Extraordinary price-performance ratio with impressive quality and software features (ETS)

The KNX/EIB Universal Presence Detector 360 KLR with integrated KNX/EIB connection is the latest in the world. With its 4 pyro-detectors (can be switched on and off separately via ETS!) and a high-resolution lens it captures the smallest movement and evaluates each signal with a first-class electronic system controlled by a micro-controller. For concealed ceiling installation a usual case (flat is sufficient) is required or an optional surface installation cap can be used.

The differences and most important advantages of a presence detector compared with a motion detector (simple light measurement, malfunction caused by artificial light) are the universal application thanks to the special and permanent light measurement (daylight and/or mixed light measurement). The light value measurement is executed by a special sensor which disposes of a spectral sensitivity similar to the human eye.

Another advantage is the complete 360° room monitoring without any obstacles (for ceiling installation) with one single detector. The detector can capture an area of approx. 16x16 meters with the movement detection, a pure presence detection covers approx. 6x6 meters. When installed on the ceiling vandalism and theft by simply removing the detector is almost impossible. This is particularly important for public buildings. Larger rooms can be equipped with additional detectors based on the Master/Slave Function. Switching the 4 Pyro detectors on or off via ETS permits to influence the detection which can again be adjusted individually by sensitivity parameters.

Applications:

Constant light control, semi or fully-automatic corridor lighting or basic lighting control with restricted and manual operation as well as scene control for each room, particularly in apartment rooms, offices and spare rooms, bathroom/WC, corridors and staircases etc., control of workplace lighting, switching and dimming functions, HCV (Heating, Climate, Ventilation) presence control, simple alarm functions, hotel room control, server room monitoring (activating cameras, light or alarm functions, access control etc.). When installed on the ceiling ideal for rooms with limited installation options (glass or metal walls).
**Features/Assembly:**

Using the presence detector application software for the ETS the following operating modes can be parameterized:

**Light control channel:**

After detecting a movement the detector sends a 1-frame or an adjustable dimming value (0…100%). If there is no movement the presence detector sends - after an adjustable follow-up time - a 0-frame or a second adjustable dimming value (0…100%).

**Control channel HCV (Heating, Climate, Ventilation):**

This output is only activated after the verification of 2 to 20 consecutive monitoring windows of equal length in which at least one movement was detected. Thanks to the possibility to parameterize sensitivity the detector can also be used for simple alarm functions e.g. for one-family or apartment houses in Home-Automation (no VDS alarm system permit, there is no sabotage protection and multiple pulse counter).

**Master- or Slave Mode:**

Can be configured by parameterizing by means of ETS. After an adjustable release time the detector returns to its standard condition.

**Constant light control:**

Presence detectors with constant light control dispose of additional functions. They do not only send a dimming value of 0 to 100% but can also be switched by presence or a control command. Even standby time and brightness can be parameterized individually. For lamps that can be dimmed activation is achieved by permanent constant light control by means of a value object "Absolute Dimming".

**Your advantages:**

- Passive infrared (PIR) presence detector for ceiling installation with integrated KNX/EIB connection.
- 4 Pyro-detectors and one high-resolution lens capture the smallest movements
- Full or semi automat: As a full automat the light is switched on or off automatically depending on presence and brightness. With a semi-automat you must always switch on by hand using a KNX/EIB push button or a conventional push button with KNX/EIB push button interface or binary input. Switch-off is automatic. A brightness sensor with linear output provides the light measurement. An integrated optical filter has a profile that is similar to the human eye. The light sensor can trigger a 0-frame or a 1-frame in all operating modes as soon as the adjusted Lux value is exceeded or fallen below. In addition to that, the measured light value in Lux can be read out via bus.
Technical data

