

# DS160/161

## Request To Exit PIR sensors

### Installation Instructions

#### 1.0 Description

The DS160/161 is a passive-infrared (PIR) detector designed for request to exit (REX) interior applications. It is UL Listed as an access control device under the UL 294 Standard.

The technology designed into the DS160/161 is based on the principal that all objects emit infrared energy. The warmer an object is, the more infrared energy emitted. Its PIR technology allows the DS160/161 to detect the change in infrared energy that occurs when a person passes through its field of view.

The DS160/161 has features such as Sequential Logic Input (SLI) to eliminate unauthorized entry. SLI allows you to arm the detector using any dry contact device, such as a second detector, card reader, or the access control system. This provides better control for this type of application.

A built-in sounder can be automatically activated if the door is propped open. The sounder can be controlled from any dry contact device. The DS160/161 detection pattern provides dense C-shaped coverage ideal for most REX applications. In addition, complete pattern control allows it to be adjusted to a single zone or placed over a doorknob, for example. There are fifteen possible coverage patterns to accommodate most applications. This, combined with the ability to monitor the door and intelligently control the lock, adds considerable security to these types of applications.

The DS160/161 uses Motion Analyzer II signal processing to help prevent false activation due to environmental conditions. The relay output consists of two Form "C" contacts that can be adjusted to latch from approximately 0.5 to 64 seconds. The latch time features two modes of operation, resettable (where the relay timer will not time out as long as someone is in the field of view) and non-resettable (where the relay will remain latched for a fixed period of time). The relay can also be programmed to fail safe or fail secure in the event of power loss.

The DS160/161 may either be ceiling or wall mounted, and its pattern may be aimed and/or masked for more effective use based upon installation needs. It is not designed as a primary means of exit for emergency egress applications.

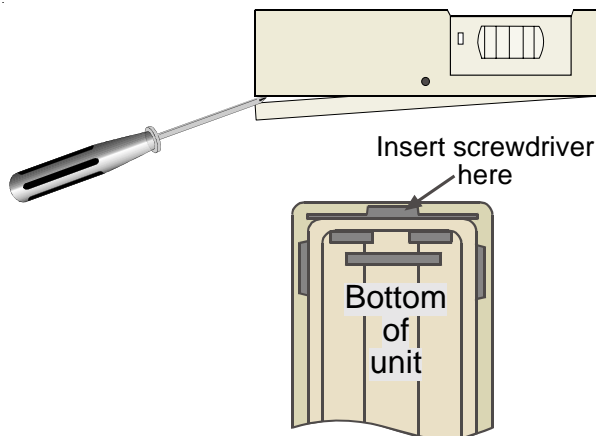
The DS160/161 is available in a light grey (DS160) or a black (DS161) enclosure along with an optional trim plate (light gray TP160 or black TP161) that can cover a single gang box. Panic hardware must be used with this or any other egress device.

#### 2.0 Specifications

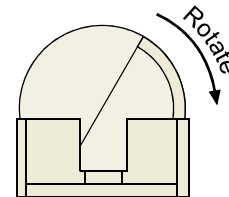
- **Input Power:** 12 VDC to 30 VDC or AC
- **Current Draw:** 39 mA at 12 VAC, 76 mA at 30 VAC Alarm 39 mA at 12 VDC, 60 mA at 30 VDC Alarm 8 mA nominal standby current
- **Relay:** Two Form "C" contact sets rated for 1 A each at 30 VDC or AC max for resistive loads.
- **Sounder:** 85 dB with adjustable volume
- **Temperature:** -20°F to +120°F (-29°C to +49°C). For UL Listed installations, the temperature range is +32°F to +120°F (0°F to +49°C).
- **Humidity:** 0% to 95% non-condensing. 0% to 85% non-condensing for UL Listed installations.
- **Dimensions (xWxD):** 1.8 in. x 7 in. x 1.75 in. (4.5 cm x 17.8 cm x 4.4 cm)
- **Trim plate (HxW):** Optional. TP160 (light gray); TP161 (black) 3 in. x 8.25 in. (7.6 cm x 21 cm)

