EIB KNX Motion detector SPHINX 105

SPHINX 105	105 9 203

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1 Functional characteristics

1.1 Benefits

- Master/Slave function for multi-device systems
- Teach-in brightness threshold for daylight-dependent switching
- Disable objects for motion detectors
- Detects and transmits current brightness
- Second motion-dependent channel for heating control

1.2 Special features

Switch-off delay and brightness threshold can be set either via the ETS parameters or directly on the device (or via remote control).

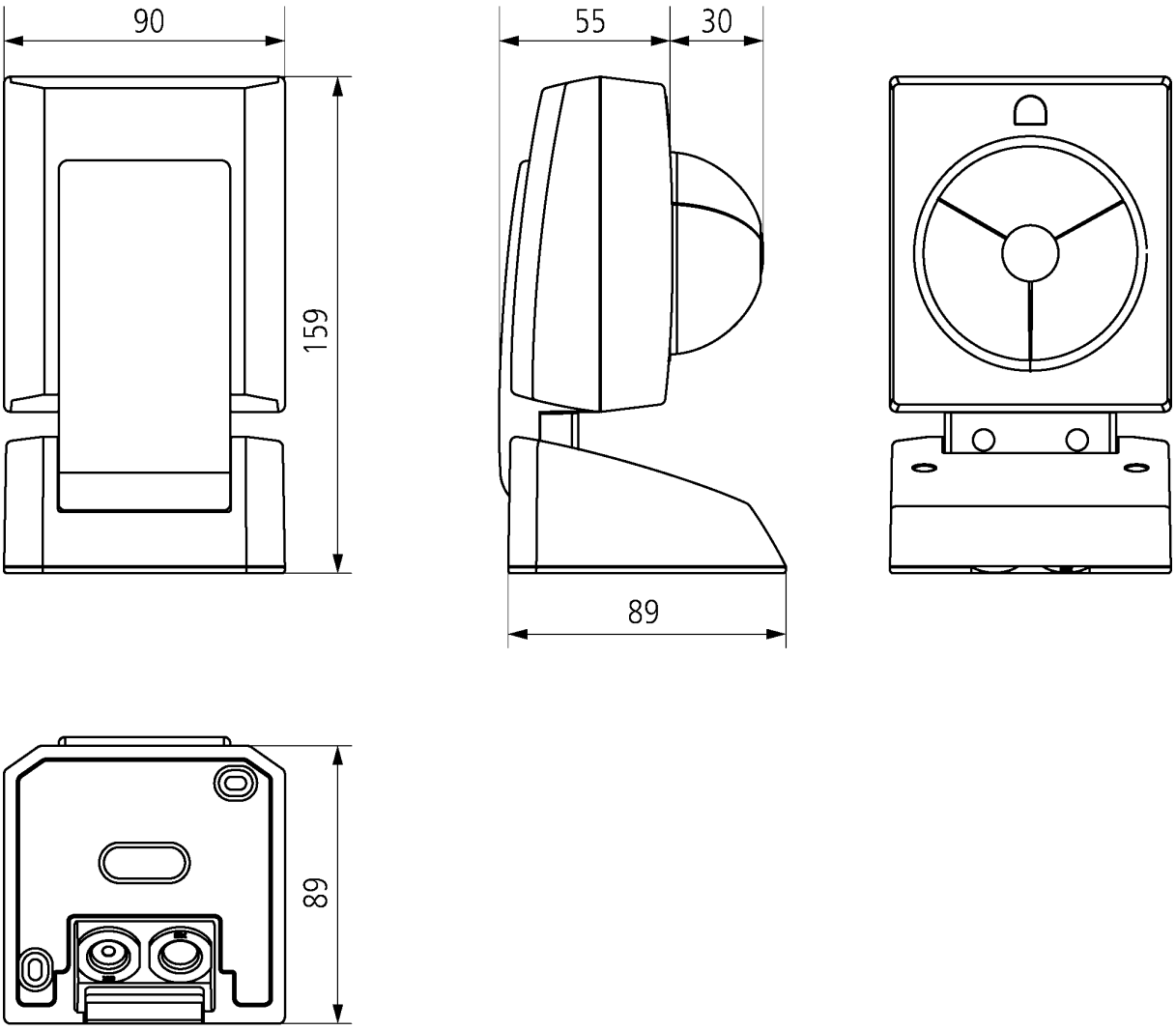
The brightness thresholds for daylight-dependent switching can be programmed directly via 2 **teach-in objects**.

