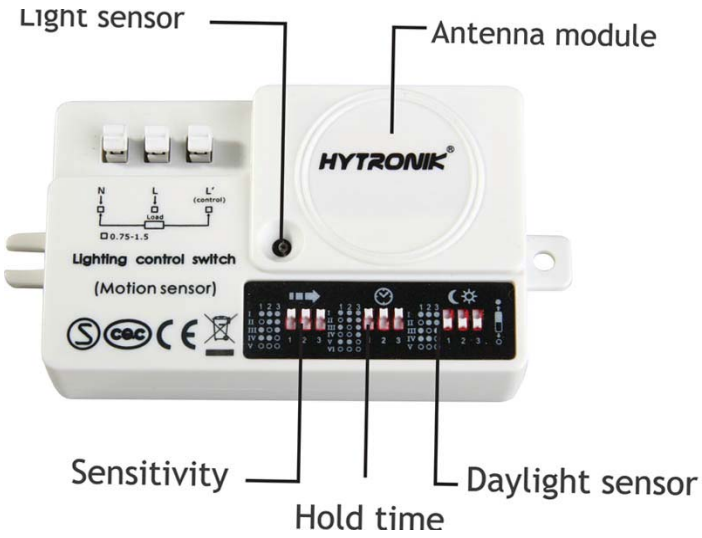
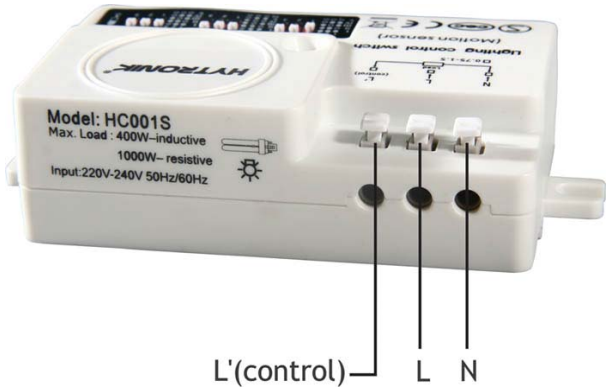
HYTRONIK®	Product Specification		Version:5.0
	Project:	Microwave motion sensor	Date: 24/12.2008
	Model :	HC001S	Pages:15





1 Objective

The objective of this microwave motion sensor is to provide automatic intelligent lighting control in areas, where the demand of light is low when there is no people, and requires full light when there are people moving around.

With the combined use of Hytronik encoded programmed ballast, this system could work as a simplified economy version of the “DALI” system.

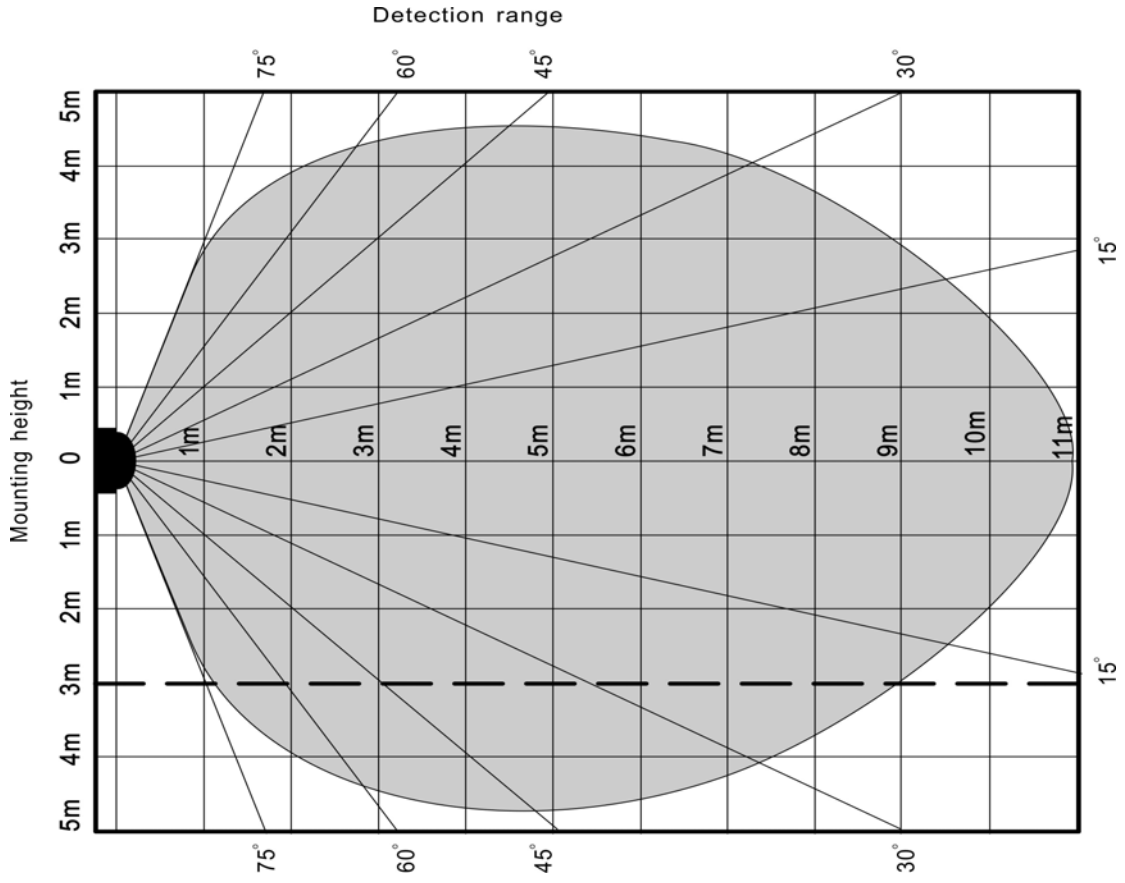
2 Functions

2.1 Detection

The sensor detects motion (moving persons) within its detection field. If a motion detected, the light will be switched on for a defined hold time. Any further motion during the hold time restarts the hold time (“retrigger function”). The hold time is adjustable in predefined steps (5s/ 30s/ 180s/ 300s/ 15min/ 25min).

