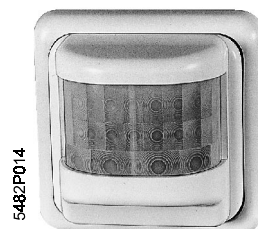


## Presence Detector

with two outputs,  
180° surveillance, for wall mounting

## QPA82.1




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**Microprocessor-based highly sensitive passive infrared presence detector with daylight sensor for demand-dependent control of lighting systems, especially in rooms frequently used, and for the control of HVAC equipment. Operates on AC 230 V, control output AC 230 V for lighting and potential-free HVAC control output.**

### Use

The QPA82.1 presence detector is a self-contained unit designed for demanding control of lighting systems and HVAC equipment.

It is used especially in spaces that are occupied on a temporary basis, where the presence of a moving infrared source (persons, vehicles, etc.) shall be detected **with great reliability**, even at great distances.

One special field of use is ceiling mounting, enabling the space to be divided into vertical sections with clearly defined detection zones.

The presence detector can be used in all kinds of spaces where, for maximum energy savings, demand-dependent control is given preference over fixed time scheduling.

### Typical use

- Long corridors, halls, subterranean garages, entrance halls, auditoriums, training and conference rooms, or
- Workplaces where the light should not be switched on by people passing by (ceiling mounting).

### Criteria for use

- Especially in rooms that are frequently used, spaces requiring an extensive detection zone, or
- Where vertical sections with clearly defined detection zones are required (version for wall mounting fitted to the ceiling).

### The following tasks can be performed

- Control of lighting systems
- Control of fans
- Switchover of temperature setpoints
- Activation of room air conditioners
- Control of circulating pumps

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## Functions

The QPA82.1 presence detector has an infrared sensor which detects changes in passive infrared radiation in the space, which are then converted into electric control pulses.

It captures changes in the thermal pattern caused by the **smallest** physical movements. This is achieved by making a comparison of the thermal radiation of the moving infrared source (person, vehicles, etc.) and the constant thermal radiation of the environment. The detection zone is subdivided into a normal zone and an extended zone (refer to illustrations under «Engineering notes»).

In the normal zone, the unit's sensitivity is sufficient to detect the movements of a seated person.

If the detector shall only respond to walking motion, the extended zone must be used. The detector has two independent outputs:

### Control output for lighting

A non-potential-free contact (AC 230 V) is used for the control of a lighting system.

To switch the lighting on and off, the detector also acquires the brightness of daylight. Using an optical filter, the detector is able to differentiate between infrared-poor artificial light (e.g. fluorescent or high efficiency lamps, but no incandescent or halogen lamps) and daylight.

The minimum brightness can be adjusted from 50 to 1600 Lux. If the daylight falls below the adjusted minimum brightness for a certain period of time, the artificial light will be switched on with no delay if a person is present.

The switch off delay is ascertained by the self-learning unit: If only a few movements are detected, the switch off delay may be a maximum of 15 minutes. If many movements are detected, it will be reduced to 5 minutes.

If the daylight exceeds the adjusted minimum brightness, the artificial light will be switched off. The unit responds only slowly to changes in daylight to avoid frequent and irritating switching on/off actions.

### Control output for HVAC

A potential-free contact is used for HVAC functions. It is independent of the intensity of daylight. If a person enters the unit's detection zone, the contact will close after a certain switch on delay time has elapsed (adjustable from 0 to 300 seconds), which activates the respective HVAC unit. If the person leaves the detection zone, the contact will open after a certain switch off delay time (adjustable from 0.5 to 30 minutes) and the HVAC unit will be deactivated.

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## Ordering

When ordering, please give name and type reference of the presence detector.

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## Mechanical design

The unit consists of an upper and a lower housing section and a mounting frame.

Upper and lower section are attached together and secured by a clamp.