Either the prevailing brightness is used or a freely-defined brightness value can be input as the new brightness threshold.

The second channel with switch on/off delay can selectively activate the heating when rooms are occupied.

1.3 Technical data

1.3.1 Dimensions



1.3.2 Detection range

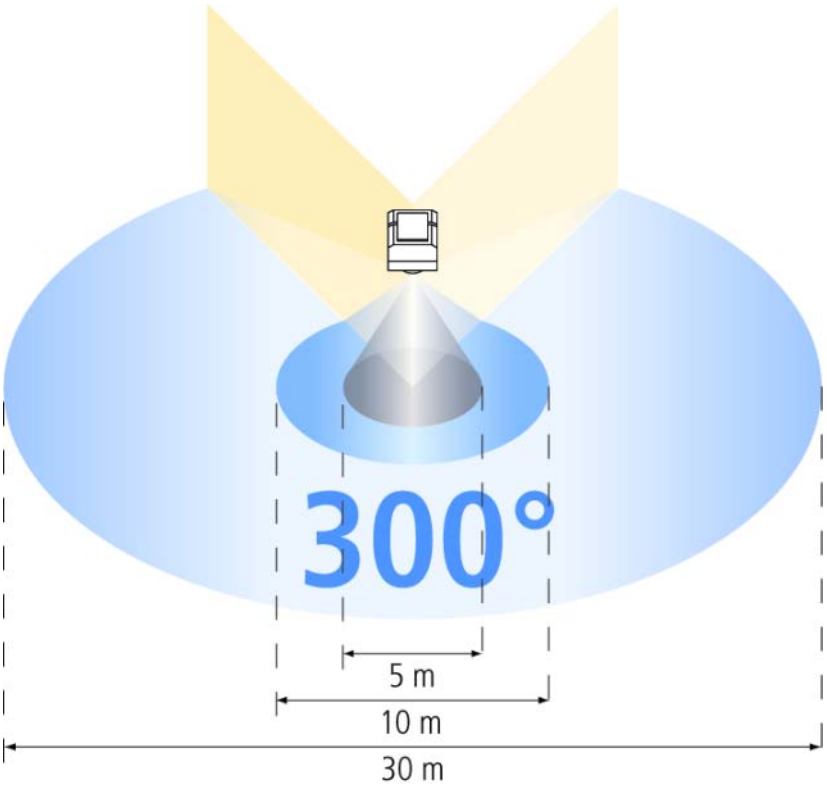


Figure 1: Area covered at ground level with installation height of 2.50 m.

Key: Detected movement.

- Creep under protection
- Running head-on to the detector
- Running diagonally to the detector

- Corner of building installation site

2 Application program "SPHINX 105"

2.1 Selection in the product database

Manufacturer	Theben AG
Product family	Phys. sensors
Product type	Motion detector
Program name	Sphinx 105 V1.0

The ETS databases can be found on our website: http://www.theben.de

2.2 Parameter pages

Table 1

Name	Description
General	Enable setting of delays and threshold via ETS or on device
Movement channel 1	Response for motion detection
Movement channel 2	2. channel e.g. for heating control
Brightness value	Settings for the brightness sensor

2.3 Communication objects

2.3.1 Object characteristics

The SPHINX 105 motion detector has 11 communication objects.

Table 2

No.	Object name	Function	Type	Flags			
				C	R	W	T
0	Movement	Switches when movement is detected	EIS 1 1 bit	✓			✓
1	Locking the motion detector	Locking the motion detector	EIS 1 1 bit	✓		✓	
2*	Master trigger	Input/output	EIS 1 1 bit	✓	✓	✓	✓
3*	Call up/save brightness threshold	Call up = 01_{dec} (01_{hex}) Save = 129_{dec} (81_{hex})	DPT. 18.001 1 byte	✓		✓	
4*	Brightness threshold for movement-dependent switching	Set point value	2 byte EIS 5	✓	✓	✓	✓
5..8	not used.						
9	Brightness value	Brightness value	EIS 5 2 byte	✓			✓
10*	Start-up mode	Input	EIS 1 1 bit	✓		✓	
11	Movement 2	Switches based on movement 2	EIS 1 1 bit	✓			✓
12	Locking the motion detector	Motion detector 2 lock	EIS 1 1 bit	✓		✓	
13*	Call up/save brightness threshold	Call up = 01_{dec} (01_{hex}) Save = 129_{dec} (81_{hex})	DPT. 18.001 1 byte	✓		✓	
14*	Brightness threshold for motion-dependent switching	Set point value	2 byte EIS 5	✓	✓	✓	✓
				C	R	W	T

* Only available with *Setting of switch-off delay and brightness threshold via ETS* (see General parameter page).