- Nominal voltage: 24V DC (21V DC – 30V DC KNX EIB)
- Power input: 0.5 W
- Captured area: 360°
- Range: 16 m, presence: 6 m
- PIR-sensors: 4 Pyro-detectors for large capture area
- Sensitivity: adjustable via ETS: low – normal – high
- Installation height: 2 m–4 m
- Adjustments: All adjustments can be set remote by ETS
- Light measurement: brightness sensor with optical filter and linear output
- Light value: light value in Lux can be read out via BUS
- Switching criteria: movement and brightness
- KNX EIB-connection: bus terminal 2-pole, 4 plug terminals each for wires with Ø 0.6 to 0.8 mm²
- release time adjustable
- Protection: IP 20 inside assembly/ class II
- Operating temperature range: 0 to +40 °C
- Detector dimensions: 86 mm x 86 mm x 35 mm
- Constant light control

<table>
<thead>
<tr>
<th>Installation height</th>
<th>Persons sitting down Ø Diameter</th>
<th>Persons walking about Ø Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0m</td>
<td>3m</td>
<td>12m</td>
</tr>
<tr>
<td>2.5m</td>
<td>4m</td>
<td>14m</td>
</tr>
<tr>
<td>3.0m</td>
<td>5m</td>
<td>16m</td>
</tr>
<tr>
<td>3.5m</td>
<td>6m</td>
<td>18m</td>
</tr>
<tr>
<td>4.0m</td>
<td>---</td>
<td>20m</td>
</tr>
</tbody>
</table>

There must be a minimum distance of 1.5 m between the motion detector and the connected lighting. Otherwise, due to the heat change, lights within the sensor range might trigger a new pulse for switching on due to the heat change after switching off. Light sources must not point directly to the motion detector.

The KNX/EIB Universal Presence Detector 360 is based on a modern microcontroller to which 4 PIR sensors are connected, a brightness sensor and an IR-receiver. As far as the output goes the motion detector disposes of a KNX bus connection which ensures all switching and control functions.
The KNX Universal Presence Detector 360 KLR disposes of the following excellent features:

- **Stylish and functional design and extraordinary price-performance ratio**

- **Pyro detectors**
  The 4 PIR-sensors of the presence detector capture smallest movements and can be activated as a single unit, and in groups of two or three.

- **Compact design**
  Presence detector and bus coupler are integrated on a single board. This ensures high reliability and fault-free function.

- **Linear light sensor**
  Disposes of an optical filter to adapt the sensitivity profile to the human eye. Sends the measured LUX values directly as 2 byte information via bus. This saves external light sensors when light controls are applied.

- **Scene function**
  The KNX/EIB Universal Presence Detector 360 can activate scenes. Actuators or push buttons which support the scene function can be linked with the scene output object of the presence detector. Thus, when light is required, not only light groups but complete scenes can be activated.

- **Constant light control**
  The constant light control receives the actual value from the common brightness measurement. Switch on (start of constant light control) as well as switch off (stop) can be carried out using object 16, the light channel or the HVC channel. Basically, after switch on/return of the bus voltage, the switch on process is started due to the transient response of the internal circuit.

**Important advice**
The KNX Universal Presence Detector 360 KLR is suitable for interior application, only.

**Function**
The KNX/EIB Universal Presence Detector 360 KLR responds to the heat radiation of bodies moving. If a person approaches the monitored area, the connected light/lamp is switched on automatically. If the person leaves the area, the light is switched off after a time that can be set in the ETS.

**Installation**
The ideal ceiling installation height is about 2m to 4m. Connect the presence detector as follows:

- **Insert** red wire (+) of the bus line into the red bus clamp.
- **Insert** black wire (-) of the bus line into the black bus clamp.
**LED Movement:** flashes 1x for each capture
**LED Programming:** shines when programming button is pressed
Numbering PIR sensors

The PIR-sensors 1 2 3 4 can be activated over the ETS as a single unit or in groups. Doing so, the respective numbers must be respected.
Detection area

The 360° round capture area as well as the dense capture network guarantee an optimum function. The range depends on the installation height and the walking direction (high sensitivity when cutting or changing a switch segment). Since the presence detector responds to the temperature difference between heat source and ambient temperature, the range can vary depending on the installation location (floor heating etc.).

