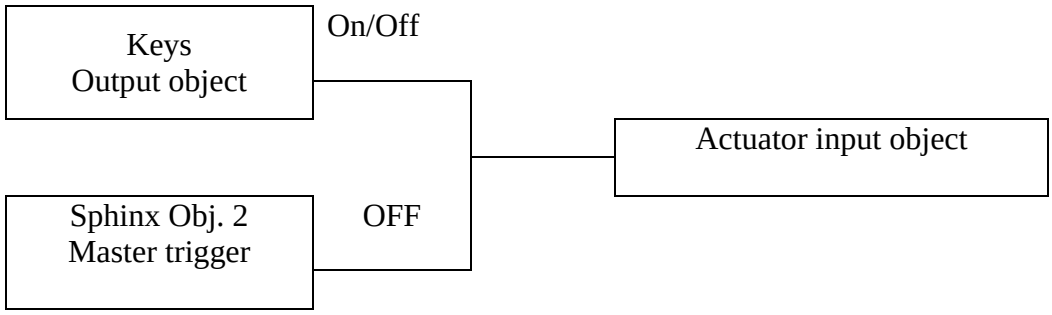
Objects 7 and 8 provide the same function for teaching-in the threshold for the brightness control.

3.4 Special function: Switching light off only

If when a room is entered, the light is to be switched on manually and only as required rather than automatically, although on leaving the room the light must be guaranteed to switch off automatically. This function can be realised with Objekt 2 (Master Trigger)

3.4.1 Principle

The movement sensor is configured as the master and object 2 is linked to the key via the same group address.
Object 0 is not used here.



Important: The “retrigger” parameter on the “movement” parameter page must be set to “ON”.

3.4.2 Functionality:

The user switches on the light via keys, his presence is detected although no telegram is sent because object 0 has no group address.
The light will remain on while there is movement in the room.
When the room is departed, the movement sensor sends a 0 to object 2, which switches the light back off.