#### 3.0 Installation

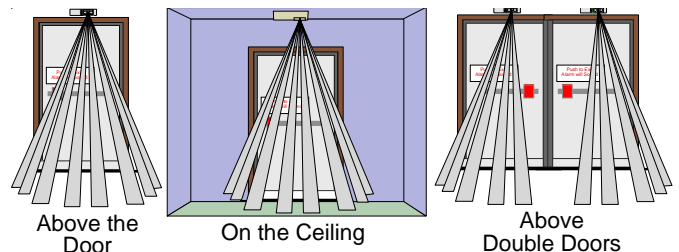
##### 3.1 Remove the cover using a small flat blade screwdriver.



##### 3.2 Rotate the detector clockwise to remove it from the base.



##### 3.3 Select a mounting location

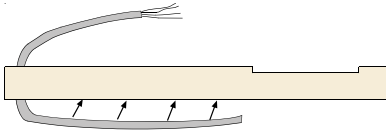




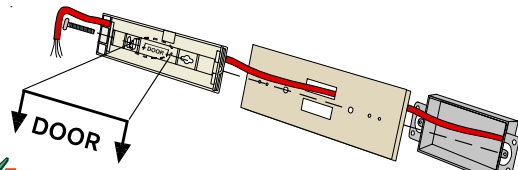
Before you mount the unit, review *Section 7 Coverage Patterns* for more information on the placement and location of the DS160/161.

IMPORTANT

**3.4 Route the wiring** through the base **before** mounting the base to the wall or ceiling. See *Section 3.5* when using the optional trim plate (TP160 or TP161).



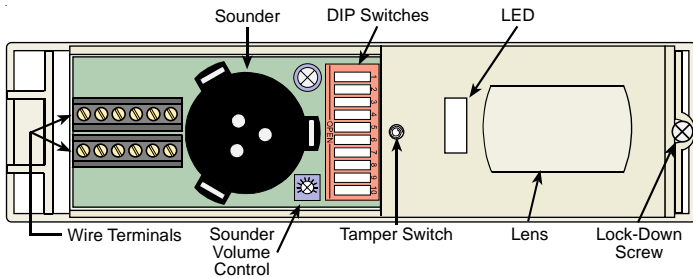
**3.5** When using the optional trim plate (TP160 or TP161), run the wiring through the trim plate and into the base before mounting the base and trim plate onto a single gang electrical box.



The arrows on the base indicate its correct mounting orientation relative to the door.

IMPORTANT

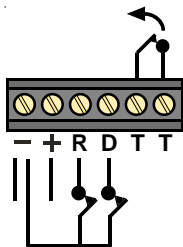
**3.6 Note the location of detector features.**



## 4.0 Wiring

### 4.1 Power, Remote Input, Door Contacts, and Tamper

- (-) Connect to the negative side of the power supply.
- (+) Connect to the positive side of the power supply. The voltage must be between 12 VAC and 30 VAC or DC.
- (R) Terminal R is for Sequential Logic Input (SLI), the keycard input or for remote control of the sounder. The contact must be Normally Closed (NC). See *Section 5.7* for more information.
- (D) Terminal D allows the detector to monitor door contacts. See *Sections 5.6* and *5.7* for more information. If used, these contacts must be Normally Closed (NC) door contacts. **Do Not share these contacts with any alarm systems.**
- (T) and (T) Normally Closed (NC) Tamper contacts.

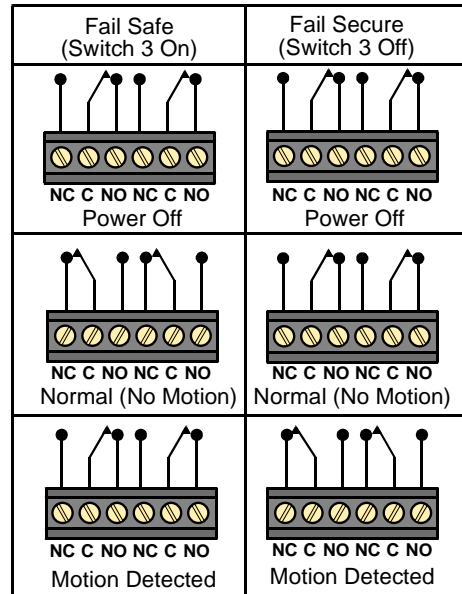


Before wiring the unit, review *Wiring Examples* in *Sections 4* and *5* for more information on the wiring of the DS160/161.

