Intelli-FLEX™II

Perimeter Protection System-Relay Output Processor

Product Guide

C6DA0602-001, Rev K
First edition
October 9, 2008

SENSTAR™

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Senstar's Quality Management System is IS0 9001:2000 registered.

Approvals
Canada: This Class B digital apparatus meets all requirements of the Canadian Interference -Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

USA: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including any interference that may cause undesired operation.

The use of shielded cables is required for compliance.

Any changes or modifications not expressly approved by Senstar Corporation could void the user's authority to operate the equipment.

Note: 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 off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation distance between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The use of shielded cables is required for compliance.

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1 Overview

What is Intelli-FLEX II

Intelli-FLEX II is an outdoor perimeter intrusion detection sensor system. It employs a passive coaxial cable detector, which is installed on the perimeter fence, to detect intrusion attempts. The cables can sense any vibration along the fence caused by climbing, cutting, or otherwise disturbing the fence fabric.

Each Intelli-FLEX II processor contains the electronics necessary to monitor one or two sensor zones, and to report sensor alarms and supervision status via relay contacts.

Features

- Easy to install
- Low cost, highly sensitive, consistent detection
- State of the art microcontroller-based processor
- User definable configuration parameters
- Detachable configuration module
- Discriminates between intrusion attempts and weather related events
- Lightning, EMI, and RFI protection
- Separate relay outputs for intrusion alarms and supervision in each zone
- Tamper sensor
- AC-powered float charger - Provides 13.5 VDC to power processor and charge battery (requires backup battery)
- 12 VDC Gel Cell backup battery - 8 hours of standby operation
- Wide voltage range DC/DC converter input for larger site installations

Purpose of this guide

This is the product guide for the Intelli-FLEX II DC/DC powered relay output processor. This guide includes information to assist you in selecting, installing, calibrating and maintaining the components of your Intelli-FLEX II system.

2 Principles of operation

The Intelli-FLEX II system uses a disturbance sensitive sensor cable to detect intrusion attempts. The sensor cable acts as a distributed microphone along a perimeter fence. It can be used as an alarm sensor, anywhere that there is significant noise caused by an intrusion event.

Sensor cables, installed on an existing fence, detect vibrations in the fence fabric. The signals generated by the vibrations are continually evaluated by the Intelli-FLEX II processor to determine if an alarm should be generated.

The vibrations of the fence could be the result of the weather or they could be caused by an intruder attempting to penetrate the perimeter by climbing over, lifting, or cutting through the fence. The Intelli-FLEX II processor evaluates the signals and discriminates between actual intrusion attempts and weather related events.

The Intelli-FLEX II system monitors the processor's power level. If there is a significant fluctuation in the power, a supervision alarm will be generated.

In most applications, the processor can be programmed by the user for optimum performance. In addition, the system firmware can be modified at the factory, for unusual applications.

Adaptive signal processing

The Intelli-FLEX II system continuously monitors and evaluates signals from the sensor cables. To avoid nuisance alarms, the system compensates for signals that are picked up by the sensor cables due to wind and rain.

Intruder detection

There are three basic intrusion attempt scenarios:

- Cut scenario - An intruder attempts to gain access to a secure area by cutting the fence fabric until enough links have been separated to allow the intruder to gain entry.
- Climb scenario variation 1 (climb-over) - An intruder attempts to gain access to a secure area by climbing over the fence.
- Climb scenario variation 2 (crawl-under) - An intruder attempts to gain access to a secure area by lifting the fence fabric, and crawling under it.

The Intelli-FLEX II system recognizes these scenarios and can discriminate between them and environmental activity.

Cut detection

The processor detects an attempt to cut through the fence if:

- sensor cable stimulation exceeds the preset cut threshold parameter;
- the number of times that the cut threshold is exceeded is greater than the preset cut count; and
- the preset cut count is exceeded within the preset cut window (time frame).

When the fence fabric is cut an impulse of energy produces a high initial amplitude signal that exceeds the cut threshold. Each time the cut threshold is exceeded a cut event is recorded. Cut activity will activate a cut counter. The cut counter has a preset number of cuts that must occur within a preset time window in order for the system to indicate that an intrusion attempt has occurred.

If the cut count is not exceeded within the preset time window, the counter resets. If it is exceeded, the system identifies an intrusion attempt and will generate a cut alarm.

Climb detection

The processor detects an attempt to climb over or crawl under the security perimeter if:

- sensor cable stimulation is sufficient to exceed the preset climb threshold parameter;
- the climb threshold is exceeded for a preset cumulative period called the climb time; and
- the climb time is accumulated within the preset climb window (time frame).

When an intruder attempts to climb over the fence, the action of feet and hands pulling on and impacting the fence fabric, as well as strain in the fence fabric, will cause a large number of energy pulses to rapidly occur. Pulling up on the fabric to crawl under the fence creates a similar scenario. This type of contact with the fence fabric will cause the preset climb threshold to be exceeded.

The initial contact will activate a climb time counter. The climb time counter accumulates energy caused by climbing action. A preset number of climb contacts must occur within a preset climb window time in order for the system to indicate that an intrusion attempt has occurred.

If the climb activity count is not exceeded within the preset climb window the climb counter resets. If the number is exceeded, the system identifies the activity as an intrusion attempt and will generate a climb alarm.

System supervision

The Intelli-FLEX II system monitors itself to ensure that its protection capability is not compromised. If that capability has been compromised, the system will generate a supervision alarm. Supervision alarms can occur for several reasons:

- a sensor cable line supervision current fluctuation, which may indicate:
    - sensor cable damage,
    - a defective splice, or
    - a defective terminator
- power failure, or low DC power
- processor enclosure door open

Unlike the intrusion alarm, which resets after detection, the supervision alarm remains on until the problem is corrected.

Sensor cable line supervision current fluctuation

A terminator device is installed at the end of the sensor cable, to permit a small DC supervision current throughout the entire length of the sensor cable. If the current exceeds the defined limits, a supervision alarm will occur for that zone.

Damaged or defective components

A defect or cut in the sensor cable, non-sensitive feed cable, cable splice or terminator will cause a supervision alarm.

If the terminator device is defective or damaged the supervision current will fluctuate, causing a supervision alarm.

Power fail

A voltage sensor monitors the internal 12 volt line and signals the system if the DC voltage is too low. If the DC voltage drops, but remains above the low DC threshold, the system will generate a power fail supervision alarm in both zones. The system will maintain normal zone alarm detection capabilities while in this condition.

Low DC voltage shutdown

When the DC voltage on the internal 12 volt line drops below the voltage required to operate the system reliably (8 VDC), a low DC voltage condition occurs. When this happens, the alarm and supervision relays for both zones activate and the entire system shuts down. Once the DC voltage on the 12 volt line increases to at least 11 VDC, the condition will clear and the system will resume operation.

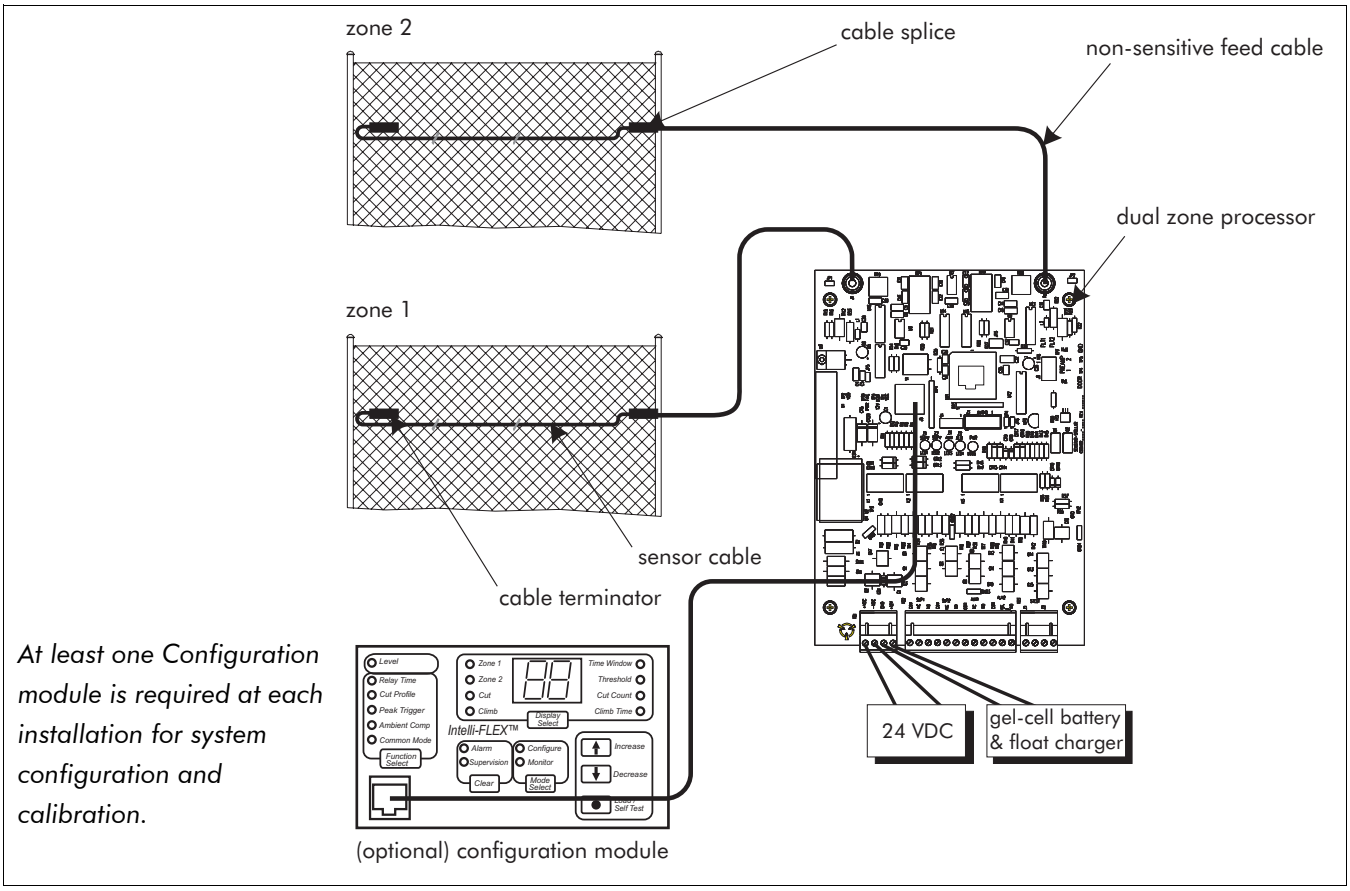
Tamper

The Intelli-FLEX II system uses a solid-state sensor to detect if the enclosure door is open.

A magnet is mounted on a standoff on the enclosure door. The magnet must be close to the tamper sensor located on the processor for the tamper alarm to be deactivated. When the enclosure door is opened the magnet is moved away from the sensor. This action causes a supervision alarm to occur in the zones that are connected to the processor. The system will maintain normal zone alarm detection capabilities while in this alarm condition.

Refer to *Appendix a - Troubleshooting, Tamper Supervision* for instructions on clearing tamper alarms.

3 System components



At least one Configuration module is required at each installation for system configuration and calibration.

Figure 3-1 Intelli-FLEX II system diagram

Each Intelli-FLEX II system is a self contained detection system.

The basic Intelli-FLEX II system requires the following components:		The following optional components can be added to the basic system:
• Intelli-FLEX II dual zone processor	• cable splice kit	• sliding gate disconnect assembly
• sensor cable	• tie wraps	• gate bypass module
• non-sensitive feed cable	• enclosure	
• cable terminator kit	• power supply	
	• configuration module (order separately)	

Standard components

Dual zone processor

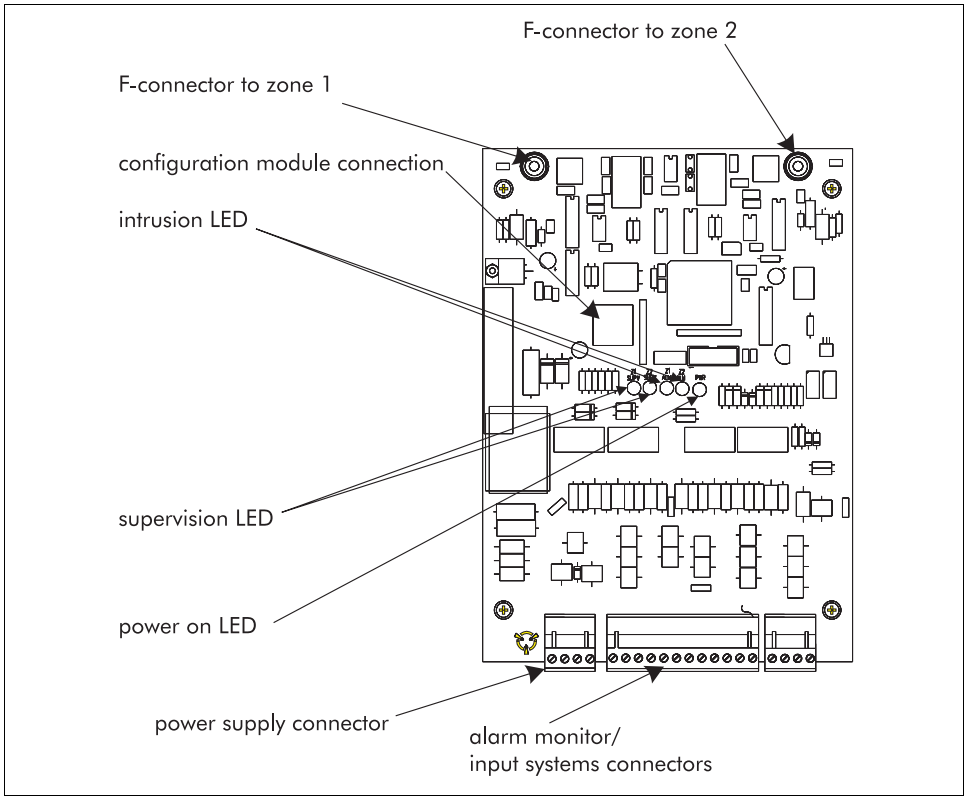


Figure 3-2 Dual zone processor

The Intelli-FLEX II dual zone processor contains the circuitry necessary to monitor one or two independent sensor zones. Generally, these two zones are located beside each other. When used to monitor two zones, the Intelli-FLEX II dual zone processor is capable of monitoring 610 meters (2,000 ft.) of sensor cable, 305 meters (1,000 feet) per zone. For a single cable pass installation, with service and corner loops included, this means that approximately 575 m (1885 ft.) of fence can be monitored by one dual zone processor.

Non-sensitive feed cables are spliced together with the sensor cables and connected to the processor at the F-connectors located at the top of the processor card.

The terminal blocks along the bottom of the processor card contain connection capacity for the processor power supply, alarm monitoring/reporting systems.

Corresponding LEDs indicate supervision and intrusion alarms for both zones 1 and 2, and system power on status.

A plug-in connector allows you to connect the configuration module to the processor.

Intelli-FLEX II processors containing relay outputs can be used with existing E-Flex sensor cable installations. They can replace existing EIIA, EIIAHR, EIIB, EIIBHR and E3i processors.

Caution *The input power of the Intelli-FLEX II processor may be different from the existing one. Be sure to use the new power transformer. If you are using distributed power, consult Senstar to determine the compatibility with existing installations.*

Sensor cables

Intelli-FLEX sensor cables are sensitive to physical disturbance. Because they are mounted directly on existing fences, anything that causes the fence fabric to vibrate, such as shaking or hitting the fence, will be transferred to the sensor cable.

These disturbances generate electronic signals that are representative of the fence activity. The signals are passed from the sensor cables to the processor where they are analyzed.

Non-sensitive feed cable

The non-sensitive coaxial feed cable does not detect vibrations. It is used primarily in two instances. In both cases, the non-sensitive feed cable allows the signals that are generated through the sensor cable to be routed to the processor.

The sensor cable cannot be connected directly to the processor, therefore, a section of non-sensitive feed cable, complete with an F-connector, is spliced to the end of the sensor cable. The feed cable is then connected to the processor at the F-connector.

The non-sensitive feed cable is also used to bypass gates or buildings. This is accomplished by splicing a section of the feed cable to the sensor cable zone at the location of the gate or building.

Cable terminator

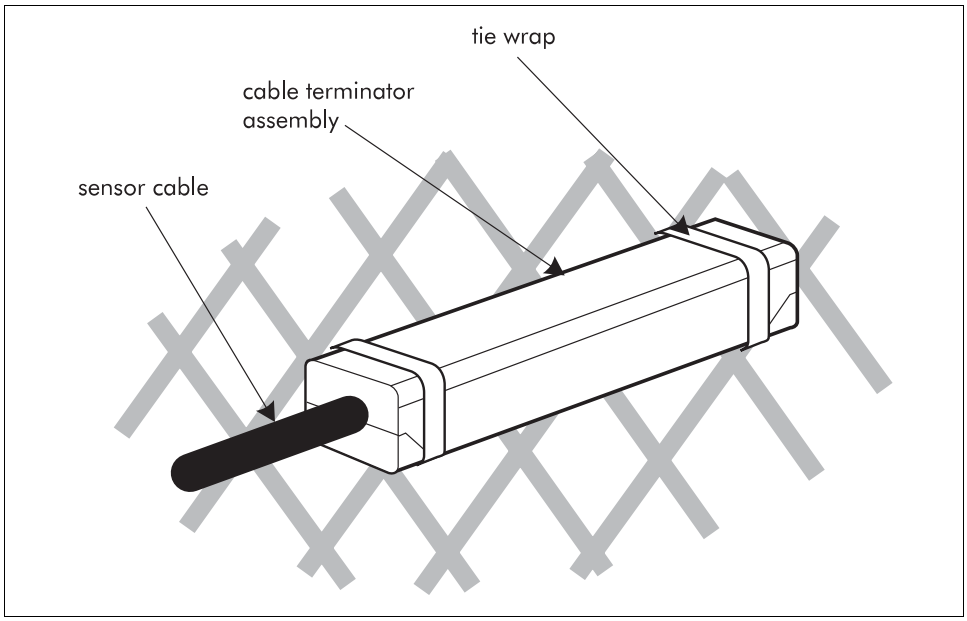


Figure 3-3 Cable terminator

The cable terminator is a moisture proof termination device that enables the supervision current to pass through the sensor cable. It is installed at the end of the sensor cable away from the processor.

Cable splice

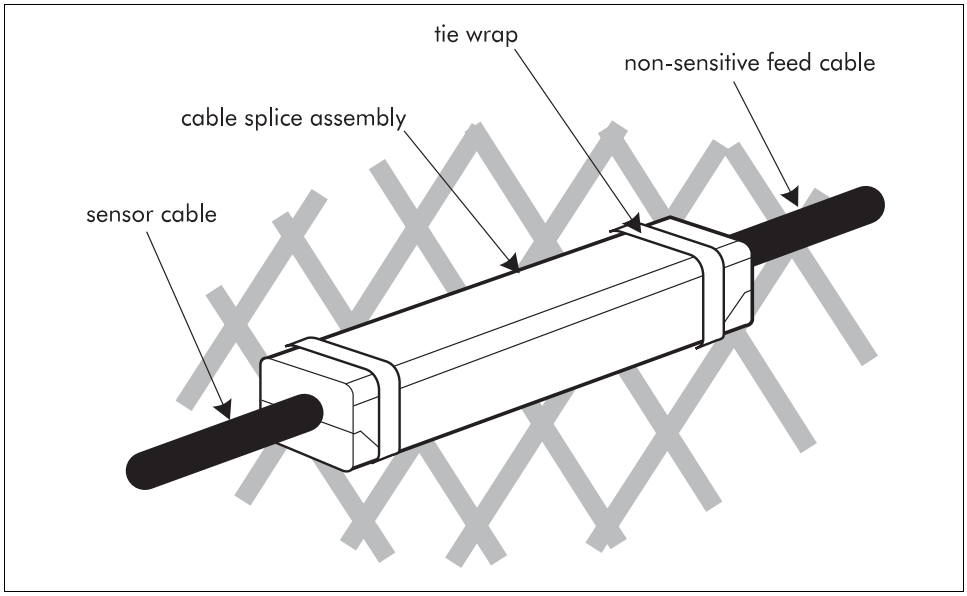


Figure 3-4 Cable splice

The cable junction device is a moisture proof splice kit. It is used to splice non-sensitive feed cable to sensor cable, or to connect two pieces of sensor cable together.

Tie wraps

UV-resistant nylon tie wraps are used to secure the cables, cable terminator and cable splice kits to the fence fabric.

Configuration module

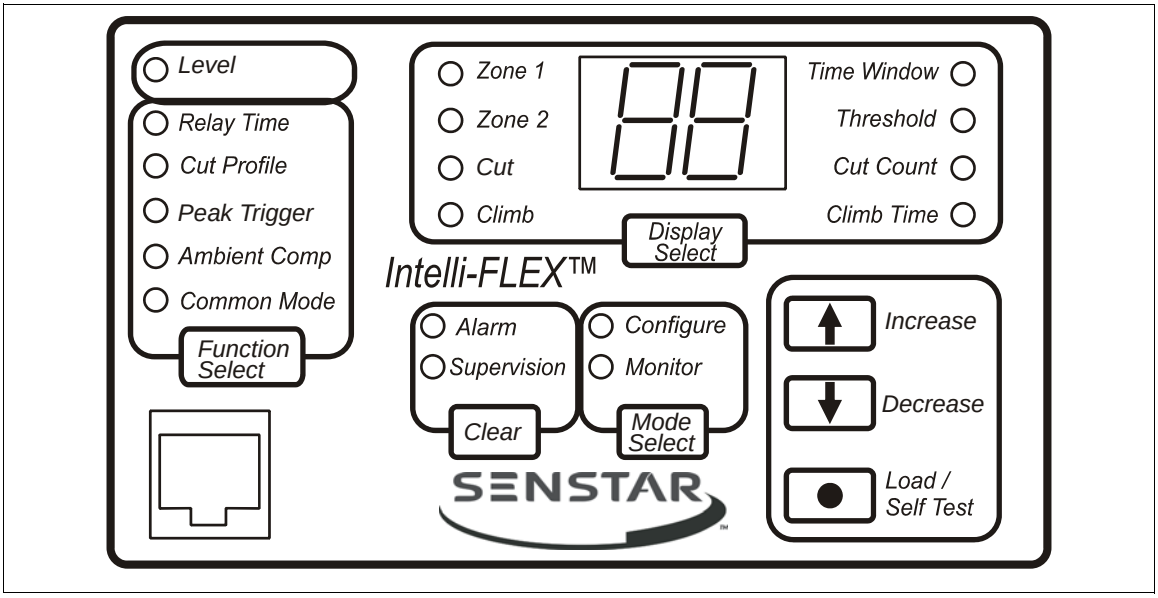


Figure 3-5 Configuration module

A detachable configuration module enables the operator to monitor the system operation and response, and to view or change the system configuration.

Power supply options

The Intelli-FLEX II DC/DC dual zone processor can be powered one of two ways:

- DC power/float charger and rechargeable battery
- a centrally located low voltage DC power source (18 to 56 VDC)

DC power/float charger and rechargeable battery

The DC power/float charger is the most feasible option when AC power is convenient and the AC power receptacle is protected from the weather. The DC power/float charger is merely plugged into the AC power source and 12 VDC is applied to the processor in parallel with a 12 VDC Gel Cell battery. This is often the best case for small installations that involve one or two processors. The DC power/float charger is capable of supplying 12 VDC to the processor, and charging the 12 volt Gel Cell Battery. A battery must be located at each processor or at the DC power/float charger.

Centrally located low voltage DC power source

A centrally located low voltage DC power source is more appropriate when multiple processors are to be deployed around a larger perimeter, or where the power run to even a single processor exceeds several meters (a few hundred feet). This option allows DC power to be conveniently distributed from a central power source to all processors and other equipment around a perimeter. In this configuration, a DC power supply may be located indoors, and the 24 VDC output, (48 VDC in large installations), is run along the perimeter to each of the Intelli-FLEX II processors. The central DC power supply may be plugged into a readily accessible UPS system to provide additional isolation and a non-interruptible source of power.

The DC/DC converters on the processor boards accept a wide input voltage range (18 to 56 VDC) and produce a regulated +12 VDC output voltage. Thus, large voltage drops in the distribution system are not a problem. The distribution voltage around the perimeter is also isolated from the output of the converter on the processor to protect the processor from electrical surges.

Backup power (UPS)

When the central low voltage power supply is used, it should be powered from a non-interruptible source of AC power. This power source will usually be provided for the computer system that is often a part of larger installations, or will be part of a UPS system for the overall security system. If a UPS system is not already a part of the overall security installation, a small standalone UPS system may be used to power the Intelli-FLEX II perimeter system. The UPS system may be purchased from a local supplier or from Senstar.

Each Intelli-FLEX II processor requires approximately 1 watt of power, making the total power consumption of even large systems very small. A small UPS system that is designed to run a personal computer system (typically 300 watts) for 15 or 20 minutes will power an Intelli-FLEX II perimeter system for several hours.

Enclosure

The fibreglass NEMA 4 rated weatherproof enclosure provides a protective covering for the processor. The processor circuit board is mounted on a metal plate, inside the enclosure. There are two cable entry ports on the bottom of the enclosure for the sensor cables, alarm communication wiring, and power & ground cables. The enclosure measures 34.8 cm h X 30 cm w X 17.3 cm d (13.7 in. X 11.8 in. X 6.8 in.) and includes four mounting feet. The enclosure can be mounted on a wall, or other flat stable surface, located close to the sensor zone.

Optional components

Sliding gate disconnect assembly

The sliding gate disconnect assembly is used to provide security across a sliding gate within an Intelli-FLEX II zone that is not frequently used. With this device the gate may be left securely unattended, however, the gate can be opened and closed by manually separating the connection to open the cable line. A supervision alarm is generated when the cable line is opened.

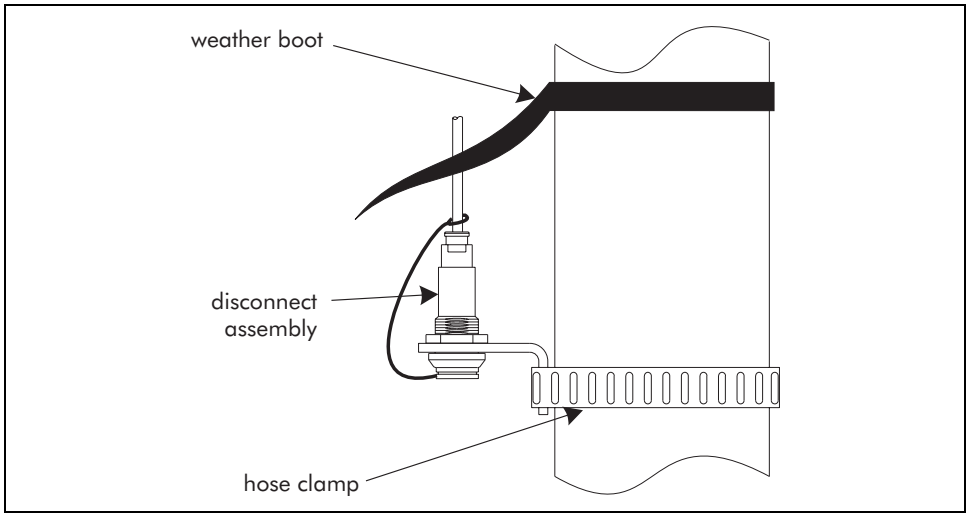


Figure 3-6 Sliding gate disconnect assembly

Gate bypass module

The Intelli-FLEX Gate bypass module is used to bypass a protected gate without triggering an intrusion alarm.

The module operates in secure and access modes. When the unit is in secure mode, the gate is monitored by the system. It acts as any other section of protected fence and an alarm triggers whenever an intrusion attempt occurs. In access mode the gate is unprotected, hence no alarm is triggered when the gate is used.

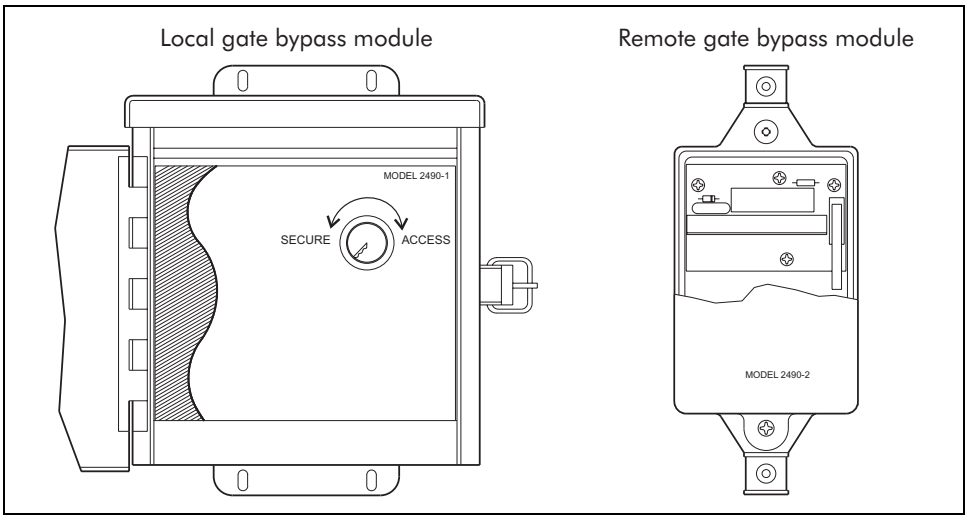


Figure 3-7 Local and remote gate bypass modules

Two options of the gate bypass module are available:

- Model 2490-1 - manual (or local) operation (keylock switch)
- Model 2490-2 - remote operation (remote-controlled relay).

