

# KNX Motion Sensor 18.4K with double PIR



FINDER S.p.A.

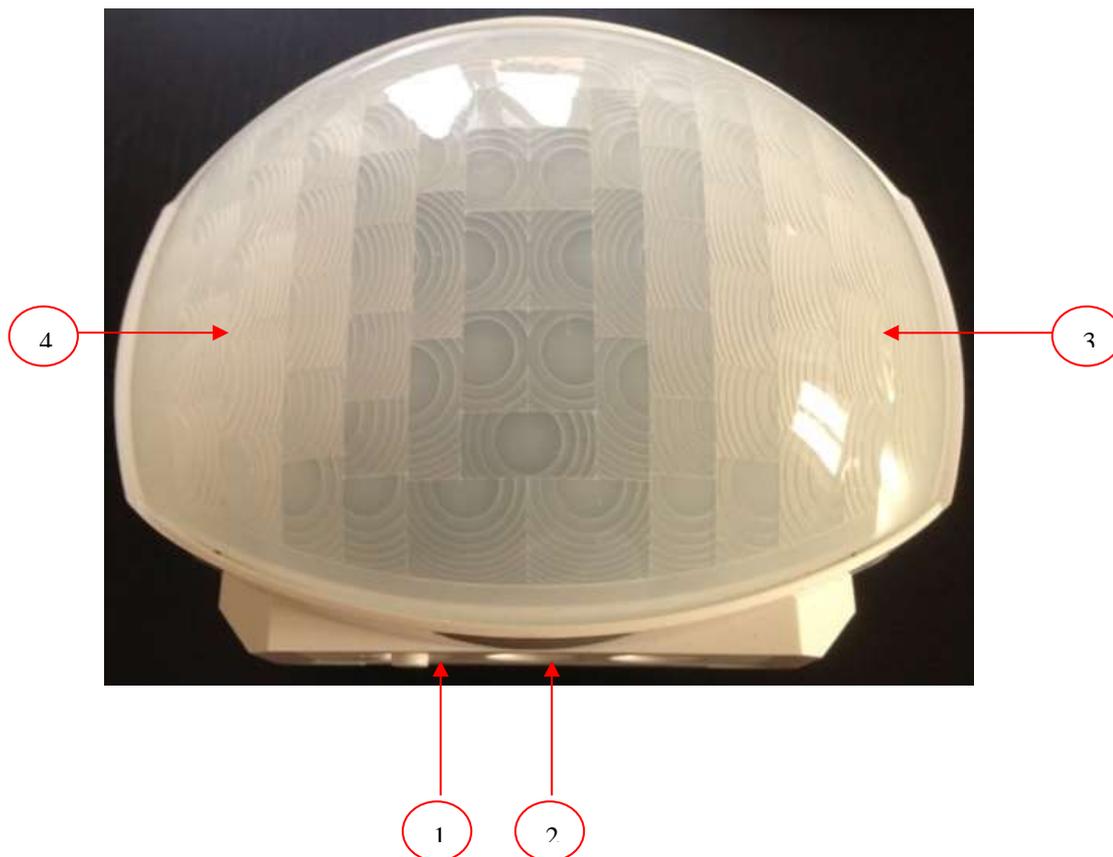
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# 1 Descriptive picture of the device



1)	Programming button
2)	Programming led
3)	Right side, movement sensor position
4)	Left side, movement sensor position

# 1 Device Template

Input	KNX Sensor	Output
DPT_PIR 1 (R) Threshold (%)		DPT_Output R ON/OFF
DPT_PIR 2 (L) Threshold (%)		DPT_Output L ON/OFF
DPT_Output1 ON (s)		DPT_Output1 ON/OFF
DPT_Minimum Brightness (lux)		DPT_Output2 ON/OFF
DPT_Output2 ON (s)		DPT_PIRs cyclic (%)
DPT_Forcing Output1 ON		DPT_LUX cyclic (lux)
DPT_Forcing Output1 OFF		
DPT_Forcing Output2 ON		
DPT_Forcing Output2 OFF		
DPT_Input 1 remote OutR		
DPT_Input 2 remote OutR		
DPT_Input 1 remote OutL		
DPT_Input 2 remote OutL		
	<p style="text-align: center;"><b>Parameters</b></p> <p>PAR_PIR1 (R) Threshold (%)            PAR_PIR2 (L) Threshold (%)            PAR_OUTPUT R/L Motion Check Time (x100ms)            PAR_OUTPUT 1 Time ON (s)            PAR_LUX Threshold (lux)            PAR_OUTPUT 2 Time ON (s)</p> <p>PAR_Cyclic LUX sending Time (s)            PAR_Cyclic PIRs sending Time (s)            PAR_Status OUTPUT 1 at restart            PAR_ASO (Automatic OUTPUT 1 ON)</p>	

