KNX Motion and Presence Sensor 18.5K

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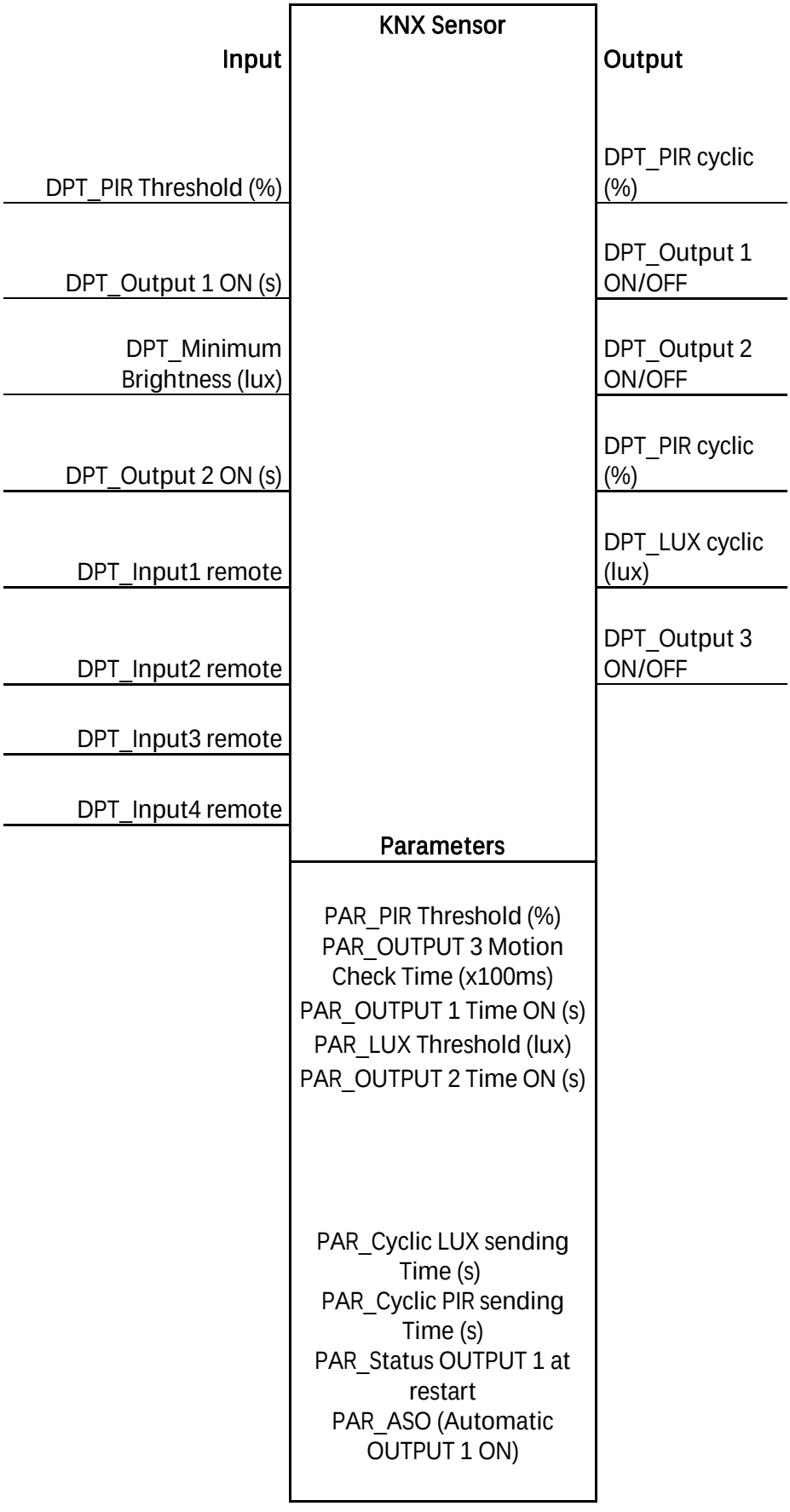
1 Device Template



1.1 Table of communication objects

Datapoint	DPT	Flags
DPT_Output 3 ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_Output 1 ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_Output 2 ON/OFF	DPT_Switch (1.001)	C-R-T
DPT_LUX cyclic (lux)	DPT_Value_Lux (7.013)	C-R-T
DPT_PIR cyclic (%)	DPT_Scaling (5.001)	C-R-T
DPT_PIR Threshold (%)	DPT_Scaling (5.001)	R-W
DPT_Output 1 ON (s)	DPT_TimePeriodSec (7.005)	R-W
DPT_Minimum Brightness (lux)	DPT_Value_Lux (7.013)	R-W
DPT_Output 2 ON (s)	DPT_TimePeriodSec (7.005)	R-W

