1.0 Description

The DS160/161 is a passive-infrared (PIR) detector designed for Request to Exit (REX) interior applications.

The DS160/161 is UL Listed as an access control device under the UL 294 Standard and is listed for Class I for UL Canada under ULC-S319 when it is connected to a UL approved access control system. For C-UL listed installation applications, the REX detector shall be connected to ULC-S319 listed compatible devices (i.e. control units, power supply and locks).

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.

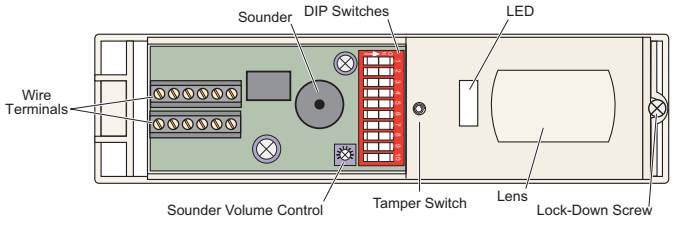
The DS160/161 uses Motion Analyzer II signal processing to help prevent false activation due to environmental conditions. The relay output consists of two Form “C” contacts that can be adjusted to latch from approximately 0.5 to 64 sec. The latch time features two modes of operation, resettable (where 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 provides one set of relay contacts specially protected from EMF (voltage) spikes caused by connecting to inductive loads.

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.

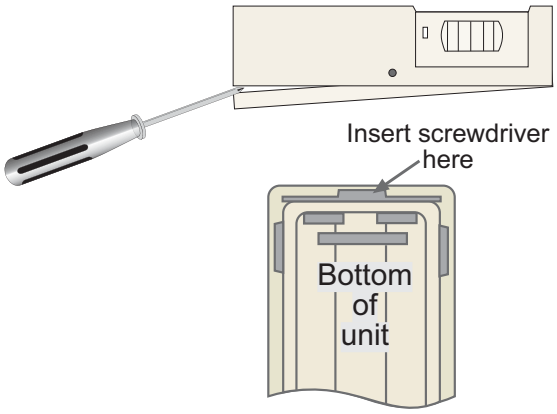
Figure 1: Detector Component Locations



2.0 Installation

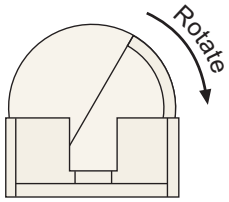
1. Remove the cover using a small flat blade screwdriver.

Figure 2: Cover Removal



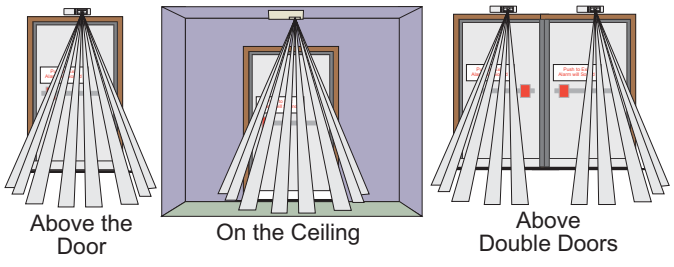
2. Rotate the detector clockwise to remove it from the base.

Figure 3: Detector Removal



3. Select a mounting location.

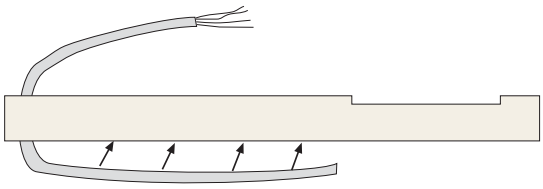
Figure 4: Mounting Locations



Before you mount the unit, review *Section 6.0 Coverage Patterns* on page 6 for more information on the placement and location of the DS160/161.

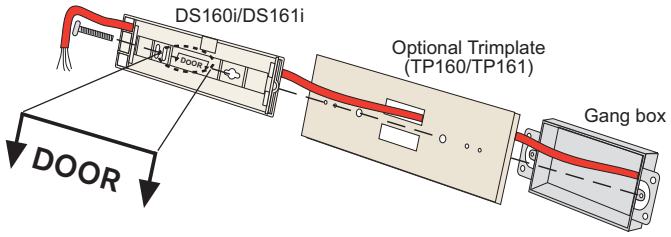
4. Route the wiring through the base before mounting the base to the wall or ceiling. Refer to *Step 5* on page 2 when using the optional trim plate (TP160 or TP161).