IMPORTANT

## 4.2 Contact Output Wiring

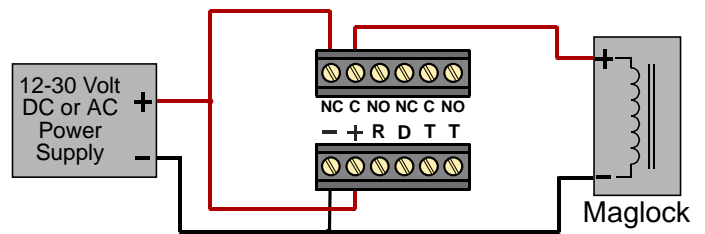
The normal settings of the contact outputs change depending on the setting of the Relay Mode Switch (S3). See *Section 5.3*.



## 4.3 Wiring Examples

### 4.3.1 Basic Hookup

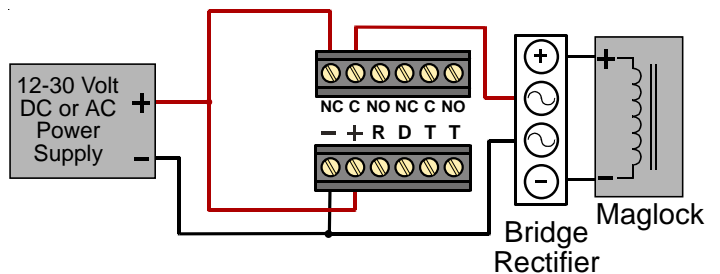
The basic hookup includes the DS160/161, a power supply, and a magnetic lock. When the sensor sees motion, power is removed from the magnetic lock.



Relay contacts shown with Switch 3 ON (Failsafe Mode) and Power On

### 4.3.2 Spike Protection

Many magnetic locks and electric door strikes have built-in spike protection (also be called diode protected). If your lock is not spike protected, install a bridge rectifier, such as a KBL005, between the relay contacts and the magnetic lock/door strike as shown below.



Relay contacts shown with Switch 3 ON (Failsafe Mode) and Power On.

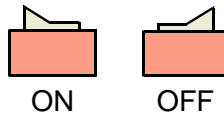
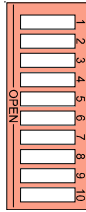


Failure to spike protect the detector can shorten the life of the relay contacts.

IMPORTANT

## 5.0 Switch Settings

You can change the switch settings by pressing the rocker to the ON or OFF position.



### 5.1 LED Operation - Switch 1

**Switch 1 ON** - LED operates normally when motion is detected.

**Switch 1 OFF** - LED is turned off.

### 5.2 Timer Reset Mode - Switch 2

**Switch 2 ON** - The relay timer starts when the detector sees motion and restarts if there is additional motion. The relay only drops out when there is no more motion and the timer expires.

**Switch 2 OFF** - The relay timer starts when the detector sees motion. It drops out when the timer runs out, even if the motion continues. If the motion continues, the timer restarts.

See *Section 5.4* to select the time period.

### 5.3 Relay Mode - Switch 3

**Switch 3 Off** - The relays operate in the Fail Secure Mode. The Fail Secure Mode must be authorized by your Local Authority. See *Section 4.2 Contact Output Wiring*, for the contact information.

**Switch 3 ON** - The relays operate in the Fail Safe Mode. See *Section 4.2 Contact Output Wiring* for the contact information.

### 5.4 Relay Timer - Switches 4, 5, and 6

Setting Switches 4, 5, and 6 determines the amount of time the output relays energize (between 0.5 sec and 64 sec) when motion is detected.

Use the following chart to set the relay timer.