4 Site planning

Site planning guidelines

Follow these guidelines to create an operating environment that allows the Intelli-FLEX II system to perform well. Perform regular inspections to ensure that the fence remains in good condition. Timely repairs to fence damage, the control of vegetation, and regular visual inspections of all detection zones, will provide years of effective operation.

Site planning includes four main steps. These steps will be detailed in the following sections:

survey site	*Site Survey* on page 4-2
upgrade existing structures as necessary	*Upgrade existing structures* on page 4-3
layout components on site plan in accordance with guidelines	*Perimeter layout guidelines* on page 4-8
determine equipment requirements	*Equipment requirements* on page 4-17

For installation guidelines refer to *Chapter 5, Installation instructions*.

Site Survey

A survey should be conducted before installing any system hardware to ensure that the site conditions are suitable for optimum function of an Intelli-FLEX II system. The primary concern of the site survey is the condition of the fences and gates where the sensor cable will be attached.

When conducting the site survey indicate the following on the site plan:

- locations of existing structures (include fences, gates, buildings, etc.) Check that the mounting surfaces are in compliance with established standards with respect to stability.
- location of obstacles such as vegetation.

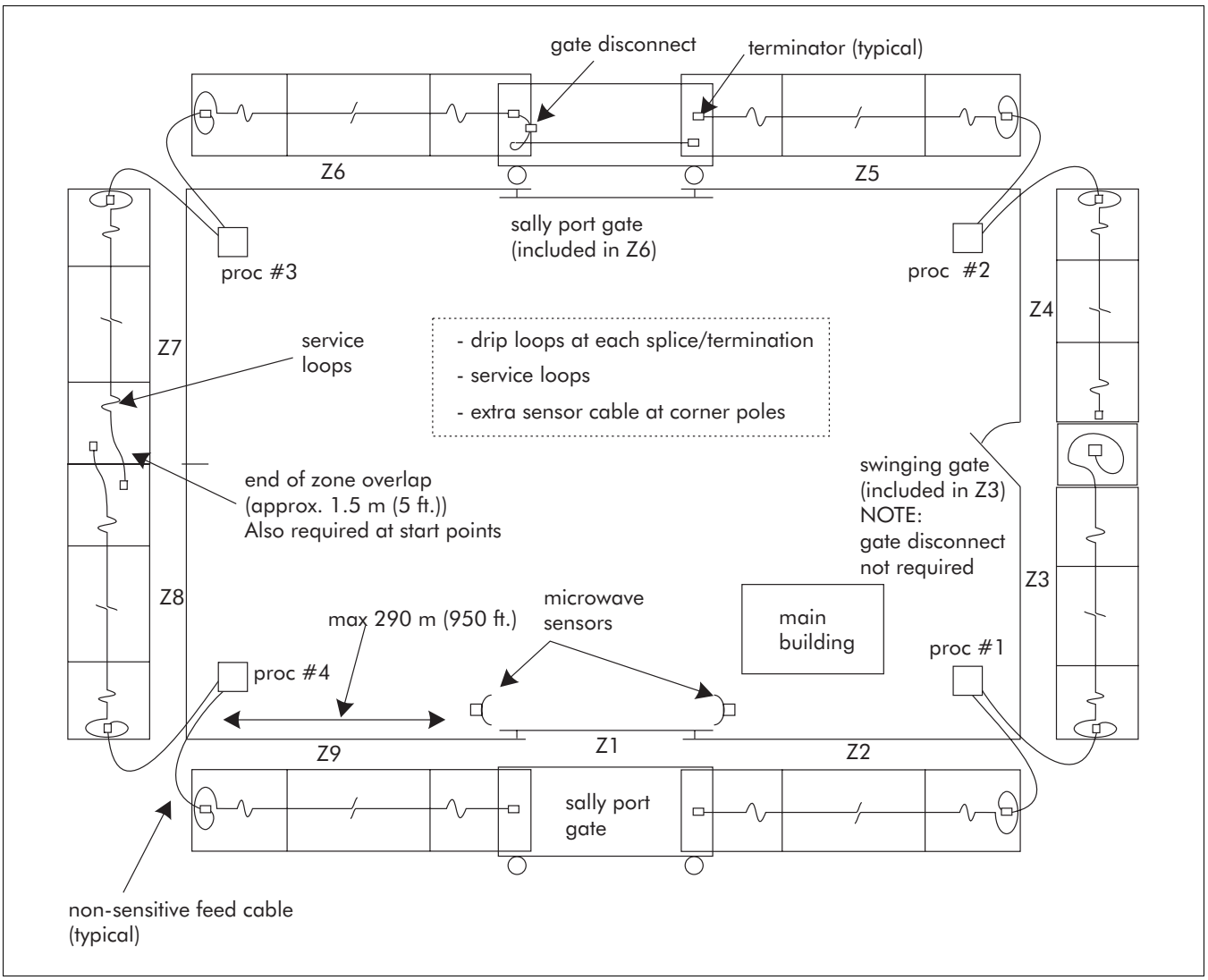


Figure 4-1 Sample site plan

Upgrade existing structures

This section details the procedures that are required to upgrade several types of fences so that they are sufficient barriers against climb over and crawl under intrusions. If you do not see your specific fence type, please contact your Senstar representative.

Fence

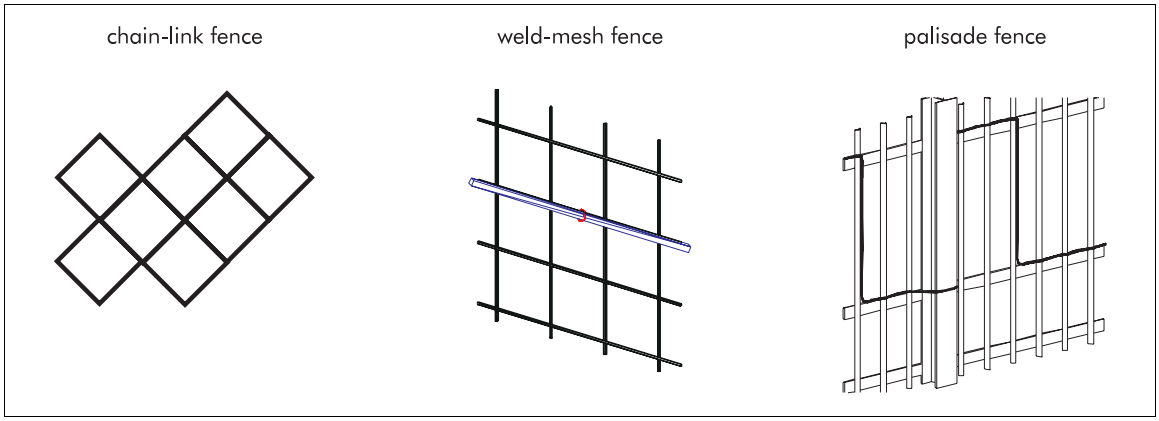


Figure 4-2 Fence types

The fence should be of a sufficient height and condition to present an effective barrier against climb intrusions. It is also recommended that the fence include a climb-over barrier, such as barbed wire, along the top of the fence.

As with all fence detection systems, the fence condition is critical to the trouble-free, efficient operation of the Intelli-FLEX II sensor. Breaks in the fence structure or slack areas in the fence fabric will inhibit the transmission of the fence vibrations to the sensor cable. The fence must be properly installed, maintained, and tensioned, to provide effective intrusion detection with the Intelli-FLEX II sensor system and it should be uniform in height and quality.

The primary objective of this section is to provide guidelines is to eliminate - or at least minimize - environmental noise sources that may be present because of fence conditions.

If you are installing a new fence or replacing fence panels, it is recommended that you do this in such a way as to ensure that a single sensor zone will be mounted to a single type of fence.

Chain-link fences

Chain-link fences are one of the most popular types of perimeter fences, hence, Intelli-FLEX II is often installed on an existing chain-link fence.

The chain-link fence fabric should meet the following minimum specifications:

- 9 GA (2.9 mm dia.) galvanized steel, 2.5 to 7.5 cm (1 to 3 in.) mesh chain-link (or weld-mesh)
- Selvages - Top sides twisted and barbed, bottom side knuckled.
- Thread stretcher bars through the fabric using 1 bar for each gate and end post, and 2 for each corner and pull post. Pull fabric tight so maximum fabric deflection is 5.0 cm (2 in.) when a 14 kg (30 lb.) pull is exerted perpendicular to the center of a panel.
- Maintain tension by securing stretcher bars to posts with metal bands spaced a maximum of 38 cm (15 in.) apart. Fasten the fabric to the steel framework with 9 gauge steel wire ties spaced a maximum of 30 cm (12 in.) apart - for all posts, rails, braces, and tension wires.
- Tighten stretcher bar bands, wire ties, and any other fasteners very securely. None of the fabric should be free to move.

Any fence movement which can cause metal-to-metal contact may be a potential source of nuisance alarms. Tension wires can be installed horizontally to stiffen the fence fabric. These wires should be secured at each post so they will not allow any perceptible movement between the wire and the post when the fabric is flexed. This can be done using wire ties or metal straps.

Weld-mesh fences

Weld-mesh fences are also common types of perimeter metal fabric fence. A typical weld-mesh fence section consists of 3 mm (0.1 in.) diameter steel wire welded into a grid configuration, with horizontal spacing differing from the vertical spacing. These fence sections are secured to fence posts, to top and bottom rails, and to the adjacent fence panel sections. The sections of weld-mesh fence are either welded together or connected using clips, bolts or rivets.

Make sure that the weld-mesh fence fabric panels are well secured to the mounting poles and to each other.

Because of their structure, weld-mesh fences are harder to climb, and require more cuts than a standard chain-link to make a man-sized hole.

Palisade fences

The effectiveness of Intelli-FLEX II installed on this type of fence will depend entirely on the characteristics and construction of the specific fence. There are several types of palisade fences.

Standard palisade fences consist of vertical metal stakes which are welded, riveted, or bolted to horizontal support members. These, in turn, are carried by metal posts. Some types of palisade fences have a horizontal connecting tubular rail. This rail provides a location to install the cable that hides the cable and protects it from the elements, tampering or other potential damage.

Unlike chain-link or weld-mesh fences, palisade fences have a uniform construction along the entire fence line including the corners. If constructed properly, a palisade fence conducts vibrations well and any attempt to cut into the fence will be detected.

Because the fence is rigid, climb-over intrusion attempts generate less noise and vibration than in a chain-link fence. The fence is also less responsive to wind and rain. Because of this, the processor gain may be adjusted to a higher level than for a chain-link fence.

A trial on the specific palisade fence is recommended before an entire system is installed to determine if the climb-over detection meets the site requirements.

For an evaluation of your specific site please contact Senstar or your area sales representative.

Climb-over deterrent hardware

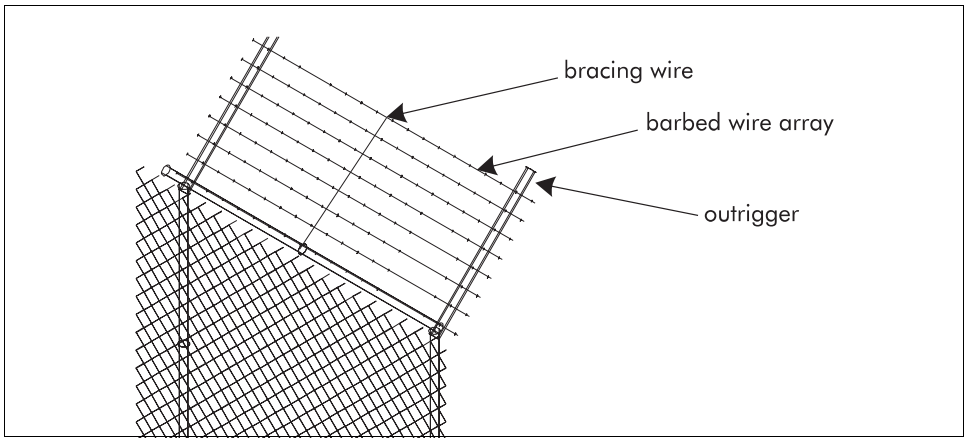


Figure 4-3 Barbed wired outrigger with bracing wires installed

Many fences and walls include barbed wire outriggers as a physical deterrent to climb-over intrusion attempts. These outrigger arrays must be secured to prevent casual movement due to environmental conditions. Each strand in the outrigger array should be taut and tightly secured at each support.

Install bracing wires between the outrigger supports to prevent the barbed wires from spreading apart.

All top-of-fence material and deterrent hardware should meet the following minimum specifications:

- Any extension arms or outriggers attached to post tops should have a tight press-fit or should be spot welded. Loose or rattling equipment should be fastened down or removed.
- The use of barbed tape is NOT recommended. It is difficult to fasten tape to prevent noise generation. If barbed tape must be used, every effort should be made to minimize noise generated from the movement of the tape. This requires tying the barbed tape at specific points where motion can cause the tape to touch the fence.

Other structures

The Intelli-FLEX II system has been used on other types of fence structures. It has been deployed on wooden fences, on indoor walls to detect break through, in conduit along the top of concrete or brick walls to detect climb-over, along wire conduits to protect sensitive data cables, even in the handrails of a yacht to detect intrusion onto the ship while it is moored.

For Intelli-FLEX II installation information on wrought iron, or any other type of fences that might be included in the security perimeter of your site, please contact Senstar.

Gates

Gate frames should consist of a rigid structural material with the necessary horizontal and vertical bracing to provide an adequate support for the rigid attachment of fabric and hardware accessories. Keep the following in mind when assessing gates:

- firmly attach all gate hardware accessories (minimum free-play and wear)
- make sure that double gates have stops (rigid anchor)
- prevent locking hardware from moving in the wind
- prevent sliding gate track hardware, supports, guides, etc., from rattling in the wind

Gate frame types - single swinging, double swinging, and sliding are covered in this guide.

Obstacles

All vegetation (weeds, brush, trees, etc.) must be cleared from the fence area. It cannot in any way touch or hang over the fence fabric.

Any other objects that will rattle, or otherwise affect the operation of the sensor cables must be removed from the perimeter.

Weather

Ambient weather conditions such as a tendency for electrical storms, high precipitation and strong winds may affect the configuration parameters for the Intelli-FLEX II system. Determine the normal weather conditions for the site.

If it is determined that your site is in a severe weather environment, the cut count and climb time may have to be increased by 1 or 2 units. See *Configuration settings,* on page 7-3 for more information.

Perimeter layout guidelines

Once the existing site features (i.e., fences) have been adapted to meet specifications, the perimeter must be laid out. Layout guidelines for each Intelli-FLEX II component are detailed in this section. These guidelines will provide you with the information that you require to layout an effective Intelli-FLEX II system.

Use a site plan to mark the locations for the Intelli-FLEX II components as follows:

- sensor cables - indicate layout of cable in each zone

  Senstar strongly recommends installing the sensor cables on the secure side of the perimeter (the side of the fence opposite the threat).

- non-sensitive feed cable - indicate layout of cable in each zone
- Intelli-FLEX II dual zone processors
- optional equipment
- cable connectors - indicate type of connector (splice, terminator)
- power supply - indicate type of power supply and power distribution plan
- communications system wiring plan

Cable layout guidelines

This section provides the information required to determine the amount of cable required to install your Intelli-FLEX II system. Installation guidelines are found in *Chapter 5, Installation instructions*. Keep the following in mind when determining your cable requirements:

- The sensor cable must be mounted on the same or similar type of surface for each zone. (i.e., one type of fence) DO NOT install one sensor cable on both fence fabric and barbed wire.

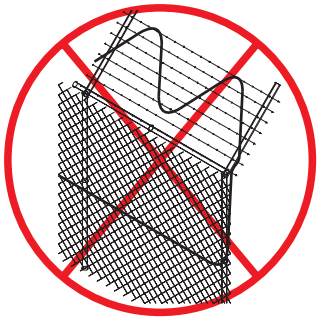


Figure 4-4 Fence type installation rule

- The cable should be mounted at least 30 cm (1 ft.) from the horizontal support poles and tension cables.
- The sensor cable should be attached to the fence or surface where intrusion attempts are to be detected.
- The sensor cable may be deployed in maximum lengths of 305 m (1,000 ft.) per zone and can be cut on site as required. Keep in mind the combined total of sensor cable and lead-in cable. (See *Non-sensitive feed cable lengths* on page 4-12)
- The smallest allowable bend radius for sensor cable is 7.5 cm (3 in.).
- To maintain a uniform response over an entire zone the sensor cable should follow the ground contour to maintain a constant height above the ground.

Fence height considerations

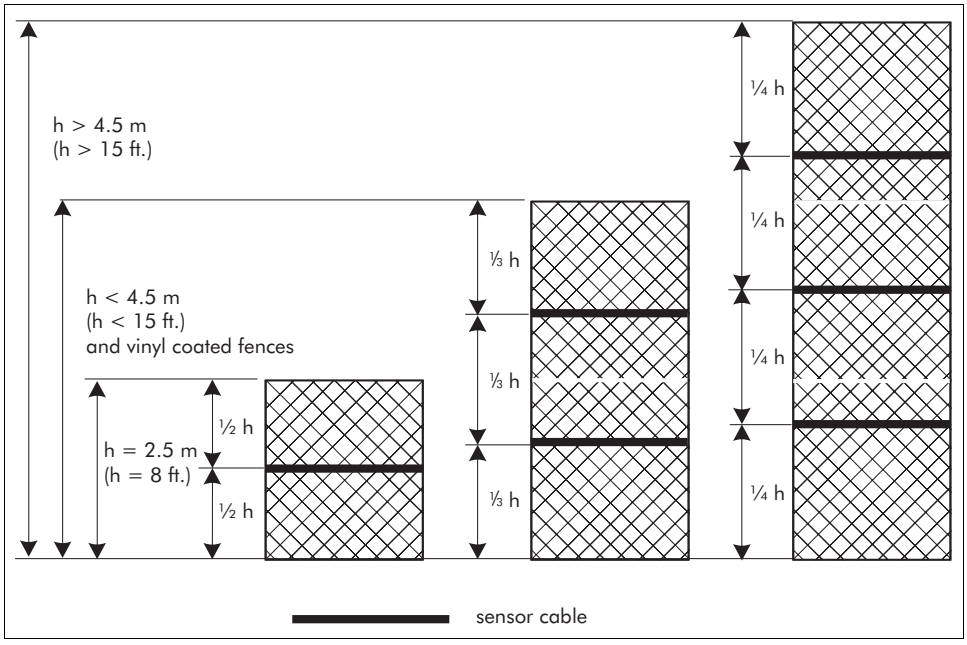


Figure 4-5 Cable installation height recommendations

The following cable layouts are recommended, depending on fence height:

- for fences up to 2.5 m (8 ft.) tall - a single pass of sensor cable
- for fences greater than 2.5 m and less than 4.5 m in height, and on vinyl coated fence - a double pass of sensor cable. The cable is installed at approximately 1/3 and 2/3 the height of the fence
- for fences exceeding 4.5 m (15 ft.) in height - three or more passes of sensor cable. This depends on fence fabric and structure, and on the level of security required by the system. These cable passes should be equally spaced.

Palisade fences

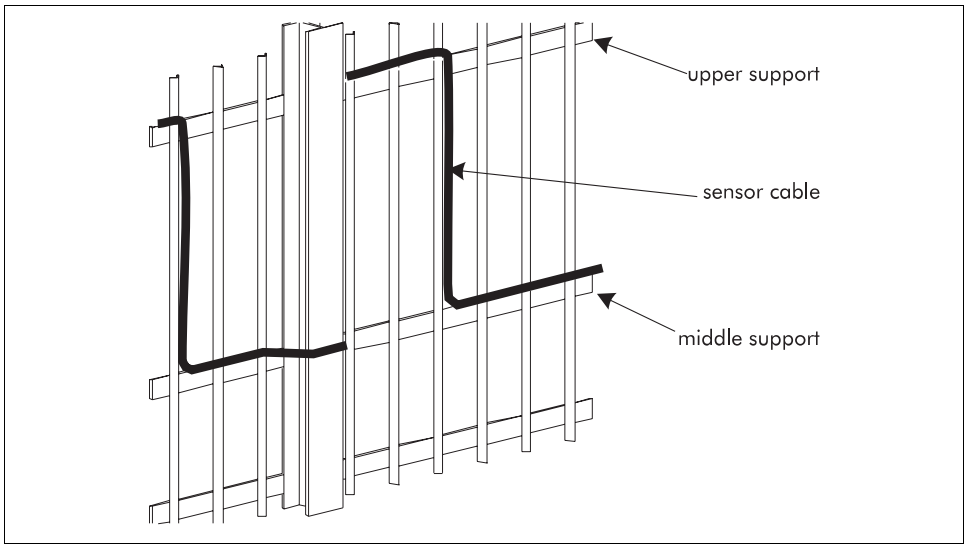


Figure 4-6 Cable installation on Palisade fence

On palisade fences the sensor cable should be deployed in a square wave pattern with the top and bottom sections attached to the upper and middle support. On palisade fences greater than 2 m (6 ft., 6 in.) in height, an alternative method of cable deployment is recommended. Usually such fences have three horizontal supports.

Outrigger arrays

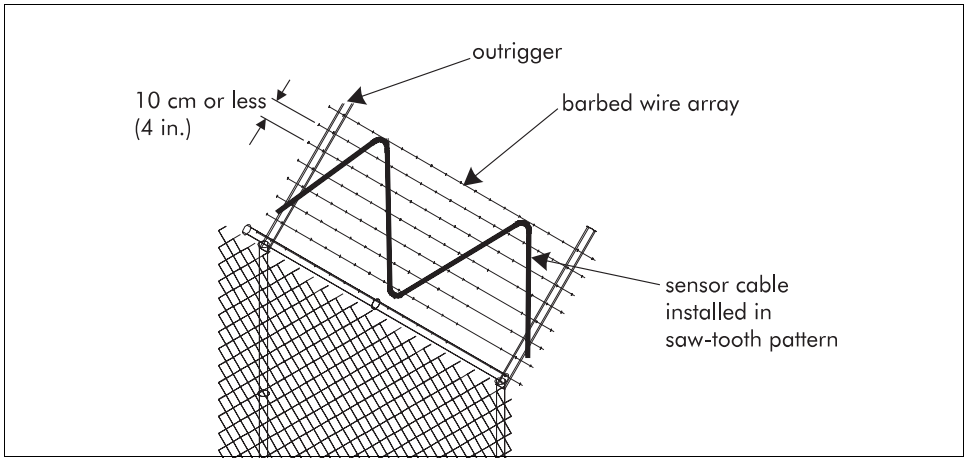


Figure 4-7 Cable installation on barbed wire outrigger array

In a barbed wire outrigger array, if the wires in the array are less than 10 cm (4 in.) apart, the sensor cable will be laid out on the array in a saw-tooth pattern.

Fence corners and heavier gauge posts

Corner posts are usually more sturdy than the regular fence support posts, and often are braced. Heavier gauge posts can occasionally be found in the middle of a fence section, as well. An intruder may be able to climb over the fence at these points without causing as much fence vibration as at other points along the fence.

Allow enough additional sensor cable to install cable loops at corner posts and at any heavier gauge posts in the protected fence. This will increase the detection sensitivity at corner posts and heavier gauge posts. (See also *Service loops*)

Palisade fences have a uniform construction along the entire fence line including the corners, unlike chain-link or weld-mesh fences. Therefore, no special sensor cable deployment is required at corners.

Service loops

Service loops provide lengths of extra cable to allow repair of damaged cable without the need to splice in a section of cable. 30 to 45 cm (12 to 18 in.) of cable should be allotted approximately every 15 to 61 m (50 to 200 ft.) along a cable run for a service loop.

The U-shaped loop should be located at a fence post whenever possible.

Due to the nature of the sensor cable deployment, it may be difficult to deploy service loops on a palisade fence.

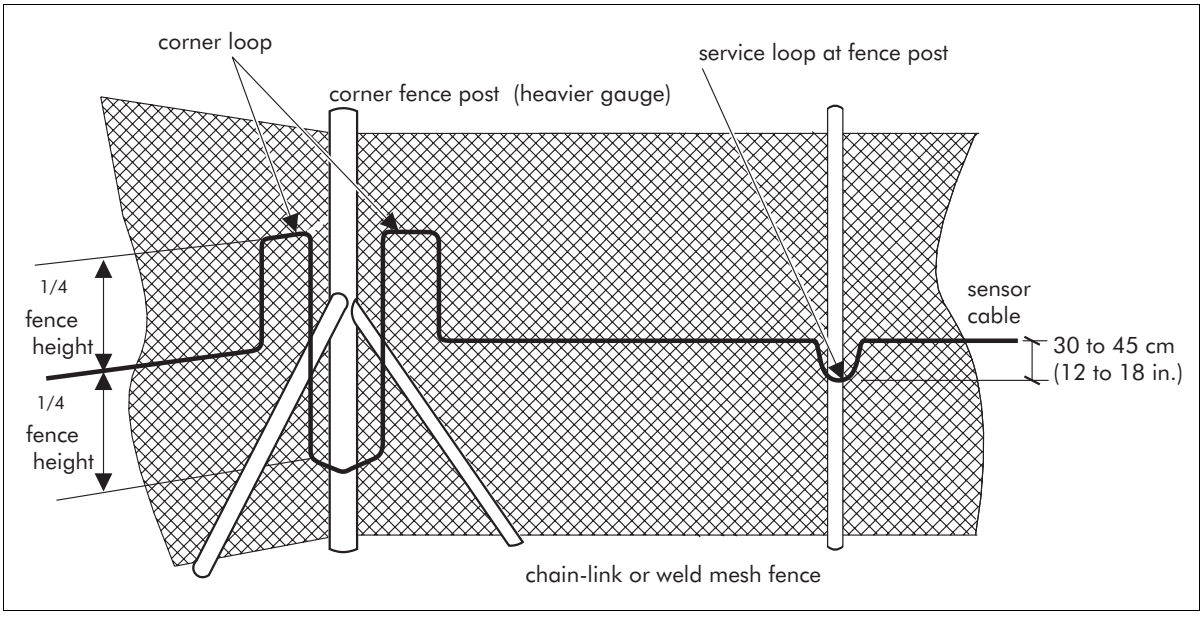


Figure 4-8 Corner posts, heavier gauge posts, and service loops

Drip loops

Drip loops must be placed at every cable connector. The drip loop raises the terminator or splice above the cable. This prevents water from pooling in the terminator gel shell. The drip loop also relieves strain on the splice connection that may result from temperature change that causes the cable to expand and contract.

A drip loop is formed by raising the cable connector a 15 cm (6 in.) above the level of the cable run, to a local high point.

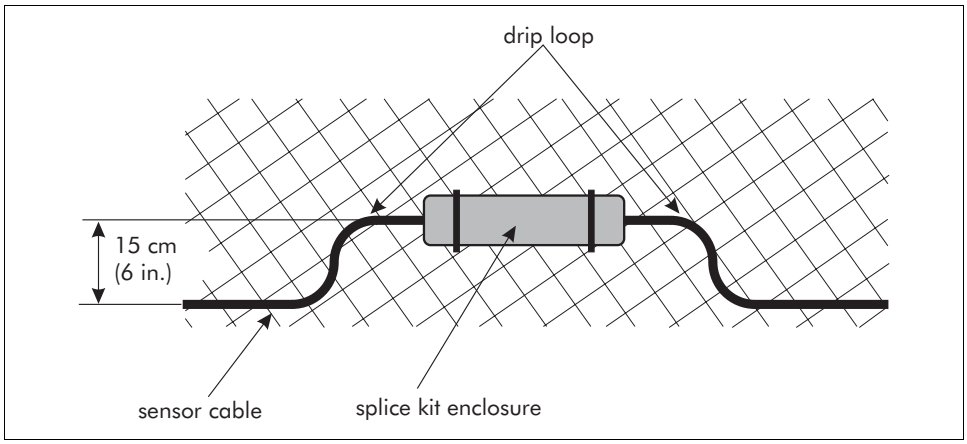


Figure 4-9 Drip loop

Approximately 15 cm (6 in.) of cable should be allotted for each drip loop.

Non-sensitive feed cable

The maximum length of non-sensitive feed cable for 305 m (1,000 ft.) of sensor cable must be in accordance with the non-sensitive feed cable lengths table.

Non-sensitive cable type	Maximum length
RG-59/U, 69 pf/m (21 pf/ft.)	116 m (380 ft.)
RG-62/U, 43 pf/m (13 pf/ft.)	186 m (610 ft.)

Table 4-1 Non-sensitive feed cable lengths

The non-sensitive feed cable should have a solid center conductor 0.6 mm (0.023 to 0.025 in.) in diameter to fit the coaxial F-connector on the processor.

The maximum length of non-sensitive feed and bypass cables may be extended, provided the length of the Intelli-FLEX sensor cable is reduced accordingly.

Gate bypass

If a gate is within an Intelli-FLEX II sensor zone, the length of non-sensitive feed cable within the zone must include a sufficient amount to bypass the gate, and to the connect the processor to the sensor cable. The length of the bypass cable is determined by the following equation:

Length of bypass cable = (width of gate + 2 X 15 cm [6 in.]) + (2 X mounting height of sensor cable) + (2 X 45 cm[18 in.])