Figure 5: Wire Routing



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.

Figure 6: Optional Trimplate



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

3.0 Wiring

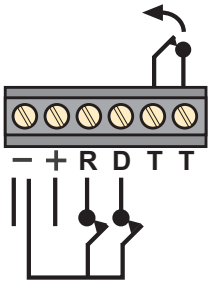
3.1 Power, Remote Input, Door Contacts, and Tamper

Refer to *Table 1* to wire the detector.

Table 1: Terminal Labels and Descriptions

Label	Description
-	Connect to the negative side of the power supply.
+	Connect to the positive side of the power supply. The voltage must be between 12-30 Volts DC or AC.
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). Refer to *Figure 7* and *Section 3.3.5 Sequential Logic Input* on page 4 for more information.
D	Terminal D allows the detector to monitor door contacts. Refer to *Sections 3.3.6* and *3.3.7* on page 4 for more information. If used, these contacts must be Normally Closed (NC) door contacts. **Do not share these contacts with any alarm systems.**
T	Normally Closed (NC) tamper contacts.

Figure 7: Sequential Logic Input (SLI)

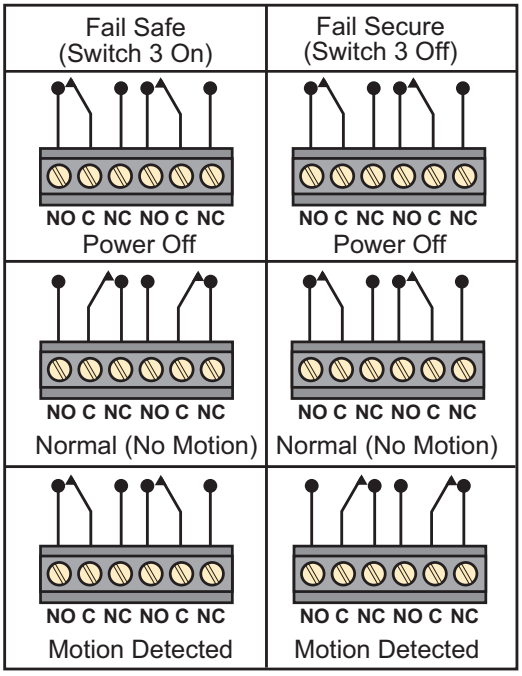


Before wiring the unit, review *Section 3.3 Wiring Examples* on page 2 for more information on the wiring of the DS160/161.

3.2 Contact Output Wiring

The normal settings of the contact outputs change depending on the setting of the Relay Mode Switch (S3). Refer to *Section 4.3 Relay Mode (DIP Switch 3)* on page 5.

Figure 8: Contact Output Wiring

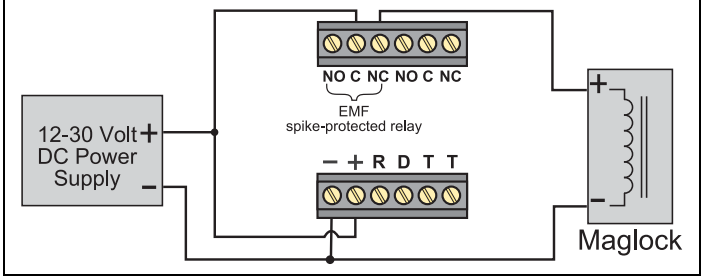


3.3 Wiring Examples

3.3.1 Basic Connection

The basic connection 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.

Figure 9: Basic Connection



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3.3.2 Spike Protection

- **EMF (Voltage) Spike-Protected Relay:** Use this relay when connecting inductive loads to the detector. This relay protects the detector from inductive loads that might deliver damaging EMF spikes. No additional spike protection is needed.
- **Non-EMF (Voltage) Spike-Protected Relay:** This relay is best used for non-inductive loads. When connecting an inductive load that is not spike-protected, such as a magnetic door lock, to the detector, use either a bridge rectifier (such as a KBL01) or a diode (such as a 1N4007). Refer to *Figure 10* and *Figure 11*.