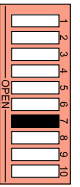
Relay Timer	Switch		
	4	5	6
1/2 Second	OFF	OFF	OFF
1 Second	OFF	OFF	ON
2 Seconds	OFF	ON	OFF
4 Seconds	OFF	ON	ON
8 Seconds	ON	OFF	OFF
16 Seconds	ON	OFF	ON
32 Seconds	ON	ON	OFF
64 Seconds	ON	ON	ON

## 5.5 Signal Processing - Switch 7

The Signal Processing setting determines how sensitive to movement the detector is.

**Switch 7 ON** - High sensitivity (REX Mode).

**Switch 7 OFF** - Low sensitivity (security sensor).



### 5.6 Door Secure Mode - Switches 8, 9, and 10

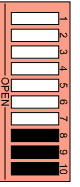
If the detector activates, but the door does not open, the relay drops out after 10 sec. If the detector activates and the door opens and then closes, the relay drops out after 2 sec. This prevents unauthorized people from entering.



**Set the relay timer (see *Section 5.4*) for 16 sec or longer for the Door Secure Mode to operate properly.**

**Switches 8, 9, and 10 ON** - Door Secure Mode is enabled. Wire according to *Section 5.7.5* for door secure.

**Switches 8, 9, and 10 OFF** - Door Secure Mode is disabled.



### 5.7 Remote Input Function - Switches 2, 9, and 10

The Remote Input Function switches determine what the DS160/161 does when the contact attached to Terminal R is closed.

**Keycard Input** - An input to the Terminal R activates the detector. Normally, this is used with a keycard reader outside of the door/building. The internal sounder does not activate when the keycard input is selected. The keycard inputs are affected by Resettable/Non-resettable Mode (Switch 2). The relay remains activated for as long as the keycard input is closed. The timer starts when the keycard input is force activated. If Switch 2 is on, toggling the keycard input again restarts the timer ( the suggested setting). When Switch 2 is off, toggling the keycard input does not restart the timer.

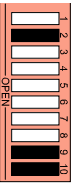
**Direct Sounder Enabled** - The sounder is turned on for long as the contact on Terminal R is open. It does not affect the relay or timer.

**Sequential Logic Input** - The detector only activates if the Sequential Logic Input (Terminal R) is open, or for 10 sec after it closes again. Movement after 10 sec after the contact on Terminal R closes is ignored.

**Monitor Door Contacts** - Door contacts connected to Terminal D monitor if the door is open or closed. If the detector activates and the door is open when 10 sec remain on the timer, the sounder turns on. If the door opens without activating the detector, the sounder turns on. The sounder remains on until the door closes or the detector activates. For this feature to work, set the timer a minimum of 16 sec.

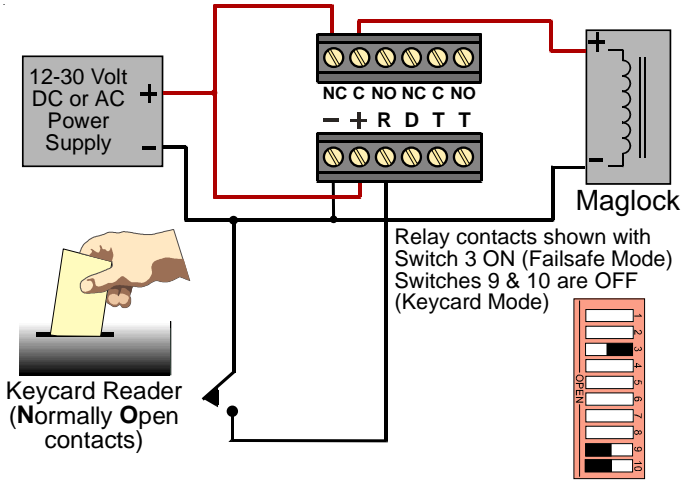
Use the following chart to set the Remote Input function.