If the application is with a double gate using a gate bypass module this length must be tripled.

The total length of lead-in cable in a zone must not exceed the length given in *Table 4-1, Non-sensitive feed cable lengths,* on page 4-12.

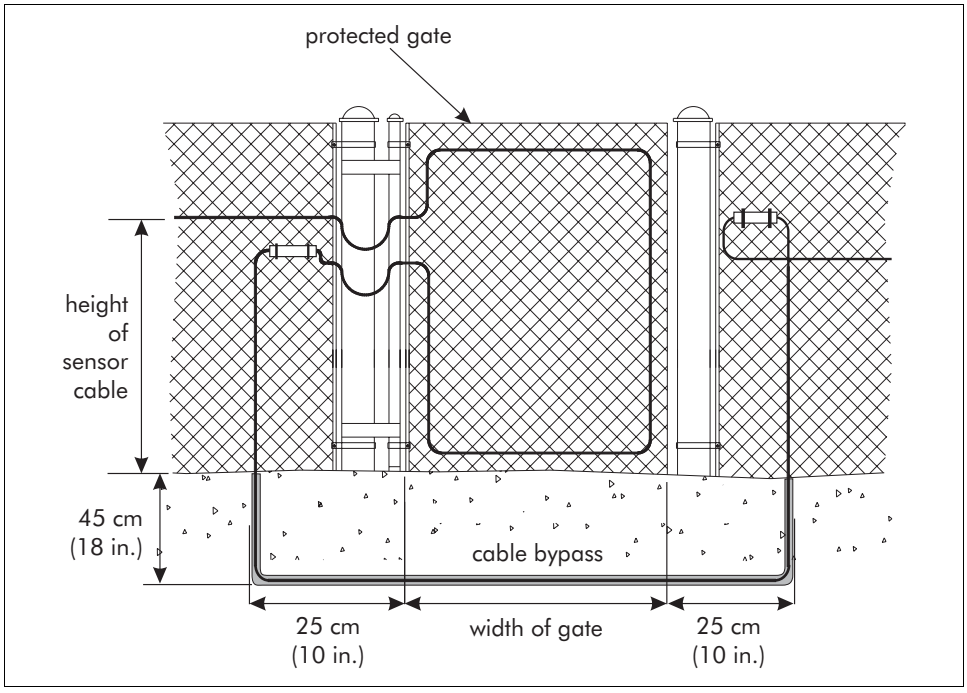


Figure 4-10 Gate bypass

The bypass cable should be buried in a piece of PVC conduit. The length of the PVC conduit is determined by the following equation:

Length of bypass cable conduit = (width of gate + 2 X 25 cm [10 in.]) + (2 X 45 cm [18 in.])

Processor location guidelines

The Intelli-FLEX II dual zone processor provides circuitry to operate two independent adjacent zones. In general, there is no limit to the number of processors in a system. The maximum number of processors that can be used usually depends on the limitations of the system control panel.

The Intelli-FLEX II processor is designed to be mounted outdoors inside a NEMA 4 rated enclosure. The enclosure is then mounted on a wall, or other stable flat surface, that is located close to, but separate from, the fence where the sensor cable is mounted. This is to ease testing, calibration and noise reduction of the system. A rigid fixed post with a flat mounting surface attached (app. 36 cm w X 41 cm h {14 X 16 in.}) a few meters from the fence line on the protected side of the perimeter is best for outdoor applications. The maximum distance that the processor can be installed from the fence is determined by the non-sensitive feed cable length requirements. See *Table 4-1, Non-sensitive feed cable lengths,* on page 4-12.

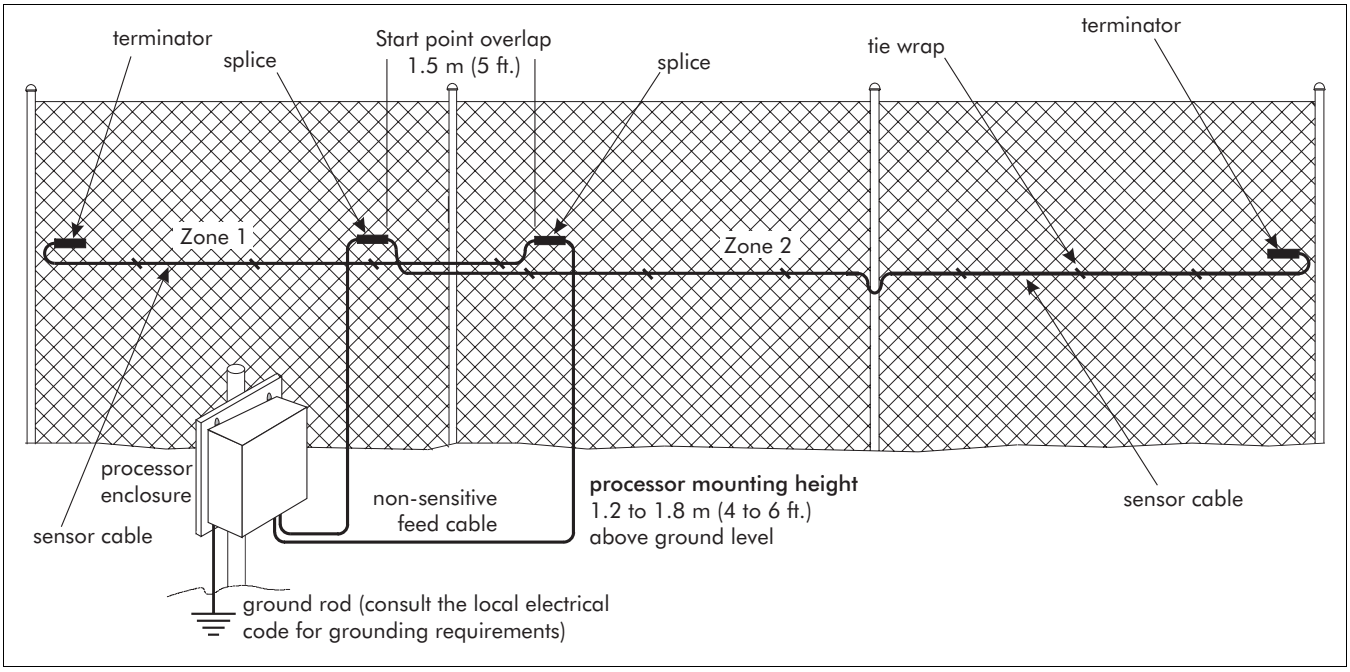


Figure 4-11 Processor location

The processors should always be mounted on the secure side of the perimeter. Each processor installation must include a suitable connection to earth ground.

DO NOT use the fence as an earth ground. Consult the local electrical code for grounding requirements.

The enclosure includes four mounting feet and the hardware for attaching the mounting feet to the enclosure. Mounting hardware for the enclosure is customer supplied.

AC or DC power wiring

The DC power/float charger and battery or the 24 VDC power supply require primary power. A separate enclosure may be required at the processor locations for power distribution and circuit breaker installations, if the 115 VAC power is routed outdoors to a location near the processors. Normally, if primary power is not conveniently located, 24 VDC is run to the processors.

In locations where the AC power supply may not be stable or reliable, an uninterruptable power system (UPS) should be considered for primary power, in conjunction with the 24 VDC power supply. See also *Power source* on page 4-16.

Alarm monitoring

The processors have both intrusion alarm and line supervision alarm relays for each zone. These relays are to be connected to monitoring equipment.

Grounding considerations

The Intelli-FLEX II sensor must have a single ground reference. This earth ground must be located at each processor. A stable earth ground is required at the processor mounting location. The entire system is referenced to this ground. Refer to the local electrical code for grounding requirements.

Cable connectors

The splice kit is used to join two cables together within a zone, either sensor cable to sensor cable or sensor cable to non-sensitive feed cable. It is mounted horizontally to a fence post or fence fabric using two tie wraps.

The termination kit is installed at the end of a zone to allow supervision of the sensor cable. It is mounted horizontally to a fence post or fence fabric using two tie wraps.

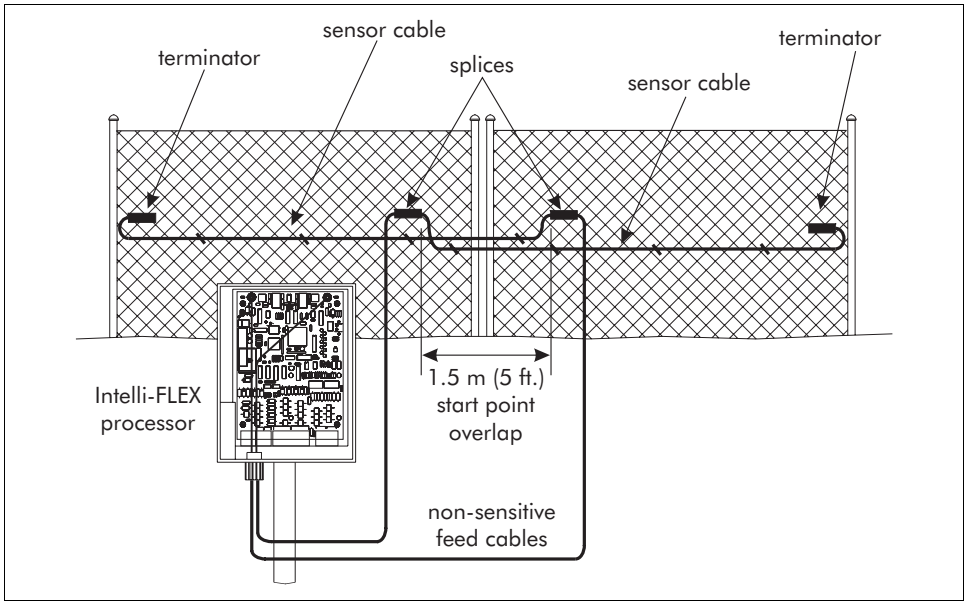


Figure 4-12 Cable connectors

Power source

Power source requirements can be determined after all other component requirements have been met. There are two basic choices to power the processors.

- The DC power/float charger and backup battery provides 12 VDC for sites that require one or two processors.
- A centrally located low voltage DC power source is preferred for larger sites. It can provide 24 or 48 VDC depending on the site requirements.

For sites in remote locations a UPS system may be required as the primary power source.

Power distribution plan

The DC/DC converters on the Intelli-FLEX processors operate over an input range of 18 to 56 VDC. The input is electrically isolated from the regulated 12 VDC output. This allows the processors to operate reliably with long power distribution runs.

Small installations can be operated from a 24 VDC power supply, whereas larger installation with many processors, may require a 48 VDC power supply.

Intelli-FLEX II processors consume 3 Watts maximum load (this includes the Configuration module).

Equipment requirements

After the site layout is complete, compile a list of equipment requirements for your site. The Intelli-FLEX II sensor system is supplied in kits for single and dual zone applications. Components can also be purchased individually. Refer to *Appendix b - Spare parts list* for a list of components.

At least one Configuration module is required at each site for system configuration and calibration.

	Single zone kit (C6FG0401)	**Dual zone kit (C6FG0402)**
Intelli-FLEX II dual zone Processor	1 each	1 each
DC power/float charger	1 each	1 each
Back-up battery	1 each	1 each
Sensor cable	1 of 305 m (1,000 ft.)	2 of 305 m (1,000 ft.)
Non-sensitive feed cable	1 of 7.5 m (25 ft.) complete with F-connector	2 of 7.5 m (25 ft.) complete with F-connector
Terminator/cable splice kit	2 each	4 each
Tie wraps	1 bag of 1,000 pieces	2 bags of 1000 pieces

Table 4-2 System component quantities for single and dual zone kits

5 Installation instructions

Overview

This section includes the guidelines required to install Intelli-FLEX II components. In general, the following sequence of events occurs when installing an Intelli-FLEX II system:

- Upgrade or adjust mounting surface for cables as required.
- Install sensor cable.
- Install bypass device(s) as required.
- Install terminator device(s) at the end of the sensor cable.
- Install junction device(s) between the sensor cable and non-sensitive feed cable.
- Install the enclosure complete with the Intelli-FLEX II dual zone processor.
- Complete the wiring connections for all components.

For site planning and equipment requirement guidelines refer to *chapter 4, Site planning.*

Refer to instruction sheet 15 at the back of this manual for important information about installing Mark 2 Intelli-FLEX II sensor cable.

Basic sensor cable installation

Sensor cable should be installed by two people.

Please read through all of the sensor cable installation guidelines before installing the Intelli-FLEX sensor cable.

Sensor cable routing guidelines

- The sensor cable can be mounted on either side of a fence. However, Senstar strongly recommends installing the cable on the secure side of the fence.
- Make sure that the sensor cable is not trapped between the fence fabric and the support posts. Excessive squeezing will dampen the sensor cable response and result in non-uniform detection.

Bend radius

- The smallest allowable bend radius for the sensor cable is 7.5 cm (3 in.).

Attaching the sensor cable

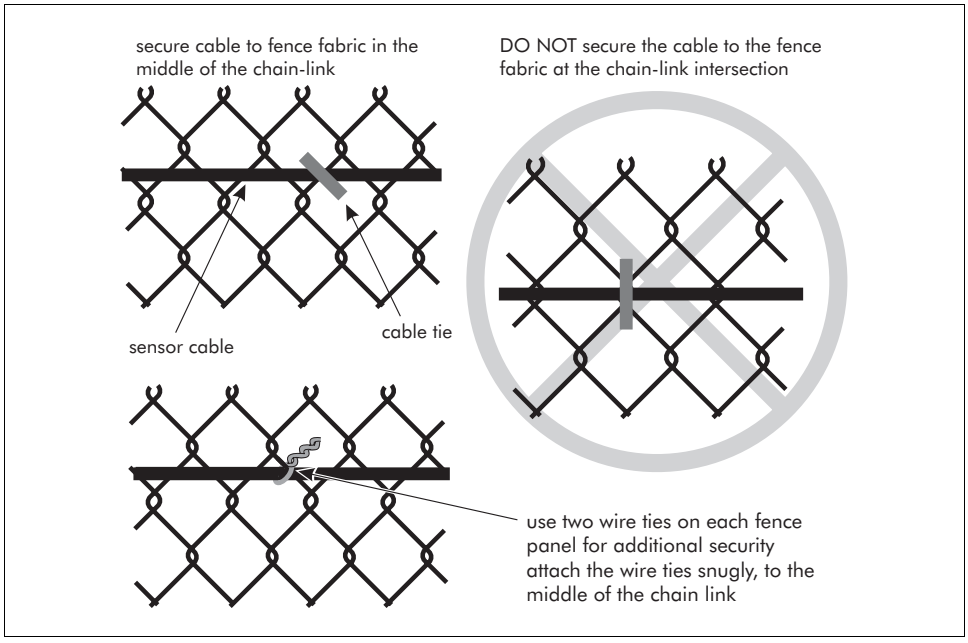


Figure 5-1 Securing cable to chain-link fence

- Secure the cable to the fence fabric at the midpoint of the chain-link. Space the cable ties every 25 to 30 cm (10 to 12 in.) along the sensor cable.

At fence posts

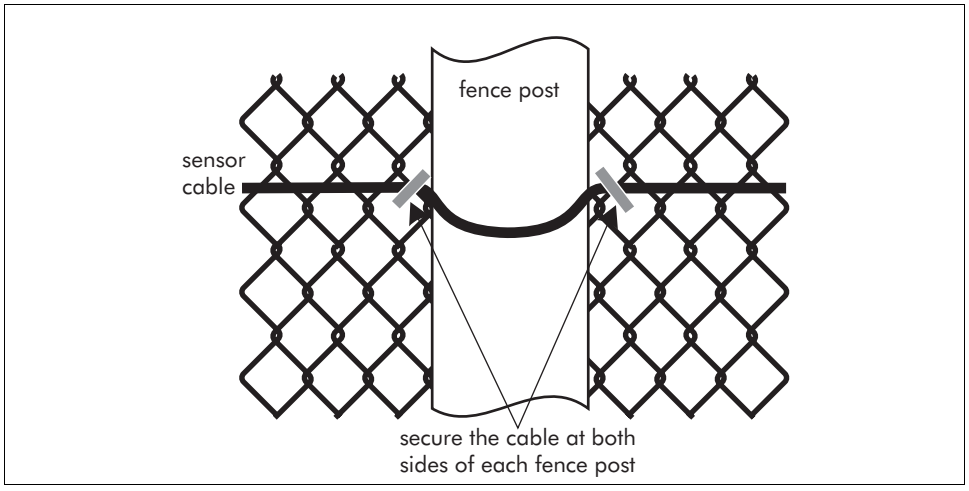


Figure 5-2 Cable at fence posts

- Secure the cable at both sides of the fence post so the cable is in contact with the post. The cable should have enough slack so that it is not stressed, but be tight enough so that it can not move.

Overlap

Wherever two Intelli-FLEX II zones meet, there should always be an overlap to prevent an area with reduced detection sensitivity. Overlap the sensor cables from the two zones by approximately 1.5 m (5 ft.).

An alarm originating in an overlap can be reported in both detection zones.

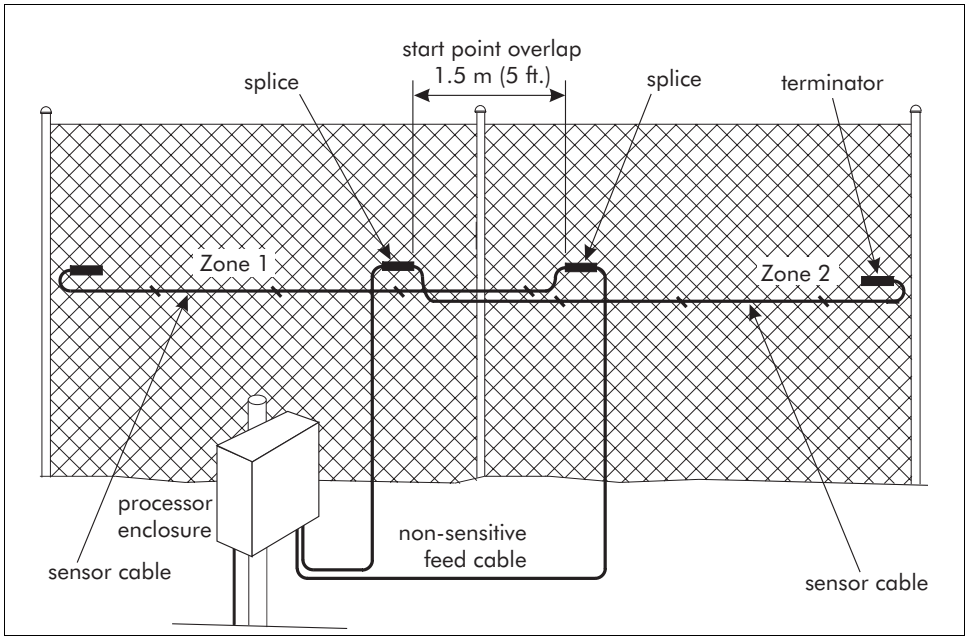


Figure 5-3 Start point overlap

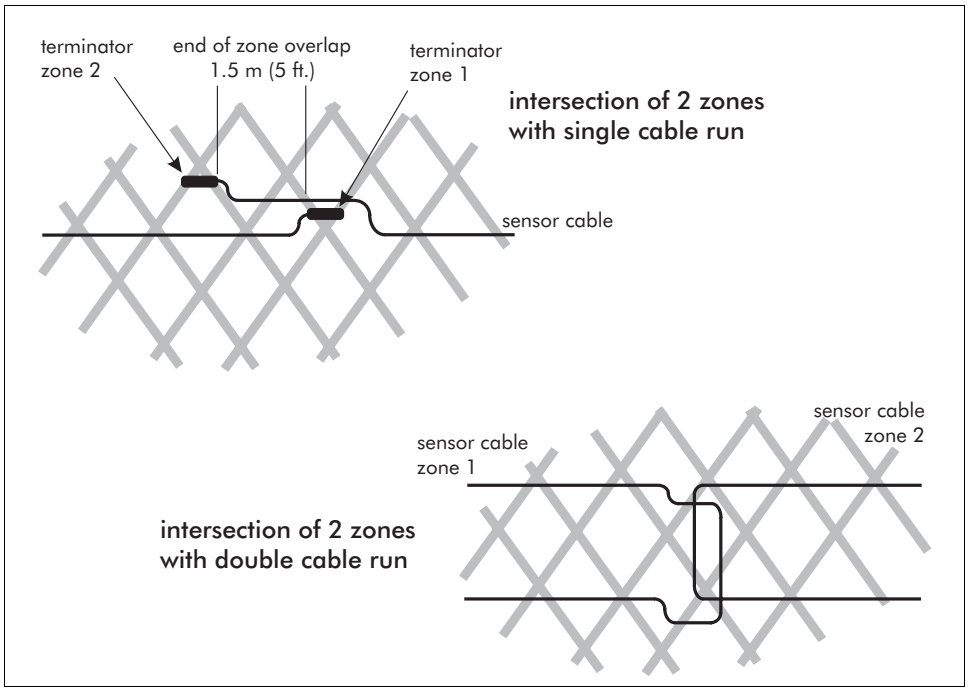


Figure 5-4 Adjacent zone overlap

Drip loop

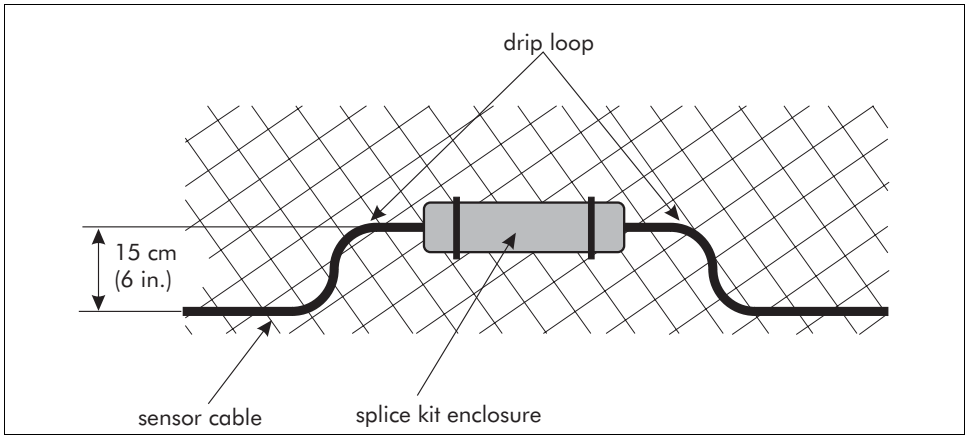


Figure 5-5 Drip loop

- Install a drip loop at every cable connector. Form the drip loop by raising the splice connector approximately 15 cm (6 in.) above the level of the cable run before securing it, horizontally, to the fence fabric.

Ground contour

- Secure the cable to the fence so that it follows the contour of the ground while it maintains a constant distance from the ground (i.e., if the fence steps up a hill, the cable should also step up the hill).

At corners or heavier gauge posts

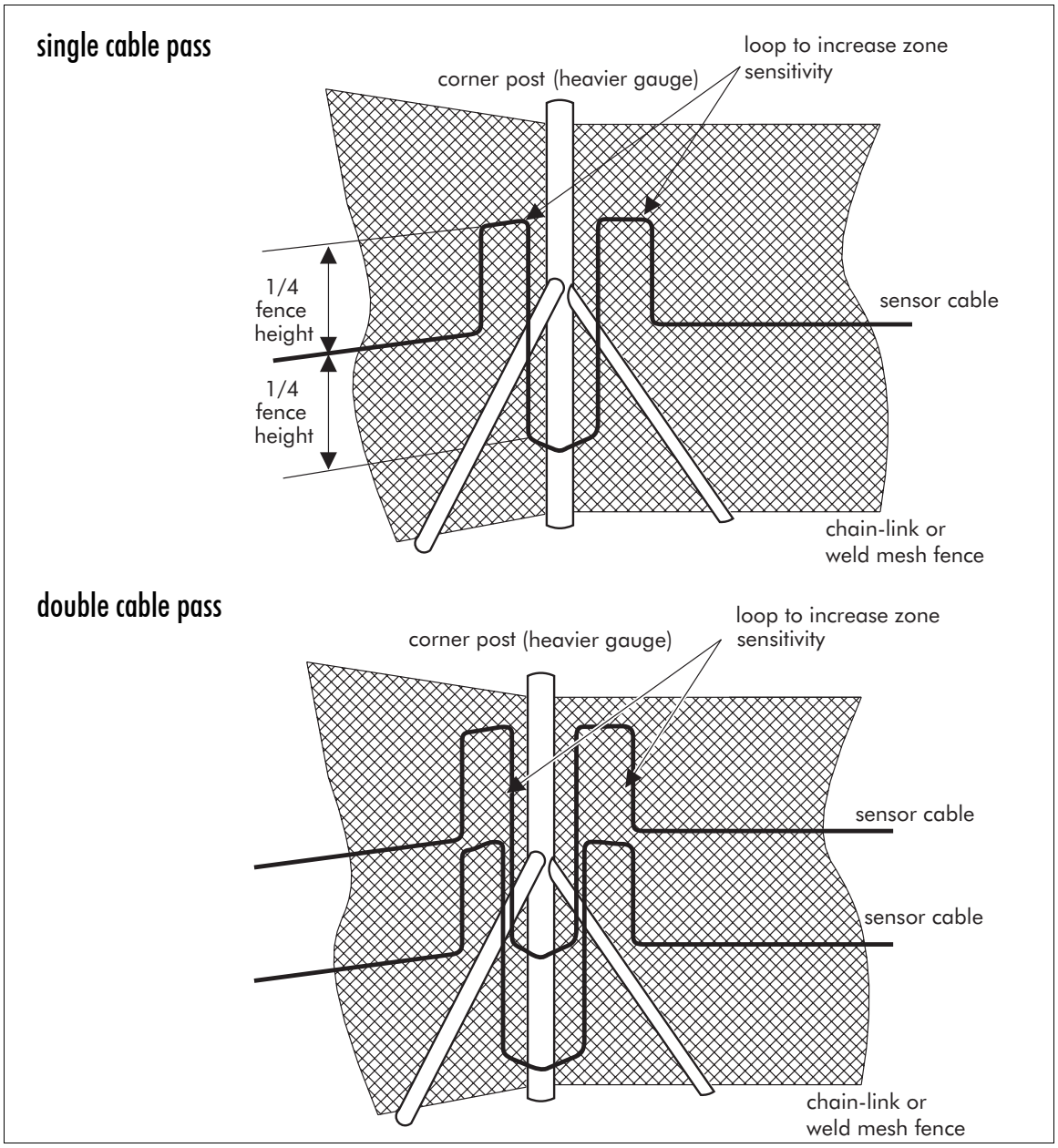


Figure 5-6 Sensor cable at corner and at heavier gauge posts

- Install a corner loop at all fence corners and at heavier gauge fence posts.

Corner loops may be required at all fence posts in a vinyl fence installation due to the insulating properties of the vinyl coating.

Service loops

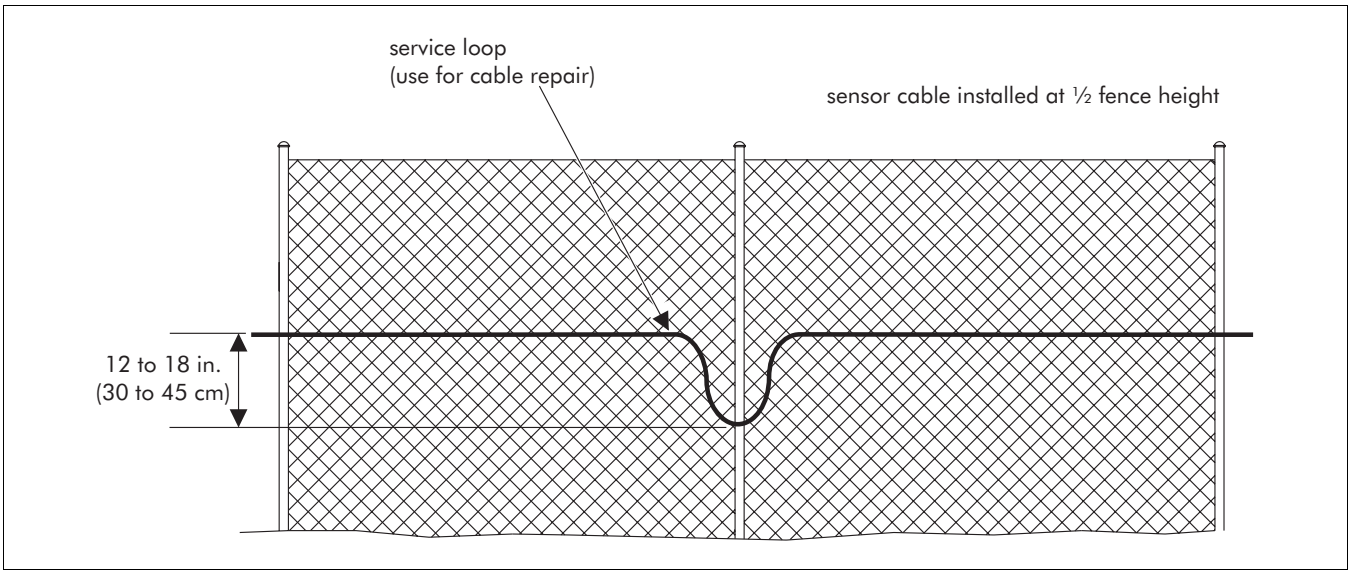


Figure 5-7 Single cable pass

- Install a U-shaped service loop approximately every 15 m (50 ft.) along the sensor cable run. The loop should measure approximately 30 to 45 cm (12 to 18 in.) from top to bottom. The recommended location for service loops is at fence posts. Fence posts are typically 3 m (10 ft.) apart.