## 1.1 Table of communication objects

Datapoint	DPT	Flags
DPT_Output R ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_Output L ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_Output1 ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_Output2 ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_LUX cyclic (lux)	DPT_Value_Lux (9.004)	C-R-T
DPT_PIRs cyclic (%)	DPT_Scaling (5.001)	C-R-T
DPT_PIR 1 (R) Threshold (%)	DPT_Scaling (5.001)	R-W
DPT_PIR 2 (L) Threshold (%)	DPT_Scaling (5.001)	R-W
DPT_Output1 ON (s)	DPT_TimePeriodSec (7.005)	R-W
DPT_Minimum Brightness (lux)	DPT_Value_Lux (9.004)	R-W
DPT_Output2 ON (s)	DPT_TimePeriodSec (7.005)	R-W
DPT_Forcing Output1 ON	DPT_Switch (1.001)	R-W
DPT_Forcing Output1 OFF	DPT_Switch (1.001)	R-W
DPT_Forcing Output2 ON	DPT_Switch (1.001)	R-W
DPT_Forcing Output2 OFF	DPT_Switch (1.001)	R-W
DPT_RemotePresence1_ChN 1≤N≤2	DPT_Switch (1.001)	R-W
DPT_RemotePresence2_ChN 1≤N≤2	DPT_Switch (1.001)	R-W

## 1.2 Detailed description of the communication objects

### 1.2.1 DPT\_Output R ON/OFF (1.001 Switch), DPT\_Output L ON/OFF (1.001 Switch)

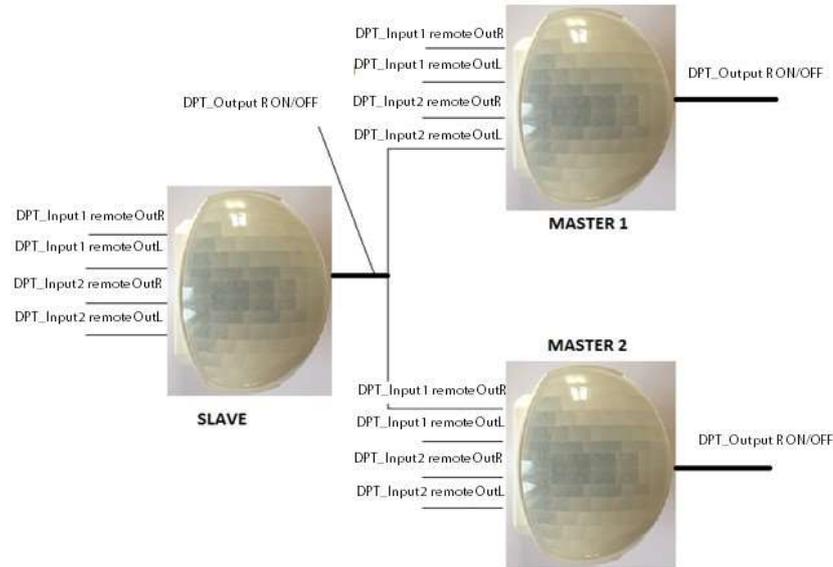
The DPT\_Output R ON/OFF message, in Slave mode (i.e. when the DPT\_Output R ON/OFF or the DPT\_Output L ON/OFF of no other device is connected to any DPT\_Input1/2 remote OutR/L remote channel) is relayed with ON value as soon as the signal module detected by the motion sensor differs from a percentage amount equal to the threshold set by the PAR\_PIR1 (R) Threshold (%) parameter.

Subsequently, each time that the device, while monitoring the sensor's signal, detects that the threshold has been exceeded (in absolute value), it resets the motion timer. When no motion is detected for a period exceeding the value of the PAR\_OUTPUT R/L Motion Check Time (x100ms) parameter, a message with OFF value is sent, and the transmission cycle resumes. The threshold value can be changed run-time by the DPT\_PIR 1 (R) Threshold (%) message. Upon reboot, the threshold and the DPT\_PIR 1 (R) Threshold (%) datapoint assume the default value indicated by the corresponding parameter.