1.1.1 Name of communication objects in the product descriptor

Datapoint	Name	Function
DPT_Output 3 ON/OFF	Presence	On/Off presence
DPT_Output 1 ON/OFF	Light Switch	On/Off light
DPT_Output 2 ON/OFF	Relay Switch	On/Off 2nd output
DPT_LUX cyclic (lux)	Light Lux	Lux lightness detection
DPT_PIR cyclic (%)	Motion Detection (%)	Percentage motion detection
DPT_PIR Threshold (%)	Motion Threshold (%)	Percentage motion threshold
DPT_Output 1 ON (s)	Light Time (sec)	Time light On
DPT_Minimum Brightness (lux)	Minimum Brightness (lux)	Lux luminosity min
DPT_Output 2 ON (s)	Relay Time (sec)	Time relay On

1.2 Detailed description of the communication objects

1.2.1 DPT_Output 3 ON/OFF (1.001 Switch)

The **DPT_Output 3 ON/OFF** message, in Slave mode (i.e. when **the DPT_Output 3 ON/OFF** of no other device is connected to any **DPT_Input N ON/OFF remote**) 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_PIR Threshold (%)** parameter.

Subsequently, each time that the device, while monitoring the sensor's signal, detects that the threshold has been exceeded (in module), it resets the motion timer. When no motion is detected for a period exceeding the value of the **PAR_OUTPUT 3 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 Threshold (%)** message. Upon reboot, the threshold and the **DPT_PIR 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 from other remote sensors. Up to 5 separate sensors can be connected. The Master / Slave function is activated by interconnecting the **DPT_Output 3 ON/OFF** of a remote device with one of the four **DPT_Input N ON/OFF** 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 3 ON/OFF** belonging to some other devices.

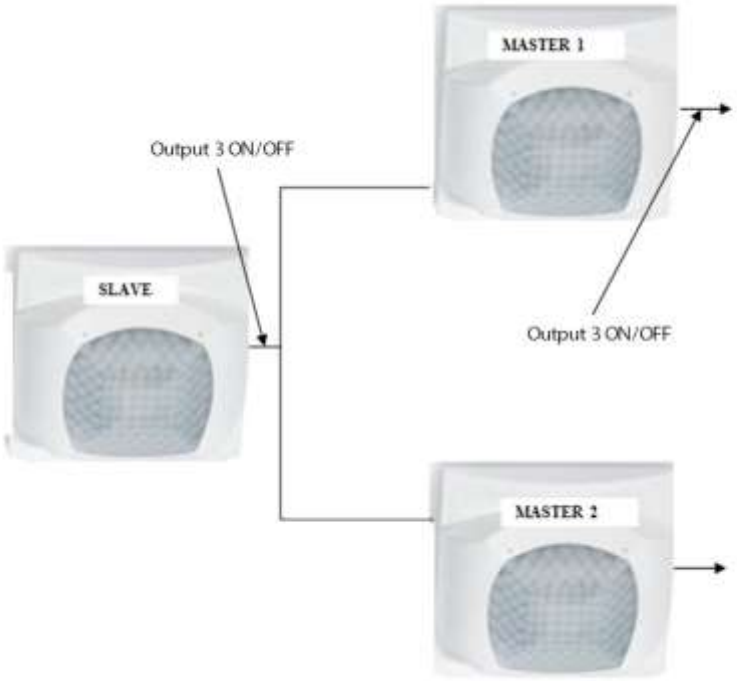


Figure 1: example of Master / Slave function

Moreover, the devices functioning as a Master monitor the OR status of the 4 input channels for remote presence. Therefore, the **DPT_Output 3 ON/OFF** in such devices has the following logic:

1) As soon as the sensor detects movement, or the OR of the 4 channels is ON, **DPT_Output 3 ON/OFF**=ON is sent;
2) If no movement is detected by the sensor and all the channels are in the OFF position for a period of time exceeding the **PAR_OUTPUT 3 Motion Check Time (x100ms)** (no presence), **DPT_Output 3 ON/OFF**=OFF is sent.