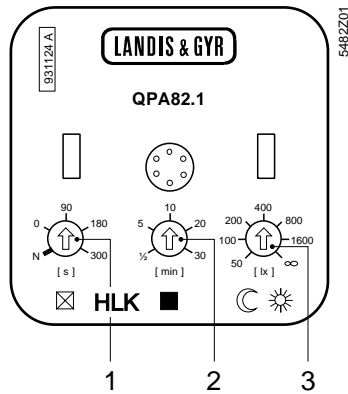
The mounting frame is placed between the upper and the lower section.

The electrical connections are established via pins.

The upper housing section contains the actual detector. It consists of a white plastic casing which accommodates a plastic insert with the integral Fresnel lenses and an insert with the pyroelectric sensors, microelectronics, setting potentiometers, securing clamps and pins.

The lower section houses the power part. It is designed for fitting into a recessed conduit box (single conduit box of 58 mm dia.).

## Setting elements



- 1 Setting potentiometer for switch on delay (HVAC control output); typical setting: 90 s  
N = Emergency operation (refer to «Commissioning notes»)
- 2 Setting potentiometer for switch off delay (HVAC control output); typical setting: 10 min
- 3 Setting potentiometer for daylight switching threshold (control output for lighting); typical setting: 400 Lux

## Disposal

To ensure environmentally compatible disposal, the larger plastic components are labeled with a material description as per ISO/DIS 11 469.

## Engineering notes

For the correct detection of persons, the detector's location is of utmost importance. It should be chosen such that most movements of the people in the space will be within the detection zone. This is a mandatory requirement for the control of lighting systems. Depending on the application, it may be necessary to use the QPA82.1 or the QPA82.2 (360° surveillance, refer to data sheet 5483). Both units can also be combined, if desired.

## Checklist for planning

### *Detection of movements*

- People must be present within the detection zone.
- The presence detector must be located such that it clearly detects all people.
- The presence detector cannot see through glass. For this reason, glass doors and windows confine the detection zone.
- Interference by partitions, shelves, plants, etc., must be avoided.
- In the case of individual workplaces that must be clearly separated vertically, and in corridors, the QPA82.1 can also be fitted to the ceiling. The horizontal detection zones then become a vertical «curtain» (refer to illustration «Ceiling mounting»).
- The detection zone is basically unlimited, but sensitivity is reduced as the distance to the detector increases.

### *Measurement of intensity of light (only for the control of lighting systems)*

- The intensity of light is measured in the detector's viewing direction. Only daylight is measured, not artificial light.  
The effect of the opposite surface must be taken into consideration when adjusting the brightness. In the case of a bright window, for example, the setting must be higher than in the case of a dark wall.
- When using incandescent or halogen lamps, daylight control can be used only when the intensity of the artificial light lies below the selected LUX level or when there is a certain distance between the detector and the lamp. If this is not observed, there may be oscillations (blinking at intervals of a few minutes).

## Possible sources of error

- Moving objects (curtains covering radiators, revolving doors, etc.) that are close to the presence detector (within 2 m).
- Objects that warm up rather quickly (lamps, air inlets, radiators, etc.) and that are close to the presence detector.
- Direct solar radiation hitting the presence detector.

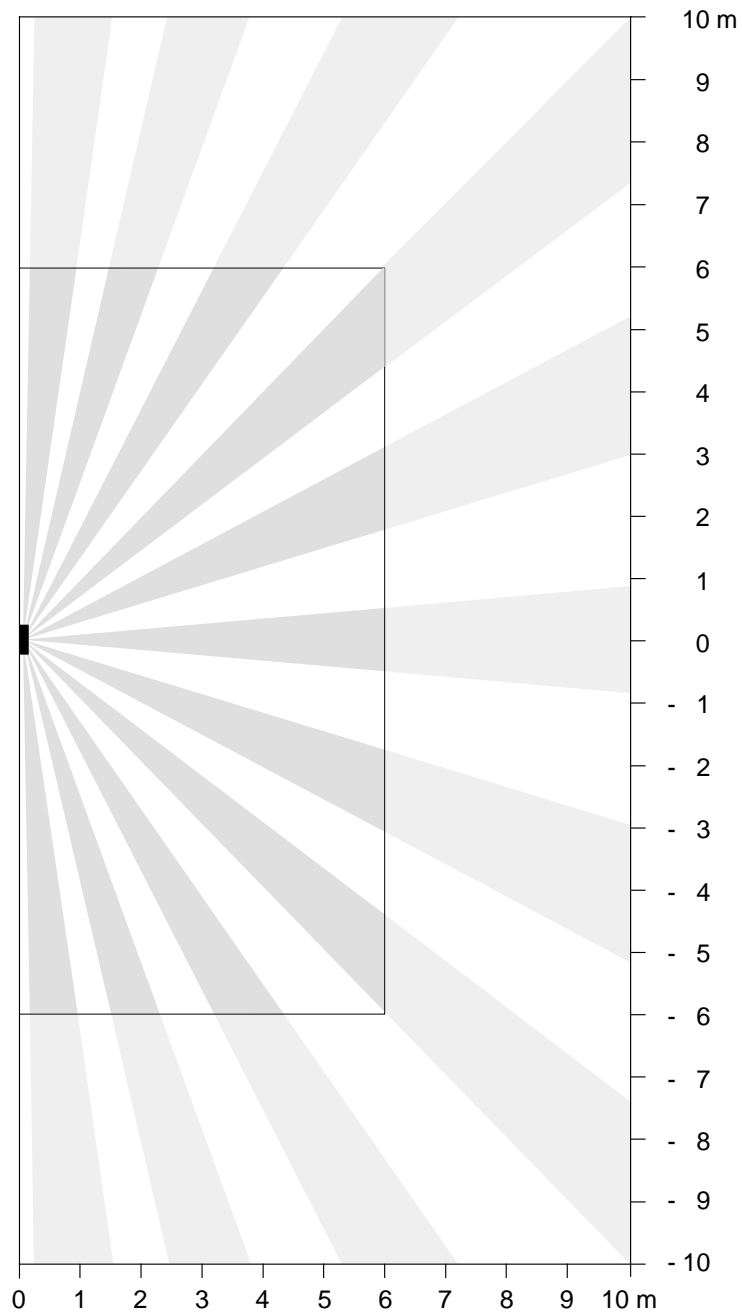
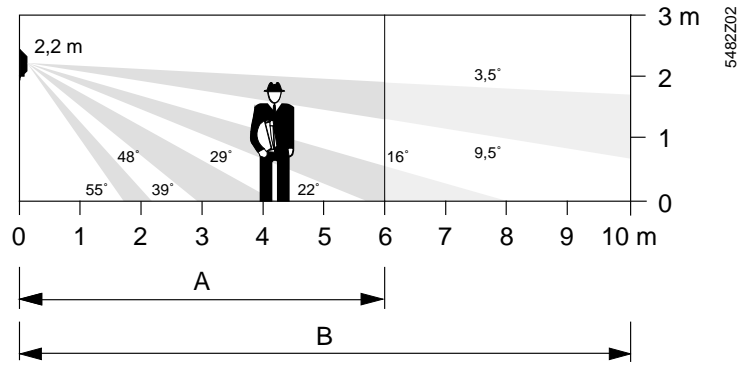
## Vandalism

In public buildings, the units must be installed out of reach ( $\geq 1.8$  m).