Table 3: Object flags

Flag	Name	Application
C	Communication	Object can communicate
R	Read	Object status can be viewed (ETS / display etc.)
W	Write	Object can receive
T	Transmit	Object can send

Table 4

Number of communication objects	11
Number of group addresses	41
Number of associations	41

2.3.2 Description of objects

- **Objects 0 "*Movement*"**

Object for motion-dependent light switching:
0 = No motion
1 = Motion detected

- **Object 1 "*Lock motion detector*"**

1 = Set lock
0 = Enable
The response for setting the lock and unlocking is configured on the "movement" parameter page

- **Object 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 motions 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 accessories: Master / Slave mode

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

Teach-in via measured value
This object can be used to overwrite or call up the programmed setting for the brightness threshold.
During teach-in (81_{hex}), the current measured brightness value is accepted as a new value for the brightness threshold. This overwrites the previously set 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 motion-dependent switching*"**

Teach-in via set point.
This object can be used to program the new set point for the brightness threshold directly as an EIS5 brightness value. This overwrites the previously set value.
The maximum teach-in value depends on the set calibration factor for the brightness sensor.
See appendix: Limiting the r teach-in values

- **Objects 5, 6, 7, 8**

Not used.

- **Object 9 "*Brightness value*"**

Transmits the measured brightness value according to configuration if there is a change in brightness
and / or cyclically taking into account the calibration factor.
Sent after reset in accordance with "Transmission of brightness value" and "Cyclical transmission of brightness value" parameters.

- **Object 10 "*Start-up mode*"**

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

- **Objects 11 "*Motion 2*"**

Object for motion-dependent switching of heating:
Switch on/off delays can be set individually.
0 = No motion
1 = Motion detected

- **Object 12 "*Lock motion detector 2* "**

1 = Set lock
0 = Enable
The response for setting the lock and unlocking is configured on the "motion" parameter page

- **Object 13 "*Call up/save brightness threshold 2*"**

Teach-in via measured value
This object can be used to overwrite or call up the programmed setting for the brightness threshold.
During teach-in (81_{hex}), the current measured brightness value is accepted as a new value for the brightness threshold. This overwrites the previously set 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 14 "*Brightness threshold 2 for motion dependent switching*"**

Teach-in via set point.
This object can be used to program the new set point for the brightness threshold directly as an EIS5 brightness value. This overwrites the previously set value.
The maximum teach-in value depends on the set calibration factor for the brightness sensor.
See appendix: Limiting the teach-in values

2.4 Parameters

2.4.1 General

Designation	Values	Application
Setting of switch off delay and brightness threshold	on device (potentiometers, remote control)	Brightness thresholds and switch-on delays can only be set directly on device or via remote control. ETS can only be used for the following settings: **Motion channel 1:** Response when setting/removing lock. **Motion channel 2*** Switch-on delay. Response when setting/removing lock. **Brightness value:** No restrictions
	via ETS	Thresholds and delays are exclusively set via ETS. The device potentiometer and setting of thresholds or switch-on delays via remote control are ineffective.

2.4.2 Motion channel 1 / channel 2

Important:
All parameters are only available if the *Setting of switch-off delay and brightness threshold* parameter is set to *via ETS*.
See above, General parameter page.

Table 5

Designation	Values	Application
Master/Slave	**Master**	The device receives telegrams from slave devices and assumes the lighting on/off function. The parameter page for the second channel will be displayed.
	Slave	The device signals detected motion to the master. See appendix: Master / Slave mode A second channel is not available.
Switch on	**with motion and with Master Trigger**	The channel responds to a detected movement or when a 1 is received on object 2 *Master Trigger* .
	Only with Master Trigger	The channel does not respond to movement and only transmits if a 1 is received on object 2 *Master Trigger* . This function is only available with channel 1, as this is intended specifically for light control.

