ZigBee™- Occupancy Sensor

User Manual

Occupancy Sensor

Model: ZB11D

Firmware: V2.1/V2.2/V2.3
Hardware: V1.0

Version History

Date	Description	Version
2015-11-17	Added Netvox App control interface	0.1

Table of Contents

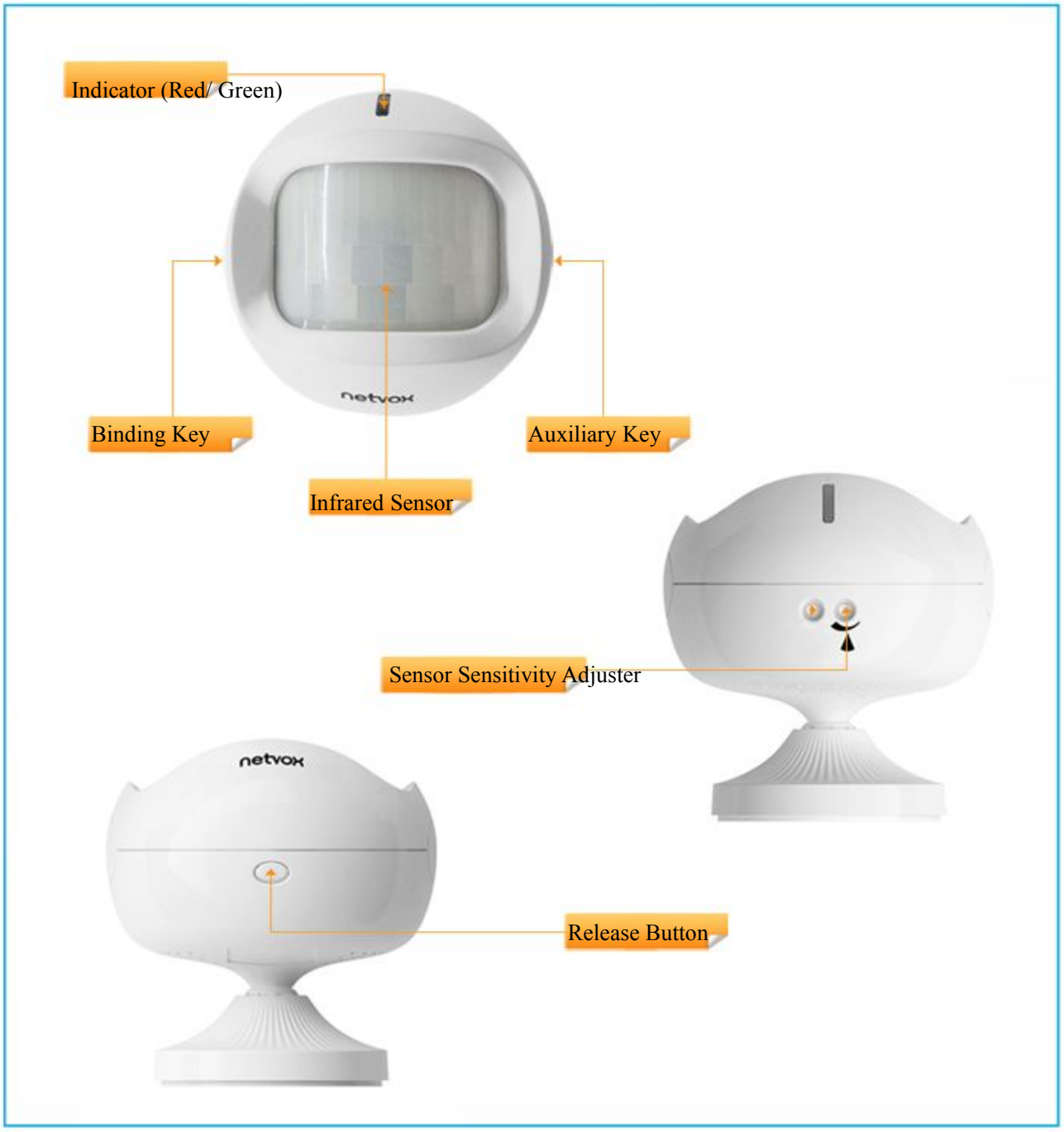
1. Introduction

Netvox ZB11D, an infrared radiation (IR) occupancy sensor, acts as an End Device in ZigBee network. It does not perform permit-join function as a coordinator or a router for other devices to join the network. When ZB11D detects movement, it reports the message to the ZigBee network.