UL listed magnetic locks typically are already EMF spike-protected, and therefore do not require the bridge rectifier or diode as shown in *Figure 10* and *Figure 11*. Refer to the magnetic lock's documentation for more information.

Figure 10: Diode Connection

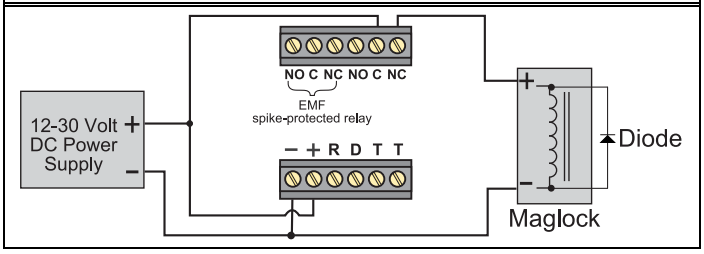
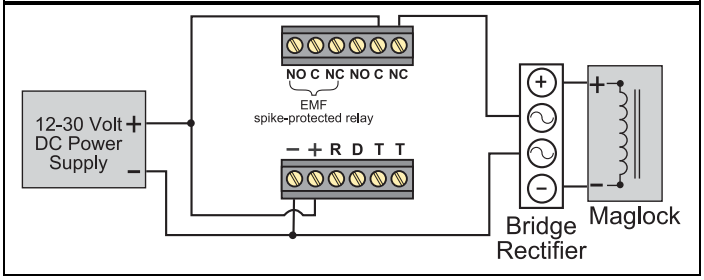


Figure 11: Bridge Rectifier Connection



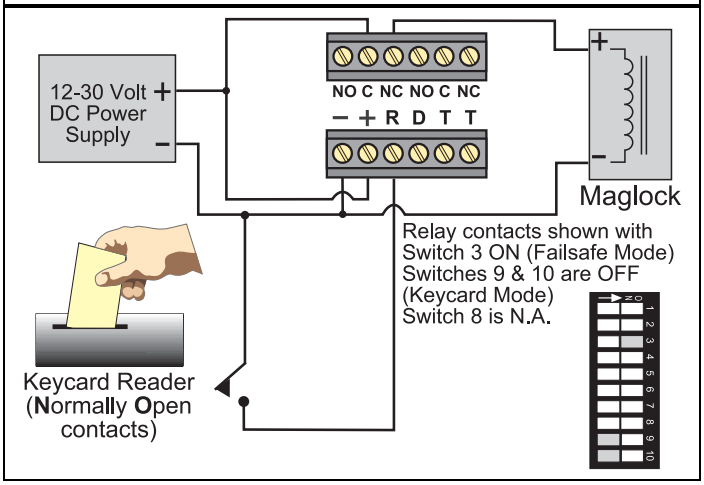
Failure to spike-protect the detector can shorten the life of the relay contacts.

3.3.3 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.

For DIP switch settings, refer to *Section 4.7 Remote Input Function (DIP Switches 2, 9, and 10)* on page 6.

Figure 12: Keycard Reader Configuration

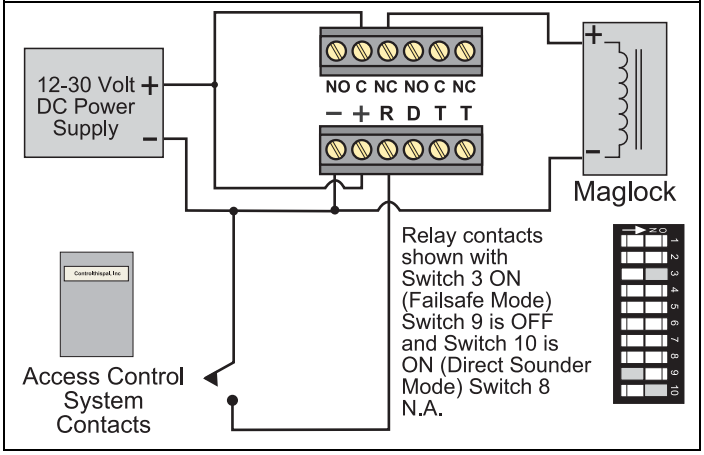


3.3.4 Direct Sounder Enable

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.