In other words, the presence status (**DPT_Output 3 ON/OFF** = ON) also occurs each time at least one of the four channels are ON, while the status of absence (**DPT_Output 3 ON/OFF** = OFF) occurs if all the channels are OFF and the sensor does not detect motion for a period of time greater than the timeout set.

Figure 2 is an example of 3 devices, 2 Masters and 1 Slave. The **DPT_Output 3 ON/OFF_Slave** of the Slave is connected to the **DPT_Output 3 ON/OFF_Master 1** channel of Master 1 and to the **DPT_Output 3 ON/OFF_Master 2** of Master 2. Each time the Slave sensor detects a motion status in the manner described in paragraph 1.2.1, it sends **DPT_Output 3 ON/OFF_Slave** = ON to the above-mentioned input channels of the two Masters, which in turn will send **DPT_Output 3 ON/OFF_Master 1-2** = ON as a result of the OR=1 status, even if their sensors do not detect motion.

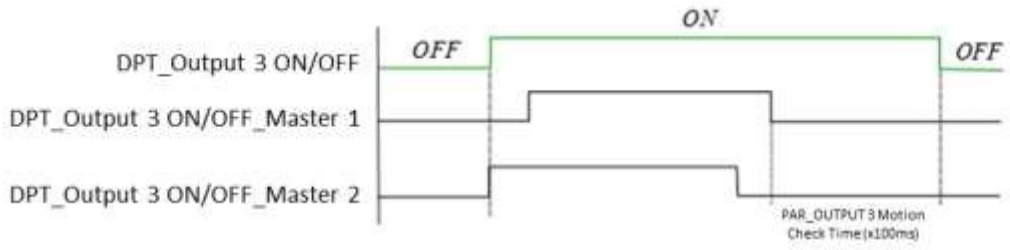


Figure 2: example of remote presence detection

1.2.2 DPT_Output 1 ON/OFF (1.001 Switch)

The **DPT_Output 1 ON/OFF** message is sent with ON value every time the following conditions are satisfied:

a) the motion sensor detects the motion status or at least one of the **DPT_Input N ON/OFF** = ON channels;
b) 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 through run-time via the **DPT_Minimum Brightness (lux)** message, which is valid until the next reboot of the device.

As a result, the **DPT_Output 1 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_Output 1 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_Output 1 ON/OFF** is sent with OFF value and the light goes off. Figure 3 refers to a Slave device and shows an example of the messages sent in case the motion threshold has never been changed through the **DPT_PIR Threshold (%)** datapoint, under the condition that the brightness is inferior to the minimum value (condition b).

At instant t1, 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 t1 and t2. Upon timeout from the last reset, the shutdown message is sent.

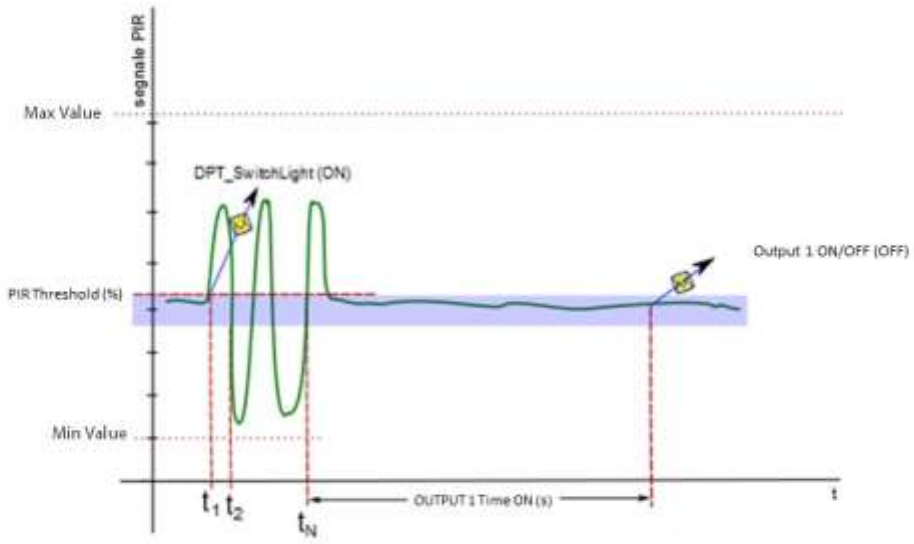


Figure 3: example of DPT_Output 1 ON/OFF sending

On powering the sensor, or after a reset due to its reprogramming via ETS, the **DPT_Output 1 ON/OFF** message is sent with a value selected from the **PAR_Status OUTPUT 1 at restart** parameter, irrespective of the movement and / or brightness statuses. Subsequently, the sensor 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_Output 2 ON/OFF (1.001 Switch)