## Detection zone

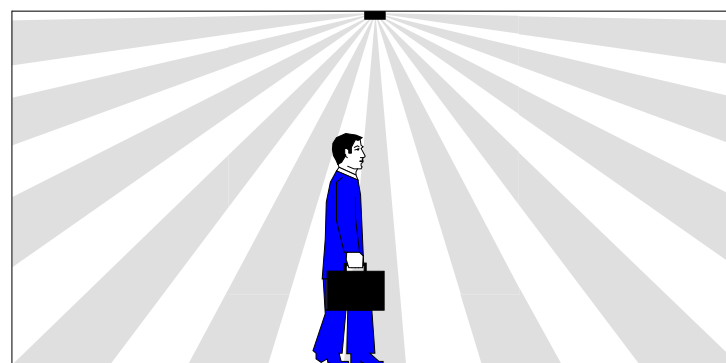
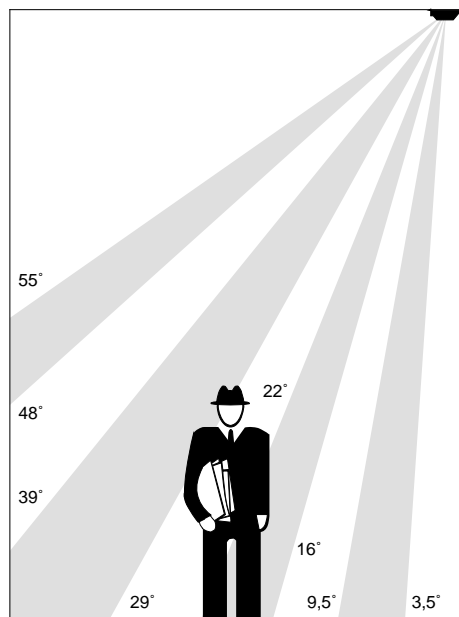
Detection zone with wall mounting

Spatial arrangement of detection zones for people predominantly seated (normal detection zone) and for people predominantly walking (extended detection zone).



Legend

- A Normal detection zone (seated people)
- B Extended detection zone (walking people)



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## Fitting notes

- The detector locations specified in the planning documentation must not be changed.
- There is a choice of fitting the detector on a recessed conduit box (using a single conduit box of 58 mm dia.) and surface mounting (using a standard mounting frame of 50 mm depth).
- To avoid damage to the detector, only the power part should be fitted. The actual detector should be installed only at the time of commissioning. The optical part of the detector should be handled with care. No pressure must be exerted on the plastic insert!
- When fitting the QPA82.1 to the ceiling of corridors exceeding 1.5 m in width, the asymmetric pattern of the detection zone must be taken into consideration. In that case, it is recommended to install the detector off the middle of the corridor. The front of the detector must face the closest wall (refer to illustration «Ceiling mounting»).

## Commissioning notes

- Prior to commissioning, it must be made certain that the wiring is in compliance with the plant diagram.
- The required brightness for the control of the lighting system and the switch on and switch off delays for HVAC control must be set with the respective potentiometers at the rear of the unit as specified.
- The detector should be fitted to the power part without applying any force! When inserting, the inscription can be used as an orientation aid. To avoid damage when

fitting, the inscriptions on both unit sections must be mirror-inverted. Caution! Do not exert any pressure on the plastic insert (optics) of the unit!

- After applying the operating voltage or after fitting the detector, the unit will be switched on for 1.5 min (initialization phase), that is, the lighting and HVAC outputs are deactivated. This is followed by a 9-minute service phase. During that phase, the output for lighting responds with no delay if the brightness changes. During this period of time, the proper functioning of the lighting circuitry can be checked by darkening the space or by pointing a torchlight at the sensor.
- The switch off delay facility for the lighting system is self-learning. It is adapted to the frequency of movement of people present in the space and, after the movement detected last, is 5 to 15 minutes (refer to «Functions»).
- The HVAC switch on delay starts when the first movement is detected.
- The HVAC switch off delay starts after the last movement is detected.
- If the detection zone of a detector interferes with that of another detector, the part of the detector that should not monitor the area of the other detector must be covered with an adhesive tape that is impervious to light.