Function	Switch	
	9	10
Keycard Input	OFF	OFF
Direct Sounder Enable	OFF	ON
Sequential Logic Input	ON	OFF
Monitor Door Contacts	ON	ON



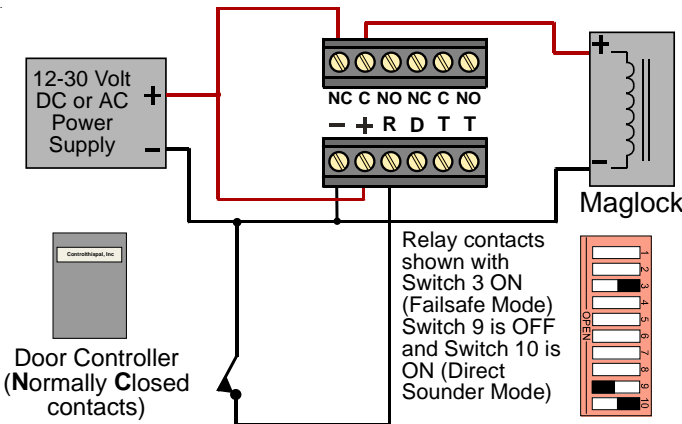
### 5.7.1 Wiring Example: DS160/161 and a Keycard Reader

Normally, this setup is used when a keycard reader is on one side of the door and the DS160/161 is on the other side. Either swiping a keycard or a motion detected by the DS160/161 removes power from the magnetic lock.



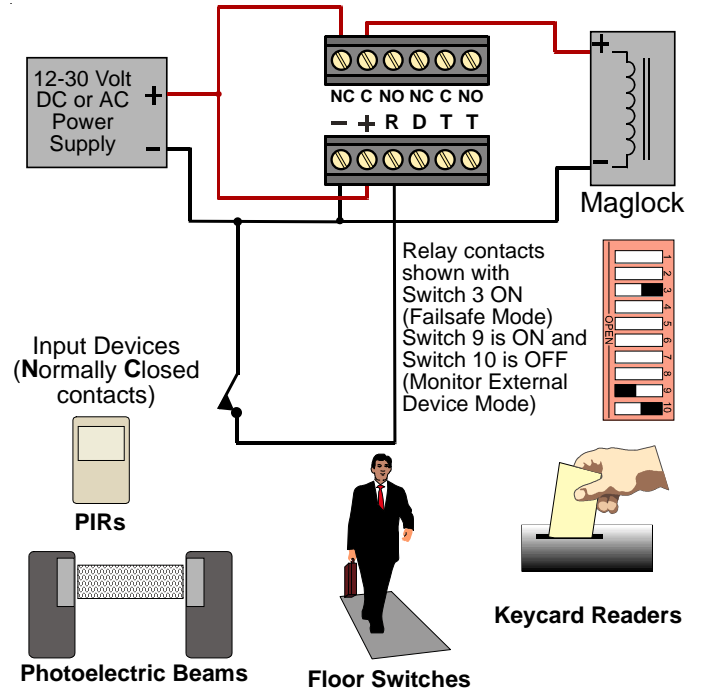
### 5.7.2 Wiring Example: Direct Sounder Enable

The Direct Sounder Enable setting can be used to activate the DS160/161 sounder from a remote contact. The DS160/161 internal sounder remains on as long as the external contacts remain open. The sounder input can come from devices such as a door controller or door contacts. **Turning the sounder on does not affect the relay or relay timer. The direct sounder input does not remove power from the magnetic lock.**



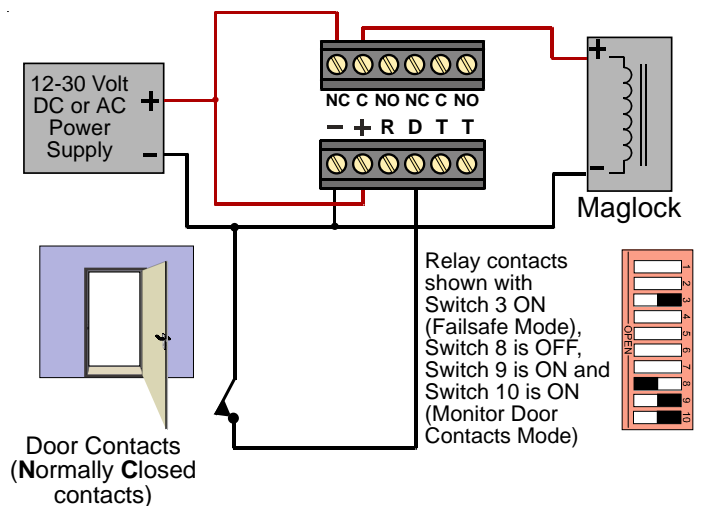
### 5.7.3 Wiring Example: Sequential Logic Input

The detector only activates by motion when the Sequential Logic Input (Terminal R) is open, or for 10 sec after it closes. For example, when a second detector placed before the DS160/161 activates, and for 10 sec after it resets, the DS160/161 activates when it detects motion. Any movement after 10 sec after the contact on Terminal R closes is ignored.