The **DPT_Output 2 ON/OFF** message is sent from a device whenever the presence status is met, i.e. when the motion sensor detects the motion status expressed by (1.0), or at least one of the **DPT_Input N ON/OFF** = ON channels. With this communication object, control of a generic device such as a fan coil, a second row of lights in the simple On/Off mode, etc. can be gained via the input channel of an actuator. The access time of the peripheral device is specified by the **PAR_OUTPUT 2 Time ON (s)** parameter, or by the value sent via the DPT**_OUTPUT 2 ON (s)** message, a temporary value set until the next reboot of the device. After this time, the **DPT_Output 2 ON/OFF** message is sent with OFF value and the peripheral device controlled with this second output switches off. The management logic of the power-on time according to the presence status is identical to that specified in section 1.2.2 for the **DPT_Output 1 ON/OFF** message.

1.2.4 DPT_PIR Threshold (%) (5.001 Scaling)

This message temporarily modifies the motion detection threshold, which is set to the default value, by means of the **PAR_PIR Threshold (%)** parameter, which is not overwritten by the new value. By sending the message to the device, the **DPT_Output 3 ON/OFF** will be sent in the set status only when the output signal from the motion sensor exceeds the new threshold value. Figure 5 shows an example of motion threshold setting greater than that defined by the parameter value for a device operating in Slave mode.

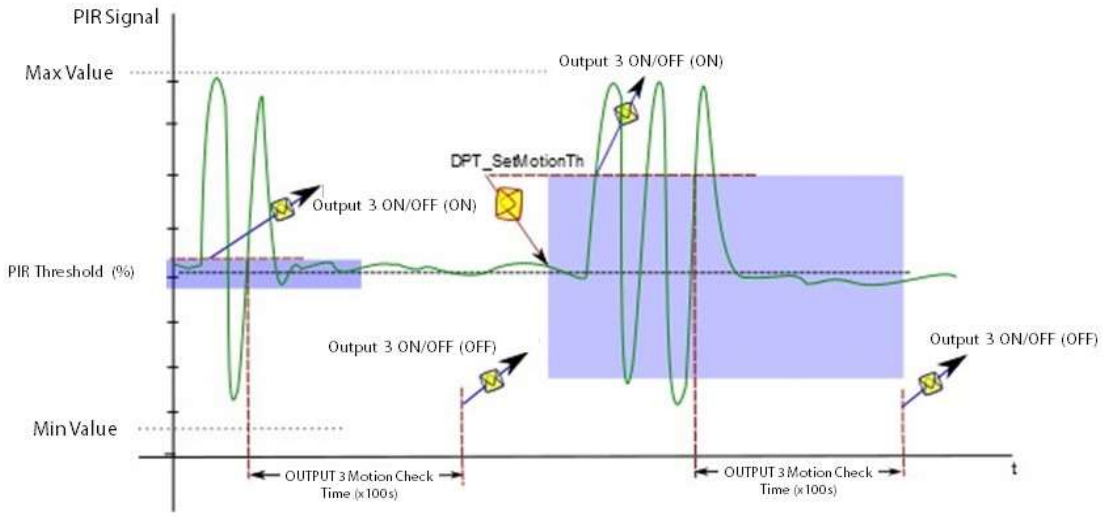


Figure 4: example of motion threshold variation with DPT_PIR Threshold (%)

1.2.5 DPT_Output 1 ON (s) (7.005 TimePeriodSec)

The **DPT_Output 1 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. Figure 6 shows an example with modification of the turn-on timeout from 1 to 2 minutes.