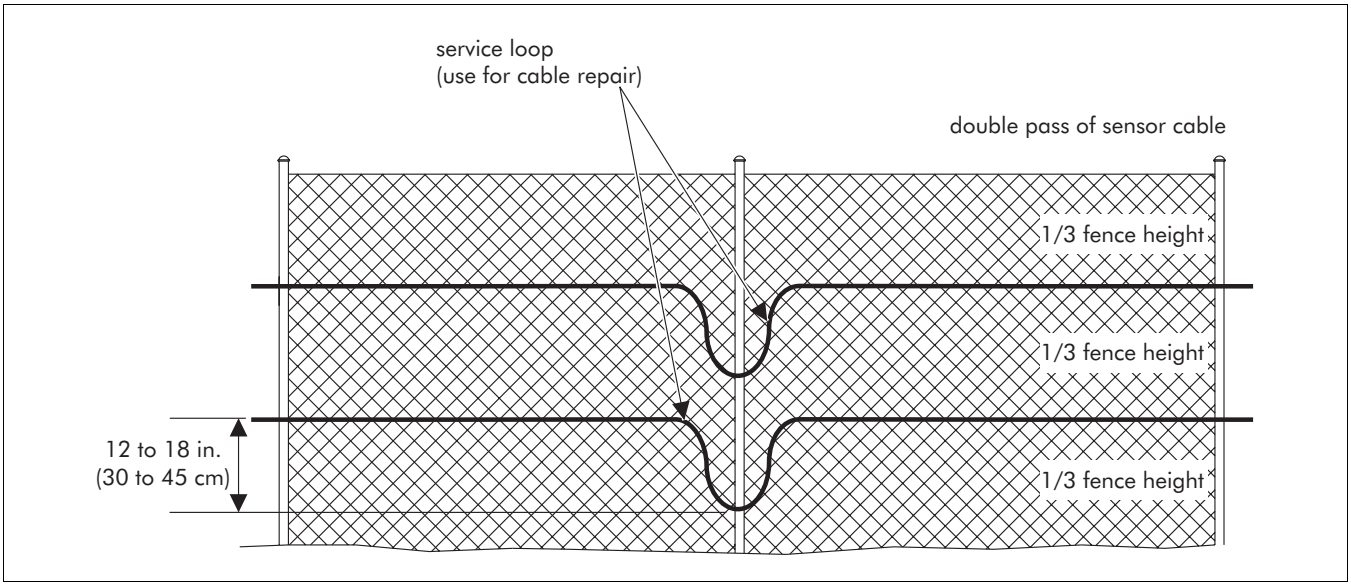


Figure 5-8 Double cable pass

Pointers

Keep the following in mind when handling the sensor cables:

- Handle the cable carefully. Sensor cable MUST not be jerked, stretched, knotted, kinked, nicked, or scraped.

- Do NOT subject the sensor cable to more than 4.5 kg (10 lbs) of tension at any time during the installation.
- Always apply consistent tension to the cable while it is being attached to the fence.
- Use UV resistant nylon cable ties to secure the cable to the fence fabric.
- Install the cable ties by hand, tightening them enough to hold the cable securely against the fence.

  Do not use mechanical devices to tighten the tie wraps.

- Attach the sensor cable to the midpoint of the chain link. Do not attach sensor cable to the intersecting points (where two fence wires intersect).
- Space the cable ties every 25 to 30 cm (10 to 12 in.) along the sensor cable.
- Do not attach the sensor cable to tension wires. Insufficient mechanical contact between these wires and the fence fabric may prevent the sensor cable from adequately detecting vibrations.
- Attach the sensor cable at least 30 cm (1 ft.) away from horizontal support bars and other cables.

For high security applications, or for additional security for all applications, Senstar recommends using two galvanized wire ties on each fence panel, in addition to the nylon cable ties. Twist the wire ties to hold the sensor cable snugly against the fence fabric, then flatten the twisted wire against the fence. Do not over-tighten the wire ties, or the sensor cable response may be affected.

Installation instructions

For fences other than chain-link or weld-mesh, refer to cable installation on different fence types.

The following procedure requires two people.

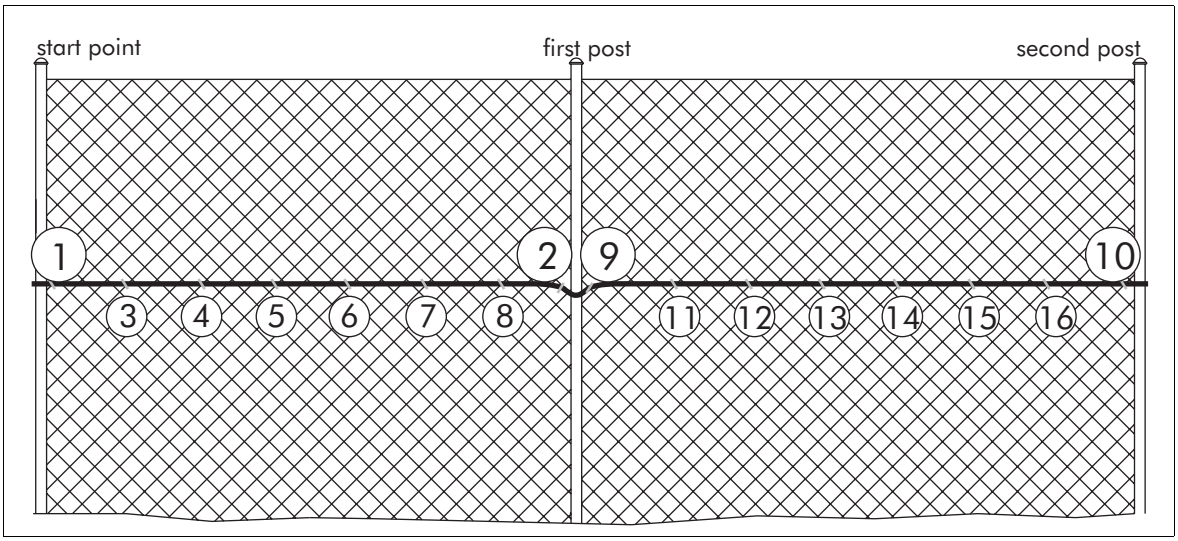


Figure 5-9 Installation procedure diagram

1. Carefully unspool the sensor cable alongside the intended installation location.

   Do not allow the sensor cable to fall off the spool, as it may twist and kink.

   Refer to instruction sheet 15 at the back of this manual for important installation information about cable stabilization.

2. Beginning at the start point of the zone, attach the sensor cable to the fence fabric (point 1). Leave enough extra sensor cable at this point to install a splice kit to connect the sensor cable to the lead-in cable (0.5 to 1 m {1.6 to 3.3 ft.}).

   Ensure that consistent tension is applied to the sensor cable, throughout the installation.

3. Have the second person apply 2.2 to 4.5 kg (5 to 10 lbs.) of tension to the sensor cable beyond the first post, while you attach the cable to the fence fabric adjacent to the first support post (point 2).
4. Return to the start point and install cable ties every 25 to 30 cm (10 to 12 in.) along the first fence panel (points 3 to 8).
5. Once the sensor cable is completely attached to the first fence panel, have the second person apply the same amount of tension to the sensor cable beyond the second post, while you attach the cable to the other side of the first support post (point 9).
6. Continue applying the tension to the sensor cable, while you attach the cable to the fence fabric adjacent to the second support post (point 10).

7. Return to the first support post and install cable ties every 25 to 30 cm (10 to 12 in.) along the second fence panel (points 11 to 16).
8. Repeat this procedure, one fence panel at a time, until the cable is fully installed in the zone.
9. Verify that the tension on the cable is consistent along the entire length. Loose sections of sensor cable can result in low detection sensitivity.

Cable installation on different fence types

The following section describes the installation requirements for specific fence types. Exceptions to these may occur if an unusual type of fence construction is encountered. Contact your Senstar representative.

On chain link fence

The following cable layouts are recommended, depending on fence height:

- for fences up to 2.5 meters (8 ft.) tall - a single pass of sensor cable
- for fences greater than 2.5 m and less than 4.5 m, and on vinyl coated fence - a double pass of sensor cable. The cable is installed at approximately 1/3 and 2/3 the height of the fence.
- for fences exceeding 4.5 m (15 ft.) in height - three or more passes of sensor cable This depends on fence fabric and structure, and on the level of security required by the system. These cable passes should be equally spaced.

If the chain link fence has been constructed with its lower edge placed in a concrete footing, detection will be poorer near the bottom than for a fence with a free lower edge. In such cases the processor gain and the signal threshold may require further adjustments.

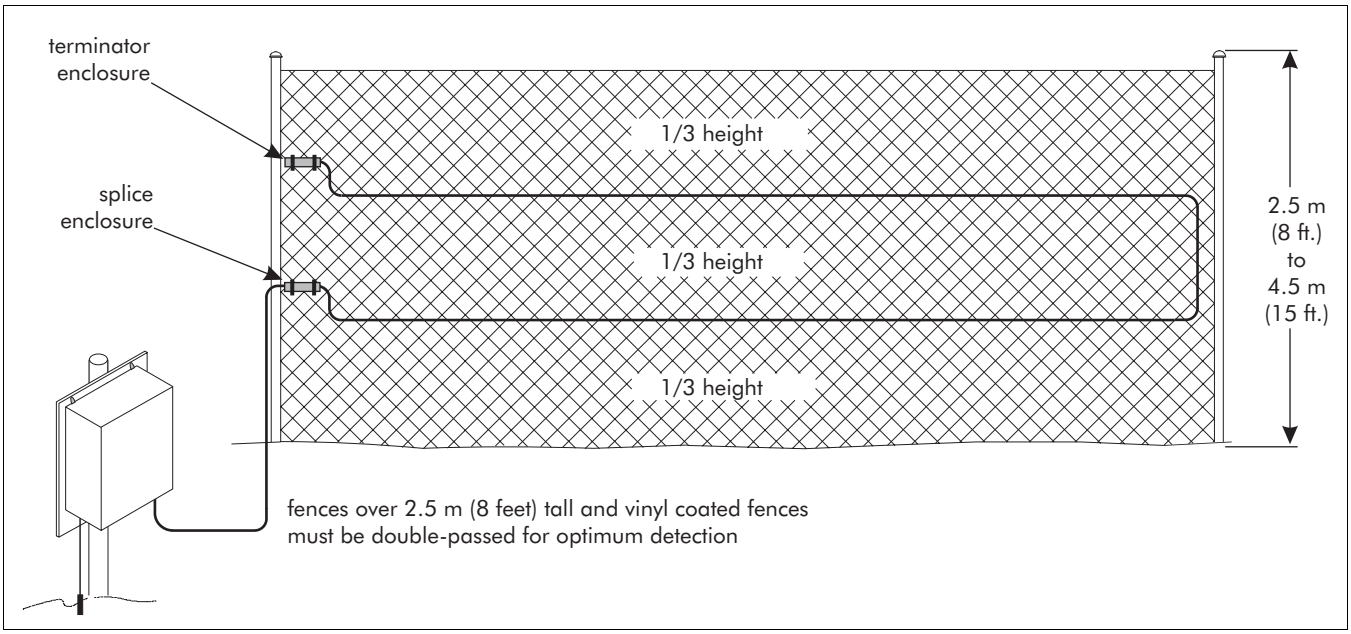


Figure 5-10 Cable layout on 2.5 to 4.5 m tall fence

On weld-mesh fence

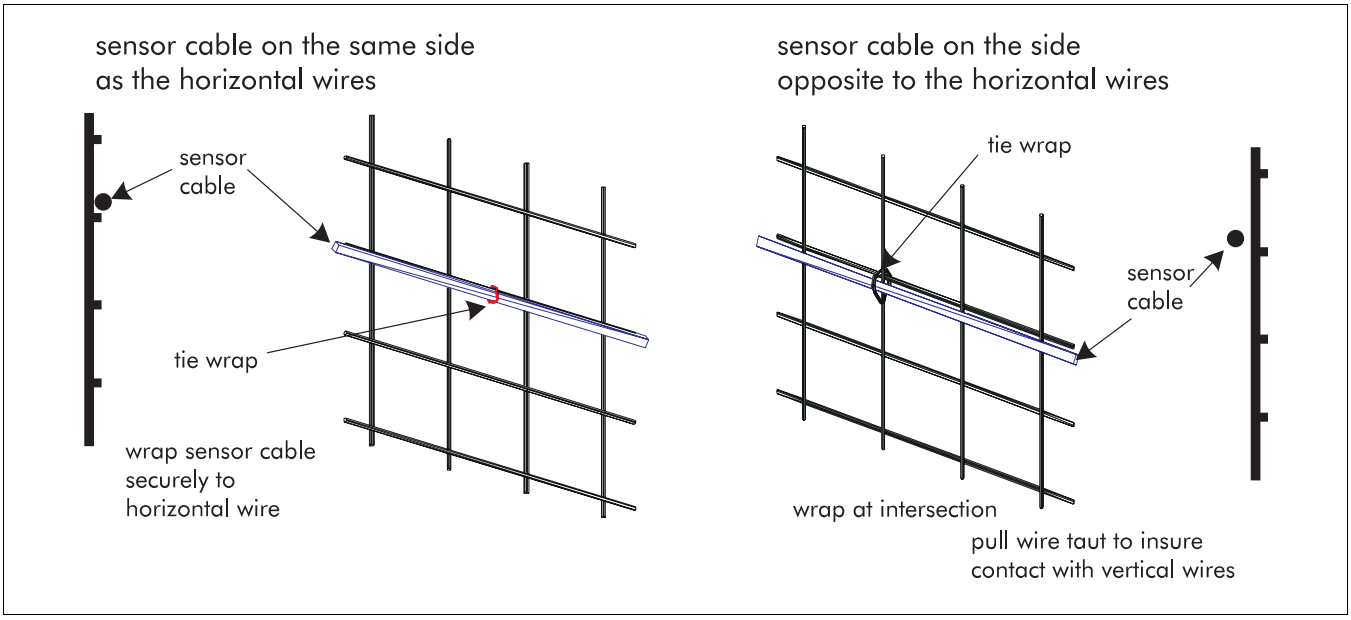


Figure 5-11 Weld-mesh fence

Installation of cable on weld-mesh fences is similar to cable installations on chain-link fences with the following specific instructions:

- Attach the sensor cable to the horizontal wires of the weld-mesh fence at the same distance above ground as for a chain-link fence of the comparable height.

- For sensor cable that is attached to the same side of the fence as the horizontal wires, the sensor cable should be placed directly below the horizontal wire and tie wrapped every 25 cm (10 in.) along the fence.
- For sensor cable that is attached to the opposite side of the fence - the vertical fence wires are on the same side as the sensor cable - the tie wraps should be placed at the intersection points of the weld-mesh wires every 25 cm (10 in.).

On Palisade fence

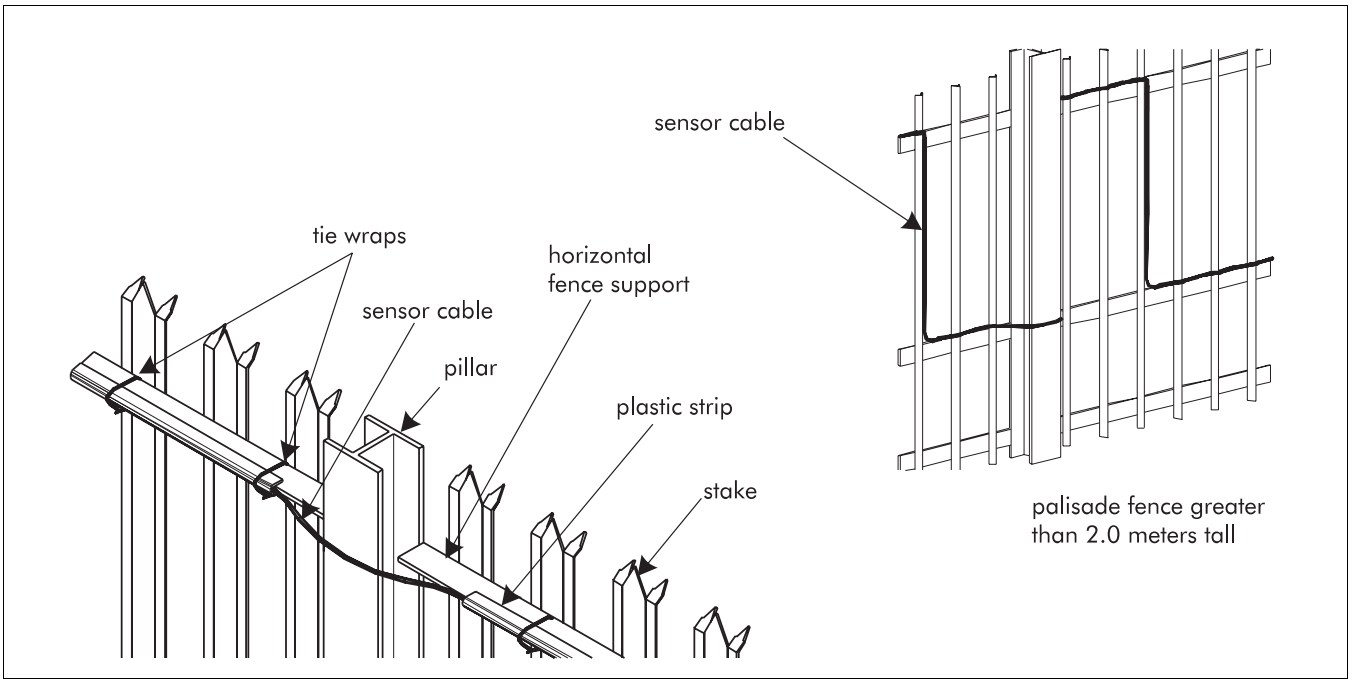


Figure 5-12 Palisade fence

Keep the following in mind when installing Intelli-FLEX sensor cable on a Palisade-style of fence:

- Along the flat sections of fence, insert the sensor cable in plastic strips or clips and fasten the strips to the upper horizontal fence support using tie wraps.
- Leave the cable exposed at the support pillars so that it can curve smoothly around the pillar and maintain maximum contact with the fence.
- On palisade fences greater than 2.0 meters in height, deploy the sensor cable in a square wave pattern with the top and bottom sections attached to the upper and middle support, respectively.
- Unlike chain-link or weld-mesh fences, palisade fences have a uniform construction along the entire fence line including the corners. Therefore, no special sensor cable deployment is required at corners.

- Due to the nature of the sensor cable deployment, it is difficult to deploy service loops on a palisade fence. It may be necessary to repair a damaged section of sensor by removing the damaged section, and splicing in a new section of cable.
- The tie wraps can be positioned along the horizontal rail so that they are behind the vertical metal stakes, out of view from the outside of the fence. This type of installation is more covert, and will prevent potential cable damage, or tampering.

On barbed wire fence

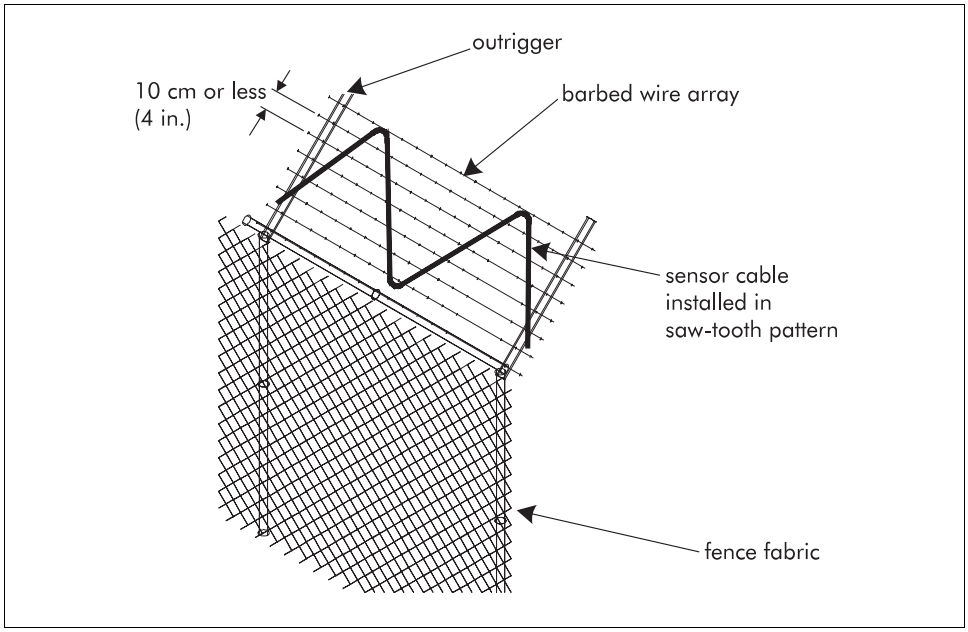


Figure 5-13 Sensor cable installed on barbed wire fence

Keep the following in mind when installing Intelli-FLEX II sensor cable on a barbed wire fence:

- Take care not to damage the sensor cable on the barbs during installation and to ensure that there is no possibility of subsequent damage from the barbs.
- Attach the sensor cable to the barbed wire using UV-resistant cable ties.
- If the barbed wire array contains three or more wires, attach the sensor cable to the top wire.
- If the wires in the array are less than 10 cm (4 in.) apart, attach the sensor cable to the array in a saw-tooth pattern.

Installation of cable at gates

Gates, including sally ports, require protection comparable to that provided on the fence. Since gates are usually constructed of the same material as the fence, the Intelli-FLEX II can be used to protect them. There are generally two types of gates, swinging and sliding. This section provides the installation details for various gate configurations.

Pointers

- Install the sensor cable on the side of the fence into which the gate panel opens.
- If the gate panel opens in the opposite direction be sure to leave enough slack in the sensor cable so that the gate can be opened in either direction without damaging the cable.
- Make sure that there is no loose sensor cable when the gate is closed.

Swinging gate bypass cable

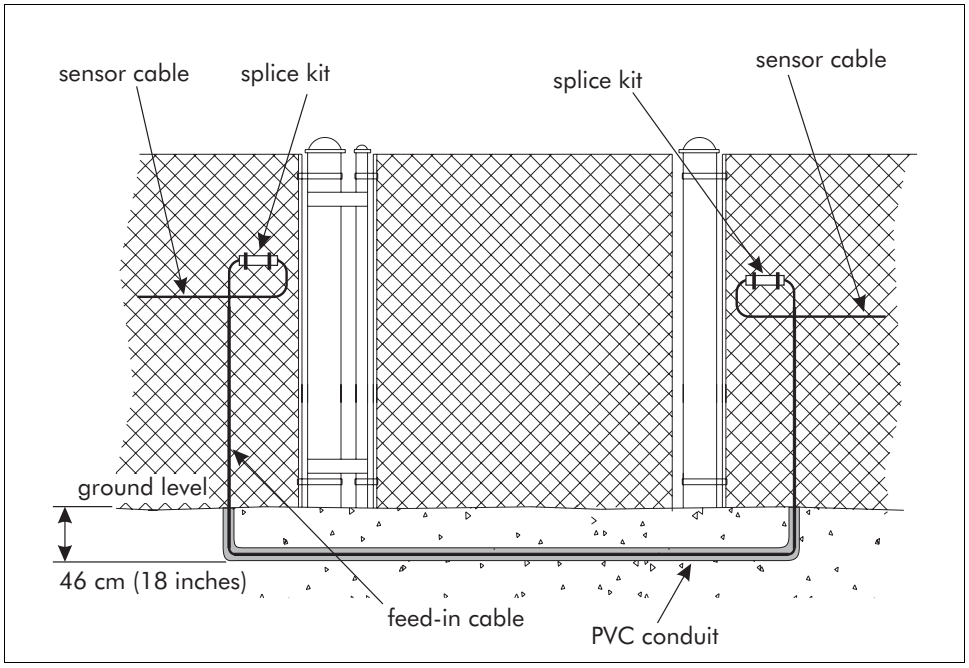


Figure 5-14 Swinging gate bypass

If a swinging gate is to be part of an Intelli-FLEX II zone, a non-sensitive, bypass cable must be run from one side of the gate to the other in order for the sensor cable to be usable on both sides of the gate. The bypass cable is a piece of non-sensitive feed cable that runs underground for the width of the gate. The bypass

cable length must be added to the total amount of non-sensitive feed cable used in the zone. This total length must not exceed that the non-sensitive feed cable lengths. See *Table 4-1, Non-sensitive feed cable lengths,* on page 4-12.

This bypass is used in all applications that use the gate bypass module.

Installation instructions

1. Install the sensor cable on the fence in the usual manner.
2. Cut the a piece of PVC conduit to the required length:

   Length of bypass cable = (width of gate + 2 X 25 cm [10 in.]) + (2 X 45 cm [18 in.])

3. Bury the conduit to a depth of 45 cm (18 in.)
4. Cut the required length of non-sensitive feed cable:

   Length of bypass cable = (width of gate + 2 X 25 cm [10 in.]) + (2 X mounting height of sensor cable) + (2 X 45 cm [18 in.])

5. Pull the bypass cable through the buried conduit.
6. Join the bypass cable to the sensor cable using the required junction devices. See "Cable devices" on page 34 for installation details.
7. Seal the ends of the conduit.

Swinging gate without cable protection

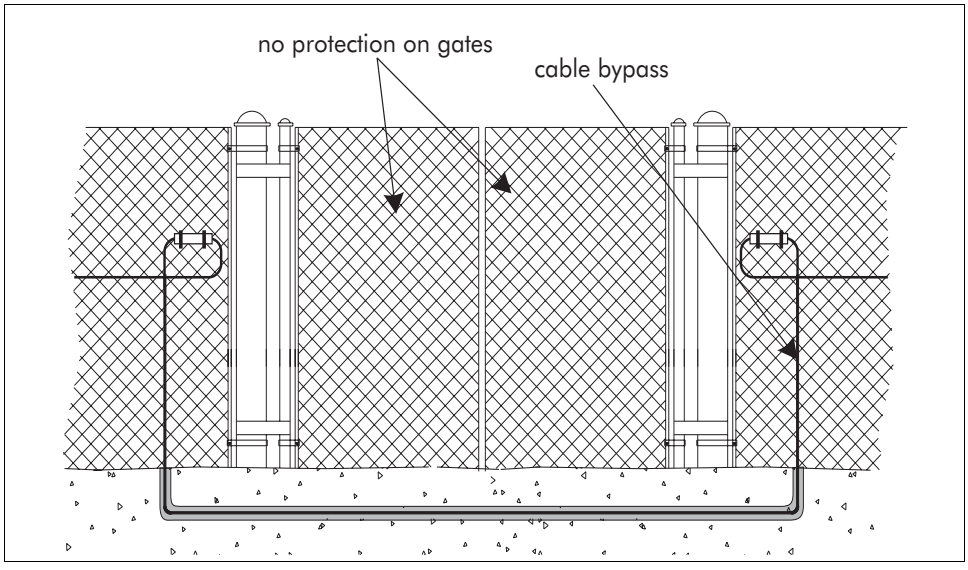


Figure 5-15 Swinging gate without protection

A swinging gate within an Intelli-FLEX II zone that does not require cable protection requires the installation of a bypass cable. See “Swinging gate bypass cable” on page 13 for installation instructions.

A microwave sensor is often used across these types of gates.

Swinging gate with cable protection

Gates that have occasional use, such as maintenance gates, are usually included in the Intelli-FLEX II zone. These gates can be protected by installing a loop of Intelli-FLEX sensor cable on the gate panel.

Installation on a single panel swinging gate

1. Run sensor cable to the hinge side of the gate.
2. Make a service loop that reaches the gate without binding the cable when the gate is fully opened in either direction.
3. Run the sensor cable around the perimeter of the gate panel, 30 cm (12 in.) in from the edges.
4. Run a bypass cable from one side of the gate to the other. See “Swinging gate bypass cable” on page 13 for installation instructions.