What is ZigBee?

ZigBee is a short range wireless transmission technology based on IEEE802.15.4 standard and supports multiple network topologies such as point-to-point, point-to-multipoint, and mesh networks. It is defined for a general-purpose, cost-effective, low-power-consumption, low-data-rate, and easy-to-install wireless solution for industrial control, embedded sensing, medical data collection, smoke and intruder warning, building automation and home automation, etc.

2. Product Appearance



3. Specification

- Fully IEEE 802.15.4 compliant (ZigBee Pro)
- Utilizes 2.4GHz ISM band; up to 16 channels
- Power supply: 2 ER14505 3.6V batteries
- Up to 70 meters wireless transmission range in non-obstacle space
- Easy installation and configuration

4. Features

- A mounting height between 2 and 2.2 meters is recommended.
- Do not aim the passive infrared sensor to a heat or cold source.
- The sensor should not face open door/windows as sunlight will affect its operation.
- The sensor must be mounted on a vibration-free surface.

5. Set up

5-1. Turn On/ Off ZB11D

(1) Load Battery: push down release button to open the case. Load two ER14505 3.6V AA batteries and then close the case.
(2) Default state is "off" after batteries loaded. Short press binding key, two indicator flash once to show "on" status.
(3) Press and hold binding key for 15 seconds till green light flashed slowly, release binding key to turn off.
(4) It is recommended to wait for 10 seconds between turning on and off ZB11D to prevent interruption between energy storage elements.

5-2. Join the ZigBee Network

After ZB11D is turned on, it will search for an existing ZigBee network and send a request to join the network automatically. While ZB11D is under the coverage of a coordinator or a router that **permit-join feature is enabled**, ZB11D will join the network.

(1) Enable the permit-join function of a coordinator or a router (please refer to the user manual of the coordinator or the router to enable the permit-join feature).
(2) Turn on ZB11D. It will start to search and join the network.
(3) The indicator will flash **green once** when it finds out a network to join.
(4) The indicator will flash **green 5 times** after it is joined successfully. Otherwise, the indicator will not flash.
(5) Support to join Zigbee network in a manner of commissioning.
(6) ZB11D will go to sleeping mode in 3 seconds if it does not join Zigbee network.

5-3. Infrared Sensor Detection

While IR detection is on, any living object triggers the sensor. ZB11D will then detect status once per second according to (attribute: 0x0011PIRUnoccupiedToOccupiedDelay, default 1 second.) When ZB11D reaches the threshold (attribute: 0x0012 PIRUnoccupiedToOccupiedThreshold, default 1 time), ZB11D will be "occupied" (attribute 0x0000 Occupancy) and red indicator flashes once. Otherwise, ZB11D will return to IR detection status.

In the mean time, users are able to process customized operation by programming or configurating according to IRDetectionTime（IRDetectionTime >= IRDisableTime，default 120 seconds).

1)、IRDetectionTime: 1~0xFFFF

Once ZB11D turns to "occupied", ZB11D will enter IRDetectionTime duration. IR detection closes for IR delay*70%（=PIROccupiedToUnoccupiedDelay*70%). ZB11D starts to detect from IR delay*70% to full IR delay. If it detects events in this time, IR delay（attribute 0x0010 PIROccupiedToUnoccupiedDelay）will extend again till there is no more IR event and IRDetectionTime is due. "Occupied" status will turn to "Unoccpied ". ZB11D will report to bind device the "Occupancy" status according to report time setting.

Note: default IR delay=30 seconds.

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2)、IRDetectionTime: 0

Once ZB11D turns to “occupied”, IR detection closes for IR delay*70%. ZB11D starts to detect from IR delay*70% to full IR delay. If it detects events in this time, IR delay will extend again till there is no more IR event . “Occupied” status will turn to “Unoccpied ”. ZB11D will report to bind device the status according to report setting.

Note:

1.During the time of “PIRUnoccupiedToOccupiedDelay”, PIR detects once per second, make sure PIRUnoccupiedToOccupiedDelay >= PIRUnoccupiedToOccupiedThreshold.