The maximum detection range of the plain sensor module up to 11m. The shape of the detection field is similar to the below drawings 1 and 2 . The detection range of a lamp with integrated sensor depends on glass type and the lamp construction and can be within a range between 4 and 11 m. In general, plastic caps work better than glass caps. The sensitivity or the detection range, respectively, is adjustable in pre-defined steps (20 / 30 / 50 / 75 / 100%).

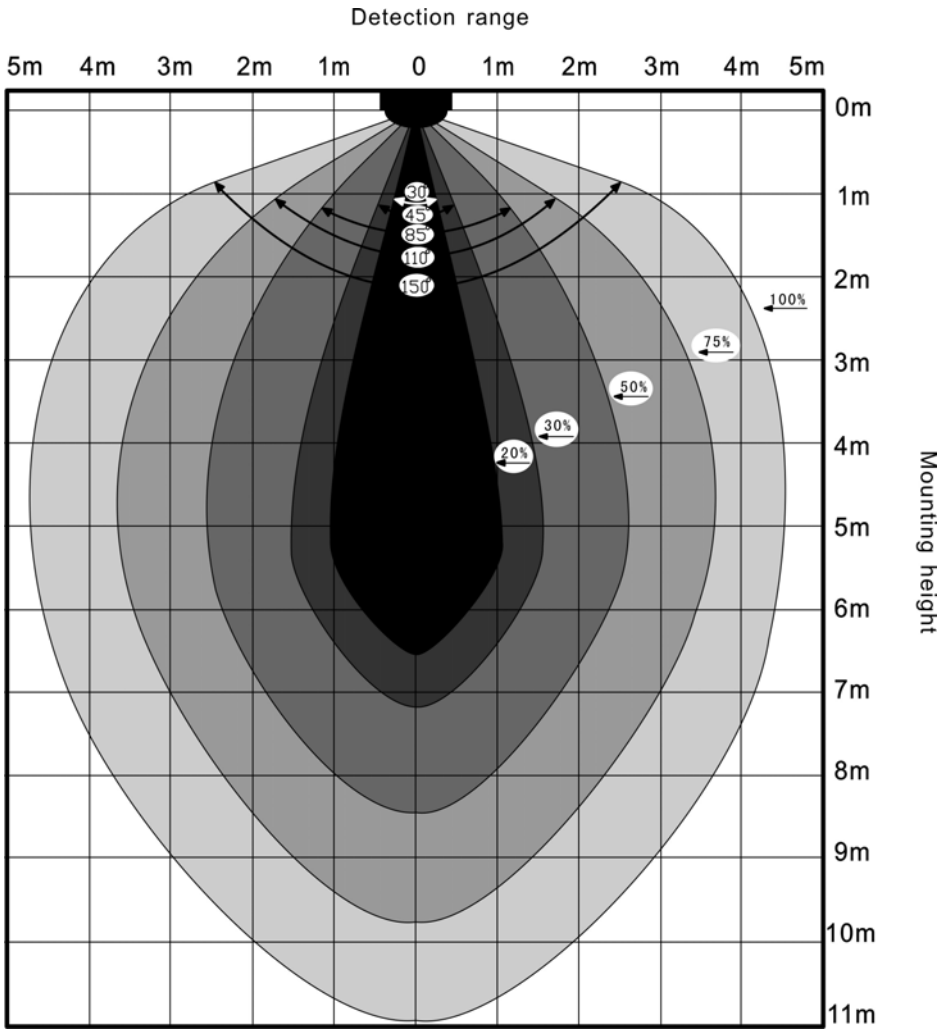
All specifications for detection range refer to the movement of an object frontal towards the sensor. Movement is detected if the speed is within a range between 1-20km/h (when mounted height<3m) or 1-200km/h (when mounted height >5m).



Drawing 1: Wall mounting and detection range
(at maximum sensitivity)

Note:

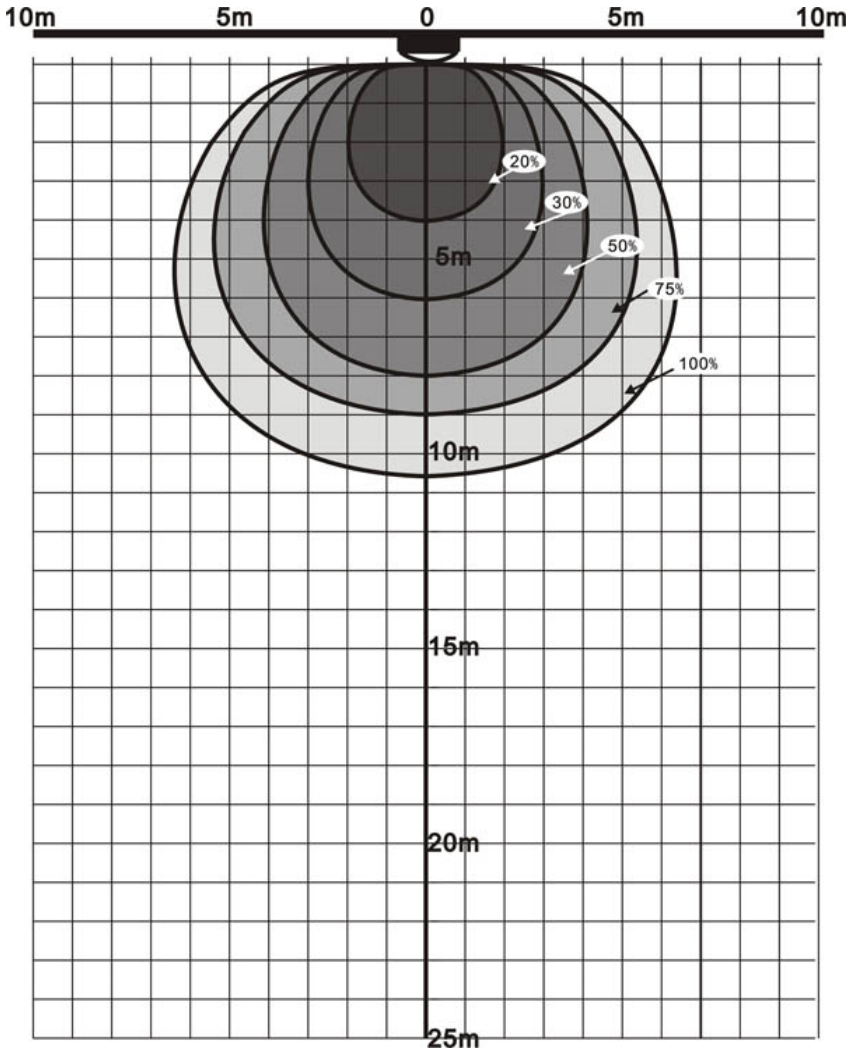
1. By reducing the sensitivity, the detection angle will also be reduced, please refer to the following drawing 2 for details on the standard version.



Standard version

Drawing 2 :Detection field & angle at different sensitivities

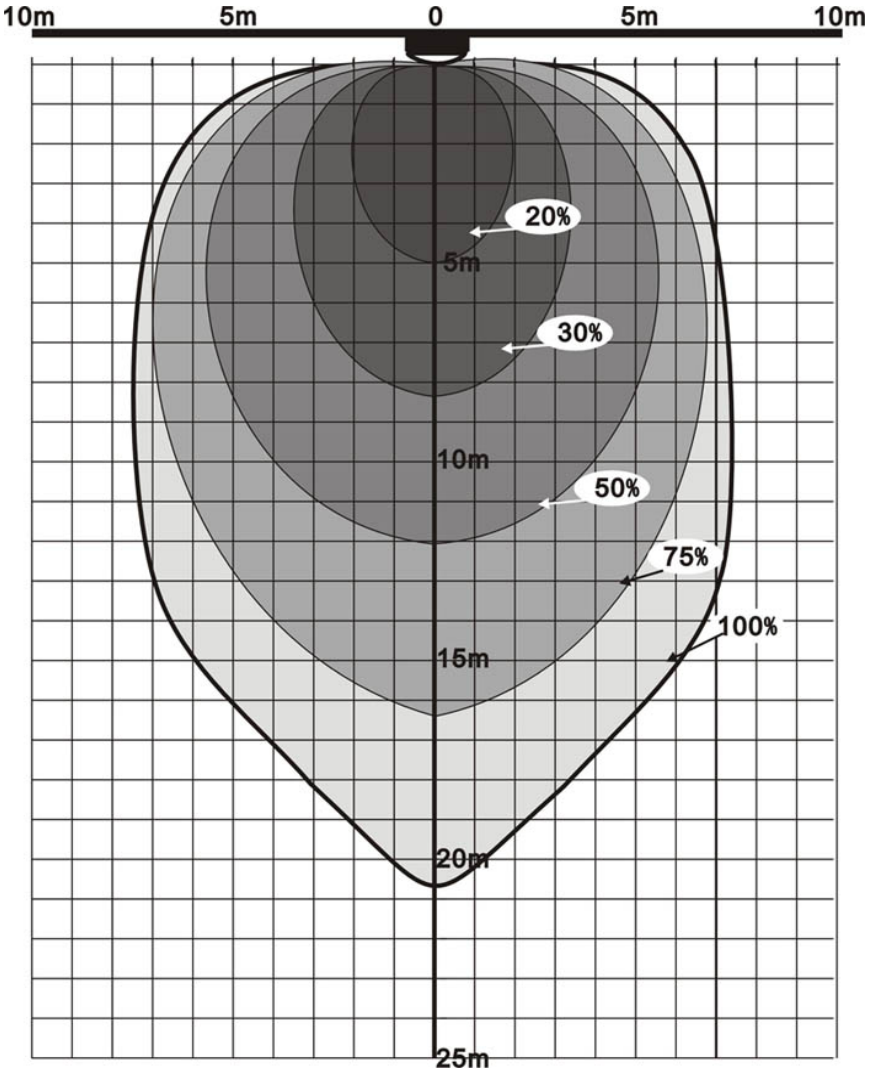
2. By increasing the transmission power to 2 mW, we can achieve max. 20 meters detection distance, please refer to the following drawings for details of the reinforced version.



Reinforced version

Drawing 3:Detection area for normal human body movement (ceiling mounting)

Above drawing is for detection of normal human body movement, the best mounting height for this application is 5-10m, any normal human body movement which beyond the detection area will not be detected.