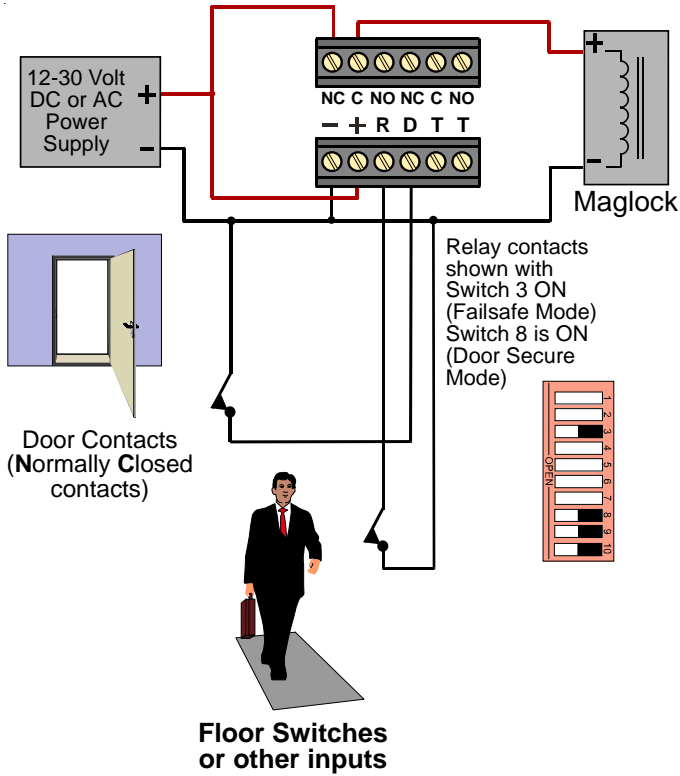
### 5.7.4 Wiring Example: Monitor Door Contacts (First Option)

In the Monitor Door Contacts Mode, a person entering the field of view of the detector activates the relay and timer. Door contacts connected to Terminal D monitor if the door is open or closed. If the relay timer gets to 10 sec or less (only if set up for 16 sec or greater [see Section 5.4]) and the door is still open, the DS160/161 internal sounder activates. The sounder also activates if the door is opened without first activating the detector or keycard input. The sounder remains on until the door closes or by someone moving in the field of view.



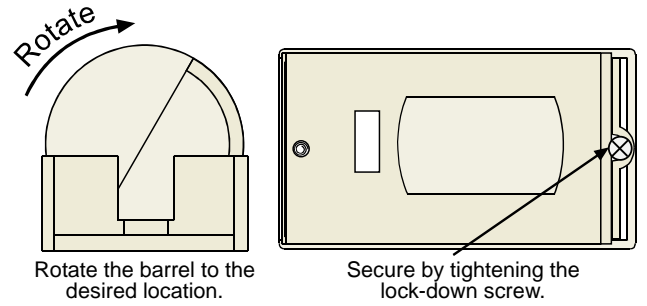
### 5.7.5 Wiring Example: Monitor Door Contacts (Second Option)

If the detector is activated but the door is not opened, the relay drops out after 10 sec. If the detector is activated and the door opens, then closes, the relay drops out after 2 sec. This prevents unauthorized people from entering.