#### 1.2.1.1 Master/Slave Function

The Master/Slave function is used to acquire information on the presence condition from other remote devices. Up to 5 separate devices can be connected. The Master/Slave function is activated by interconnecting the

DPT\_Output R ON/OFF and/or DPT\_Output L ON/OFF of a remote device with one of the four DPT\_Input1/2 remote OutR/L channels. This way, all devices can be both master and slave in motion detection. A device will only work as a slave when its four input channels are floating, i.e. not connected to the DPT\_Output R/L ON/OFF belonging to some other device



Moreover, the devices functioning as a Master monitor also the OR status of the four input channels for remote presence. For example, the DPT\_Output R ON/OFF in such devices has the following logic:

- 1) As soon as the movement sensor PIR1 detects a movement, or the OR condition of its two remote channels is true, that is

$$\text{DPT\_Input1 remote OutR} \parallel \text{DPT\_Input2 remote OutL}$$

the message DPT\_Output R ON/OFF is sent with value ON

- 2) If no movement is detected by the movement sensor PIR1 and both its remote channels are in the OFF condition for a period exceeding the PAR\_OUTPUT R/L Motion Check Time (x100ms) (no presence), the message DPT\_Output R ON/OFF is sent with value OFF.

In other words, the presence status (DPT\_Output R ON/OFF = ON) also occurs each time at least one of the two remote channels DPT\_Input1/2 remote OutR/L is ON, while the status of absence (DPT\_Output R ON/OFF = OFF) occurs if both the remote channels are OFF and the movement sensor PIR1 of the device does not detect motion for a period of time greater than the timeout set.

The message DPT\_Output L ON/OFF, concerning the motion sensor PIR2 (left sensor), works with the same logic, referring to its remote channel DPT\_Input2 remote OutR e DPT\_Input2 remote OutL. The scheme is an example of 3 devices, two Masters and one Slave. The DPT\_Output R ON/OFF of Slave is connected to the DPT\_Input2 remote OutL of Master 1 and to the DPT\_Input1 remote OutR of Master 2. Each time movement sensor PIR1 of Slave device detects a motion status in the manner described in paragraph 2.2.1, it sends the message DPT\_Output R ON/OFF = ON to the above-mentioned input channels of the two Masters, which in turn will send DPT\_Output R ON/OFF = ON and DPT\_Output L ON/OFF = ON as a result of the OR = true condition, even if their movement sensors do not detect motion.

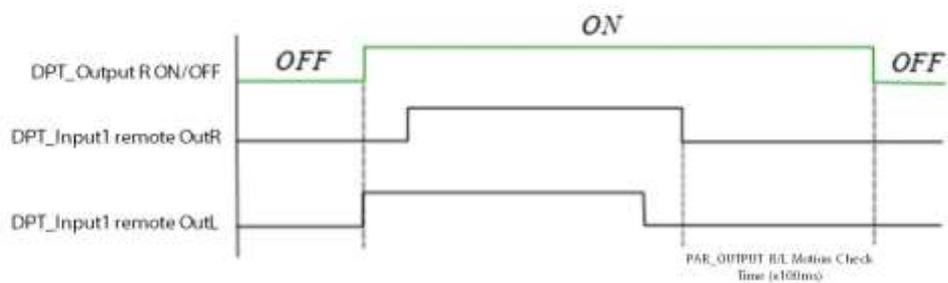


Figure 1: example of remote presence detection

Figure 1 is an example of the status change of the **DPT\_Output R ON/OFF** value for a Master connected to two Slaves via the **DPT\_Input 1 remote OutR** and **DPT\_Input 2 remote OutR** remote channels, when its sensor does not reveal any motion (remote presence only).

### 1.2.2 DPT\_Output1 ON/OFF (1.001 Switch)

Without forcing condition of lights output, the **DPT\_Output1 ON/OFF** message is sent with ON value every time the following conditions are satisfied:

- the movement sensors detect the motion status expressed by (1.0) or at least one of the remote channels **DPT\_Input1/2 remote OutR/L** channels is ON;
- the light sensor detects brightness lower than the minimum desired value.