2. Once IRDetectionTime < PIROccupiedToUnoccupiedDelay， it will automatically default to IRDetectionTime=PIROccupiedToUnoccupiedDelay

3. PIROccupiedToUnoccupiedDelay must >= 5 seconds.

4. (APP control interface) Infrared detection means “IRDetectionTime” > = “IRDisableTime”.
(APP control interface) IR delay means “PIROccupiedToUnoccupiedDelay” must >= 5 seconds.

5-4. Infrared Sensor Report

This device supports “Voltage status” and “Occupancy status” report.

For “Voltage status” report:

(1) If ZB11D does not bind any device (ClusterId: 0001), it will not send report.

(2) After binding, ZB11D will send voltage status to bind device.

Default configuration: Min: 3600s, Max: 3600s, Report change:1

For “Occupancy status” report:

(1) If ZB11D does not bind any device (ClusterId: 0406), it will not send report.

(2) After binding, ZB11D will send voltage status to bind device.

Default configuration: Min: 0s, Max: 3600s, Report change:0

Note: it is recommended to set MinInterval as small as possible such like “0” for immediately detection and avoid missing IR detection report.

5-5. Wake up ZB11D

When users would like to setup or acquire data from the device which is in sleeping mode, we have to wake up the device as the following steps:

Step1. Press the *Auxiliary Key*.

Step2. The indicator flashes **green 5 times** when ZB11D is online.

Step3. ZB11D will broadcast the device data to the ZigBee network.

ZB11D would be in active status for 2 minutes for communication.

5-6. Battery Power and Low Voltage Alarm

ZB11D will send a low-power report to the ZigBee network when the operating voltage is lower than 3.2V by default.
The related data:

- Power configuration cluster (ID: 0x0001)
- Battery voltage attribute (ID: 0x0020)

The reporting voltage can be adjusted. There are 4 voltages for choosing: 3.5V / 3.4V / 3.3V / 3.2V.
It is recommended that the minimal reporting internal is longer than 5-minute.

5-7. Restore to Factory Setting

To restore it to factory setting, please follow the steps:

Step1. Press and hold the *Auxiliary Key* for 10 seconds.
Step2. Release the button after the indicator shows fast **green** flashes to complete the restore.

5-8. Testing Mode Set-up

5-9. Sleeping Mode

ZB11D is designed to go into sleeping mode for power-saving in some situations:

A. While the device is in the network → the sleeping period is 5 minutes; it will wake up every 5 minutes to keep online.
B. When it doesn't find a network to join → ZB11D will go to sleeping mode. It will wake up every 15 minutes to search a network to join.
C. Once ZB11D was joined to a network and by any chance the network is no longer existed or the device is out of the network → ZB11D will wake up every 15 minutes to find the network it joined before.

It never keeps in sleeping mode and continues to find out a network every 15 minutes. This condition would consume up to 30 times power spending compared to normal-operating status. To prevent this unwanted power consumption, we recommend that users remove the batteries to power off the device.

5-10. Binding

To bind ZB11D with other devices which support attribute 0x0000 (occupancy) of Occupancy Sensing Cluster (0x0406),

6. Home Automation Clusters for ZB11D

A cluster is a set of related attributes and commands which are grouped together to provide a specific function. A simple example of a cluster would be the On/Off cluster which defines how an on/off switch behaves. This table lists the clusters which are supported by ZB11D.

1、End Point(s)：0x01:

2、Device ID： **ZCL_HA_OCCUPANCY_SENSOR--(0x0107)**

3、EndPoint Cluster ID

Server side	**Client side**
Mandatory	
Basic (0x0000)	
Power Configuration(0x0001)	
Identify (0x0003)	
Commissioning(0x0015)	
Occupancy Sensing（0x0406）	
Poll control(0x0020)	
Diagnostics Cluster(0x0B05)	

This lists the attributes of the basic information.