## Emergency operation

If there are too many false switching operations, caused by an unfavourable location of the unit, the potentiometer for the HVAC switch on delay must be set to «N». This means:

- Switch off delay «Lighting»: 15 min, fixed
- Switch on delay «HVAC»: 0 s, fixed

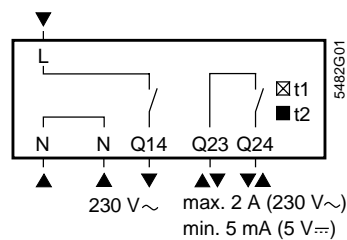
## Technical data

Operating voltage	AC 230 V $\pm$ 10 %
Frequency	50 or 60 Hz
Power consumption	
Idle state	0.5 VA
Contact closed	1.5 VA
Control output for lighting	
Relay contact (N.O.), non-potential-free	AC 230 V
Rating	
with fluorescent lamps	8 A max.
with incandescent lamps	5 A max.
Switch off delay (self-learning)	5...15 min
Daylight control	automatic off switching
Min. brightness (adjustable)	50...1600 Lux
HVAC control output	
Relay contact (N.O.)	potential-free
Rating	2 A max. at AC 230 V 5 mA min. at DC 5 V 3.75 kV isolated against mains
Switch on delay (adjustable)	0...300 s
Switch off delay (adjustable)	0.5...30 min
Detection of movements	
Optics	Fresnel lens
Sensing elements	2 pyroelectric sensors
Sensitivity (seated people)	typically 25 cm body movement
Surveillance angle	
Vertically	3.5...55°
Horizontally	180°
Detection zone	
Seated people	6 x 12 m
Walking people	10 x 20 m

Ambient conditions	
Operation	to IEC 721-3-3
Climatic conditions	class 3K5
Temperature	0...50 °C
Humidity	<95 % r.h.
Transport	to IEC 721-3-2
Climatic conditions	class 2K3
Temperature	-25...+70 °C
Humidity	<95 % r.h.
Mechanical conditions	class 2M2
Electromagnetic compatibility	
Emissions	EN 50 081-1
Immunity	EN 50 082-1
CE conformance to	
EMC directive	89/336/EEC
Low voltage directive	73/23/EEC
Product standards	
Switches for household and similar fixed electrical installations	EN 60 669-1
Safety class	II to EN 60 730
Degree of protection	IP 50 to EN 60 529
Connecting terminals (screwless)	2.5 mm <sup>2</sup> max.
Weight	0.173 kg

## Diagrams

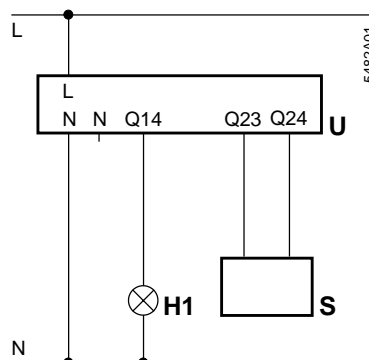
### Connecting terminals



- L, N      Operating voltage AC 230 V
- t1        HVAC switch on delay, adjustable from 0 to 300 s  
(with emergency operation)
- t2        HVAC switch off delay, adjustable from 0.5 to 30 min
- Q14, N    Control output «Lighting»
- Q23, Q24 Control output «HVAC»