Ceiling installation version

View from top

![Diagram of ceiling installation version](image)

Ceiling installation version

Side view

![Diagram of side view](image)
Wall-Version - View from top

Front detection
NOT SENSITIVE
Range reduction approx. 50%

Tangential detection
= SENSITIVE

max. 10m
max. 5m
ca. 3m Präsenz

Trouble shooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause/Correction</th>
</tr>
</thead>
</table>
| Device does not switch: | - dimming value set too high  
- check light bulb  
- check position of hand switch  
- check voltage/ fuse |
| Switches on and off without any reason or does not switch off at all: | - check detection area for faults: (draught, animals, heating etc.) can cause malfunctions!  
- check distance to lamp (heat reflection or direct light)  
- the presence detector is too sensitive, reduce the range with the sensitivity adjustment on ETS and / or cover the lens in the malfunction area with adhesive tape. |
| Switches on by day: | - LUX value for brightness threshold set too high.  
Change using menu light on ETS. |

After connection to the KNX EIB Bus the electronic needs about 1 min. until it is ready for operation!
# Application Description

## Communication objects

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Name</th>
<th>Function</th>
<th>in/out</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Output - light</td>
<td>Switching</td>
<td>out</td>
<td>DPT1 / DPT 5</td>
</tr>
<tr>
<td>1</td>
<td>External switch / status - light</td>
<td>Switching</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>2</td>
<td>External movement - light</td>
<td>Switching</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>3</td>
<td>Input - light</td>
<td>Restraint</td>
<td>in</td>
<td>DPT 2</td>
</tr>
<tr>
<td></td>
<td>Input - light</td>
<td>Lock</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>4</td>
<td>Output - HCV</td>
<td>Switching</td>
<td>out</td>
<td>DPT 1</td>
</tr>
<tr>
<td>5</td>
<td>Movement HCV</td>
<td>External switch</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>6</td>
<td>Movement HCV</td>
<td>External movement</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>7</td>
<td>Input-Climate HCV</td>
<td>Restraint</td>
<td>in</td>
<td>DPT 2</td>
</tr>
<tr>
<td></td>
<td>Input-Climate HCV</td>
<td>Lock</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>8</td>
<td>Brightness switch</td>
<td>Threshold switch</td>
<td>out</td>
<td>DPT 1</td>
</tr>
<tr>
<td>9</td>
<td>Brightness value Lux</td>
<td>Brightness value Lux</td>
<td>out</td>
<td>DPT 9</td>
</tr>
<tr>
<td>10</td>
<td>Brightness AD calibration value</td>
<td>AD calibration value</td>
<td>out</td>
<td>non DPT</td>
</tr>
<tr>
<td>16</td>
<td>ConstantLight</td>
<td>Switch On/Off</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>17</td>
<td>ConstantLight</td>
<td>Set Relative Dimming</td>
<td>in</td>
<td>DPT 3</td>
</tr>
<tr>
<td>18</td>
<td>ConstantLight</td>
<td>Set Absolute Dimming</td>
<td>in</td>
<td>DPT 5</td>
</tr>
<tr>
<td>20</td>
<td>ConstantLight</td>
<td>Forced Control</td>
<td>in</td>
<td>DPT 1</td>
</tr>
<tr>
<td>21</td>
<td>ConstantLight</td>
<td>Scene</td>
<td>out</td>
<td>DPT 17</td>
</tr>
<tr>
<td>22</td>
<td>ConstantLight</td>
<td>Absolute Dimming Output</td>
<td>out</td>
<td>DPT 5</td>
</tr>
</tbody>
</table>
PARAMETERS
The following parameters are visible:
Functional Blocks

Function of the presence detector can be divided into the following blocks:

- Motion detection
- Brightness meter
- Light control channel
- HCV control channel
- Threshold switch depending on light
- Constant light control

The presence detector as well as the brightness meter have an independent influence on the light channel and the HCV channel.
**LIGHT CONTROL CHANNEL**

The light control channel has two operating modes which are set using the parameter operating mode of the presence detector. Possible adjustments are:

- fully-automatic
- semi-automatic

The differences between the operating modes fully-automatic and semi-automatic are as follows:

- **Fully-automatic** function has two operating conditions: ready, active and passive
- **Semi-automatic** function has two operating conditions: ready and active.
- The semi-automatic system does not switch on the light automatically when motion is detected. This can only be done by an external push button (KNX EIB).