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	*ZCLVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x03	M
0x0001	*ApplicationVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	-------	O
0x0002	*StackVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	--	O
0x0003	*HWVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	--	O
0x0004	*ManufacturerName*	Character string	0 – 32 bytes	Read only	netvox	O

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0005	*ModelIdentifier*	Character string	0 – 32 bytes	Read only	--	O
0x0006	*DateCode*	Character string	0 – 16 bytes	Read only	--------	O
0x0007	*PowerSource*	8-bit Enumeration	0x00 – 0xff	Read only	-------	M
0x0010	*LocationDescription*	Character string	0 – 16 bytes	Read/write	--------	O
0x0012	*DeviceEnabled*	Boolean	0x00 – 0x01	Read/write	0x01	M

7. Netvox App control

1. Add device to Netvox control system as below; an EP device shows up in the device management page.

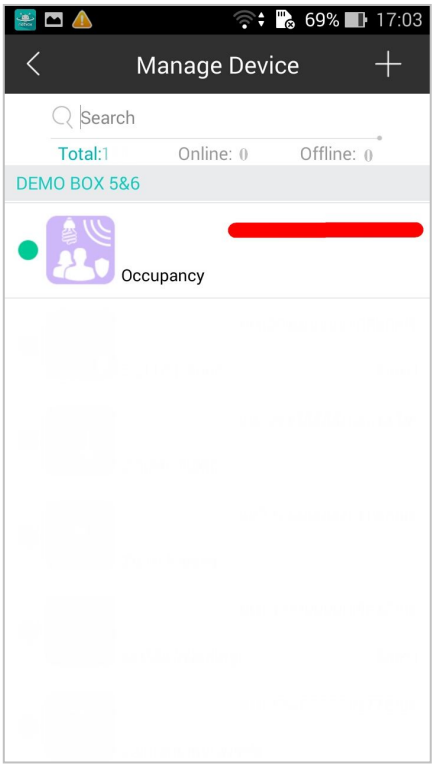


Fig. 1

2. EP 01 is “Occupancy Sensor” type，click EP 01 to control interface：

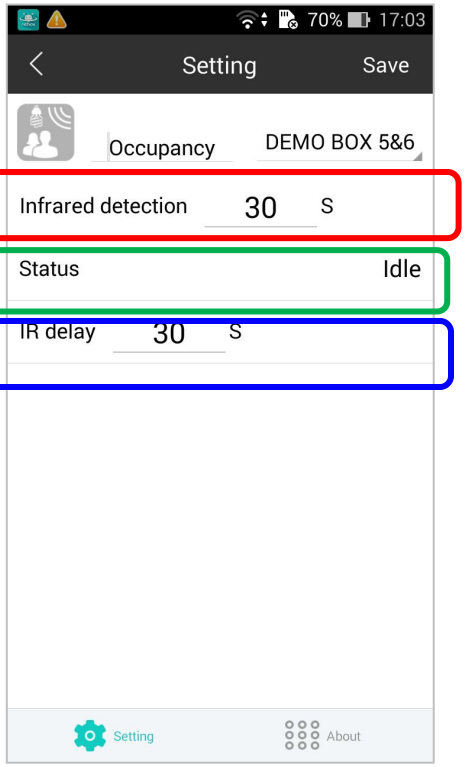


Fig. 2

Infrared detection: “IRDetectionTime” > = “IRDelayTime”. (Refer to Chapter 5.3)
IR delay: “PIROccupiedToUnoccupiedDelay” > = 5 seconds. (Refer to Chapter 5.3)
Status: current status
Idle: ZB11D is not triggered.
Occupancy: ZB11D is triggered.
Note: Infrared detection and IR delay are recommended to be default value due to the power saving issue.

