PROTECT WHAT MATTERS

SHOTALERT

ACTIVE SHOOTER DETECTION

SA-100

Gunshot Detection Sensor

PROTECT

What Matters

ALERTS ARE INITIATED FOR GUNSHOTS AND EXPLOSIONS

- Classrooms, hotel/motels, banks, offices, or other indoor locations provided automated alerting when gunshots occur.
- When combined with the Eagle IP base module, remote units can wirelessly initiate a contact closure at the alarm panel for up to 15 units.
- Mounts on the ceiling/wall and looks like a smoke detector.

Patent 10,054,576 B2

- *Standalone operation when utilizing a single output attached to your existing alarm panel or camera system, requiring only power and provides a grounding logic output when in alarm*
- *Reports immediate detection of gunshot event to your alarm panel*
- *Patented detection system integrated in a small self contained safety sensor*
- *Optionally up to 15 Eagle AP modules can be wirelessly connected to the Eagle IP base module master module for a minimally wired solution*
- *EAR99, fully exportable globally without licensing issues*
- *Available in an industrial ABS molded enclosure in either white or black*

SPECIFICATIONS

SHOTALERT®

CEILING OR WALL MOUNTED GUNSHOT DETECTION SENSOR

Physical

- Mounts on the ceiling and appears like a smoke detector
- Indicators: Status indicator provide basic visual feedback
- Connections: Single RJ45 connector providing power and access to a single contact closure alert output.
- Optional wireless connection to the alarm panel

Sensors

- Sensing: Patented gunshot and explosive detection sensor to accurately determine valid events
- Operates from events concussion, audio and vibration

Alerting

- Open drain logic outputs when a gunshot event is detected. An output is provided to alert external equipment.
- Optionally reports back to an Eagle AP base unit that can be located at the alarm panel which wirelessly supports 15 AP units and 15 contact closure outputs to the alarm panel
- Optional cellular reporting when utilized with an Eagle IP primary unit. Reports over Verizon Wireless or Vodafone
- Users maintain their own call out list, no call center required

Additional Units

- Up to 15 additional units can be connected to a single Eagle IP Base Unit for central notification

Power and Enclosure

- Input: +6V~26V DC input from external power

Environment

- Size: 5” Wide x 6" Tall x 1.25" Thick, Weight: 0.5 lb (227g)
- 95% Relative Humidity
- Enclosure: White/Black ABS housed in a ceiling mounted accessory
- Size: 5” Wide x 6" Tall x 1.25" Thick, Weight: 0.5 lb (227g)

SAFETY

TECHNOLOGY

INTEGRITY

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SHOT ALERT
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P R O T E C T W H A T M A T T E R S

SHOTALERT
ACTIVE SHOOTER DETECTION

SA-400

Gunshot Detection Sensor

PROTECT
What Matters

ALERTS ARE INITIATED FOR INITIAL GUNSHOT, MULTIPLE GUNSHOTS, MANUALLY INITIATED ALERTS

Any outdoor location used to provide near instant automated alerting when gunshots occur.

Basic connection requirements:
Power, ground and provides (3) logic outputs for optional alarm panel interfacing

A secure enclosed system that provides simple installation and notification options:
Technology is self-contained providing secure operation and additional cellular options for ease of installation and notification setup.

Mounts on the outdoor wall or entrance and looks like a smoke detector.

Patent 10,054,576 B2

- *Wall mounted Gunshot Detection and Explosive sensor with optional integrated cellular data modem. Provides immediate detection of event and alerts location*
- *Patented detection system integrated in a small safety sensor*
- *Manual alert feature enables non-gunshot alert to be sent*
- *Reports GPS/GNSS location when a validated event occurs*
- *Alerts sent (using https) to a private cloud, using SMS, email and direct IP directed responses. Enables customized responses when an event is detected*
- *No Call Center required! Alerts are managed by each account owner from a secure cloud service*
- *EAR99, fully exportable globally without licensing issues*
- *Operates globally using Vodafone and in the USA using Verizon Wireless*
- *Available in an industrial ABS molded IP65 weather sealed enclosure*

S P E C I F I C A T I O N S

SHOTALERT®

WALL MOUNTED GUNSHOT DETECTION SYSTEM

Physical

- Mounts on the outside wall or entrance of a building
- Indicators: Status indicator provide basic visual feedback
- Connections: RJ45 connector carrying Power (+6V ~ +60V),Ground and Physical Contact Closure signals

Sensors

- Uses patented acoustic and pressure detection sensing technology to determine valid gunshot and explosion events

Alerting

- SA-100 sends alerts to Shot Alert's cloud notification server when the module has been alerted. The cloud can be configured to send users alert notifications via SMS or email.
  - *Users maintain their own call-out list, no call center required*
- SA-100 also provides outputs that can be sent to a building's existing alarm system for event detection purposes

Coverage Area

- When placed on a flat surface facing outward, the sensor will detect small arms gunshots/explosions within 60 feet from the front of the sensor with a field of view (FOV) of 120~150 degrees. Range can vary depending on environmental conditions such as wind/rain

Data

- Verizon LTE (USA), Vodafone (Global)
- Alerts published to Shot Alert's alarm notification service

Power and Enclosure

- Input: +9V ~ +60V input from the alarm wiring external power
- Rechargeable battery provides event detection without AC power

Contact Closure

- Separate contacts for single gunshot; multiple gunshots, and manual pull-down switch.

Environment

- Temperature: -20°C ~ 50C° (-4°F ~ +122°F)
- 95% Relative Humidity: Built to IP65 environmental standards
- Enclosure: ABS housing with an aluminum wall mounting plate
- Size: 8.5" Wide x 5.9" Tall x 1.25" Thick, Weight: 1.35 lb (613g)

Shot Alert Incorpates multiple layers of alert notifications baed on the event.

Alert	Building Security
Single Gunshot	911, Building Security
Multiple Gunshots or Explosion	911, Building Security, Medical

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SHOT ALERT
ACTIVE SHOOTER DETECTION

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How Does it Work?

Shot Alert sensors are unique in that they detect changes in both sound and pressure in order to determine whether or not a gunshot or explosion event has occurred.

When a gun is fired, hot and rapidly expanding gases propel the bullet out of the barrel of the gun at high speed. These gases momentarily raise the pressure in a local area. The loud sound generated is from the combination of these changes in pressure and sound. If only either sound or pressure changes are identified, the sensor does not indicate the presence of a gunshot. Furthermore, the amounts of change, total length of time for the pressure and sound events, and lag between the two events are factored in. This combination leads to an unparalleled success rate in determining that a gunshot event has taken place, while false positive responses are limited almost entirely.

Sensors connect to existing alarm panel or camera systems to alert first responders. These sensors only require low-voltage power. They are typically mounted on ceilings and are about the same size as smoke detectors.

What makes Shot Alert Stand Out?

Shot Alert boasts patented technology that detects specific combinations of auditory (sound) and pressure activity that accompany gunshots. This is the only product that utilizes the change in pressure that occurs when a firearm is discharged, which is one of the most reliably accurate measurements associated with gunshot detection. There is no need to compromise when the very best is available with Shot Alert.

How Can I Order?

Click here to let us know you are interested. One of our experienced technology partners will work with you to craft a customized detection solution based on your specific needs. They will determine the number of sensors and likely placement locations based on building size and floor-plan layout.

Who Handles Sensor Installation?

Shot Alert works with local integration partners to ensure high-quality installation and service in your immediate area. Each partner is thoroughly vetted and trained by Shot Alert to ensure proper placement and installation. Our partners are already experts in similar industries, such as security, fire suppression, audio/visual wiring, and other low-voltage electrical specialties.

How Big of An Area?

In most installations, each sensor is able to cover approximately 50 feet by 50 feet of unobstructed room space, assuming ceiling heights of less than 24 feet. Hallways generally require a sensor every 80-100 feet, while large rooms like gymnasiums and auditoriums may require additional sensors in order to maintain effective coverage. It may be helpful to

assume that a Shot Alert sensor would make sense wherever there is an existing smoke detector.

Can Shot Alert be Outside?

Shot alert sensors may be used outdoors in some instances. Shot Alert maintains the highest of standards of accuracy and does not recommend the use of sensors in environments where reliability is compromised.

What Does the Notification Process Look Like?

Most Shot Alert sensors will be tied in with existing, actively monitored building systems like security and fire suppression. Upon detection of a gunshot, those partner companies receive immediate notification and are then able to contact law enforcement near instantaneously. Our units may also be leveraged to initiate the automatic door lockdown safety protocol.

What if the Power Goes Out?

Shot Alert sensors are protected by backup batteries that allow for up to two hours of continuous protection in the event the primary power source is shut off.

How Do Shot Alert Systems Integrate?

A wire connector allows power input and gunshot logic output between the sensor's RJ-45 connector and the alarm panel. Acceptable voltage ranges from +6V to +60v, and POE power is accepted.

Can the Shot Alert Sensors Be Used to Record?

Shot Alert sensors use acoustic and pressure triggers to identify gunshots. They do not track or record sounds indiscriminately. Our sensors do not record sound in a way that would make sense of normal conversations or interactions; they are specifically tuned to seek gunshots. Additionally, the sensors are part of a closed system that does not present vulnerability to hacking. Our sensors are the most secure on the market and represent an unparalleled opportunity to maintain diligent surveillance without compromising human privacy.

What About Support?

When you have a question, you want answers. Shot Alert engineers are available to answer technical questions promptly and to help work through troubleshooting for all Shot Alert dealers.

PROTECT WHAT MATTERS

SHOT ALERT

ACTIVE SHOOTER DETECTION

Gunshot Detection Sensors

TECHNICAL SPECIFICATIONS

Physical

- Temperature: -40°C ~ 80°C (-40°F ~ 175°F), 95% relative humidity
- Enclosure: White or black ABS* housed in a ceiling mounted bracket
- Size (with bracket):
  - 5˝ (127mm) wide
  - 6˝ (152.4mm) tall
  - 1 5/16˝ (33.7mm) thick
  - 0.5 lbs (227g)
- Mounts on ceiling; looks like a smoke detector.
  - Indicators: Power and status indicators to provide basic visual feedback.
  - Connections: Power (+9V ~ +60V), Ground, Physical contact closure referenced to ground. (POE power accepted); pins 4, 5 = (+); pins 7,8 = (-).

Sensors

- Sensing: Patented acoustic and concussion sensor operating from the room's atmosphere used to accurately determine the presence of a gunshot and/or explosive event.

Display

- Red LED indicating the module is in alert status.
  - Signal: This display will provide subtle indication when the unit is activated and when help is on the way by short LED flashes.

Alerting

- Single gunshot detected and alerted by an open collector output to the building's existing alarm panel.
- Multiple gunshot detected and alerted by an open collector output to the building's existing alarm panel.
- Manual pull switch detected and alerted by an open collector output to the building's existing alarm panel.
- Alerts are sent to the building's alarm panel, which alerts the security system manager to the detected gunfire.
- The user must either manually reset the device or cycle power to the device to cancel the alert.
- The LED will flash faster when in alert mode, indicating that the sensor has been activated. Unit can be configured to either emit a beeping tone when activated or can be configured as a silent alarm.

Power

- Input: +9V ~ +60V input from the alarm wiring external power.
- Battery: 500mA/hour long life LiPo battery. Battery recharged from the module's external power.
- Operation Life: 4-hour operation without AC power applied (depending on radio broadcasts).

Contact Closure

- Separate outputs for single gunshot, multiple gunshots, and manual pull-down switch.
  - Output is closed to ground when activated.

Tampering

- Unit can be configured to provide a user specific load resistor to alert the alarm panel if a cable cut event happens or if tampering has occurred.
- Screw terminal to enable a user specific axial resistor.
  - Specified by the panel's detection circuit.
- Output provided for tamper detection when unit is removed from the mounting bracket.

ALERTS ARE INITIATED FOR GUNSHOTS AND EXPLOSIONS

We Hold to the Truth that Life Matters.
Whether at a place of education or a place of doing business, Shot Alert has created an active shooter detection system that protects the lives of those gathering in such places. We bring safety back to public gathering areas, and a solution that notifies help within seconds when a safe environment is compromised.

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SHOTALERT

ACTIVE SHOOTER DETECTION

SA100 Operator's Manual

12/13/2022

Version 1

Shot Alert SA100
Operator's Manual

Contents

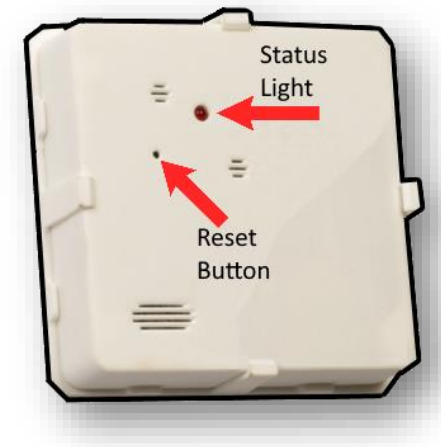
Shot Alert SA100
Operator's Manual

Introduction

The Shot Alert® SA100 indoor unit is a powerful gunshot and explosive detection system designed to easily interface to your existing alarm panel. This device operates from 9VDC~64VDC and provides dry contact closures out to indicate the detection of a gunshot/explosion and multiple gunshots. When a gunshot(s) or explosion is detected, the unit will provide a logic output closure associated with the event. If multiple events are detected, the SA100 unit will provide a logic output closure associated with multiple events detected. All connections are available from either the Signal Output connector or RJ-45 connector on the back of the board.

The SA100 unit is powered by a wide DC input source, and is emergency powered by the internal battery. The system requires the battery for proper operation, which is included. The backup battery will power the unit for at least two additional hours, providing accurate detection when AC power is not available.

Clearing the Alarm and Magnet Feature



To clear the alarm, reset the system power, or press the reset button (using a paperclip or toothpick) which will automatically clear the alarm on the unit.

Silence-by-Magnet Feature: Newer units (Revision N or higher) also support the Silence-by-Magnet feature. Just wave a magnet near the status light to silence the alarm.

Test-by-Magnet Feature: Newer units (Revision N or higher) can be tested by simply holding a magnet near the Status Light for 5 seconds. This will sound the alarm on the device and cause the light to blink. Once the magnet is removed, then the device will return to normal operation.

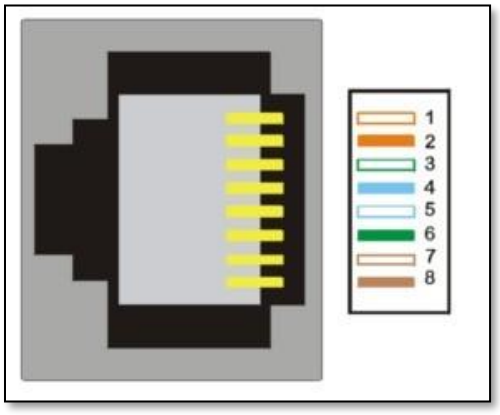
Alarm Panel Connection Information

Signal Output Connector Pinout

All alert signals from the SA100 are brought out using an RJ-45 connection on the back of the unit and is labeled Signal Output.

Green indicator: Initial Gunshot or Explosion events detected

Yellow indicator: Multiple Gunshot or Explosion events detected



RJ-45 Connector Pinout:

1. Signal Ground, Common Reference
2. Multiple Event Open Collector Out
3. Gunshot/Explosion Open Collector Out
4. DC Power Input (+/- accepted)
5. DC Power Input (+/- accepted)
6. Manual Pull Switch Open Collector Out
7. DC Power Input (+/- accepted)
8. DC Power Input (+/- accepted)

This connector in located on the back of the SA100 unit. Power input is polarity insensitive (+ and - do not matter, just so it is DC input). Open Collector outputs can handle a maximum of 100mA of current, and are referenced to Pin 1, Power Ground. So, when an event is active it connects the event contact closure to the Power Ground pin (Pin 1) and provides a closure to your alarm panel.

Wire/Tamper Detection Connector

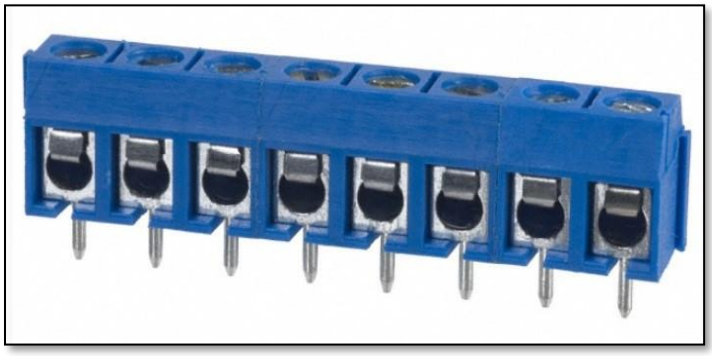
The SA100 unit supports tamper detection load resistors on the two contact closure output lines. When utilized, the installer can attach an alarm panel specific load resistor to monitor the "Normal" line conditions. If the cable feeding the SA100 unit is disconnected or severed, the load resistor will no longer be visible to the alarm panel, and this condition indicates a problem.

Line Conditions:

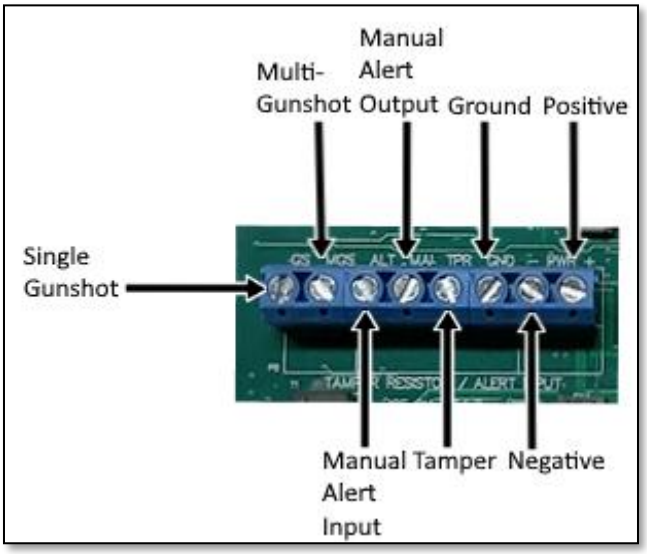
Normal:	Load resistor detected if installed. If the load resistor is not installed an open is detected by the panel which is the same as a non-connected sensor.
Alarm:	When in alarm the panel will detect a low resistance, or a short to Signal ground.
Fault:	When the load resistor is used, and the cable is disconnected or severed, and open will be detected. This condition only applies when the Load resistor is installed.

Wire Terminal:

Pin 1 – (GS) Gunshot Logic Output
Pin 2 – (MGS) Multiple Gunshot Logic Output
Pin 3 – (ALT) Manual Alert Logic Output
Pin 4 – (MAI) Manual Alert Input
Pin 5 – (TPR) Tamper Detection Logic Output
Pin 6 – (GND) Power/Signal Ground
Pin 7,8 – (+ PWR -) DC Power Input



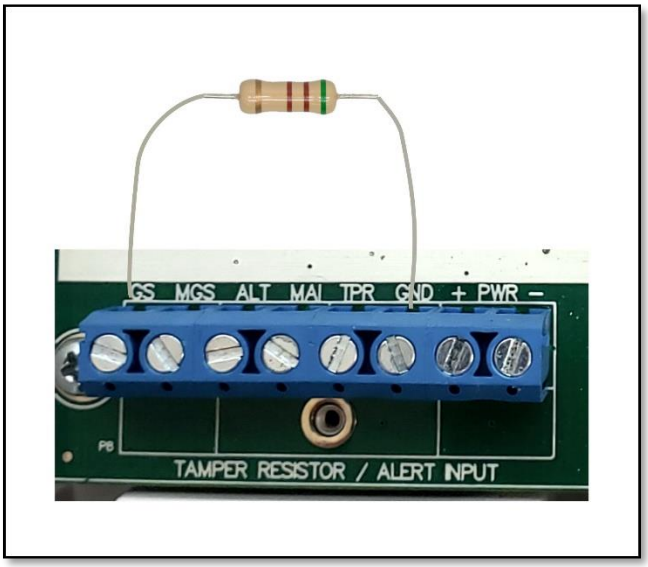
The Wire Terminal is located on the back of the SA100 base board and is a connector that looks like the above picture. The terminals are tightened from the screw on the top, and the load is connected on the side of each terminal.



Using Tamper Resistors

For signal monitoring purposes, a resistor that is compatible with the alarm system can be connected to the Wire Terminal.

The connections on the Wire Terminal are also available on the RJ-45 connector. If you are utilizing the RJ-45 port for power and shot detection, then you do not need to attach wires from the alarm panel to the Wire Terminal. The main purpose for the Wire Terminal while using the RJ-45 port is to insert tamper resistors if required.



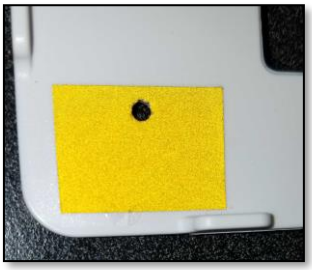
Tamper Resistor Placement:

The Tamper Resistor is placed between the signal you are monitoring and ground. The functions are defined as:

1) Normal: Resistor load measured
2) Alarm: 0 Ohm, ground measured
3) Cut Wire: Open, no load measured

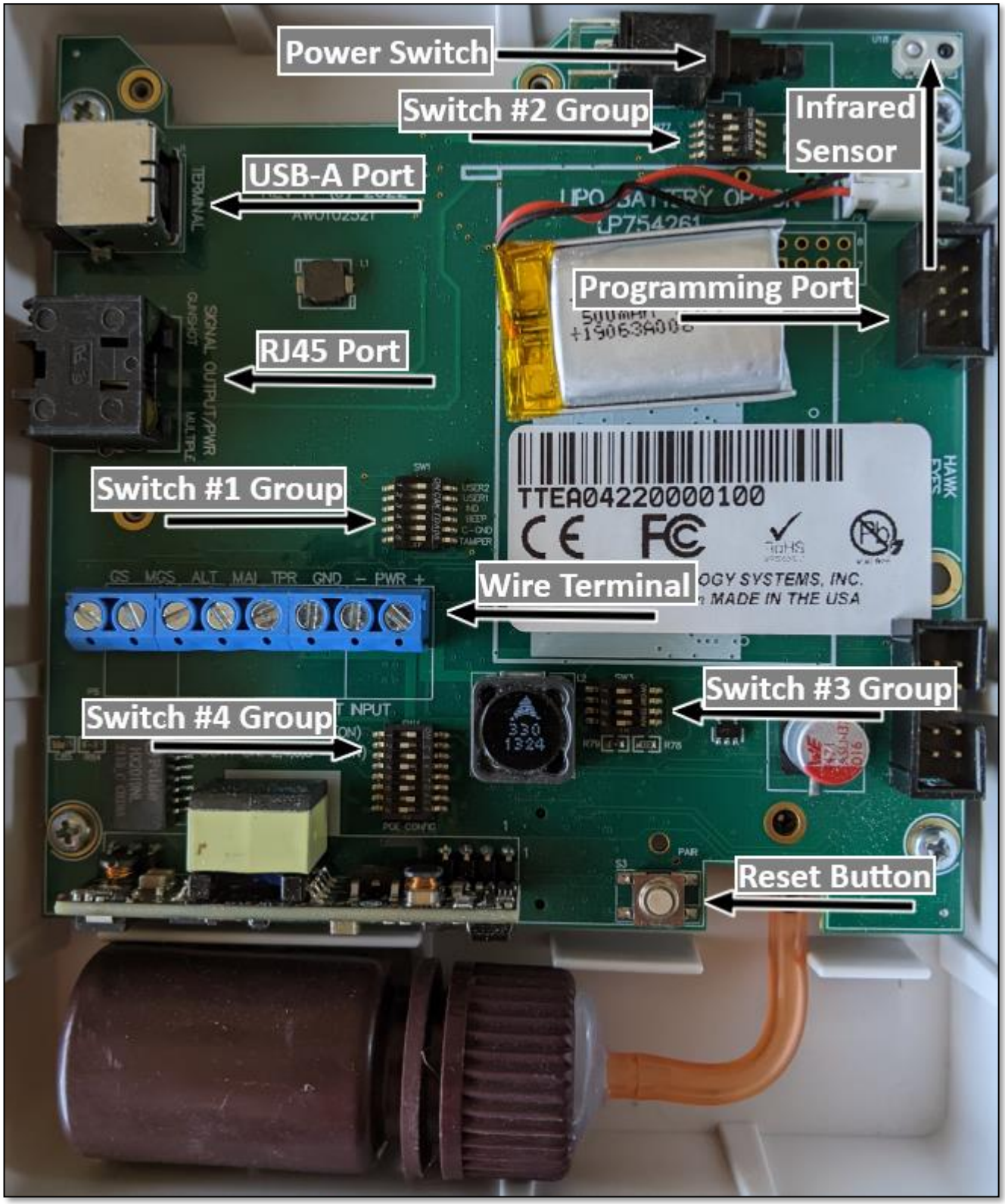
The user inserts the load resistor their panel requires, the screw connector is provided for this function. You can also use screw-down connections if you choose not to utilize the RJ-45 connector because the signals are identical to the RJ-45 signals.

Tamper Sensor Information



The mounting bracket has a reflective corner that must be lined up with the infrared detection sensor. If performing bench testing, then it's recommended to turn off Tamper detection, as this will impede testing performance if the Infrared sensor is not properly lined up with reflective surface. Please see "*Beep/Flash indication - Switch #1 Group Settings*" section for more details on how to adjust Tamper Sensor settings.

Board Connection Top



Beep/Flash indication - Switch #1 Group Settings

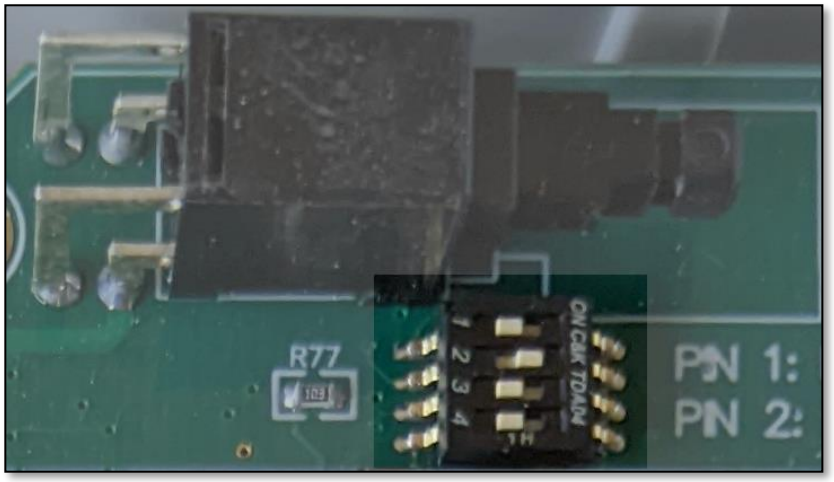
Switch 1,2: User #1 and User #2. (On/On by default)
Switch 3: When ON (default), the front panel RED LED will flash, off disables the LED
Switch 4: When OFF (default), the front panel beeper will not sound when an event is detected
Switch 5: Common Ground on the Blue Wire Connector
Switch 6: Tamper Detection Bypassed (Recommend for Testing)

*** Note: PC Board labeling is incorrect on Revision L boards and earlier. Refer to switch settings and not the marking on the PC Board when configuring the operation modes and indicators ***

Switch 2 User1	Switch 1 User 2	Operation
Off	Off	Gunshot Output => Gunshot active Multiple Gunshot Output => Tamper Detection Output Manual Alert Output => Low Battery Alarm Output All cleared after 5 seconds
On	Off	Gunshot Output => Gunshot active Multiple Gunshot Output => Tamper Detection Output Manual Alert Output => Low Battery Alarm Output All cleared after 5 seconds
Off	On	Gunshot Output => Gunshot active Multiple Gunshot Output => Heartbeat Output Manual Alert Output => Low Battery Alarm Output All cleared after 5 seconds
On	On	All relay outputs are latched and require a Power Cycle or front panel Reset to clear the alerts and silence the beeping if enabled (see switch #2)

When all switches are ON, then the gunshot detection alarm can only be silenced by removing power, pressing the reset button, or using a magnet on Rev N and newer models.

Room Size - Switch #2 Group Settings



The Room Size switch setting enables the user to adjust the SA100 unit's detection sensitivity based on the physical room the unit is installed into.

Switch #1	Switch #2	Switch #3	Switch #4	Room Size
ON	OFF	OFF	OFF	20 x 20 x 24 Maximum
OFF	ON	OFF	OFF	30 x 30 x 24 Maximum
OFF	OFF	ON	OFF	40 x 40 x 24 Maximum
OFF	OFF	OFF	ON	50 x 50 x 24 Maximum

Caution!

One switch must be always on! All switches off is a faulty setting and will affect the reliability and detection capability of the unit.

Remember to test the unit for proper function after adjusting switch configurations!

Power Configuration – Switch #4 Group

Using Power-Over-Ethernet (POE)

SA100 units support a power connection through enabled network switches, reducing the amount of copper wire needed to power and receive alarm outputs from the device.

There are two configuration modes that can be set up with the POE configuration Switch #4 group.

MODE #1 (Default) – POE uses the RJ45 port for power (switches #1, #3, #5, #7 are ON)

- In this mode, power is obtained from the connected POE enable network switch
- Class 0 POE is supported.

Using Cameras: The POE can also be shared by external cameras by simply splitting the network cable that feeds the SA100 unit. Take the network cable, 'Y' it and feed one side to the camera, and the other side to the SA100 unit. Contact alerts are used only on the blue Wire Terminal on Pin #8.

MODE #2 (Legacy Configuration) – use of the RJ45 port (switches #2, #4, #6 #8 are ON)

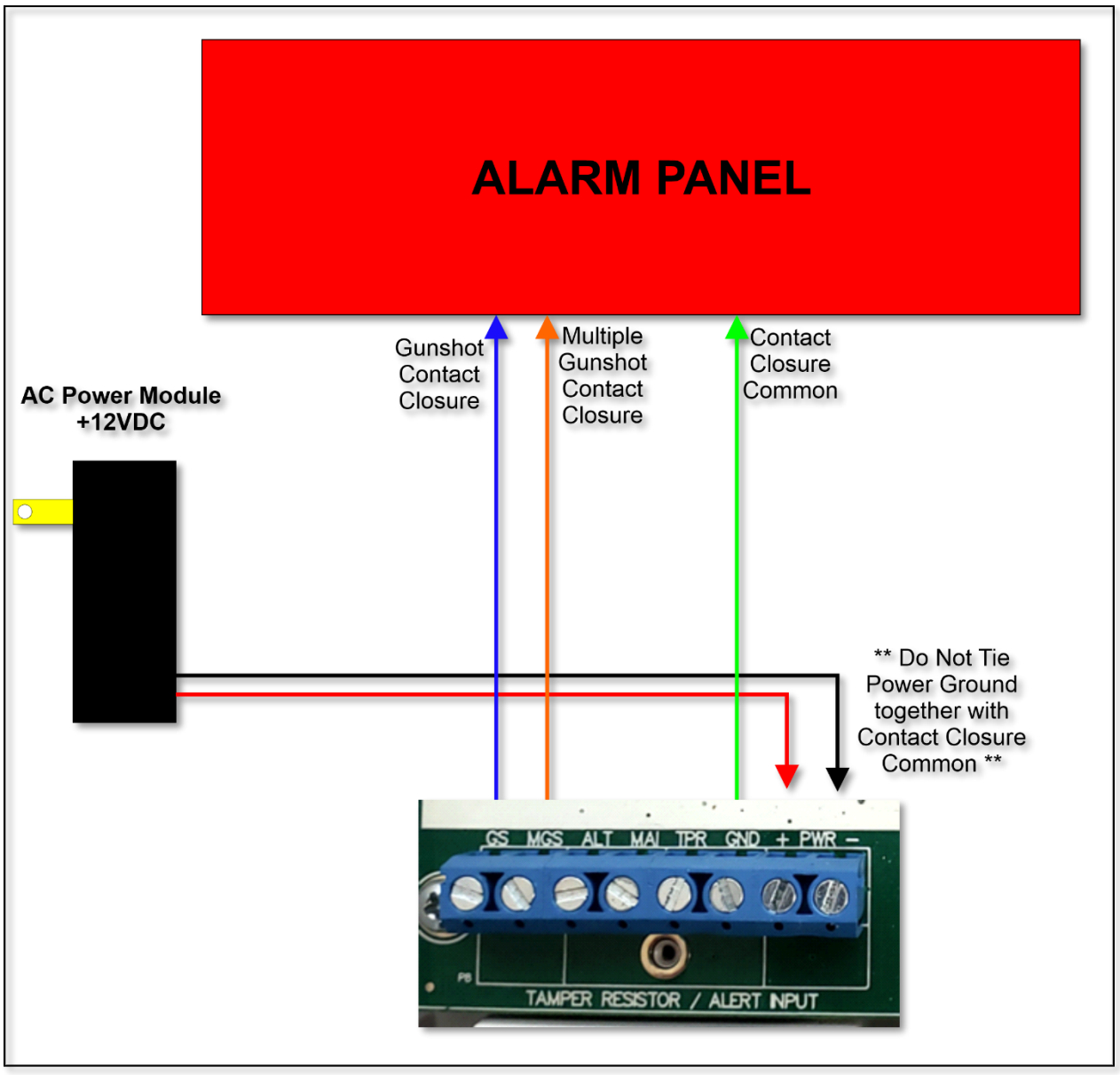
- Contact alerts are available on pins #1, #2, #3, and #6.
- The contact outputs are also available on the blue Wire Terminal on pin #8.
- Power through the RJ45 port is achieved using pins #4, #5, #7 and #8.
- When External DC power is connected, all connections are available on the RJ45 port as well as the blue Wire Terminal.

NOTE: RJ45 connector, J2 is the Signal Power connector referenced in Mode 1 and Mode 2.

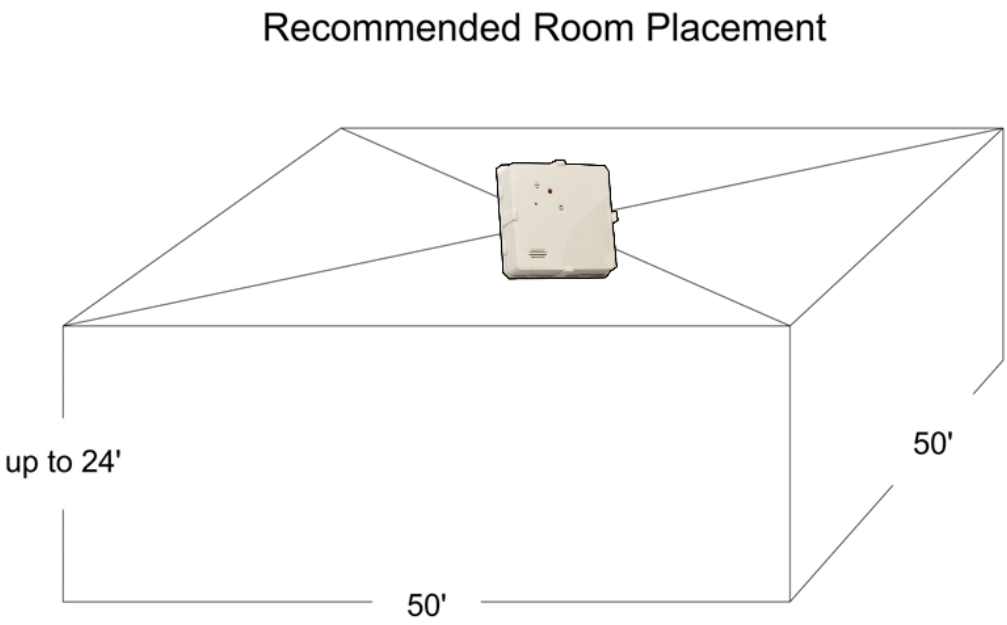
Alarm Panel Installation Diagram

This diagram demonstrates how a typical connection to the alarm panel would work while using the Wire Terminal.

NOTE: Be sure to insert the proper resistor per the alarm system's requirements to monitor signals from the SA unit. See "Using Tamper Resistor" section for more information.



Room Placement Information



Attach to the ceiling in the center of the room, on a flat surface.

Keep out of reach of persons to minimize tampering with, damaging or activating to unit.

Each sensor can detect small arms fire in a room up to 2500 square feet.

Detection Range

As the ceiling height is lowered, the floor space increases, enabling a larger that stated detection range.

Testing

When testing with any weapon, treat the gun, even if using blanks, as if it were shooting live rounds. Never under any circumstances point a gun at a person, even joking around. When testing, keep the test weapon pointed away from people.

When testing with blanks, it's recommended to use an approved gunshot simulator. The best devices are designed to fire only blank rounds and diffuse the energy from the shot in a way that is safer than a traditional firearm.

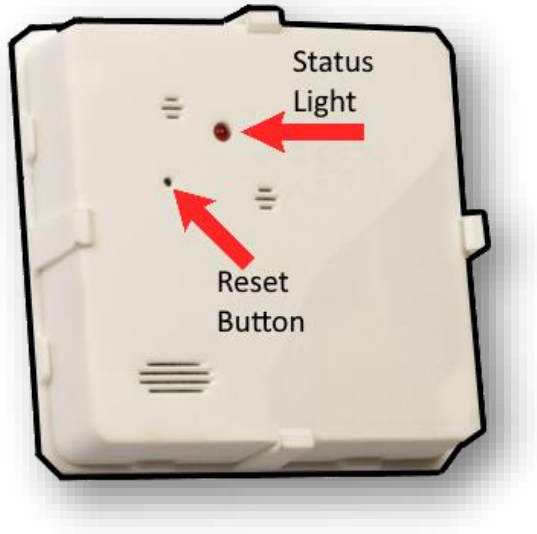
It's important not to use nail hammer blanks when testing, as these do not provide enough energy to set off a gunshot detection event. Using the proper starter blanks are required for an accurate test.

When testing do not point the weapon at the unit, it could damage the device with flying material from the blank round. Mount the unit instead on the ceiling or wall and before testing a room's response.

Gunshot Testing Procedure

1) With power applied to the SA100 unit, fire a test round. The sensor will begin beeping, and Status Light will start blinking indicating a detection. To quiet the beeping cycle, power to the sensor or press the front panel reset (see "Clearing the Alarm and Magnet Feature" section for more details).

2) If placing the sensor in a large room/warehouse you may need to increase the detection sensitivity. Do not set the units sensitivity for a large room in a small room, or else a false detection may occur.



Factory default settings are set for a small sized room. If a larger space is required, then please see section labeled as "Room Size Switch Settings" for more information on how to configure the SA100 unit.

Technical Specifications

Physical

- Temperature: -40°C ~ 80°C (-40°F ~ 175°F), 95% relative humidity
- Enclosure: White or black ABS* housed in a ceiling mounted bracket
- Size (with bracket):
  - 5″ (127mm) wide
  - 6″ (152.4mm) tall
  - 1 5/16″ (33.7mm) thick
  - 0.5 lbs (227g)
- Mounts on ceiling; looks like a smoke detector.
  - Indicators: Power and status indicators to provide basic visual feedback.
  - Connections: Power (+9V ~ +60V), Ground, Physical contact closure referenced to ground. (POE power accepted); pins 4, 5 = (+); pins 7,8 = (-).

Sensors

- Sensing: Patented acoustic and concussion sensor operating from the room's atmosphere used to accurately determine the presence of a gunshot and/or explosive event.

Display

- Red LED indicating the module is in alert status.
  - Signal: This display will provide subtle indication when the unit is activated and when help is on the way by short LED flashes.

Alerting

- Single gunshot detected and alerted by an open collector output to the building's existing alarm panel.
- Multiple gunshot detected and alerted by an open collector output to the building's existing alarm panel.
- Manual pull switch detected and alerted by an open collector output to the building's existing alarm panel.
- Alerts are sent to the building's alarm panel, which alerts the security system manager to the detected gunfire.
- The user must either manually reset the device or cycle power to the device to cancel the alert.
- The LED will flash faster when in alert mode, indicating that the sensor has been activated. Unit can be configured to either emit a beeping tone when activated or can be configured as a silent alarm.

Power

- Input: +9V ~ +60V input from the alarm wiring external power.
- Battery: 500mA/hour long life LiPo battery. Battery recharged from the module's external power.

Operation Life: 4-hour operation without AC power applied (depending on radio broadcasts).

Contact Closure

- Separate outputs for single gunshot, multiple gunshots, and manual pull-down switch.
  - Output is closed to ground when activated.

Tampering

- Unit can be configured to provide a user specific load resistor to alert the alarm panel if a cable cut event happens or if tampering has occurred.
- Screw terminal to enable a user specific axial resistor.
  - Specified by the panel's detection circuit.
- Output provided for tamper detection when unit is removed from the mounting bracket.