

# Terminus™

SHOCK DETECTION PRODUCTS

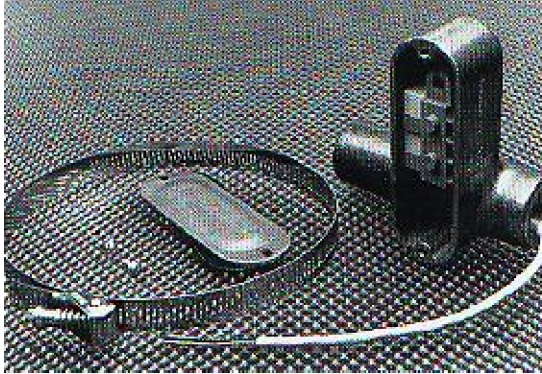
## Installation Manual

11/30/06

# Fence Intrusion Detection Systems

## Terminus™ Fence System

### SP3223 Pass-Thru Fence Kit

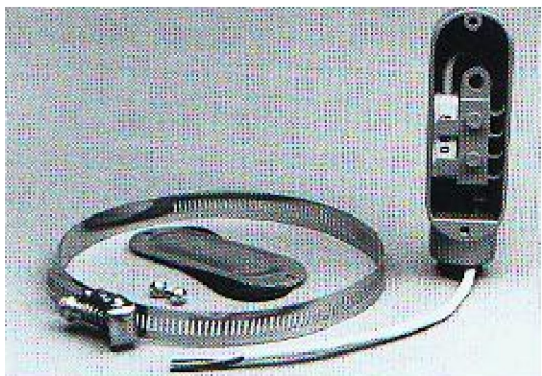


Kit contains: (1 each)

- Condulet Housing
- Condulet Cover
- Gasket
- Sensor Retainer Clip
- Screw-Type Clamp
- Sensor: SP3237 - Undamped or SP3237D - Damped
- Sensor Order Information:

Part Number	Sensor Type	Condulet Size
SP3223-IU	UNDAMPED	½ inch
SP3223-ID	DAMPED	½ inch
SP3223-2U	UNDAMPED	¾ inch
SP3223-2D	DAMPED	¾ inch

### SP2539 Fence Kit



Kit contains: (1 each)

- Condulet Housing
- Condulet Cover
- Gasket
- Sensor Retainer Clip
- Screw-Type Clamp
- Strain Relief (Stopper)
- Sensor: SP3237 - Undamped or SP3237D - Damped
- Sensor Order Information:

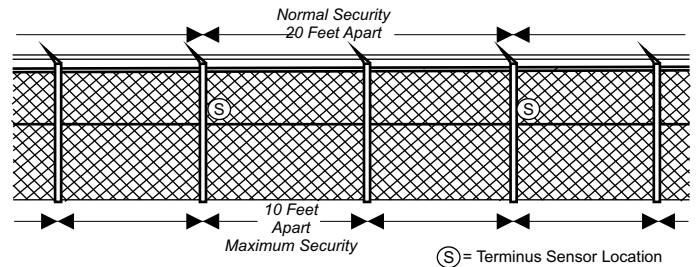
Part Number	Sensor Type	Condulet Size
SP2539	UNDAMPED	½ inch
SP2549	DAMPED	½ inch

### How Terminus™ Works

The Terminus Fence Intrusion Detection System (F.I.D.S.) utilizes "shock" sensors to detect the vibrations associated with intrusion attempts. Cutting the fabric, climbing the fence and lifting the fence material all produce mechanical vibrations, or shock waves, in the fence material. These shock waves are detected by the Terminus™ shock sensors, which send the signals to a Terminus™ signal processor where the information is analyzed.

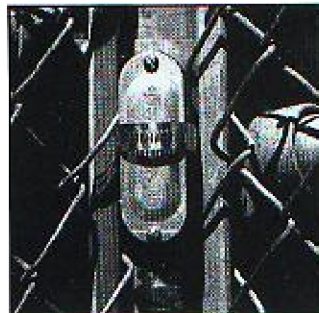
### Sensor Spacing

In a typical installation, Terminus fence shock sensors are mounted on the sides of fence posts so that the shock sensors are perpendicular (at a 90° angle) to the fence fabric. For applications where maximum security is needed, fence sensors can be mounted on every vertical fence post (about 10 linear feet or 3 meters for an 8-10 foot high chain link fence). On jobs sites where the fence is in excellent condition and maximum security is not required, mounting fence sensors on every other fence post (about 20 linear feet or 6 meters apart for an 8-10 foot high chain link fence) will provide an adequate level of perimeter protection. These spacings are calculated on the use of thin walled metal conduit. UL requires 10 foot spacing.