2. Click “About” to check device information as below:

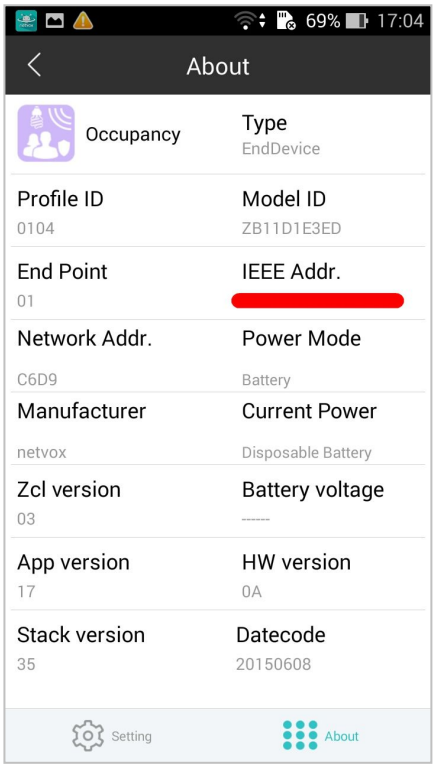
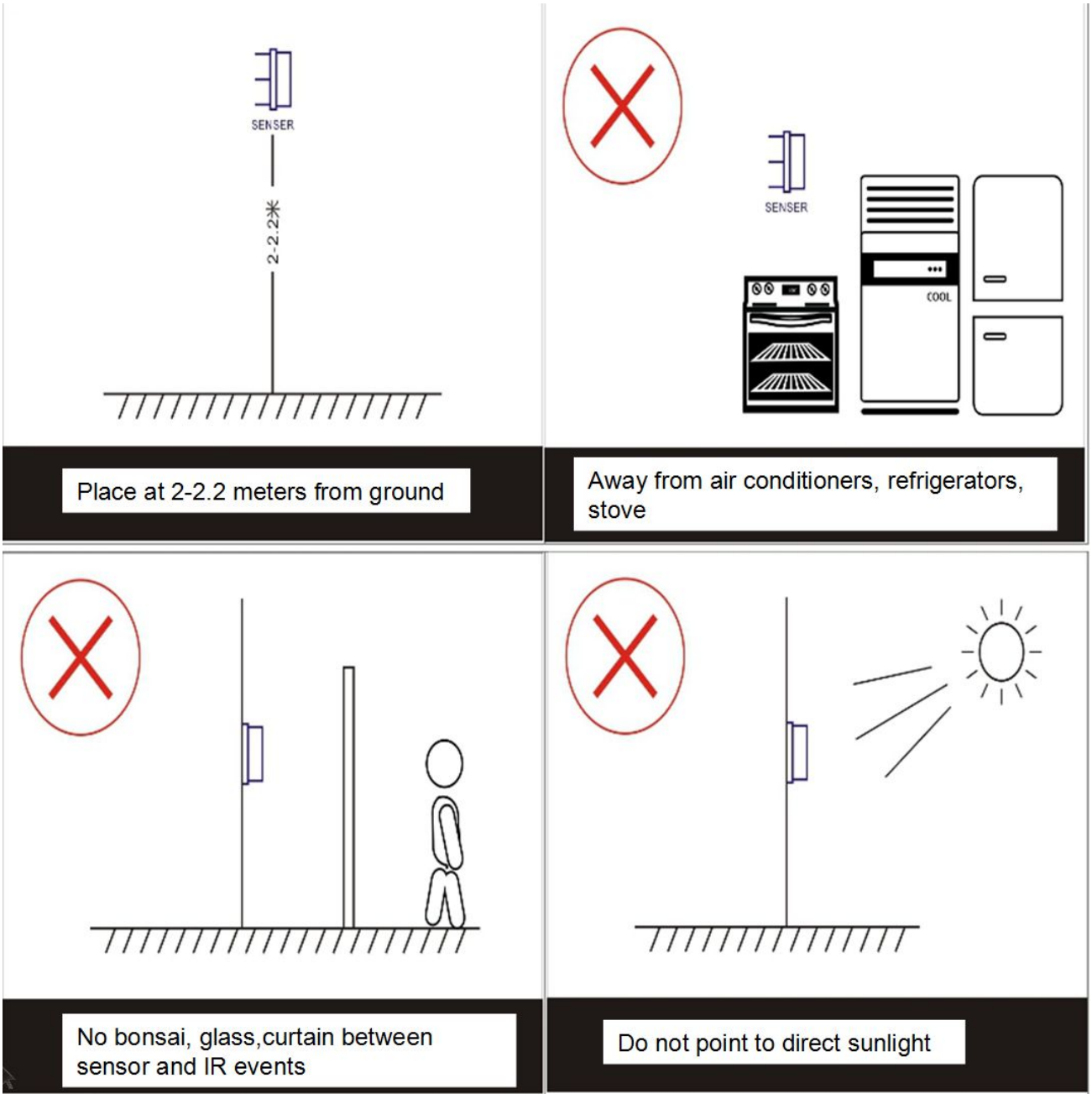
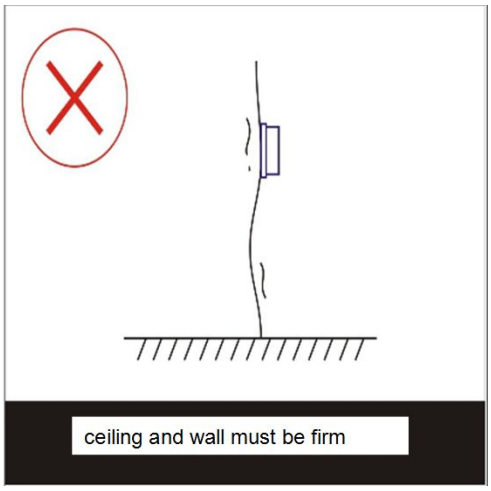