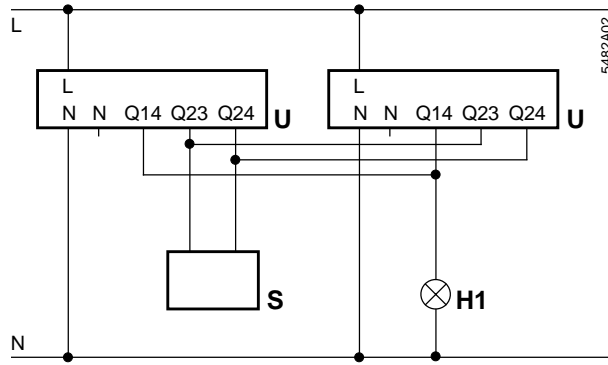
### Connection diagram 1

Control of a lighting system and a HVAC unit



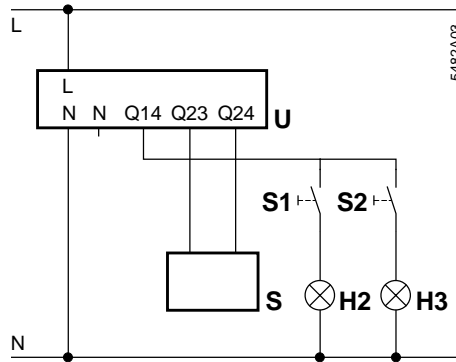
### Connection diagram 2

Parallel connection of several presence detectors



### Connection diagram 3

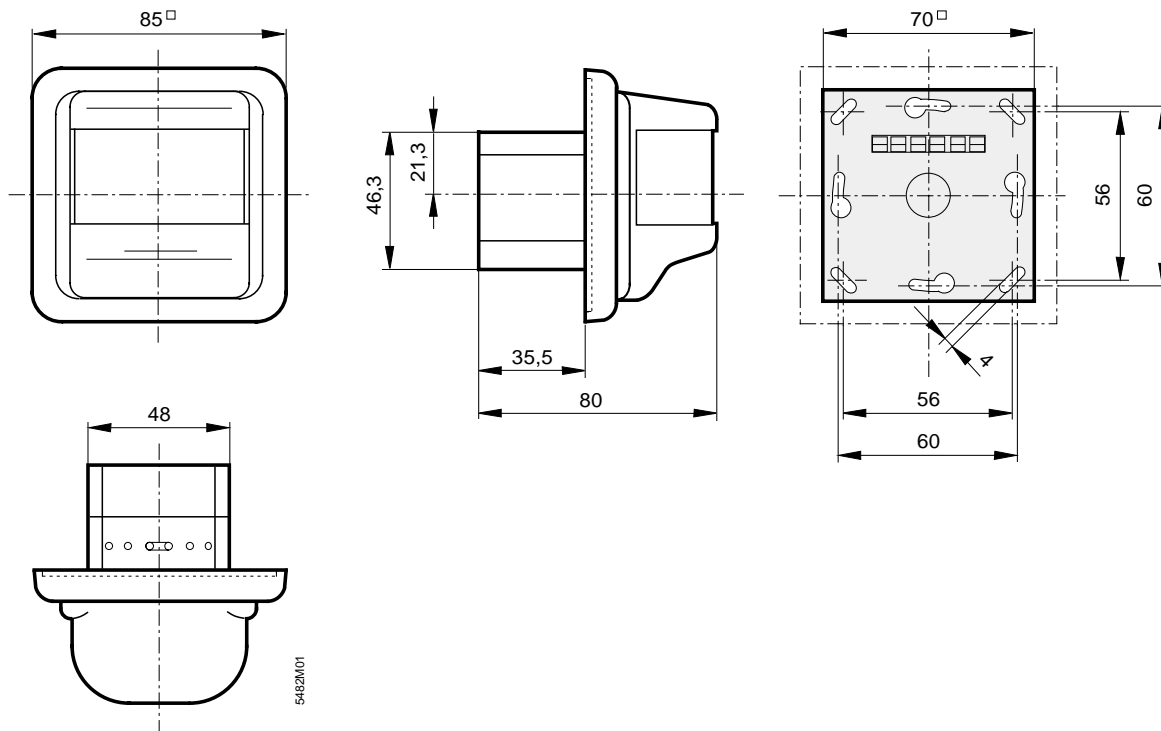
Control of a lighting system with two rows of lamps and manual switches, and of a HVAC unit



Legend for connection diagrams 1 to 3

- H1 Lighting
- H2 Row of lamps 1
- H3 Row of lamps 2
- S HVAC control unit
- S1 Manual switch for row of lamps 1
- S2 Manual switch for row of lamps 2
- U Presence detector QPA82...

### Dimensions



Dimensions in mm

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