The condition b) can be disabled through the **PAR\_ASO (Automatic OUTPUT 1 ON)** parameter, so that the lights controlled by an actuator that receives the message are always lit under the presence status a). The minimum brightness value is set by means of the **PAR\_LUX Threshold (lux)** parameter and can be changed run-time through via the **DPT\_Minimum Brightness (lux)** message, which is valid until the next reboot of the device.

As a result, the **DPT\_Output1 ON/OFF** message can activate a light actuator which will switch on for a minimum time equal to the time-out time, corresponding to the **PAR\_OUTPUT 1 Time ON (s)** parameter (default value) or to the value sent via the **DPT\_Output1 ON (s)** message i.e., a temporary value until the next reboot of the device. Once the time period expires in the no presence status, the **DPT\_Output1 ON/OFF** is sent with OFF value and the light goes off. Figure 2 refers to a Slave device, shows an example of the messages sent in case the motion threshold of movement sensor PIR1 has never been changed through the **DPT\_PIR 1 (R) Threshold (%)** datapoint, under the condition that the brightness is inferior to the minimum value (condition b).

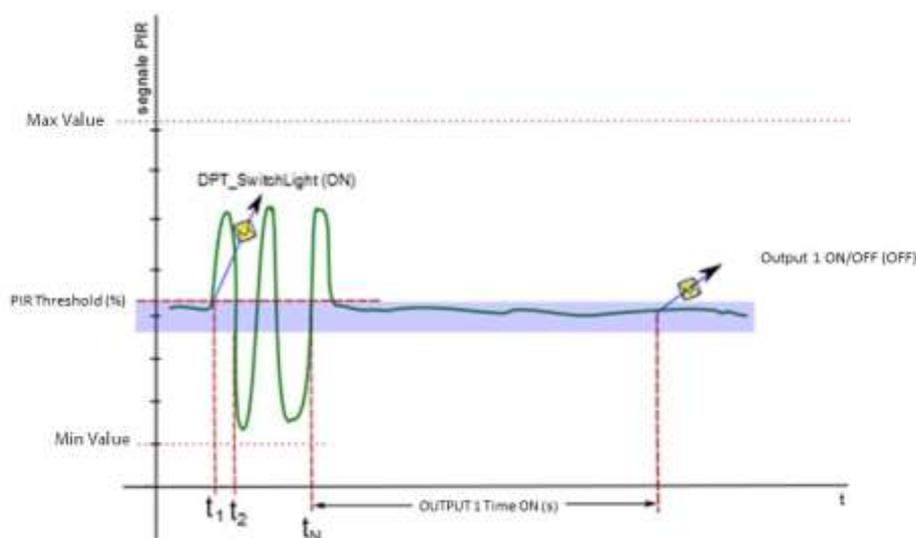


Figure 2: example of DPT\_Output1 ON/OFF sending

At instant  $t_1$ , the motion threshold is exceeded and the activation message sent. At the same time, the sleep timer is reset. Timer resetting occurs whenever the value of the threshold is exceeded, as for  $t_2$  and  $t_N$ . Upon timeout from the last reset, the shutdown message is sent.

On powering the device, or after a reset due to its reprogramming via ETS, the **DPT\_Output1 ON/OFF** message is sent with a value selected by the **PAR\_Status OUTPUT 1 at restart** parameter, independently from the movement and/or brightness conditions. Subsequently, the device waits for a period of approximately 26 seconds, after which it resumes the logic of message sending described in the present paragraph.

### 1.2.3 DPT\_Forcing Output1 ON (1.001 Switch), DPT\_Forcing Output1 OFF (1.001 Switch)

The **DPT\_Forcing Output1 ON** and **DPT\_Forcing Output1 OFF** messages are sent to the device whenever you want to force the light output bypassing the indications of the sensors. If the messages value is ON, the lights will be respectively turned on permanently or permanently switched off. If the value of both messages is OFF, the device adjusts the lights according to the normal operation piloted by the indications of movement and brightness sensors. At the end of the forcing condition (value of both messages equal to OFF), the device restores the state it had before to satisfy the condition and returns to adjust the lights according to the normal operation. When the lights are forced in a particular state, the receipt with ON value of a message that requires forcing on the complementary state involves resetting by the device of the previous forcing request, with the immediate activation of the last forcing condition. In this way, the light output will always be forced on the basis of last forcing request received with value ON.