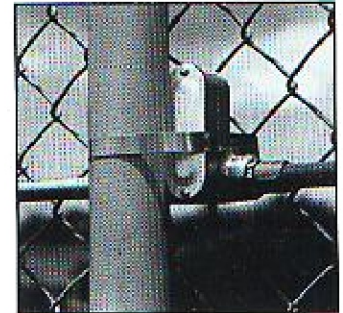


Vinyl coated fence fabric does not transmit shock activity as well. It is highly recommended that sensors be mounted on every post with conduit for vinyl coated fences.

### SP2539



### SP3223



Mount sensors on fence posts as shown.

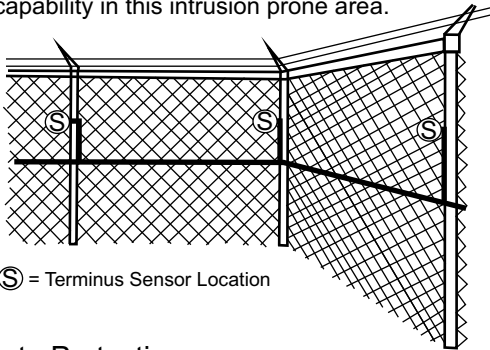
## Information

### Conduit

To improve fence sensor coverage and overall system life in both high security and normal security applications, the wiring between each sensor should be housed in thin wall conduit (EMT). This conduit helps to transmit shock signals from the fence fabric to the sensor. Also, EMT offers shielding from RFI and the effects of lightning. If conduit is not used, weatherproof PVC jacket shielding cable is required. The shielded cable offers some of the advantages of conduit and may be less costly. However, the sensors should be mounted on every post.

### Fence Corner Protection

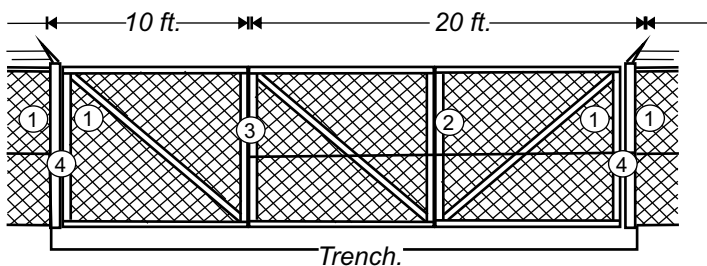
Because of the additional supports and the use of larger posts, sensors should always be mounted on corner posts. Proper installation calls for a sensor to also be mounted on each post immediately adjacent to the corner post, increasing the detection capability in this intrusion prone area.



### Fence Gate Protection

A special damped fence sensor must be used on gates and gate posts to avoid false alarms. To detect attempts to cut through gate fabric, damped fence sensors should be placed on the diagonal crossbar of the gate, and about halfway to the centerline. To detect a gate being opened or left standing open, gate contacts should be placed on each pivoting pole (example, *Sentrol 1904A*). Gates that roll should also have sensor and gate contacts mounted.

Alarm circuit must be trenched past gate if circuit can not approach gates from both directions. Do not use moisture proof pull apart connections.



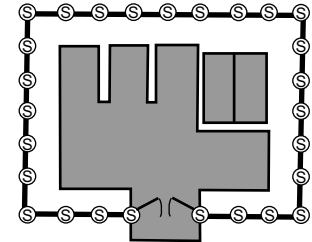
- ① = SP2549      ③ = 1904A Contact
- ② = SP3223D    ④ = Armored Cable

Damped sensors should be used on gate posts and on gate at hinge side. Place gate contacts on each pivoting pole.

### Single Zone Coverage

A maximum of 50 fence shock sensors may be installed on one fence intrusion detection zone. This zone of sensors is wired in series, then connected to the loop terminals of the zone processor. An end-of-line resistor is supplied and must be installed for wire and sensor supervision. Depending on the conditions at the job site, the Terminus™ zone of fence shock sensors can be programmed as a group to respond only to the conditions that require action. Thereby reducing the frequency of false alarm signals. This signal zone coverage of less than 50 shock sensors is used on relatively small fence perimeters. Never use Pac-A-Dap SP3219 on outdoor fences because of limited set up capability.