**OBJECT ON/OFF LIGHT**

In this operating mode, each detectable movement causes the output object „ON/OFF LIGHT“ to send an „ON“ command and, thus, the follow-up time starts. The follow-up time is set using the respective parameter. After completion of the follow-up time, an „OFF“ command is sent on the output object.

**OBJECT EXTERNAL MOVEMENT**

Using the object „external motion“ an additional detector can be connected. The movement that is detected and received is dealt with in the same way as the own detected motion and is always parallel to it.

**OBJECT RESTRAINT**

The object „Restraint“, has three values that can be received:

- **Restraint ON** (Control = 1 value = 1). Here, an unconditional „ON“ command is sent on the output object. After that, evaluation is cancelled and the restraint release time starts. If, after completion of the release time, nothing is received on the restraint object, normal operation is taken up again.
- **Restraint OFF** (Control = 1 value = 0). Here, an unconditional „OFF“ command is sent on the output object. After that, evaluation is cancelled and the restraint release time starts. If, after completion of the release time, nothing is received on the restraint object, normal operation is taken up again.
- **Restraint AUTO** (Control = 0 value = 0). After that, normal operation of the detector is taken up again.
OBJECT EXTERNAL SWITCH / STATUS

The recipient object „External switch / Status“ can be used in two different ways:

- as input for an external switch which switches the light directly
- as input to receive the status or the switching input of an actuator

In both cases, an incoming frame with the value ON switches the detector into the mode „Light switched on“ and an OFF into the mode „ready“. Whether, during the status transitions, the commands to switch the light on or off are sent, depends on the parameter „Sending condition for external push button“. After receiving the ON frame the follow-up time starts as if motion was detected. After that it is switched off automatically. After an OFF frame the detector remains in its passive mode in which it does not detect any movement. Finally, the detector is ready to detect movement again. The passive time is determined by the parameter „Idle time after switch off“ which is visible in full access mode.
HCV Channel

The HCV channel has the same objects and the same operating modes as the light channel. The HCV channel functions in the same way, too. It is only the motion detection that has an extended function. Motion detection has been replaced by a „Longer present detection“. This works by detecting at least one movement in each time window during several monitoring time windows of the same length. The required parameters are: „Number of monitoring time windows“ and „Length of monitoring time window“.

The total time, the product of the two parameters can vary by the time of one monitoring period.

**OBJECT ON/OFF HCV**
**OBJECT EXTERNAL MOTION**
**OBJECT RESTRAINT**
**OBJECT EXTERNAL SWITCH / STATUS**

TRESHOLD SWITCH

This block has two output objects:
TRESHOLD SWITCH

This output object sends an “ON” as soon as the measured brightness is bigger than the parameter “Threshold for switching on“. When the value falls below the “Threshold for switching on “ – parameter “Hysteresis“, an “OFF” is sent.

BRIGHTNESS VALUE

This output object sends the currently measured brightness value in Lux. It is sent as soon as there are changes bigger than the parameter „Send in case of changes“ or cyclically with the time set for „cyclical sending “. If cycle time is 0, there is no cyclical sending.

AD CALIBRATION VALUE

This output object does not send automatically. It can only be read. Its 16 Bit value without algebraic sign represents the current value of the AD converter for brightness measurement. The brightness meter can be calibrated as follows:

1) Using an external luxmeter. Measure brightness next to detector.
2) Read AD calibration values. This can be done, for example, with the ETS
3) Enter these 2 values, Lux value and AD value as parameters into AD calibration value and Lux value in full access mode.
EVALUATION OF THE PIR SENSORS

The PIR sensors are analogous elements which, relative to a standstill level, generate a signal with a voltage that can deviate into the negative or the positive in case of motion. The level of the standstill signal, which is the basis for all implemented evaluations, must be determined by the software.