Reinforced version

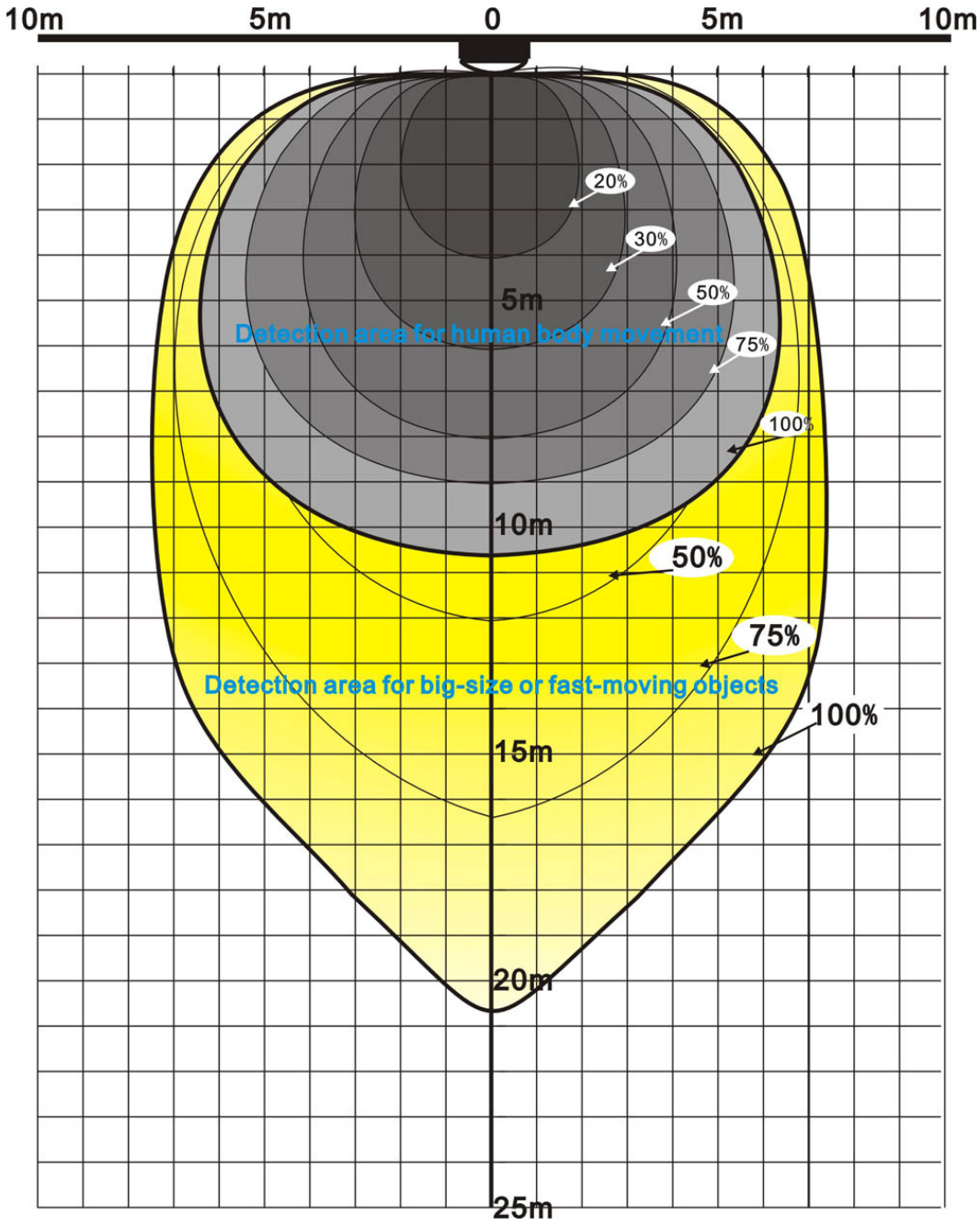
Drawing 4:Detection area for big-size or fast-moving objects (ceiling mounting)

Above drawing is for detection of big-size or fast-moving objects, all movements from big-size or fast-moving objects within this detection area will be detected. In this application, there are some requirements for the detection surface or speed of the moving objects.

Generally:

a) For 10-15m mounting height, the sensor requires 4-5 times larger detection surface or 4-5 times faster speed for the moving objects than normal human body.