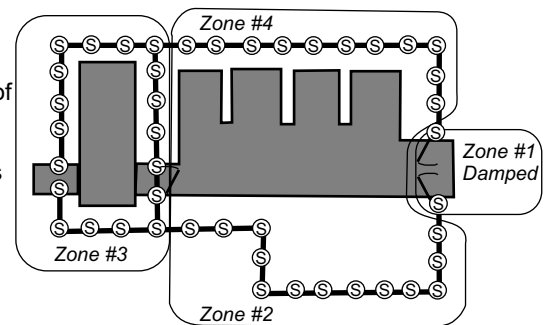
Single Zone can use a maximum of 50 shock sensors.



### Multiple Zone Coverage

The need for a multiple zone fence intrusion detection system arises from two situations: large fence perimeters requiring more than 50 sensors, or large sites where traffic or other conditions require different levels of sensitivity. By using multiple zone coverage, certain sections of the fence perimeter can be separately programmed to respond to only those conditions that require action. Also, since each zone has its own relay output, local annunciation or transmission of an alarm condition to a remote monitoring office can be chosen. Areas selected as separate detection zones can include fence corners, vehicular or pedestrian gates, fence areas adjacent to known sources of noise (railroad tracks, high-ways) or areas of fence subject to frequent outside contact (fences along a sidewalk).

Four zones of fence shock sensors. Each zone is individually adjusted



### Typical Initial Installation Settings

These initial settings are the mid-level security settings and may not be correct for all installations.

	6 ft.	8 ft.
Count	3 - 4	4 - 5
Count Interval	10 - 12 sec.	12 - 15 sec.
Pulse Width	Mid	Mid
Sensitivity	*	*

\* Sensitivity should be adjusted to detect the lightest installer after three steps up onto the fabric. This is mid-range sensitivity and not the only sensitivity level for all installation/security requirements.

## Fence Condition

One of the most important items in any fence intrusion detection system is the condition of the fence. The fence must be in good condition when the system is installed and must be maintained in good condition to ensure system effectiveness and to prevent false alarms.

Before installing the amount of protection and equipment needed to install a Terminus™ Fence Intrusion Detection System, it is recommended that you visit the job site and walk the entire fence perimeter. By examining the fence and looking for possible problems prior to installation, you may eliminate costly service calls afterwards.

### Consider the following:

*This condition should be corrected.*



- The fence fabric should be properly secured to the fence posts and the horizontal support bars. The horizontal support bars should be straight and fit tightly to the posts.

*This condition should be corrected.*



- There should be as few signs as possible. In addition, these signs should be securely attached to the fence, preferably to fence posts.

*This condition should be corrected.*



- Fence posts should be anchored firmly in the ground and should never exceed 10° from vertical.
- Wood or metal lattice work or other wind screening material may cause the fence to "sail" in the wind, creating false alarms.

*This condition should be corrected.*



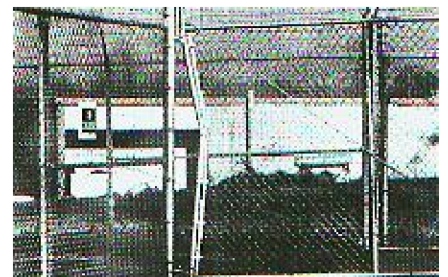
- All fence should be properly secured in the rigging slots, and should be taut.
- Any rusted out sections should be repaired or replaced.
- No metallic materials, such as posts or storage drums, should be permitted to lean against the fence.

*This condition should be corrected.*



- Any tree limbs or brush that could hit the fence in windy or stormy conditions should be removed.
- Anything that could assist an intruder in climbing over the fence should be removed.

*This condition should be corrected.*



- Fence gates must fit properly. There should be pin retaining holes in the ground to secure the gates.
- Gate locking assemblies must operate to hold the gates securely. Any chains used to secure gates should have any excess links that might hit the gate removed.

To assist you in future fence surveys and bid proposals, copies of this worksheet are available upon request from Terminus. The number and scale of problems found in the fence perimeter survey may prohibit the installation of the Terminus™ System.

## Bid Worksheet

### Terminus™ Fence Sensors

SP3223 Standard Fence Sensor

(See SP3223 ordering information on page 2)

20' Sensor spacing using conduit \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

10' Sensor spacing using conduit \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

SP2539 Fence Sensor

(To be used on corner and/or end posts)

SP2549 Damped Fence Sensor \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

(Less sensitive, to be used gate posts)

### Terminus™ Zone Processors

SP3268 Single Zone Processor \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

(Used for fence systems with less than 50 sensors)

SP3274 Four Zone Processor \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

(Provides four individually adjusted zones)

SP3273 Four Zone Expander Processor \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

(Allows expansion of SP3274 in multiples of four zones)

### Installation Hardware For Systems in Conduit

#### Cable Requirements

For zones under 1500' use 22 AWG

twisted pair Belden #8442 or equal \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

For zones over 1500' use 18 AWG

twisted pair Belden #9470 or equal \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

Spacing between sensors (10' or 20') x number of sensors = \_\_\_\_\_

3' loops for conduit stems x number of sensors = \_\_\_\_\_

Total Cable = \_\_\_\_\_

#### Conduit Requirements

For best results use thin wall EMT

electro galvanized conduit, either

1/2" or 3/4" diameter \_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

Spacing between sensors (10' or 20') x number of sensors = \_\_\_\_\_

1 1/2" loop for conduit stems x number of sensors = \_\_\_\_\_

Total Conduit = \_\_\_\_\_

Add two EMT compression connectors (1/2 or 3/4)

or equal, for each sensor to be installed. When

spacing sensors 20 feet apart using 10 foot conduit

lengths, add one EMT compression coupling or

equal for each sensor

\_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

Note: Additional connectors and tee fixtures will be necessary on corner, gate and end posts.

#### Lightning Arrester

One fail-safe gas arrester per zone should be used.

The arrester should be the type used on telephone lines.

One unit is available from CEAC of Union Springs, Alabama.

One per loop is required

\_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

#### RF Choke

SP3217-1 should be used where there is

RF interference

\_\_\_\_\_ @ \_\_\_\_\_ \$ \_\_\_\_\_

## Electronics



SP3268

### Single Zone Processor

The SP3268 Processor monitors up to 50 Terminus™ sensors on one detection loop. It features a 3 position test switch, SPDT relay, cabinet tamper and is shipped with a standby battery and transformer.



SP3274

### Four Zone Processor

The SP3274 Processor will divide a securable area into zones and provide shock detection settings tailored to the needs of each one. It will monitor up to four loops of Terminus™ sensors, each with its own set up adjustments.



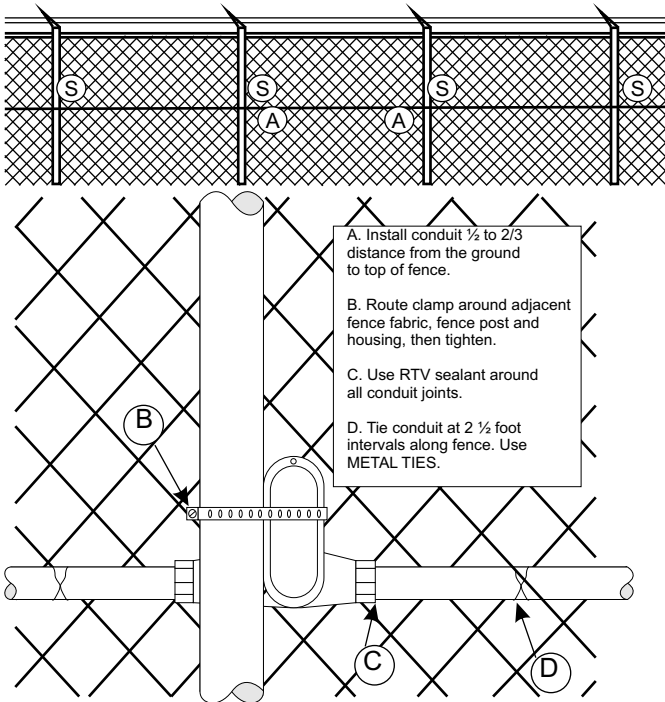
SP3273

### Four Zone Expander Processor

The SP3273 monitors up to four additional zones of Terminus™ sensors, with the same capabilities as the SP3274 master panel.

**Remember: Pac-A-Daps (SP3219 series) must not be used on fence intrusion detection systems.**

## Installation Hardware



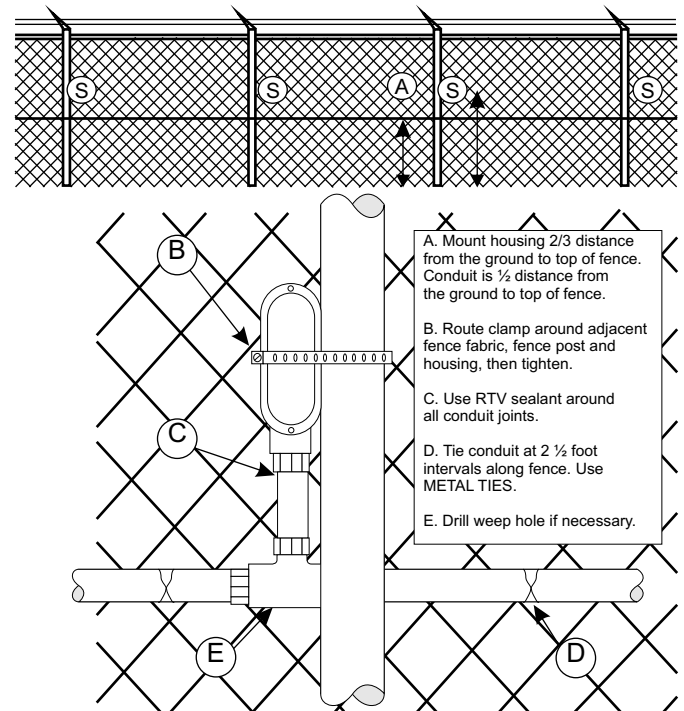
### SP3223 Pass-Thru fence Kit

Step 1. Mount the conduit (EMT) and the SP3223 to the fence fabric and fence post parallel to the ground, not lower than one-half or greater than two-thirds the distance from the ground to the top of the fence. The longer portion of the SP3223 should go between the fence fabric and the fence post. Also, be sure all conduit is installed so that it passes between the fence post and fence fabric. Slight bends in the conduit will be necessary at sensor locations where the terrain is uneven. EMT compression connectors will be necessary at each sensor for adapting the conduit to the threaded housing. Sensor housings are threaded for pipe thread. Tie the conduit to the fence fabric at least twice between fence posts.

Step 2. Pull the loop wire through the conduit and sensor housings. Be sure to leave a loop of wire at each housing to make the sensor connections.

Step 3. Connect each sensor to the loop wires (*described in sensor wiring section on next page*).

Step 4. Using the clamp provided in each sensor kit, route the clamp around the fence post, tightening the screws securely. Please note - this step is executed after the wiring. Use silicon sealant around the adaptors and couplings to prevent moisture from entering the conduit.



### SP2539 Fence Kit

Step 1. Mount the horizontal conduit (EMT) and the connecting tees to the fence fabric and fence posts parallel to the ground and one-half the distance from the ground to the top of the fence. Tie conduit to the fence fabric at least twice between posts.

Step 2. Pull the loop wire through the conduit and connecting tees.

Step 3. Mount the vertical conduit section to the tees (*using EMT adapters*) and pull the loop wire through each section. Leave enough loop wire at the top of each conduit section to cut and wire fence sensors.

Step 4. Position the conduit housing for each fence sensor on the side of the fence post, as shown. (*2/3 the distance from ground level to the top of the fence*)

Step 5. Connect each sensor to the loop wires (*described in sensor wiring section on next page*).

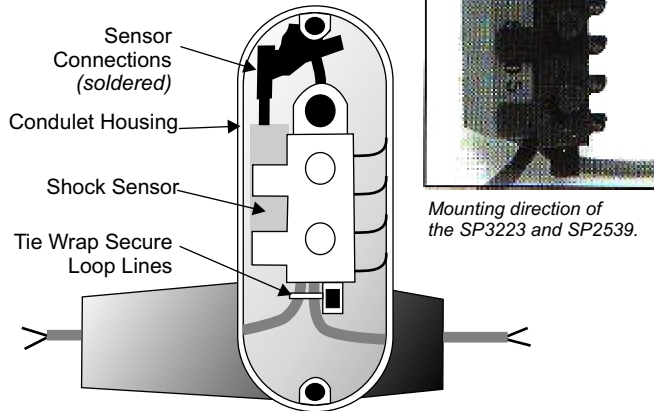
Step 6. Using the clamp provided in each sensor kit, route the clamp around the fence post and adjacent fence fabric, and over the conduit housing. Tighten the screw on the clamp securely for best sensor operation.

Step 7. Fasten the fence sensor conduit housing to the vertical conduit section using an EMT adapter (*use RTV sealant around all conduit joints to prevent moisture build-up*).

**Note:** For corner protection, installation of the SP2539 sensor on the corner posts may be easier than using the SP3223. If you choose to use the SP3223 at the corner post, bending the conduit around the post may be required for the sensor to be mounted securely to the corner post

### SP3223 Pass-Thru Fence Kit

Sensor Mounting Direction  
Connections should be mounted at top of housing in order to avoid moisture from corroding connections.



Note: For wiring of SP3223 refer to wiring diagram of SP2539.

Step 1. Cutting the sensor lead wire to a length of 4 or 5 inches will facilitate installation. Solder the sensor lead wires to the loop wires pulled through the housing. Properly insulate all wire connections.

Step 2. Place the SP3237 sensor between the clips of the sensor retainer. The sensor should be inserted with lead up in order to avoid moisture from corroding the connections. Dress the excess wire into the slot on the back of the retainer. Using a tie wrap, secure the loop wires to the eyelet provided at the bottom of the retainer assembly. This should be done to form a strain relief so that the sensor splice cannot be unduly strained.

Step 3. Holding the sensor retainer and sensor in place, insert assembly into housing being sure that the round hole in the retainer, for an optional tamper switch, is at the top. The assembly should be inserted so that it touches the top of the housing.

Step 4. Press the insulated connections and excess wire into the space between the sensor assembly and the top of the housing.

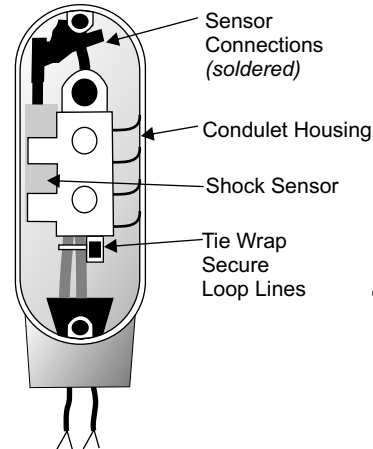
Step 5. Install the condulet gasket and cover.

Step 6. (Optional). Should the installation require a tamper switch, a hole is provided at the top of the retainer assembly for one. Reed switch part number MSPM101CS1 manufactured by Alco Switch is recommended for tampering purposes. It requires soldering the loop wires and is an SPST switch.

Note: For multi-zone installations it is recommended that cable no larger than four conductors be pulled because of limited splicing space in sensor housing.

### SP2539 Fence Kit

Sensor Mounting Direction  
Connections should be mounted at top of housing in order to avoid moisture from corroding connections.



Note: Always make loop connections in the condulet housing, **NOT** in the conduit tees.

Note: For wire runs under 1500 feet use 22 AWG wire size or greater and for runs 1500 feet or over use 18 AWG wire size.

Step 1. Pull the external loop wires into the condulet through the bottom threaded hole.

Step 2. Thread the two external loop wires through holes in the rubber strain relief, making sure the small end of the strain relief is toward the threaded hole in the condulet.

Step 3. Tie knots in the loop wires above the strain relief plug then press the strain relief into the threaded hole. Be sure to leave enough wire above the knots for connections to sensors.

Step 4. Solder sensor wires to the loop wires pulled into the housing. Properly insulate all wire connections so they cannot short together or short against the condulet housing.

Step 5. Holding the Terminus™ sensor against the side of the condulet housing, insert the metal retaining spring to hold the sensor in place.

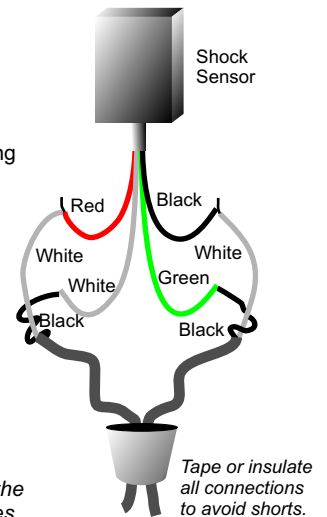
Step 6. Press the insulated connections and excess wire into the space between the sensor assembly and the top of the housing.

Step 7. Test each sensor housing assembly for continuity of loop before wiring the next sensor.

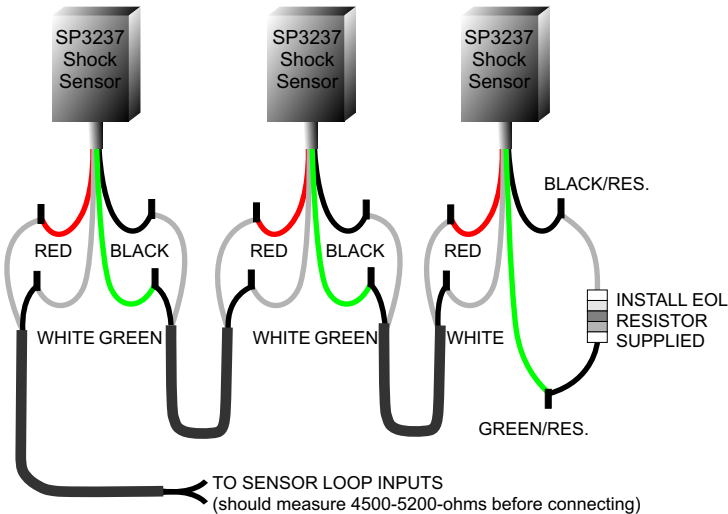
Step 8. Install the condulet gasket and cover.

### Sensor Wiring

Electrical Connections Diagram  
The SP2539 & the SP3223.



## Electrical Connections Diagram



- All joints must be soldered  
 - End-of-Line Resistor (EOL) is supplied with the processor.

Problem	Probable Cause
Zone in constant alarm	Open or shorted loop
Many alarms during high winds or storms	Loose fence fabric, loose toppings, signs or streamers
Gate zone alarms, others are quiet	Loose fitting gates, pinning or locking mechanisms. Use damped sensors
Light man on crew does not cause an alarm when climbing fence	Sensitivity set to low, count select set to high or count interval set too short
Does not detect cutting-type disturbance	Fence not stretched tight enough, or sensors too far apart

**Reminder: Do not wire the sensor loop to a Pac-A-Dap SP3219.**

If the previous steps have been followed in the correct order, all the sensors should now be wired together and ready for complete system testing. Before the test begins, we suggest that the following be checked:

1. The end-of-line resistor has been connected to the last sensor of each loop.
2. Lightning arrester devices have been installed on the loop prior to the wires entering the processor unit. The ground terminal of the arrester should be attached to a cold water ground or earth ground.
3. All electrical connections have either been taped or insulated to avoid shorts or grounds.
4. Loop wires to be connected to sensor loop inputs should measure 4500-5200 ohms before connection.
5. All joints should be sealed using RVT sealant.

You are now ready to connect the sensor loop to the zone processor and adjust the level of sensitivity as required. Refer to the proper installation instruction manual for the processor used.

**A Last Reminder:**

A Terminus™ F.I.D.S. is not something that can be installed and forgotten. Anytime the fence becomes damaged (trucks, forklifts or autos bending poles or stretching fabric) it should be professionally repaired. Trees or bushes must always be clear of the fence. While checking the fence system, also look for possible entry attempts such as cutting through, cutting the topping or digging underneath. It is recommended, as with all alarm equipment, that it be tested periodically for effectiveness. In testing, one should attempt to climb the fence to see if this action is detected. Cutting may be simulated by striking the fabric with a heavy screwdriver.

The success of any fence intrusion detection system relies highly upon the experience, technical competence and judgement of each installation crew member involved in evaluating the job site, selecting the equipment needed and setting up the system to meet each client's unique security needs. The information and recommendations presented in this manual should not be construed to represent any sole authorized procedure for installing a Terminus™ fence system. We do ask that when you have special questions concerning Terminus™ installations, you call the telephone number below for technical service.