### 1.2.4 DPT\_Output2 ON/OFF (1.001 Switch)

Without forcing condition of relay output, the **DPT\_Output2 ON/OFF** message is sent from a device whenever the presence status is met, i.e. when the movement sensor detects the motion status expressed by (1.0), or at least one of the **DPT\_Input1/2 remote OutR/L** channels is ON. With this communication object, control of a generic device such as a fan coil by the input channel of an actuator, or a second line of lights in the simple On/Off mode can be carry out. The switch on time of the peripheral device is specified by the **PAR\_OUTPUT 2 Time ON (s)** parameter, or by the value sent via the **DPT\_Output2 ON (s)** message, a temporary value set until the next reboot of the device. After this time, the **DPT\_Output2 ON/OFF** message is sent with OFF value and the peripheral device controlled with this second output switches off. The management logic of the switch on time according to the presence status is identical to that specified in section 2.2.2 for the **DPT\_Output1 ON/OFF** message.

### 1.2.5 DPT\_PIR 1 (R) Threshold (%) (5.001 Scaling), DPT\_PIR 2 (L) Threshold (%) (5.001 Scaling)

The message **DPT\_PIR 1 (R) Threshold (%)** temporarily modifies the motion detection threshold of movement sensor PIR1 (right sensor), which is set by means of the **PAR\_PIR1 (R) Threshold (%)** parameter, which is not overwritten by the new value. By sending the message to the device, the **DPT\_Output R ON/OFF** will be sent ON only when the signal of the movement sensor PIR1 exceeds the new threshold value. Figure 6 shows an example of motion threshold setting greater than that defined by the parameter value for a device operating in Slave mode.

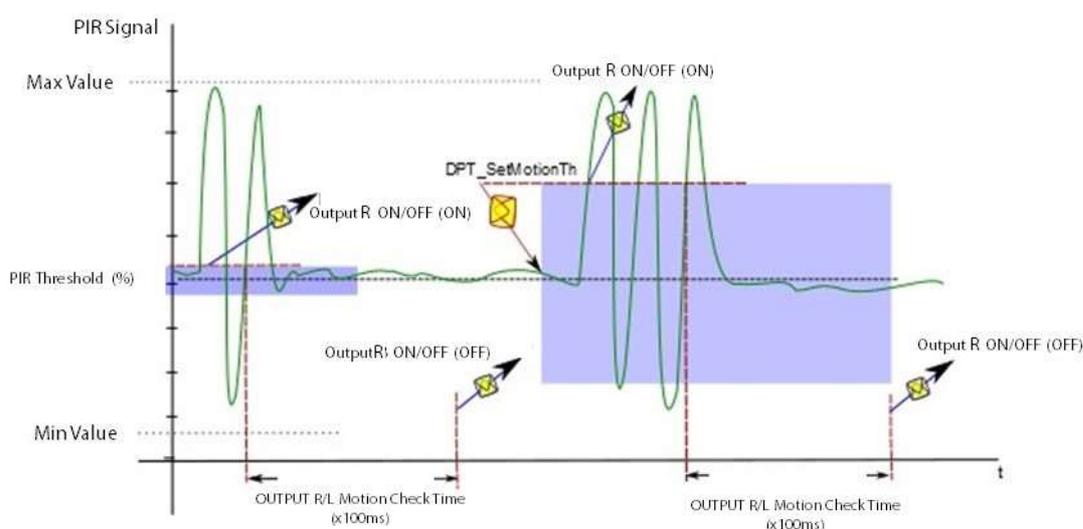


Figure 3: example of motion threshold variation with **DPT\_PIR 1 (R) Threshold (%)**

The message **DPT\_PIR 2 (L) Threshold (%)** will temporarily modifies the motion threshold of movement sensor PIR2 (left sensor), which is set at programming time by means of the **PAR\_PIR2 (L) Threshold (%)** parameter, which is not overwritten by the new value.

### 1.2.6 DPT\_Output1 ON (s) (7.005 TimePeriodSec)

The **DPT\_Output1 ON (s)** message temporarily sets the value of the maximum time for switching on the lights of an actuator in the absence of motion, without overwriting the corresponding parameter.