Turning the sounder on does not affect the relay or relay timer. The direct sounder input does not remove power from the magnetic lock.

Figure 13: Direct Sounder Enable Configuration



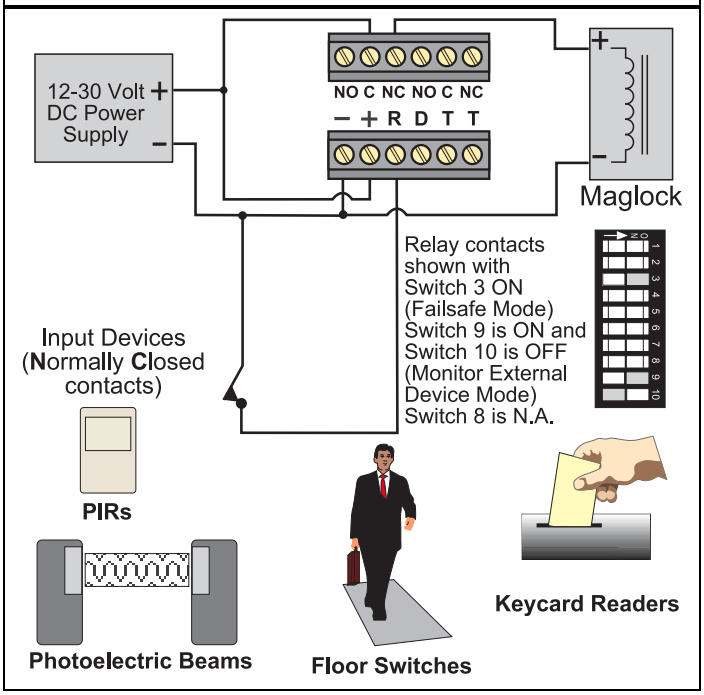
To ensure the best sound quality from the sounder, tighten all unused terminals on the terminal strip.

3.3.5 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.

For DIP switch settings, refer to *Section 4.7 Remote Input Function (DIP Switches 2, 9, and 10)* on page 6.

Figure 14: Sequential Logic Input Configuration

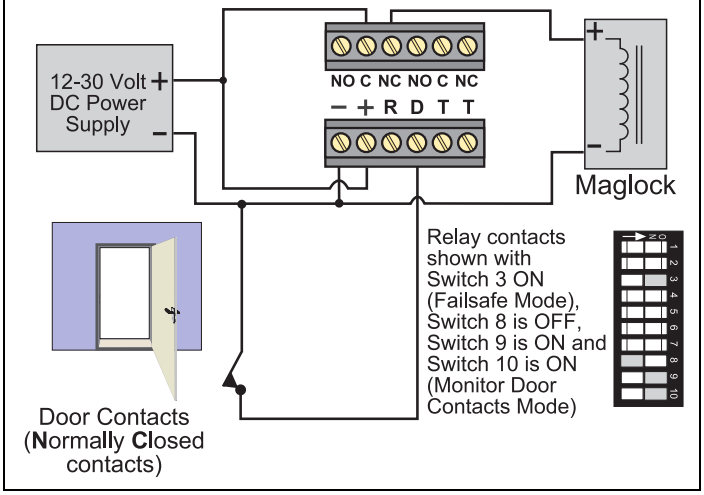


3.3.6 Door Monitor Contacts (First Option)

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 door is held open and the relay timer is in the last 10 seconds of the latch time, the sounder will turn on. In order for this to work correctly, the latch time must be set for 16 seconds or greater (refer to section 4.3 on page 5.) 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.

For DIP switch settings, refer to *Section 4.7 Remote Input Function (DIP Switches 2, 9, and 10)* on page 6.