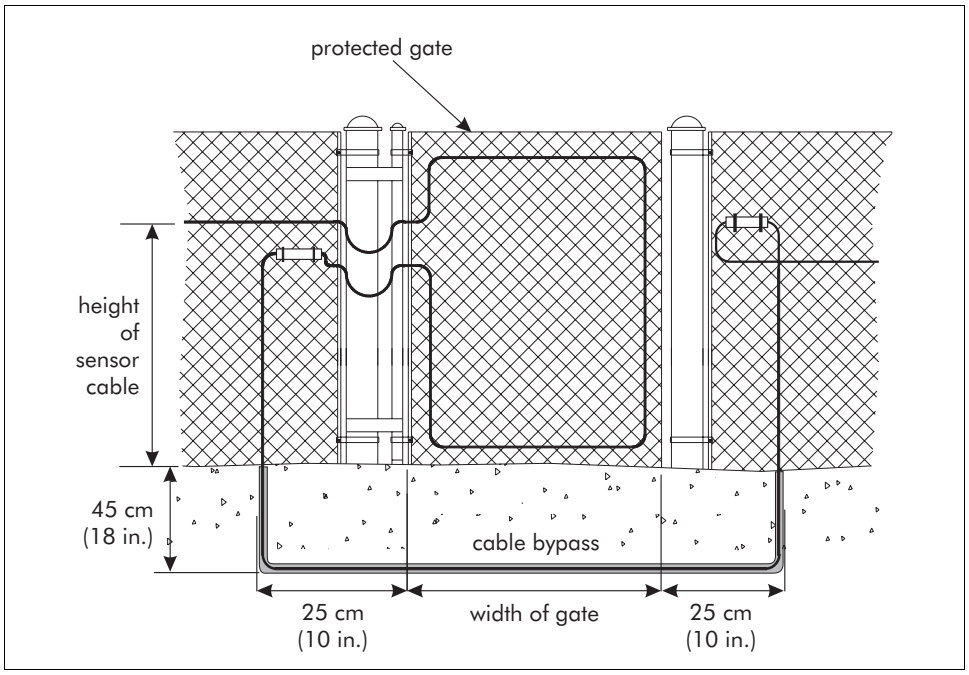


Figure 5-16 Single panel swinging gate

Installation at double panel swinging gate

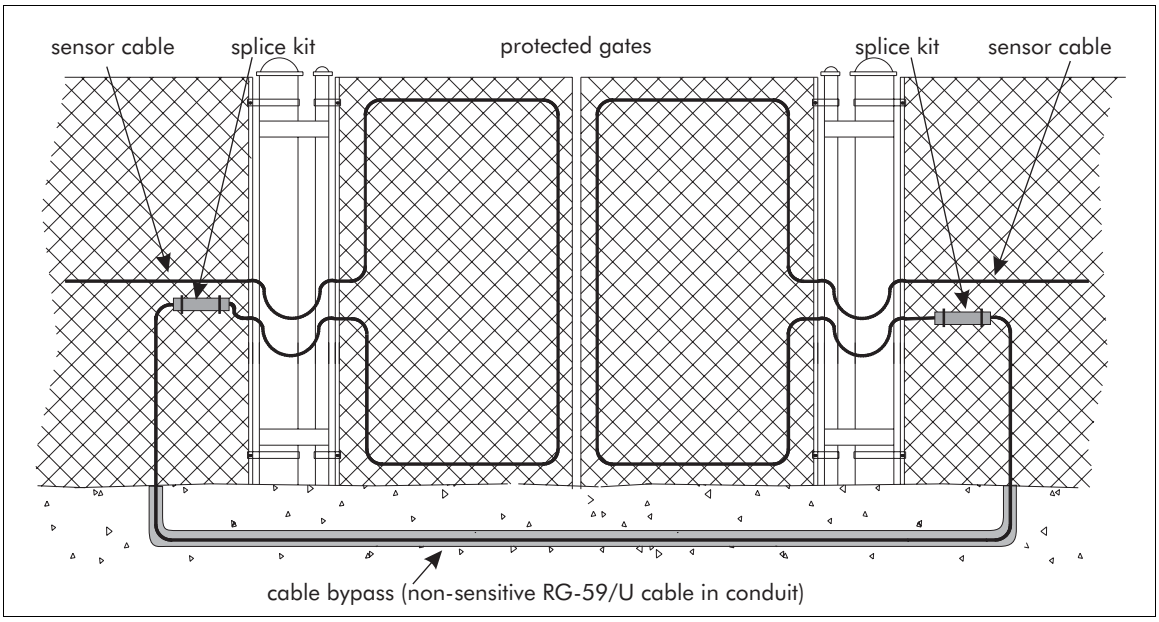


Figure 5-17 Double panel swinging gate

- For a double panel swinging gate install the sensor cable on each gate panel. See “Installation on a single panel swinging gate” on page 15.
- Run a bypass cable from one side of the gate to the other. See “Swinging gate bypass cable” on page 13.

Sliding gate with cable protection

Sliding gates can be included as part of the Intelli-FLEX II zone by installing sensor cable on the gate panel, and connecting it to the fence sensor cable with RG-59 cables.

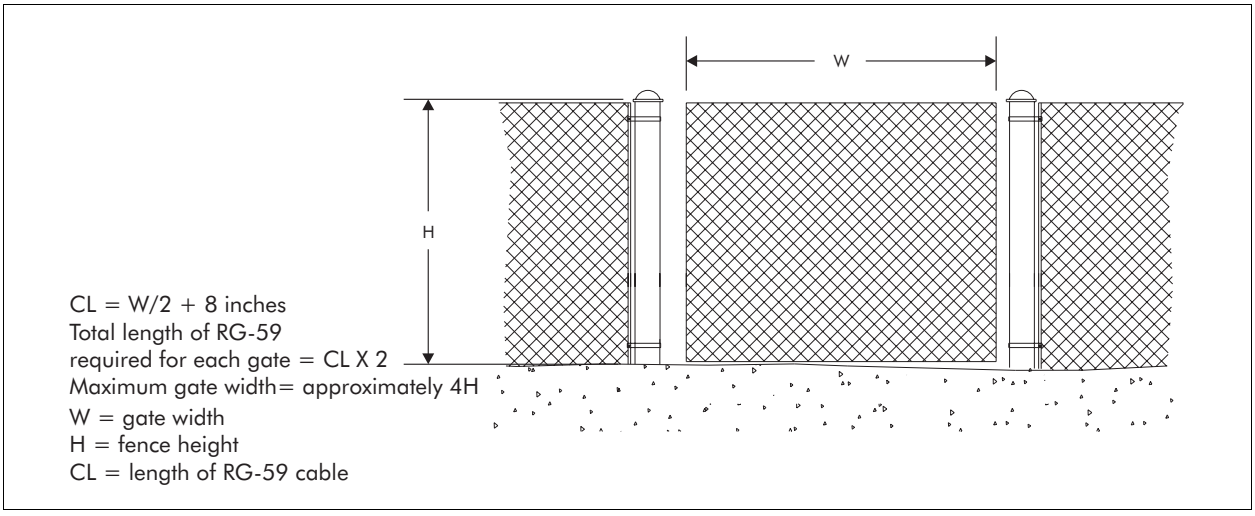


Figure 5-18 Determining RG-59 length requirements

To determine the amount of RG-59 required for the sliding gate installation refer to *Figure 5-18, Determining RG-59 length requirements,* on page 5-16.

In some instances, it may be necessary to install an L-bracket, as a cable guide bar, to prevent the coaxial cable from being jammed between the gate and the fence panel.

Single panel sliding gate on inside of perimeter

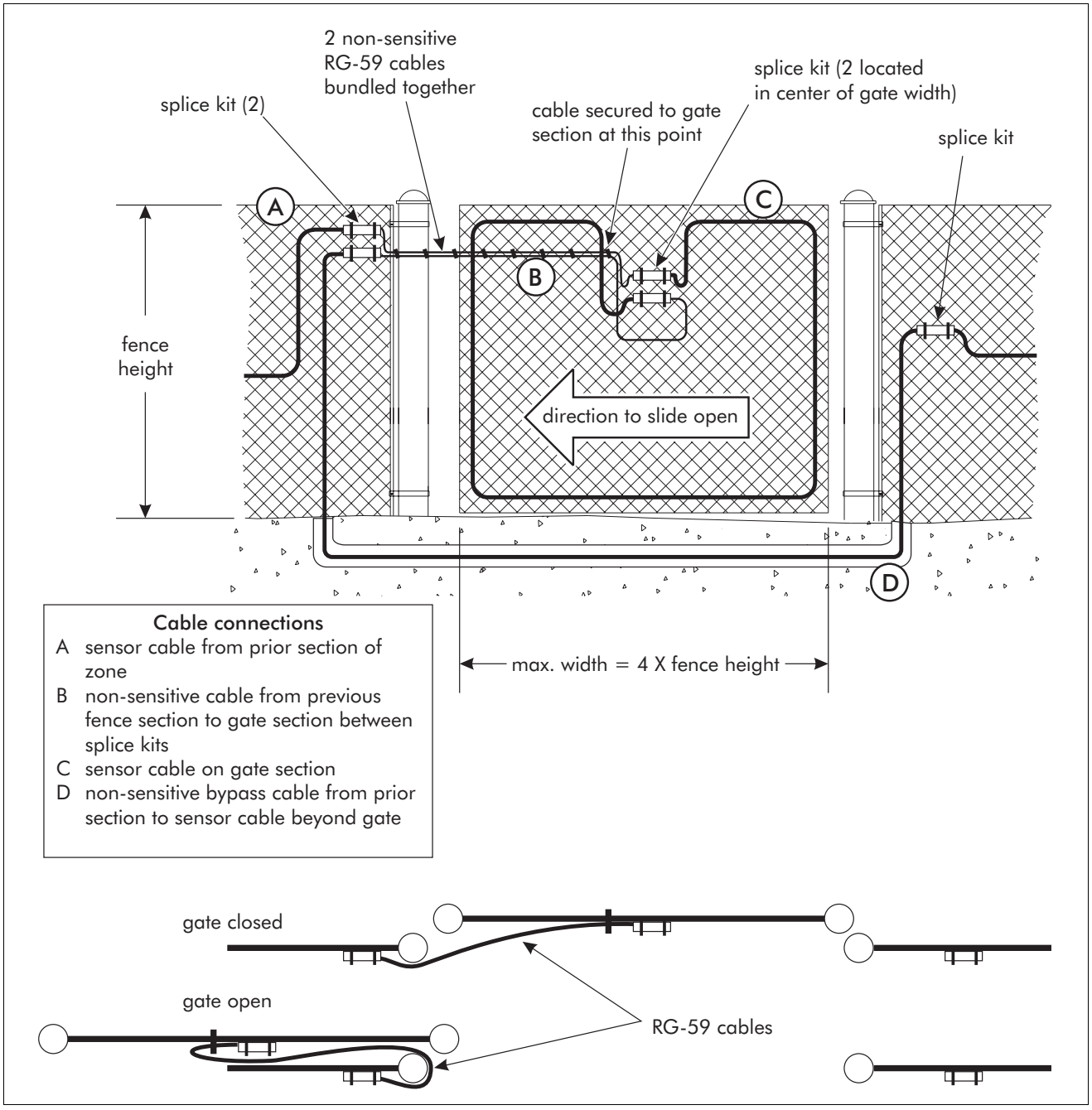


Figure 5-19 Single sliding gate on inside of perimeter

Materials

- 5 splice kits
- Cable ties (amount determined by gate size)
- non-sensitive RG - 59 cable (length determined by gate size)
- Sensor cable (length determined by gate size)

Installation at a single panel sliding gate on the inside of the perimeter

1. Run the sensor cable around the perimeter of the gate panel from top center to top center, with an overlap of 20 cm (8 in.).
2. Determine the length requirements for the RG-59 cable, see Figure 5-18.
3. Using cable ties, bundle two RG-59 cables together and secure the bundle to the gate at the location indicated in Figure 5-19.
4. Run a bypass cable from one side of the gate to the other. See “Swinging gate bypass cable” on page 13 for installation instructions.
5. Join the RG-59 cables to the sensor cables and bypass cable using splice kits.

Double panel sliding gate on inside of perimeter

Materials

- 8 splice kits
- Cable ties (amount determined by gate size)
- non-sensitive RG - 59 cable (length determined by gate size)
- Sensor cable (length determined by gate size)

Installation at a double panel sliding gate on the inside of the perimeter

1. Run the sensor cable around the perimeter of each gate panel from top center to top center, with an overlap of 20 cm (8 in.).
2. Determine the length requirements for the RG-59 cable, see Figure 5-18.
3. Using cable ties, bundle two RG-59 cables together and secure the bundle to one gate at the location indicated in Figure 5-20.
4. Repeat for the second gate.
5. Run a bypass cable from one side of the first gate to the far side of the second gate. See “Swinging gate bypass cable” on page 13 for installation instructions.
6. Join the RG-59 cables to the sensor cables and bypass cable using splice kits.

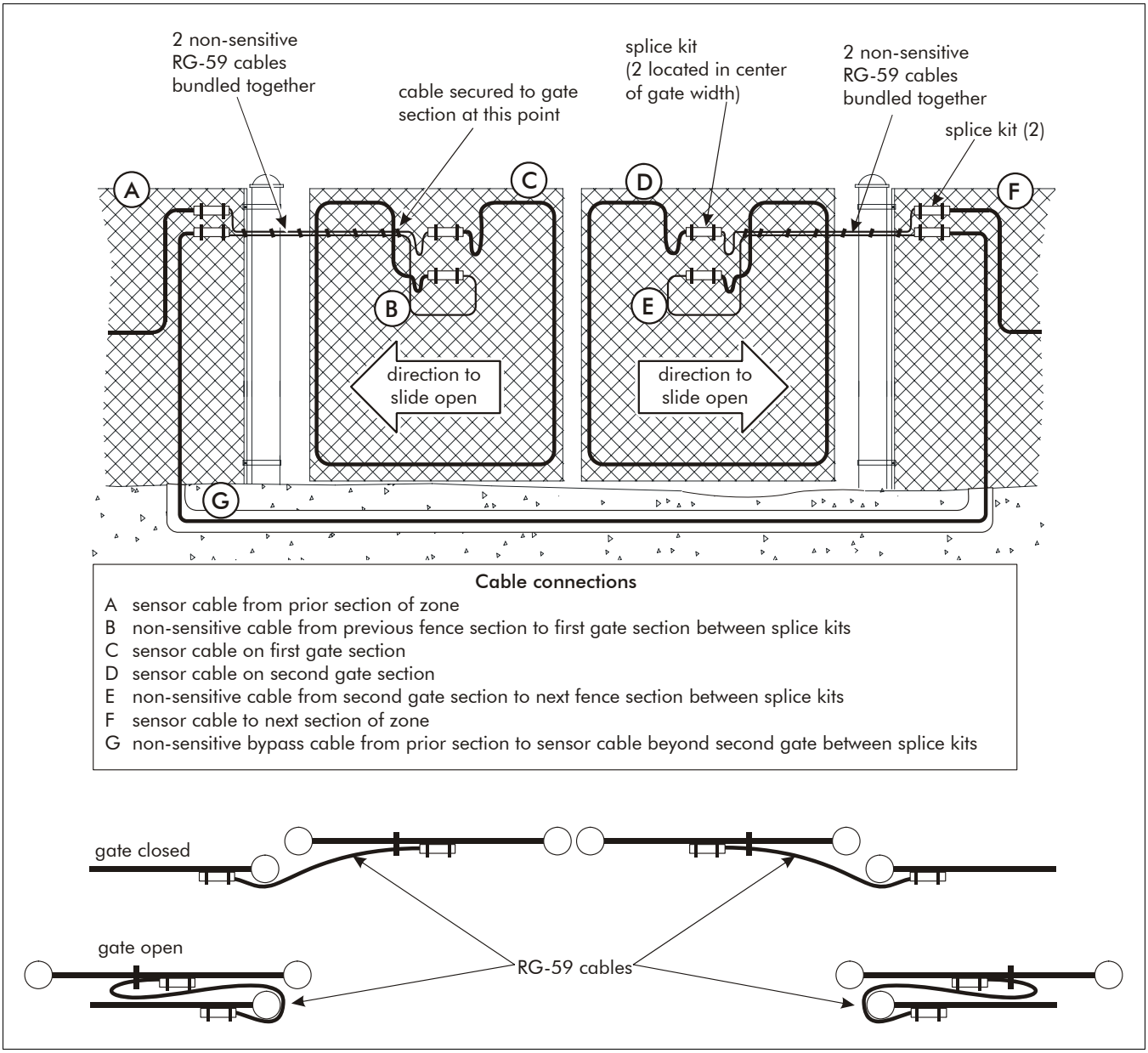


Figure 5-20 Double sliding gate on inside of perimeter

Single panel sliding gate on outside of perimeter

Materials

- 5 splice kits
- 1 cable guide bar (customer supplied)
- Cable ties (amount determined by gate size)
- non-sensitive RG - 59 cable (length determined by gate size)
- Sensor cable (length determined by gate size)

Installation at a single panel sliding gate on the outside of the perimeter

See "Installation at a single panel sliding gate on the inside of the perimeter" on page 18 with one exception. Make sure that the RG-59 cables are secured to the cable guide bar (L-bracket). This is to prevent the cables from becoming jammed between the gate and the fence when the gate is opened.

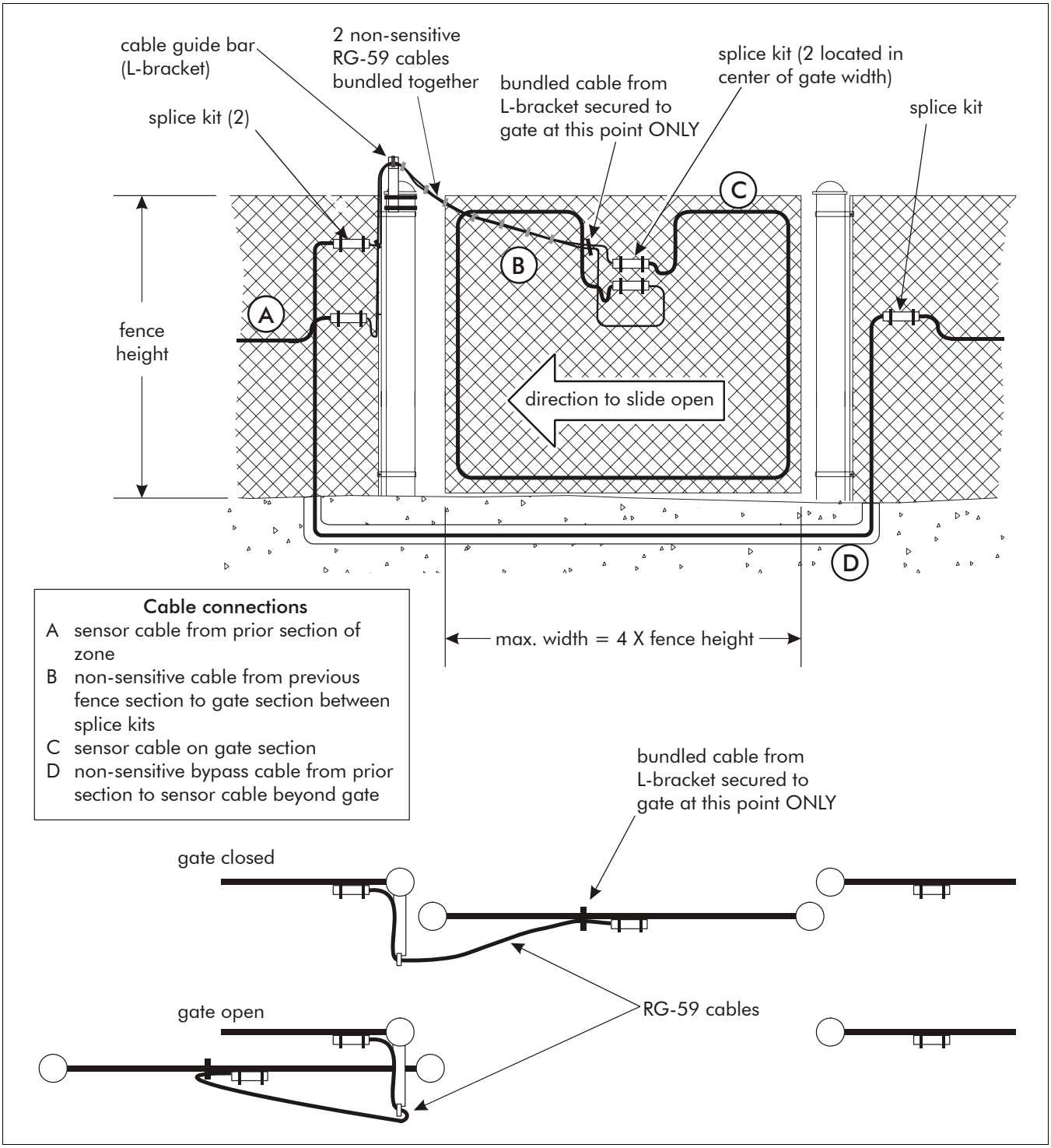


Figure 5-21 Single sliding gate on outside of perimeter

Sliding gates - sliding gate disconnect assembly

To provide security across a sliding gate that is NOT frequently used, and that is included in an Intelli-FLEX II zone, use the sliding gate disconnect assembly. With this device the gate may be left securely unattended, but the gate can be opened and closed by manually separating the connection to open the cable line. A supervision alarm is generated on each opening.

Materials

- 1 male connector with non-sensitive feed cable segment
- 1 female connector with non-sensitive feed cable segment
- 2 splice kits
- 1 Male connector cap
- 1 Female connector cap
- 1 Rubber boot cover for disconnect assembly

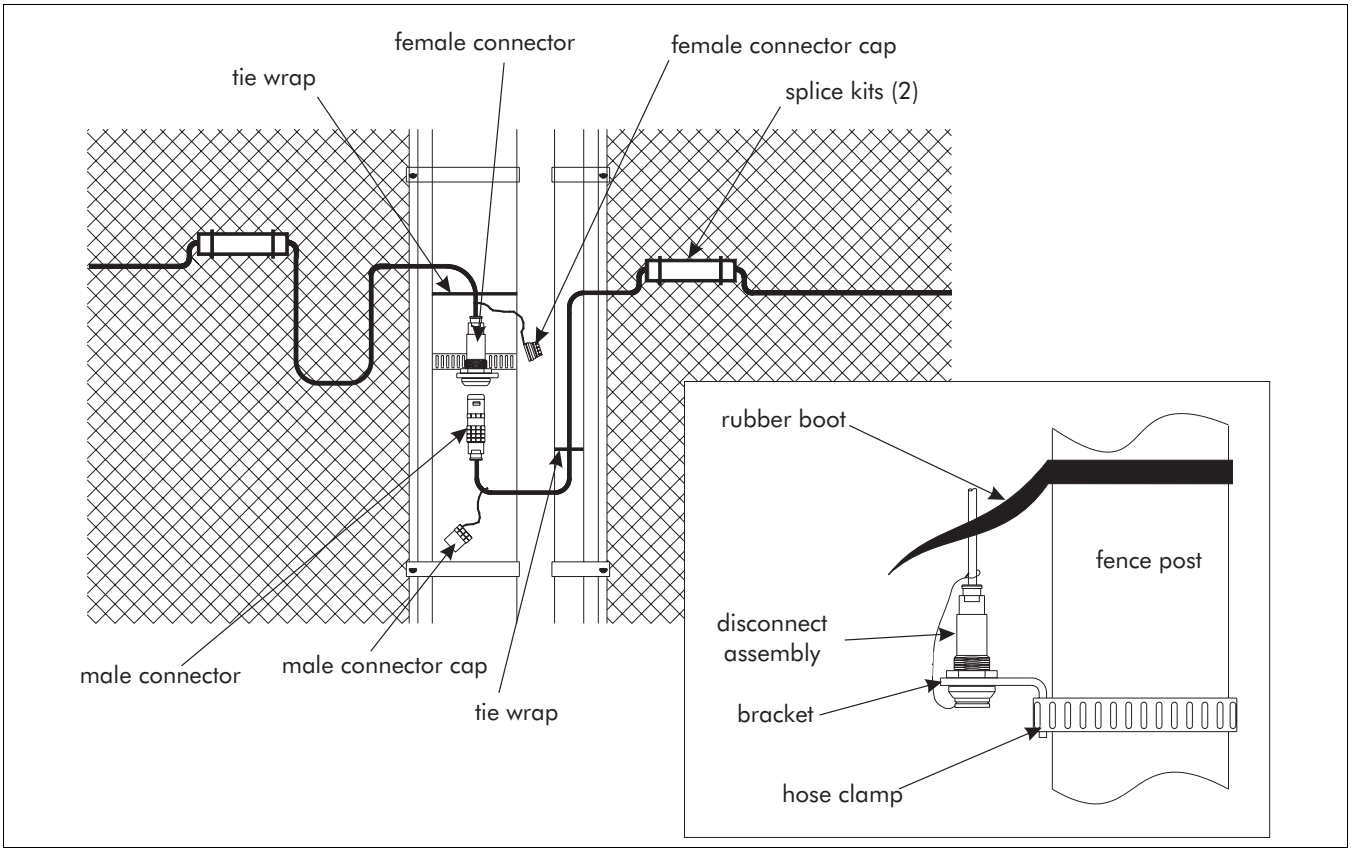


Figure 5-22 Sliding gate disconnect assembly

Installation instructions

1. Place the male cap stay wire over the open end of the non-sensitive feed cable on the male connector, put the cap in place, (on the connector) during installation to ensure proper placement.
2. Wrap a hose clamp (customer supplied) around the fixed post on the opening side of the fence on which the gate disconnect will be mounted.
3. Before tightening the clamp, position the L-shaped bracket under the clamp against the post.
4. Tighten the hose clamp until the entire assembly is firmly attached to the post.
5. Dress the non-sensitive feed cables to the splice kits with cable ties.

   Be sure to form a drip loop on the top wire, see Figure 5-22, Sliding gate disconnect assembly, on page 5-21.

6. Follow the directions for a standard splice. See "Splice kit" on page 34.

   When caps are not in use, they fit into one another for storage, and to protect from excess movement or moisture. The connectors should be capped when the gate is to remain open for extended periods.

7. Attach the rubber boot cover over the disconnect assembly.

Gate bypass module

The Intelli-FLEX II gate bypass module is used to bypass a protected gate without triggering an intrusion alarm.

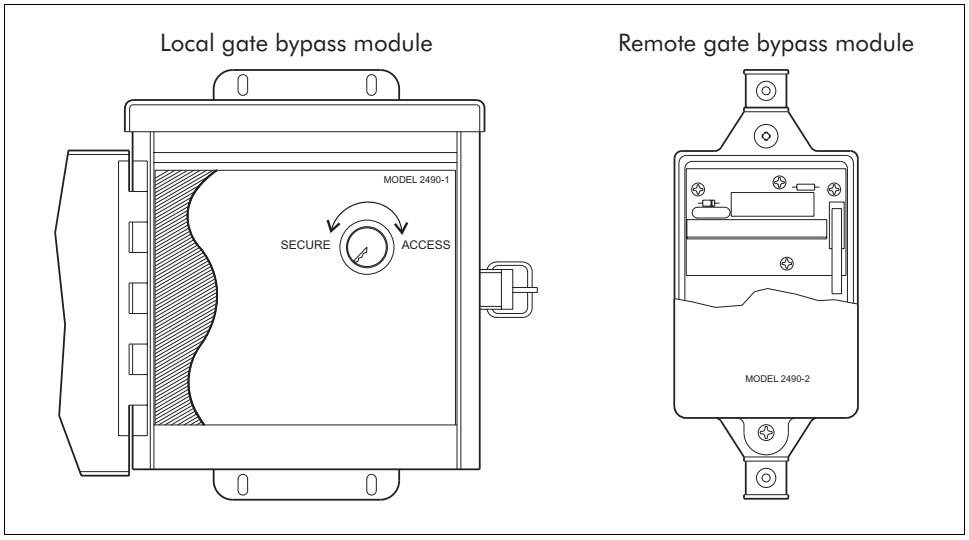


Figure 5-23 Gate bypass module

This section outlines the cable layout and wiring requirements for the gate bypass variations using the gate bypass module. Each variation has an illustration and a listing of the materials required, cable requirements, and wiring requirements.

Two types of the gate bypass module are available:

- Model 2490-1 - manual (or local) operation
- Model 2490-2 - remote operation

Both models will support the operation of the complete system with multiplexed annunciator equipment such as Senstar's StarNeT 1000 or Senstar 100.

General installation notes

- Refer to “Basic sensor cable installation” on page 2 for cable installation and “Swinging gate bypass cable” on page 13 for bypass cable installation.
- Install splice, termination and gate disconnect devices. Refer to “Splice kit” on page 34 for installation of splice connection devices. Refer to “Sliding gates - sliding gate disconnect assembly” on page 21 for installation of gate disconnect devices.
- Wire cables to gate bypass module according to the specific variation.

Local gate bypass module

Operation

When the key is in the access position:

- The sensor cable is shunted around the gate or terminated at the gate, depending on the particular configuration.
- The status contacts close giving a signal to an annunciation device.

If the faceplate assembly is removed from the bypass module housing, a tamper switch will open, supporting an indication, when wired appropriately, to an annunciation device.

Interface

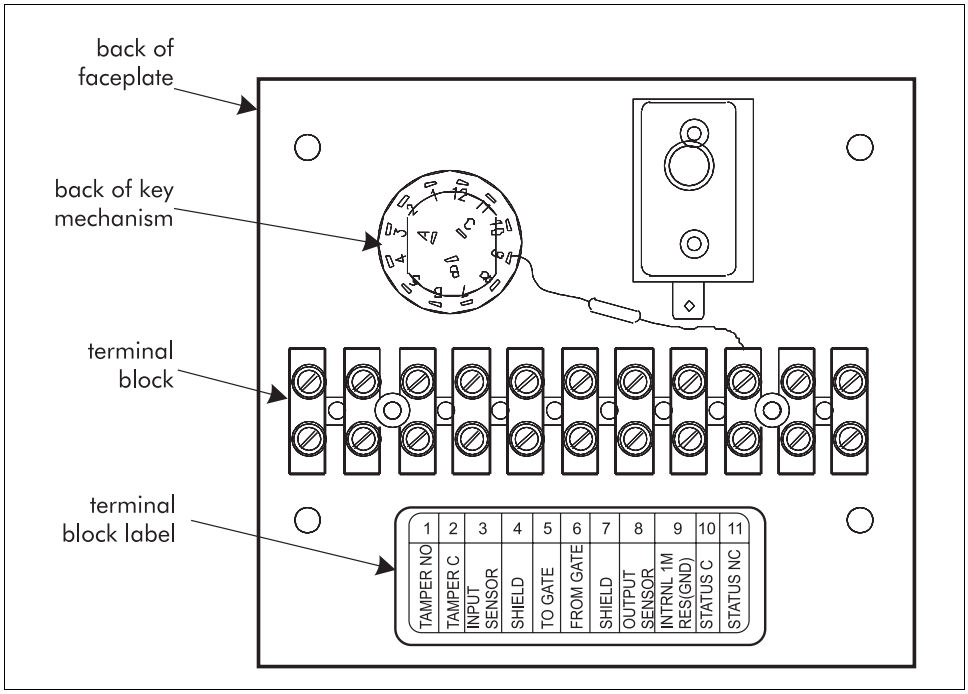


Figure 5-24 Local gate bypass module terminal block

The terminal block is an 11-position, stripped bare-wire, screw-clamp, style device. The connections to the annunciation device are consistent regardless of bypass configuration on the gate or fence. These connections are typically fed through conduit, off the fence, underground, to the transponder housing for interface to the annunciator, or to the local key box mounted for convenient access from vehicles, or the walkway.