Continuation:

Designation	Values	Application
Switch-on delay		This parameter is **only** available in *Master mode*
	none	The channel responds immediately to movement or when a 1 is received on object 2 *Master Trigger* .
	5 min. **10 min.** 15 min.	The channel does not respond until the set delay time has elapsed. However, this delay is reset if no further movement is detected within one minute. Briefly entering a room can therefore be ignored. This is especially useful if the channel is used to switch heating on and off.
Show other parameters? *(only in slave mode)*	**No**	Only detect movement and signal to master device.
	Yes	Slave reports movement to Master and transmits a switching telegram to its own lighting group.

Continuation:

Designation	Values	Application
Retrigger		Response on detecting 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 lighting is not switched off until there is no movement within the delay time.
	OFF	The lighting is switched on when the first movement is detected and switched off again at the end of the switch-off delay, even when further movement is detected. The lighting cannot be switched on again until the configured *time between switch-on and switch-off* (when movement is detected) has elapsed.
Switch-off 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 time factor.
Switch-off 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 stairway light timer, for example, to be actuated.

Continuation:

Designation	Values	Application
Time between switching off and on	0.5..2 s in 0.1 s increments	As the functional principle of a PIR movement detector is based on thermal radiation measurement, a light switch-off may be interpreted as motion and trigger switch-on. In order to avoid this effect, motion detection is deactivated at switch-off for a set period of time using this parameter.
Brightness-dependent switching *(only in master mode)*	 No **Yes**	When is the motion detector 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
Response when setting the lock	**Do not send telegram** Switch off Switch on	The device will not send telegrams while the disable object is set. Send OFF telegram Send ON telegram
Response when unlocking	 **Do not send telegram** Switch-off Switch on	Restore normal mode and: Do not send additional telegram. Send OFF telegram Send ON telegram **Note:** When the lock is cancelled, the timer the for switch-off delay is reset. The channel can then be switched on again as soon as the next movement is detected.

2.4.3 Brightness value

Table 6

Designation	Values	Application
Brightness sensor calibration factor	0,50…8,00	Compensates any unfavourable orientation of the brightness sensor. Calculation: $\text{Factor} = \frac{\text{Actual brightness}}{\text{Measured value}}$ If, for example, the sensor measures 500 lx with an actual brightness of 1000 lx, a factor of 1000/500 = 2.00 is derived **Important:** This factor influences the maximum teach-in brightness thresholds for movement-dependent switching. See appendix: The teach-in function
Send brightness value on change	do not send With change of 10 % **With change of 20 %** With change of 30%	Do not transmit on a change, only transmit cyclically where applicable. Send if the value has changed by 10%, 20% or 30% since it was last sent.
Transmit brightness value cyclically	**do not send** every minute every 2 minutes every 3 minutes every 5 minutes every 7 minutes every 10 minutes every 15 minutes	How often should the brightness value be sent?

3 Appendix

3.1 Typical applications

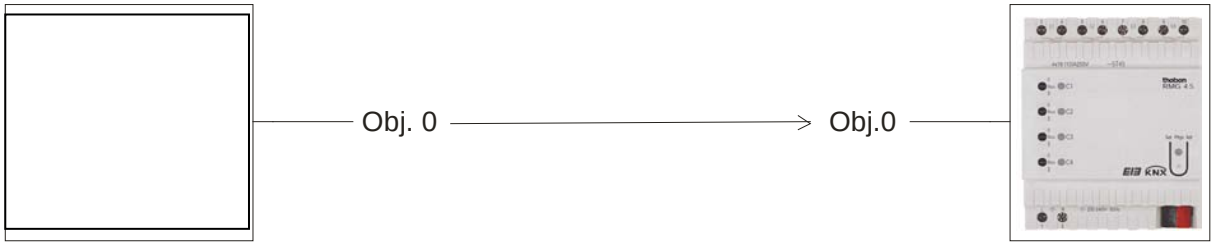
3.1.1 Basic application: Motion and brightness dependent switching with setting on device.

SPHINX 105 is designed to monitor a drive and/or courtyard and switch on lights on detecting movement.

3.1.1.1 Devices:

- SPHINX 105 (Order No. 1059203)
- RMG 4 S / RMG 4 C-Load (Order No. 4900204 / 4900206)

3.1.1.2 Overview



3.1.1.3 Objects and links

Table 7: Links

No.	SPHINX 105 Object name	No.	RMG 4 S Object name	Comments
0	*Channel 1 switching*	0	*GM RMG 4 channel 1*	Switching command for lighting

3.1.1.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

Table 8: SPHINX 105

Parameter page	Parameters	Setting
General	*Switching of switch-off delay and brightness threshold*	*on device (potentiometers, remote control)*

3.1.2 Movement and brightness-dependent switching on dimming with start-up and teach-in.

If the ambient brightness is too low, the Sphinx 105 is designed to switch on the light as soon as a movement is detected.
The switched threshold should be taught-in locally
(see below: The teach-in function).