Figure 15: Door Monitor Contacts Configuration (First Option)



To ensure the best sound quality from the sounder, tighten all unused terminals on the terminal strip.

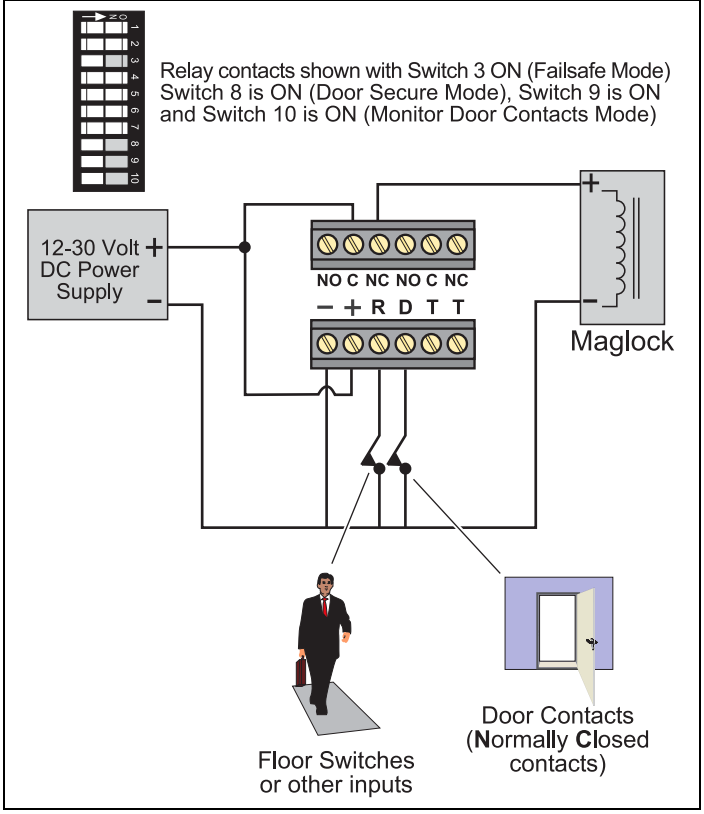
3.3.7 Door Monitor Contacts (Second Option)

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.

In this mode, the REX can be activated by either someone walking in its field of view or from a remote device if using the R input. If using the R input to activate the detector, switch 2 should be set in the ON position (resettable mode).

For DIP switch settings, refer to *Section 4.7 Remote Input Function (DIP Switches 2, 9, and 10)* on page 6.

Figure 16: Door Monitor Contacts Configuration (Second Option)

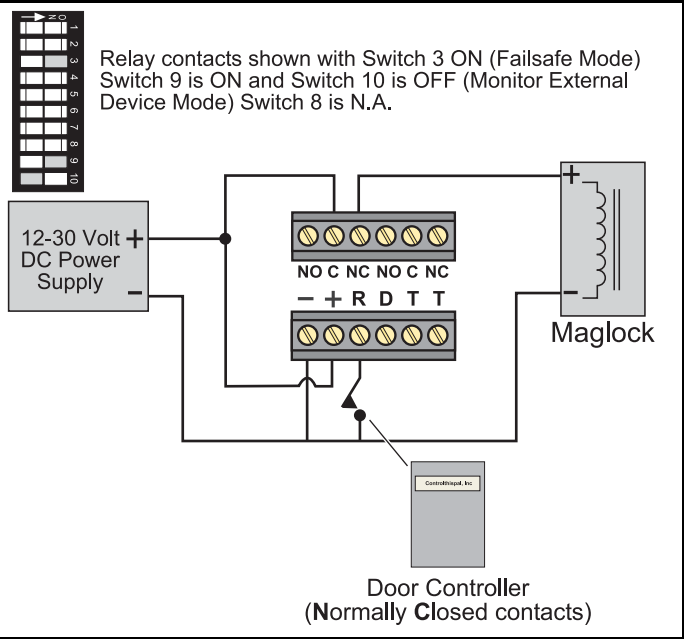


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3.3.8 Disabling the Request-to-Exit

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 3.3.5 Sequential Logic Input*, on page 4, after the contact closes.