Constant light control

The constant light control receives the actual value from the common brightness measurement. Switch on (start of constant light control) as well as switch off (stop) can be carried out using object 16, the light channel or the HVC channel. Basically, after switch on/return of the bus voltage, the switch on process is started due to the transient response of the internal circuit. In addition to the standard parameters such as nominal value, transmission difference, selection of control channel, cyclical sending, switch-on value, switch-on delay, forced control, dimming step intervals and range the constant light control disposes of a scene control as well as a parameter set to adapt the control parameters of the PID controller.

OBJECT constant light- ON/OFF
OBJECT constant light - set relative dimming
OBJECT constant light - set absolute dimming
OBJECT constant light- forced control
OBJECT constant light- scene
OBJECT constant light- output absolute dimming
**Constant Light**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant light controller</td>
<td>enabled</td>
</tr>
<tr>
<td>preset setpoint</td>
<td>300 lux</td>
</tr>
<tr>
<td>Send difference</td>
<td>5%</td>
</tr>
<tr>
<td>Switching ON/OFF by</td>
<td>detect</td>
</tr>
<tr>
<td>Cycle Transmission time</td>
<td>no cyclic transmission</td>
</tr>
<tr>
<td>Switch On value</td>
<td>100%</td>
</tr>
<tr>
<td>Switch On timeout</td>
<td>10 s</td>
</tr>
<tr>
<td>Force output at ON</td>
<td>no reaction</td>
</tr>
<tr>
<td>Force output at OFF</td>
<td>no reaction</td>
</tr>
<tr>
<td>Relative dimming time</td>
<td>8 s</td>
</tr>
<tr>
<td>Tastis over setpoint timer</td>
<td>5 s</td>
</tr>
<tr>
<td>Value changed setpoint to flash</td>
<td>disabled</td>
</tr>
<tr>
<td>light mode</td>
<td>enabled</td>
</tr>
<tr>
<td>light mode 1</td>
<td>500 lux</td>
</tr>
<tr>
<td>light mode 2</td>
<td>500 lux</td>
</tr>
<tr>
<td>light mode 3</td>
<td>500 lux</td>
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<tr>
<td>light mode 4</td>
<td>500 lux</td>
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<td>light mode 5</td>
<td>500 lux</td>
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<td>light mode 6</td>
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<td>light mode 7</td>
<td>500 lux</td>
</tr>
<tr>
<td>light mode 8</td>
<td>500 lux</td>
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<tr>
<td>PID parameters</td>
<td>user defined</td>
</tr>
<tr>
<td>dead band</td>
<td>2</td>
</tr>
<tr>
<td>cycle time</td>
<td>590</td>
</tr>
<tr>
<td>Dimming up</td>
<td></td>
</tr>
<tr>
<td>Kp - multiplier</td>
<td></td>
</tr>
<tr>
<td>Kp - divider</td>
<td></td>
</tr>
<tr>
<td>KI - multiplier</td>
<td></td>
</tr>
<tr>
<td>KD - divider</td>
<td></td>
</tr>
<tr>
<td>Dimming down</td>
<td></td>
</tr>
<tr>
<td>Kp - multiplier</td>
<td></td>
</tr>
<tr>
<td>Kp - divider</td>
<td></td>
</tr>
<tr>
<td>KI - multiplier</td>
<td></td>
</tr>
<tr>
<td>KD - multiplier</td>
<td></td>
</tr>
</tbody>
</table>
Optional Accessories

**Surface installation frame**
Surface installation frame for KNX/EIB Universal Presence Detector 360 KLR
*Reference no. N000503*

**Protective grid**
Dimensions: 150x150x80 mm  
Color: white
*Reference no. N000504*

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For a current product database and further information visit: [www.eibmarkt.de](http://www.eibmarkt.de) or send your enquiry to: [info@eibmarkt.de](mailto:info@eibmarkt.de)

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