For function testing the system, start-up mode is activated with a telegram to object 10.

The telegrams for teaching-in the brightness threshold and the start-up mode are generated with ETS 3 (menu*Diagnostics/Group telegrams*) in the project group monitor (*Read/Send*button).

3.1.2.1 Devices:

- SPHINX 105 (Order No. 1059203)
- RMG 4 S / RMG 4 C-Load (Order No. 4900204 / 4900206)

3.1.2.2 Overview

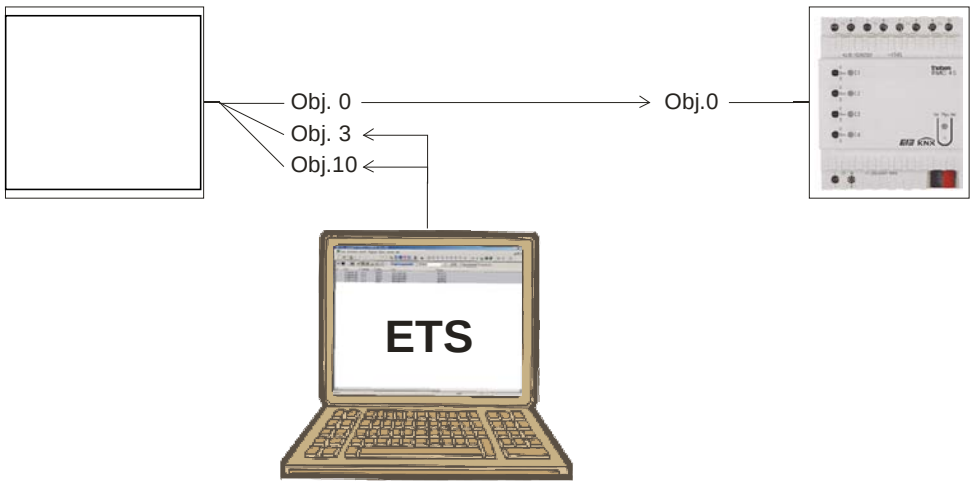


Figure 2

3.1.2.3 Objects and links

Table 9: Links

No.	SPHINX 105 Object name	No.	RMG 4 S Object name	Comments
0	*Channel 1 switching*	0	*GM RMG 4 channel 1*	Switching command for lighting
3	*Call up/save brightness threshold*	-	-	Teach -in telegram: The ETS transmits the value $81 (128) and the current brightness value is saved as a new threshold.
10	*Start-up mode*	-	-	The start-up mode is started with a “1” and ended with a “0”. In this mode, the channel switches on immediately every time movement is detected and switches off again after 3 seconds. Switching occurs independent of brightness.

3.1.2.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

Table 10: SPHINX 105

Parameter page	Parameters	Setting
General	*Switching of switch-off delay and brightness threshold*	*via ETS*
Movement channel 1	*Master/Slave*	*Master*
	Switch-on	*with motion and with Master Trigger*
	Brightness-dependent switching	*Yes*
	Brightness threshold after download. in 10 lx (1..100, max 650 lx x calibration factor)	*5**

*corresponds to 50 Lux.

Table 11: RMG 4 S

Parameter page	Parameters	Setting
RMG 4 channel 1	*Function*	*Switching On/Off*

3.1.3 Master/Slave mode

A larger area should be covered with 4 Sphinx 105.
One device is used as master, the other 3 as slaves.
The slaves trigger the master when movement is detected.
Delay times and brightness thresholds are configured in the master.