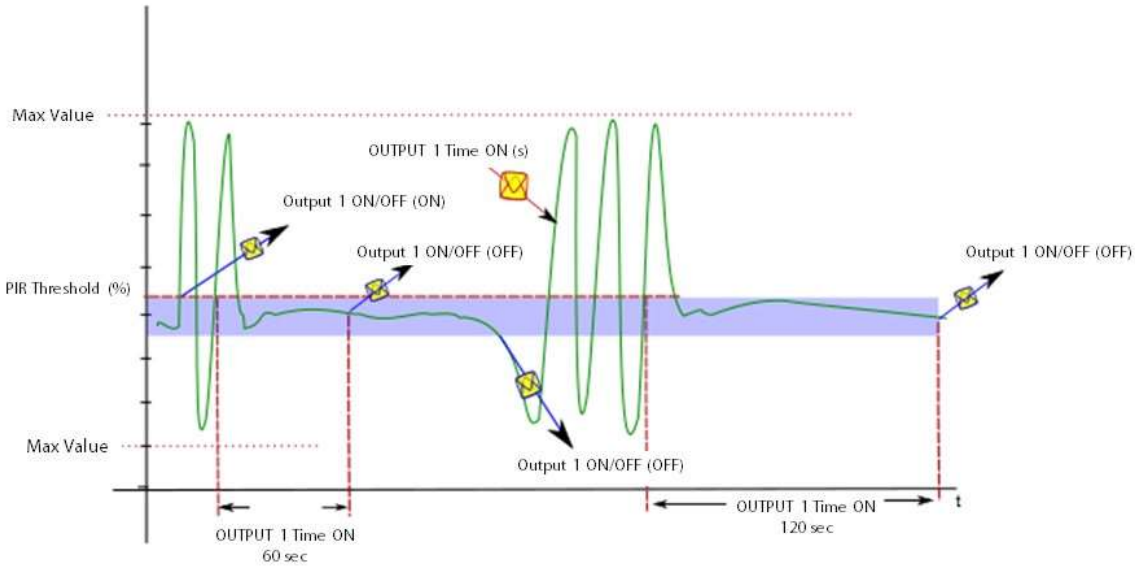


Figure 5: example of setting of the timeout for switching on lights

1.2.6 DPT_Minimum Brightness (lux) (7.013 Brightness)

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_Output 1 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 Max Value, then the **DPT_Output 1 ON/OFF** message will always be sent (Lights always On), independently of the brightness measured. Figure 6 shows an example of the operation of this communication object for a Slave device.

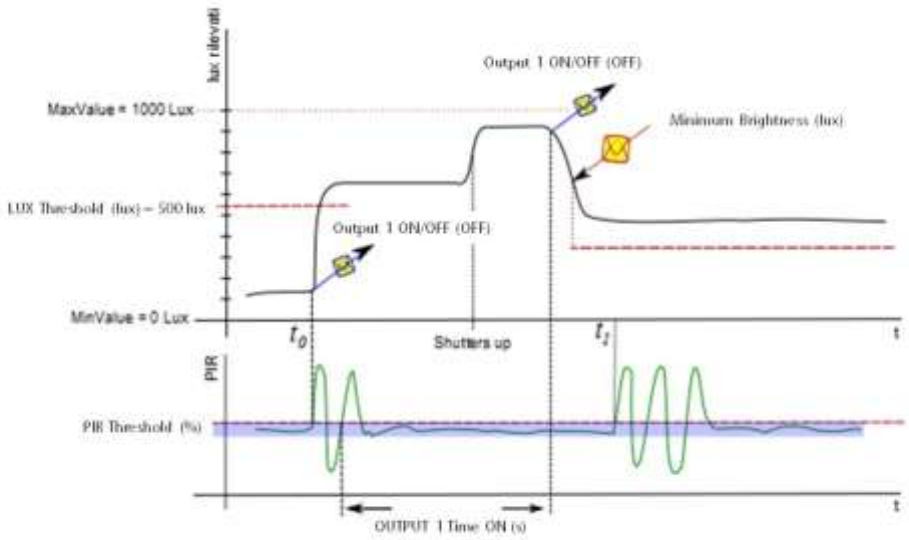


Figure 6: example of variation of minimum brightness in ASO mode

Upon first motion detection (t0), 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 meanwhile the device has received a **DPT_Minimum Brightness (lux)** message with the value displayed in the example, upon the next motion detection (t1) the lights remain off, since the sending status for the **DPT_Input N ON/OFF** with value ON is not checked for.

If there is any movement and with the ASO mode (Automatic switch-on / off) enabled by the PAR_ASO parameter (Automatic switch-on Output 1) = ON:

- If the detected lux value is lower than the value set by the **PAR_LUX Threshold (lux)**, an ON value will be sent with **DPT_Output 1 On / Off** = 1.
- If the detected lux value is higher than the threshold value set by **the PAR_LUX Threshold (lux)**, an OFF value will be sent with **DPT_Output 1 On / Off** = 0.

1.2.7 DPT_LUX cyclic (lux) (7.013 Brightness)

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 8 shows an example of sending with 5-second **PAR_Cyclic LUX sending Time (s)**.