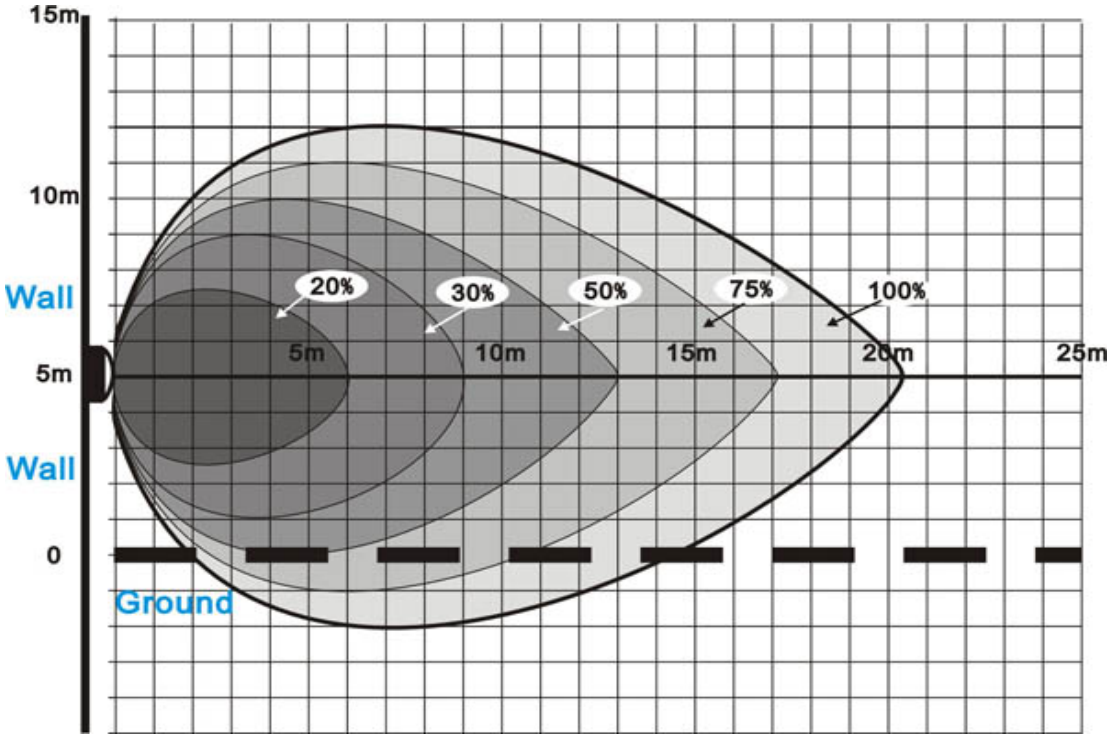
b) For 15-20m mounting height, the sensor requires 6-8 times larger detection surface or 6-8 times faster speed for the moving objects than normal human body.



Drawing 5:Detection area for HC001S reinforced version(ceiling mounting)

Drawing 5 is the combined diagram for our microwave motion sensor reinforced version, different mounting height and detection area for different application(grey part for normal human body application, yellow part for big-size or fast-moving objects application).

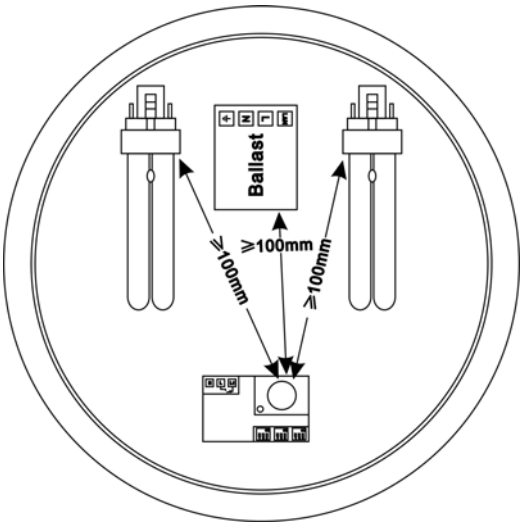
This reinforced motion sensor can also be wall-mounted, in this case, it is applicable for both human body movement and big-size or fast-moving objects movement, please refer to following drawing 6 for details.



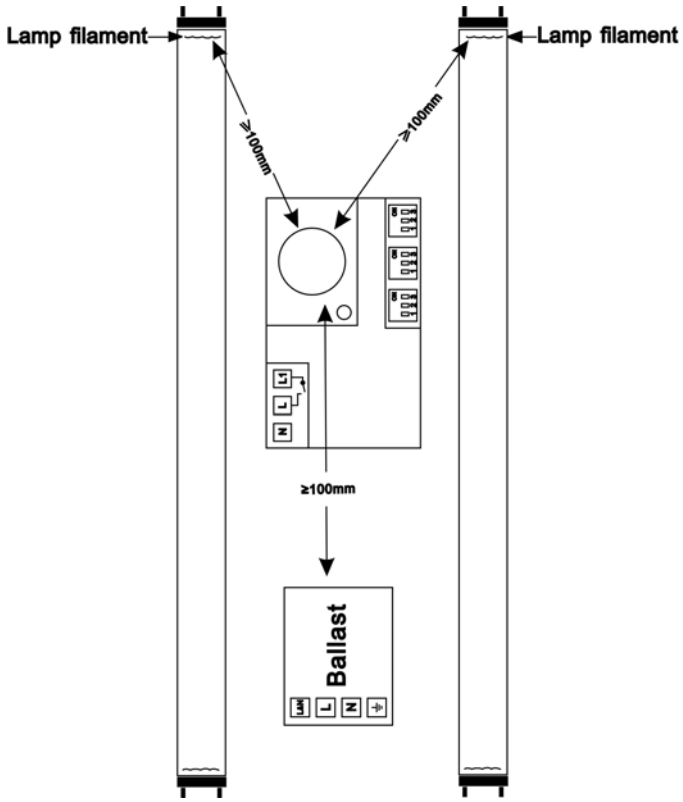
Reinforce version

Drawing 6 :Detection area at different sensitivities (wall mounting)

3: Ballast and lamp filament affect the detection range. For the better performance, we recommend to keep the sensor antenna module away from the ballast and lamp filament by at least 100mm. Please see following drawing 7 and 8.



Drawing 7: Sensor antenna module away from ballast and lamp filament(≥100mm)



Drawing 8: Sensor antenna module away from ballast and lamp filament(≥100mm)

2.2 Daylight sensor

The sensor contains a daylight sensor in order to allow a function only below a defined brightness threshold. The “brightness threshold” can be set in the following steps:

“daylight”: The lamp works always, even during daylight.