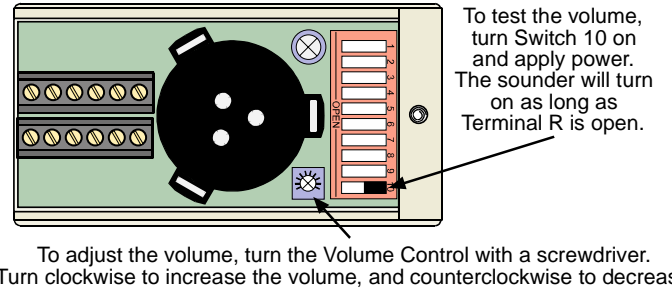


## 6.0 Complete Installation

### 6.1 Secure the detector inside base.

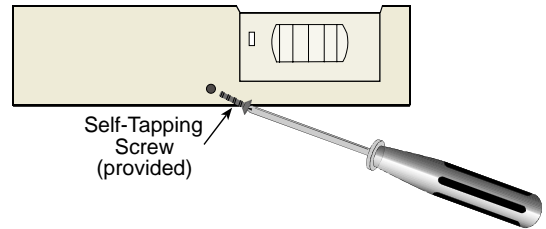


### 6.2 Adjust the sounder volume.



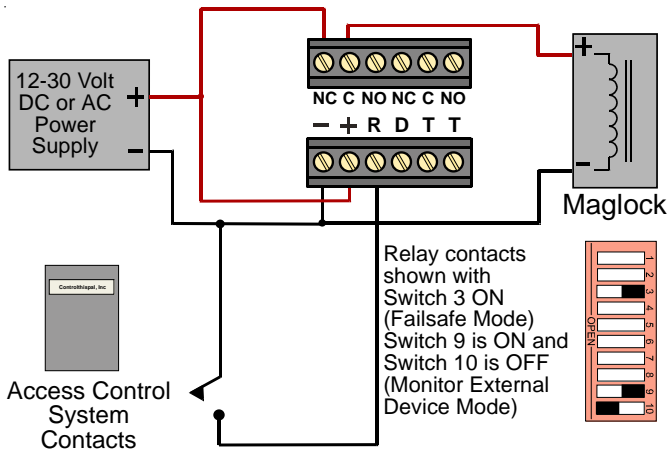
### 6.3 Replace the cover and secure with screw.

Use a drill to remove screw knockout in the cover only, then start screw and tighten to secure.



### 5.7.6 Disabling the Request-To-Exit (Example 1)

The DS160/161 can be disabled by using Terminal R and an external device such as an access control or burglar alarm system. When the contact connected to Terminal R closes, the DS160/161 disables after a 10-sec delay. The DS160/161 returns to normal operation as described in Section 5.7.3 after the contact closes.



**IMPORTANT** The NFPA 101 Life Safety Code® requires secured doors to have a “manual release device that shall result in direct interruption of power to the lock-independent of the access control system electronics”.

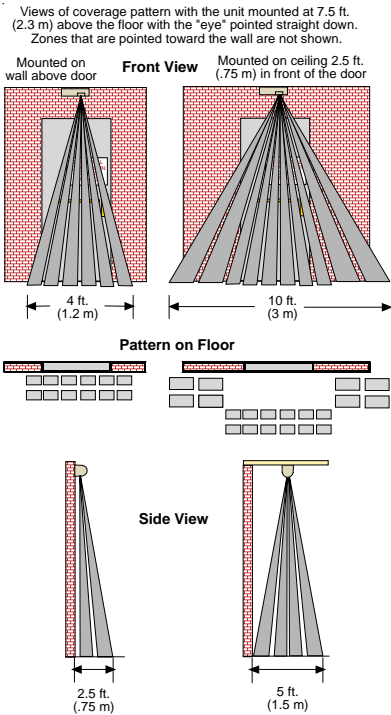
## 7.0 Coverage Patterns

The coverage (detection area) of the DS160/161 varies depending on the mounting height above the floor, angle of the lens, and if the unit is mounted on a wall above the door or on the ceiling.

The unit can also be masked to allow only some parts of the coverage pattern to be active.

