

Intrusion Sensor
Application Notebook



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Preface

This is the GE *Intrusion Sensor Application Notebook*. This document includes a product overview, installation guidelines, and applications for the following products:

- glassbreak/shock sensors
- motion sensors
- magnetic contacts

Although the installation and tips in this document have been developed by engineers and installers, GE disclaims any liability for injury or losses due to this information. This document does not supersede codes, ordinances, or regulatory standards. Refer to each sensor's manual for detailed installation instructions. GE reserves the right to change product specifications at any time.

To use this document effectively, you should have the following minimum qualifications:

- a basic knowledge of security and life safety sensors; and
- a basic knowledge of sensor installation requirements

The most current versions of this and related documentation may be found on our website. Refer to [Online publication library](#) on page 170 for instructions on accessing our online publication library.

Note: A qualified service person, complying with all applicable codes, should perform all required hardware installation.

Conventions used in this document

The following conventions are used in this document:

| | |
|--------------------|---|
| Bold | Menu items and buttons. |
| <i>Italic</i> | Emphasis of an instruction or point; special terms. File names, path names, windows, panes, tabs, fields, variables, and other GUI elements. Titles of books and various documents. |
| <i>Blue italic</i> | (Electronic version.) Hyperlinks to cross-references, related topics, and URL addresses. |
| Monospace | Text that displays on the computer screen. Programming or coding sequences. |

Safety terms and symbols

These terms may appear in this manual:



CAUTION: *Cautions* identify conditions or practices that may result in damage to the equipment or other property.



WARNING: *Warnings* identify conditions or practices that could result in equipment damage or serious personal injury.

Chapter 1 Glassbreak/shock sensors

This chapter provides information on glassbreak and shock sensors including an overview of acoustic sensors, shock sensors, and wireless-compatible sensors.

Applications in this chapter include different types of windows and glass doors in a variety of rooms and buildings as well as applications for metal enclosures such as filing cabinets and safes.

Product overview

There are two basic types of glassbreak sensors: acoustic and shock. Acoustic sensors *listen* for the unique sound of glass breaking, while shock sensors *feel* the wave generated by glass breaking.

Acoustic sensors

Acoustic glassbreak sensors are an important part of an effective perimeter detection system. It is very important to choose the right sensor for a particular application or environment. GE offers you a variety of choices for virtually any glassbreak application.

ShatterPro 3, the premier technology. ShatterPro 3 acoustic glassbreak sensors give you a potent combination of range, reliability, flexibility, and ease of use. They offer a 25 ft. (7.6 m) radius range for extended glassbreak detection. Using patented pattern recognition technology, the sensor is designed to eliminate common false alarms and improve detection of framed glass breaks. It does this by *listening* for the unique sound of glass breaking at numerous points across the entire frequency spectrum, not just at one or two points.

ShatterPro Plus, 24 hours a day. The ShatterPro Plus is an acoustic glassbreak sensor combined with a passive infrared motion sensor (PIR). The sensor can detect break-ins through glass while eliminating occupant-generated false alarms.

Table 1 shows product comparison information of acoustic sensors to help you choose the right product.

Table 1. Acoustic sensors

| Model | Range to window | Automatic test | End-user verification | Pattern recognition technology | Occupied area perimeter loop | 24-hour application/ built-in PIR sensor |
|------------------------|-----------------------------|----------------|-----------------------|--------------------------------|------------------------------|---|
| ShatterPro 3 | | | | | | |
| 58121NT | 25 ft. (7.6 m) | Yes | Yes | Yes | Yes | No |
| R5812NT | 25 ft. (7.6 m) | Yes | Yes | Yes | Yes | No |
| 5812-RND | 25 ft. (7.6 m) | Yes | Yes | Yes | Yes | No |
| 2000 | 25 ft. (7.6 m) | Yes | No | No (3 x 3 technology) | Yes | No |
| ShatterPro II | | | | | | |
| 5820A | 25 ft. (7.6 m) | Yes | Yes | Yes | Yes | No |
| 584503* | 20 ft. (6.1 m) | Yes | No | Yes | Yes | No |
| 24-hour sensors | | | | | | |
| 5885 ShatterPro Plus | 12 to 15 ft. (3.7 to 4.6 m) | Yes | Yes | Yes | Yes | Yes |
| 5600 | 10 ft. (3.1 m) | No | No | No | Yes | Yes |

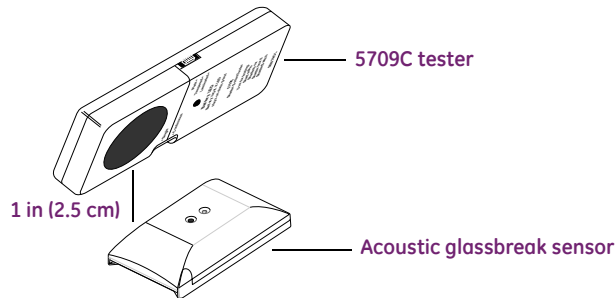
*Also available as 5845-ID, Point ID, NX488, and 60-873-95

Acoustic sensor testing with the 5709C

To verify sensor range and operation for acoustic sensors (for 2000 models, see [Acoustic sensor testing with the GT-2 tester](#) on page 7), use the 5709C tester and do the following:

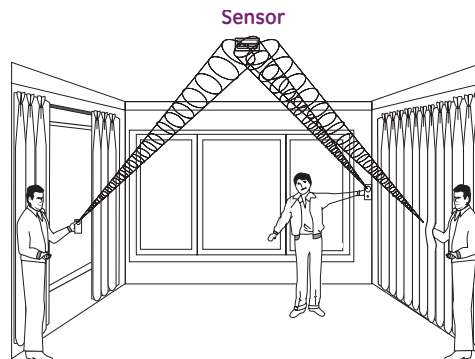
1. Set the tester to the appropriate glass type. Use the *tempered* setting if you are unsure about the glass type.
2. Hold the tester 1 in. (2.5 cm) from the sensor (*Figure 1*) and activate the sensor.

Figure 1. Hand-held tester



3. Hold the tester near the surface of the glass to be protected and aim the speaker at the sensor. Be sure the tester is at the point on the glass furthest from the sensor. If closed drapes or curtains are present, hold the test behind them (*Figure 2*).

Figure 2. Testing with drapes



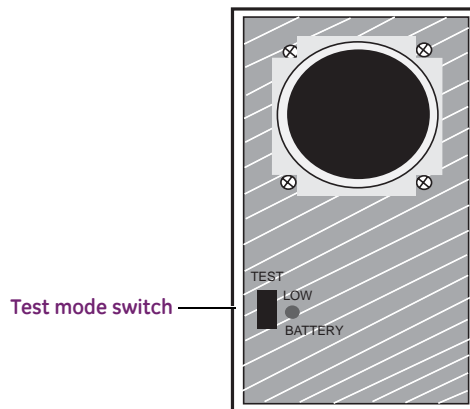
4. Press the test button on the tester. The sensor should indicate the glass is within detection range of the sensor. If not, move the sensor and retest.

Acoustic sensor testing with the GT-2 tester

To verify sensor range and operation for 2000 model acoustic sensors, use the GT-2 tester and do the following:

1. Remove the cover from the glassbreak sensor.
2. To put the sensor in test mode, press the test button on the sensor two times. The sensor LEDs will blink slowly. (See the sensor installation instructions for test button location).
3. For a **low frequency test**, tap the wall or ceiling near the sensor. The sensor LEDs should stay lit during the alarm event.
4. For a **high frequency test**, press the test button on the sensor two times. The sensor LEDs should blink rapidly. Place the cover on the sensor. Place the GT-2 tester behind the curtains of the window to be protected (see *Figure 2* on page 6) and press the test mode switch on the tester (*Figure 3*). The sensor LEDs should remain lit during the alarm event.
5. The sensor will time out of test mode in 15 minutes.

Figure 3. GT-2 tester



Shock sensors

Breaking glass produces specific shock frequencies that travel through glass and window frames. When shock sensors *feel* the wave generated by breaking glass, they signal an alarm. These sensors mount directly on the glass or the frame and give you a product virtually immune to false alarms. Shock sensors can operate on windows with heavy drapes or shutters and they help prevent break-in attempts by providing a visual deterrent to intruders.

Most GE shock sensors are solid-state, with no mechanical part to wear out or fail. We incorporate a piezo transducer specifically tuned to the shock frequency of glass breaking, providing both excellent detection and false alarm immunity. Use *Table 2* to choose the right shock sensor for a particular application or environment.

Table 2. Shock sensors

| Model | Coverage | Mounting site | Powered | Indicating LED | Reed switch |
|-------|--------------------------------------|-----------------------------|------------------|----------------|-------------|
| 5150 | 10 ft. (3.1 m) | Glass | Self | No | No |
| 5600 | 10 ft. (3.1 m) | Frame | Wired | Yes | No |
| 5620 | 10 ft. (3.1 m) | Frame | Wired | Yes | Yes |
| 5414 | 10 ft. (3.1 m) | Glass or frame | Self | Yes | No |
| 5415A | 10 ft. (3.1 m) | Glass or frame | Self | Yes | Yes |
| GS600 | Varies | Glass, frame, wall, or roof | Wired (analyzer) | No | No |
| GS611 | Varies | Glass, frame, wall, or roof | Wired (analyzer) | No | Yes |
| 5402 | 2 x 4 x 1 ft. (0.6 x 1.2 x 0.3 m) | Metal enclosure | Self | No | No |
| 5422 | 2 x 4 x 1 ft. (0.6 x 1.2 x 0.3 m) | Metal enclosure | Wired | Yes | No |

Shock sensor testing

To test shock sensors, rap the protected glass with the handle of a screwdriver in the corner farthest from the sensor. This should trip the sensor. If the sensor does not trip, you may need to move the sensor, or use more than one sensor in the application.

Wireless compatible sensors

Use *Table 3* to choose the right wireless compatible acoustic/shock sensor for a particular environment or application.

Table 3. *Wireless compatible acoustic/shock sensors*

| Model | Coverage | Mounting site | LED | Reed switch |
|-----------|----------------|-----------------|-----|-------------|
| 5845 | 25 ft. (7.6 m) | Omnidirectional | Yes | No |
| 5645 | 10 ft. (3.1 m) | Frame | Yes | Yes |
| 5150 | 10 ft. (3.1 m) | Glass | No | No |
| 5812NT | 5 ft. (1.5 m) | Frame | No | No |
| 60-873-05 | | | | |
| NX488 | | | | |

Installation guidelines

When using glassbreak sensors, follow these guidelines:

- Glass must be in good repair (not cracked) and securely mounted in its frame.
- A bullet or BB going through the glass will probably not be detected. The glassbreak incident must leave a fist-sized hole before a sensor is expected to detect the incident.
- Sensors are designed to work on glass that is a minimum of 1 square foot (0.3 x 0.3 m).
- Acoustic glassbreak sensors are designed to detect breaks in framed windows from the outside in.

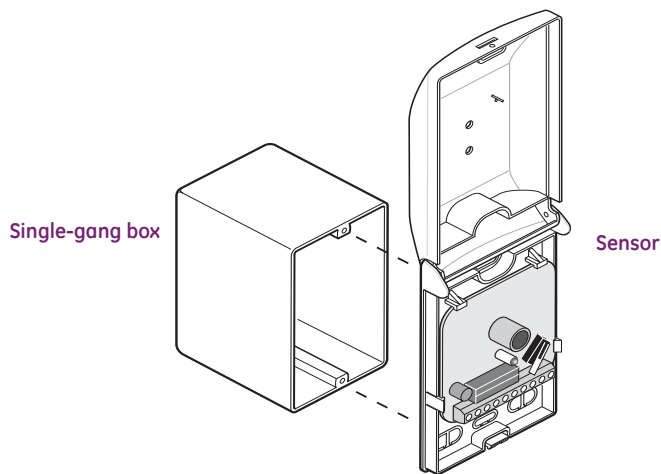
Prewire installation

Application. New construction applications offer the opportunity to prewire an acoustic glassbreak sensor, creating an attractive, unobtrusive installation. The 5812NT and 2100 sensors, installed on a single-gang box, are especially appropriate for prewire installations.

Installation. Open the sensor and screw the back of the sensor onto the single-gang box as shown in *Figure 4*.

Recommended products. 5812NT, 2100

Figure 4. Prewire 5812NT installation



Inconspicuous installations

Application. Sometimes customers want their security system to be as inconspicuous as possible. This is especially true in most residential, office foyers, executive offices, and upscale retail store installations. The 5820A Recessed ShatterPro II sensor is the least obtrusive acoustic glassbreak sensor available. When installed, the sensor is little larger than a quarter and is rarely noticed. Another option is to hide a 5600 ShatterPoint sensor behind curtains or blinds.

Installation. The 5820A (*Figure 5*) can protect an entire room. Sensor range is 25 ft. (7.6 m) to the bottom of the glass in a 360-degree pattern. Mount the sensor on the ceiling, the opposite wall, or an adjoining wall (*Figure 6* on page 12). To install the sensor, do the following:

1. Drill a 1 in. (2.5 cm) diameter hole through the drywall or ceiling tile in the desired location.
2. Insert the 1 in. (2.5 cm) sleeve into the hole and insert the sensor into the sleeve. Use the trim ring, if necessary, to cover any irregularities in the drywall hole.

The 5600 is a shorter range sensor that protects up to 10 ft. (3.1 m) of glass. For a hidden appearance, mount the sensor on the window frame behind curtains or blinds (*Figure 7* on page 12). To protect windows that open, use a sensor with a built-in magnetic contact.

Recommended products. 5820A, 5600

Figure 5. 5820A installation

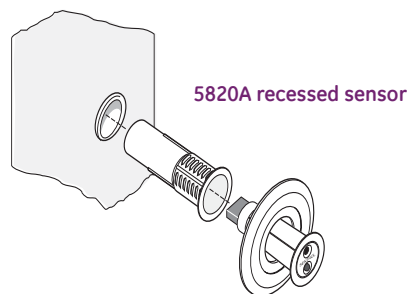
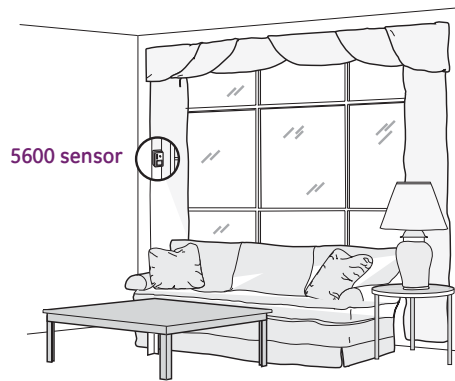


Figure 6. Wall-mounted Recessed ShatterPro II



Figure 7. ShatterPoint mounted behind the curtains



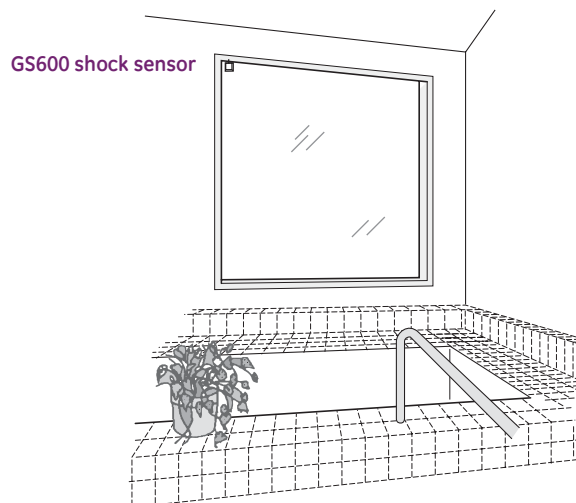
Bathroom windows

Application. Bathrooms are challenging environments for glassbreak sensors. Humidity can be very high and bathrooms are acoustically live rooms. These attributes produce a greater potential for false alarms when acoustic sensors are used. Shock sensors are a better choice and have fewer problems than acoustic sensors in high humidity environments such as bathrooms.

Installation. For best false alarm immunity in bathrooms, use the hermetically-sealed GS600 shock sensor with 12 ft. (4 m) of range mounted on the glass (*Figure 8*). To protect windows that open, use the frame-mounted GS611 shock sensor with built-in magnetic contact. Both sensors work with the GS614 analyzer.

Recommended products. GS600, GS611

Figure 8. Bathroom window



Skylights

Application. Skylights can be a vulnerable entry point to many homes and businesses. To protect skylights made of Plexiglas or other types of plastic, use a shock sensor. To protect glass skylights, use an acoustic glassbreak sensor.

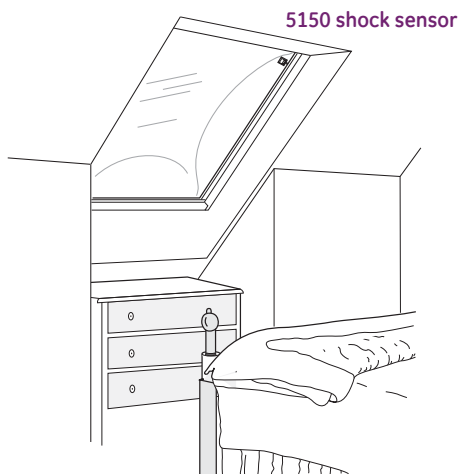
Installation. To protect **plastic skylights**, mount a 5150 shock sensor in a corner of the skylight 1 in. (2.5 cm) in from the frame (*Figure 9*). If more than 3.5 ft. (1.1 m) of range is required, mount two sensors in opposite corners.

The plastic material in the skylight will absorb much of the shock energy from a break and the range of a shock sensor on plastic is typically 50 percent less than the range on glass. For example, a shock sensor with a 7 ft. (2.1 m) range on glass would generally have a 3.5 ft. (1.1 m) range on a plastic skylight. See [Shock sensor testing](#) on page 8.

To protect **glass skylights**, mount a 5600 sensor on the ceiling or on any wall within range of the skylight or use a GS600 sensor mounted on the frame. To protect vented skylights, use the GS611 with built-in magnetic contact.

Recommended products. 5150, 5600, GS600, GS611

Figure 9. Skylights



Windows with curtains and blinds

Application. Many homes and offices have windows with curtains or blinds. The 5150 shock sensor can protect windows regardless of the type of window covering present. With proper placement, acoustic sensors can also protect windows with blinds and light drapes.

Installation. Mount shock sensors in the corner of the glass, 1 in. (2.5 cm) from the frame. Shock sensors are not affected by curtains or blinds. See [Shock sensor testing](#) on page 8.

You can also mount a 5600 sensor on the window frame behind curtains or blinds to protect one or more windows ([Figure 10](#)). The sensor will protect a 10 ft. (3.1 m) area, although the range may be reduced if the window coverings are touching the glass. For windows that open, use a sensor with a built-in magnetic contact.

For a larger range on windows with venetian or vertical blinds, mount a 5812NT ShatterPro 3 or a 5820A Recessed ShatterPro II on the ceiling ([Figure 11](#) on page 16), adjoining wall, or a wall opposite the glass you want to protect. See [Acoustic sensor testing with the 5709C](#) on page 6.

Recommended products. 5150, 5600, 5812NT, 5820A

Figure 10. Sensor mounted behind curtains

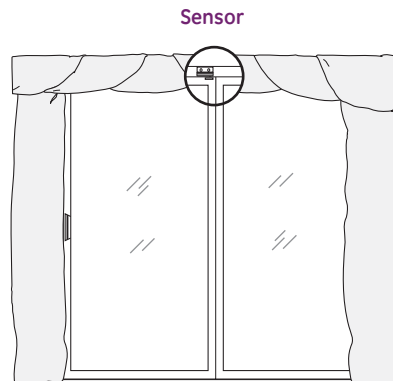
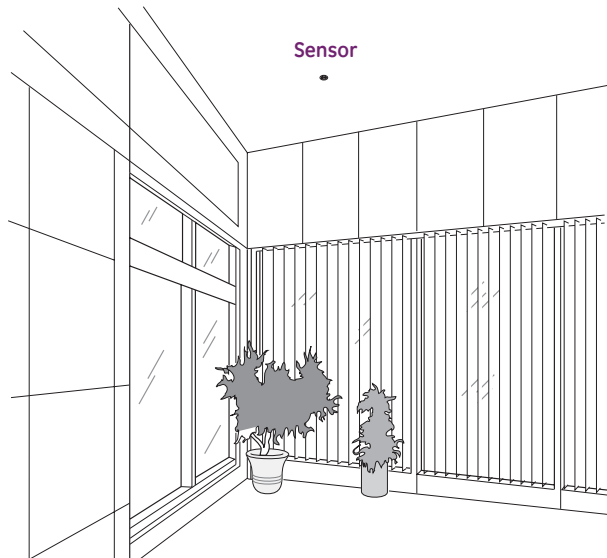


Figure 11. Recessed sensor on ceiling



Single window with wireless sensor

Application. A wireless-compatible shock sensor can be used for economical protection of rooms with a single window. For glass doors or windows that open, use a wireless compatible sensor with a built-in magnetic contact.

Installation. Mount the 5150 shock sensor on the glass, 1 in. (2.5 cm) in from the corner. Range is a 7 ft. (2.1 m) radius out from the sensor.

The 564503 frame-mounted shock sensor can protect two fixed windows in the same window opening (*Figure 12*). Range for the sensor is up to 10 ft. (3.1 m). Frame mounting affects the sensor range, so it is essential to test the sensor (see *Shock sensor testing* on page 8). The sensor includes a built-in magnetic contact to protect windows that open.

These sensors must be connected to a transmitter.

Note: The 564503 Wireless ShatterPoint shares the battery of the transmitter. Its current draw of up to 15 microamps may reduce transmitter battery life by up to 50 percent. Since other devices are likely to need battery replacement before the sensor, this is rarely a problem.

Recommended products. 5150, 564503

Figure 12. Wireless sensor on single window



Multiple windows with wireless sensors

Application. To economically protect multiple windows use one transmitter and a 584503 Wireless ShatterPro acoustic sensor. The sensor combines excellent false alarm immunity and consistent detection with wireless compatibility and has a coverage radius of 20 ft. (6.1 m) if mounted on a ceiling. A single sensor can typically protect an entire room.

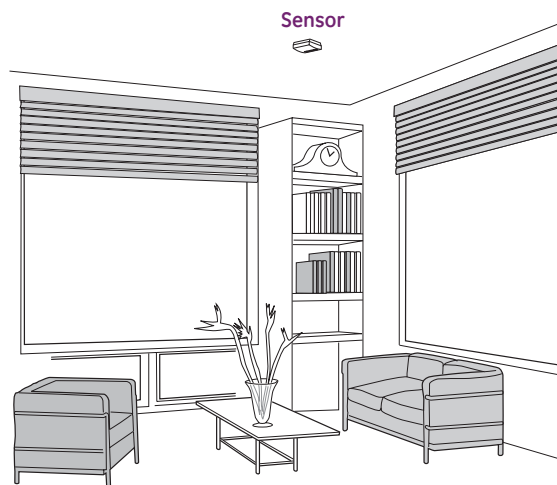
Installation. To hide the transmitter and provide an integrated look, mount the transmitter inside the back box of the 584503 sensor. The transmitter can also be mounted next to the sensor on the bracket (included with the sensor).

Note: The sensor shares the transmitter battery, which may reduce battery life by up to 50 percent. Since other devices are likely to need battery replacement before the sensor, this is rarely a problem.

Position the 584503 sensor a minimum of 4 ft. (1.2 m) and a maximum of 20 ft. (6.1 m) from the glass (*Figure 13*). See [Acoustic sensor testing with the 5709C](#) on page 6

Recommended products. 584503, NX488, 60-873-95

Figure 13. Multiple window with wireless sensors



French doors and small windows

Application. Older homes often have windows with small panes and French doors. Small windows have unique properties when they break. The sound output may be low since there is not much glass to break and the glass may pop out of the window frame when hit instead of breaking. Detection in both cases can be difficult.

Modern French doors are usually two large panes of glass with false dividers between them. The dividers have little effect from a detection standpoint you do not need to take any special precautions.

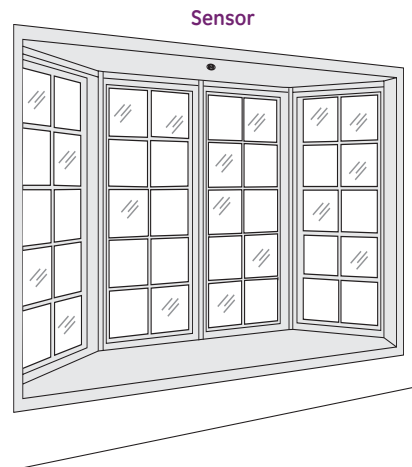
Installation. To protect small windows with an acoustic sensor, use a 5600 ShatterPoint mounted within 4 ft. (1.2 m) of the glass. See [Acoustic sensor testing with the 5709C](#) on page 6.

For more consistent detection, use a GS600 frame-mounted shock sensor. Often several sensors will be needed to protect a frame of multiple windows. Make sure you test the sensor (see [Shock sensor testing](#) on page 8) and use additional sensors as needed.

Minimum glass size for glassbreak sensors is 1 square foot (0.3 x 0.3 m).

Recommended products. 5600, GS600

Figure 14. Small window protection



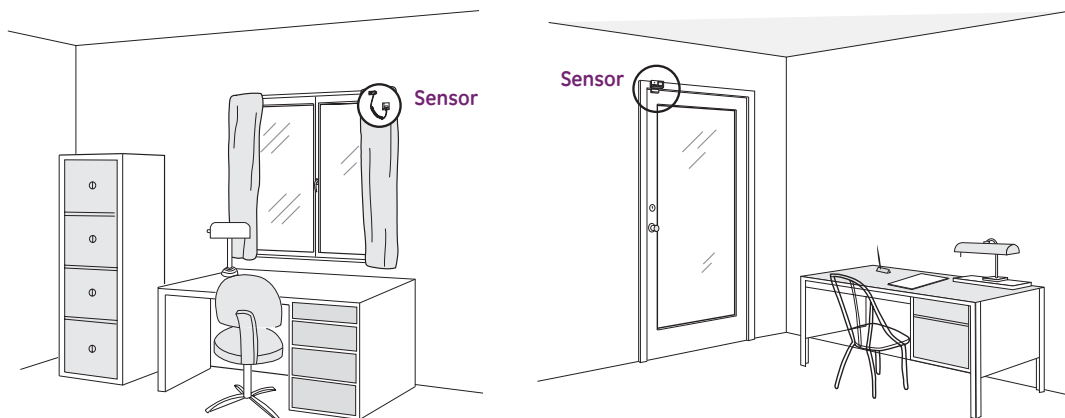
Glass doors and windows that open

Application. Running wires from the glass to the frame can make glass door protection a challenge. A shock or acoustic sensor with a built-in magnetic contact can make both glassbreak and forced-open protection possible.

Installation. To protect glass doors and windows that open, use a 5150C or GS611 shock sensor, or a 5620 shock/acoustic sensor. The 5150C sensor mounts on a corner of the frame and ships with a 3 ft. (0.9 m) coil cord that reaches to a termination on the frame (*Figure 15*). The 5620 and GS611 sensors have built-in magnetic contacts and mount on the frame. Mount the sensor's magnet on the door or movable window and mount the sensor on the frame as close as possible to the magnet. See [Shock sensor testing](#) on page 8.

Recommended products. 5150C, 5620, GS611

Figure 15. Protection for windows and glass doors that open



Insulated glass

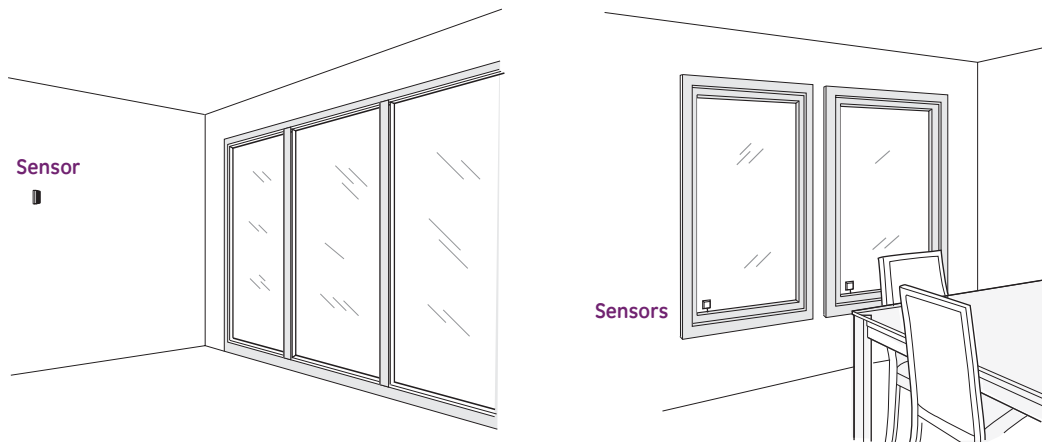
Application. Many modern buildings use windows that contain two panes of glass divided by an air space for added insulation. You can protect this insulated glass with shock and acoustic glassbreak sensors. As long as the inside pane of the glass breaks, the sensor will detect the break. It is possible to break the outside pane of glass without setting off an alarm.

Installation. Installation for insulated windows is the same as for other windows. Mount 5150 or GS600 shock sensors in the corner of the glass or GS611 shock sensors on the frame. Mount 5600, 5620 or 5812NT acoustic sensors so that the protected glass is within the sensor's range (*Figure 16*).

See [Acoustic sensor testing with the 5709C](#) on page 6 and [Shock sensor testing](#) on page 8.

Recommended products. 5150, 5600, 5620, 5812NT, GS600, GS611

Figure 16. Insulated glass protection



Windows with film

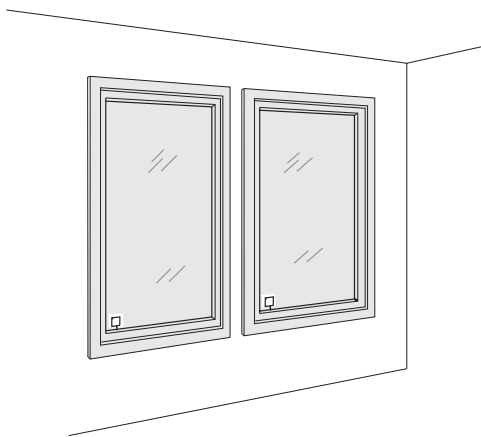
Application. Film is applied to windows for a variety of reasons. In sunny climates some commercial windows have a tinting film attached to the glass. Some commercial windows have a plastic film attached to the glass to prevent shattering from impact or bullets. This *armor-coated* glass can be found in bank drive-up windows, in retail stores, and in other vulnerable buildings.

Installation. Tinted film does not affect shock sensors. To mount shock sensors on the glass, cut away the film where the sensor will be placed so that the mounting tape is affixed to the glass itself and not to the film (*Figure 17*).

Armor-coated glass may reduce shock sensor range. Thoroughly test shock sensors (see [Shock sensor testing](#) on page 8) to see if additional sensors are needed.

Recommended products. Any GE shock sensor, as long as the installation guidelines are followed.

Figure 17. Tinted film on windows



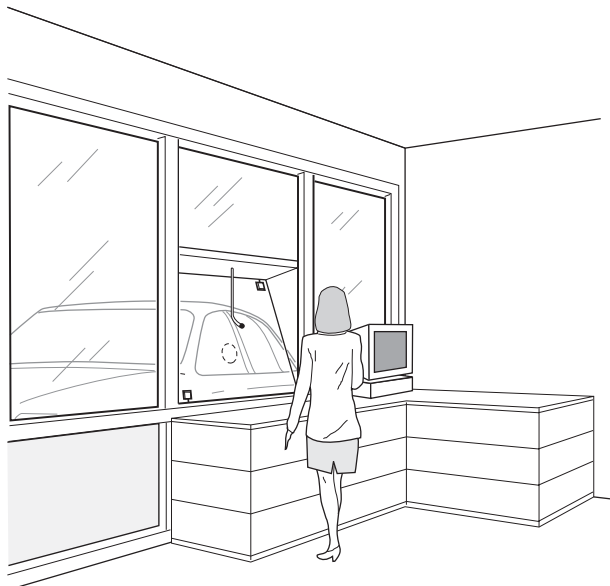
Thick glass

Application. Some installations may have glass thicker than the 0.25 in. (0.6 cm) maximum thickness rating of acoustic and shock sensors. Since thick glass absorbs much of the shock energy from a break, it is more of a challenge for glassbreak detection. Shock sensors can be used on thick glass if they are thoroughly tested (multiple sensors may be needed). ShatterPro sensors are not designed to protect thick glass and should not be used for this application.

Installation. Use the 5150 or GS600 shock sensor and mount the sensor on the glass approximately 1 in. (2.5 cm) in from the corner (*Figure 18*). See [Shock sensor testing](#) on page 8 and add multiple sensors as needed.

Recommended products. 5150, GS600

Figure 18. Thick glass protection



Large rooms

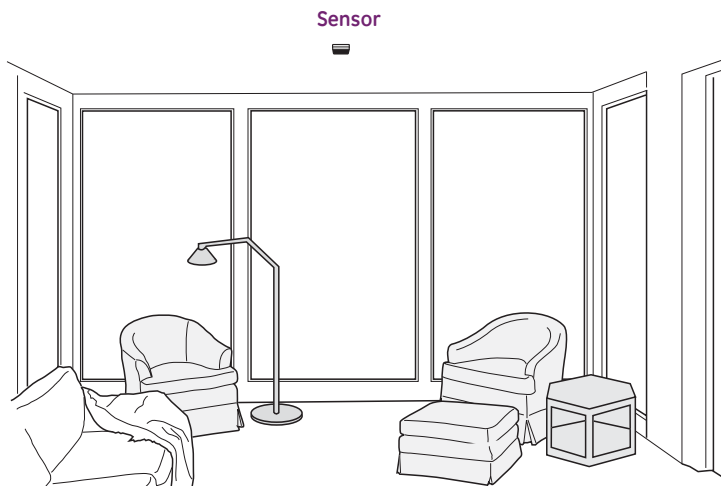
Application. Most large rooms have several windows, often widely spaced from each other. The most economical way to protect large rooms with multiple windows is with a single, long-range acoustic sensor. However, be careful to match sensor range to room size. If the sensor range extends beyond the room boundaries it is vulnerable to false alarms.

Installation. Use a 5812NT ShatterPro 3 or a 5802A Recessed ShatterPro II to protect large glass areas and up to four walls of glass. To protect glass on more than one wall, mount the sensor on the ceiling (*Figure 19*). Make sure that all protected glass is within the sensor's coverage pattern. The distance from the bottom of the window to the sensor must be no more than the sensor's maximum range.

To protect one wall of glass, mount the sensor on the opposite wall (if all protected glass is within the sensor's range). See [Acoustic sensor testing with the 5709C](#) on page 6.

Recommended products. 5812NT, 5820A, 2000

Figure 19. Large rooms with multiple windows



Small rooms

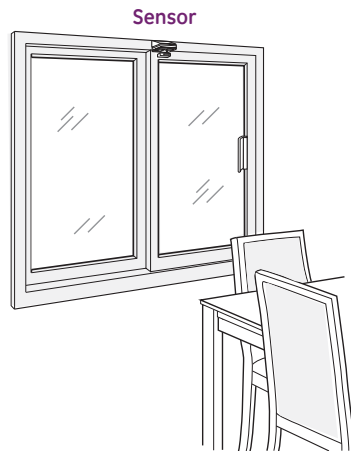
Application. False alarms are more likely in small, acoustically live rooms such as small kitchens, glass entry airlocks, stairwells, small glass offices, and utility rooms. Shock sensors offer the best false alarm immunity and are the most economical if there is only one window to protect. If an acoustic sensor is preferred, you must match the range of the sensor with the size of the protected room and glass to minimize false alarms.

Installation. In small room applications, follow these guidelines:

- To protect a single window in a small room, use a 5150 shock sensor mounted on the glass or a 5414 or GS600 sensor mounted on the frame.
- For windows that open, use a 5415A or GS611 sensor with a built-in magnetic contact (*Figure 20*). See [Shock sensor testing](#) on page 8.
- To protect multiple windows in a small room, use a 5600 ShatterPoint.
- Do not install an acoustic sensor with a large range in a small room. For example, a sensor with 25 ft. (7.5 m) diameter range in a 10 ft. (3.1 m) room increases the risk of false alarms. See [Acoustic sensor testing with the 5709C](#) on page 6.

Recommended products. 5150, 5414, 5415A, GS600, GS611, 5600

Figure 20. Small rooms



Occupied areas

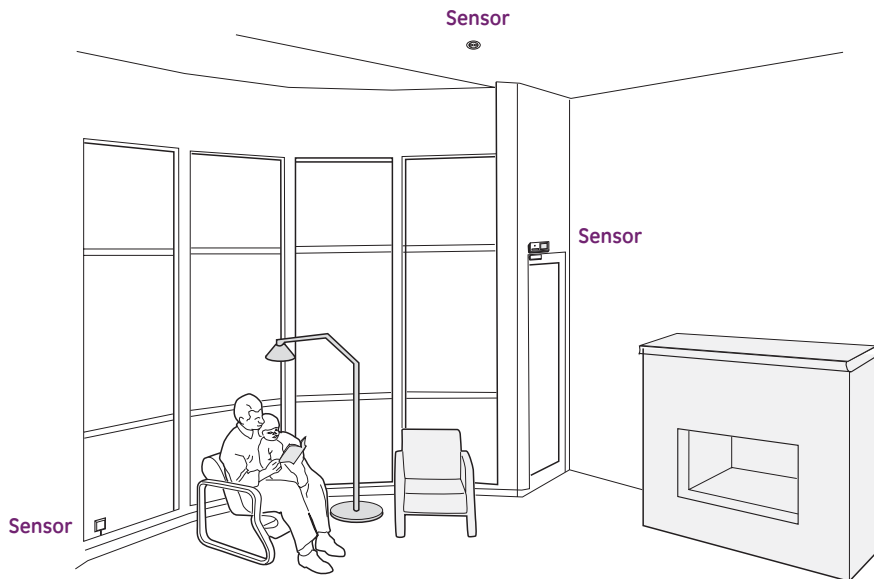
Application. Occupied areas can be protected either on a perimeter loop or on a 24-hour loop. On a perimeter loop, sensors are armed when the magnetic contacts on doors are armed. On a 24-hour loop, sensors are armed continuously.

Installation. For **24-hour loop** protection, mount a 5150 shock sensor on the glass 1 in. (2.5 cm) in from the corner, or frame-mount a 5600 shock sensor with the correct sensitivity setting (see [Shock sensor testing](#) on page 8). The 5885 ShatterPro Plus acoustic sensor can also be used for 24-hour loop applications.

For **perimeter loop** protection, use a 5600 for glass areas smaller than 10 ft. (3.1 m). For larger glass areas, use a 5812NT, 2000, or a 5820A recessed acoustic sensor. See [Acoustic sensor testing with the 5709C](#) on page 6.

Recommended products. For 24-hour loop protection: 5150, 5600, 5885, GS600. For perimeter loop protection: 5812NT, 5820A, 2000.

Figure 21. Occupied areas



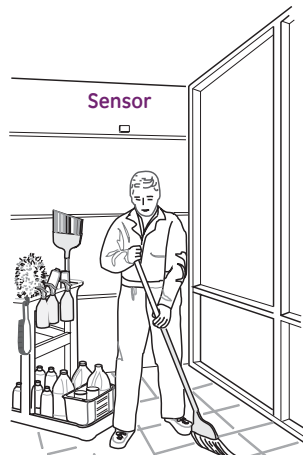
Rooms with cleaning crews

Application. Often the perimeter loop of the security system is armed when the cleaning crews are in a building. If acoustic sensors are armed, they will be listening to all sounds, including those made by night cleaning crews. Acoustic sensors are most likely to false alarm to multiple sounds. The cleaning crews produce a combination of sounds from vacuums, floor polishers, and clattering garbage cans, all of which combine to cause false alarms for some sensors in some applications.

Installation. The 5150, 5600, and GS600 shock sensors provide the best false alarm immunity for a building when it is occupied. However, multiple shock sensors can be economically impractical for applications with large numbers of windows and may not be an option in applications where appearance is important. When multiple shock sensors will not work for your application, use the 5885 ShatterPro Plus acoustic sensor that combines a passive infrared sensor with a glassbreak sensor (*Figure 22*). When an occupant enters the field of view of the PIR, the glassbreak sensor is disabled for 70 seconds. This prevents false alarms due to loud noises such as vacuums or floor buffers. The 5885 makes 24-hour acoustic applications possible.

Recommended products. 5150, 5600, GS600, 5885

Figure 22. Cleaning crew protection



Storefront windows

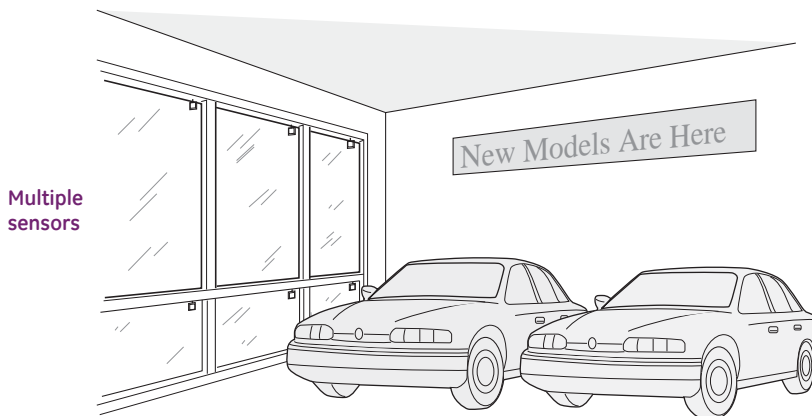
Application. Merchants often want glassbreak protection on their front windows, in order to have the alarm sound as soon as the glass breaks. While this does not prevent *smash and grab* losses, it helps prevent burglars from actually entering the building.

Installation. To protect storefront windows, 5150, 5620, or GS600 shock sensors are the best choice. The sensors mount on the glass or frame and are visible from the outside to deter burglars before the glass is broken. Shock sensors are also less likely to be set off by street noise or rolling metal shutters than acoustic sensors. However, multiple shock sensors may be required to cover the same glass area that one acoustic sensor can protect (*Figure 23*). See [Shock sensor testing](#) on page 8.

To successfully use acoustic sensors to protect storefront glass, store personnel must be trained to keep the sensor's line-of-sight clear. If the sensor's *vision* is blocked by store displays or furniture, the sensor is unlikely to detect a break-in. In stores without window displays, mount a ShatterPro 3 or 5820A ShatterPro II on the ceiling. In stores with window displays, Mount a 5600 ShatterPoint directly above the glass. See [Acoustic sensor testing with the 5709C](#) on page 6.

Recommended products. 5150, GS600, 5600, 5620, 5812, 2000, 5820A

Figure 23. Storefront glass protection



Roll-up metal shutters

Application. Retail shops in high-risk areas will often have roll-up metal shutters to protect glass windows at night. The clanging and banging sounds of these shutters can cause acoustic sensors to have false alarms. False alarms can also be caused by people rattling the shutters by or other sources of vibration.

Installation. GS600 or 5150 shock sensors provide the best false alarm immunity on windows with roll-up shutters. The sensors mount on the glass (*Figure 24*) and are easily visible from the outside to deter break-ins. See [Shock sensor testing](#) on page 8.

If acoustic sensors are preferred, use the 5812, 2000, or 5820A sensors. Mount the sensor away from the street and roll-up shutters and within specified range limits. See [Acoustic sensor testing with the 5709C](#) on page 6.

Recommended products. 5150, GS600, 5812, 5820A, 2000

Figure 24. Store windows with roll-up metal shutter protection



Glass display and jewelry cases

Application. Museum curators and retailers with glass display and jewelry cases often want glassbreak sensors inside their cases. Both shock and acoustic sensors can be used in this application.

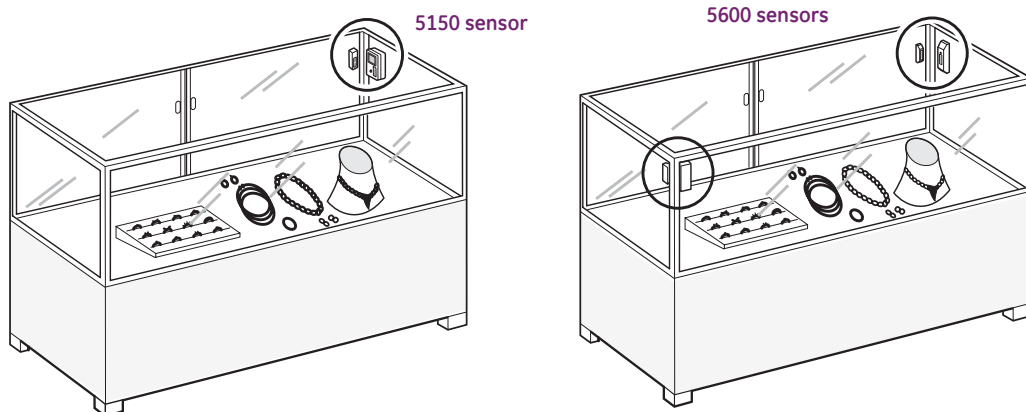
Acoustic sensors sealed within a glass display case are extremely *live* and are vulnerable to false alarms if the case is accidentally struck by keys or other metal objects. For this reason, acoustic sensors are only appropriate for applications where the sensor will only be armed when the premises are not occupied. For occupied or 24-hour protection, use shock sensors.

Installation. The 5150 and GS600 shock sensors mount directly on the glass and are the best choice if only one piece of glass needs to be protected. For protecting multiple glass walls in the case, use one or more frame-mounted 5600 sensors. Use a 5620 sensor with built-in magnetic contact to detect a forced opening. To prevent sensor tampering, you must place the sensors inside the case (*Figure 18*). See [Shock sensor testing](#) on page 8 and use multiple sensors as needed.

If using multiple shock sensors is not a viable solution, use a single acoustic sensor with a limited range. We do not recommend the ShatterPro sensors for this application.

Recommended products. 5150, 5600, 5620, GS600

Figure 25. Glass case protection



Metal enclosures

Application. The 5402 and 5422 shock sensors eliminate the need for costly lined boxes or placement of security system controls in a vault for UL mercantile applications. To meet UL requirements, a tamper switch is required.

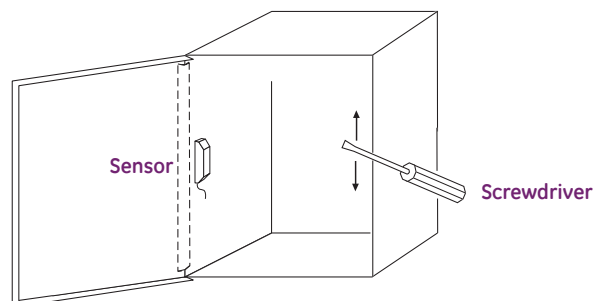
Installation. To protect metal enclosures, use the self-powered 5402 or 4-wire 5422 shock sensor. Mount the sensor on the side wall on or near the hinge. If the hinge runs the length of the side, center the sensor vertically (*Figure 26*). If the enclosure has multiple hinges, mount the sensor next to the hinge nearest the middle of the enclosure.

To mount the sensor, do the following:

1. Peel back the paper from one side of the adhesive tape pad and press it onto the back of the sensor. The tape pad must be flat against the plastic case.
2. Use a 50/50 solution of isopropyl alcohol/water to clean the mounting area. Dry the mounting area, then peel the backing paper from the tape pad and press the sensor against the metal. The tape will fully adhere within 24 hours.
3. Wire the sensor (if applicable) to the loop according to wiring instructions.
4. To test the sensor, use the metal shaft of a medium-size screwdriver to lightly scrape back and forth against the edge of the metal enclosure farthest from the sensor (*Figure 26*). If the sensor does not respond, a second sensor may be required.

Recommended products. 5402, 5422

Figure 26. Metal enclosure



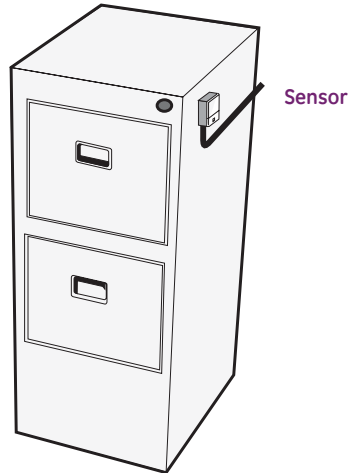
Filing cabinets

Application. Filing cabinets that contain high value documents in military, government, or private business settings can be protected with the DV1201A sensor.

Installation. Since the lock is normally placed on one side of the upper drawer on the front of the cabinet, mount one sensor on the side of the cabinet closest to the lock (*Figure 27*). Mount the night position plate on the drawer and the day position plate on the side together with the junction box DV1228A. Use cable kit DV1219A.

Recommended products. DV1201A (sensor), DV1219A (cable kit), DV1228A (junction box), DV1215A (tester)

Figure 27. Filing cabinets



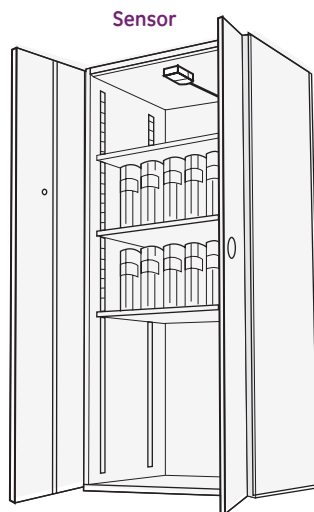
Jewelry store safes

Application. Jewelry store safes present several protection challenges. The safes hold high value merchandise, but are generally small in size. The stores are located in public locations, such as shopping malls and strip malls, where employee turnover can be high. The DV1201A sensor can protect safes from internal (employee) and external threats and lower store owner's loss risk.

Installation. Since most attacks against safes are aimed at the door and the locking mechanism, mount one sensor on the body of the safe and another inside the door close to the hinges (*Figure 28*). Use flexible cable kit DV1219A together with the junction box DV1228A. Also add a magnetic contact (2707A or similar) on the door. Cable outlets are normally provided in new safes, if not, we recommend you mount the sensors on the outside of the safe.

Recommended products. DV1201A (sensor), DV1212 (mounting plate), DV1219A (cable kit), DV1228A (junction box), 2707A (contact), DV1215A (tester)

Figure 28. Jewelry safe



ATM and night deposit boxes

Application. ATM (automatic teller machines) and night deposit boxes are located in high activity public areas and involve cash. There is also environmental vibration from normal operations. These factors combine to make protection a challenge.

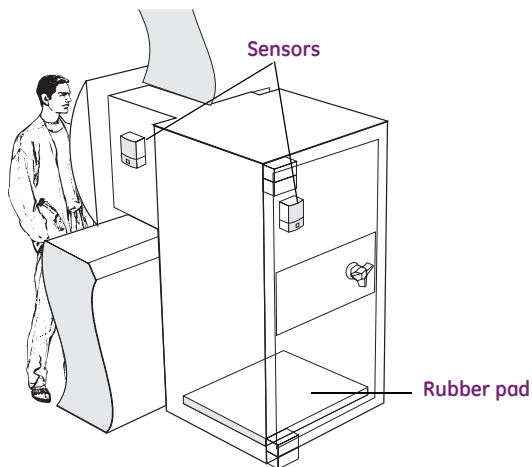
The DV1221A sensor ignores environmental vibrations while ensuring actual attacks are detected. The sensor sounds an alarm before the intruder gains access to the contents of the machine.

Installation. For ATMs, the best locations for sensors are the door and as close to the dispenser opening as possible. These locations are the most likely points of attack.

To protect night deposit boxes, use the same sensors. Attenuate the chute and the landing place with rubber insulating material to reduce the noise created by the falling cash boxes when deposited (*Figure 29*).

Recommended products. DV1221A (sensor), DV1219A (cable kit), DV1228A (junction box), DV1215A (tester)

Figure 29. ATM and night deposit boxes



Chapter 2 Motion sensors

This chapter provides information on motion sensors. Applications include both indoor and outdoor sensors for residential, commercial, and industrial installations.

Product overview

Passive infrared (PIR) motion sensor technology provides one of the most reliable and cost effective methods for protecting spaces in homes, offices, or industrial facilities. PIR motion sensors sense temperature contrasts between a relatively stable background and hotter or colder objects moving across their fields of view. The sensors emit no energy of their own, they merely *see* infrared images.

RCR sensors

The PrecisionLine dual technology sensors combine range-controlled radar (RCR) technology with a passive infrared (PIR) system. This combination increases false alarm immunity by allowing them to sense human-sized objects within a specified range. Both the RCR and the PIR system must be triggered to set off an alarm, unless in stealth mode (radar only). An internal jumper allows you to disable the PIR and use the radar-only stealth mode to detect intruders faster. The stealth mode can also be used for covert installations (mounted behind walls or drop-tile ceilings).

Choosing the right motion sensor

GE Security offers a complete line of motion sensors suitable for every application. The sensors fit compactly and unobtrusively into any environment. Use *Table 4* to help you match the appropriate PIR sensor with your installation needs.

Table 4. PIR sensors and descriptions

| Motion sensor | Description |
|---------------------------------|--|
| 6255 SureShot | Residential/commercial - 30 x 30 ft. room, wall, corner, or ceiling mount, pet alley, curtain, 40 ft. single spot lens, stairwell coverage |
| 6255FM SureShot Flush Mount | Residential/commercial - Prewired wall or ceiling retro flush mount |
| 6351 Sharpshooter DesignLine | Residential/commercial - 35 x 35 ft. room, wall or corner mount, 90 degree wide angle, pet alley, vertical barrier lens, mounts 1/8 in. from ceiling |
| 6155 Sharpshooter | Residential/commercial - 45 x 45 ft. room, wall or corner mount, pet alley, curtain, 90 ft. long range, extra-wide lens |
| 6187CTX Industrial Sharpshooter | Commercial/industrial - Outdoors, warehouses, locker rooms, food processing plants, underground parking lots, dusty, cold, or wet environments |
| 6197 Intrinsically Safe PIR | Commercial - Hazardous areas with ignitable atmospheres, government sites, pharmaceutical labs, oil refineries, grain elevators Industrial - Hazardous areas, for use in Class I, II, and III; Division 1 and 2; Groups A, B, C, D, E, F, and G |
| 6198 Non incendive PIR | Industrial - Hazardous areas, for use in Class I Division 2, Groups A, B, C, and D (only) |
| AP100PI | Residential/commercial - Form A, mirror optic wall mount, 33 x 40 ft. room, corner or wall mount, 5 curtains at 33 ft. each, mounting height 6 to 10 ft. |
| AP450 AP450A | Residential/commercial - Form A/Form C, 50 ft., wall mount, low profile, 9 curtains, mounting height 6 to 10 ft. |
| AP475 | Commercial/Industrial - Form C, long range wall mount, 75 ft. single curtain barrier, mounting height up to 16 ft. |

Table 4. PIR sensors and descriptions (continued)

| Motion sensor | Description |
|----------------------------------|--|
| AP669 | Commercial/industrial - Form C, 60 ft. diameter 360° coverage, ceiling mount, 18 curtains at 30 ft. each, mounting height 7 to 15 ft., coverage patterns: full 360°, 90° curtain, L-turn pattern, corridor intersection |
| AP633A | Commercial/industrial - 200 ft. long range, 80 ft. wide angle, wall mount, 12 selectable coverage patterns, mounting height 6 to 10 ft. |
| AP750 | Residential/commercial - Form A/Form C, mirror optic wall mount, 50 x 65 ft. coverage, corner or wall mount, 7 curtains at 50 ft. each, mirror mask allows coverage patterns, mounting height 6 to 10 ft. |
| AP-750W NX482 | Wireless residential/commercial - Form A/Form C, mirror optic wall mount, 50 x 65 ft. coverage, corner or wall mount, 7 curtains at 50 ft. each, mirror mask allows coverage patterns, mounting height 6 to 10 ft. |
| AP950PI | Residential/commercial/industrial - Form A, 35 ft. range with up to 80 pound pet immunity, 50 ft. range with no pet immunity, corner or wall mount, 9 curtains, 2 units in 1 housing, mounting height 7 to 10 ft. |
| AP950AM | Commercial/industrial - Antimasking high security, 50 ft. range, corner or wall mount, 9 curtains |
| RCR-50 | Dual technology commercial - Range control: 20, 30, 40, and 50 ft., tamper, Form C, retail, warehouse, office space, public sector projects, high security |
| RCR-PET | Dual technology residential/commercial - Range control: 9, 18, 27, and 35 ft., Form A, pet immune up to 80 pounds |
| RCR-A (Form A) RCR-C (Form C) | Dual technology residential/commercial/industrial - Range control: 9, 18, 27, and 35 ft., no pets, tamper (RCR-C only), retail, office space, public sector projects, high security |
| RCR-90 | Dual technology commercial/industrial - Range control: 60, 70, 80, 90 ft., tamper, Form C, retail, warehouse, office space, public sector projects, high security |
| RCR-REX | Dual technology commercial/industrial - Request-to-exit, Range: 3 to 15 ft. depth, 7.9 ft. width, mounting height 7 to 15 ft., tamper, Form C |
| 60-511-319.0 | Wireless residential/commercial - DS924 PIR, 35 x 40 ft. coverage, tamper, sensitivity options, 3.6 VDC lithium battery |

Table 4. PIR sensors and descriptions (continued)

| Motion sensor | Description |
|---------------|---|
| 60-511-02-95 | Wireless residential/commercial - DS924 PIR, 35 x 40 ft. coverage, tamper, sensitivity options, 1.5 VDC lithium battery |
| 60-639-95R | Wireless residential/commercial - SAW PIR, 35 x 40 ft. coverage, tamper, sensitivity options |
| 60-639-95R-OD | Wireless residential/commercial - Outdoor SAW PIR, 35 x 40 ft. coverage, tamper, sensitivity option |
| 60-639-02-95R | Wireless residential/commercial - SAW PIR, pet immune to 40 pounds, 1.5 VDC lithium battery, 35 x 40 ft. coverage, tamper, sensitivity options |
| 60-703-95 | Wireless residential/commercial - Crystal PIR, 35 x 40 ft. coverage, tamper, sensitivity options |
| 60-807-95R | Wireless residential/commercial - SAW PIR, pet immune up to 40 pounds, 35 x 40 ft. coverage, tamper, sensitivity options |
| 60-807-01-95R | Wireless residential/commercial - SAW PIR, pet immune to 40 pounds, 35 x 40 ft. coverage, tamper, 3.6 VDC lithium battery |
| 60-807-02-95R | Wireless residential/commercial - SAW PIR, pet immune to 40 pounds, 35 x 40 ft. coverage, tamper, 1.5 VDC lithium battery |
| 60-880-95 | Wireless residential/commercial - 315 MHz AP750W with learn mode 4D signal processing with gliding focus mirror optics |

Installation guidelines

Use the following installation guidelines for motion sensors:

- Position the sensor so that any intruder must cross the sensor's field of view. To trigger an alarm, an intruder must cross both the positive and negative elements of one zone.
- Test the sensor in the direction of likely intruder motion and walk test monthly. See [Walk test](#) on page 42.
- Locate the sensor so that valuables are well within its coverage pattern.
- Terminate each protection zone on a solid object such as a wall or floor.
- Use an industrial sensor in locations where a standard sensor may be affected by water, steam, or oil.
- Do not aim sensors at sources of rapid heating or cooling. These sources include forced air ducts, space heaters, fireplaces, direct sunlight, strong white lights, and mirrors that can reflect strong light.
- Do not obstruct the sensor's field of view.
- Seal optics when possible.

Outdoor installation guidelines

Test your application over a 24-hour period and use the following guidelines when installing outdoor motion sensors:

Sunlight. Avoid direct sunlight on the plastic lens (even with UV stable plastics).

Temperature. Make sure the temperature range is within sensor specifications. For example, the 6187CTX sensor is rated to work from -40 to 120°F (-40 to 50°C). Be aware of temperatures in excess of the sensor's specifications.

Humidity/rain/fog. If conduit is used, run conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure the conduit openings and the mounting holes on the sensor are well sealed.

Birds and animals. Depending on the size, speed, and proximity to the sensor, warm-blooded animals can trigger an alarm. The larger the animal, the farther away it can be detected. Avoid directing the sensor towards bushes or branches where birds can perch. You can mount two sensors in parallel to require alarm verification.

Trees and bushes. Tree branches or bushes can cause an alarm when the wind moves them, and can block detection. Keep branches and bushes at least 30 ft. (9.15 m) from the sensor.

Walk test

To ensure proper operation, always walk test the sensor location. To walk test, do the following:

1. Mount the sensor in the desired location.
1. Walk throughout the intended coverage pattern.
2. Verify the sensor alarms (see the specific sensor installation instructions).

Most sensors walk test more accurately if you wait 10 seconds between tripping the sensor and walking again. This allows the sensor to stabilize between trips.

Prewiring

Prewiring allows you to work with the builder in the planning stage to determine optimum locations for sensors. It will also allow you to avoid many of the hazards inherent in post-construction installations such as drilling through the electrical cables, plumbing, and duct-work hidden in existing walls.

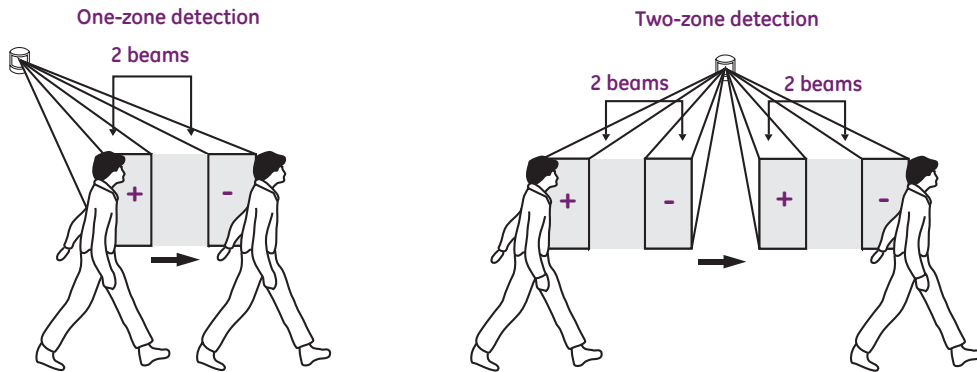
When wiring after construction, compromises are usually the norm. Existing walls, lighting fixtures, air conditioning ducts, and other obstacles often determine sensor and control panel locations. Compromises such as these can leave *blind spots* in security installations.

Motion sensors are available that will fit into standard outlet boxes just like a light switch. The flush-mount SureShot (6255FM) sensor fits into a standard single-gang box, remodel box, or rough-in plate in two easy steps. You simply connect the wires to the proper terminals on the back of the unit, then screw the unit into an outlet box like you would a switch.

False alarm reduction

Many GE motion sensors allow you to select one or two zone detection (*Figure 30*). Each zone is made up of two fields of view, one positive and one negative. With one zone selected, an alarm will be indicated when an intruder moves across one positive and one negative field. With two zones selected, an intruder must cross the positive and negative fields of two zones before an alarm is indicated. We recommend two-zone detection (except when using long-range and curtain lenses) to reduce the chance of false alarms. See the sensor's installation instructions for details on setting the zone detection.

Figure 30. Zone selection



Masking areas on motion sensors

Most motion sensors include masks to modify the coverage pattern to fit specific applications. Coverage curtains should be masked to avoid sources of false alarms such as heaters, air conditioners, and windows. Available masks include:

- Plastic masks to cover large areas (*Figure 31* on page 44)
- Adhesive labels used on mirror curtains (*Figure 32* on page 44)
- Undercrawl window masks to improve false alarm immunity in the presence of objects within 5 ft. (1.5 m) and directly under the sensor (*Figure 33* on page 44)

Figure 31. Plastic masks

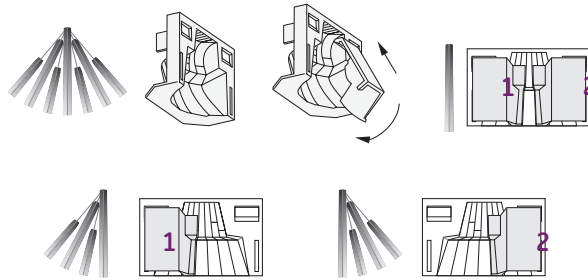


Figure 32. Adhesive labels for the mirror

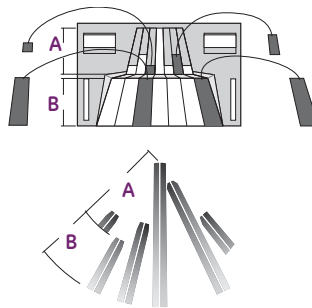
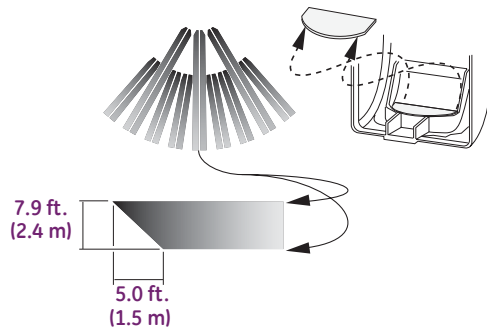


Figure 33. Undercrawl mask



The examples show the AP750 sensor. For masking options for a specific motion sensor, see the installation instructions for that sensor model.

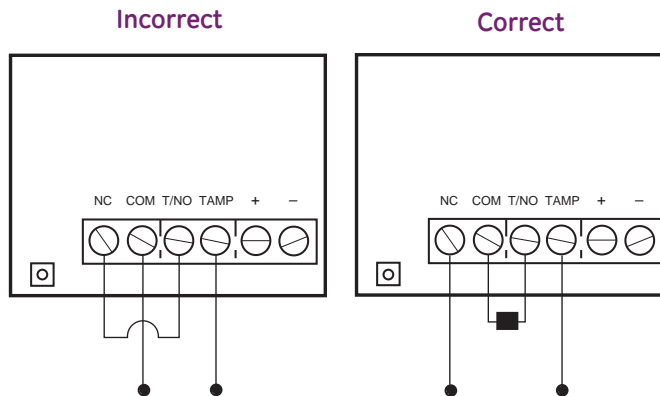
Loop supervision

If a resistor is placed at the end of a protection zone (at the last unit in the line), that zone becomes a supervised loop. A small amount of current can always be applied to that loop, allowing it to *watch* the wiring at all times. You can then program the system to give a warning light or audible alarm if it is tampered with during daytime hours. Supervising the loop is a security technique used to prevent internal tampering.

Terminal blocks with shared terminals

The SureShot and some older Sharpshooter sensors have SPDT (single-pole double-throw) contacts in which the normally open (NO) and one of the tamper (TAMP) terminals are shared. When wiring a tamper switch in series with the alarm output in the normally closed configuration, be sure to wire the terminals as shown in the correct diagram in *Figure 34*. If the jumper wire is placed from the normally closed (NC) terminal to the NO terminal, as shown in the incorrect diagram, no alarm will sound. When wiring a tamper switch in series with the normally closed alarm loop, place the jumper or EOL device between the COM and T/NO terminals.

Figure 34. Wiring terminal blocks with shared terminals



Peripheral control

Motion sensors can be used to control peripheral devices in applications such as:

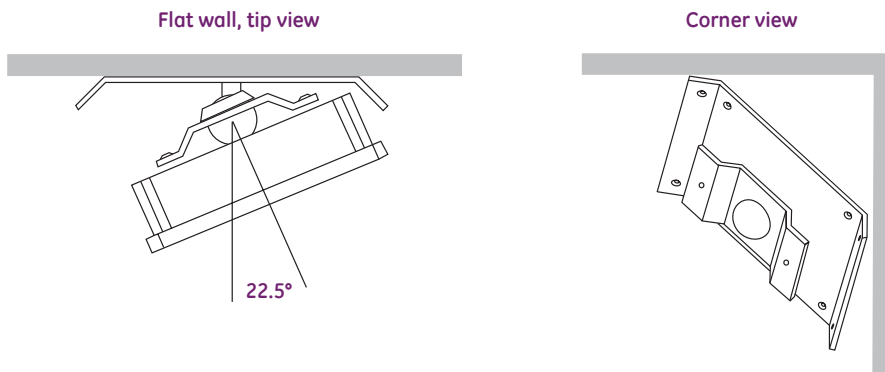
- CCTV cameras (see [CCTV camera activation](#) on page 76)
- Lights (see [Hallways and lobby lighting activation](#) on page 58 and on page 80)
- Recorded messages (see [Museums](#) on page 55)

Swivel brackets

The 6083-N swivel bracket can be used with the 6187CTX outdoor PIR sensor, the 6198 nonincendive PIR sensor, and the 6197 intrinsically safe PIR sensor in areas where mounting is difficult.

You can mount the bracket on a flat wall or in a corner (*Figure 35*). The maximum adjusting angle for a flat-wall mount is 22.5 degrees. Mount the bracket with the small self-tapping screws that ship with it.

Figure 35. Swivel bracket



Pets

Application. Because PIR sensors are sensitive to moving, heat-radiating sources, they can be triggered by animals as well as humans. To avoid this false alarm hazard, do one of the following:

- Use a sensor with pet immunity
- Use a sensor with a pet alley lens
- Mount a sensor upside down to create a pet alley

Installation using a sensor with pet immunity. The introduction of the PrecisionLine RCR-PET with its dual technology RCR (range-controlled radar) and PIR, has virtually eliminated the need to create a pet alley associated with nominal motion sensors. The RCR-PET provides excellent pet immunity for animals up to 80 pounds, and detects only objects within a very precise range of user settings. *Table 5* gives examples of pet immunity limits for RCR-PET sensors. The table is not accurate for other sensors.

The AP100PI, PI6000, and AP950PI sensors also have pet immunity. See specific sensor installation instructions for details.

Recommended products. RCR-PET, AP100PI, AP950PI, PI6000

Table 5. RCR-PET hair chart

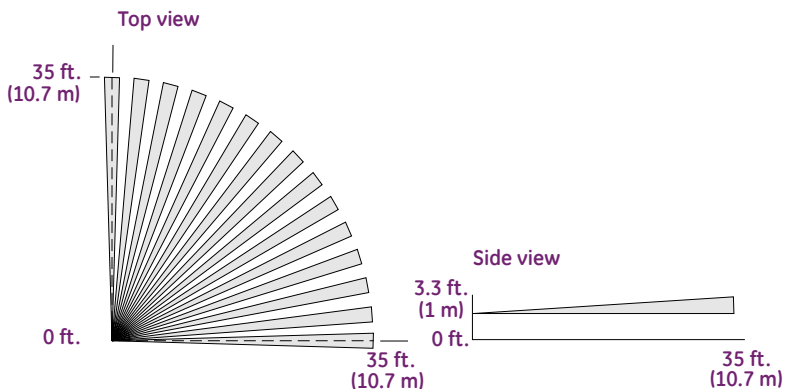
| Long hair 2 in. (5.1 cm) long up to 80 lbs. | Medium hair 1.5 in. (3.8 cm) long up to 50 lbs. | Short hair 1 in. (2.5 cm) long up to 30 lbs. | Not recommended, use a pet alley application |
|---|---|--|--|
| Chinook | Collie | Basenji | Doberman |
| Husky | English setter | Border terrier | Great Dane |
| Poodle | Pointer | Cocker spaniel | Greyhound |
| Retriever | Pug | French bulldog | Mastiff |
| Sheepdog | Toy poodle | Mini bull terrier | Pit bull |
| German shepherd | Weimaraner | Welsh corgi | St. Bernard |
| | | Cats | |

Installation with a pet alley lens. To install the sensor, do the following:

1. Mount the sensor, with the pet alley lens installed, against the wall at the desired height.
2. Mask the sensor to avoid tables, chairs, cat climbing posts, and other objects a pet could jump on. Remember that the size of the pet should also be considered while aiming and adjusting the sensor.
3. Remind the homeowner that furniture moved into the sensor coverage pattern can give a pet a place to climb or jump and can result in false alarms.
4. Test the sensor (see [Walk test](#) on page 42).

Recommended products. 6155 with 6074 pet alley lens, 6255 with pet alley shield

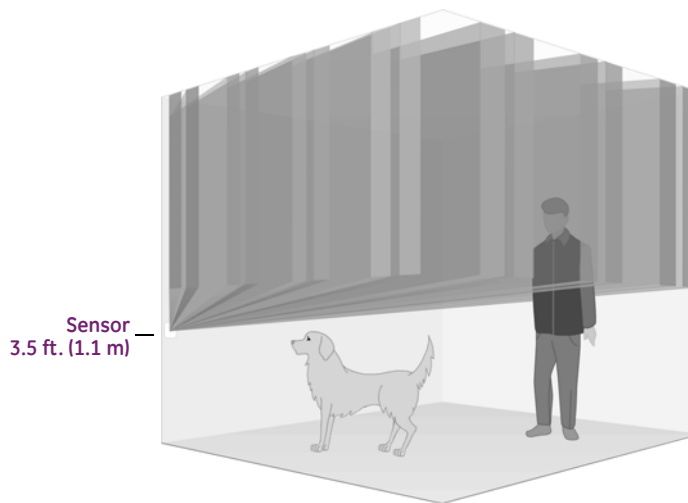
Figure 36. 6155 sensor with pet alley lens coverage



Installation creating a pet alley. To create a detection-free area close to the floor, mount an AP450, AP750, or AP950 sensor 3.5 ft. (1.1 m) above the floor, upside down (sensor window towards the ceiling). Make sure the under-crawl mask is in place to reduce exposure to the ceiling. As shown in *Figure 37*, pets are free to roam below the mounting height of the sensor without causing an alarm.

Recommended products. AP450, AP750, AP950

Figure 37. Pet alley



Wireless sensors

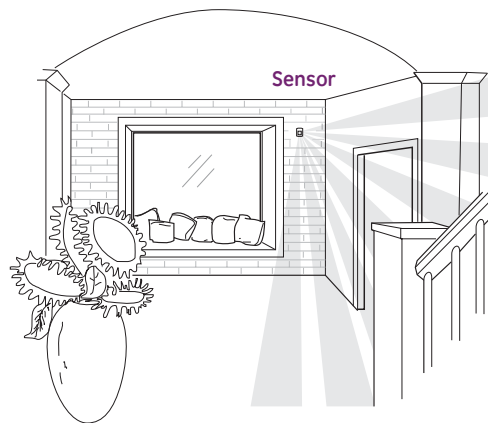
Application. Wireless motion sensors can be used in residential and commercial applications. Wireless sensors are especially useful for installations where it is difficult or impossible to run wires. See [Choosing the right motion sensor](#) on page 37 for descriptions of wireless sensor models.

Installation. Wherever possible, use a single sensor to cover more than one room (*Figure 38*). To install the sensor, do the following:

1. Mount the back box.
2. Attach the sensor to the swivel bracket that is incorporated into the front cover of the back box.
3. Walk test the sensor (see [Walk test](#) on page 42).

Recommended products. NX-482, AP750W, 60-880-95, 60-639-95R, 60-703-95, 60-511-02-95

Figure 38. Wireless sensor installation



Discreet appearance

Application. When adding a security system to an existing residence, the appearance of the system is often very important to the homeowner. The homeowner is concerned with sensor placement, wiring and control panel location, and holes drilled through existing walls.

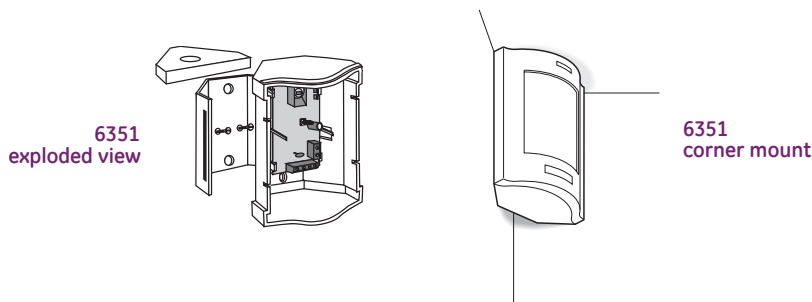
The 6351 DesignLine sensor combines an attractive, unobtrusive design with an easy-to-mount snap-on bracket. It can be mounted in a corner within 1/8 in. (0.3 cm) of the ceiling. This sensor can save you installation time and cost, and has a standard 90-degree lens that provides entire room coverage with one sensor.

Installation. To install the sensor, do the following:

1. Choose a mounting location close to the ceiling in the corner adjacent to the room's entrance (*Figure 39*) to get the best sensor line of sight. Pull wiring through the ceiling where possible for a faster, easier installation.
2. Using the foam spacer, mount the bracket to the wall. Connect the wires to the sensor terminal block and snap the cover in place.
3. Most rooms need only one-zone sensitivity, but if the room is subject to temperature fluctuations or other instability, adjust the sensor for two-zone sensitivity.
4. Test the sensor (see *Walk test* on page 42).

Recommended products. 6351

Figure 39. DL6351 mounting



Flush mount

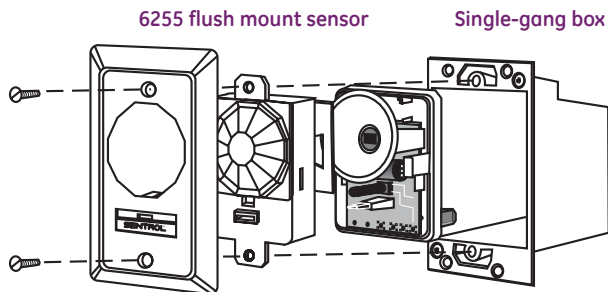
Application. Flush-mount motion sensors make protection no more intrusive in a room than an electrical outlet or switch. Flush-mount PIR sensors are most often used in prewired security installations, but can also be used in retrofit installations.

Installation. The 6255FM flush mount SureShot (*Figure 40*) fits into a standard, plastic single-gang box. If the security system is to be prewired, mount a single-gang box for each sensor as planned with the builder. Sensor wires can be easily run through walls and routed to the control panel. Due to noise problems, do not run PIR sensor wires beside AC wires. To install the sensor, do the following:

1. Mount the box in the ceiling. For retrofit installations, take care to cut a hole in the wall just large enough to fit the single-gang remodel box.
2. Run wires through the box to the sensor terminal block.
3. Screw the sensor into the single-gang box as you would an electrical outlet and walk test the sensor to ensure correct operation. See [Walk test](#) on page 42.

Recommended products. 6255FM

Figure 40. 6255FM flush mount SureShot



Ceiling mount

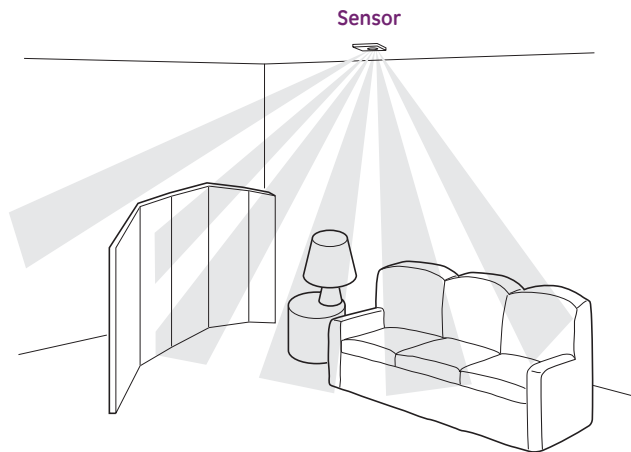
Application. Mounting a sensor in the ceiling is a good way to hide wiring in single-level homes. Running wires in an attic allows you to easily avoid water pipes, duct work, and high voltage wiring. It also provides complete coverage of rooms with obstructions such as half-walls and shelving that can block wall mounted sensor coverage.

Installation. For flush mount installation, install a standard plastic single-gang outlet box in the ceiling (*Figure 41*). Use a remodel box for homes where construction is already complete. Always test the installation (see *Walk test* on page 42).

If you use the 6255 or 6255FM sensors, ensure the ceiling is less than 12 ft. (3.7 m) high. If you use the AP669 sensor, ensure the ceiling is less than 16 ft. (4.9 m) high.

Recommended products. 6255, 6255FM, AP669

Figure 41. Ceiling mount



Antimasking

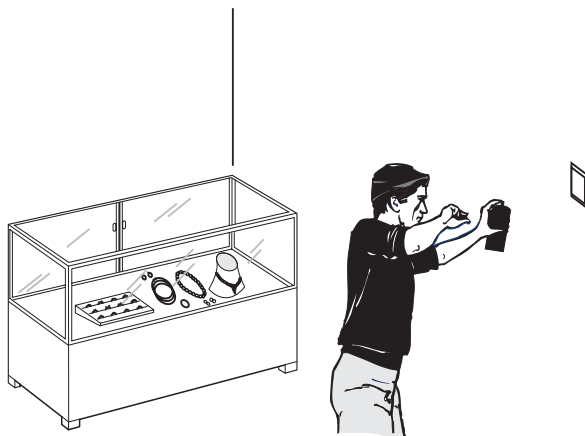
Application. In high-risk applications, you may need to guard against an intruder disabling a motion sensor. The intruder could gain access to the sensor when the installation is disarmed and spray the lens (*Figure 42*) or cover the lens with a transparent piece of glass that blocks the sensor window. The intruder could then return when the installation is armed and know the sensor would not detect his presence.

The AP950AM antimasking motion sensors have built-in technology that looks for a masking tamper and notifies the system of the problem.

Installation. Use a AP950AM motion sensor in this application and install the sensor as appropriate to the installation environment. You do not need to do anything to enable the antimasking feature.

Recommended products. AP950AM

Figure 42. Intruder masking a sensor



Museums

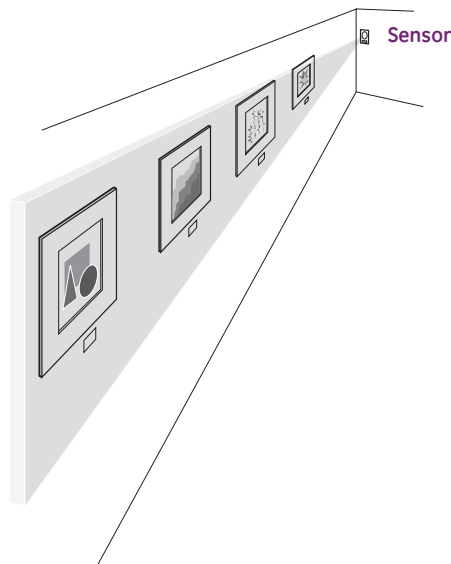
Application. Use a motion sensor to effectively protect areas where the presence of valuable items increases the risk of theft or vandalism.

Installation. To protect a wall of paintings, mount a sensor on a side wall as shown in *Figure 43*. Use the sensor to trigger an alarm or a recorded message warning patrons to stay a certain distance from the paintings. You can also use a sensor mounted behind a painting or wall hanging to sound an alarm if the object is moved.

Use a sensor with a curtain lens to provide blanket coverage of entry areas, or use a vertical barrier lens to prevent intruders from crawling under the sensor's field of view.

Recommended products. AP450, AP475, AP633, AP950AM

Figure 43. Museum protection



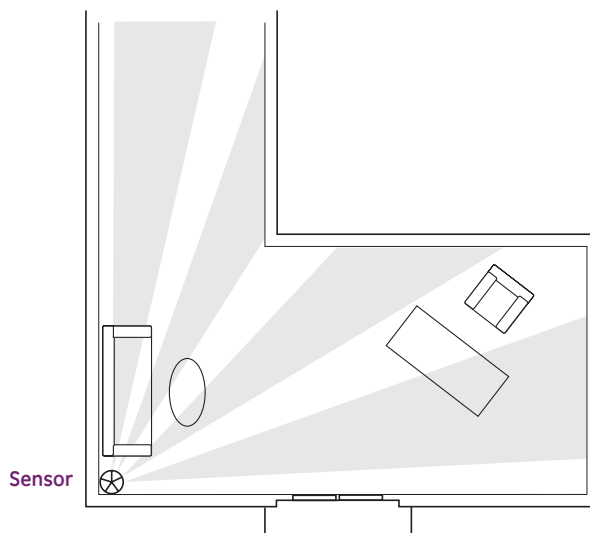
Office foyers

Application. Large office foyers can be difficult to protect with a single motion sensor.

Installation. Mount a sensor in the corner on a wall or on the ceiling as shown in *Figure 44*, to provide appropriate coverage of foyers, corridors, and hallways.

Recommended products. AP669, AP450, AP750, NX482, 60-880-95

Figure 44. Foyer coverage



Storefront windows

Application. A curtain motion sensor, such as the AP450 or AP475, provides a cost-effective and secure means of intrusion detection through large windows and doors that are typical of a storefront or car showroom.

Installation. To mount the sensor, do the following:

1. Mount the sensor 3 ft. (0.9 m) from the window. This avoids any possibility that one half of the curtain is *looking at* the window, while the other half is not (a potential cause of instability). If this is not possible, angle the sensor slightly inwards.
2. Make sure the sensor is set to standard sensitivity and the appropriate range.
3. Install the appropriate mirror masks. *Figure 45* shows the left side of the pattern masked out (always mask out curtains that are directed at the windows), while the right side is active to protect the inside of the store.
4. Test the sensor (see [Walk test](#) on page 42).

Recommended products. AP450, AP475, AP750, NX482, 60-880-95, RCR series

Figure 45. Storefront coverage



Hallways and lobby lighting activation

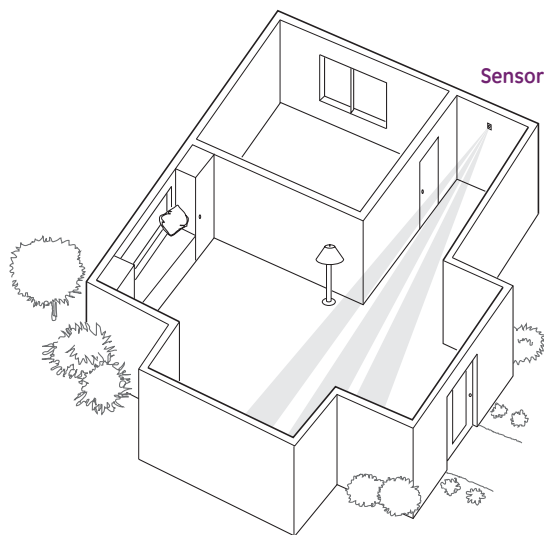
Application. Use motion sensors to protect long narrow areas such as corridors or hallways (see *Long corridors or aisles* on page 69 for commercial applications). You can also use a sensor with a separate relay and power supply to activate lighting controls in hallways and lobbies.

When choosing a sensor for this application, consider the length of the hallway, range and appearance of the sensor, and if pets will be a factor.

Installation. Mount a sensor with a single-spot or vertical barrier lens at the opposite end of a hallway or lobby from its entrance (*Figure 46*). Anyone entering the hallway from the entrance or from side doors will be detected.

Recommended products. AP450, AP475, 6255, NX488 with a single-spot or vertical barrier mask, 6155 with a long range or curtain lens, 6351 DesignLine with a vertical barrier mask

Figure 46. Hallway lights



Partitions or other obstacles

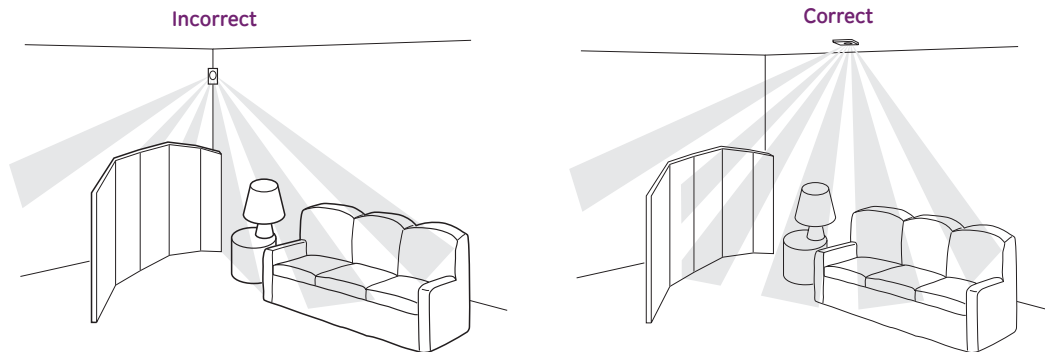
Application. Partitions, half-walls, shelving, and filing cabinets in a room or office environment can present installation challenges.

Installation. To avoid obstacles while protecting the space in a room, mount a sensor in the ceiling. Position the sensor in a location where partitions will not block sensor coverage pattern. *Figure 47* shows incorrect and correct placement samples.

Test the installation to ensure correct operation (see [Walk test](#) on page 42) and instruct office personnel to not move partitions or shelving without notifying the security consultant.

Recommended products. 6255, 6255FM, AP669

Figure 47. Incorrect and correct coverage with obstacles



Request-to-exit door control

Application. Hospitals, schools, commercial offices, warehouses, and a variety of other access control applications require request-to-exit door control. Assuring that automatic door opening devices prevent intrusion while permitting authorized ingress/egress can be a challenge and often requires multiple sensors. The RCR-REX sensor meets this challenge. The sensor's range controlled radar (RCR) technology was originally intended to prevent air-to-air collisions. Now GE has applied this technology to the RCR-REX for false alarm immune motion detection.

Installation. Mount the sensor directly to a door mullion, the ceiling, or the wall just above the door (*Figure 48*). The RCR-REX provides aiming and range control capabilities that make it easy to adjust the distance for the appropriate coverage. The sensor will detect motion toward the door and activate an event flag in the access control panel. The event flag will start a macro that will unlock the door and shunt the door switch for the programmed time period or until the switch is closed (*Figure 49* on page 61).

Recommended products. RCR-REX

Figure 48. Request-to-exit door control

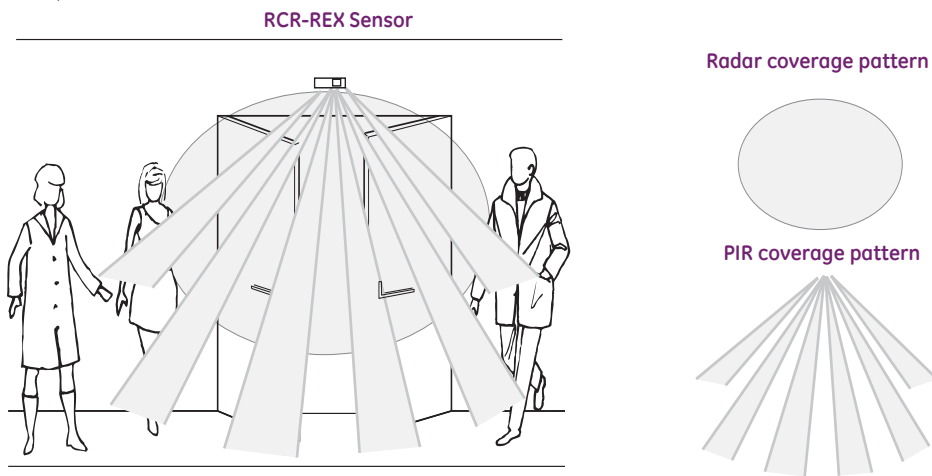
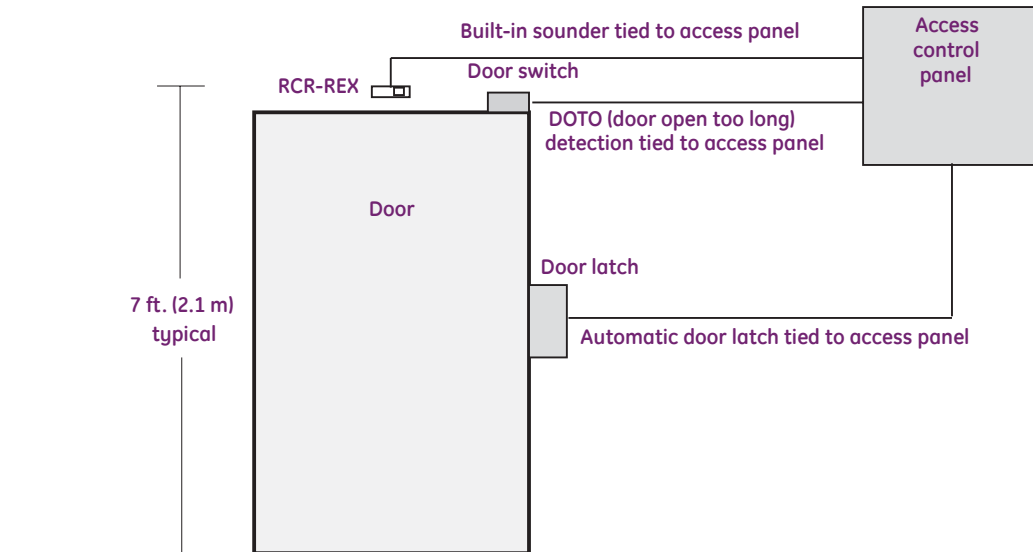


Figure 49. Door control



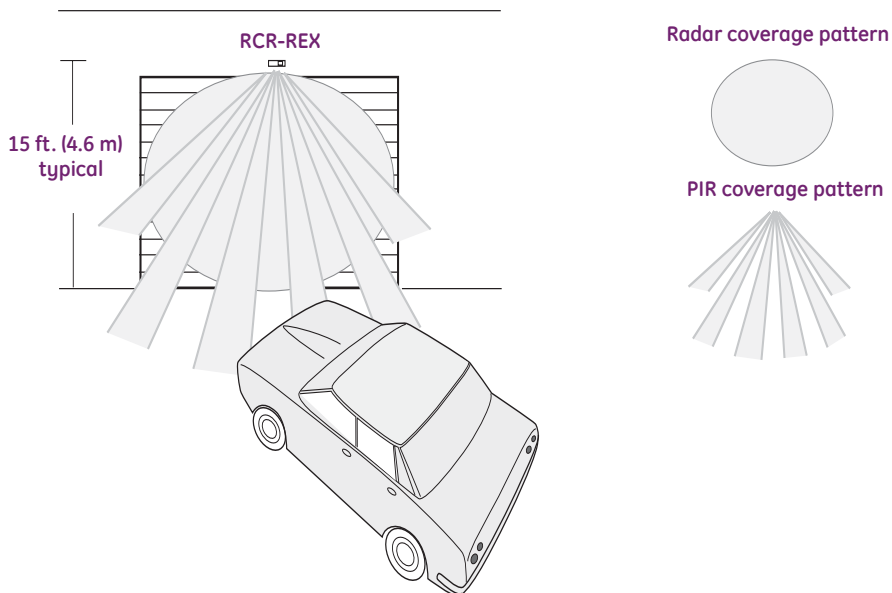
Request-to-exit roll-up door control

Application. Drive-through areas with roll-up doors such as shipping docks, garages, and car service centers, are good applications for request-to-exit door control using the RCR-REX. Benefits include both security and economic advantages, such as heat conservation. The sensor's dual technology requires both heat from the car engine and vehicle motion before the internal relay is triggered (*Figure 50*). You can use the 15 ft. (4.6 m) range of the RCR-REX to signal an attendant with a bell or to automatically open the door. The sensor can provide both local annunciation and an alarm with forced entry.

Installation. The RCR-REX is not designed for outdoor environments and is intended for indoor use only. For pet or rodent immunity, adjust the radar curtain at a height from 1 to 2 ft. (0.3 to 0.6 m) above the floor. Adjust the internal turret for a maximum range of 7 ft. (2.1 m) when the device is mounted at 15 ft. (4.6 m).

Recommended products. RCR-REX

Figure 50. Roll-up door control



Room perimeters

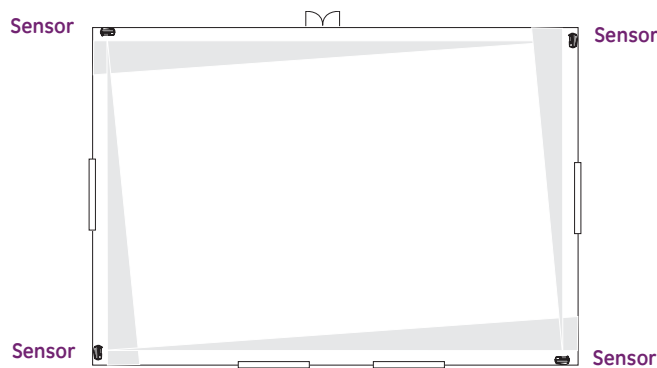
Application. Motion sensors can be sensitive to direct sunlight. In a room with multiple windows, the windows can limit the choice of coverage patterns and mounting locations. However, you can use four sensors to protect the entire perimeter.

Installation. Use a sensor in each corner (*Figure 51*). Mount the swivel bracket near a corner and connect the back case of the sensor to the bracket. The outside coverage zone should run parallel to, but not touch, the wall to be protected. With proper aiming you can reduce the unprotected space near the wall.

Test the installation (see *Walk test* on page 42).

Recommended products. AP450, AP475, AP750, NX-482, 60-880-95

Figure 51. Room perimeter coverage



Multilevel homes

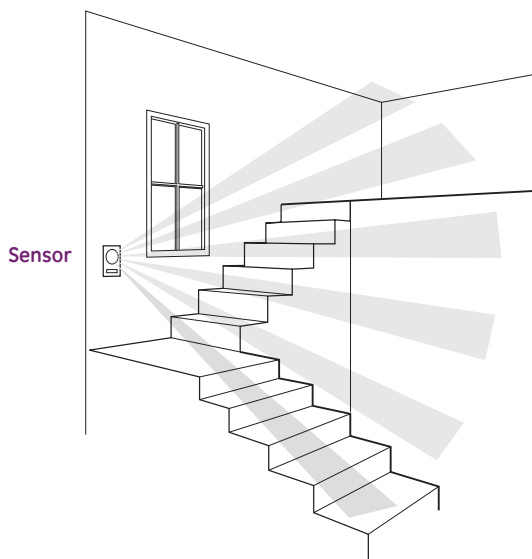
Application. In homes with a multilevel floor plan, you must take care to ensure complete coverage. The most cost-effective way to obtain complete coverage is to mount a sensor with a 360-degree lens on the wall or ceiling. A standard, wall-mounted 90-degree lens may leave unprotected zones that an intruder can use to invade a home.

Installation. Mount the sensor on a wall that is adjacent to the room's entrance to get the best sensor line of sight (*Figure 52*). You can also mount the sensor in the ceiling to achieve 360-degree coverage of the room.

Test the installation (see *Walk test* on page 42).

Recommended products. 6255, 6255FM

Figure 52. Stairwell in a multilevel house



Valuable equipment

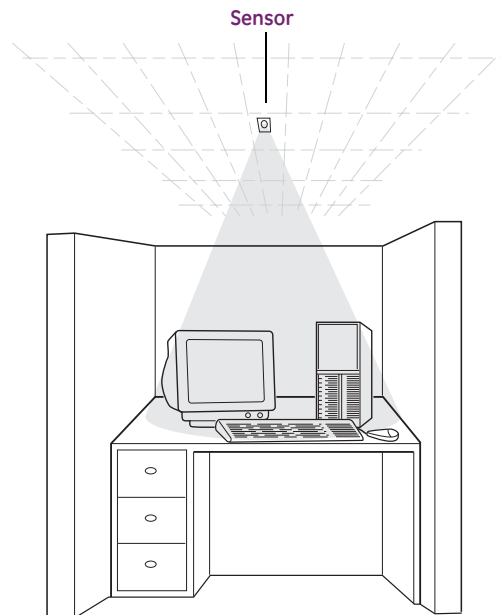
Application. To protect valuable equipment, such as computers, TVs, and video equipment, mount a sensor in the ceiling above the equipment (*Figure 53*) and use a very narrow coverage pattern.

Installation. Use a 6255 SureShot or a 6255FM SureShot with a single spot mask in this application. Verify that the sensor range is suitable for the application. Mount the sensor in the ceiling directly above the equipment and test (see *Walk test* on page 42).

You can also use an RCR-A or RCR-C set at a range of 9 ft. (2.7). If you want to hide the sensor above a drop-tile ceiling, you must use the sensor's stealth mode. See *RCR sensors* on page 36 and the sensor's installation instructions.

Recommended products. 6255, 6255FM, RCR-A, RCR-C

Figure 53. Computer spot coverage



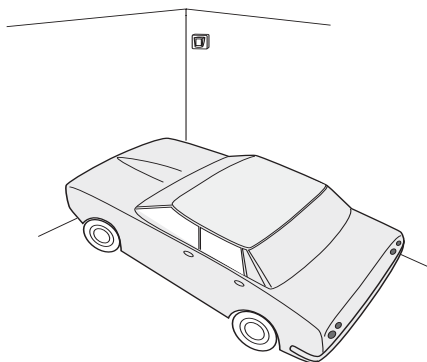
Vacation homes and garages

Application. Garages and vacation homes often contain valuable objects and present some protection challenges. They are not always temperature-regulated, and, in the case of garages, there can be a risk of damage to sensors from accidental impacts with balls and tools. The 6187CTX operates from -40 to 120°F (-40 to 50°C) and is ideal for protecting garages and vacation homes in cold climates. The RCR series sensors are a good solution in installations where temperature extremes are not an issue.

Installation. Mount the sensor as indicated by the specific sensor's installation instructions. Use the swivel bracket included with the sensors to aim and adjust the sensor (*Figure 54*), if needed, and test the sensor (see *Walk test* on page 42).

Recommended products. 6187CTX, RCR series

Figure 54. Garage protection



Indoor swimming pools

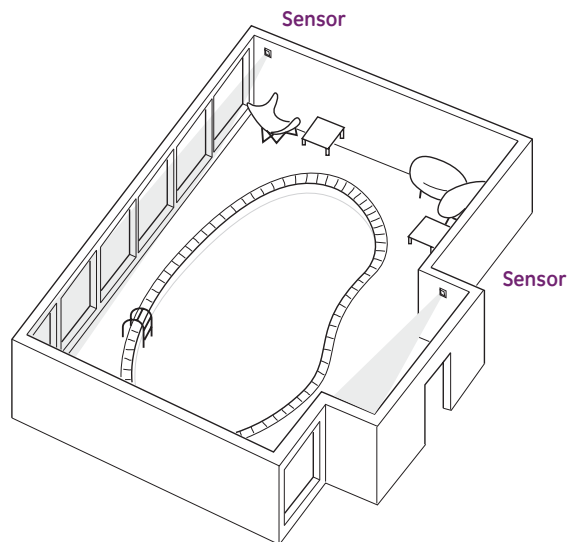
Application. Use 6187CTX or 618703 sensors to sound a local alarm upon unauthorized entrance into indoor swimming areas either in homes or in hotels. The cast metal housing of the 6187CTX sensor provides water resistance in humid indoor swimming environments.

Installation. Mount the sensor approximately 7 ft. (2.1 m) high on a wall adjacent to the entrance door, pointing downward (*Figure 55*), or in the ceiling pointing toward the door. Walk test the installation (see *Walk test* on page 42).

If conduit is used, run the conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure conduit openings and mounting holes are well sealed.

Recommended products. 6187XCTX, 618703

Figure 55. Indoor swimming pools



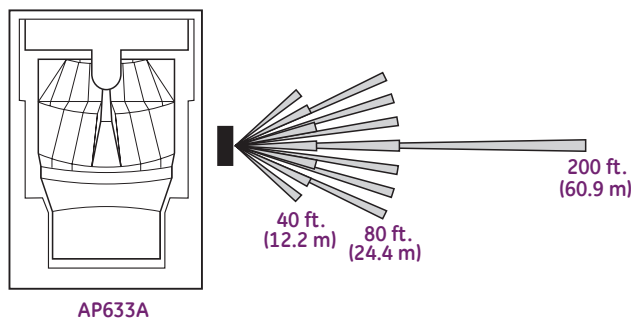
Large areas

Application. Large indoor areas such as factories, sports or concert halls, gymnasiums, and warehouses, can require multiple sensors for adequate coverage. With an 80 ft. (24.4 m) wide angle coverage pattern, a single AP633A can often do the job of several conventional PIR sensors, saving material and labor costs. The coverage includes a complete 40 ft. (12.2 m) curtain and a 200 ft. (60.9 m) long-range field of view (*Figure 56*) that can be enabled when required. The combination of step focus mirror and microprocessor controlled 4D signal processing ensures excellent detection in all ranges and trouble-free performance in these often difficult environments. If you need coverage of 90 ft. (27.4 m) or less, the RCR-90 is also a good solution.

Installation. Mount the AP633A between 6 and 10 ft. (1.8 and 3.0 m) high. Select the correct sensitivity for standard wide-angle detection. For fine adjustments, use the aiming mechanism described in the installation instructions and walk test the installation (see [Walk test](#) on page 42).

Recommended products. AP633A, RCR-90

Figure 56. AP633 coverage pattern



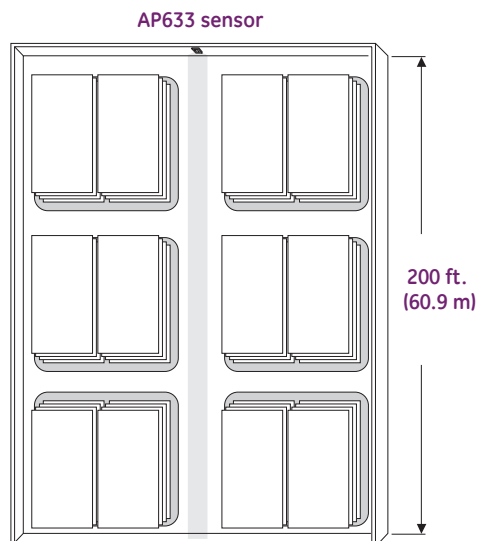
Long corridors or aisles

Application. Supermarkets, factories, and schools frequently have long corridors or aisles that need protection. The AP633 with a range of 200 ft. (60.9 m) provides the longest coverage range of any PIR sensor available. The step focus mirror ensures that even at maximum range, detection is crisp and consistent without oversensitivity at closer ranges. If you need coverage of 90 ft. (27.4 m) or less, the RCR-90 is also a good solution.

Installation. Mount the AP633 (*Figure 57*) between 6 and 10 ft. (1.8 and 3.0 m) high. Select the correct sensitivity for *Curtain/Long range* detection. Carry out fine adjustments using the aiming screws and install masking devices as described in the installation instructions. Be aware that a minor horizontal or vertical reorientation can result in a major displacement of the field of view at 200 ft. (60.9 m). Walk test the installation (see *Walk test* on page 42). If detection is not satisfactory at long range, check the vertical orientation. An uneven wall can make the sensor aim slightly downward, reducing range.

Recommended products. AP633, RCR-90

Figure 57. Long aisle protection



Schools

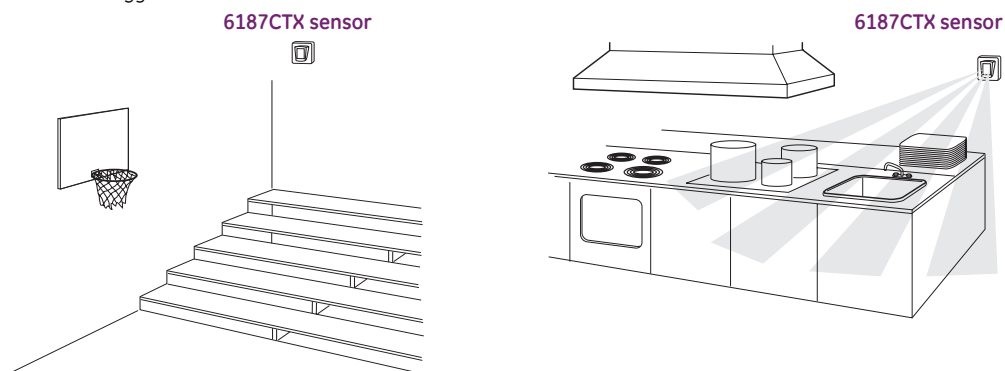
Application. Protecting schools presents challenges to security system installers. Rooms are typically larger than in other commercial environments (auditoriums, lecture halls, gymnasiums), and hallways are longer. Vandalism is a concern and it may be necessary to protect outdoor areas to prevent unwanted entry at certain times of the day or night.

Installation. Locate sensors high, near the corners of walls where they are least conspicuous. For outdoor applications, mount the 6187CTX Industrial PIR with cast metal housing out of reach of vandals, in areas where they will not be exposed to direct sunlight. The 6187CTX is also ideal for areas that may be exposed to water, high humidity such as school kitchens (*Figure 58*), or chemicals such as shops.

For larger areas and long hallways (see *Long corridors or aisles* on page 69), use the AP633. It provides 80 ft. (24.4 m) wide angle, 40 ft. (12.2 m) curtain, and 200 ft. (60.9 m) long range coverage patterns. If you need coverage of 90 ft. (27.4 m) or less, the RCR-90 is also a good solution.

Recommended products. 6187CTX, AP633, RCR-90

Figure 58. School gyms and kitchens



Outdoor areas

Application. There are many applications for outdoor motion protection. Most stem from the need to protect property that is at risk. Residential yards, parking lots (*Figure 59*), outdoor shopping areas, outdoor garden shops, auto dealerships, aircraft hangers, perimeters of military installations, and public utility installations are all examples of such applications.

The cast metal housing of the 6187CTX PIR sensor is specifically designed for outdoor applications, and the sensor provides water resistance and reliable detection in temperatures from -40 to 120°F (-4 to 50°C). The 60-639-95R-OD is also rated for outdoor applications.

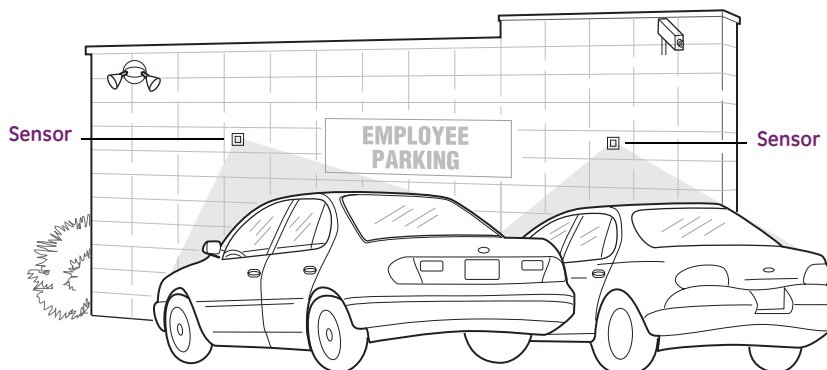
Both sensors should be used in fenced applications for local alarm or camera activation only.

Installation. Mount the sensor approximately 7 ft. (2.1 m) high (*Figure 59*). Avoid direct sunlight on the lens and keep away from branches that may impede sensor coverage pattern. See [Outdoor installation guidelines](#) on page 41. Walk test the installation (see [Walk test](#) on page 42).

If conduit is used, run the conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure conduit openings and mounting holes are well sealed.

Recommended products. 6187CTX, 60-639-95R-OD

Figure 59. Outdoor area coverage



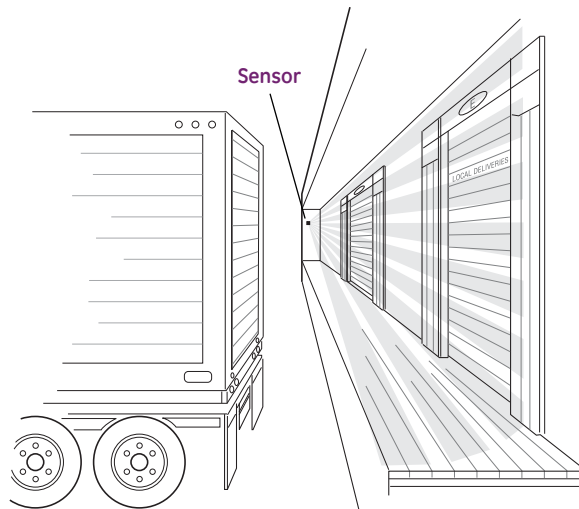
Loading docks

Application. Loading docks are a frequent target for burglars. Early detection can avoid costly break-ins to both the backs of trucks and the warehouse itself. Use the 6187CTX PIR sensor, designed for outdoor use, with the 6083-N swivel bracket in this application. The sensor should be used for local alarm or video activation only.

Installation. Mount the sensor equipped with a vertical-barrier lens on a 6083-N swivel bracket and direct the sensor toward the area to be protected (*Figure 60*). Walk test the installation (see *Walk test* on page 42).

Recommended products. 6187CTX, 6083-N (bracket)

Figure 60. Loading dock coverage



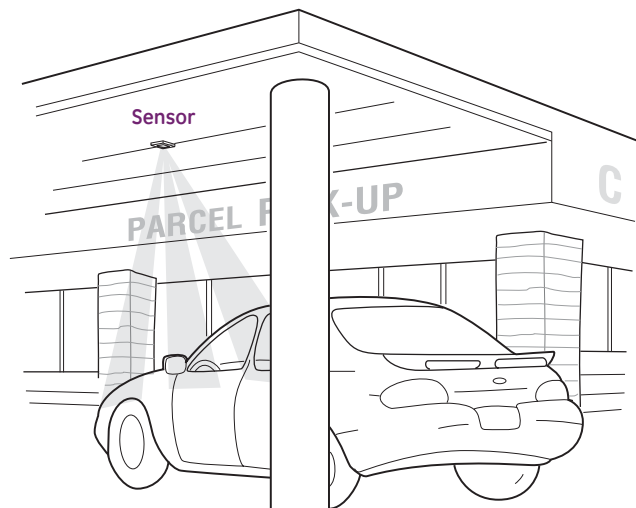
Drive-through pickup areas

Applications. Drive-through areas are used by stores and other businesses for parcel pickups. A motion sensor with a long range lens can be used to signal the store attendant with a bell and/or lights when a car pulls up at the pickup door. The long range lens provides spot detection of automobiles and minimizes false alarms from people in the walkways next to the drive-through lane. This configuration is designed for local annunciation, not alarm. The sensor is responding to the heat of the car engine and upon initial startup some car engines may not generate sufficient heat to trip the sensor.

Installation. Mount a 6187CTX sensor in the ceiling directly above the drive-through area (*Figure 61*). Test the installation (see [Walk test](#) on page 42).

Recommended products. 6187CTX

Figure 61. Drive-through areas



Vegetable gardens

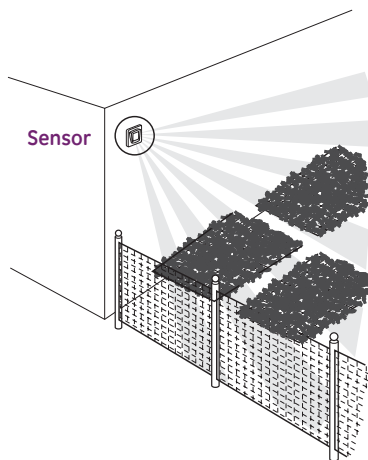
Application. Use a 6187CTX or 618703 motion sensor to sound a local alarm when animals enter a fenced vegetable garden. The cast metal housing of the 6187CTX sensor is specifically designed for outdoor applications and provides water resistance and reliable detection in temperatures from -40 to 120 °F (-40 to 50°C). Use a curtain lens and mount a sensor on all four sides of a fenced garden to provide complete perimeter detection. If the sensors are covered to protect them from rain, outdoor-rated 60-880-95R-OD and 60-880-95 sensors are also good options.

Installation. Mount one sensor approximately 7 ft. (2.1 m) high at each corner of the garden (*Figure 62*). Avoid direct sunlight on the lens and keep away from branches that may impede sensor coverage. See [Outdoor installation guidelines](#) on page 41.

If conduit is used, run the conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure conduit openings and mounting holes are well sealed.

Recommended products. 6187CTX, 618703, 60-880-95R-OD, 60-880-95

Figure 62. Garden coverage



Outdoor swimming pools

Application. Use a motion sensor to sound a local alarm upon unauthorized entrance into outdoor swimming areas either at homes or hotels. The cast metal housing of the 6187CTX sensor is specifically designed for outdoor applications, and the sensor provides water resistance and reliable detection in temperatures from -40 to 120°F (-4- to 50°C). The 618703 and 60-639-95R-OD sensors are also outdoor rated and can be used.

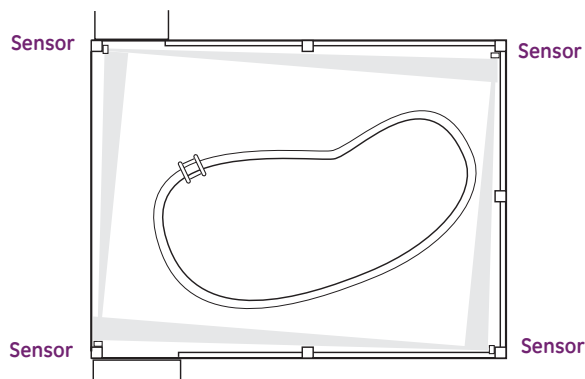
Note: The sensors in this application do not take the place of a fence. All outdoor swimming pools should be surrounded by a fence for liability reasons.

Installation. Mount one sensor with a curtain lens approximately 7 ft. (2.1 m) high at each corner of the pool area (*Figure 63*) to provide complete perimeter detection. Avoid direct sunlight on the lens and keep away from branches that may impede sensor coverage. See [Outdoor installation guidelines](#) on page 41. Walk test the installation (see [Walk test](#) on page 42).

If conduit is used, run the conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure conduit openings and mounting holes are well sealed.

Recommended products. 6187CTX, 618703, 60-639-95R-OD

Figure 63. Outdoor pool coverage



CCTV camera activation

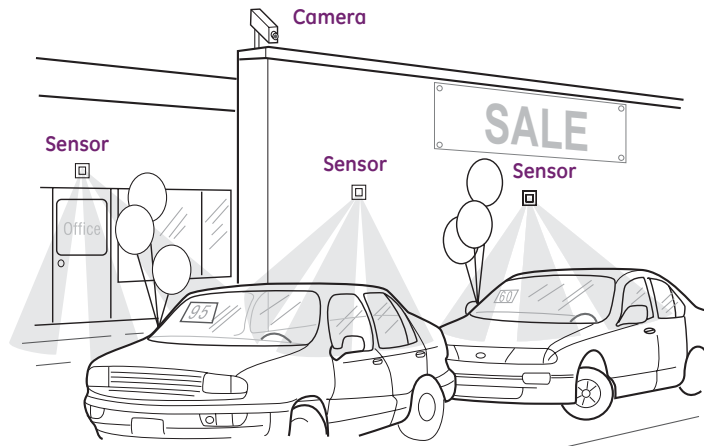
Application. Use a motion sensor to activate CCTV cameras that monitor outdoor parking lots, auto dealerships, shopping areas, shipping areas, garden shops, aircraft hangars, perimeters of military installations, and public utility installations. In this application, the sensor does not directly activate a central station alarm. Rather, it alerts a guard station and/or automatically starts a CCTV recording device. This prevents false alarms due to birds and other animals that might enter the sensor's coverage area.

Installation. Connect a 6187CTX or 60-639-95R-OD sensor to the local alarm switch in a guard station or to a CCTV camera. Mount the sensor approximately 7 ft. (2.1 m) high (*Figure 64*). Avoid direct sunlight on the lens and keep away from branches that may impede the sensor coverage pattern. See [Outdoor installation guidelines](#) on page 41.

If conduit is used, run the conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure conduit openings and mounting holes are well sealed.

Recommended products. 6187CTX, any sensor with Form C (for indoor applications), 60-639-95R-OD

Figure 64. CCTV camera activation



Outdoor lighting activation

Application. Use a motion sensor to activate lighting controls around homes, detached garages, gardens, backyard patios and decks, outdoor parking lots, auto dealerships, shopping areas, shipping areas, garden shops, aircraft hangars, perimeters of military installations, and public utility installations. When activating lights, use a separate relay and power supply.

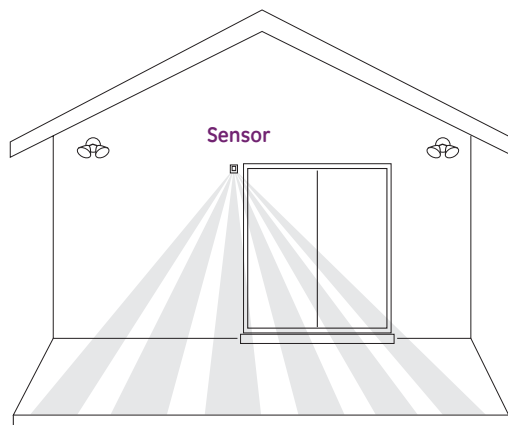
The cast metal housing of the 6187CTX PIR sensor is specifically designed for outdoor applications, and the sensor provides water resistance and reliable detection in temperatures from -40 to 120°F (-4- to 50°C). The 618703 and 60-639-95R-OD outdoor-rated sensors can also be used.

Installation. Mount the sensor approximately 7 ft. (2.1 m) high (*Figure 65*). See [Outdoor installation guidelines](#) on page 41. Walk test the installation (see [Walk test](#) on page 42).

If conduit is used, run the conduit out the side or bottom of the sensor to keep conduit condensation from draining into the sensor housing. Make sure conduit openings and mounting holes are well sealed.

Recommended products. 6187CTX, 618703, 60-639-95R-OD

Figure 65. Outdoor lighting activation



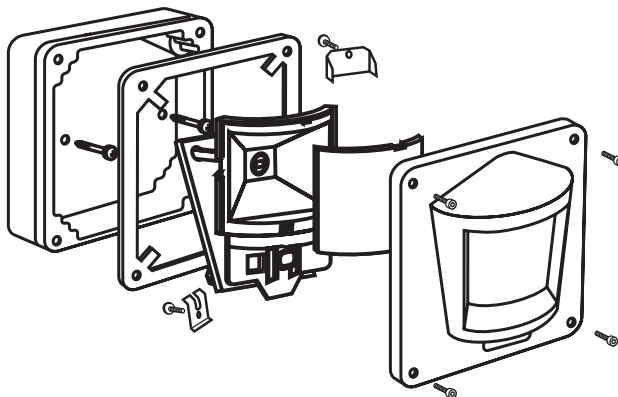
Extreme temperature conditions

Application. Meat lockers, unregulated buildings in very hot or cold climates, and other areas of extreme temperatures often require space protection. Use motion sensors in these applications for zone verification or to trigger local alarms only.

Installation. For industrial applications in very cold environments, use the 6187CTX PIR sensor (*Figure 66*) that operates down to -40°F (-40°C). The 6155CT can also be used in cold climates, but is housed in standard plastic.

Recommended products. 6187CTX

Figure 66. 6187CTX



Explosive atmospheres

Application. Areas such as munitions depots, grain storage areas, and chemical plants can involve explosive atmospheres. It is imperative that PIR sensors used in such areas contribute no electrical signal or field that could cause ignition.

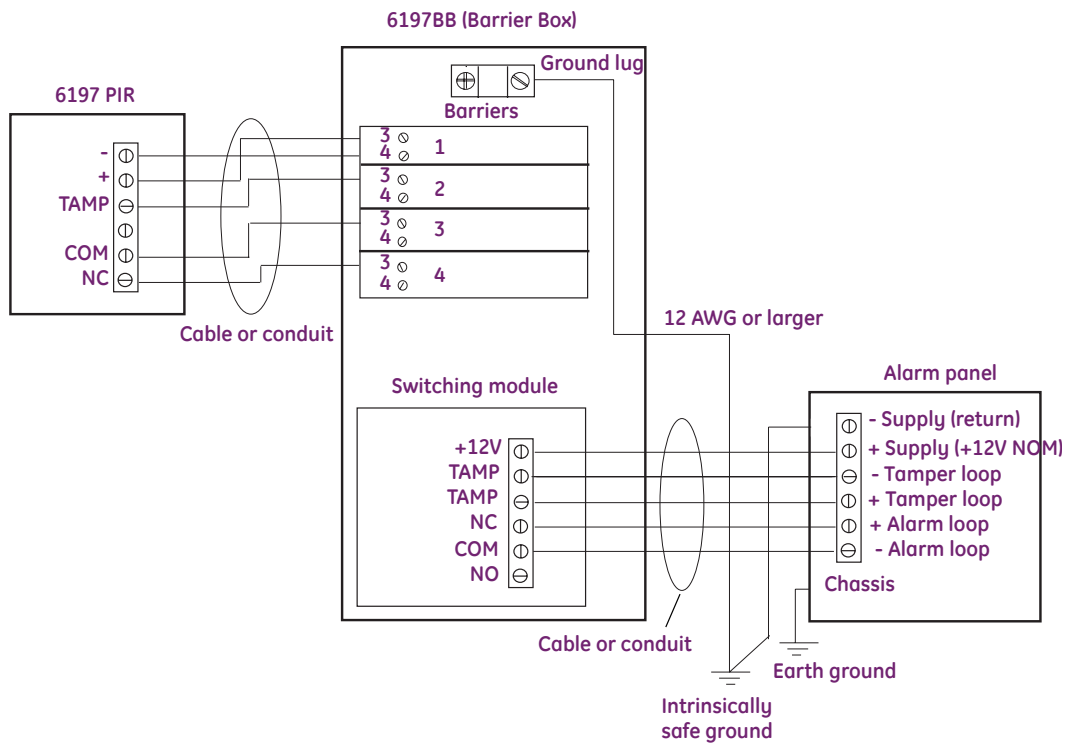
The 6197 Intrinsically Safe PIR System is FM-approved and UL Listed for use in hazardous locations. For nonincendive applications that require Class I, Division 2, Groups A, B, C, and D, use the 6198 PIR sensor.

Installation. To install the 6197 sensor, do the following:

1. Mount the sensor using either a sealed cable or sealed conduit fitting.
2. Replace the standard lens with either of the other two lenses if needed.
3. Mount the Barrier Box next to the alarm panel. Run wire between the Barrier Box and the alarm panel terminals. Connect the ground lug on the bus bar inside the Barrier Box to an intrinsically safe ground using a 12 AWG or larger wire. Connect the chassis ground on the alarm panel to earth ground (*Figure 67* on page 80).
4. Remove the front housing and install the jumpers in the sensor in the walk test mode. Select either the one-zone mode or the two-zone mode. Replace the front housing with the rubber gasket using four screws.
5. Walk test the sensor (see *Walk test* on page 42) and then install the Barrier Box lid.

Recommended products. 6197

Figure 67. Wiring diagram for explosive atmospheres



Chapter 3 Magnetic contacts

This chapter provides an overview of magnetic contacts and how to use them in a variety of applications. Applications include installations to protect doors, windows, gates, cabinets, valuable objects, and people.

Product overview

GE Security has earned its leadership position in the manufacture of magnetic contact sensors by pioneering advances such as the use of multiple reads, wide gapping, and numerous features that reduce false alarms. We have developed a range of innovative designs to assure both greater sensitivity and complete reliability, even in the most demanding environments. With over 400 models to choose from, we offer the most comprehensive line of magnetic contacts and peripherals available.

Built for durability and dependability, GE magnetic contacts are conservatively rated at 10,000,000 cycles for closed loop (Form A), ensuring long life. UL rates SPDT (Form C) at 100,000 cycles. Every reed connection is hand soldered, and the switches in many models are environmentally sealed in polyurethane. Each magnetic contact is tested before they leave the factory.

Our world-class manufacturing standards and attention to detail virtually eliminate out-of-box failures. You can install our magnetic contacts quickly and with confidence in their reliability.

Many residential and commercial applications for magnetic contacts are similar. Residential users, however, will typically be more concerned with appearance than commercial users. Commercial considerations include specific issues such as how to protect valuables in storefront windows or display cases, how to protect steel doors and windows, and how to protect trucks at loading docks. Magnetic contacts are particularly suited for use on a 24-hour loop to protect occupied areas.

Specifications

Switch configurations:

- Closed loop (Form A) - Switch closed when magnet is in close proximity
- Open loop (Form B) - Switch open when magnet is in close proximity
- SPDT (single-pull, double-throw) (Form C) - Switch has common, open, and closed sides
- DPDT (double-pull, double-throw) - Two switches, each has common, open, and closed sides

Gap distances

Ratings are nominal and may vary $\pm 20\%$. Ratings are the distance for the switch to *make*. Break distance is approximately 1.1 to 1.5 times the *make* distance.

Electrical specifications



WARNING: Each electrical rating is an individual maximum and cannot be exceeded. For example, an application at 100 V @ 0.25 amp would be 25 watts and would exceed the 7.5 watt rating of the switch (power = voltage x amps).

| Rating | Closed loop | Open loop | SPDT | DPDT |
|-----------------------------|---------------------|------------------|------------------|------------------|
| Switching voltage (max.) | 100 volts @ 0.075 A | 30 volts @ 0.1 A | 30 volts @ 0.1 A | 30 volts @ 0.1 A |
| Switching current (max.) | 0.5 amp @ 15 V | 0.25 amp @ 12 V | 0.25 amp @ 12 V | 0.25 amp @ 12 V |
| Watts (max.) (volts x amps) | 7.5 watts | 3 watts | 3 watts | 3 watts |

Environmental specifications

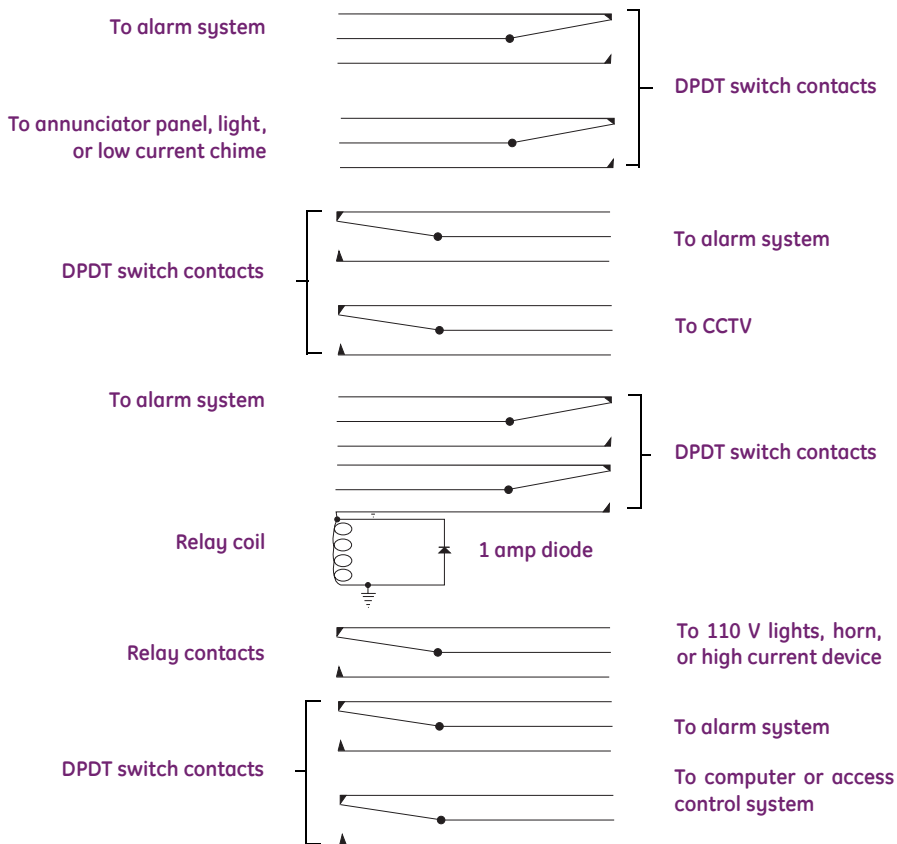
| | |
|--------------------------|---|
| Temperature range | -40 to 150°F (-40 to 65°C) |
| Shock | 50 G's @ 11 milliseconds |
| Impact | Withstands drop of 2 in. (5 cm) diameter steel ball from 30 in. (76.2 cm) |
| Vibration | 35 G's @ 50-2000 Hz |
| Reed internal atmosphere | Dry nitrogen |

Control switching using DPDT switches

This information describes how to achieve dual switching with one magnetic contact and one magnet (*Figure 68*). DPDT (double-pull, double-throw) magnetic contacts such as the 1087D, 1084D, 2507AD, or 2707AD may be used in place of two contacts or one contact and a floor mat for an annunciator panel. Other applications include access control multiplex systems, computer monitoring of doors, lighting control and safety systems. DPDT switches are available in recessed, steel door, surface, and industrial outdoor models.

Note: Each switch is electrically and mechanically isolated from the other and may switch at a slightly different point.

Figure 68. Control switching using DPDT switches



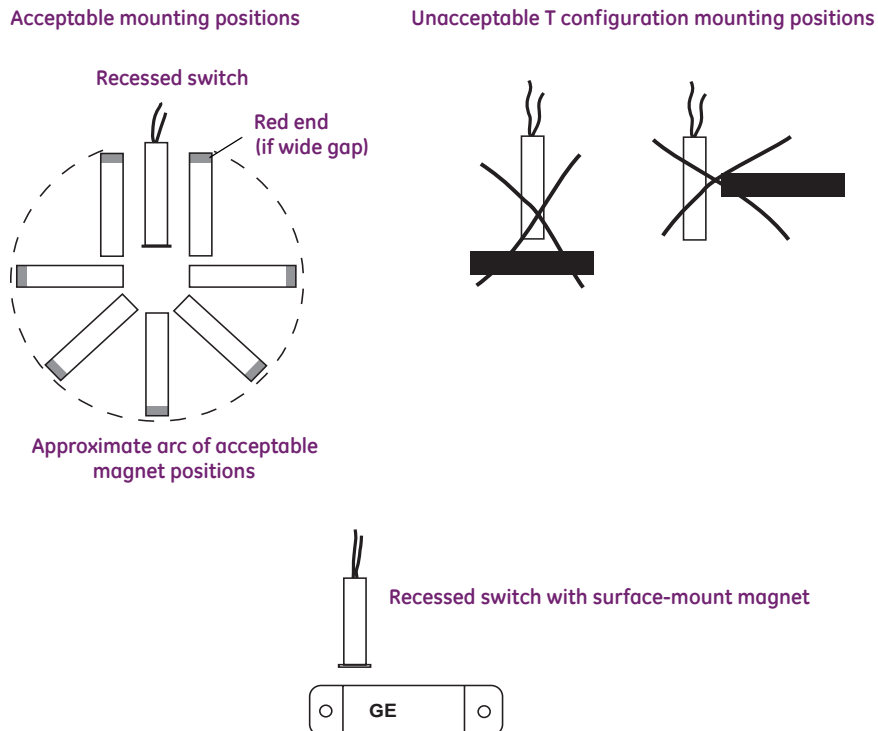
Mounting positions for recessed switches

Recessed contacts can be installed in a variety of positions to accommodate any application. As shown in *Figure 69*, the switch and magnet can be mounted end-to-end within an imaginary arc around the switch, or parallel to the switch. If using a wide-gap switch with a bare magnet, the red end must be mounted away from the switch (wide-gap switches are sensitive to the polarity of the magnet).

Gap distance will vary approximately 20% from the rated gap distance of the switch, depending on the type of switch and the mounting position. It will be necessary for the installer to experiment to determine if a given switch will work in a given position.

Note: Switch and magnet must not be mounted in a *T* configuration. In cases where a surface magnet must be used with a recessed switch, use a surface-mount switch from the 1082 switch series. Mount the magnet as shown in *Figure 69*

Figure 69. Mounting positions for recessed switches



Professional tips for reliable installation

To prevent switch damage as green lumber dries, twists, and contracts:

- Over-drill (loose fit) the mounting hole. Use RTV mounting compound (1905) to hold the unit in place.
- As an alternate, use an adapter such as the 1908 model.
- Use model 1275 or 1275W wing fit models.

To protect loose-fitting doors from false alarms:

- Mount the switch and magnet toward the hinge side of the door.
- Use a wide-gap switch to assure trouble-free performance.

To protect steel doors:

- Use wide-gap switches for maximum tolerance.
- Use recessed switches that provide adequate insulation from steel, such as the 1078 or 1078C model.

Ohmmeter testing

To verify switch operation with an ohmmeter, set the range to 200 Kohms. For a closed loop (normally open) switch, the meter will read an open when the actuator is away. On a digital meter this is typically displayed as *OL*. The meter will show resistance value when the actuator is within sensing range. Metering at the switch you will see at or near 0 ohms when the magnet is in proper alignment with the reed switch. In a typical residential setting you will see a resistance value of 4 to 6 ohms when metering the switch and cable. If the circuit includes an end-of-line (EOL) resistor, the meter will reflect the accumulated resistance of the switch, cable, and resistor. You will see opposite readings when an open loop (normally closed) switch is used.

Terms

Closed loop/open loop. Burglar alarm industry terms that reflect the condition of the switch when the actuator is in place.

Normally closed/normally open. Electrical terms that reflect the condition of the switch (without actuator).

Actuator. Magnet.

Steel door and window test

This section covers the results of tests on GE magnetic contacts used on steel doors and windows.

Test procedures. Each sample was selected at random from finished goods inventory. Tests on each contact measured pull-in (make), and drop-out (break) distances prior to mounting on a 6 in. (15.2 cm) wide, 16 in. (40.6 cm) long, and 0.5 in. (1.3 cm) thick steel plate.

Each contact pull-in (make) gap distance was measured:

- With the contact and magnet attached directly to the 0.5 in. (1.3 cm) steel plate with no spacers.
- With a single 0.125 in. (0.3 cm) spacer under both the contact and magnet. A 0.5 in. (1.3 cm) spacer was used under both the magnet and contact in the 2505 test.

All measurements were recorded to the nearest 0.05 in. (fifty-thousandths of an inch).

Test results. All dimensions in *Table 6* are shown in inches.

Table 6. Test data

| Contacts mounted on a 0.5 in. thick 6 x 16 in. steel plate | | | Control tests in air | |
|--|--------------------------------|---|-----------------------|-------------------------|
| Switch number | Make distance with out spacers | Make distance with magnet and contact spacers | Make distance pull-in | Break distance drop-out |
| 1085T | 0.4 | 0.55 | 0.8 | 1.0 |
| 1085W | 0.75 | 0.95 | 1.5 | 2.1 |
| 1082T | 0.55 | 0.7 | 1.25 | 1.5 |
| 1084T | 0.4 | 0.6 | 1.0 | 1.2 |
| 1084TW | 0.9 | 1.2 | 2.3 | 2.55 |
| 2505 | 1.2 | 2.2 | 4.2 | |

Conclusions. Surface-mount contacts can be used in such applications as steel fire doors, safes, file cabinets, truck doors, and roll-up garage doors. Allow a safety factor in installation. We recommend installing the contact and magnet with no more separation than approximately 50% of the pull-in distance. For instance, on the 1084TW measurements on steel, a maximum separation of 0.5 in. (1.3 cm) to 0.6 in. (1.5 cm) should provide a reliable system.

Steel door and window installation guidelines. Use the following installation guidelines for steel door and window applications:

- The gap on steel is approximately half the distance achieved in the air.
- Space the switch and magnet approximately 25 percent of the rated gap in air for a safety factor.
- Use a spacer whenever practical. If only one spacer is used, mount it under the magnet.
- Applications on steel do not *drain* the magnet, but they do reduce the magnetic field.

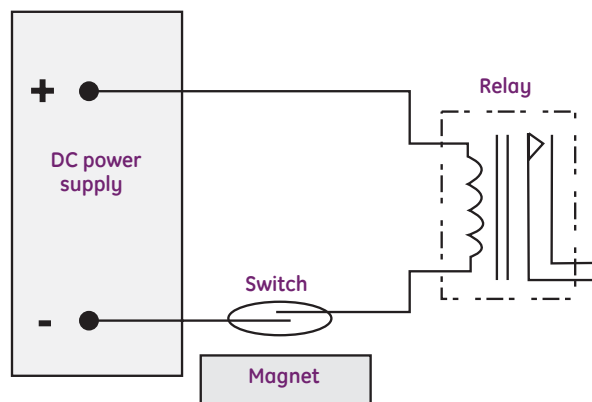
Voltage spike protection

When magnetic reed switches are wired in line with relay devices with coils, the reverse voltage spike generated when current is removed from the relay can fuse the switch contacts together.

As shown in *Figure 70*, when the contact is closed, current flows through the relay coil and magnetizes the iron core. When the contact is opened, current from the power supply stops and the magnetism of the relay iron drops to zero instantly. The collapsing magnetic field draws voltage into the relay coil. Since the coil is open (open reed switch) and there is no circuit loading to limit the voltage, spikes from the open relay can reach 500 volts or more, causing arcing across the reed contacts. Most GE reeds arc between 150 and 200 volts, well within this reverse voltage kick.

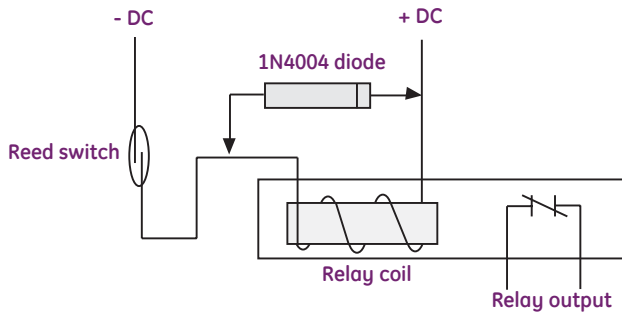
Repeated arcing roughens and pits the reed switch blades until they eventually stick together mechanically. Tapping on the switch will cause the contacts to release (open). However, this is only a temporary fix.

Figure 70. Current flow in a closed contact



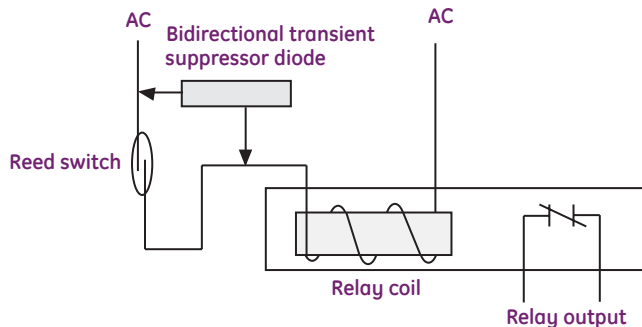
DC circuit solution. Voltage kicks or transients from DC circuits are easily controlled by adding a diode across the relay coil, as shown in *Figure 71*. The diode has no effect on the circuit when the current flows in the right direction. However, when current from the power supply stops suddenly and the relay coil generates a reverse voltage, it shorts through the diode. The stripe on the diode points toward the + voltage. The diode used should be a 1N4002, 1N4003, 1N4004, or equivalent.

Figure 71. DC circuit solution



AC circuit solution. In AC circuits, current flows through the relay coil in both directions. Using a diode would simply short out half of every cycle. However, a bidirectional transient suppressor diode can be used to clip off voltage spikes in either direction installed in parallel with the switch, as shown in *Figure 72*. The transient suppressor diode must be selected to fit the voltage used in the circuit. To find the correct diode voltage rating, multiply the circuit voltage times 1.414. For example, in a 24-volt circuit, a transient suppressor diode rated at 34 volts or more may be used ($24 \times 1.414 = 34$).

Figure 72. AC circuit solution



Nice-Duc surface wire concealment

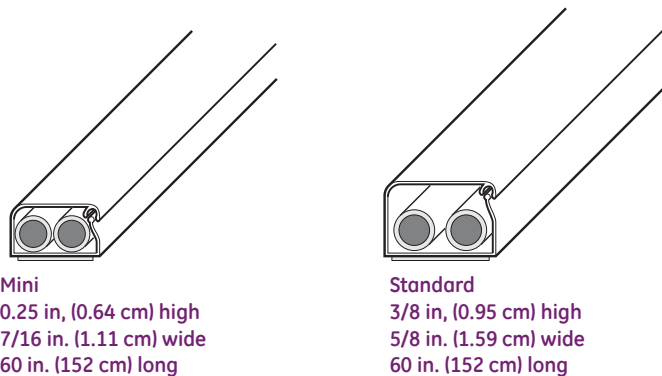
Application. Nice-Duc is the ideal self-adhesive wiring duct for concealing low-voltage alarm systems in completed structures. You can use Nice-Duc on walls, ceilings, woodwork, metal doors, and window frames. You can also use Nice-Duc to conceal a variety of other wires and cables, including telephone, audio, and video.

Nice-Duc comes in mini and standard sizes (*Figure 73*). Both sizes come in a 60 in. (1.5 m) length. A variety of right angles, T-connectors, inside and outside corners, and end caps are also available. Nice-Duc comes in white, off-white, or brown.

Installation. For easy installation, Nice-Duc features a hinged design on one side and a slot tract on the other that snaps shut with the wire inside. Low initial tack lets you move Nice-Duc without damaging tape or surface. The thin wall design is easy to cut to fit. To install Nice-Duc, clean the mounting surface with the alcohol cleaning pads included with the product, strip off the self-adhesive cover, and place the Nice-Duc in position (use connectors if needed).

Recommended products. ND5-WH-MINI, ND5-OW-MINI, ND5-BR-MINI, ND5-WH-STD-2P, ND5-OW-STD-2P, ND5-BR-STD-2P, ND5-BE-STD-2P;
Connector packs: 5U5-WH-STD, 5U5-OW-STD, 5U5-STD-BR, 5U5-BE-STD

Figure 73. Nice-Duc



Sliding aluminum doors

Application. To protect sliding aluminum doors against unauthorized entry, use one of the following magnetic contact installation methods:

- Parallel recess mount
- Perpendicular recess mount
- Parallel recess mount with adhesive surface-mount switch
- Screw-down surface mount (do not drill into glass)
- Adhesive surface mount

Installation. The installation technique you select will depend on the gap distance available and ease of installation.

To remove the door (*Figure 74* on page 93), do the following:

1. Open the door as far as required.
2. Lift the door straight up into the upper channel.
3. Pull the door out from the bottom.

Install the contact using one of the methods shown in *Figure 75* on page 93.

Recommended products. 1035, 1035W, 1055W, 1075, 1075W, 1085, 1085T, 1138T, wireless model: NX-452

Figure 74. Removing the door

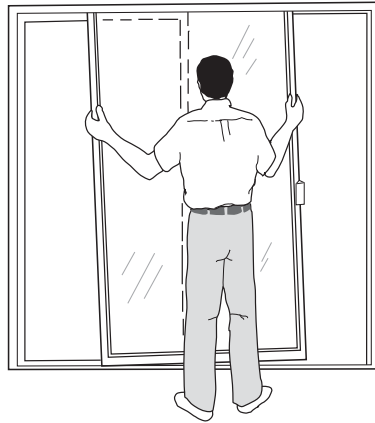
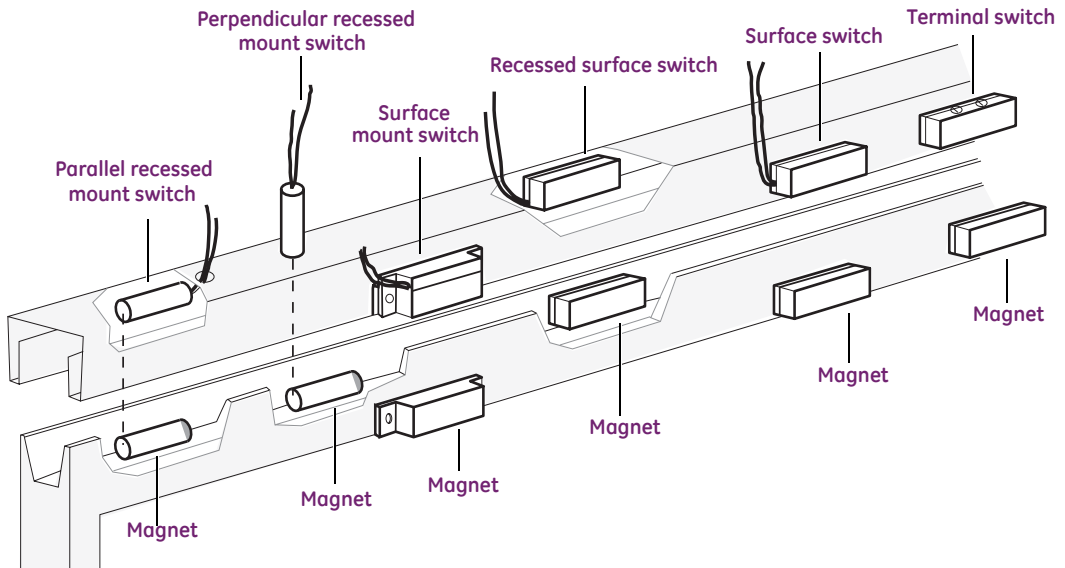


Figure 75. Aluminum sliding door mounting options



Automatic garage doors with switch shunting

Application. Use relays to provide *on* and *off* alarm protection when an exit delay is part of the system and entrance and/or exit is via a door to the garage. The garage door must also have an automatic opener that has a timed entrance light.

Installation. For installation, use two 110-volt AC SPST (single-pull, single-throw) hermetically sealed relays (*Figure 76* on page 95), and do the following:

1. Place the coil of Relay 1 across the AC line going to the motor which opens the garage door.
2. Place the coil of Relay 2 across the AC line going to the light on the garage door opener.
3. Place both sets of the 110-volt relay contacts in parallel and connect them together across the garage door contact. Use a junction box to ease wiring.

User operation is as follows:

- Before leaving home, arm the alarm system and leave via the door leading to the garage, which would normally be on the Exit/Entry delay loop.
- As you signal the garage door to rise, Relay 1 activates as the motor starts and shunts the garage door contact, preventing an alarm.
- As the door rises, the light comes on and Relay 2 activates, also shunting the garage door contact.
- Once the door is all the way open, the motor shuts off, causing Relay 1 to drop out. However, the light remains on for a fixed period of time, so Relay 2 remains activated, still shunting the garage door contact and preventing an alarm.
- Prior to the light going out (this should be timed), exit the garage and signal the door to lower.
- The motor starts, activating Relay 1 and shunting the garage door relay.
- The light, still on, restarts the timed cycle and Relay 2 remains activated.
- When the door is completely closed, Relay 1 drops out.
- After a fixed time, Relay 2 drops out and returns the loop to the garage door contact and normal operations.

Wood doors with threshold contacts

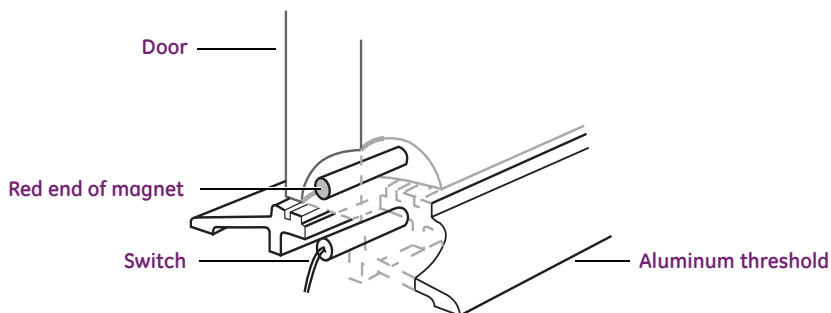
Application. For wood doors with aluminum thresholds, it is sometimes convenient to mount the magnet in the bottom of the door and the switch in the hollow space beneath the threshold. The distance between the magnet and switch will require a wide-gap switch.

Installation. Select a recessed-mount wide-gap switch, and do the following:

1. Drill a horizontal hole for the magnet in the outside edge of the door. Coat the magnet with RTV mounting compound and insert the magnet in the hole. If using a wide-gap switch with a bare magnet, insert the red end of the magnet toward the outside of the door (switch is polarity sensitive).
2. Remove the threshold. Attach the switch on the inside of the threshold with RTV mounting compound. Position the switch so it will be directly beneath (and parallel to) the magnet when the threshold is replaced (*Figure 77*).
3. Replace the threshold and test (see *Ohmmeter testing* on page 86) while opening and closing the door.
4. Connect the switch to the alarm loop.

Recommended products. 1055W, 1065W, 1057RT, 1075W, RTV 1905;
wireless model: NX-458

Figure 77. Wood door threshold with recessed contact



Steel doors with threshold contacts

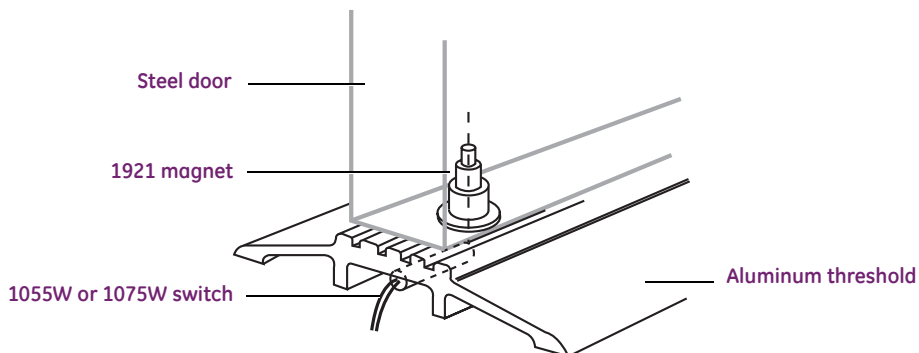
Application. For steel doors with aluminum thresholds, you can mount the magnet in the bottom of the door and the switch in the hollow space beneath the threshold. The distance between the magnet and switch requires a wide-gap switch.

Installation. Select a steel door magnet with a wide-gap switch and do the following:

1. Remove the door from the hinges and drill a 1 in. (2.5 cm) diameter hole in the bottom of the door about 2 in. (5 cm) from the front edge of the door. Glue with RTV or epoxy and snap-fit the magnet in the hole.
2. Remove the threshold and attach the switch on the inside of the threshold with RTV mounting compound. Position it so it will be directly beneath and perpendicular to the magnet with the end centered beneath it when the threshold is replaced (*Figure 78*).
3. Replace the threshold and door and test (see *Ohmmeter testing* on page 86) while opening and closing the door.
4. Connect the switch to the alarm loop.

Recommended products. 1055W or 1075W with 1921 magnet, RTV 1905

Figure 78. Steel doors with threshold contacts



Recessed steel doors

Application. Some steel doors are recessed at the top, creating a large gap which must be overcome when you use a concealed magnetic contact. Installation varies, depending on one of the following recess depths:

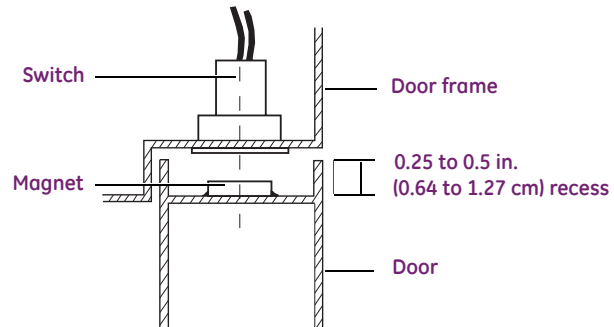
- 0.25 to 0.5 in. (0.6 to 1.3 cm) recessed top
- 0.5 to 0.75 in. (1.3 to 1.9 cm) recessed top
- more than 0.75 in. (1.9 cm) recessed top

Installation with 0.25 to 0.5 in. (0.6 to 1.3 cm) recessed top. To install the contact, do the following:

1. Align the position for the switch and magnet and drill a hole for the switch in the door frame:
 - 1078CW and 1078CTW: 0.75 in. (1.9 cm) with a hole punch; 11/16 in. (1.8 cm) with a hole saw.
 - 1078W and R1078: 1 in. (2.5 cm) with a hole punch; 15/16 in. (2.4 cm) with a hole saw.
2. Wire the switch to the loop and insert in the frame.
3. Clean the top of the door and mount the magnet using tape (*Figure 79* on page 99). Close the door and test (see *Ohmmeter testing* on page 86).
4. Use RTV or epoxy to glue the magnet permanently in place and retest.

Recommended products. 1078W, R1078, 1078CW, 1078CTW, 1840, 1802, RTV 1905

Figure 79. Steel doors with 0.25 to 0.5 in. recessed top

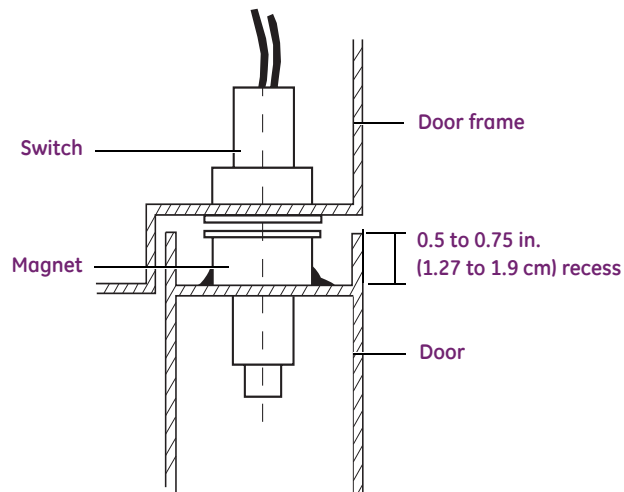


Installation with 0.5 to 0.75 in. (1.3 to 1.9 cm) recessed top. To install the contact, do the following:

1. Align the position for the switch and magnet and drill a hole for the switch in the door frame:
 - 1078CW: 11/16 in. (1.8 cm) with a hole saw; 0.75 in. (1.9 cm) with a hole punch.
 - 1078W: 15/16 in. (2.9 cm) with a hole saw; 1 in. (2.5 cm) with a hole punch.
2. Drill a hole for the magnet in the top of the door:
 - 1078CW: 11/16 in. (1.8 cm) with a hole saw; 0.75 in. (1.9 cm) with a hole punch.
 - 1078W: 15/16 in. (2.9 cm) with a hole saw; 1 in. (2.5 cm) with a hole punch.
3. Wire the switch to the loop and insert the switch in the frame.
4. Clean the top of the door and mount the magnet in the hole (*Figure 80*). Hold in place with tape. Close the door and test (see *Ohmmeter testing* on page 86).
5. Use RTV or epoxy to glue the magnet permanently in place and retest.

Recommended products. 1078W, 1078CW, 1078CTW, R1078, RTV 1905

Figure 80. Steel door with 0.5 to 0.75 in. recessed top

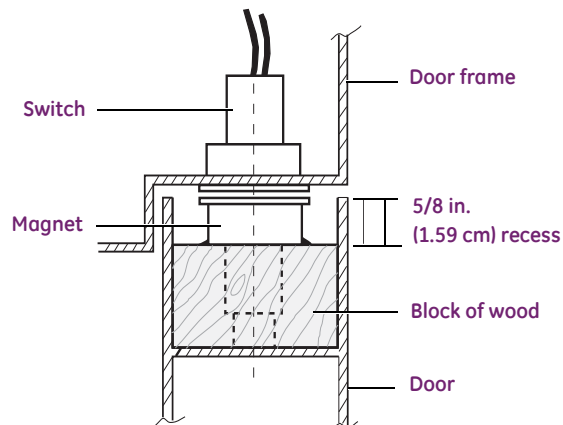


Installation with more than 0.75 in. (1.9 cm) recessed top. To install the contact, do the following:

1. Glue a wood block in the top of the door. The thickness of the block should leave 5/8 in. (1.6 cm) to the top of the door.
2. Align the position for the switch and magnet. The end of the magnet must be centered on the switch as shown in *Figure 81*. Drill a hole for the switch in the door frame:
 - 1078CW: 11/16 in. (1.8 cm)
 - 1078W: 15/16 in. (2.4 cm)
3. Drill a hole for the magnet:
 - 1078CW: 9/16 in. (1.4 cm)
 - 1078W: 5/8 in. (1.6 cm)
4. Wire the switch to the loop and insert the switch in the frame.
5. Clean the top of the door and mount the magnet in the hole using tape (*Figure 81*). Close the door and test (see *Ohmmeter testing* on page 86).
6. Use RTV or epoxy to glue the magnet permanently in place and retest.

Recommended products. 1078W, 1078CW, 1078CTW, R1078, RTV 1905

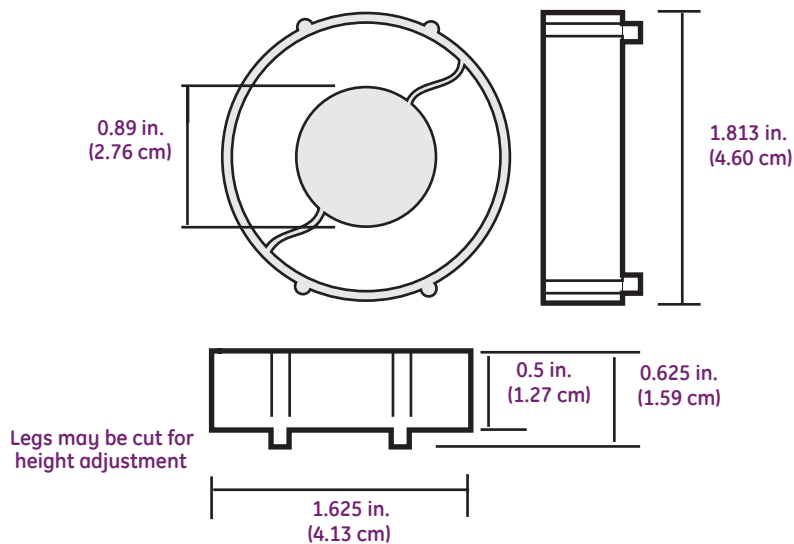
Figure 81. Steel door with more than 0.75 in. recessed top



Installation using the 1840 magnet. The 1840 rare earth magnet (*Figure 82*) is designed for use in metal entry/exit doors with a channel in the top of the door. The magnet eliminates the need to cut a mounting hole in the door channel. The flexible magnet housing can be compressed to accommodate a variety of channel widths for quick, easy installation. We recommend you use an adhesive with the magnet.

Recommended products. 1840 magnet

Figure 82. 1840 magnet



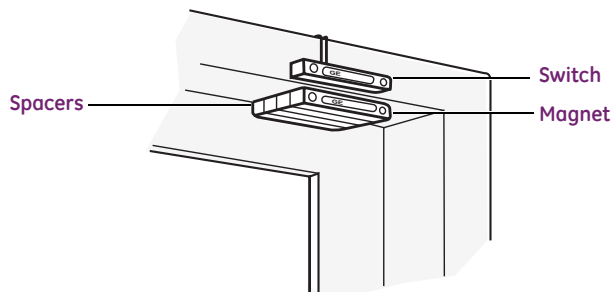
Deeply recessed doors

Application. Use one of the following installations to protect deeply recessed doors using surface-mount contacts. When mounting on steel doors, use a spacer behind the switch and/or use a wide-gap switch. Always test the installation (see *Ohmmeter testing* on page 86).

Installation using a magnet with spacers. There is a wide range of spacers available for each contact series. Stack spacers until the magnet aligns with the switch when the door is in the closed position (*Figure 83*).

Recommended products. 1082TW, 1085TW, 1045T, 1914T

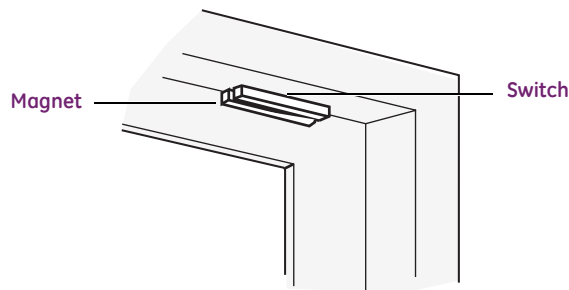
Figure 83. Deeply recessed door with magnet and spacers



Installation using a switch on the inside of the jamb. To avoid the use of brackets, align and mount as shown in *Figure 84*. Use this technique only on a door with a reliable stop so that the door cannot swing inward and hit the switch.

Recommended products. 1082TW, 1045T

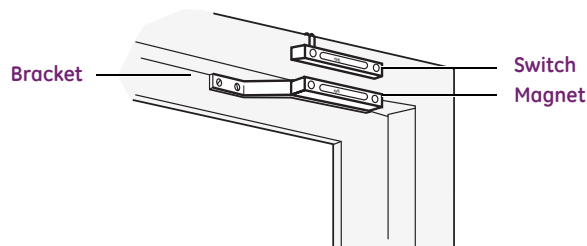
Figure 84. Deeply recessed door with switch mounted on jamb



Installation using a 1910 or 1910-2 bracket. Verify that the distance from the inside of the door frame to the inside of the door does not exceed 1.0 in. (2.5 cm). Align and mount as shown in *Figure 85*. If the distance exceeds 1.0 in. (2.5 cm), use the 1912 or 1911 L-bracket or a 1940-1 bracket as shown in one of the following installations.

Recommended products. 1082TW with 1910 bracket, or a 1045T with a 19102 bracket

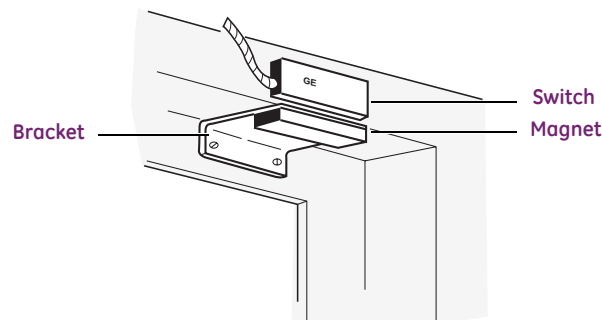
Figure 85. Deep recessed door installation with 1910 bracket



Installation using a 1912 L-bracket. Verify that the distance from the inside of the door frame to the inside of the door does not exceed 2 in. (5.2 cm). Align and mount as shown in *Figure 86*.

Recommended products. 1045T or 1085TW with 19122 L-bracket, 2500 with 1912 L-bracket

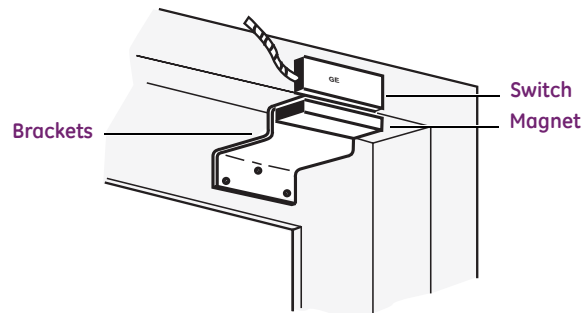
Figure 86. Deep recessed door with L-bracket



Installation using a 19401 Z-bracket and a 19122 L-bracket. Verify that the distance from the inside of the door frame to the inside of the door does not exceed 3 in. (7.6 cm). Align and mount as shown in *Figure 87*.

Recommended products. 2505A with 19401 Z-bracket and 1912 L-bracket

Figure 87. Deep recessed doors with a Z and L bracket



Overhead or curtain doors

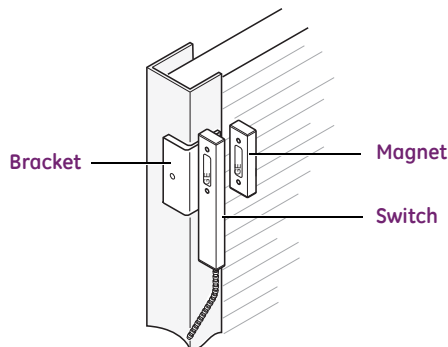
Application. There are many different types of overhead and curtain doors with different mounting surfaces, such as ribs and lips. You can use a variety of magnetic contacts and mounting techniques, depending on the specific overhead or curtain door. Always test the installation (see *Ohmmeter testing* on page 86).

Installation using a 2515A contact mounted on the channel. The 2515A allows a vertical gap distance of 6 in. (15.2 cm) and an overall side-to-side gap of 6 in. (15.2 cm). Use this contact to install a security switch on the channel of overhead doors that do not line up properly, sag, or are loose and move with wind and vibration. To install the contact, do the following:

1. Mount the contact and magnet so both labels read in the same direction and the mounting holes are parallel (*Figure 88*).
2. To ensure maximum operating gap, do not mount the magnet more than 3 in. (7.6 cm) away from the contact. If the magnet is mounted 1 in. (2.5 cm) from the contact and is offset by 1 in. (2.5 cm) either in front or back of the contact, the unit will maintain a vertical gap distance of 6 in. (15.2 cm). If the magnet is mounted 2 in. (5.1 cm) from the contact and is offset by 1 in. (2.5 cm) either in front or back of the contact, the unit will maintain a vertical gap distance of 4 in. (10.2 cm).

Recommended products. 2515A

Figure 88. Overhead door with 2515A mounted on the channel

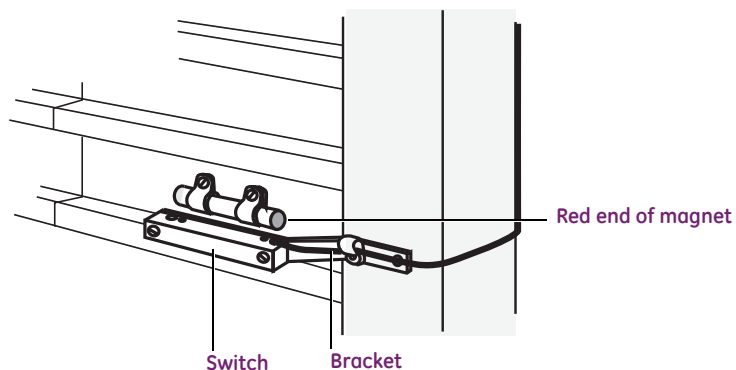


Installation using a 1042TW contact. Depending on your application, you can mount the 1042TW contact on the channel or door lip. To mount the contact, do the following:

1. Close the door and tape the magnet in place with masking tape. Position the magnet in the recessed portion of the slat as close to the edge of the door as possible. Mount with the red end as shown in *Figure 89*.
2. Roll up the door, making sure the magnet clears and does not interfere with operation of the door. Close the door.
3. Attach the magnet to the door with screws.
4. Attach the wires to the switch terminals. Attach the switch to the outside of the long portion of the bracket. The label must be right side up and facing away from the door when the bracket is mounted on the channel.
5. Attach the bracket to the channel with self-tapping screws. Position the bracket so that the corner of the door lip clears as the door is opened and closed.
6. Test for proper operation of the switch by opening and closing the door.
7. Dress the wires with wire clamps and hook into the alarm loop. Retest for operation and clearance.

Recommended products. 1042TW switch, 19102 bracket, 1923 magnet

Figure 89. Overhead door with 1042TW contact

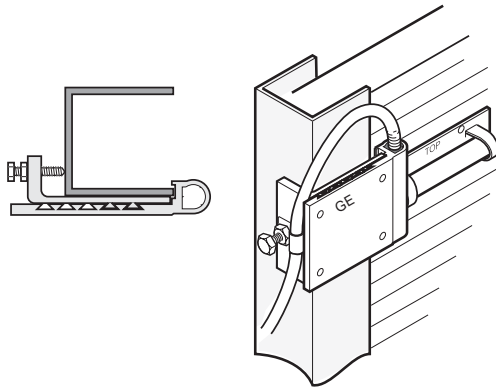


Installation using a 2302 or 2304 contact. Use the 2302 or 2304 contacts for applications where you want to mount the switch on the channel and the magnet horizontally in the door slats. To install the contact, do the following:

1. Close the door. Adjust the interlocking bracket into the appropriate slot in the switch housing to fit the specific curtain door channel. Place the unit on the channel making sure the outer lip of the switch housing is positioned so it overlaps the edge of the channel.
2. Move the switch and bracket assembly so that it is no more than 36 to 48 in. (91.4 to 121.9 cm) from the surface of the floor. This allows the magnet to roll up with the door without interference.
3. Tighten down the mounting bolt enough to hold the unit in place.
4. Position the magnet so that the word *TOP* is reading in the same direction as the label on the switch housing, and the center line of the magnet is aligned with the label on the switch housing (*Figure 90* on page 109). The magnet end should be within 0.24 to 0.5 in. (0.6 to 1.3 cm) from the edge of the switch housing for reliable actuation on heavy steel surfaces.
5. Connect the switch to an ohmmeter to verify functioning. Push firmly on the door so that the area the magnet occupies is moved to its farthest position away from the switch in all directions. If the circuit is interrupted, slide the magnet closer to the switch assembly. Repeat this procedure to ensure proper operation. Mark the position on the door.
6. Establish the correct position, tighten the mounting bolt down and then fasten the lock nut against the housing. For extra mounting strength, drill two 0.15 in. (0.4 cm) diameter holes through the mounting holes in the housing and fasten with two #8 screws (not provided).
7. To mount the magnet, do one of the following:
 - Drill two 0.15 in.(0.4 cm) diameter holes through the mounting holes in the magnet housing. Fasten with the two #8 self-tapping screws provided.
 - For faster installation, remove the magnet. Clean the door surface with alcohol, dry it off, then mount with strips of double-stick adhesive tape. Mount the tape to the magnet housing first and then attach the housing to the door, pressing firmly to ensure proper adhesion.

Recommended products. 2302, 2304

Figure 90. Overhead door with 2302 or 2304 contact

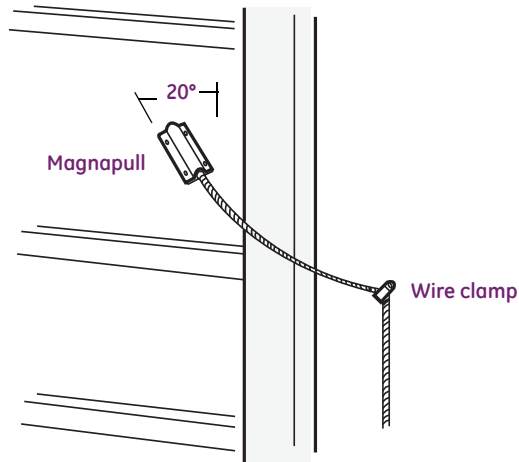


Installation using the 2105 Magnapull. The Magnapull provides a quick and easy method to protect overhead doors. There are no brackets to adapt and no drilling needed. This is ideal for applications where there is a lot of play in the door. To install the Magnapull, do the following:

1. Fasten the cable using a wire clamp so that if the switch is dropped it will not hit the floor.
2. Mount the magnet housing at an angle approximately 20 degrees from vertical (*Figure 91*) to prevent switch damage if the door is opened before the switch is removed. (The user should be instructed to release the Magnapull switch before the door is opened to prevent damage to the switch.)
3. Position the cable so there is slack between the magnet housing and the wire clamp.
4. To test proper operation, open the door.

Recommended products. 2105

Figure 91. Overhead door with 2105 Magnapull contact

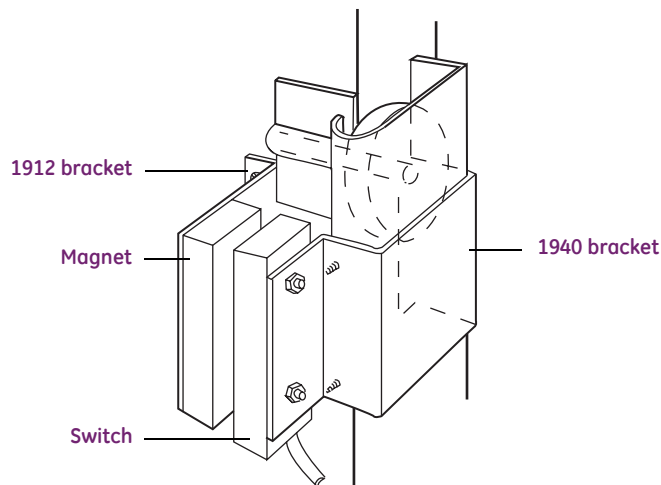


Installation using a 1092A kit. Mount the contact on the track at the bottom of overhead doors. Make sure the door does not have a guard that extends around the track. To install the contact, do the following:

1. Mount the unit on the side opposite the rope pull, or move the rope pull to the side opposite the switch.
2. Mount the 1940 bracket on the track with two self-tapping screws. Tighten evenly against the track. Mount the switch to the 1940 bracket.
3. Mount the 1912 bracket. Mount the magnet to the bracket, allowing about a 0.5 in. (1.27 cm) gap between the switch and magnet (*Figure 92*). The switch and magnet labels must read in the same direction (switch is polarity sensitive).
4. Test for clearance and operation (see *Ohmmeter testing* on page 86).
5. Loosen the holding screws on the 1940 bracket and apply RTV mounting compound to the flat side of the track. Tighten the screws and retest.

Recommended products. 1092A kit (in some applications, 1082TW with 1912 and 1940 brackets)

Figure 92. Overhead door with 1092A kit



Installation using heavy-duty, low-profile contacts. You can use a variety of mounting methods to use low-profile contacts to protect overhead doors. All of the methods described use easy-to-mount 1982 magnets with the 2200 heavy-duty, low-profile series contacts. The contacts feature active gap distances of up to 3 in. (7.6 cm) and heavy-duty design. The mounting methods include:

- Lip mount (*Figure 93*)
- Smooth surface-mount (*Figure 94* on page 113)
- Rib mount (*Figure 95* on page 113)
- Overhead mount (*Figure 96* on page 113)

To mount the 1982 magnet, use bolts through the steel door, or tap holes for #6 stainless steel combo-head screws. The flange of the magnet features slots that allow you to move the magnet left or right over the screw heads for best alignment.

Recommended products. 2202A, 2202AU, 2205A, 2205AU

Figure 93. Overhead door with lip mount installation

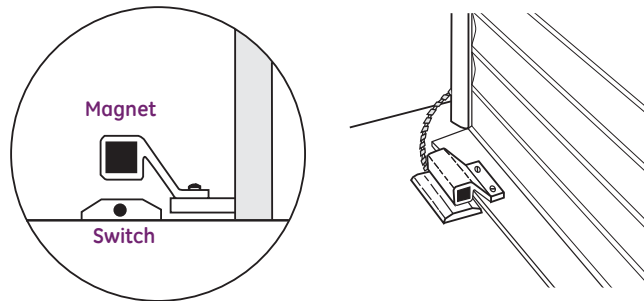


Figure 94. Overhead door with smooth surface-mount installation

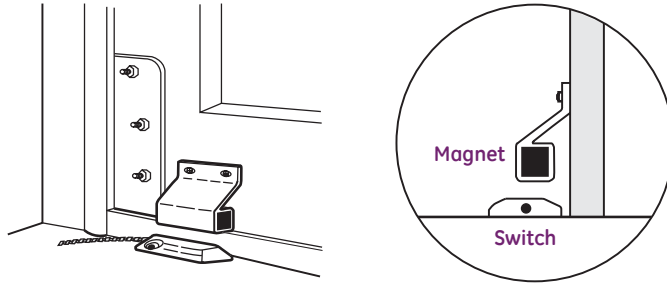


Figure 95. Overhead door with rib-mount installation

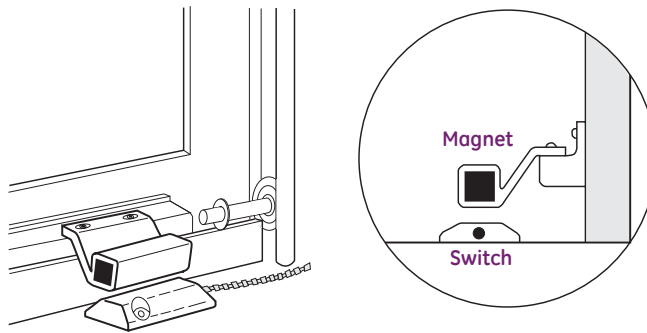
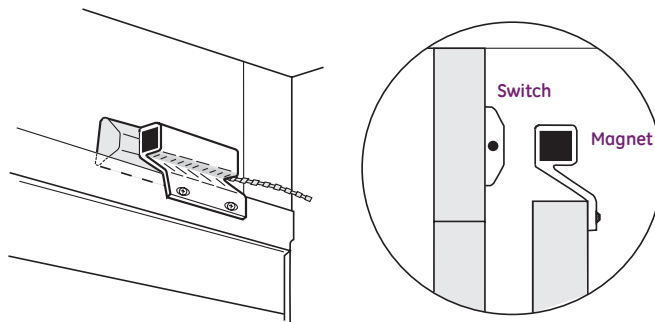


Figure 96. Overhead door with top-mount installation



Panel or sectional overhead doors

Application. The 2315A, 2317A, and 2325A contacts are specifically designed for panel or sectional overhead doors. The contacts can be mounted directly to the door channel, with the magnet mounted vertically on the door and out of the way. The contact's integrated mounting bracket is adjustable and can fit most door channel widths.

Installation. The contact should be mounted at least 13 in. (33 cm) from the floor. If other track-mounted devices interfere, mount the switch under them.

To install the contact, do the following:

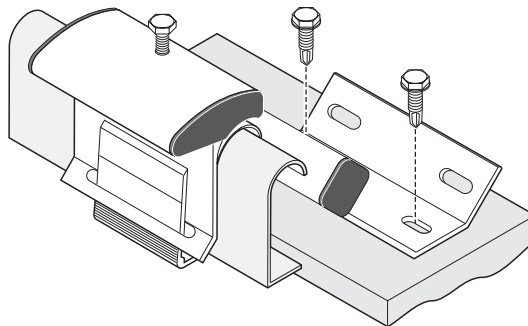
1. Slide the slot of the switch over the beveled edge of the L-bracket and snap it tightly into place. Screw it down firmly.

Optional: Use the existing roller-track bolts to mount the switch without using the L-bracket.

2. Align the magnet with the switch and use screws to attach it to the door (*Figure 97*). The switch and magnet must be aligned within 0.5 in. (1.3 cm) of each other to prevent false alarms.
3. Connect the switch wires to the alarm system and test (see [Ohmmeter testing](#) on page 86).

Recommended products. 2315A, 2317A, 2325A

Figure 97. Panel door



High security doors

Application. High security magnetic contacts are used to protect doors in high security locations or where high-value materials are stored. The contacts can be effectively used at airports, biotechnology labs and other medical research settings, warehouses, manufacturing plants, jewelry stores, banks, data processing centers, military bases and ships, ammunition depots, and energy-generation facilities.

The 2757/2767 series is specifically designed for high security applications in prisons, military installations, and government facilities. These contacts are virtually impossible to defeat. Total encapsulation coupled with recess mounting prevents access to the switch and to cabling, and prevents tampering with an external magnet. They are factory calibrated for operation in steel and are not subject to sticking or freezing on seldom-used doors. In addition, the 2767 contacts are adjustable for use in loose-fitting doors.

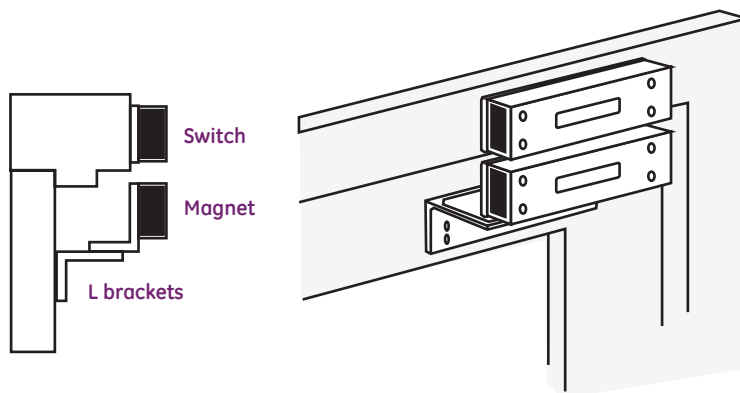
Installation using surface mount contacts. See the specific contact's installation instructions for each recommended contact. To install the 2707A contact, do the following:

1. Bring the magnet toward the switch until an ohmmeter, connected to the closed loop wires, reads 0 ohms. Mark this point.
2. Bring the magnet closer to the switch until the ohmmeter reads infinity. Mark this point.
3. Position the magnet midpoint between the two marks.
4. Use the magnet template to mark the mounting holes.
5. Drill the mounting holes.
6. If a pry tamper plate is required for Certified Safe and Vault applications, install it under the switch with two #6 x 0.75 in. flathead screws. Connect the gold and blue pointed leads to the 24-hour circuit.

Note: Other contact models have unique installation instructions.

Recommended products. 2702A, 2707AD, 2706AS, 2706AP, 2767, 2757, 2757D, 2727A, 2747A

Figure 98. High security 2707A contact installed with 2 L-brackets



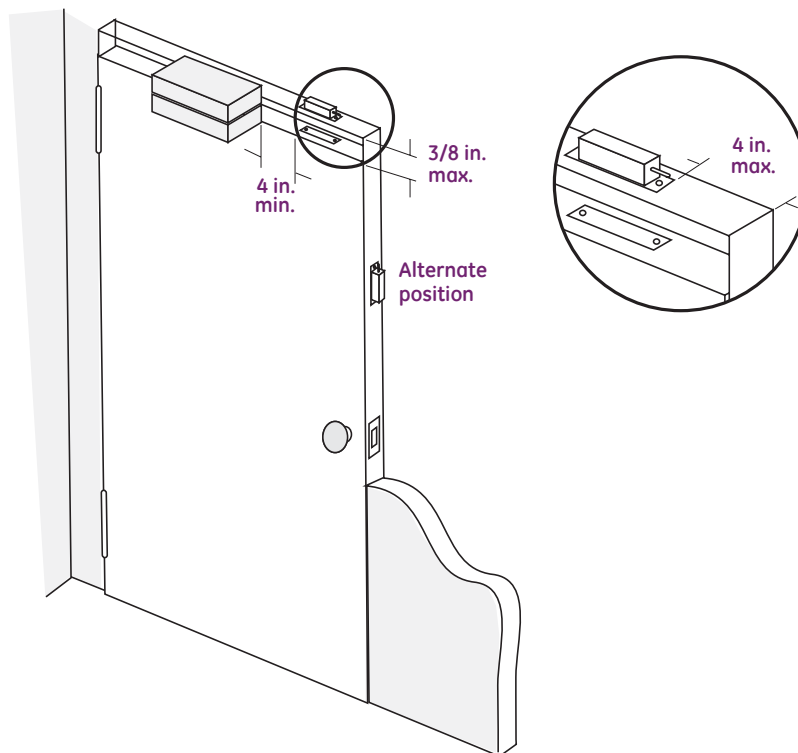
Installation using concealed contacts. The 2757/2767 contact are designed to fit into standard ANSI cutouts for mortise installation. If door and jamb are provided with ANSI cutouts and blanks, simply remove the blanks and install the switch and magnet in place.

If cutouts aren't provided, cut holes (W x D x L) 1.25 x 4.875 x 1.25 in. (3.18 x 12.38 x 3.18 cm) in both the door and jamb for the 2757 and 2757D models, and 1.25 x 4.875 x 1.0 in. (3.18 x 12.38 x 2.54 cm) for the 2767. Switch and magnet should be within 0.625 in. (1.58 cm) both vertically and horizontally for proper alignment.

Connect leads to a security loop per the electrical schematics and test (see [Ohmmeter testing](#) on page 86).

Recommended products. 2757, 2767

Figure 99. Concealed contacts



Explosion-proof, high-security switches

Application. The explosion-proof, high-security switches have rugged die-cast aluminum housings with conduit fittings. They are UL Listed for hazardous location classes (Class I Group C and D, and Class II Group E, F, and G). These switches are used in high-security applications such as airports, transportation depots, military locations, chemical plants, nuclear power plants, and coal mines.

Installation. To install the 2804T switch (*Figure 100* on page 119), do the following:

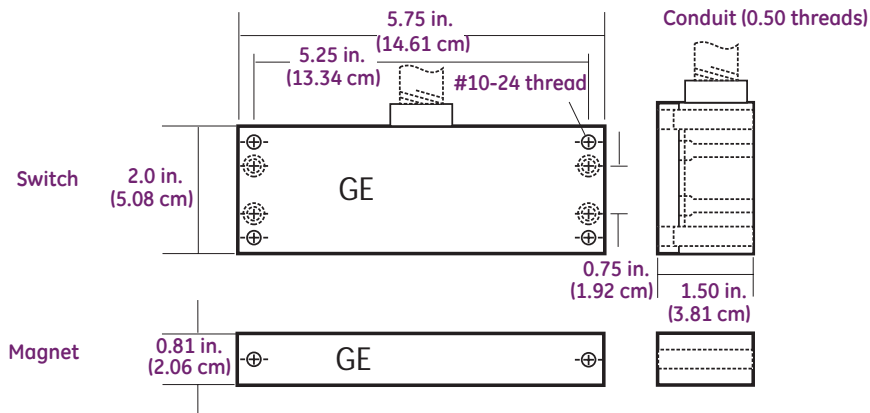
1. Place the bottom of the template provided on the frame approximately 0.25 in. (0.6 cm) from the edge of the door. Mark the mounting holes.
2. Drill the four mounting holes 5/8 in. (1.6 cm) deep using a 5/32 in. drill. Tap the holes for a #10-24 machine screw thread. Mount the contact with the #10-24 x 1.25 in. flathead screws provided.
3. Before running the conduit, attach an ohmmeter to the common and the closed loop terminals. The meter should read *INFINITY* with the magnet away from the switch (wiring diagram provided).
4. The magnet for the unit is contained in two pieces. The master magnet is brown and the submagnet is silver. Place the submagnet housing into the master magnet housing, making sure that the yellow dot on the subhousing is towards the switch.
5. Position the magnet and switch so that the labels read in the same direction and the monogram on the magnet is directly aligned with the monogram on the switch. The setup gap distance is 0.4 in. (1.0 cm). Switches will operate at approximately 0.2 to 0.6 in. (0.5 to 1.5 cm) on closing, and go into alarm at approximately 0.4 to 0.8 in. (1.0 to 2.0 cm) on opening. Maximum gap is 0.1 in. (0.3 cm). However, environmental conditions, such as the thickness of the metal to which the switch and magnet are attached, may cause slight variations in gap distance. Therefore, we recommend the following installation method:
 - Bring the magnet toward the switch until the ohmmeter reads 0 ohms. Mark this point.
 - Continue bringing the magnet towards the switch until the meter reads *INFINITY*. Mark this point.
 - Use the magnet template and mark the mounting holes.

6. Drill the two inside mounting holes 5/8 in. (1.6 cm) deep, using a 9/64 in. drill. Tap the holes for a #8-32 machine screw thread. Drill the two outside mounting holes 5/8 in. (1.6 cm) deep, using a 5/32 in. drill. Tap the holes for a #10-24 machine screw thread.
7. Remove the submagnet housing from the master magnet housing. Mount the submagnet housing first using the two center holes. Use the #8-32 x 1.5 in. machine screws provided. Be sure that the yellow dot faces the switch.
8. Mount the master magnet housing directly over the submagnet housing. Use the #10-24 x 1.75 in. machine screws provided. Be sure that the monogram labels on the switch and magnet read in the same direction.
9. Test (see *Ohmmeter testing* on page 86).
10. Install the conduit.

Note: Other models have unique installation instructions.

Recommended products. 2804T, 2807T, 2814T, 2845T, 2847TH

Figure 100. Explosion-proof, high security 2804T contact



Revolving doors

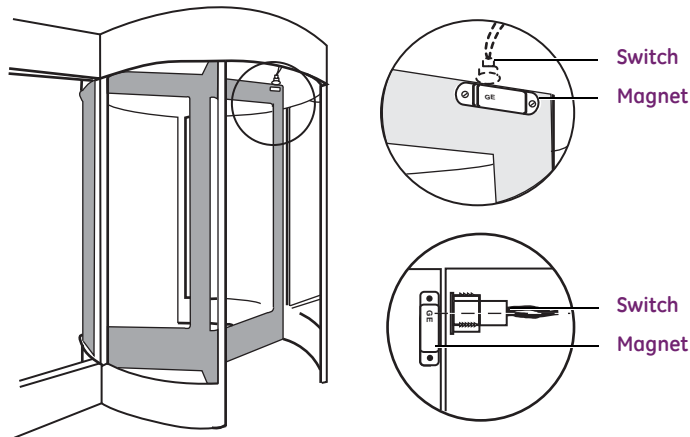
Application. You can secure steel or aluminum revolving doors with magnetic contacts in several ways, depending on their material and the availability of mounting space.

Installation for doors accessible from the top. To install the contact, do the following:

1. Lock the door to check its position when secured. Mark the switch mounting location in the top or canopy of the assembly. Offset it slightly as the magnet will be positioned on the side of the door. Drill a 15/16 in. (2.4 cm) diameter hole when using a saw hole, or 1 in. (2.5 cm) diameter hole when using a hole punch and mount the switch in the hole using RTV mounting compound.
2. Place the magnet on the door as close to the rubber gasket as possible. Observe polarity. If mounting the magnet on steel, use a spacer or order a special magnet containing two magnets inside the housing (1920D). When using a surface-mount magnet with the 1078W, position the left end of the magnet as you read the label, centered off the G on the switch label (*Figure 101*).
3. Test (see [Ohmmeter testing](#) on page 86).

Recommended products. 1078W, 1080T, 1920D

Figure 101. Revolving doors with contact mounted at the top



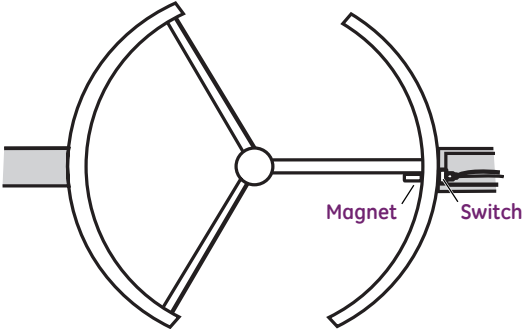
Installation for doors not accessible from the top. When you cannot install the contact in the top of the canopy of the door assembly, do the following:

1. Lock the door to check its position when secured. Mark the switch mounting location in the side of the door in the wall (*Figure 102*). Drill a 15/16 in. (2.4 cm) diameter hole when using a hole saw, or 1 in. (2.5 cm) diameter hole when using a hole punch and mount the switch in the hole using RTV mounting compound.
2. Place the magnet on the door as close to the rubber gasket as possible. Observe polarity. If mounting the magnet on steel, use a spacer or order a special magnet containing two magnets inside the housing. When using a surface-mount magnet with the 1078W, position the left end of the magnet as you read the label, centered off the G on the switch label (*Figure 101* on page 121).
3. Test (see *Ohmmeter testing* on page 86).

Note: Some systems incorporate an electromagnetic break-away device, usually located in the drum. Locate the magnetic contact far enough away to prevent adverse effects to the magnet. Stainless steel armored cable is available if the switch will be exposed.

Recommended products. 1078W, 1080T, 1920D

Figure 102. Revolving door with switch mounted in the wall



Freezer doors

Application. Use the 2505A-L industrial magnetic contact to secure walk-in freezer doors against unauthorized entry. These closed loop contacts can withstand condensation or temperatures in freezers down to -40°F (-40°C).

Installation. To install the contact, do the following:

1. Mount the switch with sheet metal screws inside the freezer on the door casing as shown in *Figure 103*. Because steel can decrease the gap of the switch by as much as half, mount 1913 anodized aluminum 0.5 in. (1.3 cm) spacers under the switch and magnet to decrease the effect of the steel on the magnetic field.

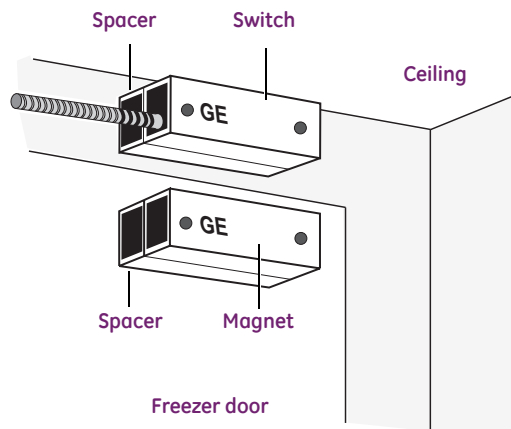
The magnet and switch should be at the top of the door to prevent accidental damage to the switch and to discourage tampering.

The labels on the magnet and switch must read in the same direction (switch is polarity sensitive).

2. Test (see *Ohmmeter testing* on page 86).

Recommended products. 2505A-L, 1913, 1920D

Figure 103. Freezer door installation



Roller-plunger contacts

Application. Protect wood and steel doors with roller-plunger contacts that can be installed without removing the door from its hinges. The 3008 is designed specifically for light, thin-framed window and door applications.

Roller-plunger switches can also be used to protect windows, sliding patio doors, and high-value objects such as antiques.

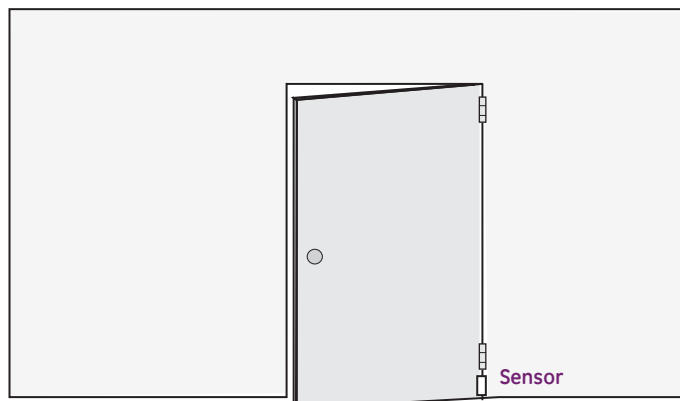
Note: In order to comply with UL installations, the contact should not be used on exterior doors that open outward.

Installation. The roller-plunger contact must be mounted on the hinge side of the door below the lowest hinge (*Figure 104*). To install the contact, do the following:

1. Open the door and drill a 0.75 in. (1.9 cm) diameter hole in the frame. The hole should be 1.5 in. (3.8 cm) deep for the 3005 and 0.75 in. (1.9 cm) deep for the 3008.
2. Run wire through the frame and connect the switch to the alarm loop. Insert the switch in the hole and test for proper operation by opening the door.
3. Screw the switch in place.

Recommended products. 3005, 3008

Figure 104. Roller-plunger contact placement



Doors with uneven wiring holes

Application. During installation, holes can be overdrilled, underdrilled, or have an uneven diameter. Press-fit 3/8 in. (0.9 cm) diameter switches can actually fall out of overdrilled holes even when they initially seem to fit well. This necessitates a costly service call and the use of adhesives. Additionally, many switches cannot withstand the pressure as green wood in new construction dries and shrinks.

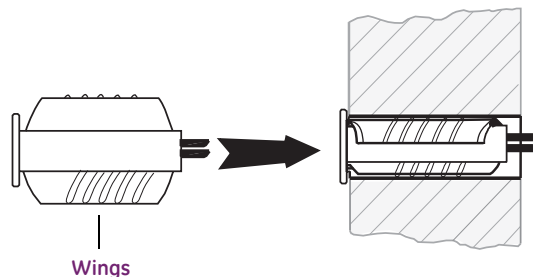
The 1275 contact addresses these problems. Its flexible, collapsible wings surrounding the switch barrel, accommodate smaller or larger holes, and cushion the reed. With a 1.25 in. (3.2 cm) gap, the 1275W also reduces costly time spent aligning the switch and magnet on loose-fitting doors and windows.

Installation. To install the contact, do the following:

1. Find the best location for the switch in the header or sill, and the magnet in the door or window frame. Drill 3/8 in. (0.9 cm) diameter holes. The switch measures 1 in. (2.5 cm) long. The magnet is about 1.33 in. (3.4 cm) long.
2. Pull the wire and connect it to the switch. Squeeze the wings on the 1275 and press-fit the switch into place. Press-fit the magnet into its hole (*Figure 105*).
3. Test (see *Ohmmeter testing* on page 86), then connect the switch to the loop.

Recommended products. 1275, 1275W

Figure 105. Uneven and oversize hole protection



Increase gap distances with a second magnet

Application. You can increase the gap distance of a recessed switch in a door an additional 40 percent, by placing two magnets side-by-side. This is helpful if you need to increase the gap distance but do not have a wide-gap switch

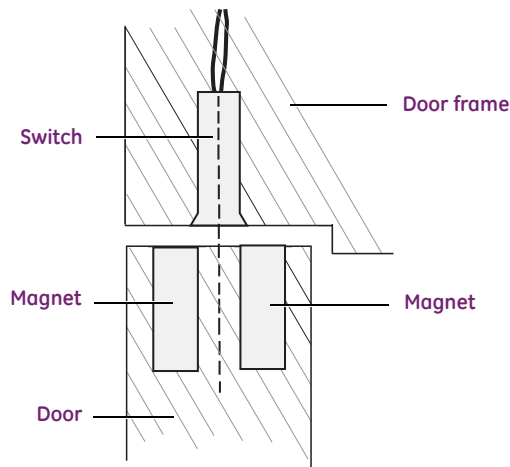
Installation. Mount the magnets with like poles in the same direction; magnets will actually push away from each other when mounted in this manner. To observe correct polarity for wide-gap switches, the red ends of the magnets must be mounted away from the switch.

To mount the magnet, do the following:

1. Drill holes for the magnets, spacing them equal distances from a line drawn through the center of the switch. Mount magnets as close together as possible (*Figure 106*).
2. Test (see *Ohmmeter testing* on page 86).
3. Connect the switch to the alarm loop and retest.

Recommended products. 1075, 1075W, 1275, 1275W, 1924 magnet

Figure 106. Using a second magnet



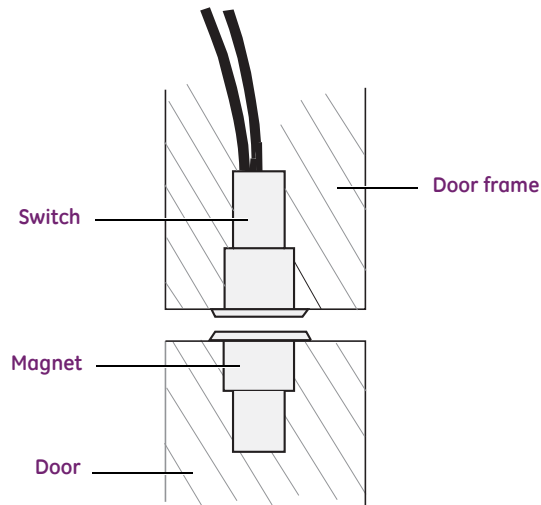
Mechanical recessed switch replacement

Application. Floating magnet-type mechanical switches can fail due to corrosion (the switch is not hermetically sealed) or uneven wear of the plastic body. They can also be crushed between the door and frame. Use a GE switch as a better alternative.

Installation. If the unreliable switch is a *repel* magnet type, remove the switch and magnet and replace with a hermetically sealed, 0.75 in. (1.9 cm) diameter 1078C1. The hole should be 1.5 in. (3.8 cm) deep. The 1078C1 self-locks in place, requiring no screws (*Figure 107*).

Recommended products. 1078C, 1078C1

Figure 107. 1078C-1 installation



Window ventilation without false alarms

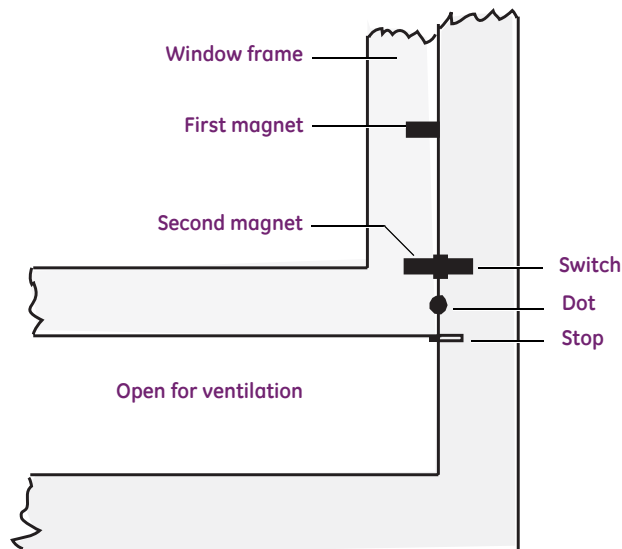
Application. In some applications, you may need to be able to open a window for ventilation without causing a false alarm.

Installation. We recommend one of the following methods for opening windows for ventilation without causing a false alarm:

- Add a small dot, either adhesive or painted, to both the window frame and window jamb. The dot marks the spot above which you should not open the window. The user simply aligns the dot as shown in *Figure 108*. Or
- Provide a removable window stop so that the window cannot pass the alarm point in normal usage. Drill a hole in the jamb for the stop and use a nail or small dowel as the stop. The dowel or nail should protrude from the hole so it supports the opened window as shown in *Figure 108*. To close the window, remove the stop.

See also [Window ventilation using two magnets](#) on page 129

Figure 108. Ventilating windows



Window ventilation using two magnets

Application. You can use two magnets and one wide-gap switch to vent sliding windows. It is possible to obtain up to 5 in. (12.7 cm) ventilation with a 1.5 in. (3.8 cm) gap between the magnets and the switch.

Installation. Use a wide-gap recessed switch and an additional 3/8 in. (0.9 cm) diameter by 1.5 in. (3.8 cm) long magnet and do the following:

1. To remove the window frame, open the window as far as required, lift the window straight up into the upper channel, and pull the window straight out from the bottom (*Figure 109* on page 130). Some windows have spring locks in the upper frame channel that you must open before you can remove the window.
2. Slightly overdrill a vertical hole for the switch in the top of the frame, about 5.5 in. (14 cm) from the edge of the frame. Coat the switch with RTV mounting compound and insert in the hole.
3. Mount the magnets on the inside of the upper window channel toward the top of the channel with RTV mounting compound (*Figure 110* on page 130). Locate one magnet at the edge of the channel, red end toward the edge of the window. Locate the other magnet with the nonred end under the switch, red end pointing away from the other magnet.
4. After the RTV sets (about 15 minutes), reinsert the window in the frame by reversing the procedure in step 1.
5. Test (see *Ohmmeter testing* on page 86) for proper operation. If the switch *drops out* anywhere within the ventilation range, move the inside magnet and switch closer to the outside edge of the window.
6. Connect the switch to the alarm loop.
7. Instruct the user on proper use of the ventilation feature. If necessary, add a window stop or mark the maximum permissible opening to prevent false alarms.

Note: Sliding windows can also be vented using a surface mounted switch and magnet. The 1275W switch can also be used for this application.

Recommended products. Recessed: 1065W, 1075W, 1057-RT;
Surface: 1035W, 1145W, 1057-RT, RTV 1905

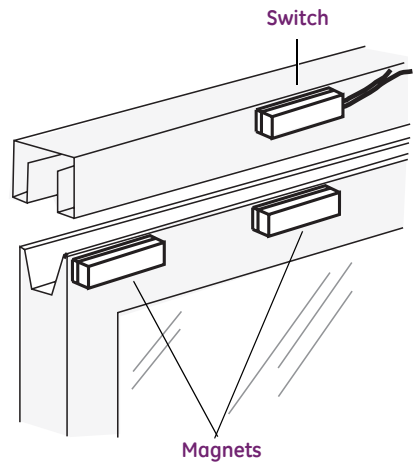
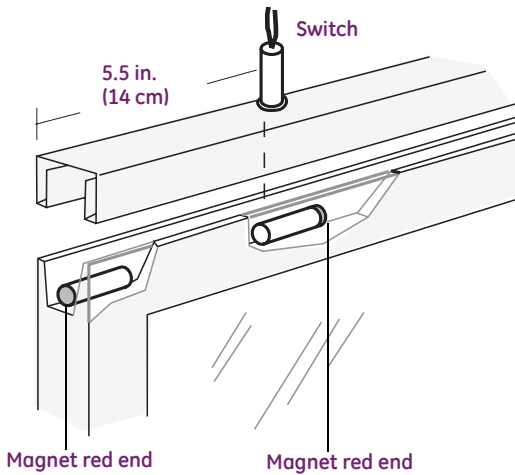
Figure 109. Removing the window



Figure 110. Window ventilation using two magnets

Align switch in an L configuration,
not a T configuration with the magnet.

Align switch parallel to magnet



Sliding aluminum windows

Application. There are several methods of protecting sliding aluminum windows. The following installations give alternative instructions for installation with the window removed or not, and using recessed or surface mount switches, or a combination of both.

Installation with window removal. If you are running the switch leads in the channel, you must remove the window. To install the contact, do the following:

1. To remove the window frame, open the window as far as required, lift the window straight up into the upper channel, and pull the window straight out from the bottom (*Figure 111* on page 132). Some windows have spring locks in the upper frame channel that you must open before you can remove the window.
2. At the mounting position for the switch (either parallel or perpendicular to the magnet), drill a hole in the window frame. Run wires and insert the switch into the frame (*Figure 112* on page 132).
3. Mount the magnet on the inside of the upper window channel, toward the top of the channel, with RTV mounting compound. RTV should sufficiently set in about 15 minutes to permit replacement of the window in the frame.
4. Reinsert the window in the frame by reversing the procedure in step 1.
5. Test (see *Ohmmeter testing* on page 86) with the window in a closed position.

Note: Wide-gap switches are polarity sensitive. The red tip of the magnet must be aligned as shown in *Figure 112*. The magnet must not be centered under the switch; a null may result and the switch will not operate.

Recommended products. 1055, 1055W, 1065, 1975, 1275W, 1057-RT, RTV 1905, wireless model: NX-458

Figure 111. Removing the window

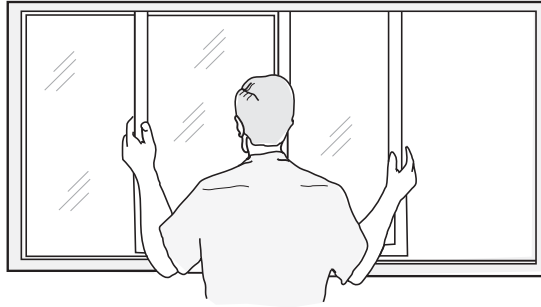
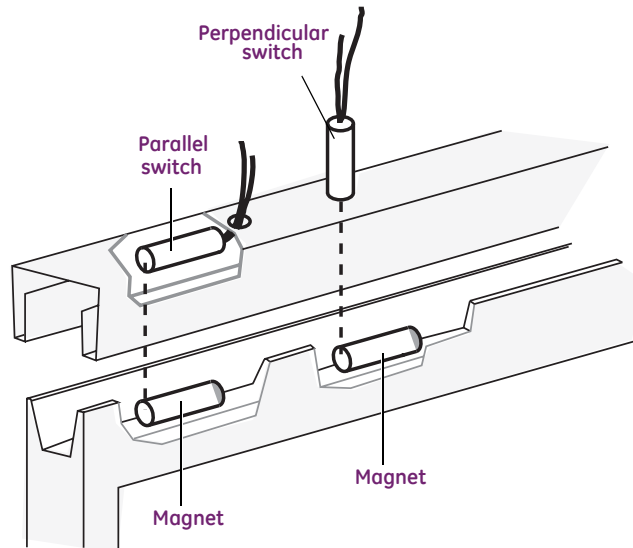


Figure 112. Mounting in sliding aluminum windows with window removal

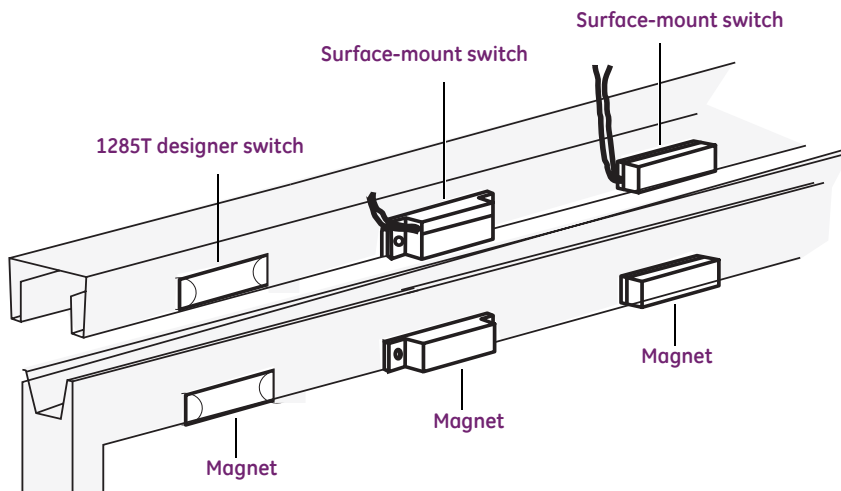


Installation without removing the window. Removing the window is not necessary unless you are running the switch leads in the channel. To install the contact, do the following:

1. If using a self-adhesive switch, clean the surface with alcohol before mounting to ensure a good bond.
2. Mount the switch on the sash in the desired position (*Figure 113*).
3. Mount the magnet on the window directly opposite the switch when the window is closed.
4. Test (see *Ohmmeter testing* on page 86) with the window in the closed position.

Recommended products. 1035, 1035W, 1085, 1085T, 1285T (Designer), wireless models: NX-452, NX-450, NX-454, NX-650

Figure 113. Contact mounting on sliding aluminum windows



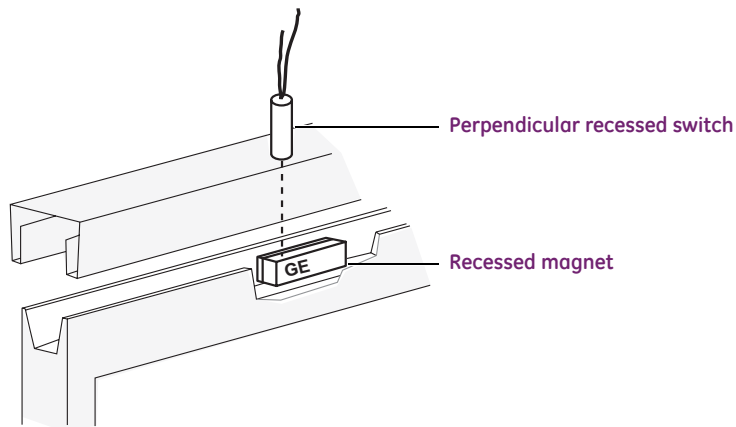
Installation with combined recessed and surface mount. A 1075 or 1075W switch with a 1927 magnet is ideal for this application. The magnet can be quickly installed using double-sided tape instead of waiting for RTV mounting compound to set up.

To install the contact, do the following:

1. To remove the window frame, open the window as far as required, lift the window straight up into the upper channel, and pull the window straight out from the bottom (*Figure 111* on page 132). Some windows have spring locks in the upper frame channel that must be opened before you can remove the window.
2. At the mounting position for the switch (which should be perpendicular to the magnet as shown in *Figure 114*), drill a hole in the window frame and run wires. Insert the switch into the frame.
3. Mount the magnet on the inside of the upper window channel using the double-sided tape provided. The label must read left to right. Align the left end of the label with the center line of the switch.
4. Reinsert the window in the frame by reversing the procedure in step 1.
5. Test (see *Ohmmeter testing* on page 86) with the window in the closed position.

Recommended products. 1075W with 1927 or 1080T magnet

Figure 114. Combined recessed and surface installation



Windows with thin frames

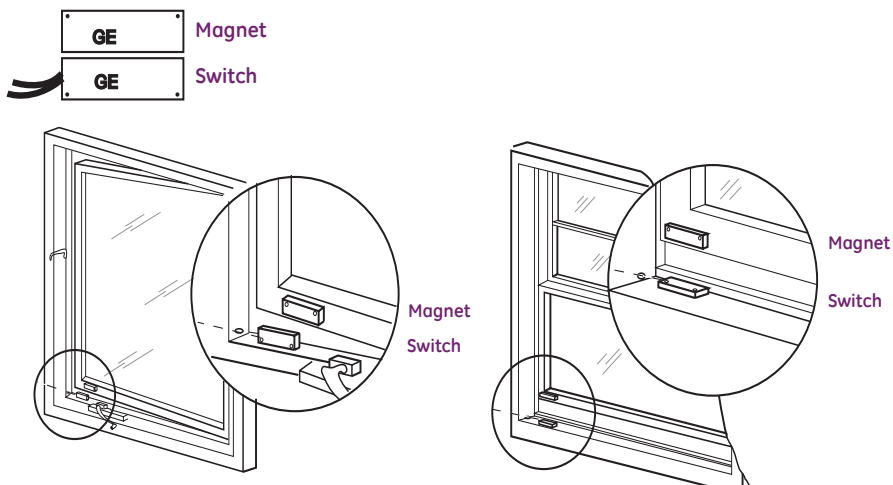
Application. When Pella or sliding aluminum windows have thin window frames or limited space for mounting the switch, use the 1145-W ultraminiature surface-mount contact with a regular or wide-gap operating distance.

Installation. To install the contact, do the following:

1. Determine the best location for the switch and magnet. The magnet will mount on the glass frame.
2. Clean the mounting surface with alcohol for good adhesion and mount the switch and magnet with very high-bonding tape, silicon glue, or brass brads, depending on the frame material.
3. For wide-gap versions, you must mount the switch and magnet with the mounting holes to the outside in the *four-corners* position (*Figure 115*). The labels on the switch and magnet must read from left to right. This ensures proper polarity. Wide-gap operating distance is 0.75 in.(1.9 cm) for the 1145W model.

Recommended products. 1145W

Figure 115. Installation for thin frame windows



Windows with thin steel frames

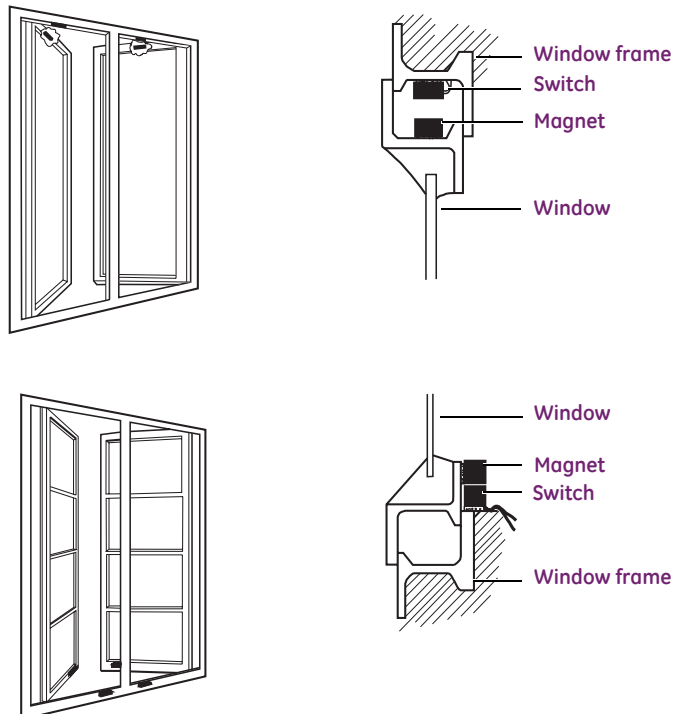
Application. When installing magnetic contacts on windows with thin steel frames that present drilling and tapping difficulties, use 1035W or 1145W miniature contacts.

Installation. To mount the contact, use an adhesive-mount switch and do the following:

1. Clean the frame with alcohol for good adhesion and use one of the two mounting methods shown in *Figure 116*.
2. Drill holes to conceal the wiring if desired.

Recommended products. 1035W, 1145W

Figure 116. Installation for thin steel frame windows



Double-hung windows

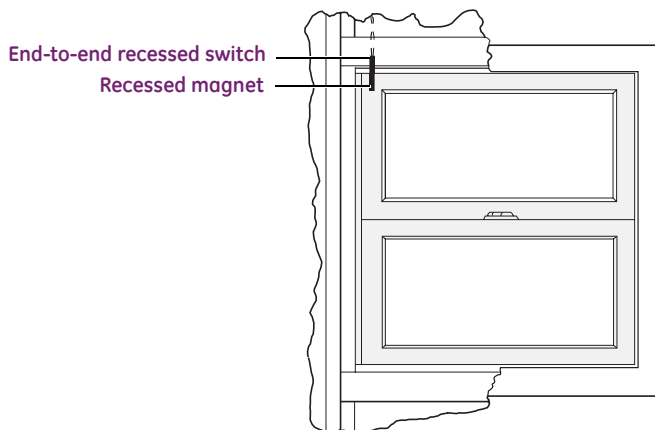
Application. You can protect double-hung windows with recessed or surface-mounted magnetic contacts with regular or wide-gap switches.

Installation with recessed contacts in top or bottom of window. To mount the contact, do the following:

1. Slightly overdrill holes at the magnet position in the window frame and the switch position in the head or sill. Coat the magnet and switch with RTV mounting compound and insert the magnet and switch in the holes (*Figure 117*).
- Note:** Wide-gap switches are polarity sensitive. If the switch uses a bare magnet, mount the magnet with the red end away from the switch to observe correct polarity.
2. Test (see *Ohmmeter testing* on page 86).
 3. Connect the switch to the alarm loop.
 4. To improve appearance, cover the switch and magnet with wood filler.

Recommended products. 1015, 1055, 1065, 1075, 1125W, 1275W, RTV 1905, wireless models: NX-650, NX-450, NX-652, NX-452

Figure 117. Top or bottom mount for double-hung windows



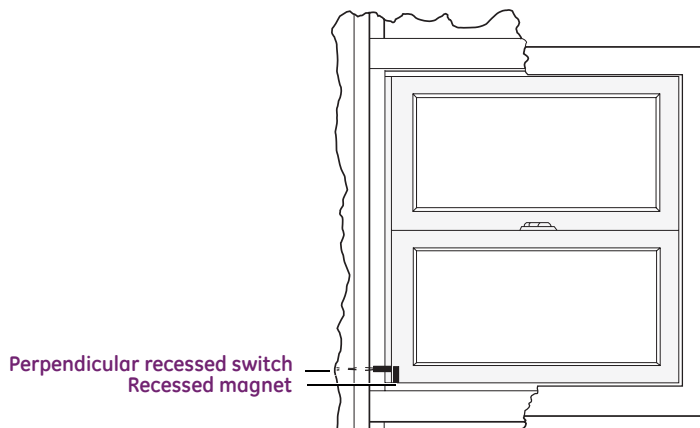
Installation with recessed contacts in window sides. We recommend you only use this method when walls are open and readily accessible for running wires. A finished wall will make this method very difficult and awkward. This method requires perpendicular mounting of the switch and magnet and may require a wide gap between the switch and magnet.

To mount the contact, do the following:

1. Drill a vertical hole in the window frame for the magnet. Coat the magnet with RTV mounting compound and insert it in the hole.
2. Select a position for the switch with the following requirements:
 - The magnet must not be centered under the switch. The end of the switch must be opposite the end of the magnet (perpendicular) as shown in *Figure 118*.
 - If a wide-gap switch is used, mount the magnet with the red end away from the switch end with wires to observe correct polarity.
3. Drill the hole for the switch and insert the switch in the hole.
4. Test (see *Ohmmeter testing* on page 86) with the window closed.
5. Connect the switch to the alarm loop.

Recommended products. 1055, 1055W, 1065, 1065W, 1075, 1075W, RTV 1905, wireless model: NX-458

Figure 118. Installation in sides of double-hung windows



Installation with surface-mount contacts. Use a surface-mount contact and do the following:

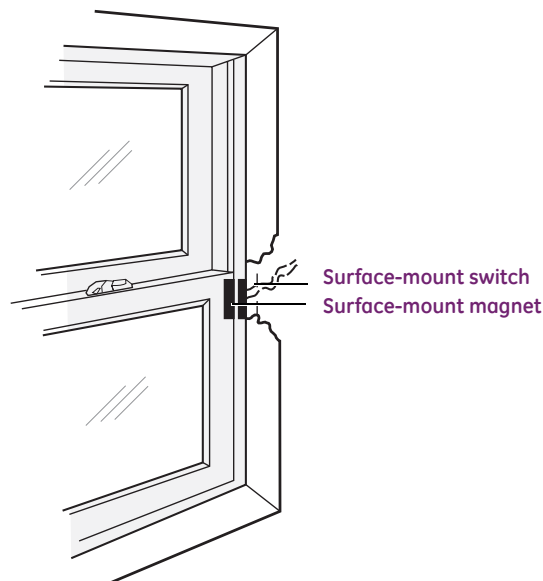
1. Mount the switch on the head, sill, or jamb in the desired position.
2. Mount the magnet on the window, directly opposite the switch when the window is closed. If you use a self-adhesive switch, clean the surface with alcohol before you mount it to ensure a good bond (*Figure 119*).

Note: If you use a wide-gap switch, be certain to align the labels on the switch and magnet so they read in the same direction (switch is polarity sensitive).

3. Test (see *Ohmmeter testing* on page 86).
4. Connect the switch to the alarm loop.

Recommended products. 1032, 1032W, 1035, 1035W, 1045T, 1045W, 1082, 1082W, 1085, 1085T, 1085W, wireless models: XNX-454, NX-452

Figure 119. Double-hung windows with surface-mount contact



Pella casement or awning windows

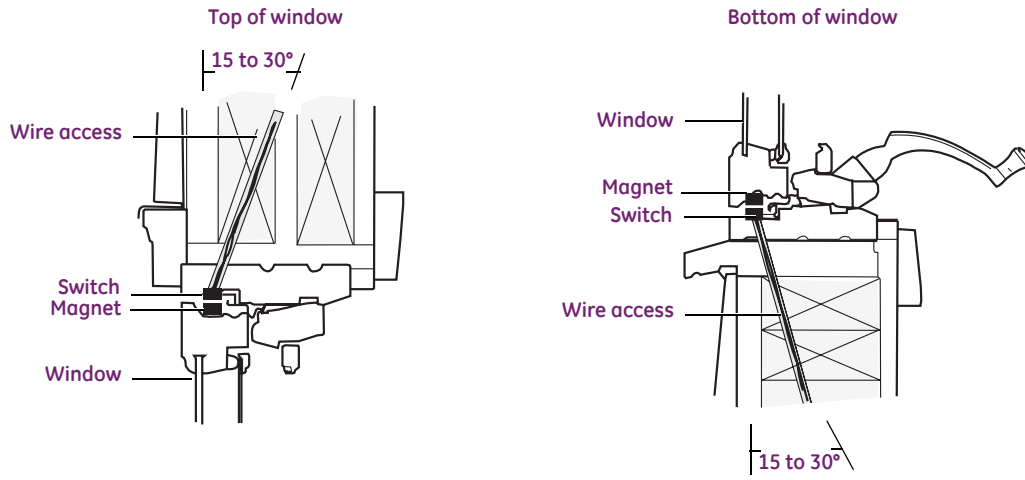
Application. Use magnetic contacts to protect Pella casement and awning windows. Pella recommends you do not mount switches in sills due to possible damage from water. If you must drill into the sill, make sure you provide a solid, tight seal using RTV compound.

Installation with surface mount contacts. The miniature size and large number of mounting options available for 1145W surface-mount contacts make these contacts ideal for protecting Pella casement windows. The switch and magnet are concealed when the window is closed. Concealed surface-mounting offers benefits over recessed mounting because the construction of these windows makes recess mounting difficult without breaking the glass. To install the contact, do the following:

1. Select the position of the switch and contact. If ventilation is desired, locate near the hinged side of the window.
2. Drill holes for the wires. Slant back at 15 to 30 degrees to make sure the wire will go inside the wall (*Figure 120* on page 141). If the 1145 W wide-gap contact is used, align so that the ends of the switch and magnet are next to each other (switch is sensitive to the polarity of the magnet).
3. Use one of the following mounting methods:
 - a. Mount with self-adhesive tape. Clean the back of the switch, magnet, and mounting surfaces with alcohol. Remove backing from tape and attach the tape to the switch or magnet, then attach the switch or magnet to the cleaned surface.
 - b. Mount with glue, epoxy, or RTV mounting compound. Attach the switch or magnet to the surface with glue, epoxy, or RTV mounting compound.
4. Test (see *Ohmmeter testing* on page 86).
5. Connect the switch to the alarm loop.

Recommended products. 1145, RTV 1905, wireless model: NX-458

Figure 120. Surface-mount installation for Pella and awning windows

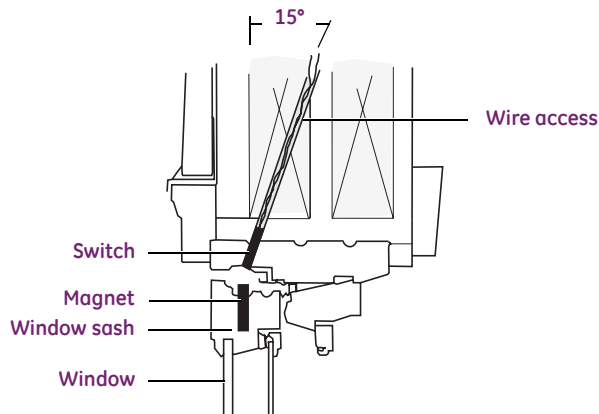


Installation with recessed contacts. Pella casement and awning windows may have two separate pieces of glass or one Thermopane. It is very important, therefore, to take extra care when drilling the mounting holes to avoid the glass. To install the contact, do the following:

1. Select the position of the switch in the top of the window frame if wires will run above the window, or in the bottom of the window if wires will run below the window.
2. Drill a 0.25 in. (0.6 cm) diameter x 1.25 in. (3.2 cm) deep hole in the window sash.
3. Insert the magnet in the hole. If using a wide-gap switch, insert the magnet with the red end away from the switch end without wires.
4. Drill a 0.25 in. (0.6 cm) diameter hole in the frame at approximately 15 degrees toward the inside of the wall. Align the switch hole center to within 0.25 in. (0.6 cm) of the center of the magnet (*Figure 121*).
5. Insert the switch (if you place the 1055W close to the pivot point, you will allow for some ventilation).
6. Test (see *Ohmmeter testing* on page 86) and glue the switch and magnet in place.

Recommended products. 1015, 1015W, 1055, 1055W, 1125W, 1125TW, R1125W, R1125TW, wireless model: NX-458

Figure 121. Installation of pella casement or awning windows with recessed contacts



Anderson casement windows

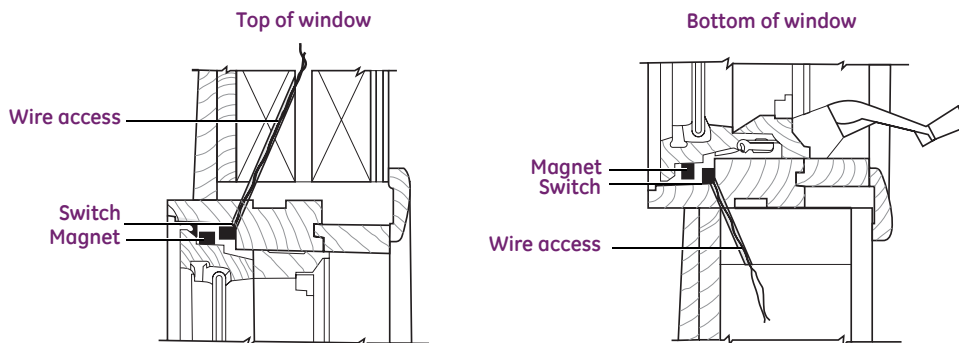
Application. Use magnetic contacts to protect Anderson casement windows. Anderson recommends you do not mount switches in sills due to possible damage from water. If you must drill into the sill, make sure you provide a solid, tight seal using RTV compound.

Installation using surface-mount contacts. When using surface-mount contacts, the switch and magnet are both concealed when the window is closed. Use off-white, white, or brown units to match the plastic cover on the window. To install the contact, do the following:

1. Select positions for the switch and magnet. For ventilation, use a wide-gap switch on the top of the window near the hinged side. Drill a hole for the wire in the back of the window frame. Angle this hole back toward the inside of the wall about 15 to 30 degrees (*Figure 122*).
2. Clean mounting surfaces with alcohol and peel the paper from the back of the switch. Install as shown or screw in place (depending on the switch used). Peel the paper from the back of the magnet and install on the sash frame with the label reading in the same direction as the switch.
3. Close the window and test (see *Ohmmeter testing* on page 86).

Recommended products. 1125, 1125TW, R1125W, R1125TW, 1035, RTV 1905, wireless models: NX-454, NX-452

Figure 122. Anderson windows using surface-mount contacts

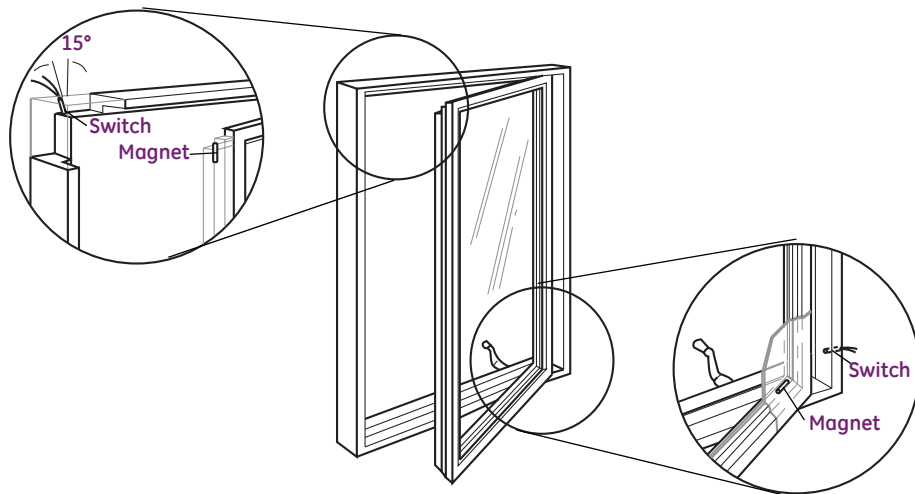


Installation using recessed contacts. To use recessed contacts to protect Anderson casement windows (*Figure 123*), you need to place the magnet in the sash on the step closest to the inside of the window. To install the contact, do the following:

1. Install the magnet in the sash on the step closest to the inside of the window. Drill a hole 0.25 in. (0.6 cm) in diameter and 1.25 in. (3.2 cm) deep. This step has a cross section of about 0.5 by 0.5 in. (1.3 x 1.3 cm) and will hold the 0.25 in. (0.6 cm) diameter magnet by centering the hole in the section.
2. Drill a hole for the switch opposite the magnet. Angle this hole back toward the inside of the wall about 15 degrees.
3. Install the switch and test (see *Ohmmeter testing* on page 86).
4. Cover the ends of the switch and magnet with silicone rubber to protect them from weather damage.

Recommended products. 1015, 1015W, 1055, 1055W, 1125W, 1125TW, R1125W, R1125TW, RTV 1905, wireless models: NX-454, NX-452

Figure 123. Anderson casement windows with recessed contacts



Hinged skylights

Application. Use surface-mount magnetic contacts to protect hinged skylights against roof entry.

Installation. To install the contact, do the following:

1. Select the location for the switch and magnet on the side opposite the hinges (*Figure 124*).
2. Mount the switch on the frame and the magnet on the skylight. Observe gap distance tolerances. You may have to use spacers to achieve proper alignment.

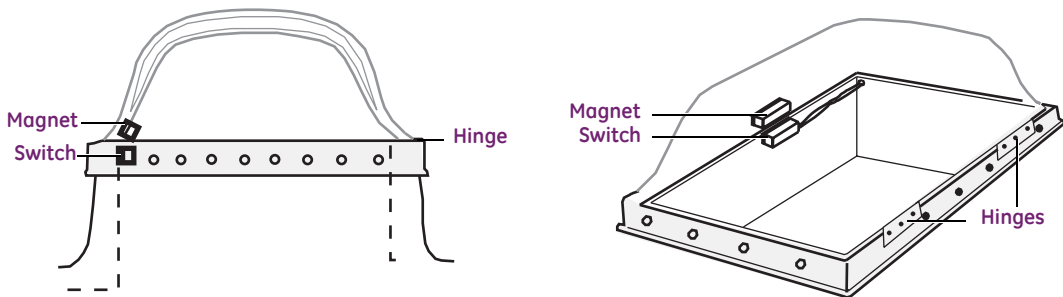
If the skylight has a steel frame, the gap distance is generally reduced by half, and you will need to use a wide-gap switch.

Mount the switch and magnet so the labels reads in the same direction (switch is polarity sensitive).

3. Test (see *Ohmmeter testing* on page 86).

Recommended products. 1032, 1035, 1085, 1145, 1032W, 1035W, 1085W, 1085TW, 1085T, wireless model: NX-652

Figure 124. Hinged skylights



Attic entry drop-down stairs

Application. Often the entry door from the garage to the house will be alarmed and the garage door will be left unsecured. An intruder can gain access to the garage, enter the attic via the drop-down stairway, cut a hole through the ceiling, and drop into the house without triggering the alarm. Magnetic contacts on the stairway can prevent this intrusion.

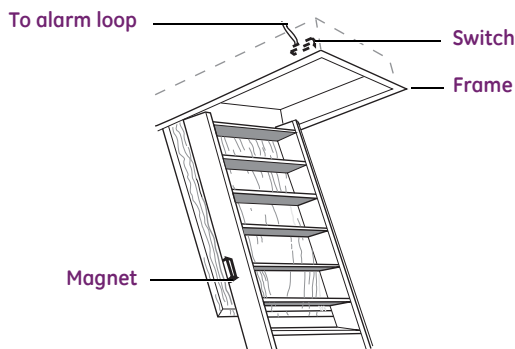
Installation. To install the contact, do the following:

1. Position the switch on the stairway frame, and the magnet on the drop-down portion of the stairway (*Figure 125*). There must be no interference to the stairway mechanism from the switch or magnet.
2. Permanently attach the switch to the frame, and temporarily attach the magnet to the stairway with masking tape.
3. Test (see *Ohmmeter testing* on page 86) with the stairway closed.
4. Permanently attach the magnet to the stairway and connect the switch leads to the alarm loop.

Note: For high-security and wide-gap switches, labels on the switch and magnet must read in the same direction. Also, observe minimum and maximum gap distances for high-security switches

Recommended products. 1035W, 1045T, 1082, 1085W, 1085TW, 2500 or H series, wireless model: NX-652

Figure 125. Attic drop-down stairs protection



Barrier Bars

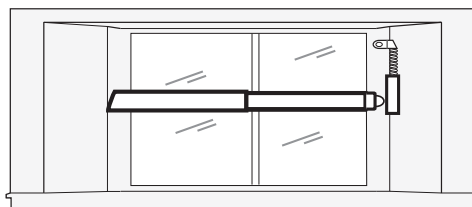
Application. Use pressure-switch-activated Barrier Bars to protect hinged skylights, attic vents, basement windows, or other openings from unwanted intrusion.

Installation. You can surface or frame mount Barrier Bars in wired or wireless systems. The spring-loaded assembly snaps into place with no screws or drilling. The self-adhesive, epoxy-based switch adheres to brick or cement surfaces, forming a strong, permanent bond. To install the contact, do the following:

1. Select the location for the switch so that the bar crosses the center of the opening (*Figure 126*).
2. Remove the adhesive backing and press the switch in place.
3. Run cable to the switch and attach to the terminals.
4. Snap the bar into place, using a spacer for openings wider than 23 in. (0.6 m).
5. Test (see *Ohmmeter testing* on page 86).

Recommended products. BB-1GS (pressure-sensitive), BB-2 (mercury tilt switch), AMDB-1 bracket, OVB-1 vertical bars.

Figure 126. Barrier Bars installation



Roof hatches

Application. To stop entry via a roof hatch, use surface-mount switches. The switch used will depend on the mounting method required by the space available and the connection to the alarm circuit.

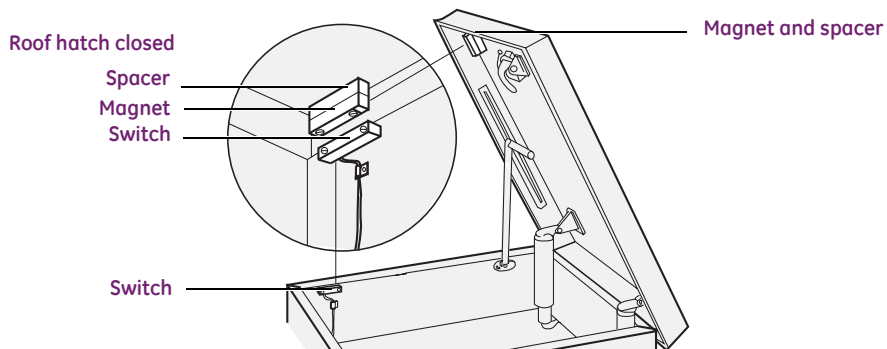
Installation. In hatch protection, it is important to mount both the switch and magnet so they will not intrude into the open hatch space where they can catch on clothing and restrict entry or exit.

To install the contact, do the following:

1. Attach the selected switch on the hatch frame opposite the hatch hinges. Be sure to keep the gap distance between the switch and magnet within specified tolerance. If the roof hatch and/or the frame is steel, allow for the gap distance to be halved or use wide-gap switches.
2. When installed, switch and magnet must be parallel for best operation (*Figure 127*). Mount the switch and magnet with the labels reading in the same direction (switch is polarity sensitive).
3. To check for proper operation and circuit continuity, open and close the hatch.

Recommended products. 1032, 1032W, 1045T, 1045TW, 1082, 1082TW, 1085, 1085T, 1085W, 2505A, 1914T (spacer for 1045T), 1906T (spacer for 1082)

Figure 127. Roof hatch installation



Metal enclosures

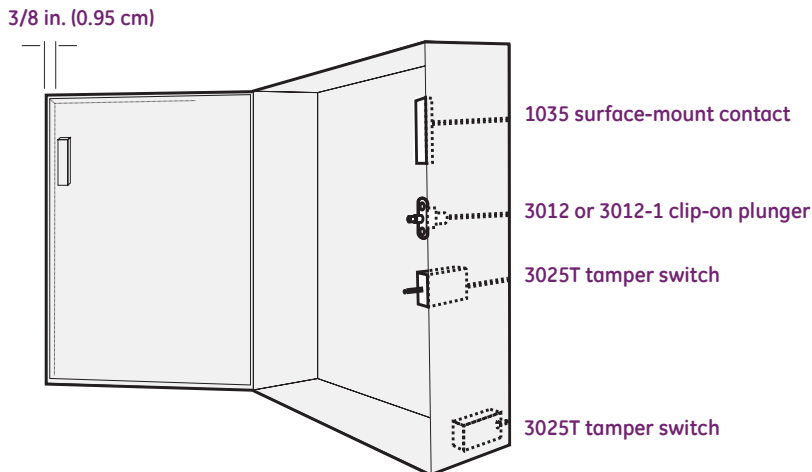
Application. Use magnetic contacts to protect control panels, bell boxes, or any metal enclosures against unauthorized access. Contacts protect against tampering (through the key hole or lock mechanism) and can be connected to the control's 24-hour loop. Always test the installation (see *Ohmmeter testing* on page 86).

Installation. To install the contacts (*Figure 128*), do one of the following:

- **Surface mount.** Use a 1035 surface-mount, self-adhesive switch. With self-adhesive contacts, such as the 1035, locate the switch on the side or bottom of the cabinet about 3/8 in. (0.9 cm) from the front edge. Align and mount the magnet.
- **Plunger mount.** The 3012 clips on 0.04 to 0.07 in. (0.10 to 0.18 cm) thick sheet metal. The 3025T has shunt capability for servicing. All are hermetically sealed and reed actuated for positive operation on seldom-used enclosure openings.

Recommended products. 1035, 3012, 3025T, 3015, 3027

Figure 128. Metal enclosure installation



Cash register drawers with Bill Trap

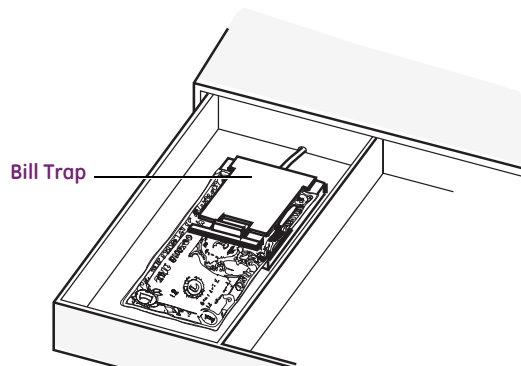
Application. You can alert authorities to unauthorized removal of money from cash register drawers with the Bill Trap. This simple device holds paper currency between a magnetized clip and a back plate that contains magnetic reed contacts. Mount the Bill Trap in a drawer and wire it to an open or closed loop to activate the alarm circuit when currency is removed.

Installation. To install the Bill Trap, do the following:

1. Determine the best mounting location (take into account the length of currency).
2. Drill a 0.25 in. (0.6 cm) diameter hole through the back of the drawer. Leads can run over the top of the drawer if there is clearance.
3. Pull the wire and connect it to the alarm loop. Special lead types and lengths are available.
4. Temporarily mount the Bill Trap and insert currency between the Bill Trap's clip and back plate (*Figure 129*). Test for proper operation.
5. Clean the bottom of the Bill Trap and the mounting location in the drawer with alcohol and use double-sided tape to adhere the Bill Trap to the drawer.

Recommended product. 3555 (Bill Trap)

Figure 129. Bill Trap installation



Drawers

Application. Use one of the following installations to protect valuables in a drawer:

- Installation using surface-mount contacts
- Installation using recessed contacts

Installation using surface-mount contacts. Because it is difficult to use a screwdriver inside a drawer, use a self-adhesive contact. Clean the mounting surfaces with alcohol before attaching the contacts. Use wide-gap switches on steel file cabinets and desk drawers (steel reduces operating distance by half). To install the contact, do the following:

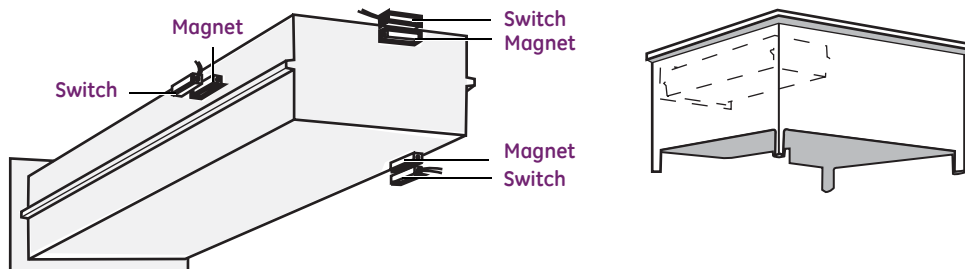
1. Select mounting locations that will not interfere with the operation of the drawer:
 - a. Install the switch in the cabinet and the magnet on the drawer.
 - b. Mount the switch and magnet on the outside of the drawer (*Figure 130*).

If you use a wide-gap switch, the labels on the switch and magnet must read in the same direction (switch is polarity sensitive).

2. Test (see *Ohmmeter testing* on page 86).
3. Connect the switch to the alarm loop. For higher security, install on a 24-hour loop and provide a shunt switch in the circuit to permit access as needed.

Recommended products. 1032, 1035, 1082, 1085, 1085T, 1032 W, 1035W

Figure 130. Drawer with surface-mount contacts

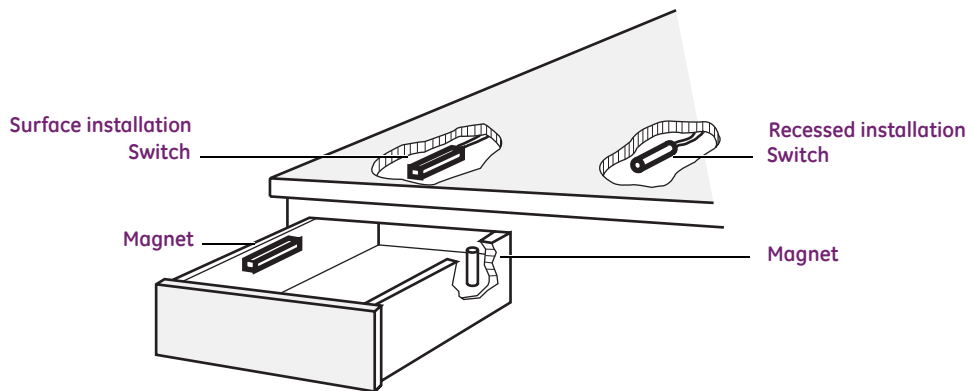


Installation using recessed contacts. Do not use recessed contacts on metal drawers (the metal is too thin). To install recessed contacts in nonmetal drawers, do the following:

1. Drill a vertical hole in the side of the drawer. Coat the magnet with RTV mounting compound and insert the magnet in the hole.
2. Coat the switch with RTV mounting compound and attach the switch to the cabinet perpendicular to the magnet. The magnet must not be centered below the switch, but near the end of the switch. If you use a wide-gap switch, the red tip of the magnet must be away from the switch (*Figure 131*).
3. Test (see *Ohmmeter testing* on page 86).
4. Install the switch in the alarm loop. For higher security, install on a 24-hour loop and provide a shunt switch in the circuit to permit access as needed.

Recommended products. 1145, 1145W, 1055W, RTV 1905

Figure 131. Drawer with recessed contacts



China cabinets

Application. Use one of the following installations to protect valuables in a china cabinet:

- Installation using surface-mount contacts
- Installation using recessed contact

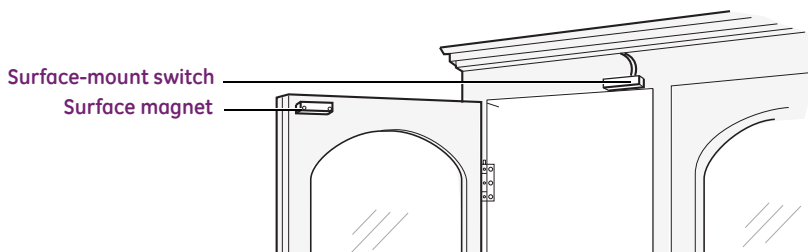
You need to alarm both doors on a two-door cabinet and wire the switches in series. Do not place contacts in the hinged portion of the cabinet door (the door could open wide before the switch is tripped).

Installation using surface-mount contacts. If space is limited and you want an unobtrusive installation, use the 1145W ultraminiature, wide-gap contact. To install the contact, do the following:

1. Mount the switches and magnets. If you use a wide-gap or high-security switch, align the switch and contact labels so they read in the same direction (switches are polarity sensitive). Observe minimum gap distances for H series contacts.
2. Drill an exit hole for the wires in the back of the cabinet. Route the wires in the joints of the cabinet, around the top of the cabinet and out the exit hole.
3. Test (see *Ohmmeter testing* on page 86).
4. Install the switch in the alarm loop. For higher security, install on a 24-hour loop and provide a shunt switch in the circuit to permit access as needed.

Recommended products. 1032, 1035, 1082, 1085, 1085T, H Series, 1145W; wireless models: NX-454, NX-450, NX-650, NX-452

Figure 132. China cabinet with surface-mount contacts

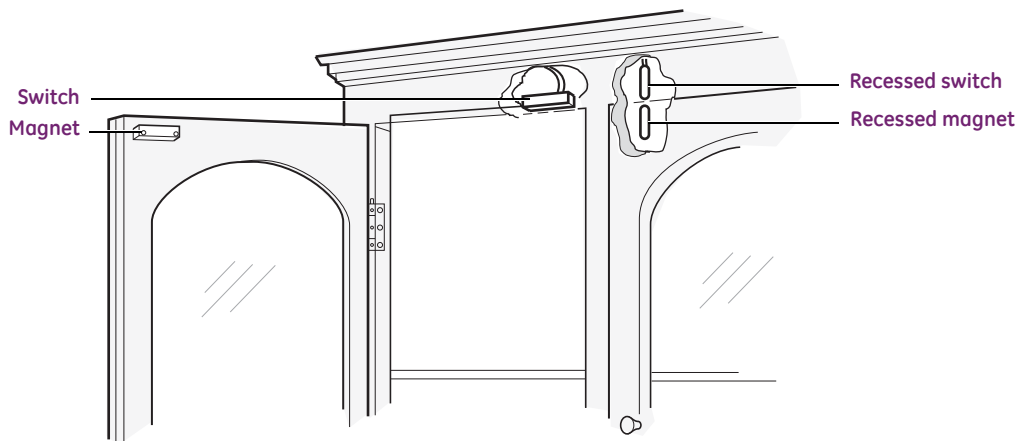


Installation using recessed contacts. For aesthetic reasons, we recommend you use recessed contacts instead of surface-mount contacts for this application where possible. To install the contact, do the following:

1. Drill a vertical hole in the top of the cabinet door. Coat the magnet with RTV mounting compound and insert the magnet in the hole. If you use a wide-gap switch, mount the magnet with the red end toward the switch end with wires (switch is polarity sensitive).
2. Drill a vertical hole in the cabinet for the switch and drill a hole at an angle from the inside of the cabinet to meet the switch hole for the wires. Drill an exit hole for the wires through the back of the cabinet.
3. Coat the switch with RTV mounting compound and insert the switch in the hole, fishing the wires through the inside of the cabinet. Route the wires in the joint of the cabinet, around the top of the cabinet and out the exit hole.
4. Test (see *Ohmmeter testing* on page 86).
5. Install the switch in the alarm loop. For higher security, install on a 24-hour loop and provide a shunt switch in the circuit to permit access as needed.

Recommended products. 1055, 1065, 1075, RTV 1905, wireless model: NX458

Figure 133. China cabinet with recessed contacts



Guns and gun cabinets

Application. Gun cabinets can be protected using the same methods used for china cabinets. However, since the glass front on a gun cabinet can be broken without sounding an alarm, you can also use one of the following installations:

- Installation using a recessed roller switch
- Installation using a Magnapull

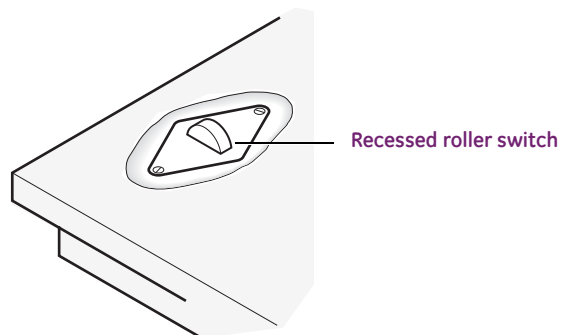
Always test the installation (see *Ohmmeter testing* on page 86).

Installation using a recessed roller switch to bug a gun. To install the contact, do the following:

1. Select the gun to be protected. Drill a 0.75 in. (1.9 cm) diameter hole in the cabinet butt cutout. Mount the roller switch in the hole (*Figure 134*).
2. Connect to a 24-hour circuit to provide protection even when the owner is home.
3. Instruct the user to disarm the system before removing the gun.

Recommended products. 3005, 3008

Figure 134. Gun installation with recessed roller switch

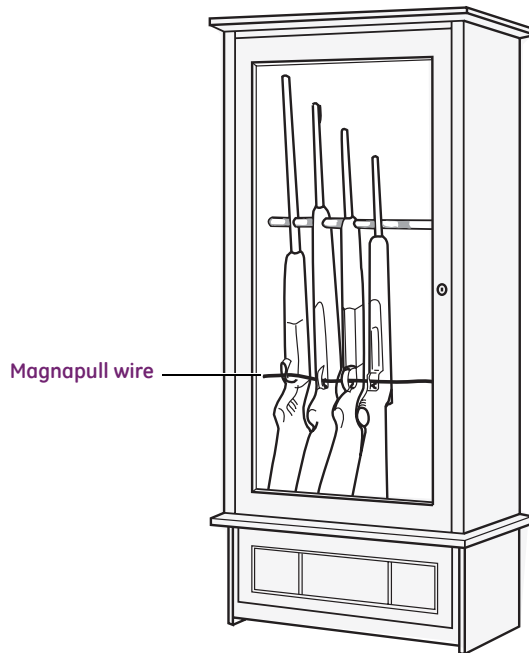


Installation using a Magnapull. Use a Magnapull for guns on open gun racks. To install the Magnapull, do the following:

1. Drill a hole through the wall near the end of the gun rack (if rack is mounted on the wall).
2. Mount the magnet housing on the wall or other end of the gun rack.
3. Pull the wire through the trigger guards of all the guns (*Figure 135*).
4. Insert the switch into the magnet housing.

Recommended products. Magnapull 1005, 2105A, 2107A

Figure 135. Guns with a Magnapull



Art objects

Application. Use a roller switch to protect art objects such as statuary, vases, chests, or other works of art not stored in cabinets.