### 1.2.7 DPT\_Minimum Brightness (lux) (9.004 Value Lux)

The **DPT\_Minimum Brightness (lux)** message is sent to the device to change the minimum required brightness temporarily. Upon reboot, it assumes the default value represented by the **PAR\_LUX Threshold (lux)** parameter, which is not overwritten by the set value. In the presence of the motion status and with ASO (Automatic Switch On/Off) mode enabled by the **PAR\_ASO (Automatic OUTPUT 1 ON)** parameter = ON, if the message is sent with the datapoint value set as 0, the **DPT\_Output1 ON/OFF** datapoint will never be sent (lights always Off). If instead the value is higher than the brightness maximum value detectable by the light sensor MaxValue, then the **DPT\_Output1 ON/OFF** message will always be sent (lights always on), independently of the brightness measured. Figure 4 shows an example of the operation of this communication object for a Slave device.

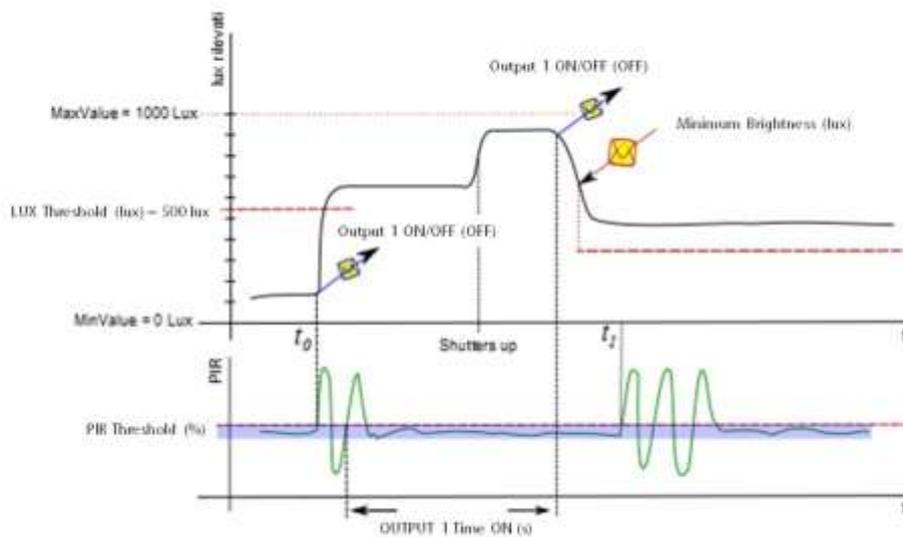


Figure 4: example of variation of minimum brightness in ASO mode

Upon first motion detection ( $t_0$ ), the switch on lights message is sent, and the brightness of the lights will change from 100lux to 650lux once they are on. After the blinds have been raised, and a value of 950lux is reached as a result, the lights will go out once the timeout has elapsed and the brightness, having lost their contribution, sets to approximately 400lux. If in the meantime the device has received a **DPT\_Minimum Brightness (lux)** message with the value displayed in the example, upon the next motion detection ( $t_1$ ) the lights remain off, since the sending status for the **DPT\_Switch with value ON** is not checked for.

### 1.2.8 DPT\_LUX cyclic (lux) (9.004 Value Lux)

This message sends the brightness value detected by the device light sensor. The sending mode is cyclical and set by the **PAR\_Cyclic LUX sending Time (s)** parameter. Figure 5 shows an example of sending with 5-second **PAR\_Cyclic LUX sending Time (s)**.