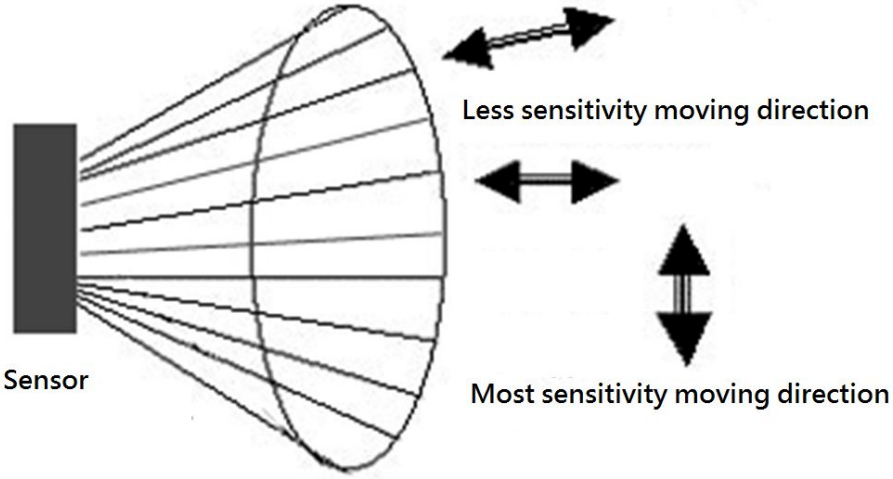
Fig. 3

8. Installation

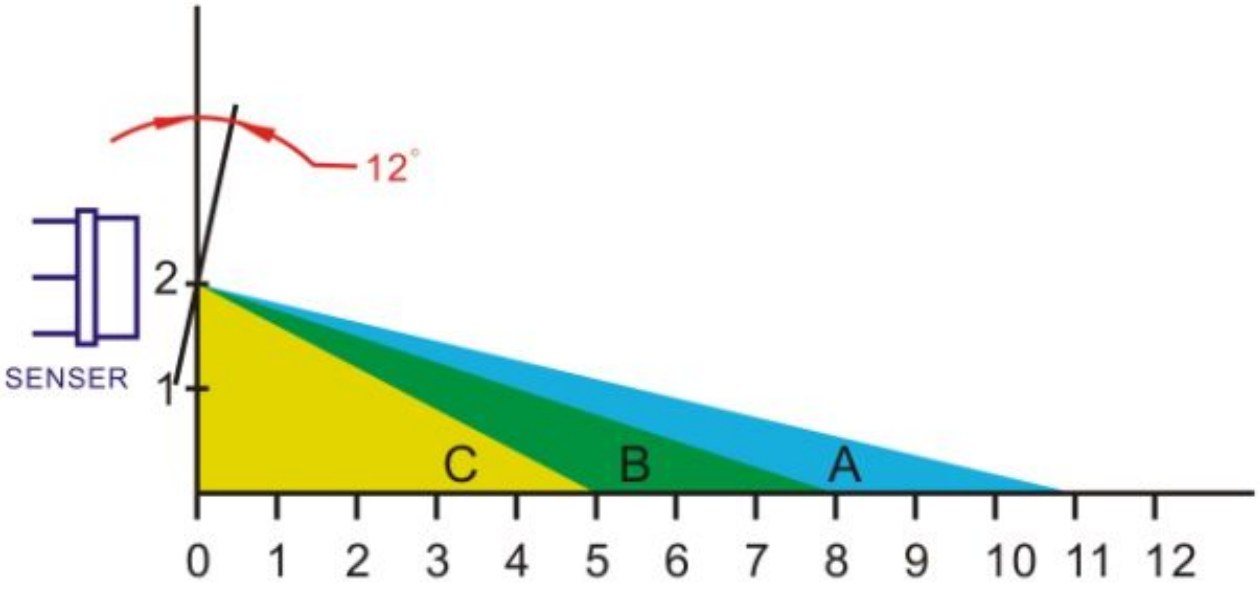
1. Indoor use only, please check the installation places.