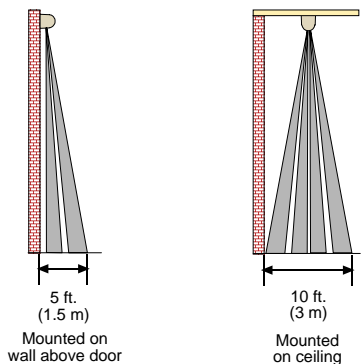
### 7.1 Examples

When the unit is mounted on the wall and the lens is pointed straight down, some detection zones point toward the wall and do not detect movement.



The higher the unit is mounted, the larger the coverage area. Do not mount the DS160/161 more than 15 ft. (4.6 m) above the floor.

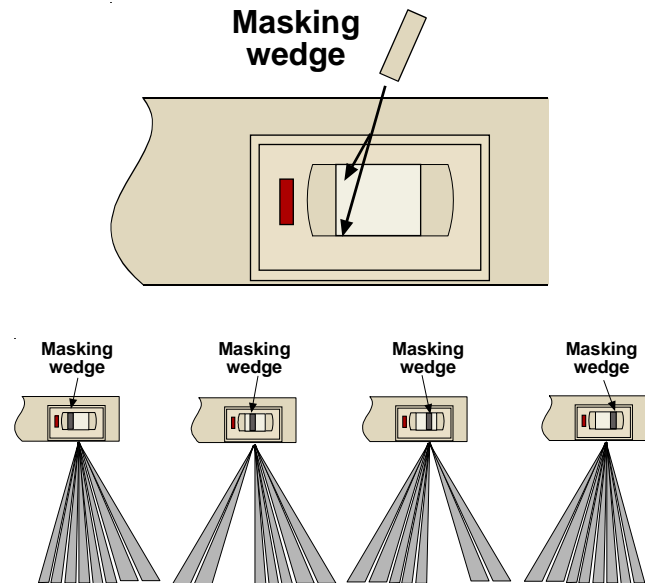
Side view of coverage pattern with the unit mounted at 15 ft. (4.6 m) above the floor with the "eye" pointed straight down



When the DS160/161 is mounted on the wall above the door, you can move the coverage pattern away from the wall by rotating the detector's lens.

## 7.2 Masking

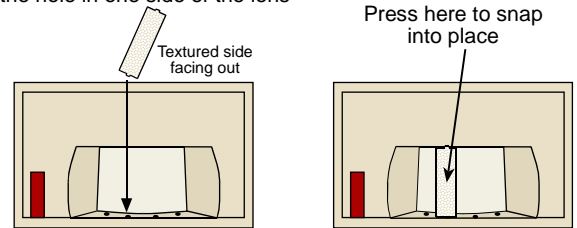
The DS160/161 is supplied with three masking wedges used to disable any part of the coverage pattern. Each wedge covers approximately 25% of the coverage pattern.



Insert a masking wedge by placing the bottom peg in first. Then press on the center of the wedge until it snaps into place.

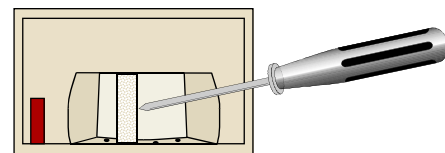
Select a section of the lens to mask  
Insert the tab on the end of the wedge  
in the hole in one side of the lens

Press here to snap  
into place

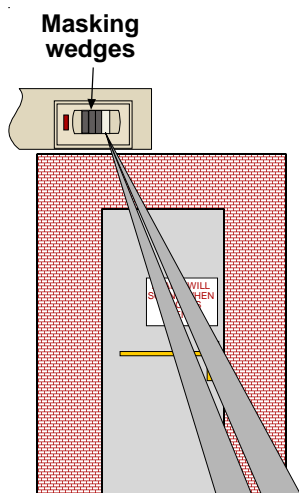


Remove a wedge by placing the tip of a small screwdriver behind the wedge and prying it up. Do not scratch the lens when removing the wedge.

Insert screwdriver behind wedge  
Pry up to remove



Up to three masking wedges can be used if you only want to detect in a very small area, such as around a doorknob or crash bar.



**IMPORTANT**

The coverage pattern depends on how high the DS160/161 is mounted, location of the unit and the position of the detector lens. If you want a setup as shown above, mount the DS160/161 just above the door, on the hinge side, with the lens pointed down and slightly out.