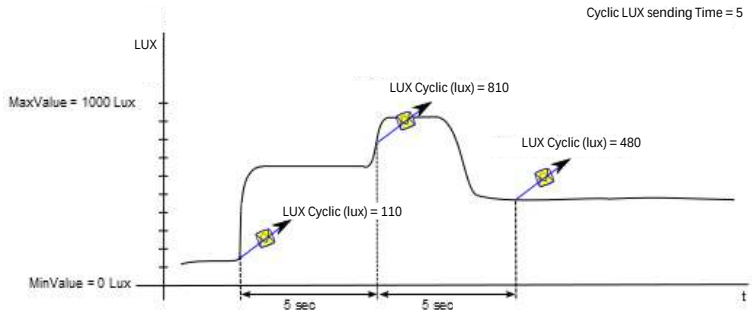


Figure 7: cyclical sending of brightness

1.2.8 DPT_PIR cyclic (%) (5.001 Scaling)

This message sends the percentage value of the signal detected by the device motion sensor. The sending mode is cyclical and set by the **PAR_Cyclic PIR sending Time (s)** parameter. The principle of operation is the same as the **DPT_LUX cyclic (lux)** message shown in Figure 7 for the similar datapoint referred to the brightness value.

1.2.9 DPT_Output 2 ON (s) (7.005 TimePeriodSec)

The **DPT_Output 2 ON (s)** message temporarily sets the value of maximum access time of the device controlled via the second **DPT_Output 2 ON/OFF** output channel in the absence of motion, without overwriting the corresponding parameter.

1.2.10 DPT_Input N remote (1.001 Switch)

These are four input channels for the device, through which the Master /Slave mode can be obtained, during detection of the presence status. They can be fed **DPT_Output 3 ON/OFF** messages from four remote devices.

1.3 List of configuration parameters

Parameter	Default Value
PAR_PIR Threshold (%)	*30%*
Motion Threshold	
PAR_OUTPUT 3 Motion Check Time (x100ms)	*1*
Timeout since last detection of motion status (presence)	
PAR_OUTPUT 1 Time ON (s)	*1*
Timeout of switching on lights since last detection of motion	
PAR_LUX Threshold (lux)	*250*
Minimum value of requested illumination	
PAR_Cyclic LUX sending Time (s)	*5*
Sets the cycle time of DPT Light Value Message sending	
PAR_Cyclic PIR sending Time (s)	*5*
Sets the cycle time of DPT Motion Value Message sending	
PAR_ASO (Automatic OUTPUT 1 ON)	*OFF*
Enable brightness control for switching on the lights within the Automatic Switch On / Off mode	
PAR_OUTPUT 2 Time ON (s)	*1*
Timeout power of the second peripheral device since last detection of motion	
PAR_Status OUTPUT 1 at restart	*OFF*
Defines the DPDT 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_PIR Threshold (%)

- Property Datatype: PDT_UNSIGNED_16bit
- Datapoint Type: None
- Range: 0÷100

It defines the percentage variation compared to the motion threshold, in order to send the corresponding **DPT_Output 3 ON/OFF** message. It represents the default value assigned to the **DPT_PIR Threshold (%)** datapoint upon device reboot.

1.4.2 PAR_OUTPUT 3 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 message **DPT_Output 3 ON/OFF** = OFF since last reset of the motion scanning timer. It serves to filter the sending of the message that states the absence of motion. The values to be set will be chosen according to the sensor signal 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 of 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_Output 2 ON (s)** upon reboot of the device.

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

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_Output 1 ON/OFF** message is sent to a light actuator to turn it on. This 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_8bit
- Datapoint Type: None
- Range: [0÷255]

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. Summarised in Table 2 are the significant values for this parameter.

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

Table 2: PAR_Cyclic LUX sending Time (s) values for cyclic sending of detected brightness

1.4.7 PAR_Cyclic PIR sending Time (s)

- Property Datatype: PDT_UNSIGNED_8bit
- Datapoint Type: None
- Range: [0÷255]

This parameter sets the cyclical sending time expressed in seconds of the **DPT_PIR cyclic (%)** message for transmission of the motion detected by the device motion sensor. By setting the value to 0, the message will never be sent. Summarised in Table 3 are the significant values for this parameter.

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

Table 3: PAR_Cyclic PIR 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_Output 1 ON/OFF** message with ON value, only if the measured brightness is below the required threshold. 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 favour 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_Output 1 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_Output 1 ON/OFF**.