Figure 17: Disabling the Request-to-Exit

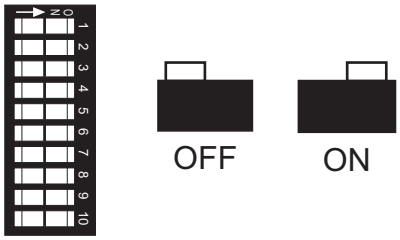


The NFPA 101 Life Safety Code requires secured doors to have a "manual release device that shall result in direct interruption of power to the lock - independent of the access control system electronics".

4.0 Switch Settings

You can change the switch settings by sliding the switch to the ON or OFF position. Refer to *Figure 18*.

Figure 18: DIP Switch Positions



4.1 LED Operation (DIP Switch 1)

- **ON:** LED operates normally when motion is detected.
- **OFF:** LED is turned off.

When LED is enabled, it will flash on and off when first powered up. Once the flashing LED stops, the REX is ready to be used.

4.2 Timer Reset Mode (DIP 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.
- **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.

Refer to *Section 4.3 Relay Mode (DIP Switch 3)* to select the time period.

4.3 Relay Mode (DIP Switch 3)

- **ON:** The relays operate in the Fail Safe Mode. Refer to *Section 3.2 Contact Output Wiring*, on page 2, for more information.
- **OFF:** The relays operate in the Fail Secure Mode. In the secure mode, the REX shall be installed in a manner that does not impair the intended operation of panic hardware used in conjunction with the REX detector. The Fail Secure Mode must be authorized by your Local Authority Having Jurisdiction (AHJ). Refer to *Section 3.2 Contact Output Wiring*, on page 2, for more information.

4.4 Relay Timer (DIP 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.

Refer to *Table 2* to set the relay timer.

Table 2: Relay Timer DIP Switch Settings

Time (sec)	Switch 4	Switch 5	Switch 6
0.5 (Default)	OFF	OFF	OFF
1	OFF	OFF	**ON**
2	OFF	**ON**	OFF
4	OFF	**ON**	**ON**
8	**ON**	OFF	OFF
16	**ON**	OFF	**ON**
32	**ON**	**ON**	OFF
64	**ON**	**ON**	**ON**

4.5 Signal Processing (DIP Switch 7)

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

- **ON:** High sensitivity (REX Mode)
- **OFF:** Low sensitivity (security sensor)

4.6 Door Secure Mode (DIP 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.

To ensure that the Door Secure Mode operates as expected, set the relay timer (DIP Switches 4, 5, and 6) to 16 sec or longer.

- **ON:** If DIP Switches 8, 9, and 10 are all ON, Door Secure Mode is enabled. Wire according to the wiring example shown in *Section 3.3.7 Door Monitor Contacts (Second Option)* on page 4 for door secure.
- **OFF:** If DIP Switches 8, 9, and 10 are all OFF, Door Secure Mode is disabled.

4.7 Remote Input Function (DIP 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.

Refer to *Table 3* to set the remote input function.

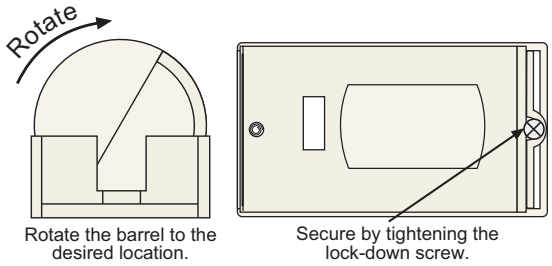
Table 3: Remote Input Function DIP Switch Settings

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

5.0 Complete the Installation

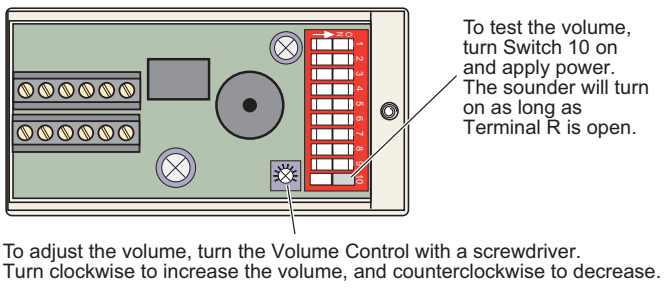
1. Secure the detector inside the base.