Connection details are given for each situation in the following sections.

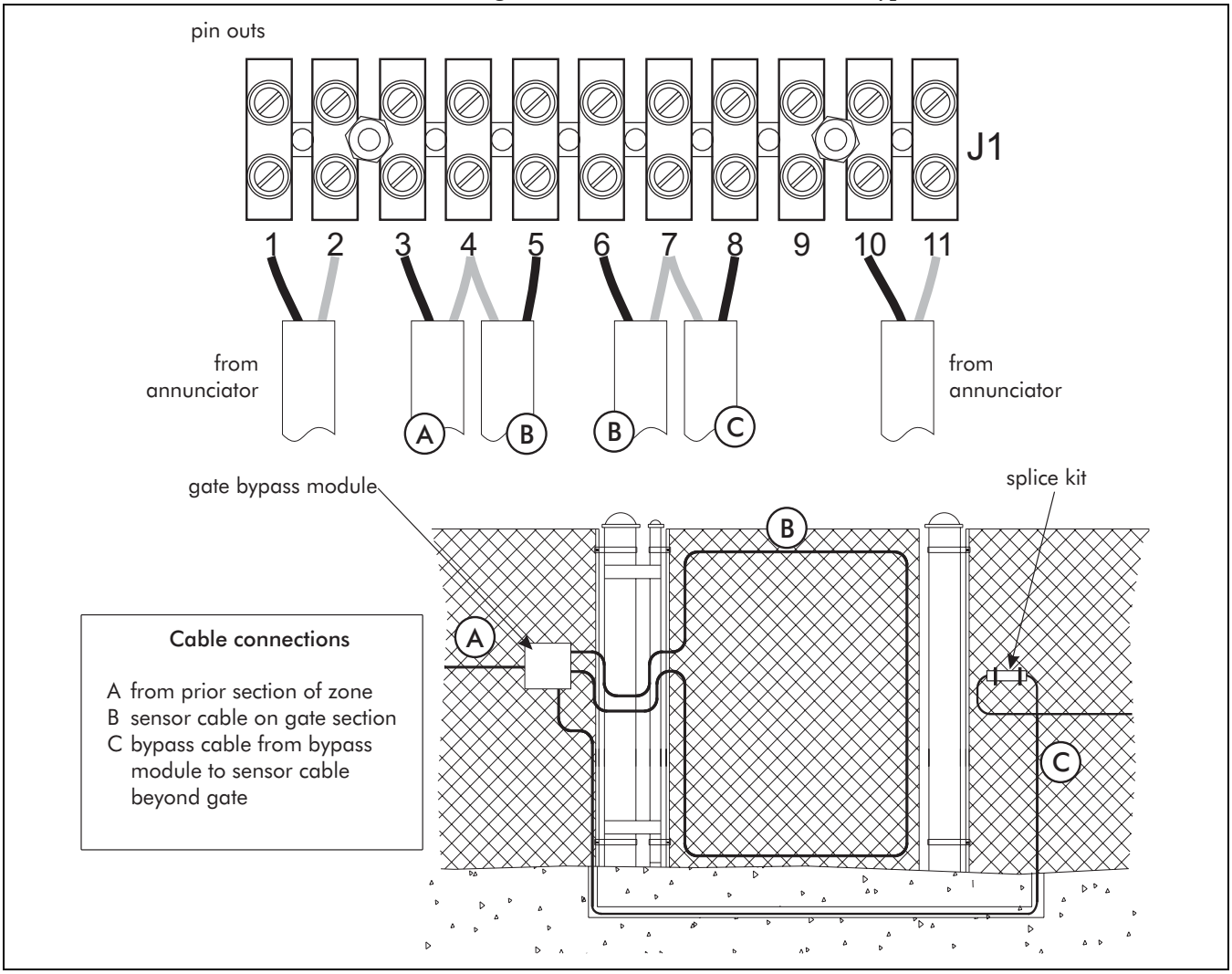
Single panel swinging gate

Materials required

1 - Model 2490-1 Gate bypass module

1 - cable splice kit

1 length of non-sensitive feed cable for bypass



Pin #	cable description	Pin #	cable description
1	from annunciator - tamper status - N/O (closed when faceplate assembly is in place)	6	center conductor of return from gate or bypassed section
2	from annunciator - tamper status - common	7	tie point for coax shield
3	center conductor from prior section of the zone	8	center conductor to continuing section of sensor
4	tie point for coax shield	9	not used
5	center conductor of cable to the gate or bypassed section	10	from annunciator - bypass status - common
		11	from annunciator - bypass status - N/C

Figure 5-25 Single panel swinging gate

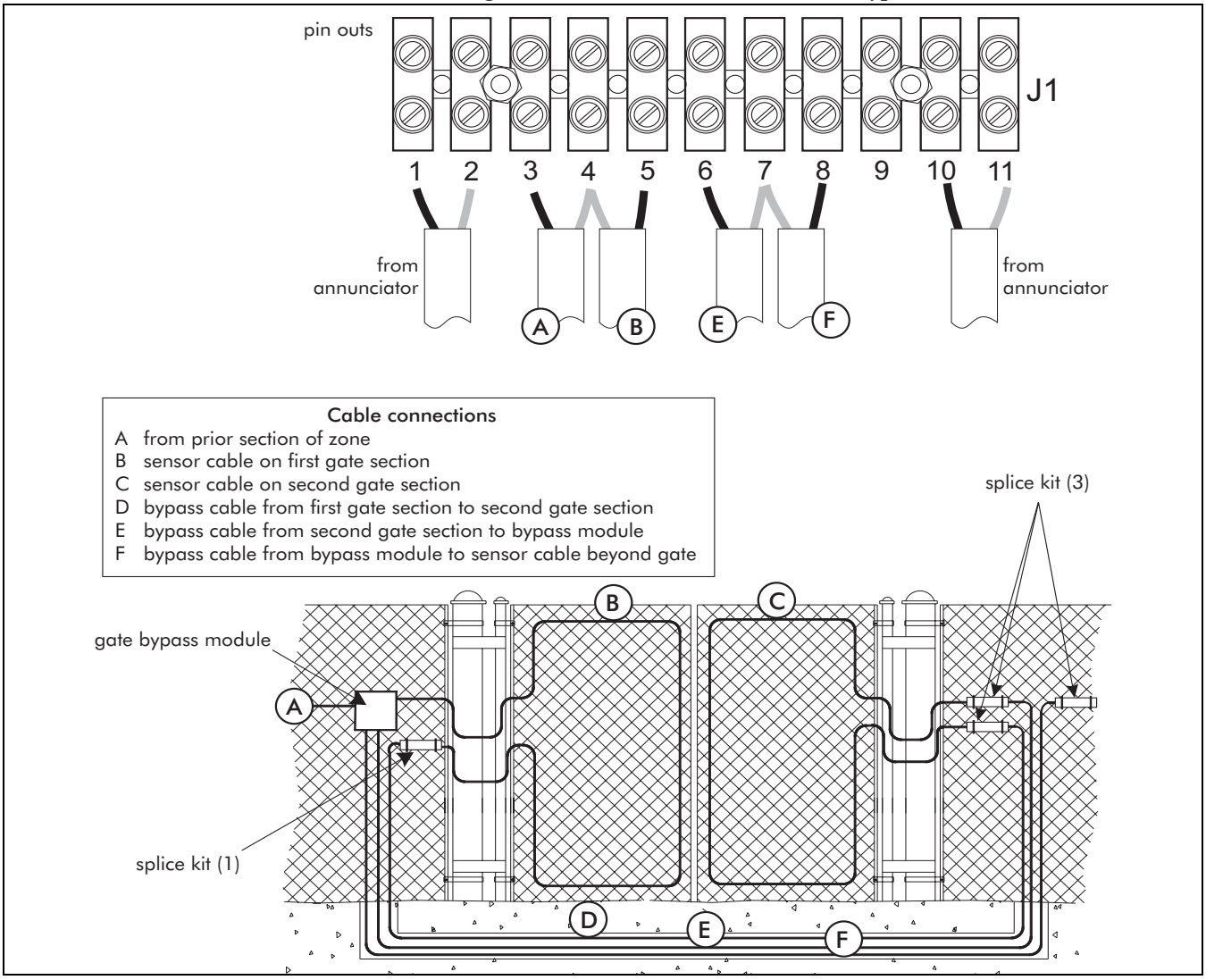
Double panel swinging gate

Materials required

1 - Model 2490-1 Gate bypass module

4 - cable splice kits

3 lengths of non-sensitive feed cable for bypass



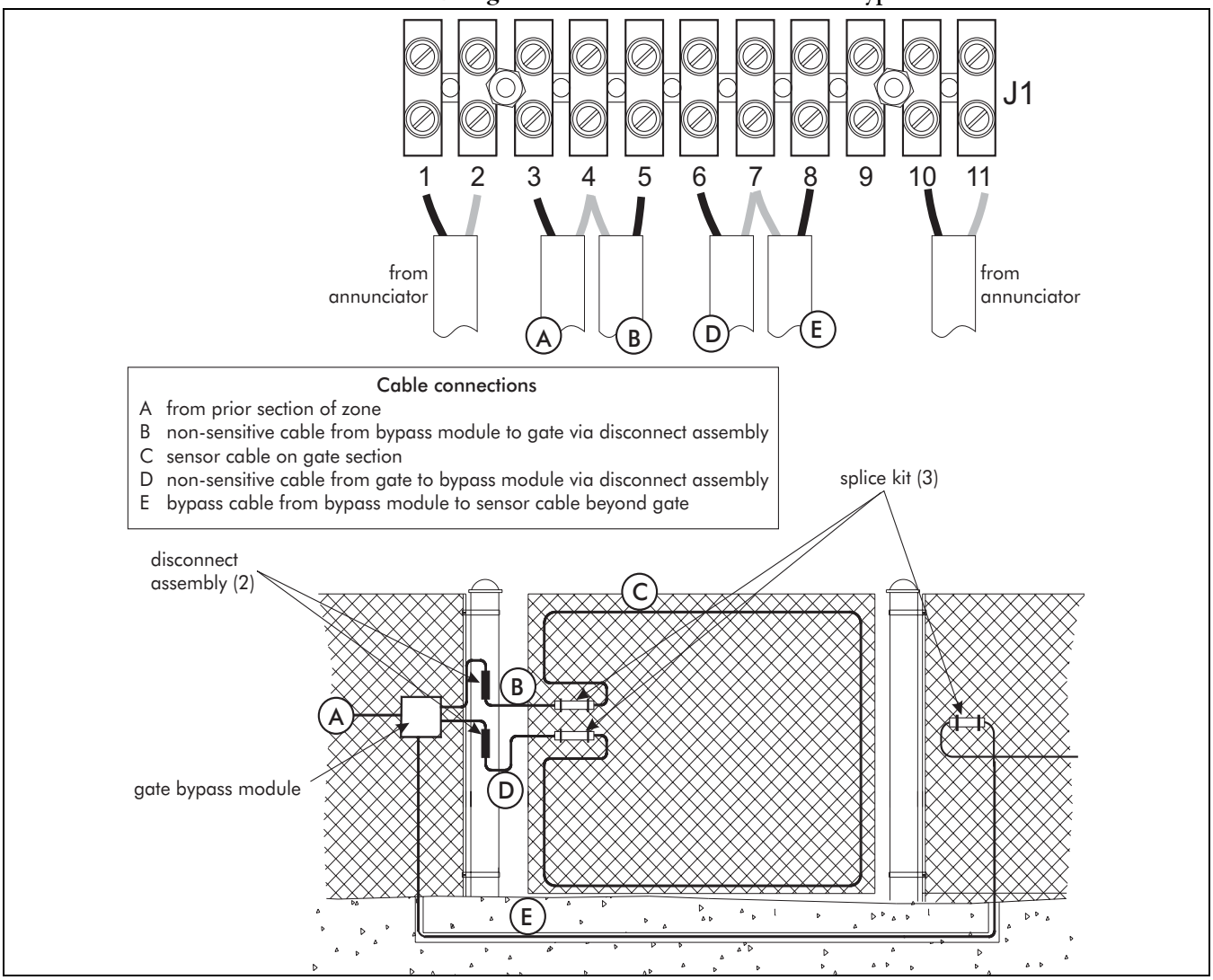
Pin #	cable description	Pin #	cable description
1	from annunciator - tamper status - N/O (closed when faceplate assembly is in place)	6	center conductor of return from second gate panel
2	from annunciator - tamper status - common	7	tie point for coax shield
3	center conductor from prior section of the zone	8	center conductor to continuing section of sensor beyond the gate
4	tie point for coax shield	9	not used
5	center conductor of cable to the first gate panel	10	from annunciator - bypass status - common
		11	from annunciator - bypass status - N/C

Figure 5-26 Double panel swinging gate

Sliding gate

Materials required

1 - Model 2490-1 Gate bypass module
2 - sliding gate disconnects
3 - cable splice kits
1 length of non-sensitive feed cable for bypass



Pin #	cable description	Pin #	cable description
1	from annunciator - tamper status - N/O (closed when faceplate assembly is in place)	6	center conductor of return from gate or bypassed section
2	from annunciator - tamper status - common	7	tie point for coax shield
3	center conductor from prior section of the zone	8	center conductor to continuing section of sensor
4	tie point for coax shield	9	not used
5	center conductor of cable to the gate or bypassed section	10	from annunciator - bypass status - common
		11	from annunciator - bypass status - N/C

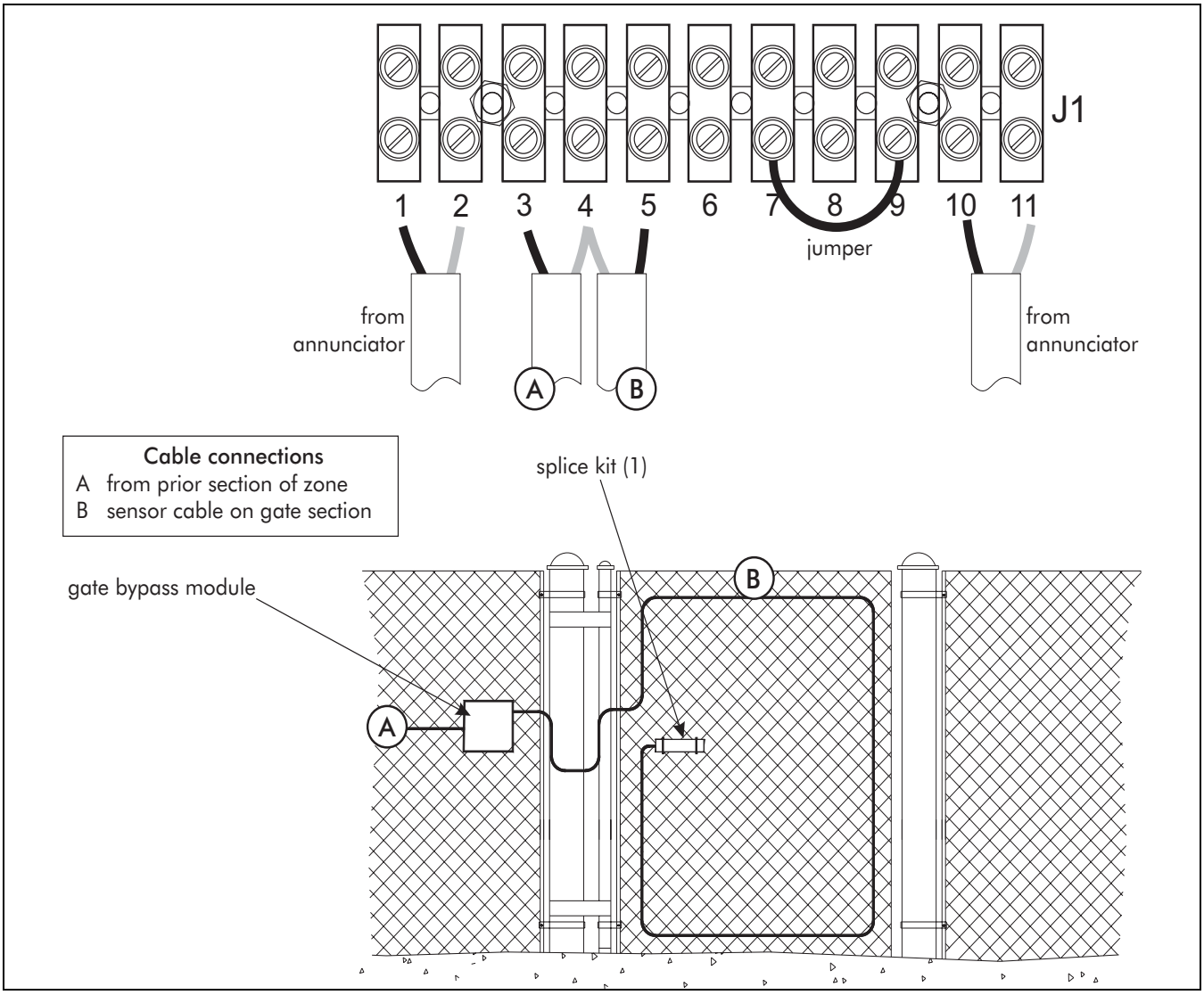
Figure 5-27 Sliding gate

End of zone

Materials required

1 - Model 2490-1 Gate bypass module

1 - cable termination kit



Pin #	cable description	Pin #	cable description
1	from annunciator - tamper status - N/O (closed when faceplate assembly is in place)	7	shield/ground
2	from annunciator - tamper status - common	8	not used
3	center conductor from prior section of the zone	9	internal 1MΩ resistor
4	tie point for coax shield	10	from annunciator - bypass status - common
5	center conductor of cable to the gate or ending sensor section	11	from annunciator - bypass status - N/C
6	not used		

Figure 5-28 End of zone

Model 2490-2 - Remote gate bypass module

Operation

Remote operation from the monitor and control system requires a 12 VDC input to energize the bypass relay, provided by the control system. When the relay is energized the sensor cable is shunted around the gate or terminated at the gate, depending on the particular configuration; and the status contacts close giving a signal to an annunciation device.

If the cover is removed from the bypass housing, a tamper switch will open, supporting an indication, when wired appropriately, to an annunciation device.

Interface

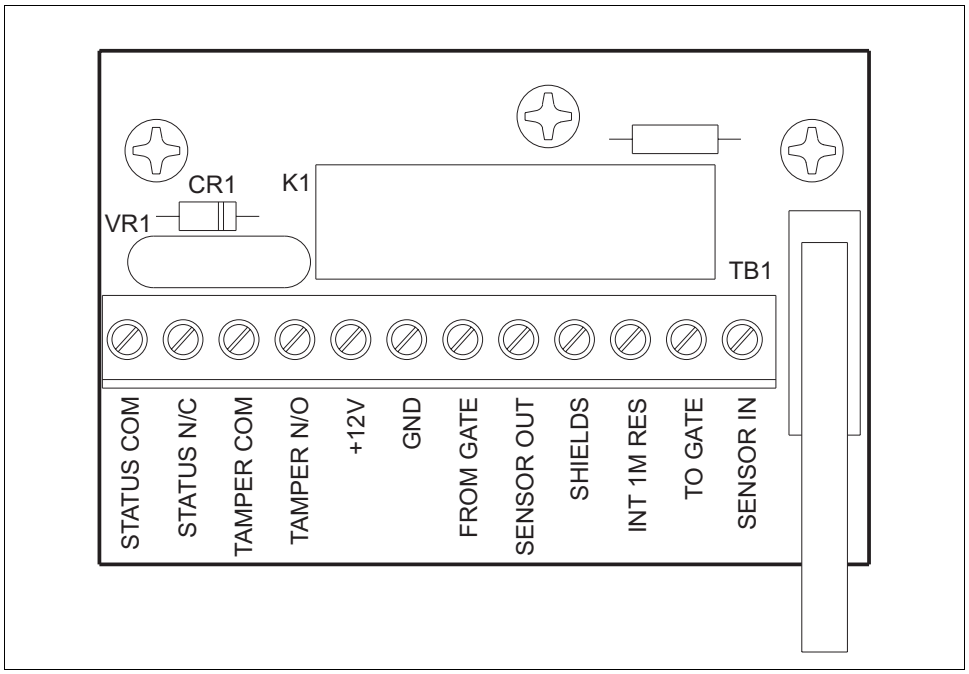


Figure 5-29 Remote gate bypass module terminal block

The terminal block is a 12-position, stripped bare-wire, screw-clamp style device which does not require crimp lugs or special hardware connections. The connections to the annunciation device are consistent regardless of bypass configuration on the gate or fence. These connections are typically fed through conduit, off the fence, underground, to the transponder housing for interface to the annunciator, or to the local key box mounted for convenient access from vehicles, or the walkway.

Connection details are given for each situation in the following sections.

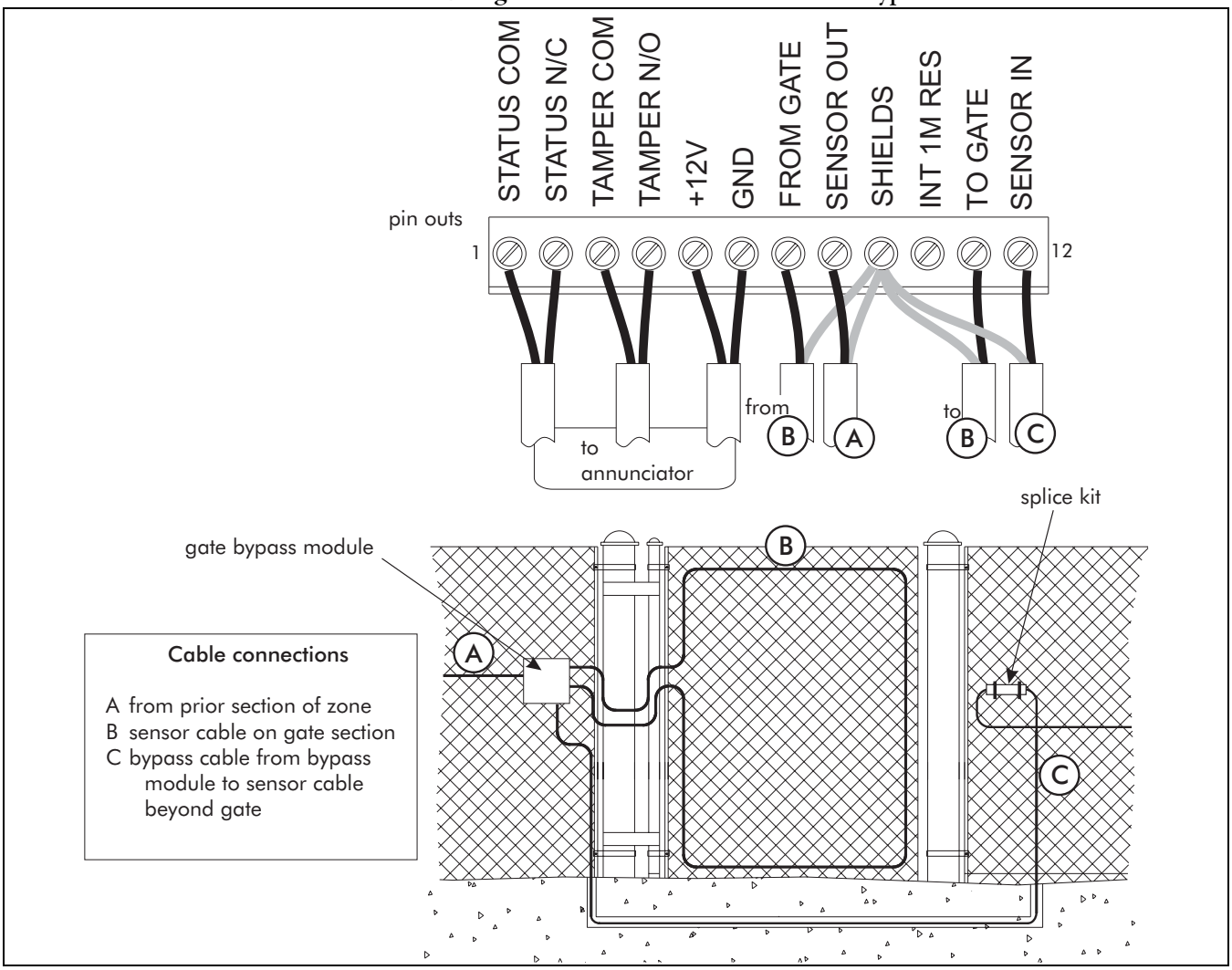
Single panel swinging gate

Materials required

1 Model 2490-2 Gate bypass module

1 cable splice kit

1 length of non-sensitive feed cable for bypass



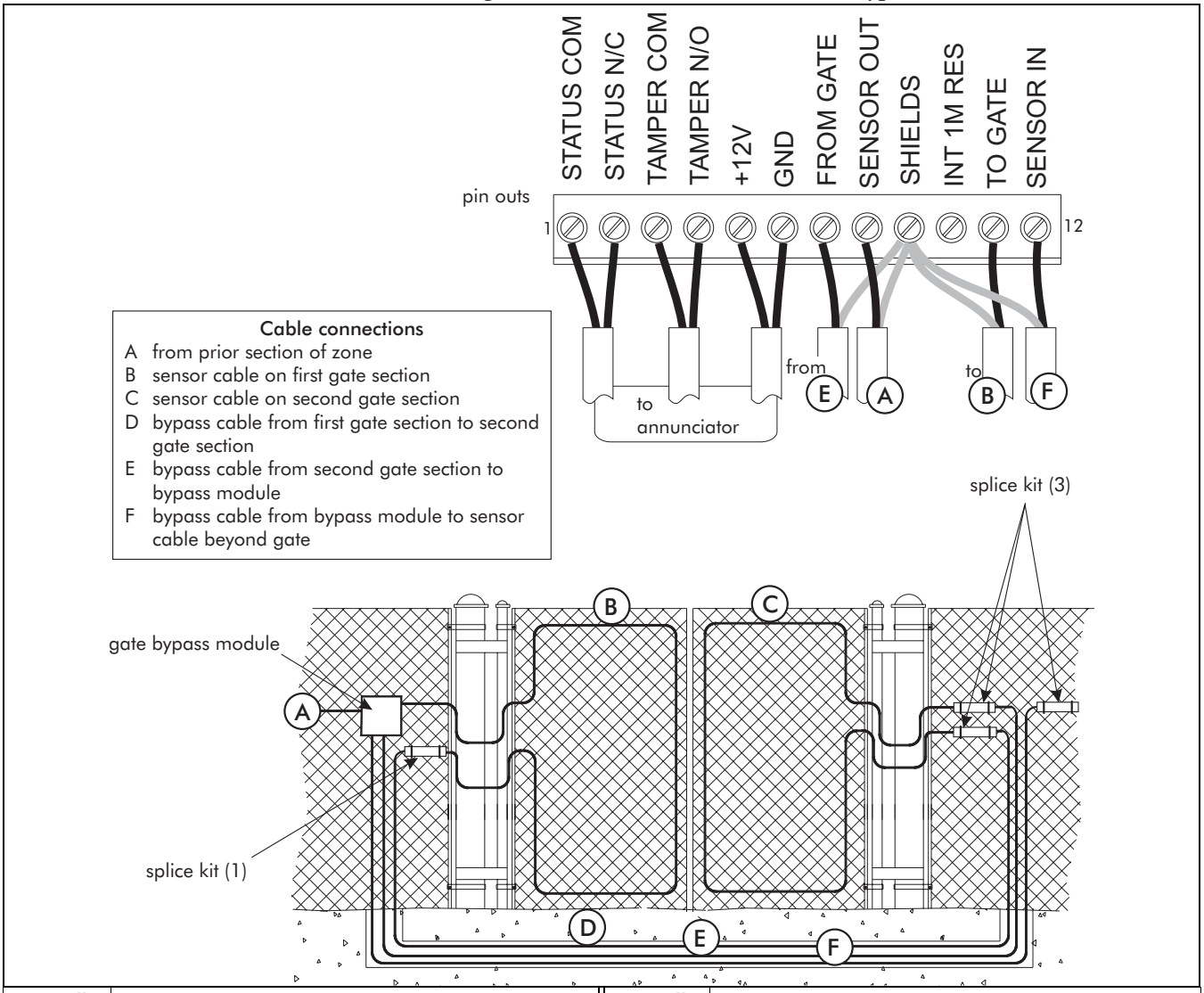
Pin #	cable description	Pin #	cable description
1	from annunciator - bypass status - common	7	center conductor of return from gate or bypassed section
2	from annunciator - bypass status - N/C	8	center conductor to continuing section of sensor
3	from annunciator - tamper status - common	9	tie point for coax shields
4	from annunciator - tamper status - N/O (closed when cover is in place)	10	not used
5	from annunciator -+12 VDC	11	center conductor of cable to the gate or bypassed section
6	from annunciator - ground	12	center conductor from prior section of the zone