3.1.3.1 Devices:

- SPHINX 105 (Order No. 1059203)
- DMG 2 (Order No. 4910220)
- TR 644 S EIB / DCF (6449203 / 6449204)

3.1.3.2 Overview

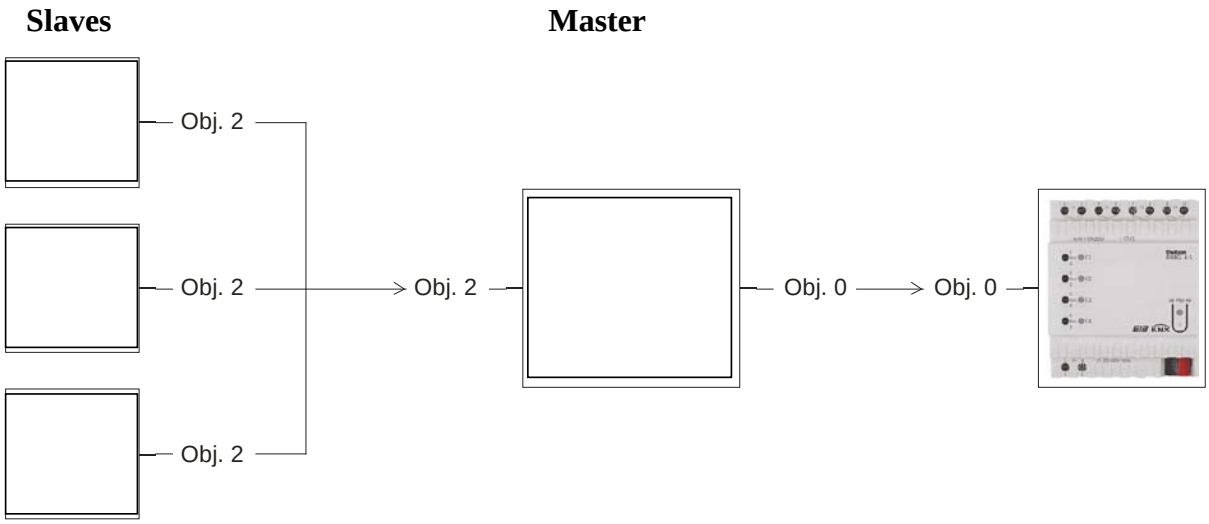


Figure 3

3.1.3.3 Objects and links

Table 12: Links

No.	SPHINX 105 **Slave** devices Object name	No.	SPHINX 105 **Master** devices Object name	Comments
2	*Master trigger*	2	*Master trigger*	As long as a movement is detected, the affected slave device sends a 1 every 10 s to the master device*. During switch-off, the master device sends a 0 to the slave device, which allows the configured*time between switch-off and switch-on* to take effect.

* After no further movement is detected, the slave devices stop sending.
A 0 is not sent.

No.	SPHINX 105 Master device Object name	No.	RMG 4 S / C-Load Object name	Comments
0	*Channel 1 switching*	0	*GM RMG 4 channel 1*	The master device switches the lighting.

3.1.3.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

Table 13: SPHINX 105 Slave devices

Parameter page	Parameters	Setting
General	*Switching of switch-off delay and brightness threshold*	*via ETS*
Movement channel 1	*Master/Slave*	*Slave*
	Show other parameters?	*No*

Table 14: SPHINX 105 Master device

Parameter page	Parameters	Setting
General	*Switching of switch-off delay and brightness threshold*	*via ETS*
Movement channel 1	*Master/Slave*	*Master*
	Switch on	*On movement and with Master Trigger*
	Retrigger	*ON*

3.1.4 Special function: Deactivating light only

The monitored area, e.g. a storeroom, has low passage lighting that is permanently on overnight.

Normal lighting is only switched on as required via push button.
This lighting should go off once the area is vacated.

This can be achieved automatically using the Sphinx 105 or manually via push button.

The switching actuator is controlled by object 2 (Master Trigger) of the Sphinx in combination with any EIB key.
The key can send both switch on and switch off commands to the switching actuator.
The motion detector's sole purpose is to switch off the lighting.

Object 0 of the motion detector is not used.

3.1.4.1 Devices:

- SPHINX 105 (Order No. 1059203)
- RMG 4 S / C-Load (Order No. 4900204 / 4900206)
- EIB key