“twilight”: The lamp works only in twilight and in darkness (below approx. 50 lux)

“darkness”: The lamp works only in darkness (below approx. 5 lux)

2.3 Setup

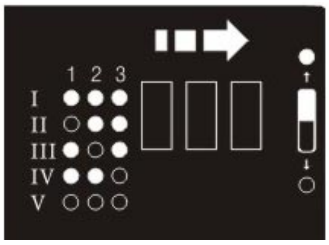
The sensor has three tiny switches to make different combination to set up the following functions:

Sensitivity (20 / 30 / 50 / 75 / 100%)
Hold time (5s/30s/180s/300s/15min/25min)
Daylight sensor (daylight / twilight / darkness).

The number and the values for these steps can be defined customer specific.

The set up of sensitivity is to choose the desired combination of the encoded switch—

●:ON ○:OFF



recommendation

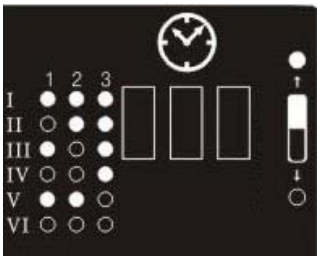
	1	2	3	
Ⅰ	●	●	●	100%
Ⅱ	○	●	●	75%
Ⅲ	●	○	●	50%
Ⅳ	●	●	○	30%
Ⅴ	○	○	○	20%

other combinations

Ⅵ	○	○	●	48%
Ⅶ	○	●	○	25%
Ⅷ	●	○	○	22%

Likewise, the hold time can be specified as below—

●:ON ○:OFF



recommendation

	1	2	3	
Ⅰ	●	●	●	5s
Ⅱ	○	●	●	30s
Ⅲ	●	○	●	3 min.
Ⅳ	○	○	●	5 min.
Ⅴ	●	●	○	15 min
Ⅵ	○	○	○	25 min

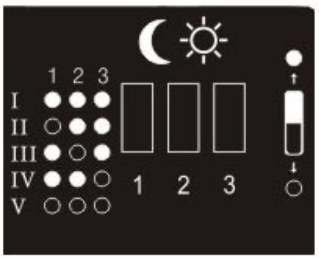
other combinations

Ⅶ	○	●	○	18 min
Ⅷ	●	○	○	22 min

Same for the daylight sensor—

●:ON ○:OFF

recommendation other combinations



	1	2	3		
Ⅰ	●	●	●	2 Lux	Darkness
Ⅱ	○	●	●	5 Lux	
Ⅲ	●	○	●	20 Lux	Twilight
Ⅳ	●	●	○	50 Lux	
Ⅴ	○	○	○	Disabled	Daylight

Ⅵ	●	○	○	48 Lux
Ⅶ	○	●	○	45 Lux
Ⅷ	○	○	●	20 Lux

Disabled means the light is always on, even in bright daylight.

The “recommendation” are printed on the product, while the “other combinations” are for users’s reference only.

The sensor is delivered with a factory setup, which works in many cases:

- Range 75%,
- Hold time 30 s,
- Daylight sensor “daylight”.

Customer specific predefined settings are possible.

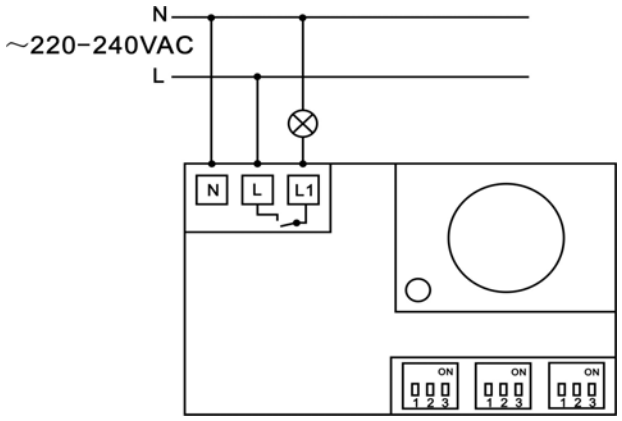
3 Electrical Interface

The sensor works with a main voltage of 220-240V (+/-10%) 50/60 Hz. A 100-120 V version is available on request.

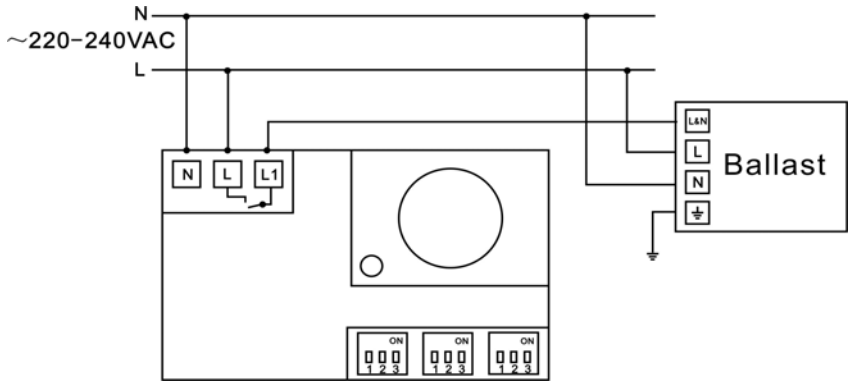
The sensor has a 3-wire electrical interface:

N (neutral / 230 V AC)
L (phase / 230 V AC)
L’ (switched phase / output)

To achieve on/off function with incandescent lamp and non-dimmable fluorescent ballast, The sensor has to be wired inside the lamp according to the following schematic:

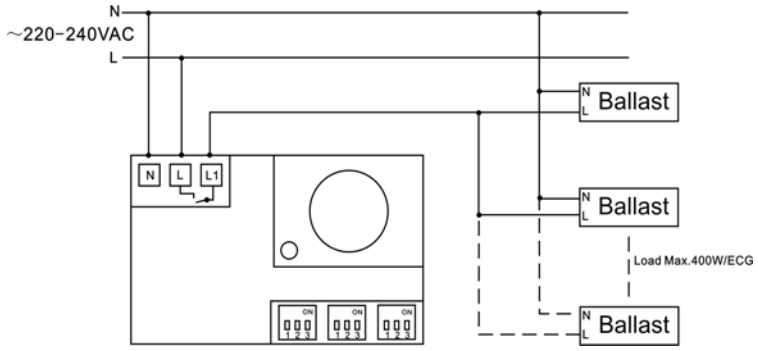


To achieve dimmer function with specially designed Hytronik dimmable ballast (HB0135-1, for example), the wiring should follow the below schematic:

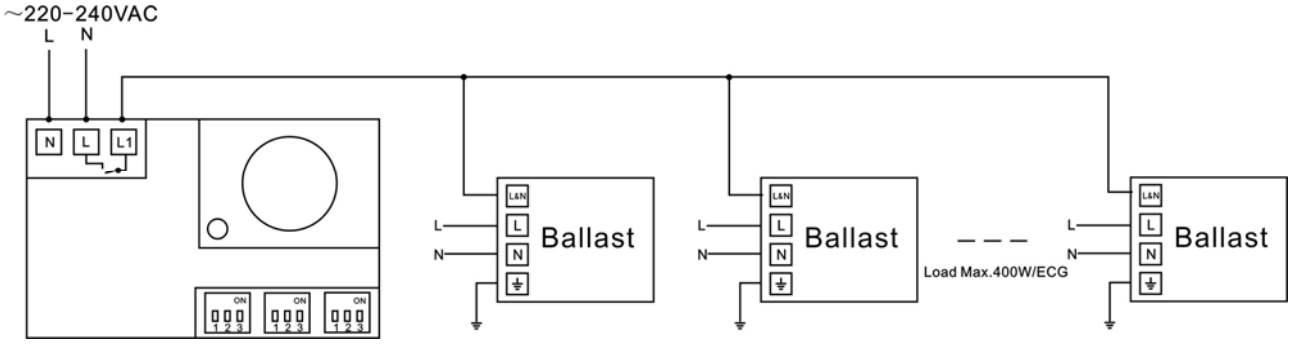


The maximum switchable load is 1000 W (incandescent bulbs) or 400 W (fluorescent lamps). This load could be bulbs inside the lamp and also additional / external lamps. However, when the sensor is loaded with HYTRONIK particularly designed dimmable ballast, the load is unlimited.

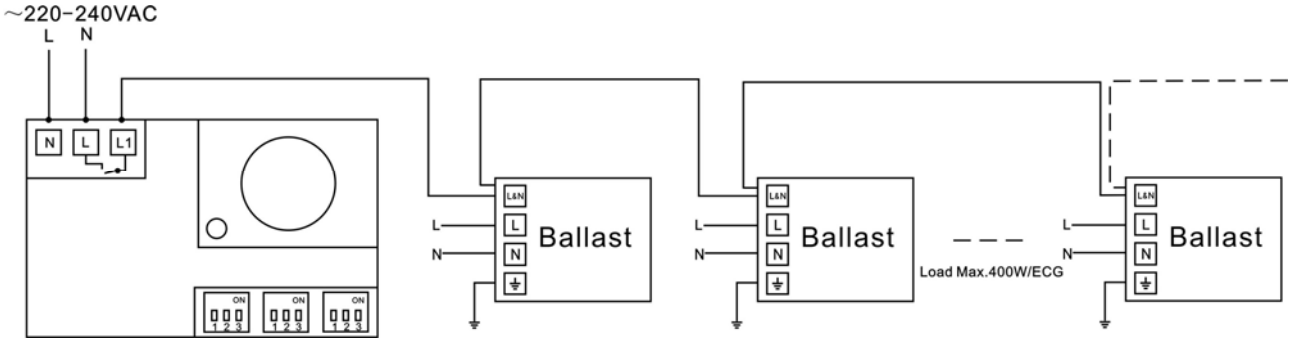
When the sensor is supposed to control several external lamps to achieve on/off function with incandescent lamp and non-dimmable fluorescent ballast, The the wiring should then follow the below schematic:



When the sensor is used to control several Hytronik dimmable ballast (HB0135-1, for example) to achieve dimmer function, the wiring should follow the below schematic:



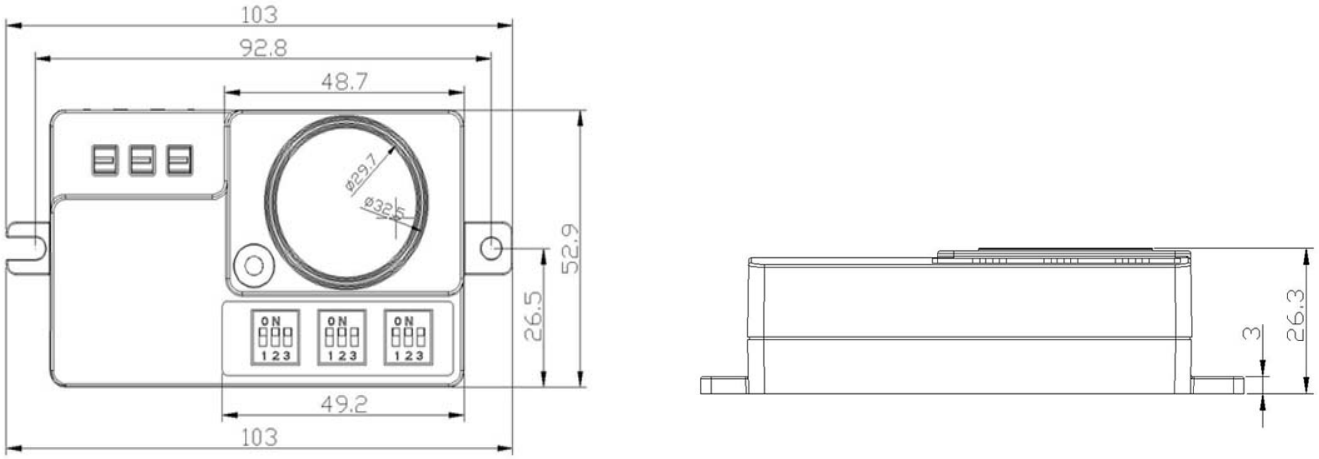
Or, like this:



4 Mechanics

4.1 Casing

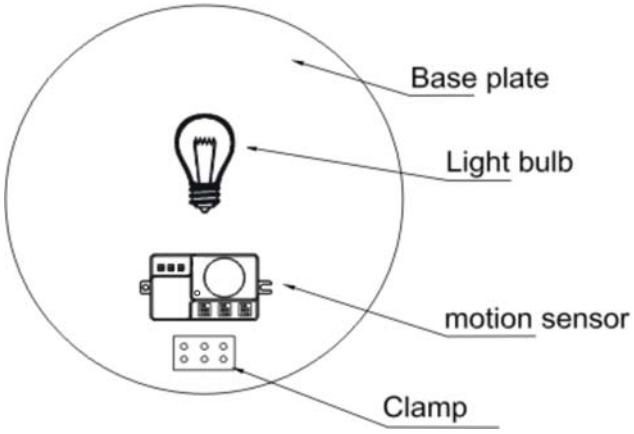
The sensor is provided as a compact PC box. The size of the casing is approx. 98 x 51 x 26 mm including mounting holes.



Drawing 9: Casing dimensions

4.2 Mounting

The box must be mounted inside the lamp, considering the following points:
The sensor must be mounted flat on the base plate of the lamp, providing a detection field rectangular to the base plate.
Any metal parts in front of the sensor or besides the sensor can change the detection field in size and shape.
The sensor must not be mounted close to the light bulb (maximum operating temperature is 70°C). The best position is below the bulb.
Vibrations must be avoided.
The daylight sensor must not be shaded by any parts. A fiber optic is included to allow the end users to stretch the fiber optic outside the lamp, to the position and direction desired.



Drawing 10: positioning example

Enclosed in our special designed IP54 housing, the sensor is completely protected against any harmful deposits of dust and water splashing from any direction, which makes it possible for outdoor use.
(Note: snow, storm and falling leaves does not activate the sensor.)

Tips for installation:

1. When the sensor is placed in lighting fixture, or other compartment where the surrounding is very dark, it is recommended to insert the fiber optic (included in the package) in the sensor hole, to direct the outside light into the sensor.

2. If the sensor is activated / interfered by motion of the people / object next door, please reduce the sensitivity, or adjust the direction of the sensor.

3. The detection angle and distance is closely related to sensitivity. Fine-tune the sensitivity switch program to fit your specific application.

5 Technical Data

Power:	
Operating voltage:	220-240V +/- 10%, 50/60 Hz, 100-127V+/- 10% on request
Switched power:	1000 W (light bulbs), 400 W (fluorescent lamps)
Standby power:	0.6w (standby), 1.2w (operation)
Interface:	3 pole pluggable terminal block (N, L, L') for 1.5 mm² cable
Sensor:	
Sensor principle	microwave motion detector
Microwave frequency	5.8 GHz +/- 75 MHz
Microwave power	Standard version:< 1 mw; reinforced version: < 2mw
Detection field:	Refer to page 3/12 diagram
Detection range	Standard version:11m; reinforced version 22m (at max.sensitivity)
Detection angle	30--150° (depending on sensitivity and height, see page 3/12)
Motion detection	1-20km/h(<3m mounting height); 1-200km/h(>5m mounting height)
Adjustable functions:	
Sensitivity	20 / 30 / 50 / 75 / 100% , can be customized
Hold time	5s/30s/180s/300s/15min/25min, can be customized
Daylight sensor	daylight / twilight / darkness , can be customized
Operating conditions:	
Mounting height:	Standard version:max.5m (wall mounting), max.11 m (ceiling mounting) Reinforced version:max.8m (wall mounting), max.22m (ceiling mounting)
Operating temperature:	-20 … +70°C
IP rating:	IP20(mounting inside a lamp); IP54(mounting in Hytronik special box)

6 Compliance and Marking

This sensor is compliant to the following European directives and standards:

EU directives:

Nr. 1999/5/EC	EU Directive on radio equipment and telecommunications
Nr. 89/336/EEC	EU Directive on Electromagnetic Compatibility
Nr. 73/23/EEC	EU Low-Voltage Equipment Directive
Nr. 2002/95/EC	EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Harmonized standards:

IEC61000-4-2	IEC61000-3-2
IEC61000-4-3	IEC61000-3-3
IEC61000-4-4	EN60669-2-1
IEC61000-4-5	EN60669-1
IEC61000-4-6	CISPR 14
IEC61000-4-8	CISPR 15
IEC61000-4-11	

Marking:

This sensor is marked with the following conformity marks:

CE compliance, declares the compliance to the above mentioned standards

Semko certificate

Chinese safety standard