Figure 5-30 Single panel swinging gate

Double panel swinging gate

Materials required

1 - Model 2490-2 Gate bypass module
4 - cable splice kits
3 lengths of non-sensitive feed cable for bypass



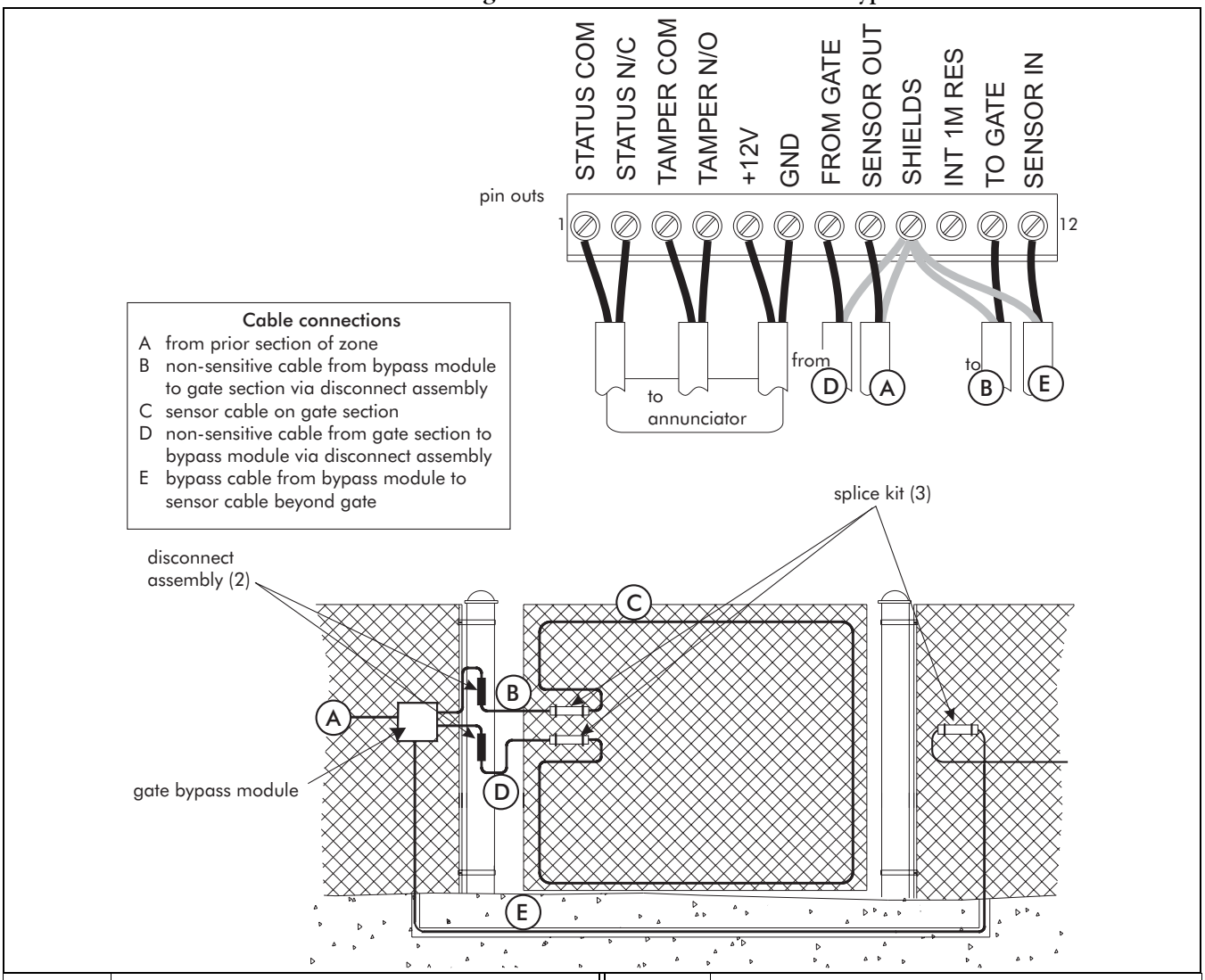
Pin #	cable description	Pin #	cable description
1	from annunciator - bypass status - common	7	center conductor of return from second gate section
2	from annunciator - bypass status - N/C	8	center conductor to continuing section of sensor
3	from annunciator - tamper status - common	9	tie point for coax shields
4	from annunciator - tamper status - N/O (closed when cover is in place)	10	not used
5	from annunciator -+12 VDC	11	center conductor of cable to the first gate section
6	from annunciator - ground	12	center conductor from prior section of the zone

Figure 5-31 Double panel swinging gate

Sliding Gate

Materials required

1 - Model 2490-2 Gate bypass module
3 - cable splice kits
2 - gate disconnects
1 length of non-sensitive feed cable for bypass



Pin #	cable description	Pin #	cable description
1	from annunciator - bypass status - common	7	center conductor of return from gate or bypassed section
2	from annunciator - bypass status - N/C	8	center conductor to continuing section of sensor
3	from annunciator - tamper status - common	9	tie point for coax shields
4	from annunciator - tamper status - N/O (closed when cover is in place)	10	not used
5	from annunciator -+12 VDC	11	center conductor of cable to the gate or bypassed section
6	from annunciator - ground	12	center conductor from prior section of the zone

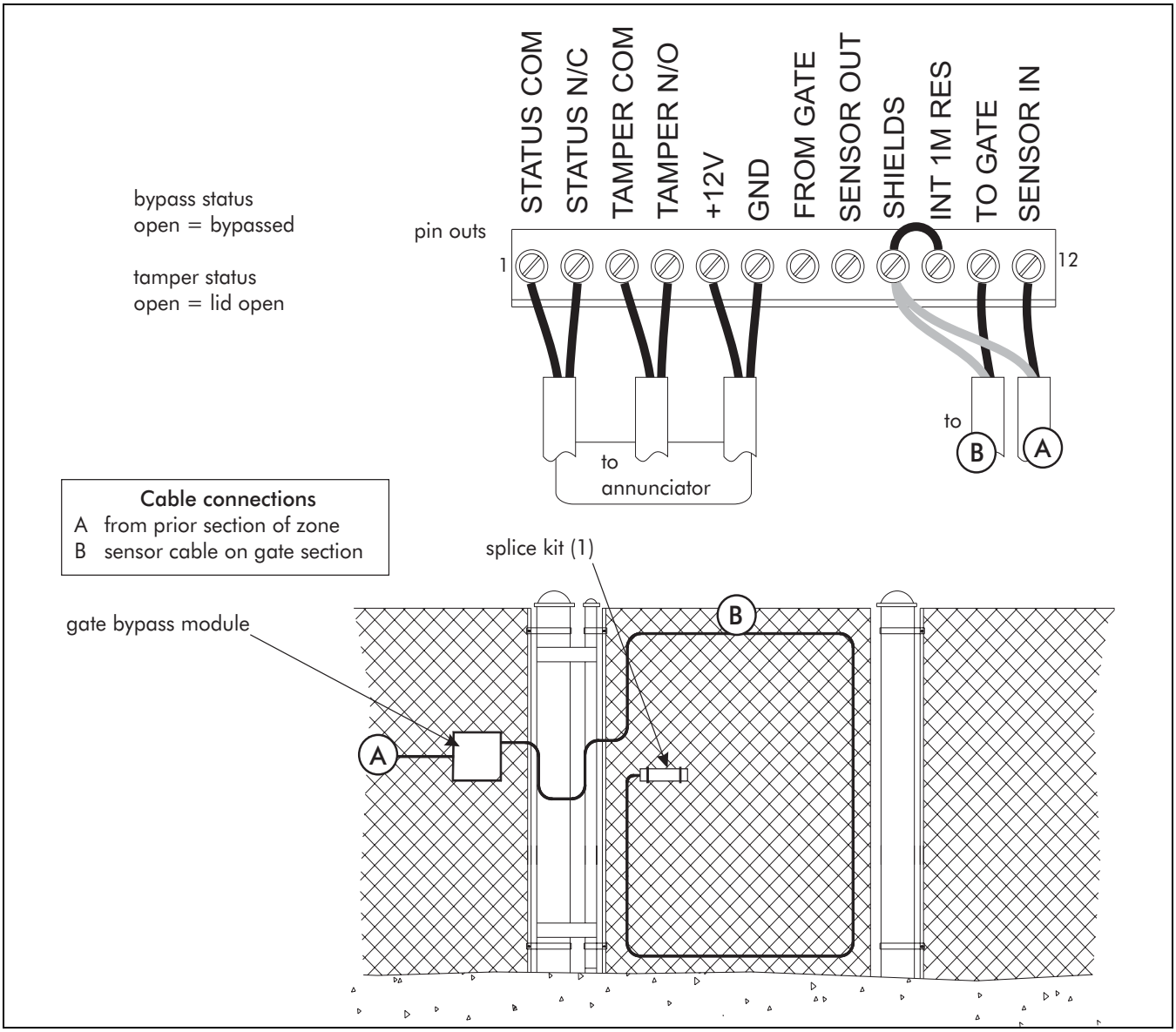
Figure 5-32 Sliding gate

End of zone

Materials required

1 - Model 2490-2 Gate bypass module

1 - cable termination kit



Pin #	cable description	Pin #	cable description
1	from annunciator - bypass status - common	7 & 8	not used
2	from annunciator - bypass status - N/C	9	tie point for coax shields; shield/ground
3	from annunciator - tamper status - common	10	internal 1MΩ resistor
4	from annunciator - tamper status - N/O (closed when cover is in place)	11	center conductor of cable to the gate or ending sensor section
5	from annunciator -+12 VDC	12	center conductor from prior section of the zone
6	from annunciator - ground		

Figure 5-33 End of zones

Cable devices

Cable splices

Cable splices are used to splice sensor cable to lead-in cable, for sensor cable bypasses, for gate installations, to join short lengths of sensor cable to create a longer length (up to 305 m), to reconfigure or extend an existing zone, and for cable repairs. There is no technical limit to the number of splices that can be used on a sensor cable. However, the reliability of each spliced connection depends on the quality of workmanship, the installation, and proper weatherproofing. Therefore, limiting the number of splices used on a sensor cable will lower the potential for problems.

For all types of splices, the splice must be made at a location where the cable is not placed under any strain, and where the splice enclosure can be elevated above the cable to form drip loops. For cable repair you must determine whether the center conductor has been damaged by being stretched or elongated with respect to the dielectric. If the center conductor is damaged over a length you should replace the cable. If the center conductor is not damaged as described above, you can use cable splices for repair.

Splice kit

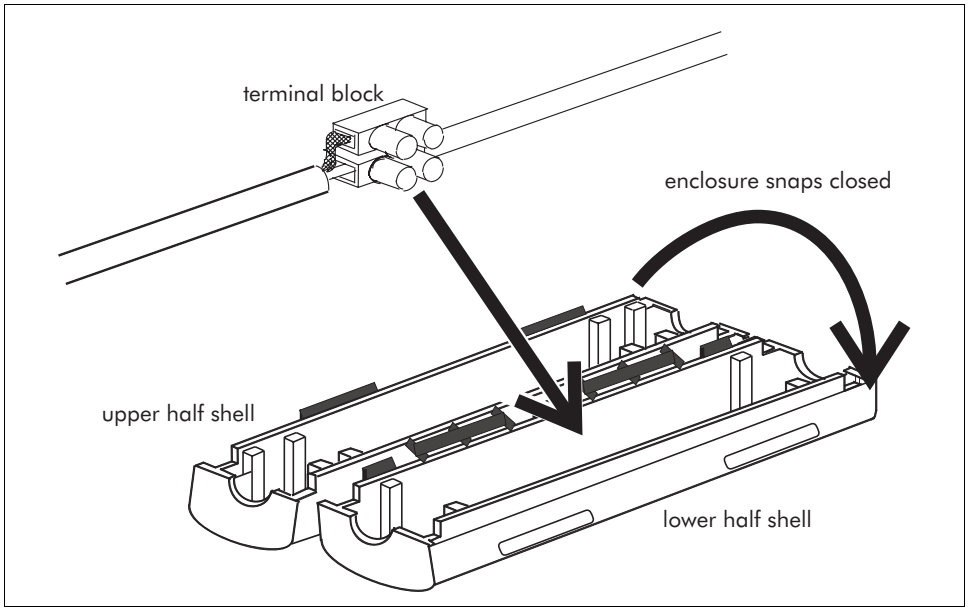


Figure 5-34 Splice kit

The splice kit is used to join two cables together within a zone, either sensor cable to sensor cable or sensor cable to non-sensitive feed cable. It is mounted horizontally and attached to a fence post or fence fabric using two tie wraps.

The splice enclosure must remain dry during the installation process. Always install the enclosure with a horizontal orientation to protect the cable entry points from rain and run off.

Materials

- 1 gel shell
- 1 terminal block

Installation instructions

Caution *Be sure to attach shield-to-shield, and center-to-center.*

1. Separate the shield and center conductor, twist the shield into a 'solid strand'. Make sure that the screw terminals are open enough to accept wires.
2. Connect the sensor cable center conductor to one post of the terminal block.
3. Connect the shield to the adjacent post.
4. Connect the other sensor cable or non-sensitive feed cable center conductor on the opposite post to the first center conductor connection.
5. Connect the shield to the remaining post.
6. Place the terminal block into the gel cavity of the shell.
7. Snap the two halves of the shell together.
8. Secure the completed assembly to the fence fabric horizontally at the top of the drip loop, (see “Drip loop” on page 4), using two UV-resistant tie wraps.

Termination kit

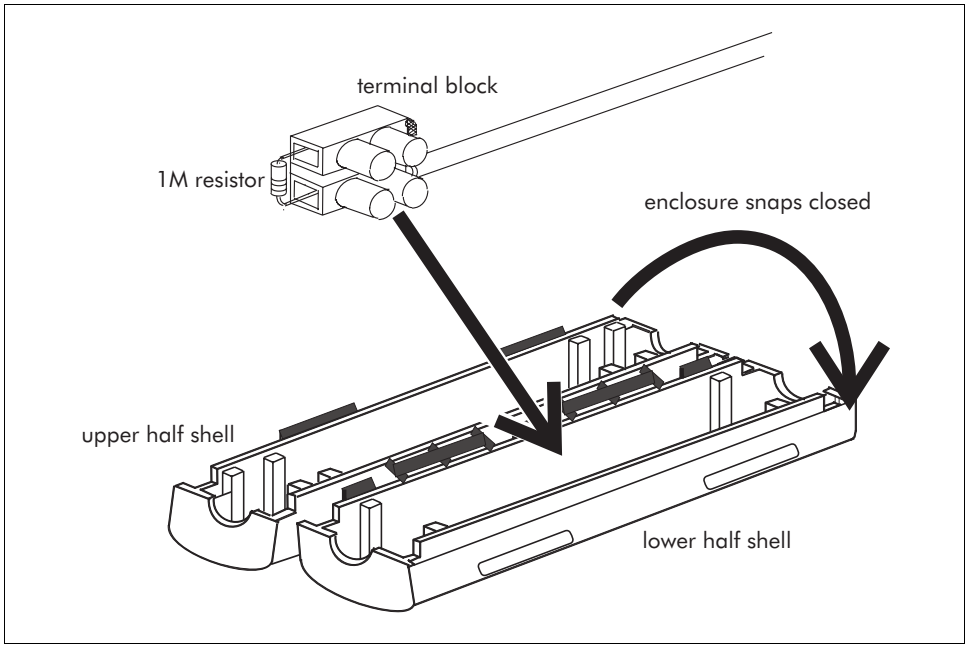


Figure 5-35 Termination kit

The termination kit is installed at the end of a zone to allow supervision of the sensor cable. It is mounted horizontally and attached to a fence post or fence fabric using two tie wraps.

Materials

- 1 gel shell
- 1 terminal block
- 1 one Megohm resistor

Installation instructions

Caution *Do not short the shield to the center conductors.*

1. Separate the shield and center conductor, twist the shield into a 'solid strand'.
2. Connect the sensor cable center conductor to one post of the terminal block. Make sure that the screw terminals are open enough to accept wires.
3. Connect the shield to the adjacent post.
4. Connect the resistor (1 Meg) across the opposite terminals.
5. Place the terminal block into the gel cavity of the shell.
6. Snap the two halves of the shell together.
7. Secure the completed assembly to the fence fabric horizontally at the top of the drip loop, (see “Drip loop” on page 4), using two UV-resistant tie wraps.

If there is excess sensor cable at the terminator, do not coil the cable. Such a coil can provide hyper-sensitive detection, with resultant nuisance alarms. Either cut the cable to the proper length, leaving a moisture drip loop outdoors, or loop the cable back on the fence structure. Secured with tie wraps, such a loop will not only provide additional protection for the area near the terminator, it is a convenient way to save extra cable that might be needed for later rearrangement or repair.

Installing the Intelli-FLEX II processor

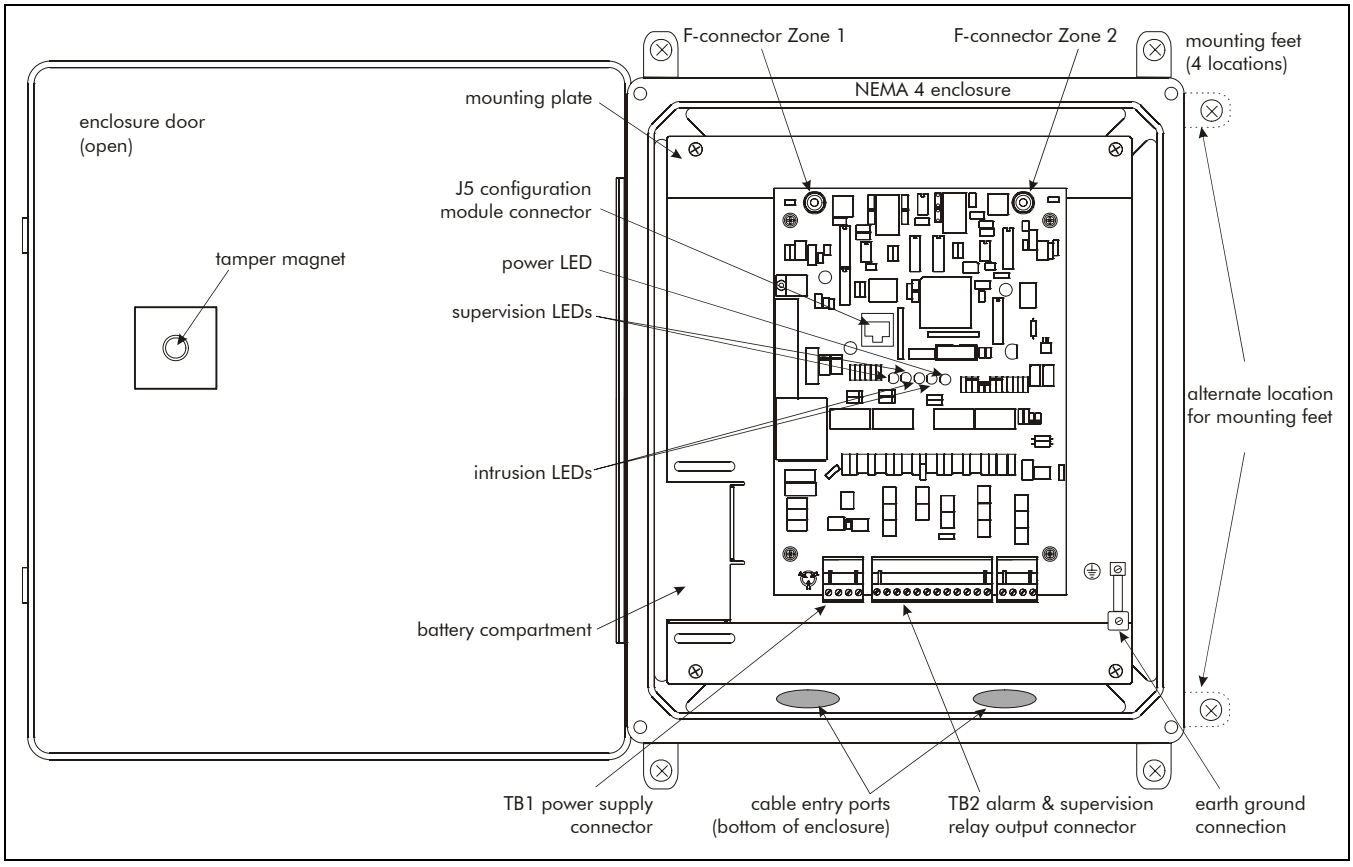


Figure 5-36 Intelli-FLEX II dual zone processor

The Intelli-FLEX II dual zone processor is shipped mounted inside a NEMA 4 rated weatherproof enclosure. The processor should remain inside the enclosure during the installation of the enclosure. The enclosure must be mounted on a wall, or a flat stable surface that is at least 36 cm w X 41 cm h (14 in. X 16 in.).

The enclosure includes four mounting feet and the hardware for attaching the feet to the enclosure. Mounting hardware for the enclosure is customer supplied.

Installation guidelines

Consult the local electrical code for power and grounding requirements.

When installing an Intelli-FLEX II processor, keep the following points in mind:

- to help prevent tampering Senstar, recommends that you install the processor on the secure side of the perimeter at a location other than on the fence where the sensor cable is installed
- if razor ribbon is installed along the bottom of the fence, mount the processor away from any razor ribbon
- install the processor near eye-level (above the high snow level)
- mount the enclosure so that the cable entry holes are on the bottom toward the ground (2 holes, one for feed cables and alarm communication wiring, one for power and ground)
- keep the power and ground cables away from the feed cables
- install all cables to the processor inside conduit
- the F-connectors will not fit through the conduit fittings
- locate the processor close to the protected fence so that one person can easily perform calibration or maintenance tasks

Installation procedure

1. Using the supplied hardware, attach the four mounting feet to the enclosure.
2. Position the enclosure in the intended mounting location and mark the locations of the holes.
3. Drill the mounting holes.
4. Using appropriate hardware for the mounting surface (customer supplied) mount the enclosure.

Intelli-FLEX II processor settings

Once all of the components have been installed, the processor jumpers can be set and the wires can be connected.

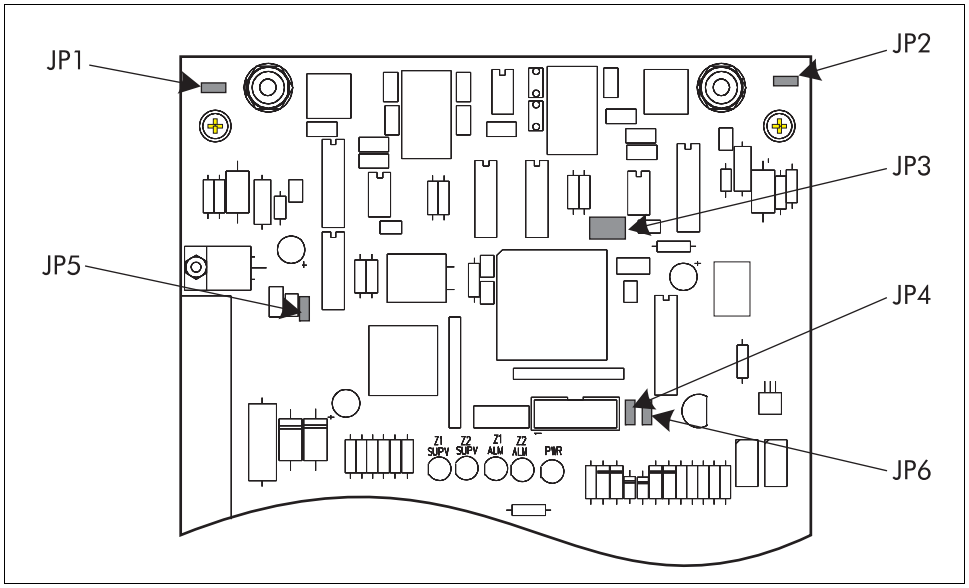


Figure 5-37 Processor jumpers

Jumper settings

The factory setting has shunts installed at JP1 through JP6.

JP-1 and JP-2 Local supervision

- Remove the shunt at JP-1 if a properly terminated sensor cable is to be connected to Zone 1.
- Remove the shunt at JP-2 if a properly terminated sensor cable is to be connected to Zone 2.

> *If the sensor cable is disconnected, replace the appropriate jumper (i.e., JP-1 for zone 1). This can be helpful in locating cable faults.*

JP-3 Unused processor A/D inputs

- Three jumpers hold the inputs to three A/D inputs on the microprocessor at 0 VDC.

> *DO NOT remove this shunt unless specifically instructed.*

JP-4 LED power

- Remove JP-4 to prevent LED indicators on the processor board from lighting, otherwise leave the shunt in place.

JP-5 Power Fail Jumper

- Remove JP-5 to prevent the Power fail supervision alarm, otherwise leave the shunt in place.

JP-6 Option Jumper

- Reserved for future use. The shunt must remain installed on JP-6.

Alarm and supervision relays

The dual zone Intelli-FLEX II processors may be connected to many types of alarm monitoring/report systems using the two form C, single-pole, double-throw latching type, output relays for each zone.

- The NC (normally closed) contacts of the alarm relays will close when an alarm condition occurs. The NO (normally open) contacts will open when an alarm condition occurs.
- The NC (normally closed) contacts of the supervision relay will close when a supervision condition occurs. The NO (normally open) contacts will open when a supervision condition occurs.
- If the processor looses power, the NC (normally closed) contacts of the alarm and supervision relays will close, and the NO (normally open) contacts will open.

The relays have an associated LED, red for intrusion, and amber for supervision alarm.

Wiring to alarm and supervision relays

The Intelli-FLEX II processor uses dry contact relays as alarm and supervision indicators for each zone. There are four independent relays on each processor - Alarm 1, Alarm 2, Supervision 1, and Supervision 2.

Each relay has a common connection to either a Normally Open (NO) or Normally Closed (NC) relay contact. This nomenclature refers to the state the relay will assume when the alarm is reported, or when there is a power failure condition. The processor board has the relay and contact designation silk-screened on the board near the terminal connectors.

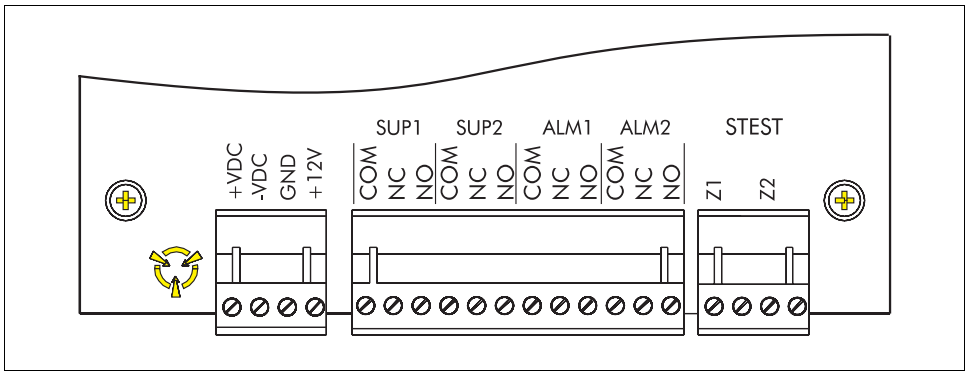


Figure 5-38 Wiring to alarm and supervision relays

Wire the contacts in the manner specified for the alarm monitoring panel, or transponder system you are using. Refer to the instructions given for your particular monitoring panel, or transponder system, for instructions on how to wire to the Intelli-FLEX II relay contacts.

Relay contact ratings

The connections to the Intelli-FLEX II processor are rated at 0.5 amp maximum, 30 VAC/DC maximum.

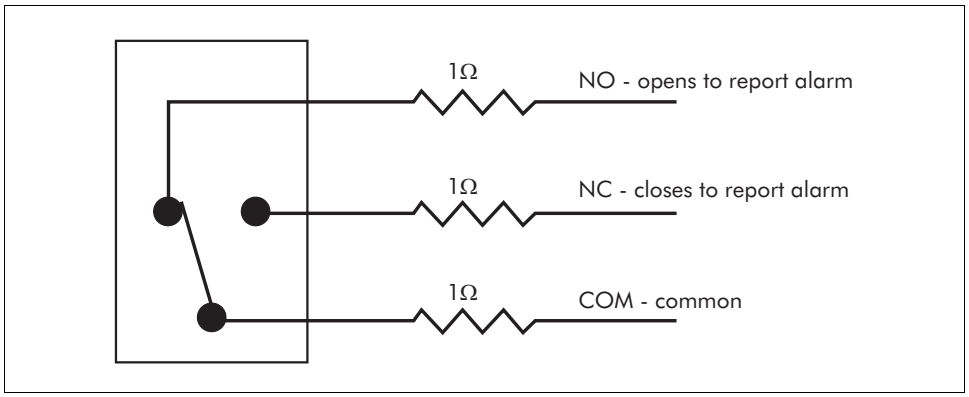


Figure 5-39 Relay contacts non-alarm state

Wiring connections

Once the jumpers have been set, proceed to make the wiring connections at the processor as follows:

1. Feed the non-sensitive feed cable from inside the enclosure, through the gland fittings to the sensor cable.

   The F-connector will not fit through the gland fitting.