3.1.4.2 Overview

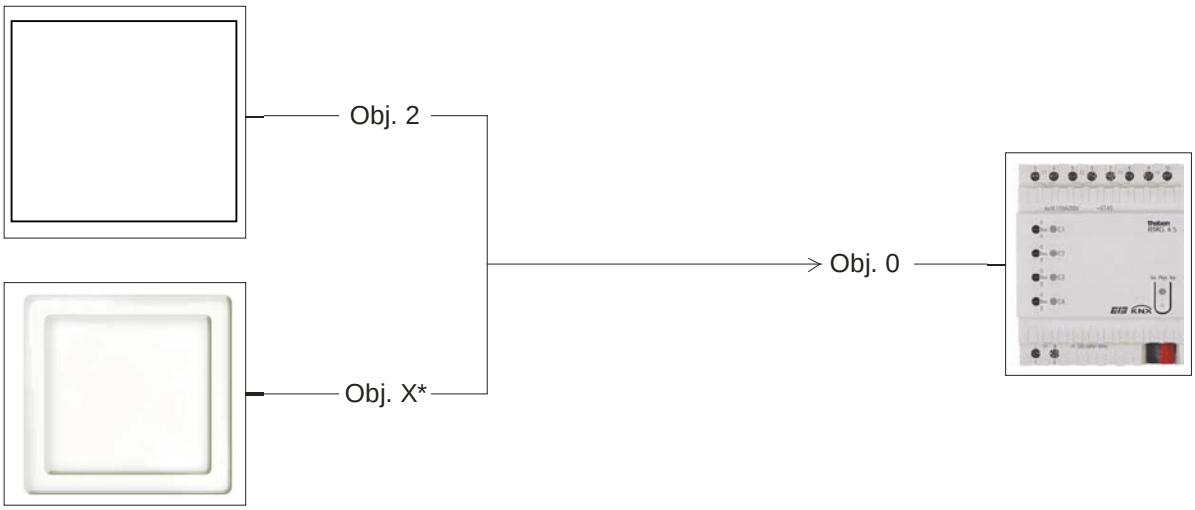


Figure 4

* Depending on push button.

3.1.4.3 Objects and links

Table 15: Links

No.	Any EIB key Object name	No.	RMG 4 S / C-Load Object name	Comments
x	*e.g. key 1*	0	*GM RMG 4 channel 1*	The light can be switched on and off using the key.

No.	SPHINX 105 Object name	No.	RMG 4 S / C-Load Object name	Comments
2	*Master trigger*	0	*GM RMG 4 channel 1*	A presence is detected but no telegram is sent, since object 0 is not used. The lighting will remain on while there is movement in the room. When the room is departed, the motion detector sends a 0 to object 2, which switches the light back off.

3.1.4.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

Table 16: SPHINX 105

Parameter page	Parameters	Setting
General	*Switching of switch-off delay and brightness threshold*	*via ETS*
Movement (channel 1)	*Master/Slave*	*Master*
	Switch on	*with motion and with Master Trigger*
	Retrigger	*Yes*
	Brightness-dependent switching	*No*
	Switch-off delay time basis	*Seconds*

Table 17: EIB key (example)

Parameter page	Parameters	Setting
Rocker 1 left	*Telegram on pressing the key*	*On*
	Telegram on releasing the key	*no telegram*
Rocker 1 right	*Telegram on pressing the key*	*Off*
	Telegram on releasing the key	*no telegram*

Table 18: RMG 4 S

Parameter page	Parameters	Setting
RMG 4 channel 1	*Function*	*Switching On/Off*

3.2 The teach-in function

3.2.1 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.

3.2.2 Functionality

Example: Teach-in threshold for brightness-dependent switching (channel 1).

3.2.2.1 with the current ambient brightness

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

3.2.2.2 with a fixed value

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

Note:
For the second channel, objects 13 and 14 are used for teach-in.

3.2.2.3 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 1 (byte) to object 3.

3.2.2.4 Limiting the teach-in values

The maximum teach-in value depends on the set calibration factor for the brightness sensor. The limitation conforms to the following rule:

$$\text{The quotient } \frac{\text{Teach-in value}}{\text{Brightness sensor calibration factor}}$$

may not exceed 650 lx.

Higher values are limited as follows.

Table 19:

Calibration factor	Maximum teach-in value
0,50	325 lx
1,00	650 lx
2,00	1300 lx
3,00	1950 lx
4,00	2600 lx
5,00	3250 lx
6,00	3900 lx
7,00	4550 lx
8,00	5200 lx

3.3 Master / Slave mode

3.3.1 Principle

In larger or narrow and winding areas, there is often only one common lighting circuit.
However, the available detection area cannot be covered by a single motion detector.
It is recommended to use more than one device.

3.3.2 Functionality

To control the lighting, one motion detector 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. This occurs independent of brightness.
A slave device sends a 1-telegram to the master every 10 s, as long as a movement is detected.

During switch-off, the master device sends a 0 to the slave device, which allows the configured*time between switch-off and switch-on* to take effect.

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