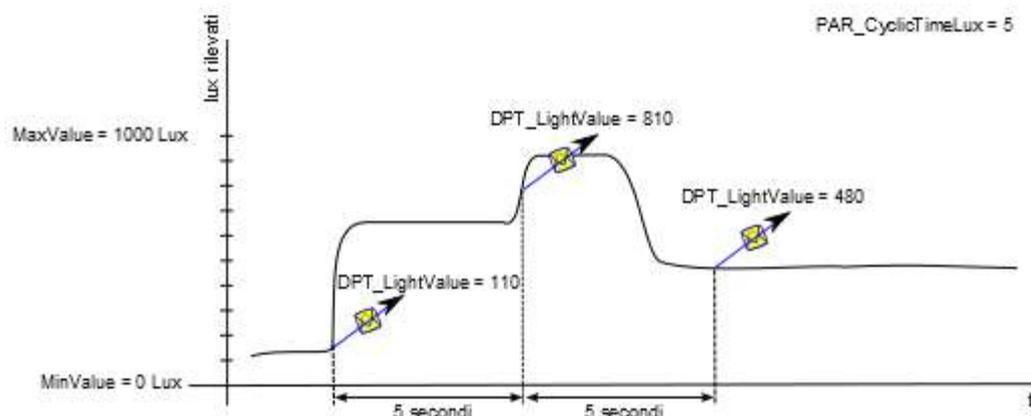


Figure 5: cyclical sending of brightness

### 1.2.9 DPT\_PIRs cyclic (%) (5.001 Scaling)

This message sends the percentage value of the greater between the two signals detected by the pair of movement sensors of device. The sending mode is cyclical and set by the **PAR\_Cyclic PIRs sending Time (s)** parameter. The principle of operation is the same as the **DPT\_LUX cyclic (lux)** message shown in Figure 9 for the similar datapoint referred to the brightness value.

### 1.2.10 DPT\_Output2 ON (s) (7.005 TimePeriodSec)

The **DPT\_Output2 ON (s)** message temporarily sets the value of maximum switching ON time of the device controlled via the second **DPT\_Output2 ON/OFF** output channel in the absence of motion, without overwriting the corresponding parameter.

### 1.2.11 DPT\_RemotePresence1\_ChN, 1 ≤ N ≤ 2 (1.001 Switch)

These messages driver the two input remote channels of the device referred to message **DPT\_Output R ON/OFF**, through which the Master/Slave mode can be obtained, during detection of the presence status. They can be fed by **DPT\_Output R/L ON/OFF** messages coming from remote devices.

### 1.2.12 DPT\_RemotePresence2\_ChN, 1 ≤ N ≤ 2 (1.001 Switch)

These messages driver the two input remote channels of the device referred to message **DPT\_Output L ON/OFF**, through which the Master/Slave mode can be obtained, during detection of the presence status. They can be fed by **DPT\_Output R/L ON/OFF** messages coming from remote devices

### 1.3 List of configuration parameters

Parameter	Valore di default
<b>PAR_PIR1 (R) Threshold (%)</b>	30%
Motion threshold of movement sensor PIR1 (right side sensor)	
<b>PAR_PIR2 (L) Threshold (%)</b>	30%
Motion threshold of movement sensor PIR2 (left side sensor)	
<b>PAR_OUTPUT R/L Motion Check Time (x100ms)</b>	1
Timeout (x100ms) since last detection of motion status (presence) by movement sensors	
<b>PAR_OUTPUT 1 Time ON (s)</b>	1
Timeout of switching on lights output since last detection of no presence	
<b>PAR_LUX Threshold (lux)</b>	250
Minimum value of requested illumination	
<b>PAR_Cyclic LUX sending Time (s)</b>	5
Sets the period time of DPT Light Value Message cyclic sending	
<b>PAR_Cyclic PIRs sending Time (s)</b>	5
Sets the period time of DPT Motion Value Message cyclic sending	
<b>PAR_ASO (Automatic OUTPUT 1 ON)</b>	Disable
Enable brightness control for switching on the lights within the Automatic Switch On/Off mode	
<b>PAR_OUTPUT 2 Time ON (s)</b>	1s
Timeout of switching on of the second peripheral device since last detection of no presence	
<b>PAR_Status OUTPUT 1 at restart</b>	Off
Defines the DPT Switch Light status at device power-on or after a restart by ETS	

## 1.4 Detailed description of the configuration parameters

### 1.4.1 PAR\_PIR1 (R) Threshold (%), PAR\_PIR2 (L) Threshold (%)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: 15÷100

They define the percentage variation compared to the polarization voltage (threshold) of the signals detected by the movement sensor PIR1 (right side sensor) and PIR2 (left side sensor) respectively to state the motion status, in order to send the corresponding **DPT\_Output R ON/OFF** and **DPT\_Output L ON/OFF** messages. They represent the default value assigned to the **DPT\_PIR 1 (R) Threshold (%)** and **DPT\_PIR 2 (L) Threshold (%)** datapoints upon device reboot.

### 1.4.2 PAR\_OUTPUT R/L Motion Check Time (x100ms)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: [0÷65535]

It defines the time in multiples of 100 ms before sending the messages **DPT\_Output R ON/OFF** and **DPT\_Output L ON/OFF** with OFF value since last reset of the motion scanning timer. It serves to filter the sending of the messages that states the absence of motion (no presence). The values to be set will be chosen according to the sensors signal dynamic as multiples of 0.1 seconds (e.g. 100ms = 1, 1000ms = 10, 1500ms = 15, etc.).