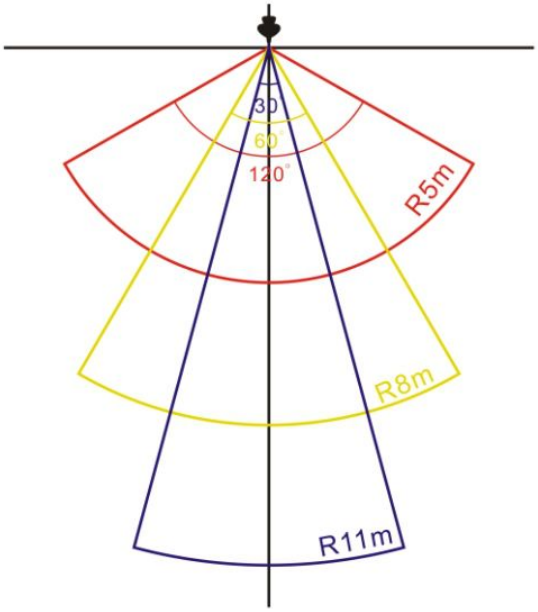




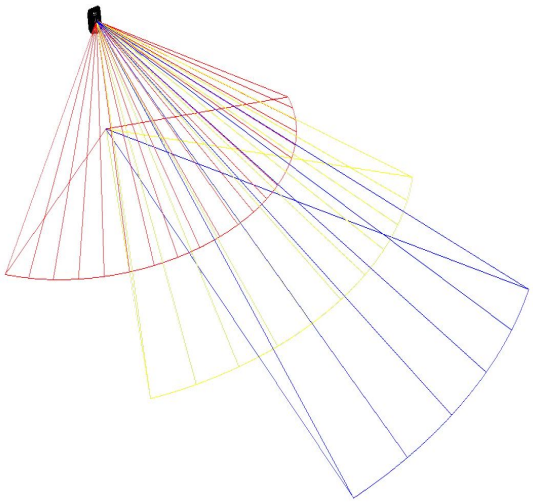


2. Detection coverage





Horizontal projected area



Space projected area

- IR coverage range:

  The coverage area A- Distance: 11 meters; sensing angle: 30°.

  The coverage area B- Distance: 8 meters; sensing angle: 60°.

  The coverage area C- Distance: 5 meters; sensing angle: 120°.

Double-sided stickers tips:

1. Clean two surfaces to stick with.
2. Tear sticker on one side; stick to the position shown product base, and smoothly press it.
3. Rip the remaining side and stick to the clean side of the wall (the direction of arrow shows up) and press firmly around 20 seconds.


UP

9. Important Maintenance Instructions

- Please keep the device in a dry place. Precipitation, humidity, and all types of liquids or moisture can contain minerals that corrode electronic circuits. In cases of accidental liquid spills to a device, please leave the device dry properly before storing or using.
- Do not use or store the device in dusty or dirty areas.
- Do not use or store the device in extremely hot temperatures. High temperatures may damage the device or battery.
- Do not use or store the device in extremely cold temperatures. When the device warms to its normal temperature, moisture can form inside the device and damage the device or battery.
- Do not drop, knock, or shake the device. Rough handling would break it.
- Do not use strong chemicals or washing to clean the device.
- Do not paint the device. Paint would cause improper operation.

Handle your device, battery, and accessories with care. The suggestions above help you keep your device operational. For damaged device, please contact the authorized service center in your area.

FCC Statement:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note:

1. Use the product in the environment with the temperature between -10°C and 50°C.

For the following equipment:

CE 0700

Is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC,
The equipment was passed. The test was performed according to the following European standards:

EN 301 489-1 V1.9.2: 2011-09
ETSI EN 301 489-17 V2.1.1: 2009-05
ETSI EN 300 328 V1.7.1:2006-10
EN62311:2008
EN 60950-1:2006+A11:2009+A1:2010+A12:2011

CAUTION
RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS