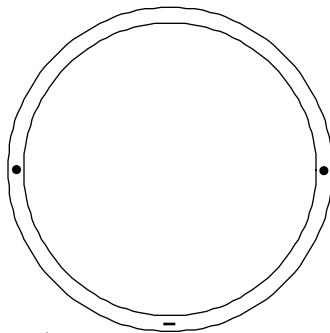


INSTALLATION INSTRUCTIONS

Model FG-1025Z Glass-Break Detector



PRODUCT DESCRIPTION

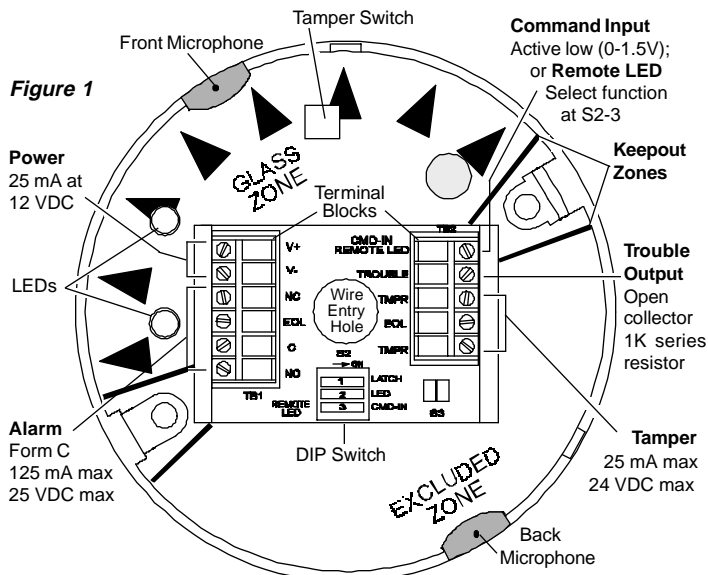
The FG-1025Z is a directional glass-break detector. Two microphones and time-of-arrival processing allow the unit to provide precisely-defined protected and excluded zones.

For a detailed description of how the FG-1025Z works, refer to the Technical Information section on page 5.

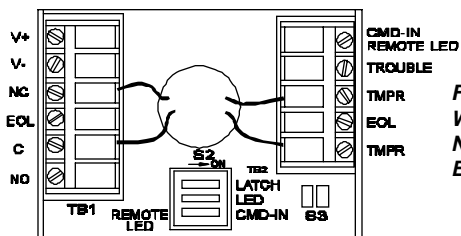
WIRING

1. For surface-wired installation, use optional Wiring Spacer Plate (model number FG-SP2).
2. Route wire through Wire Entry Hole in the center of the printed circuit board (PCB), and strip wire ends 1/4" (6.5 mm).
3. Wire the unit as shown, (use 22 - 18 AWG). Reverse polarity connections will not damage the unit.
4. When wiring is complete, push excess wire back into the ceiling. (Refer to the Mounting Locations section.)

NOTE: If end-of-line resistors are required, wire as shown in Figures 2c and 2d.



**Figure 2
WIRING**

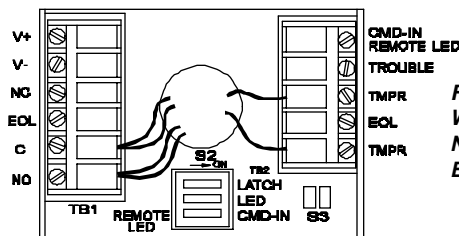


**Figure 2a
Wiring for a
N.C. loop, no
EOL resistor**

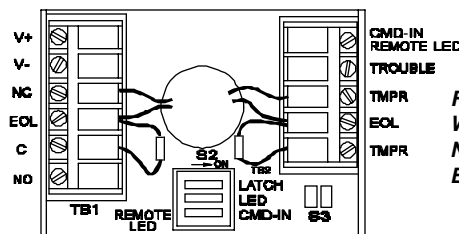
FEATURES

- Advanced microcontroller with Digital Signal Processing (DSP)
- Precise 160° protected and 160° excluded zones
- Dual microphones with time-of-arrival (TOA) processing
- Continuous self-test
- No adjustments
- No minimum range
- RemoteTest Mode activation with FG-701 simulator
- End-of-line / spare terminals
- Cover and wall tamper
- Selectable Alarm Memory
- LED enable
- 8 - 14 VDC operation
- Energized Form C relay
- PCB and housing designed to protect against ESD and mechanical damage
- Watchdog for microcontroller
- Green event LED lights when sounds are processed
- Dedicated trouble output
- Selectable Command Input or Remote LED Enable

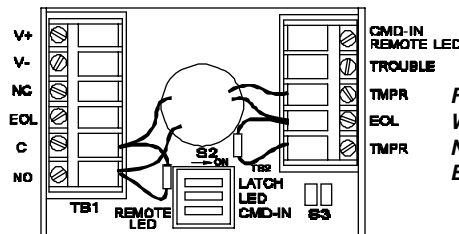
WIRING (Continued)



**Figure 2b
Wiring for a
N.O. loop, no
EOL resistor**



**Figure 2c
Wiring for a
N.C. loop with
EOL resistor**



**Figure 2d
Wiring for a
N.O. loop with
EOL resistor**

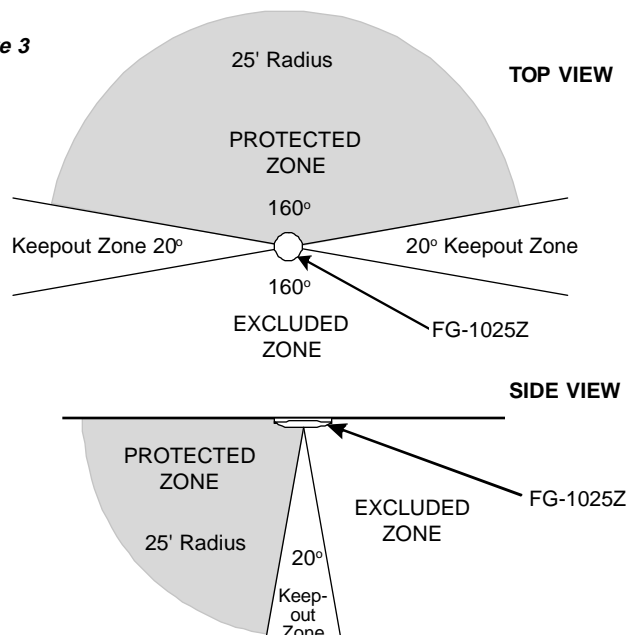
MOUNTING LOCATION

For the greatest flexibility in aiming the FG-1025Z, mount the unit on the ceiling. Figure 3 illustrates the protected, excluded and keepout zones for a ceiling mounted FG-1025Z.

The arrows printed on the intermediate cover (see Figure 1) indicate the direction of the protected zone. Refer to the Mounting Guidelines to select an appropriate location, and refer to the Aiming Guidelines to aim the unit properly. (If ceiling mounting is not possible, the unit can be mounted on a wall or post.)

MOUNTING LOCATION (Continued)

Figure 3



Mounting Guidelines:

- Mount the unit close to, and within 25' (7.6 m) of the protected glass. *As much of the room as possible should be in the excluded zone.*
- There is no minimum range, but the unit must have a clear line-of-sight and a clear view of the protected glass.
- The preferred location is on the ceiling directly opposite the glass.
- Do not mount in corners, and keep the unit at least 1' (0.3 m) from any adjacent walls.
- When wall mounting, mount the unit at a height of at least 6 feet (1.8 m) to avoid accidental screening if furniture in the room is moved.
- There should be no obstructions on the mounting surface within 6" (15 cm) of the microphone openings.
- The FG-1025Z will detect through venetian blinds and light drapes. *Test the location thoroughly whenever there are window coverings present.*
- Do not mount within 3 feet (0.9 m) of forced air ducts, sirens, or bells measuring two inches (5 cm) or more in diameter.
- **Be sure to test the unit for detection in the final mounting location.**

Aiming Guidelines:

- Orient the unit so that all protected glass is within the protected zone and all known false alarm sources are within the excluded zone. (Refer to Figure 3.)
- Aim the unit so that no protected glass is in the keepout zones. Sounds in the keepout zone may or may not be processed. (However, false alarm immunity is at least as good in the keepout zones as it is in the protected zone.)
- Verify the edges of the protected zone by using the FG-701 simulator, hand claps, or any sharp sound. If the sound source causes the green LED to flicker, the sound is being processed. (The LEDs must be enabled.)
- Before mounting the unit, refer to the Testing section to help determine the best location.

Tip: It is a good idea to mount the unit temporarily in the intended location and power it with a 9 V battery until aiming and testing have established proper detection. If the 9 V battery cannot supply sufficient power, the unit will not operate.

MOUNTING PROCEDURE

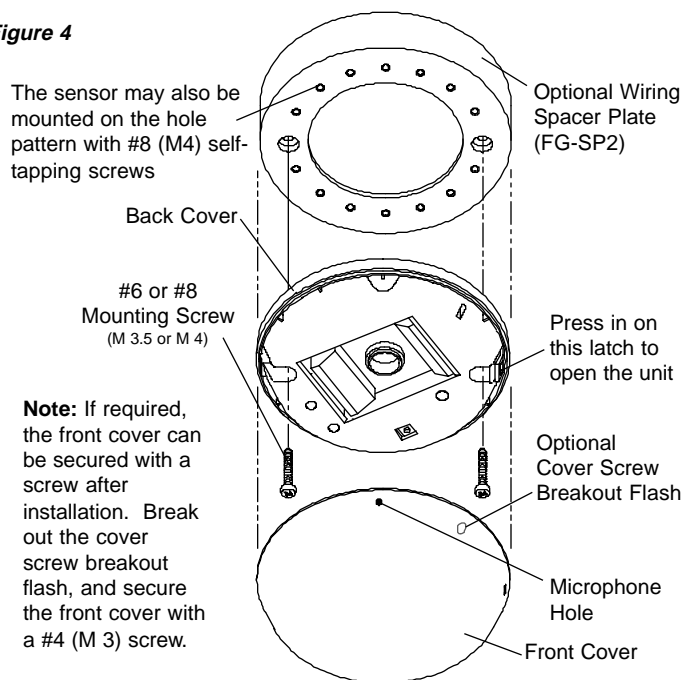
NOTE: If you plan to use the ceiling/wall tamper, locate the position of the ceiling/wall tamper screw before locating the mounting screws. (Refer to Tamper Switch section.)

1. To open the sensor, use a screwdriver to push down on the latch through the slot on the side of the unit. (See Figure 4.)

NOTE: The FG-1025Z is designed to be mounted without removing the PCB. DO NOT remove the PCB from the protective enclosure.

2. For mounting the FG-1025Z sensor, #6 (M 3.5) or #8 (M 4) screws are recommended. (Screws are not provided.)
3. If surface wiring is required, use the optional Wiring Spacer Plate (model number FG-SP2).

Figure 4



Note: If required, the front cover can be secured with a screw after installation. Break out the cover screw breakout flash, and secure the front cover with a #4 (M 3) screw.

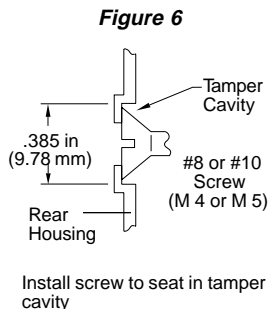
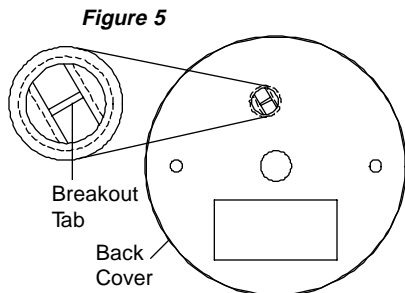
TAMPER SWITCH

The FG-1025Z is equipped with a combination normally-closed (NC) cover and ceiling/wall tamper. Each unit is shipped with the cover tamper operational and the ceiling/wall tamper disabled.

To use the wall tamper:

1. Use needle-nose pliers to break out the plastic tab on the back of the unit. (See Figure 5.) The ceiling/wall tamper arm will then extend through the hole.
2. The ceiling/wall tamper screw (not provided) should be a flat-head #8 (M 4) or #10 (M 5) screw.
3. Install the ceiling/wall tamper screw so that it will just make contact with the bottom of the tamper cavity when the unit is mounted. (Refer to Figure 6.)
4. After installing the ceiling/wall tamper screw, position the unit over it and mark the locations for the mounting screws.

TAMPER SWITCH (Continued)



CMD IN / REMOTE LED INPUT

Use DIP switch S2-3 to select the function of the control input at terminal strip TB2. Designate the input as a Command Input or a Remote LED Enable. The input circuit is shown in Figure 7.

- *As Command Input:* a logic low signal will initiate a complete self-test sequence. If the test fails, the Trouble Output will be activated.
- *As a Remote LED Enable:* A logic low signal will enable both LED's. The manual LED enable at DIP switch S2-2 must be OFF.

Note: If not used, you can leave the input unconnected.

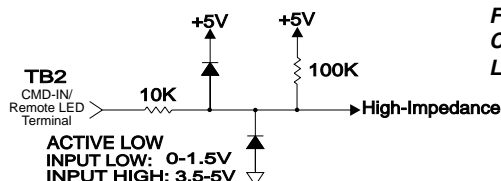
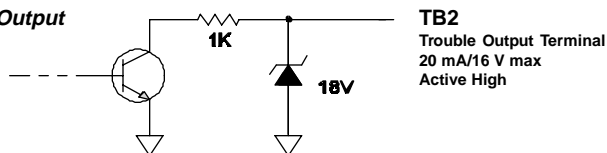


Figure 7
Command/Remote LED Input Circuit

TROUBLE OUTPUT

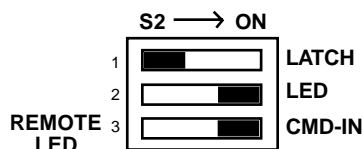
Failure of a power-up or periodic self-test is signaled by a logic high output at the Trouble Output terminal on TB2. The output will be held high until a subsequent self-test passes. The output circuit is shown in Figure 8.

Figure 8
Trouble Output Circuit



FG-1025Z CONFIGURATION

Configure DIP switch S2 to best suit the application:



FG-1025Z CONFIGURATION (Continued)

SWITCH	OFF	ON
LATCH	Red alarm LED lights for 5 seconds when unit alarms	Red alarm LED latches ON when unit alarms ^{a,b}
LED	LEDs are disabled except during power-up test	LEDs are enabled
CMD IN/REMOTE LED	TB2 terminal set to Remote LED Enable ^c	TB2 terminal set to Command Input ^c

Shaded boxes are factory default settings.

^aLatched alarm LED does not affect timing of alarm relay.

^bReset the alarm LED by removing and restoring power, or by toggling the S2 LATCH switch off and on.

^cSets function of CMD-IN/Remote LED terminal.

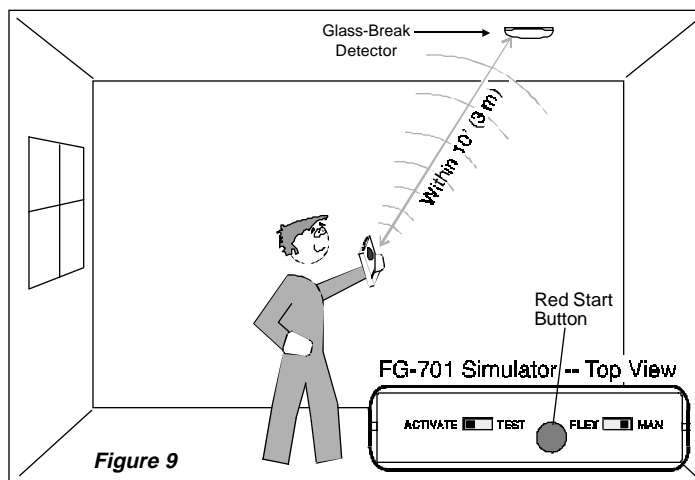
TESTING

The FG-1025Z should be tested at least once each year. Test the unit with the FG-701 Glass-Break Simulator. The model FG-700 Glass-Break Simulator can be used if it is set for the TEMPERed glass sound. Other glass-break simulators will not give accurate indication of range.

You must place the FG-1025Z in Test Mode before you can test the unit.

To activate Test Mode:

1. Stand inside the protected zone within 10 feet (3 m) of the unit.
- NOTE:** The FG-1025Z will not respond to simulator sounds from the excluded zone.
2. Switch the FG-701 to ACTIVATE and MANUAL modes.
 3. Point the front of the simulator at the unit and press the red start button. (See Figure 9.)



You should hear a short buzz from the simulator, and the green LED on the FG-1025Z should begin flashing about once per second to indicate it is in Test Mode.

NOTE: In Test Mode the LED disable switch is overridden.

TESTING (Continued)

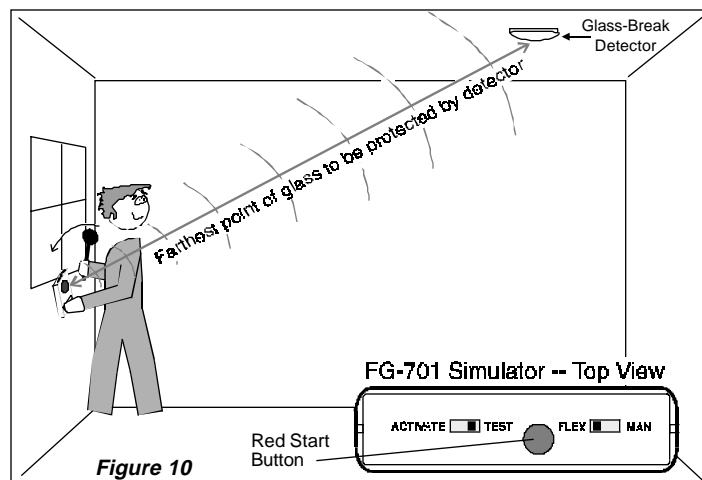
IMPORTANT: Some environmental factors may reduce the sensor activation range. If you do not see the green LED flashing after pressing the red start button, move closer to the unit and try again.

If an FG-701 is not available, or if for any reason remote activation cannot be used, use a screwdriver to short the test pads at location S3 on the PCB (see Figure 1). This will activate Test Mode. Make sure to replace the front cover of the FG-1025Z before beginning test.

To test the FG-1025Z:

1. Place the unit in Test Mode as described above.
2. Set the FG-701 switches to the TEST and FLEX positions.
3. Press the red start button. The simulator will "click" on and start an eight second armed period.
4. Position the FG-701 near the farthest point of the protected glass and point it directly at the FG-1025Z.
5. Generate a flex signal by carefully striking the glass with a cushioned tool. The FG-701 will respond by producing a burst of glass-break audio. (Refer to Figure 10.)

If both the flex and audio are received properly, the red alarm LED on the FG-1025Z will light.



IMPORTANT: If window coverings are present, close them fully and hold the FG-701 behind the window coverings for testing.

NOTE: You can also use the simulator in the MANual mode to test audio alone. The blinking green LED on the unit will flicker when the simulator audio is received correctly. (See the FG-701 Operating Instructions for additional information.)

After testing, exit the Test Mode using the same procedure for activating the Test Mode. The FG-1025Z also will automatically exit Test Mode after ten minutes. If the red alarm LED is lit, it will automatically extinguish upon exiting Test Mode.

LED Indicators:

The two LED's on the front cover are used to indicate the sensor's operational status. The following table summarizes the LED operation when the LED's are enabled.

LED Indicators (Continued):

Condition	Green LED	Red LED
Normal, no event	OFF	OFF
Normal, event detected	Flicker	OFF
Normal, break detected	OFF	ON
Power-up self-test	ON, one second	ON, one second
Trouble detected	Flash ON/OFF	Flash OFF/ON
Test mode, no alarm	Flash once per second	OFF
Test mode, event detected	Flicker	OFF
Test mode, alarm	Flash once per second	ON

APPLICATIONS INFORMATION

The FG-1025Z is designed to detect framed glass broken by an impact sufficient to make a hole.

To minimize the chance of false alarms:

- Do not use outside.
- Avoid installing in rooms with high-level noise sources, such as air compressors, bells, power tools, etc., if those sources can be active when the detector can signal an alarm.
- Test false alarm immunity by activating any known noise sources in the room.

To maximize detection:

- Mount the unit on a wall or ceiling directly opposite the glass if possible. The least desirable mounting location is on the same wall as the glass.
- Minimize range to the glass. Do not install beyond the maximum specified range even if testing indicates greater range.
- Verify all installations back to the panel to be sure that the protection loop is intact.

SELF-TESTS

The FG-1025Z automatically performs a series of self-tests during power-up, and continuously (when the sensor is not detecting a trouble or alarm condition.) Refer to the chart below for descriptions of the self-tests performed:

Self-Test Chart

Power-Up Self-Tests

- **RAM Test**
Write & read all RAM locations with one's & zero's
- **Arithmetic Test**
Verify correct results for CPU arithmetic
- **Logic Test**
Verify correct results for data comparisons
- **Clock Rate Test**
Check clock frequency by measuring external time constants
- **Active Analog Circuit Test**
Inject signals into analog channels to check gains, filters, A/D, and interrupts

Continuous Self-Tests

- **Watchdog**
Supervises microcontroller
- **ROM Checksum**
Firmware ROM checksum verified
- **RAM Test**
Write & read RAM locations with one's & zero's
- **Logic Test**
Verify correct results for data comparisons
- **Passive Analog Circuit Test**
Verify analog inputs are within normal bounds

SELF-TESTS (Continued)

If any self-test fails, the unit will signal trouble by flashing the LED's alternately about once per second. Protection will continue if possible. If the trouble condition clears, the LED's will return to the normal state. Always return the unit for repair if there is any indication of trouble, even if the trouble is temporary.

TECHNICAL INFORMATION

The FG-1025Z is a directional glass-break detector. It has precisely-defined protected and excluded zones. There is no reduction in sensitivity at the edges of the protected zone, and the device completely rejects sounds in the excluded zone, no matter how loud they are, or how similar to glass-break they are.

This performance is achieved through the use of two microphones and time-of-arrival (TOA) processing. When a sound is generated in the room the microphone nearest the sound will receive it first. The microcontroller in the unit monitors all sound events received by the microphones and processes only those received first at the "front" microphone, which is pointed toward the protected zone. Sounds arriving at the "back" microphone first are simply ignored.

Because of the symmetry of the unit, the space surrounding the front and back microphones is divided evenly between protected and excluded zones. A region 20 degrees wide on each side of the unit is the keep-out zone. In this region sound may or may not be processed. Glass to be protected should never be within the keep-out zone. However, false alarm immunity is at least as good in the keepout zones as it is in the protected zone.

FCC Notice: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: 1) Reorient or relocate the receiving antenna, 2) Increase the separation between the equipment and receiver, 3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. The installer can also consult an experienced radio/television technician for additional suggestions, if necessary.

In addition, a booklet on interference, prepared by the Federal Communications Commission, is also available for reference. Order "Interference Handbook" from the U.S. Government Printing Office, Washington D.C. 20402, stock no. 0004-000-00450-7.

SPECIFICATIONS

Range:

25' (7.6 m) maximum
No minimum range

Alarm Relay:

Form C
125 mA maximum
25 VDC maximum

Alarm Duration:

5 seconds (unaffected by alarm LED latching)

Tamper Switch:

Combination cover and wall tamper
25 mA maximum
24 VDC maximum

Power Requirements:

8 - 14 VDC; 25 mA typical at 12 VDC, 35 mA max
AC Ripple: 4 Volts peak to peak at Nominal 12 VDC

Protected Glass:

Minimum size for all types is 11" (28 cm) square; Glass must be framed in the wall of the room or mounted in a barrier of 36" (0.9 m) minimum width.

Operating Temperature:

32° to 120° F (0° to 49° C)
Storage: -4° to 122° F (-20° to 50° C)

RF Immunity:

30 V/m, 10 MHz - 1000 MHz

ESD Immunity:

10 kV;
Discharges of either polarity to exposed surfaces

Dimensions:

4.25" OD x 0.88" THK
(108 mm x 22.4 mm)

Weight:

4.5 oz., (128 g)
Packaged Product: 7.5 oz, (213 g)

Command Input/

Remote LED Enable:

Active low (0 - 1.5 V)
High impedance for inputs less than 5.6 V. Draws less than 1 mA for inputs up to 16 V.

Trouble Output:

Open collector, active high; 1K series resistor; 20 mA/16 V max

Type	Thickness	
	Minimum	Maximum
Plate	3/32" (2.4 mm)	1/4" (6.4 mm)
Tempered	1/8" (3.2 mm)	1/4" (6.4 mm)
Laminated ¹	1/8" (3.2 mm)	9/16" (14.3 mm)
Wired	1/4" (6.4 mm)	1/4" (6.4 mm)
Coated ²	1/8" (3.2 mm)	1/4" (6.4 mm)
Sealed Insulating ¹	1/8" (3.2 mm)	1/4" (6.4 mm)

¹Laminated and sealed insulating glass types are protected only if both plates of the unit are broken.

²For glass coated on the inner surface with 3M scotchshield type RE35NEARL or Hard Glass Security Film, reduce maximum range to 15 feet (4.6 m).

Patents:

U.S. and International Patents Applied For

Approvals/Listings:

Accessories:

FG-701 Glass-Break Simulator
FG-SP2 Spacer Plate

Note: The FG-1025Z Glass-Break Detector is designed for primary perimeter security. For a complete security system, additional interior protection devices are recommended.

LIMITED WARRANTY

Seller warrants its products to be in conformance with its own plans and specifications and to be free from defects in materials and workmanship under normal use and service for 18 months from the date stamp control on the product or for products not having a C&K Systems date stamp, for 12 months from the date of original purchase, unless the installation instructions or catalogue sets forth a shorter period, in which case the shorter period shall apply. Seller's obligation shall be limited to repairing or replacing, at its option, free of charge for materials or labor, any part which is proved not in compliance with Seller's specifications or proves defective in materials or workmanship under normal use and service. This warranty is void if the product is altered or improperly repaired or serviced by anyone other than C&K Systems factory service. For warranty service, contact your local C&K Service Center.

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. In no case shall Seller be liable to anyone for any consequential or incidental damages for breach of this or any other warranty, express or implied, or upon any other basis of liability whatsoever, even if the loss or damage is caused by Seller's own negligence or fault.

Seller does not represent that its product may not be compromised or circumvented; that the product will prevent any personal injury or property loss by burglary, robbery, fire or otherwise; or that the product will in all cases provide adequate warning or protection. Buyer understands that a properly installed and maintained alarm may only reduce the risk of burglary, robbery, or fire without warning, but it is not insurance or a guarantee that such will not occur or that there will be no personal injury or property loss as a result. CONSEQUENTLY, SELLER SHALL HAVE NO LIABILITY FOR ANY PERSONAL INJURY, PROPERTY DAMAGE, OR OTHER LOSS BASED ON A CLAIM THAT THE PRODUCT FAILED TO GIVE WARNING. However, if Seller be held liable, whether directly or indirectly, for any loss or damage arising under this Limited Warranty or otherwise, regardless of cause or origin, Seller's maximum liability shall not in any case exceed the purchase price of the product, which shall be fixed as liquidated damages and not as a penalty, and shall be the complete and exclusive remedy against Seller.

This warranty replaces all previous warranties and is the only warranty made by C&K Systems on this product. No increase or alteration, written or verbal, of the obligation of this warranty is authorized.