### 1.4.3 PAR\_OUTPUT 1 Time ON (s)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: [0÷65535]

It defines the wait time in seconds for the lights drove by an actuator, once lit, to turn off if no motion is detected. The following table shows the significant values.

Value	Description	Condition
0<x≤65535	Timeout after x seconds (Max 18.2 h)	Once the lights are on, they will switch off after X number of seconds since last detected motion.

Table 1: description of values for the PAR\_OUTPUT 1 Time ON (s)

### 1.4.4 PAR\_OUTPUT 2 Time ON (s)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: [0÷65535]

It defines the waiting period in seconds so that the device driven by the output relay, once turned on, will turn off while motion is absent. The following table shows the significant values. This represents the default values assigned to the datapoint **DPT\_Output2 ON (s)** upon reboot of the device.

Value	Description	Condition
0<x≤65535	Timeout after N seconds (Max 18.2 h)	Once turned on, the peripheral device connected to the output relay, will turn off after N seconds since last detected motion.

Table 2: description of values for the PAR\_OUTPUT 2 Time ON (s)

### 1.4.5 PAR\_LUX Threshold (lux)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: [0÷65535]

It defines the minimum desired light intensity value with ASO mode active. In motion statuses, if the light detected by the sensor is lower than the value of the parameter, the **DPT\_Output1 ON/OFF** message is sent to a light actuator to turn it on. It represents the default value assigned to the **DPT\_Minimum Brightness (lux)** datapoint upon device reboot.

#### 1.4.6 PAR\_Cyclic LUX sending Time (s)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: [0÷65535]

This parameter sets the cyclic sending time expressed in seconds of the **DPT\_LUX cyclic (lux)** message for transmission of the brightness detected by the device light sensor. By setting the value to 0, the message will never be sent. Summarized in Table 3 are the significant values for this parameter.

Value	Description	Condition
0	Sending disabled	The message DPT_LUX cyclic (lux) will never be sent.
0<x≤255	Sending cycled	The message DPT_LUX cyclic (lux) is cyclically sent every x seconds.

Table 3: PAR\_Cyclic LUX sending Time (s) values for cyclic sending of detected brightness

#### 1.4.7 PAR\_Cyclic PIRs sending Time (s)

- Property Datatype: PDT\_UNSIGNED\_16bit
- Datapoint Type: None
- Range: [0÷65535]

This parameter sets the cyclical sending time expressed in seconds of the **DPT\_PIRs cyclic (%)** message for transmission of the motion detected by the device movement sensors. By setting the value to 0, the message will never be sent. Summarized in Table 4 are the significant values for this parameter.

Value	Description	Condition
0	Sending disabled	The message from DPT_PIRs cyclic (%) will never be sent.
0<x≤255	Sending cycled	The message DPT_PIRs cyclic (%) cycle is sent every x seconds.

Table 4: PAR\_Cyclic PIRs sending Time (s) values for cyclic sending of motion detected

#### 1.4.8 PAR\_ASO (Automatic OUTPUT 1 ON)

- Property Datatype: PDT\_UNSIGNED\_8bit
- Datapoint Type: None
- Range: [0÷1]

Through this parameter the brightness threshold control at the motion status (**Automatic Light Switch On/Off**) can be enabled or disabled. If the parameter has the value 1, the device sends the **DPT\_Output1 ON/OFF** message with ON value, only if the measured brightness is below the required threshold, as shown in Figure 5. If the parameter is 0, the device sends the same message regardless of the brightness status. This mode is useful when the device is installed in a position to detect the brightness of controlled lights, so as to favor the power-saving condition when the required brightness is satisfied without lighting.

#### 1.4.9 PAR\_Status OUTPUT 1 at restart

- Property Datatype: PDT\_UNSIGNED\_8bit
- Datapoint Type: None
- Range: [0÷1]

Through this parameter the value that is sent with the **DPT\_Output1 ON/OFF** message at power-on of the sensor or after a reprogrammed reset using the ETS can be set. Once the message is sent, the sensor waits for a period of 26 seconds, after which it resumes normal operations according to the motion and / or brightness statuses. The wait period does not affect the administration of all other communication objects other than the **DPT\_Output1 ON/OFF**.