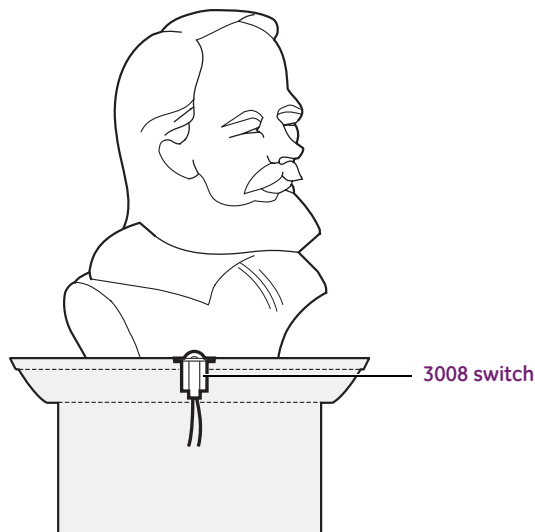
Installation. Inspect the flat surface where the art object will rest. The art object must exert sufficient weight to fully depress the roller of the switch when the object is in place. To install the switch, do the following:

1. Drill a hole 0.75 in, (1.9 cm) in diameter and at least 1.5 in. (3.8 cm) deep in the display stand.
2. Install the switch and test (see *Ohmmeter testing* on page 86). Connect to a 24-hour loop, if available, to provide protection even if the perimeter loop is off.

Note: If the height of the switch's flange causes the protected object to *rock*, recess the switch as shown in *Figure 136*.

Recommended products. 3005, 3008

Figure 136. Art object with roller switch



Hung art objects

Application. Use surface-mount or recessed wide-gap contacts to protect paintings and other hanging works of art.

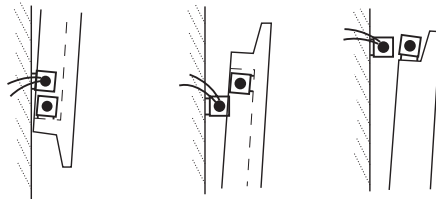
Installation. Use a wide-gap switch if the gap is more than 0.5 in. (1.3 cm). To install the contact, do the following:

1. Inspect the frame for an area to place the magnet.
2. Install the switch on the wall behind the magnet. If you use a recessed contact, install the switch in the wall at right angles to the magnet, forming an *L* with the switch and magnet as shown in *Figure 137*.
3. Test (see *Ohmmeter testing* on page 86). Wire the contact to a 24-hour loop, if available, to provide protection even if the perimeter loop is off.

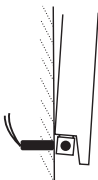
Recommended products. 1035W, 1145W, 1275W

Figure 137. Hung art objects

Surface installation



Recessed installation



Computers, TVs, and stereos

Application. Use a Magnapull switch to protect single items such as computers, TVs, and stereo components.

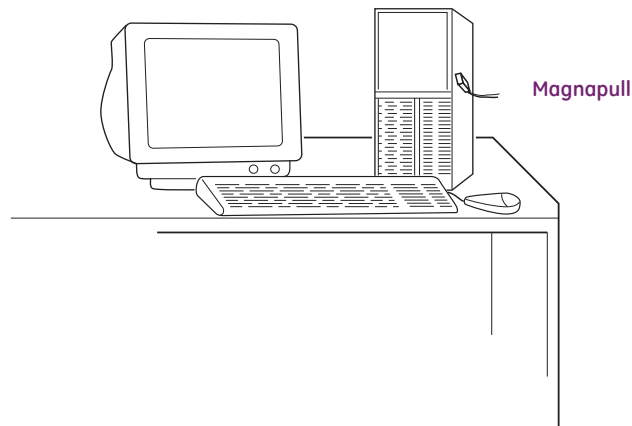
Installation. To install the switch, do the following:

1. Use epoxy or screws (if appropriate for the item) to mount the housing receptacle to the item you want to protect (*Figure 138*).
2. Insert the switch into the magnet housing.
3. Move the equipment around the desk or table as in normal use. Determine the appropriate length of cord to accommodate minor movements. Affix the cord to the table using a small wire clamp.

Note: Avoid mounting the switch too close to data disks and other media that can be adversely affected by magnetic fields.

Recommended products. 1005

Figure 138. Equipment with Magnapull



Recreational equipment

Application. Use a Magnapull to protect recreational equipment such as motorcycles, bikes, and boats. For commercial applications, pull an armored switch with leads through a row of items to be protected.

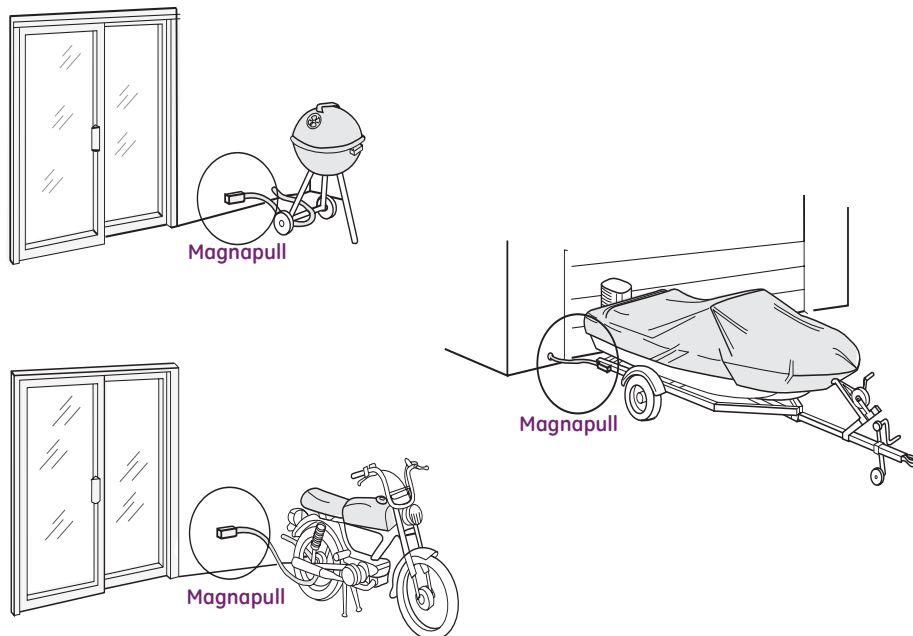
Installation. To install the Magnapull, do the following:

1. Extend the switch cable from the house to the item you want to protect.
2. Either attach the magnet block to the item or loop the cable through the item and back to the house and connect to the magnet block (*Figure 139*).

Note: Cable is available in a variety of lengths.

Recommended products. 2105A, 2107A

Figure 139. Recreational equipment with Magnapulls



Boat decks and cabins

Application. Use a magnetic contact in a simple alarm system to protect the interior of a boat. Use small surface-mount or recessed contacts to protect the hatches and companionway. If you use open circuit switches, a relay, a shunt switch, and a horn, it is possible to use the boat battery with no power drain.

Installation. To protect boats (*Figure 140*), do the following:

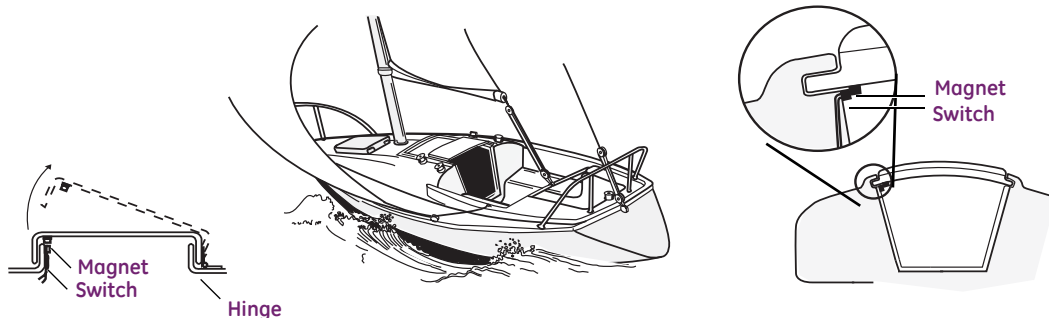
1. Install a switch and magnet in the hatch away from the hinges. If the hatch is plastic, use surface-mount contacts. If the hatch is wood, use recessed contacts.
2. Install a switch and magnet in the sliding companionway boards or door.
3. If you use open contacts to drive the horn, install a latching relay to handle the current.
4. Solder wire connections to prevent corrosion



CAUTION: Magnets affect compass readings. Check the compass before and after you install magnetic contacts.

Recommended products. 1037W, 1082, 1087, 1277

Figure 140. Boat decks and cabins



Boat moorings

Application. Use a 2105A Magnapull to extend coverage of a normal marine alarm to the dock or moorage where the boat is secured.

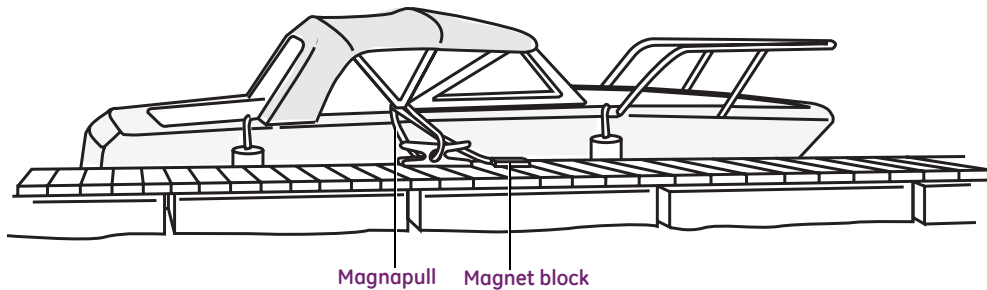
Installation. The magnet block may be attached in several locations on the dock, depending on the structure of the moorage. If possible, mount it in a location where it will not be visible. An extra magnet housing will be required if the boat owner wants to arm the system at a different location from the usual moorage.

For example, it is possible to run the switch cord through a permanently attached fixture on the dock, such as a cleat or ring, then back to the boat where the magnet housing is attached. (Figure 141)

Note: Cable is available in a variety of lengths.

Recommended products. 2105A

Figure 141. Magnapull with magnet block on boat dock



Trucks and trailers at loading docks

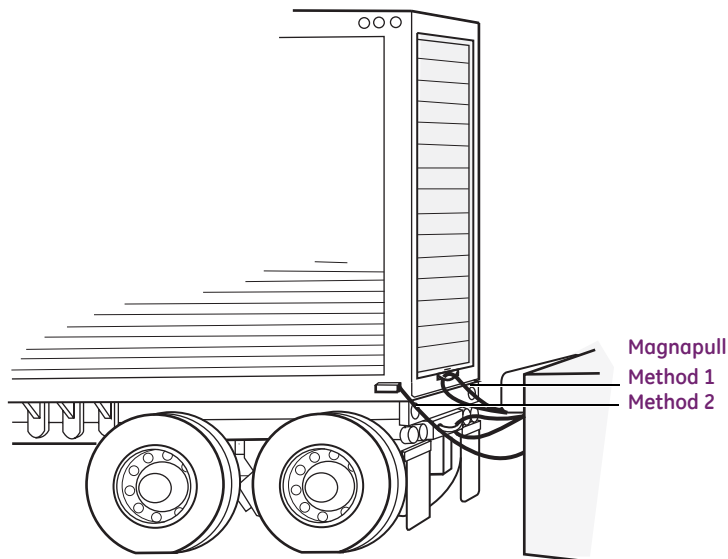
Application. Use the Magnapull to secure trucks and trailers at loading docks.

Installation. To install the Magnapull, do the following:

1. Extend a standard Magnapull from the perimeter loop on each loading dock.
2. Use one of the following mounting methods (*Figure 142*):
 - a. **Method 1.** Run the switch cord through a permanently attached part on the truck and then back to the magnet block on the dock.
 - b. **Method 2.** Affix a magnet block to the truck so that when the truck is in the loading dock, the switch cord can be plugged in. In this case, use an extra magnet block on the dock to store the switch cord when the loading dock is vacant.

Recommended products. 2105A, 2107A

Figure 142. Magnapulls on loading docks



Truck tailgates

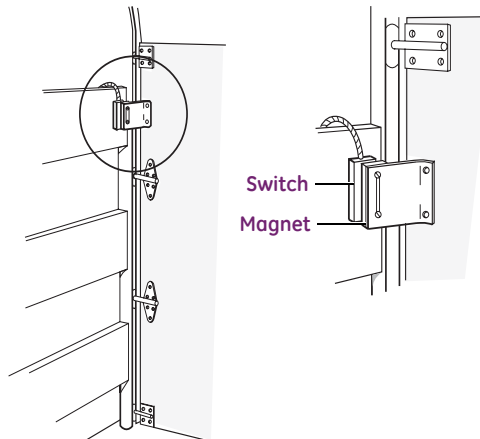
Application. Use magnetic contacts that have sufficient durability, gap, and vibration resistance to protect roll-up truck tailgates.

Installation. To install the contacts, do the following:

1. Select a location for the switch on wood or aluminum on the truck side just forward of the track. It is best to mount near the top at a point where the track starts bending.
2. Place spacers behind the switch to build it out slightly beyond the track.
3. Mount the magnet on the tailgate door using a bracket. Position the magnet and switch as close as possible with the door closed. Mount the end of the magnet about 0.5 in. (1.3 cm) past the end of the switch (*Figure 143*). Magnet and switch labels should read in the same direction (switch is polarity sensitive).
4. Test (see [Ohmmeter testing](#) on page 86). Wire in the leads and dress the wires into place. Do not hook directly into a high-current circuit, such as a vehicle horn. Use a relay if switching more than 1/4 amp.

Recommended products. 2507A

Figure 143. Truck tailgate installation



Chain-link rolling gates

Application. For most chain-link rolling gates, there is considerable tolerance and leeway in the closed position. This makes it difficult to assure proper alignment of the gate switch for alarm protection.

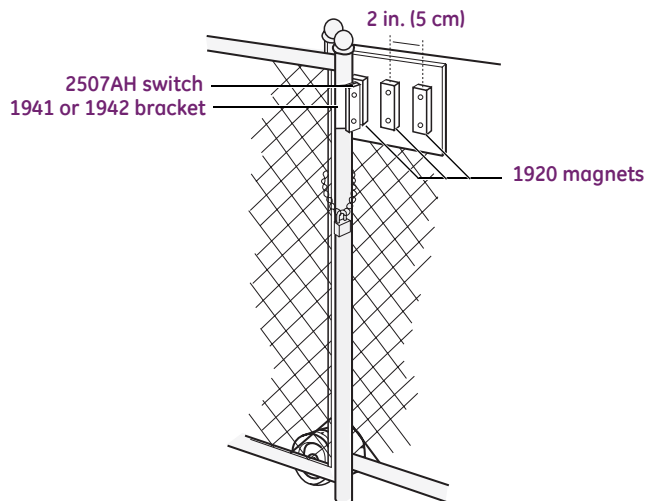
Installation. To assure security, particularly when a high-security biased switch is used, do the following:

1. Mount the switch on the fence post using the appropriate bracket.
2. Mount multiple magnets (usually three) on a wooden board with 2 in. (5 cm) spacing center-to-center. Mount the board on the gate (*Figure 144*). To observe polarity, align the switch and magnet labels so they read in the same direction. If you use the 2507H switch, observe a minimum gap of 0.74 in. (1.9 cm) and a make distance of 6 to 8 in. (15.2 to 20.3 cm).

Note: To prevent false alarms, keep gate fastened tight with a chain or other restraining device.

Recommended products. 2507H, 1941, 1942, 1920

Figure 144. Chain-link rolling gates



Fence gates

Application. Use magnetic contacts to protect chain-link fence gates. You can attach brackets to the gate post or on the gate frame, depending on the diameter of the post and gate. The switch and magnet can be mounted on the inside, outside, or side of the bracket, depending on the space between the post and gate.

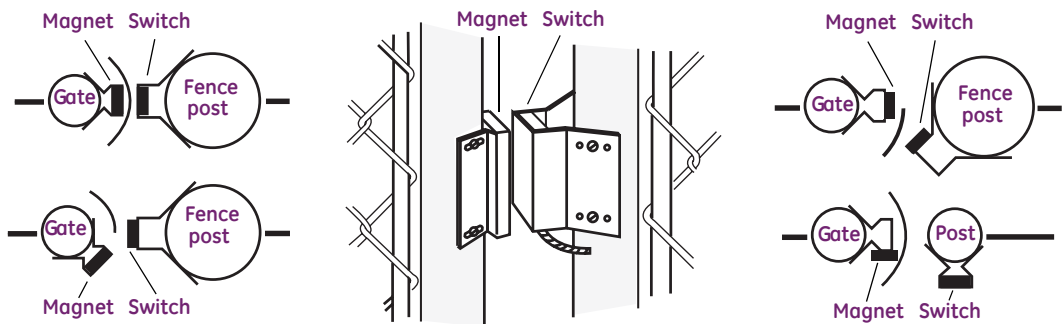
Installation. To install the contact, do the following:

1. Select switch and magnet mounting positions. The switch has a 3 ft. (0.9 m) armored cable. Run the cable to the junction box or to the inside of the pipe for splicing.
2. Mount the brackets on the post and gate with masking tape. Swing the gate to check clearance. Drill 9/64 in. (0.4 cm) diameter holes to mount the brackets, using self-tapping screws.
3. Mount the switch and magnet to the brackets (*Figure 145*). The switch and magnet labels should read in the same direction for proper polarity.
4. Test (see *Ohmmeter testing* on page 86). Wire the switch into the alarm loop and retest.

Note: To prevent false alarms, keep gate fastened tight with a chain or other restraining device.

Recommended products. 1094A Kit

Figure 145. Fence gates



Silent panic switches

Application. Use a manually operated silent panic/emergency alarm switch to protect banks, jewelry stores, and other places where people and property are at risk. The following devices can be used, depending on the application:

- **3040.** The 3040 (*Figure 146* on page 168) has a separate latching LED circuit and must be powered and reset by a push button 5 to 12 VDC source in or mounted outside the alarm panel. This panic switch is ideal for retail outlets, banks, and medical care facilities.
- **3045.** The 3045 has no latching LED. This panic switch is ideal for bedrooms and bathrooms in residential installations and can be used by someone who is unable to call for help.
- **3050, 3055.** The 3050 has a latching LED, the 3055 is nonlatching. These panic switches feature a glowing LED for low-light visibility. The LED glows green when powered up and turns red upon activation.
- **3040CT, 3045CT.** The 3040CT and 3045CT have been specifically modified for low-temperature use in walk-in freezers (*Figure 146* on page 168) to prevent accidental lockup or intentional imprisonment. They can be used in garages or other unheated facilities in cold climates. The 3045CT can also be used in wet applications, such as shower rooms in fitness centers and hospitals.

Installation. To install a panic switch, do the following:

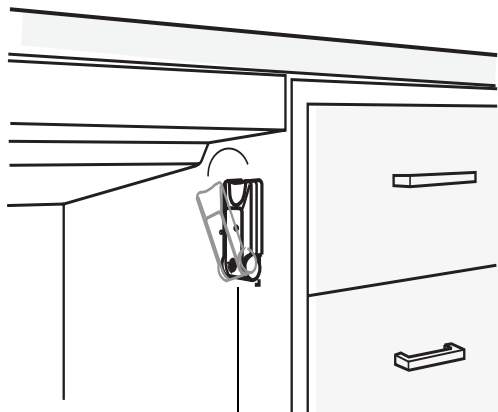
1. Determine the best location for the unit.
 - a. **In retail outlets, banks, and medical facilities,** the switch is most effective when mounted out of view but within convenient reach of the user. Locations such as under a counter top or inside the knee-hole of a desk work well.
 - b. **In a residential application,** mount no higher than 4 ft. (1.2 m) so that it can be reached by a person lying on the floor.
 - c. **In a walk-in freezer application,** mount the unit on the wall somewhere between the floor and 4 in. (10.2 cm) below the door knob.

Allow at least 3 in. (7.6 cm) of clearance above the mounting surface to accommodate the actuating lever when it is fully open. The device can be mounted horizontally or vertically.

2. Temporarily mount the unit with tape and test for ease of operation.
3. Mark the mounting holes and a hole for leads. Drill the pilot holes or start screws.
4. Connect the leads to the terminal block inside the housing and snap the cover in place.
5. Test the unit. Pull the handle approximately 30 degrees from the normal locked position to activate the alarm circuit and LED circuit. The LED will light. To reset the LED circuit, interrupt power to the LED circuit with the handle open. The LED will go out. Close the handle. The device is now fully armed.

Recommended products. 3040, 3040CT, 3045, 3045CT, 3050, 3055

Figure 146. Panic switch installations



Silent panic switch



Silent panic switch

Chapter 4 Technical support

This chapter provides information on technical support and the online publication library.

Contacting technical support

For assistance installing, operating, maintaining, and troubleshooting sensors, refer to this document and any other documentation provided. If you still have questions, you may contact technical support during normal business hours (Monday through Friday, excluding holidays, between 6 a.m. and 5 p.m. Pacific Time).

Table 7. Sales and support contact information

| | Sales | Technical support |
|--------|---|---|
| Phone | Toll-free: 888.GESECURity (888.437.3287 in the US, including Alaska and Hawaii; Puerto Rico; Canada). Outside the toll-free area: 503.885.5700. | |
| E-mail | info@gesecurity.com | generaltech@ge.com |
| Fax | 800.483.2495 | 541.752.9096 (available 24 hours a day) |

Note: Be ready at the equipment before calling for technical support.

Online publication library

Another great resource for assistance with your GE product is our online publication library, available to all of our customers. To access the library, go to our website at the following location:

<http://www.gesecurity.com>

In the **Tools** area at the top, click the [Publication Library](#) link. After you register and log on, you may search through our online library for the documentation you need.¹

1. Many GE documents are provided as PDFs (portable document format). To read these documents, you will need Adobe Acrobat Reader, which can be downloaded free from Adobe's website at www.adobe.com.

Glossary

This section explains some terms as they apply to sensors.

Table 8. Sensor terms explained

| Term | Definition |
|-----------------------|--|
| A/D converter | A device for converting an analog input signal into a series of digital values representing the instantaneous amplitude of the signal at regular sampling intervals. |
| AC | Alternating current. An electric current that flows first in one direction, then reverses its flow direction at regular intervals. |
| acceptance test limit | The poorest measured performance specification which a manufacturer is willing to accept and ship in a product. |
| accuracy | The degree of conformance of a test instrument to absolute standards, usually expressed as a percentage of reading or a percentage of measurement range. |
| actuator | A mechanism of the switch or switch enclosure that operates the contacts. |
| alnico | A metal alloy of aluminum, nickel, cobalt, iron, and other elements that can be strongly and permanently magnetized. |
| ammeter | An electrical instrument used to measure current. |
| ampere | Also referred to as <i>amp</i> , or <i>amps</i> . The electrical rate of flow in a circuit. |
| ampere-hour rating | A number given in ampere-hours determined by multiplying the current in amps times the length of time in hours a battery can deliver the current to a load. |
| ampere turn | The sensitivity of a reed switch. The greater the amp-turns rating of a reed switch, the less sensitive it is. |
| amplitude | The magnitude of a signal, which may be expressed in a variety of units. |
| bandpass filter | A filter which passes a specific frequency band essentially without attenuation while attenuating frequencies both below and above the specified band. |
| battery | An energy source that uses a chemical reaction to convert chemical energy into electrical energy. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|---------------------|--|
| bias | The application of a DC voltage to a diode or other electronic device to produce a desired mode of operation. |
| bit | Binary digit, which may have only two possible states: on or off. |
| break | To open an electrical circuit. |
| break gap | The break gap (or break distance) is the minimum distance between separated mating contacts in their fully open position. |
| capacitance | The ability of a capacitor to store electrical charge. |
| capacitor | An electrical device consisting of two conductive plates separated by an insulating material and possessing the property of capacitance. |
| change | An electrical property of matter that exists because of an excess or a deficiency of electrons. Change can be either positive or negative. |
| circuit | The complete path, or closed loop, that electricity requires to flow and do work. |
| circuit breaker | A device that protects a circuit by automatically opening when excessive current flows. |
| circuit ground | A method of grounding whereby the metal chassis that houses the assembly or a large conductive area on a printed circuit board is used as the common or reference point, also called the chassis ground. |
| closed circuit | A circuit with a complete current path. |
| closed-loop circuit | In a closed-loop circuit, the sensing switch is closed until a change, such as a door or window opening, causes the switch to open and set off an alarm. |
| codec | Compression-decompression algorithm coder-decoder for reduced bit rate transmission or recording/reproduction of digital audio, video, or still images. Codecs reduce the required bit rate by using the available bit rate resources for the most important portions of the signal. |
| complex circuit | Combined series and parallel circuits. A complex circuit is also know as a <i>series-parallel</i> circuit. |
| conductor | A material in which electrical current is established with relative ease. |
| current | Electrical rate of flow. Current is measured in amperes, or <i>amps</i> . |
| current consumption | The amount of current required to power a sensor or control (excluding load). |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|----------------------------|--|
| D/A converter | A device that converts a stream of digital numbers, each representing the amplitude or a signal at a particular sampling time, into a corresponding analog signal. |
| DC | The abbreviation for direct current. Electric current that flows in one direction. |
| dB | Decibel, a ratio unit for expressing signal amplitudes. |
| digital circuit | A circuit that has only two stable states, operating in the manner of a switch (either on or off). |
| DMM | Digital multimeter. Device used to measure voltage, current, and resistance in an electrical circuit. |
| DPDT | Double-pole double-throw. Switches that make and break two separate circuits. This circuit provides a normally open and normally closed contact for each pole. |
| DSP | Digital signal processor. A specialized microprocessor designed for highly efficient processing of digitized analog waveforms. |
| effective sensing distance | The difference between nominal sensing distance and the +/- percent manufacturing tolerance. |
| electrical | Related to the use of electrical voltage and current to achieve desired results. |
| EMF | Electromotive force. The force required to make current flow between two points. EMF is another name for voltage, and is the V in Ohm's Law. |
| enclosed switch | A basic switch unit (contact block) enclosed in a durable housing. |
| environment-proof switch | A switch that is completely sealed to ensure constant operating characteristics. |
| EOL | End-of-line. A resistor that supervises the wiring between the alarm panel and the switch, and prevent wire tampering on normal switches. |
| epoxy | Generic name for any of several types of two-component adhesives. |
| explosion-proof | Having the ability to contain an explosion within the sensor or housing, if one occurs. |
| explosion-proof switch | A UL listed switch capable of withstanding an internal explosion of a specified gas without ignition of surrounding gases. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|----------------------------|--|
| frequency | A measure of the rate of change of a periodic function: the number of cycles completed in 1 s. The unit of frequency is the Hertz. |
| fuse | A protective device that is destroyed when excessive current flows through a circuit, thereby protecting the circuit. |
| ground | Sometimes referred to as earth ground. The part of a circuit that is connected to a metallic object buried in the earth. |
| hermetically sealed switch | A switch completely sealed to provide constant operating characteristics. |
| high pass filter | A filter that passes all frequencies above a specified value essentially without attenuation, while attenuating frequencies below that value. |
| hysteresis, switching | The principle associated with sensors, such that the operate point is not at the same level as the release point. |
| IEC | International Electrotechnical Commission. A body responsible for preparing and publishing international standards for the electrical and electronic fields. |
| inductive technology | Technology based on inductance, the property of an electric circuit by which an electromotive force is induced in it by a variation of current, either in the circuit itself, or in a neighboring circuit. |
| infrared (IR) | The invisible radiation (as opposed to visible light) that certain LEDs emit. |
| input | The voltage, current, or power applied to an electrical circuit to produce a desired result. |
| insulator | Any of several materials that offer resistance to the flow of electric current. Used to cover wires and other electrical devices where current flow is not wanted. |
| integrated circuit (IC) | An interconnected array of active and passive elements integrated within a single semiconductor substrate or other compatible material, and capable of performing one complete electronic function. |
| interface | A common boundary between electronic systems, or parts of a single system. |
| interface circuit | A circuit that links one type of device with another. Its function is to produce the required current and voltage levels for the next stage of circuitry from the previous stage. |
| intrinsically safe | Limits electrical/thermal energy to levels incapable of causing ignition. External barriers are required. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|----------------------|---|
| jitter | The undesirable cycle-to-cycle variation in the period of a reference clock, such as are used in digital audio converters. |
| leakage current | Small current flowing through or leaking from the output device in the Off state due to semiconductor characteristics. |
| LED | Light emitting diode. A solid-state light source that emits variable light, or invisible, infrared radiation. |
| load current | The maximum amount of current that a proximity sensor will switch through its load. Load current for a particular device can be calculated by dividing the load voltage by the load resistance. |
| low pass filter | A filter that passes all frequencies below a specified frequency essentially without attenuation, while attenuating frequencies above that value. |
| LSB | Least significant bit. The bit in a binary word representing the smallest possible value change. |
| magnet | Any of several devices that attract each other, as well as certain kinds of metallic objects, through a force called magnetism. |
| magnetic dampening | Steel and other iron-bearing materials tend to weaken or <i>dampen</i> the field of a nearby magnet. Magnetic dampening decreases the strength of a magnet by about half. |
| magnetic field | A field of magnetic force surrounding all magnetic objects. The magnetic field is strongest at the magnetic poles. |
| magnetic flux | The line of force between the north and south poles of a permanent magnet or an electromagnet. |
| make | To close or establish an electrical circuit. |
| maximum load current | The maximum amount of current that can flow through a sensor and not cause sensor failure. |
| MPEG | Moving Picture Expert Group. A working group in the ISO/IEC that sets standards for low-bit-rate video and audio. |
| multimeter | An instrument that measures voltage, current, and resistance. |
| multitester | Device used to measure voltage, resistance, and current in a circuit. See DMM and VOM. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|--------------------------|--|
| multitone | Testing techniques with stimulus signals consisting of more than one sine wave. Most multitone techniques use 15 or more sine waves distributed across the audio spectrum. |
| NEMA ratings | National Electrical Manufacturers Association ratings of an enclosure's ability to provide a degree of protection against contact with equipment and against specified conditions. |
| nominal sensing distance | An approximate dimension value measured from the face of the sensor to the nearest point of the target. Also known as the operating point. |
| normally open (NO) | Switch that must be actuated to pass current. |
| normally closed (NC) | Switch that passes current until actuated. |
| ohm | The unit of electrical resistance. Resistance through which a current of one ampere will flow when a voltage of one volt is applied. |
| ohmmeter | An instrument for measuring resistance. |
| Ohm's law | An electrical relationship, discovered by Georg Simon Ohm, that states that the current flowing through a conductor is directly proportional to the electromotive force (voltage) that produces it. V (voltage) = I (current in amps) times R (resistance in ohms) |
| omega | The Greek omega symbol, used as the electrical symbol for the ohm. |
| opacity | The characteristic of an object that prevents light from passing through. |
| open circuit | A circuit in which there is not a complete current path. |
| open-loop circuit | In an open-loop circuit, the sensing switch remains open until a change, such as a door or window being opened, causes the switch to close and set off the alarm. |
| operating temperature | Actual temperature range over which sensors can be operated. Usage outside the limits can result in loss of stability and damage to the sensor. |
| output | The useful energy delivered by a circuit or device. |
| parallel circuit | An electrical circuit that offers more than one path (parallel paths) for current flow. A parallel circuit offers the same voltage to each path. |
| pole | The number of completely separate circuits that can pass through a switch at one time. A single-pole switch can control only one circuit at a time. A double-pole switch can control two independent circuits at the same time. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|-----------------------------|---|
| pot | Potentiometer or variable attenuator to control the gain of an amplifier. |
| potential | The energy available for doing work. |
| power | Power is produced when an electric current passes through the resistance in a circuit. |
| power dissipation | The amount of power that is consumed and converted to heat in normal operation. |
| random noise | Noise whose amplitude-vs-time distribution is mathematically random and unpredictable, never repeating. |
| RC | Resistor-capacitor. Commonly used to describe filters and oscillators, as opposed to LC (inductor-capacitor). |
| reed technology | Technology where the reed contacts are designed to be actuated by a magnet. When a magnetic field is brought close to the reed contacts, the contacts are drawn together to make the circuit. |
| relay | An electromagnetically controlled mechanical device in which electrical contacts are open or closed by a magnetizing current. |
| residual noise | The irreducible noise in a measurement instrument which sets a floor for amplitude measurements. |
| resistance | Electrical resistance decreases the quantity of electricity that can flow through a wire in a given time. All objects have resistance; those with greater resistance to current flow are insulators, and those with little resistance are conductors. |
| resistor | An electrical component that creates resistance when installed in a circuit. |
| response time | The time it takes for a device to respond to an input signal. |
| retentivity | The ability of a magnetic material to retain its magnetism after the magnetizing force is removed. |
| reverse polarity protection | Circuitry, usually a diode which prevents current from flowing into the control in case of accidental miswiring of the plus (+) or minus (-) terminals, that prevents damage to the unit. |
| ripple | (1) Undesired AC variations on a DC power supply output. (2) Variations in frequency response in the passband of a filter. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|-----------------------|---|
| RMS | Root mean square. The preferred form of signal detection, which measures amplitude in terms of its equivalent power content, regardless of signal waveshape. |
| schematic | A drawing that uses standard pictorial graphic elements to describe an electrical circuit. |
| sensing distance | The maximum recommended distance between the sensor and a standard target at which the sensor will effectively and reliably detect the target. |
| sensor | The basic element that usually changes some physical parameter to an electrical signal. |
| series circuit | An electrical circuit that offers only one path for current flow. |
| signal-to-noise ratio | The difference in level between a reference output signal and the device output with no signal applied, normally stated in dB. |
| SPDT | Single-pole double-throw. Form C switch that may either make or break a circuit, depending on how it is wired. |
| SPST | Single-pole single-throw. Form A switch with only one moving and one stationary contact. Available either normally open (NO) or normally closed (NC). |
| standard gap | Standard gap (or make distance) refers to the minimum distance required before the contact circuit restores to its normal state. For example, NO or NC. |
| supply current | The amount of current necessary to maintain operation of a photoelectric control, proximity sensor or control base. Sometimes referred to as current consumption. |
| supply voltage | The range of power required to maintain proper operation of a photoelectric control, proximity sensor or control base. |
| switch | A device for controlling an electric circuit by breaking (opening) or making (closing) one of its conductors. |
| switching frequency | The actual number of targets to which the sensor can respond in a given time period, usually expressed as Hertz (cycles per second). |
| symmetrical | Balanced. |
| temporary magnet | Magnetic material that remains magnetized only as long as it is in contact with a magnetic field. |
| terminating | Connecting the specified load resistance or impedance to a device. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|-------------------------|--|
| termination | A specific resistance or impedance value which must be connected to the output or input of a device under test for certain parameters to be measured. |
| THD | Total harmonic distortion. Normally computed from a series of selective measurements of the amplitudes of all significant individual harmonic distortion products. |
| transducer | A device to change acoustical power into an electrical signal or electrical power into an acoustical signal. |
| transformer | A device formed by two or more windings that are magnetically coupled to each other and provide a transfer of power electromagnetically from one winding to another. |
| transient protection | Circuitry to guard against spikes induced on the supply lines by inductive sources such as heavy motors or solenoids turning on and off. |
| transients | In electrical usage, usually refers to an unwanted, temporary, large increase or decrease in current or supply voltage that only occurs occasionally. |
| triac | A device that uses an electrical <i>gate</i> to switch currents (in amps) that are beyond the capabilities of reed switches. |
| trigger | An event which causes another event or action, often initiating a signal generation or acquisition. |
| UL | Underwriter's Laboratories, Inc. A nonprofit organization that establishes, maintains, and operates laboratories for the testing of devices, systems, and materials, primarily for safety. |
| unbalanced | An audio connection in which the desired signal is present as a voltage with respect to ground or common, rather than as a differential signal across a pair of balanced conductors. |
| usable sensing distance | Sensing distance after temperature range tolerance and manufacturer's tolerance are taken into account. |
| VCA | See voltage controlled amplifier. |
| VCO | See voltage controlled oscillator. |
| volt | The unit of voltage or electromotive force. |
| voltage | The amount of energy available to move a certain number of electrons from one point to another in an electric circuit. |

Table 8. Sensor terms explained (continued)

| Term | Definition |
|-------------------------------|--|
| voltage controlled amplifier | An audio amplifier with a DC voltage control port which electronically varies the gain of the amplifier. |
| voltage controlled oscillator | An oscillator whose frequency can be varied via a DC control voltage. |
| voltage drop | The potential difference in voltage between two points when there is a drop in energy level due to resistance. |
| voltmeter | An instrument used to measure voltage. |
| VOM | A volt-ohm-millimeter. This device is one of the two types of multimeters used to measure voltage, resistance, and current in an electrical circuit. |
| watt | Unit of electrical power. One watt is equal to one volt of electrical pressure multiplied by one amp of current. |

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