Figure 19: Secure the Detector



2. Adjust the sounder volume.

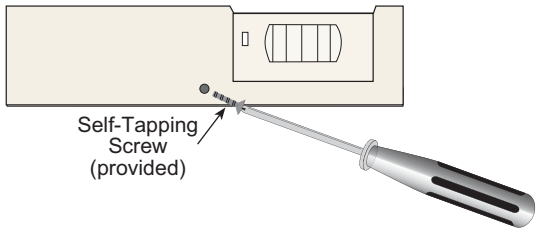
Figure 20: Sounder Volume



To ensure the best sound quality from the sounder, tighten all unused terminals on the terminal strip.

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

Figure 21: Replace and Secure Cover



6.0 Coverage Patterns

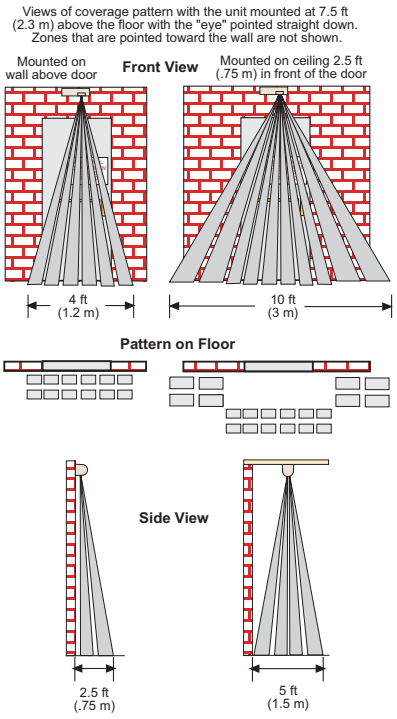
The coverage (detection area) of the DS160/161 varies depending on the mounting height above the floor, angle of the lens, and if the unit is mounted on a wall above the door or on the ceiling.

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

6.1 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.

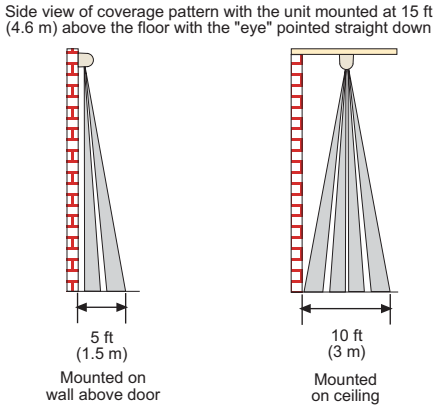
Figure 22: Coverage Pattern Example 1



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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.

Figure 23: Coverage Pattern Example 2

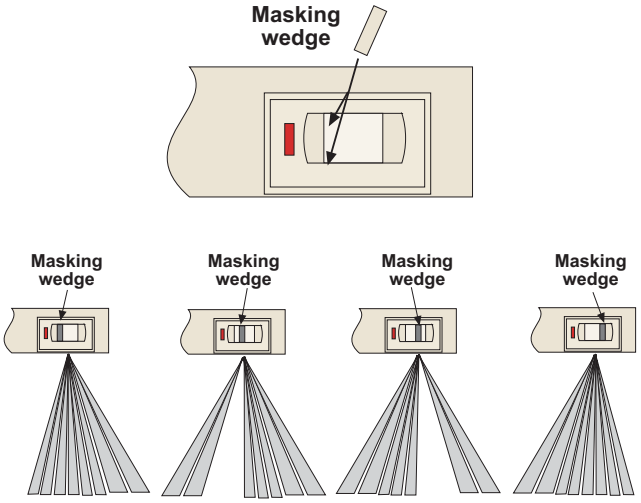


When the DS160/161 is mounted on the wall above the door, you can move the coverage pattern away from the wall by rotating the detector's lens.

6.2 Masking

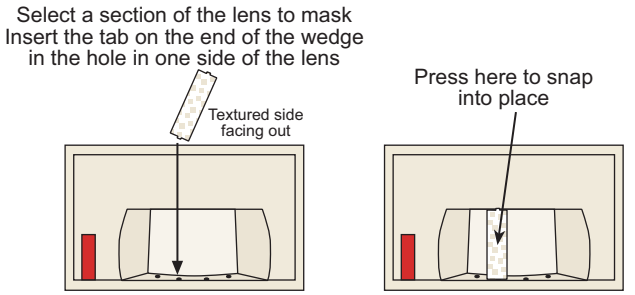
The DS160/161 is supplied with three masking wedges used to disable any part of the coverage pattern. Each wedge covers approximately 25% of the coverage pattern.

Figure 24: Masking Options



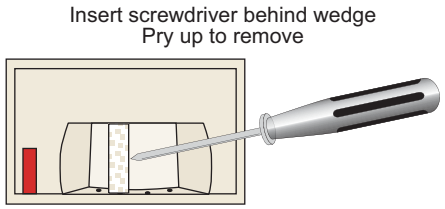
Insert a masking wedge by placing the bottom peg in first. Then press on the center of the wedge until it snaps into place.

Figure 25: Insert a Masking Wedge



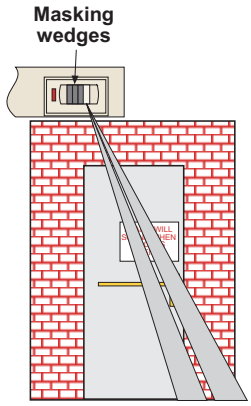
Remove a wedge by placing the tip of a small screwdriver behind the wedge and prying it up. Do not scratch the lens when removing the wedge.

Figure 26: Remove a Masking Wedge



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.

Figure 27: Masking Wedge Usage



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.

7.0 Specifications

7.1 Specifications

Input Power	12 to 30 VDC or VAC
Relay	Two Form “C” contact sets rated for 1 A each at 30 VDC or VAC max for resistive loads.
Terminal Strip	26-14 AWG
Sounder	Adjustable up to 70 dB at a distance of 10 ft (3 m).
Temperature	-20°F to +120°F (-29°C to +49°C). For UL and ULC Listed installations, the temperature range is +32°F to +120°F (0°C to +49°C).
Humidity	0-95% non-condensing
Dimensions (HxWxD)	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)

Current Draw for Fail Safe Mode (DIP Switch 3 ON)				
State	**12 VDC**	**30 VDC**	**12 VAC**	**30 VAC**
No Motion	15 mA	19 mA	29 mA	38 mA
Alarm	23 mA	26 mA	42 mA	51 mA
Alarm and Sounder	65 mA	79 mA	101 mA	147 mA

Current Draw for Fail Secure Mode (DIP Switch 3 OFF)				
State	**12 VDC**	**30 VDC**	**12 VAC**	**30 VAC**
No Motion	5 mA	9 mA	9 mA	20 mA
Alarm	33 mA	37 mA	40 mA	73 mA
Alarm and Sounder	73 mA	95 mA	95 mA	164 mA

7.2 Regulatory Notes

The unit shall be installed in accordance with National Electrical Code ANSI/NFPA 70 and part 1 of the Canadian Electrical Code CSA C22.1, Safety Standard for Electrical Installations.

The DS160/161 is not intended to be configured to function as a stand-alone access control system. Connection to listed (ALVY and/or ALVY7) compatible control units and locking devices shall be required.

It is intended to be used as an access control Request-to-Exit device only and not for security function; as such, the DS160 should not be connected to a burglar alarm system.

The Request-to-Exit device shall not be connected directly to a keypad for access control function. Connection to a listed compatible access control system is required.

The DS160/161 was not investigated by UL for special locking arrangements in accordance with NFPA 101.

The Request-to-Exit detector was tested for UL compliance while powered by an XF 1640EE transformer made by AmSeco.

8.0 Reading Bosch Security Systems, Inc. Product Date Codes

For Product Date Code Information, refer to the Bosch Security Systems, Inc. Web site at: http://www.boschsecurity.com/datecodes.