2. Splice together the non-sensitive feed cable and the sensor cable. (See cable splice directions)
3. Connect the non-sensitive feed cable for Zone 1 to J1.
4. Connect the non-sensitive feed cable for Zone 2 to J2.

On large installations with many zones, connect the lower number zone to zone 1 and the higher number to zone 2 of the processor.

Power connections

DC power/float charger

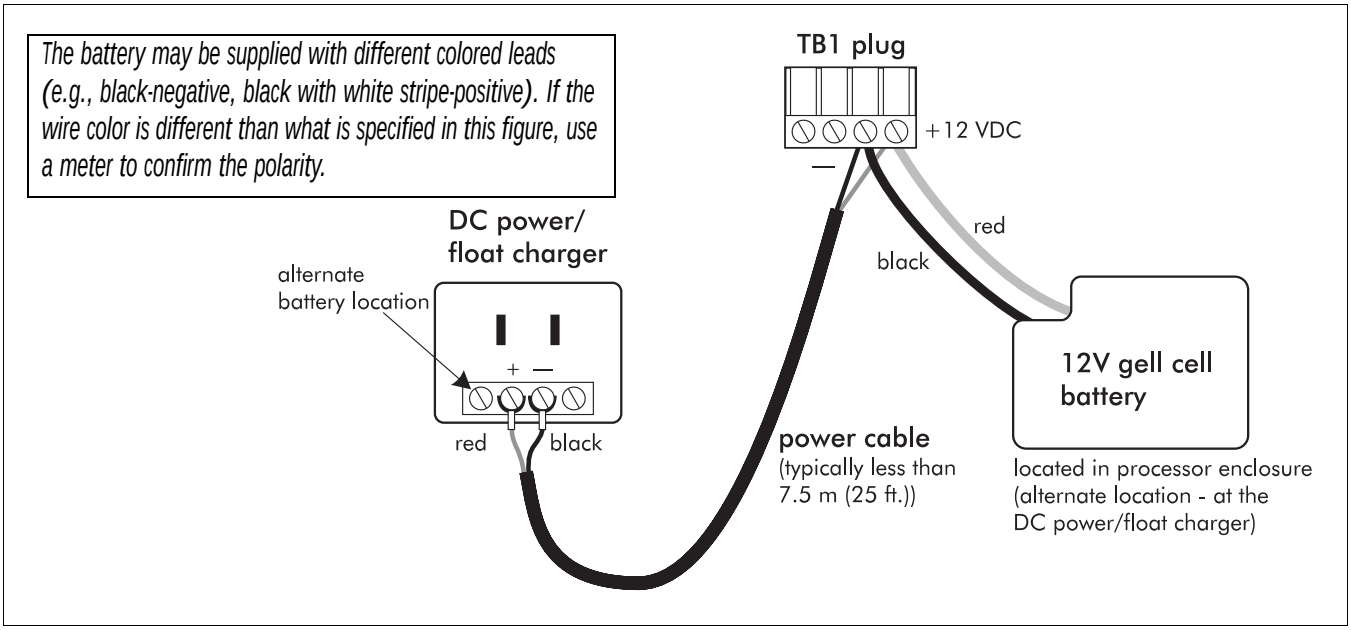


Figure 5-40 Powering a single Intelli-FLEX II processor

The DC power/float charger modules can supply 12 VDC to the processor and charge the 12 volt gel cell battery. The battery can be installed in the NEMA enclosure with the processor, or at a location inside a building, directly to the DC power/float charger.

The Model P0119 power supply/float charger (SSC P/N IFLPS100-230) MUST have a battery connected across its outputs.

To power the system from the DC power/float charger modules proceed as follows:

- Locate a source of AC power. It should be within 61 to 91 m (200 to 300 ft.) from the processor, maximum, depending on the gauge of the power cable.
- Make the following connections:
- From the gel cell battery to the processor connect:
  - Black lead to TB1-3
  - Red lead to TB1-4
- From the DC Power/Float Charger to the processor connect:
  - Black lead to TB1-3
  - Red lead to TB1-4
- On the DC power/float charger connect:
  - Black lead to (—) and to earth ground
  - Red lead to (+)
- Install the gel cell battery inside the NEMA enclosure.

Using the DC power distribution system

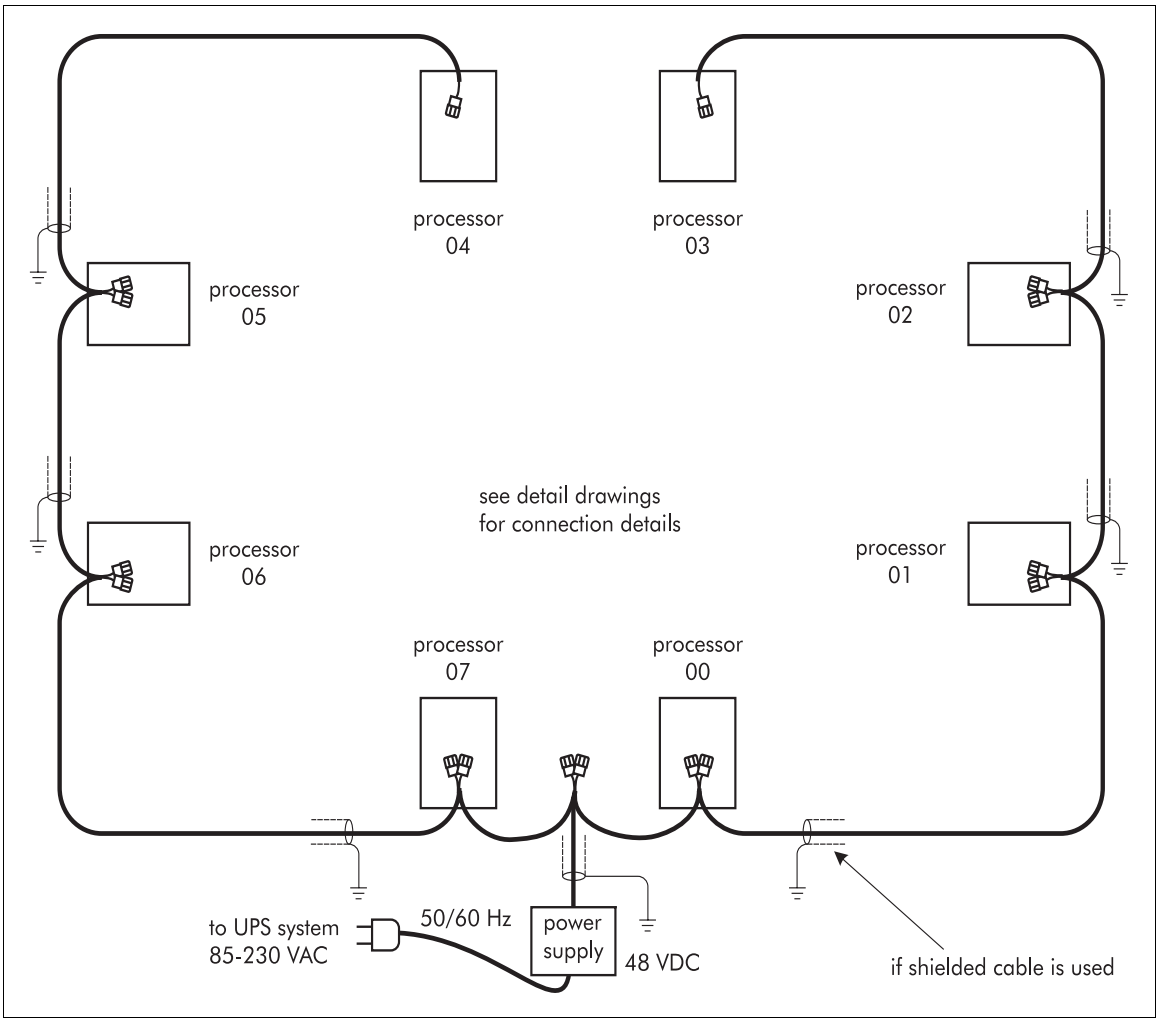


Figure 5-41 Typical DC power distribution

In a typical DC power distribution system the power cable may be installed in conduit above or below ground. The power cable may also be installed directly on the fence (depending on local electrical codes).

- To power the system from a central source, run the power distribution cable around the perimeter and tap off to each processor.

  Use a minimum of #14 gauge wire for power runs up to 1.2 km (4000 ft.). For longer runs use #12 gauge wire.

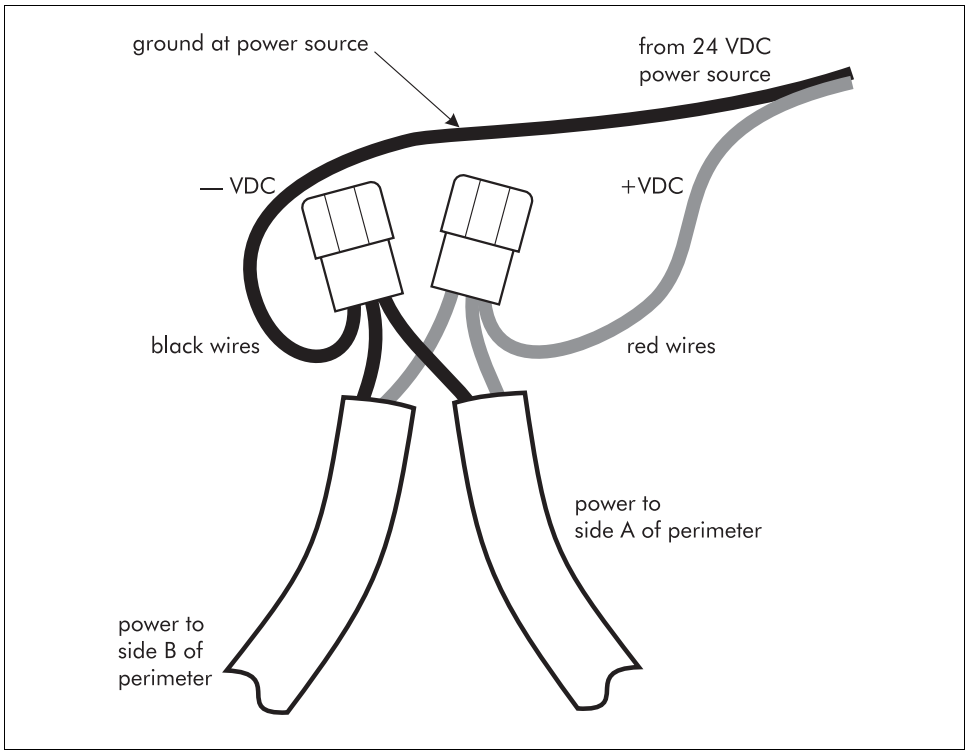


Figure 5-42 Typical connection to power source

- Splice the distribution cable to the DC output wire from the central power supply. A terminal strip may be used instead of wire nuts.

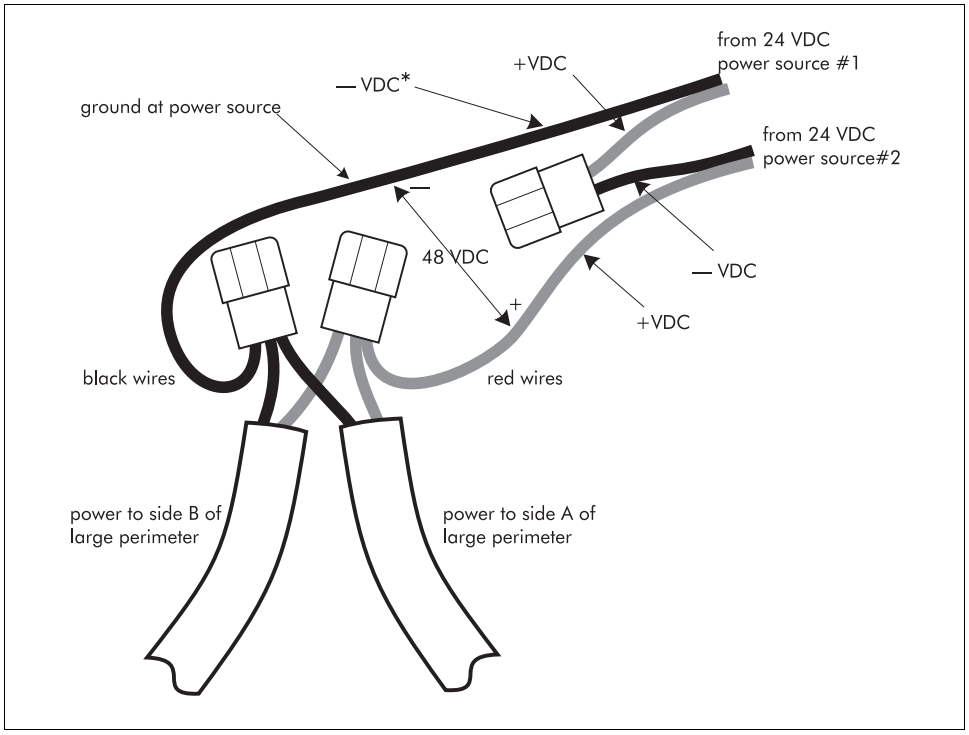


Figure 5-43 Obtaining 48 VDC

When 48 VDC is required, i.e., for larger installations, the outputs from two 24 VDC supplies may be wired in series.

Be sure to observe proper polarity.

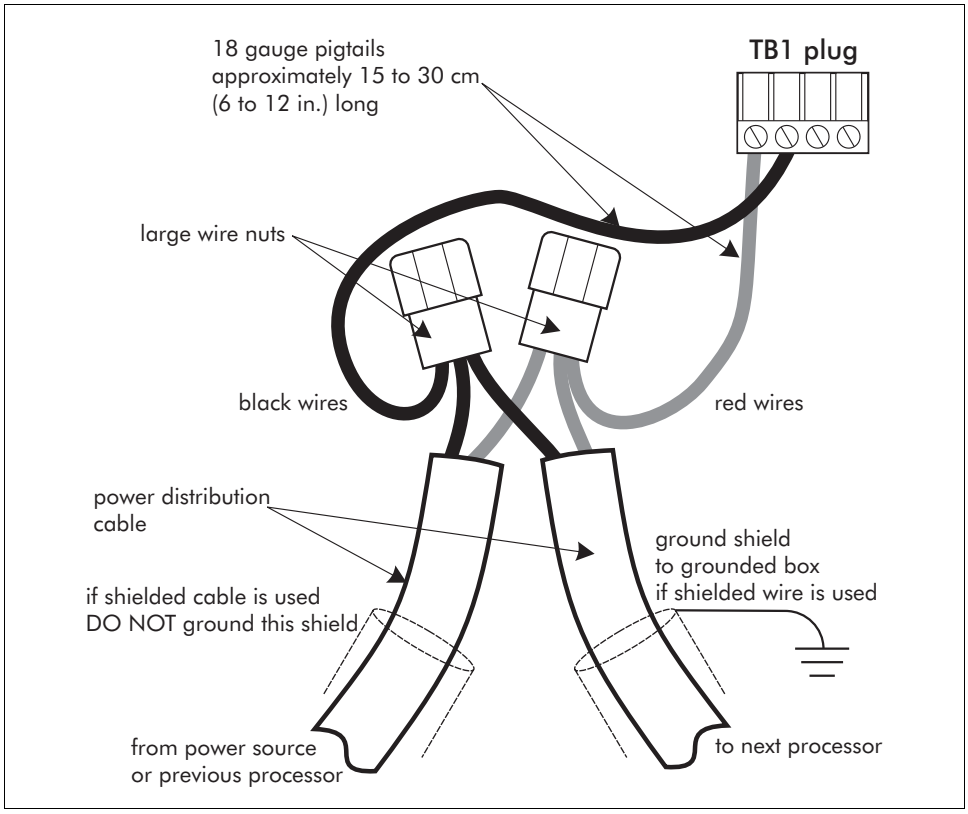


Figure 5-44 Typical power connection at processor

At each processor, using appropriate sized wire nuts, splice the heavy cable to a lighter gauge "pigtail" that is approximately 30 cm (12 in.) long and attached to TB1-1 (+VDC) and TB1-2 (-VDC).

Backup power (UPS)

When the central low voltage power supply is used instead of individual DC power/float chargers, it should be powered from a non-interruptible source of AC power. This power source will usually be provided for the computer system that is often a part of larger installations, or it will be part of a UPS system for the overall security system. If a UPS system is not already a part of the overall security installation, a small standalone UPS system may be used to power the Intelli-FLEX II perimeter system. The UPS system may be purchased from a local supplier or from Senstar.

Each Intelli-FLEX II processor requires approximately 1 W of power, making the total power consumption of even large systems very small. A small UPS system that is designed to run a personal computer system (typically 300 Watts) for 15 or 20 minutes will power an Intelli-FLEX II perimeter system for several hours.

Grounding

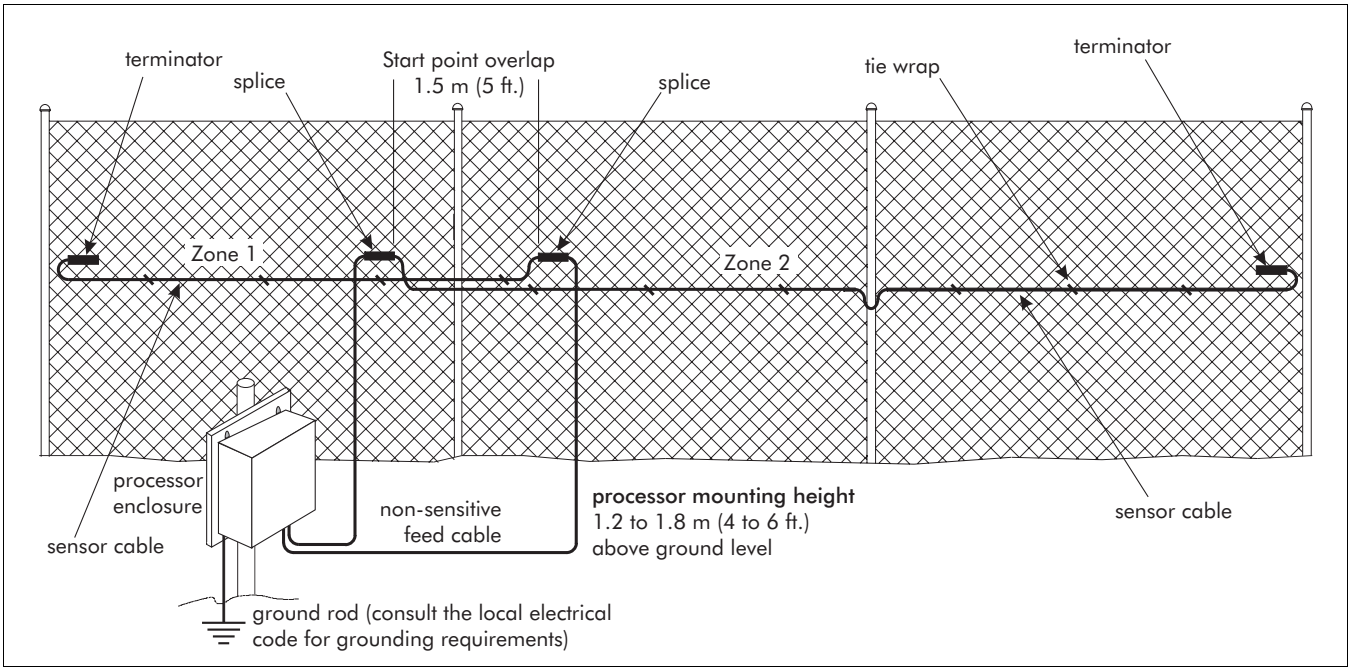


Figure 5-45 Placement of ground rod

Caution *DO NOT use the fence structure as an earth ground reference.*

The earth ground connection must be stable and noise free. An improper or unstable earth ground can induce noise in the Intelli-FLEX II processor.

Consult the local electrical code for grounding requirements. AVOID sharp bends in the ground wire.

1. Follow the local electrical code, to install a low resistance ground rod at the processor location.
2. Using an appropriate ground wire, connect the ground rod to the ground stud on the Intelli-FLEX II mounting plate.
   Route the ground wire in through the cable entry port on the right side of the enclosure, then along the bottom and up the side of the enclosure until you reach the ground stud (see *Figure 5-46, Processor ground connection,* on page 5-48).

Keep the ground wire away from the feed cable.

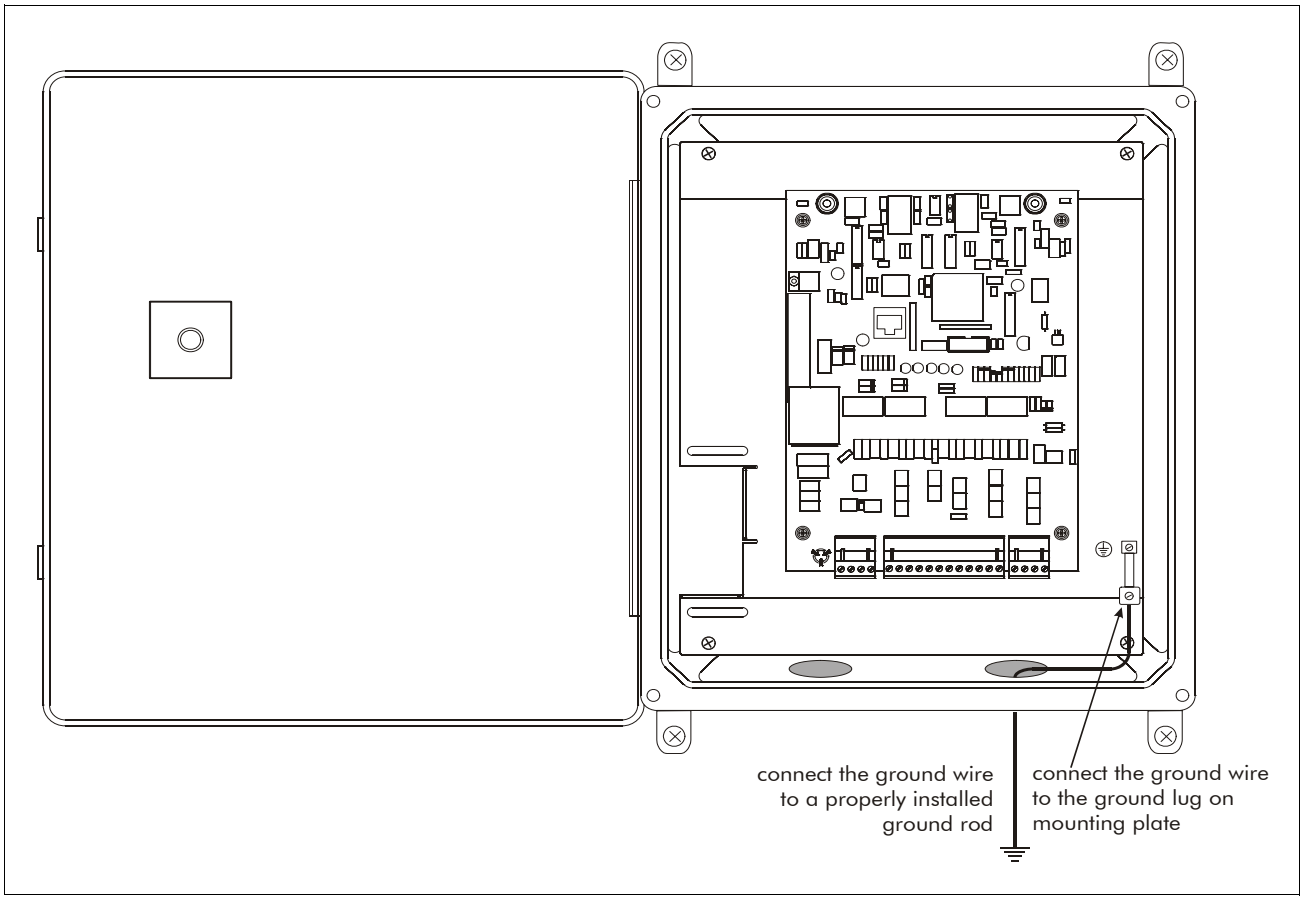


Figure 5-46 Processor ground connection

System Power Verification

Once sensor power has been connected, verify that the installation is correct. To verify the installation, perform the following checks:

- For 24/48 VDC powered processors, check TB1 terminal 1 and 2. Verify voltage is between 18 VDC and 56 VDC.
- For processors using DC power/float charger, check TB1 terminals 3 and 4. Verify voltage is between 11.5 VDC and 16 VDC.

6 The Configuration module

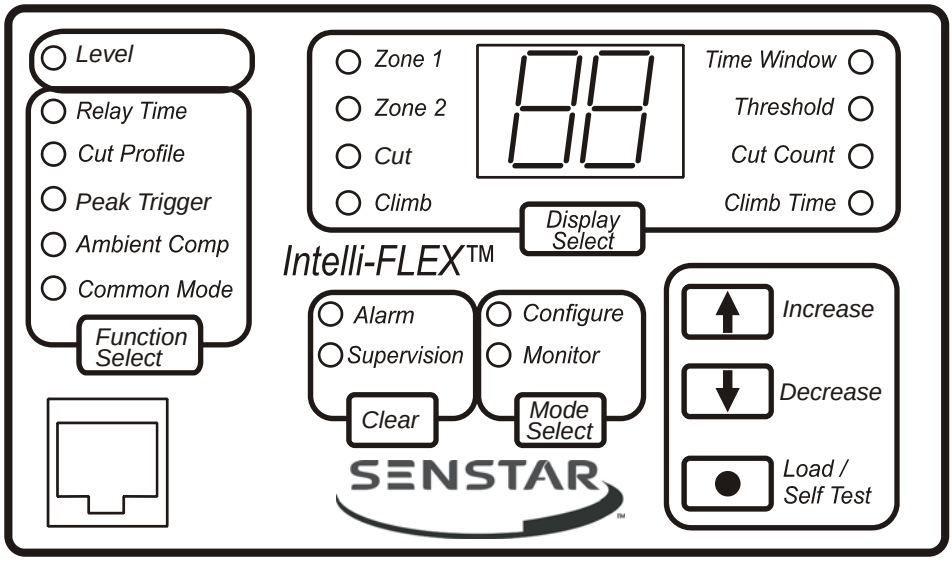


Figure 6-1: Configuration Module

The Intelli-FLEX II Configuration module is a support tool for the Intelli-FLEX II Processor. It allows you to configure the Intelli-FLEX II sensor's operating parameters to the specific site conditions for each sensor zone. It also acts as a monitoring device by allowing you to observe the Intelli-FLEX II system activity during setup and operation.

The Configuration module is required only to calibrate the Intelli-FLEX II processor. It is connected to the processor being calibrated and disconnected upon completion of the calibration, therefore enabling a single Configuration module to be used to configure all Intelli-FLEX II processors in a multiple processor installation.

The Intelli-FLEX II processor's mode of operation and status is indicated by LED's and a two digit display. The installer or maintenance technician determines the mode of operation, status and configuration parameters by interpreting the LED's and reading the display.

The Configuration module is packaged in a rugged plastic case. Dome switch technology is used to minimize contamination from dirt, dust, or coffee spills, and to provide trouble-free operation. The interconnect cable uses snap-in connectors for easy installation and removal. The Configuration module is powered by the Intelli-FLEX II processor. No batteries or maintenance are required.

This chapter describes the Configuration module features.

Modes of operation

The Intelli-FLEX II system has three modes of operation - monitor, configure and level. All three modes are accessible with the Configuration module installed. The processor automatically returns to monitor mode after the configuration module has been disconnected from the processor board.

The following text conventions will be used in this chapter and the following chapter:

- Text convention - *italic* (key names and LED names)
- **boldface** (display readout)

Monitor Mode

Monitor mode enables you to view processor status information and intrusion activity status, and acknowledge supervision and alarm messages as they occur.

Level Mode

Level mode is a sub-mode of the monitor mode. It is the maintenance mode for the processor. In Level Mode the processor outputs the average event value received from the sensor cable at the Configuration module display. The reading is similar to a digital instrument display. This mode is used during the Gain setting procedure described in Chapter 7.

Configure Mode

Configure mode enables you to view or change the existing configuration to suit site specific requirements. (Cut & climb time window, cut & climb threshold, cut count and climb time)

The specific functions and parameters are identified by the LED indicators and by the value presented in the digital display.

The functions and modes are selected by pressing the various keys on the Configuration module, and observing the LED indicators as they sequence through the possible selections that define the mode and parameter. These are described in detail in the following sections.

The operator can view and change the threat assessment and functional parameters while in this mode. No alarms are reported in this mode.

Parameters

Threat assessment parameters

Threat assessment parameters define the threat signature - i.e., Cut Count, Cut Threshold, Climb Window, etc. These parameters can be viewed or changed by the user.

Functional parameters

Functional parameters affect the event assessment and environmental response of the system.

These parameters should not be altered by personnel who do not have an in-depth knowledge of the Intelli-FLEX II processor signal processing program.

Access to functional parameters requires a special cipher code.

Configuration module LED's

The following table lists the LEDs and their functions in monitor and configure modes.

Lit LED	Mode	
	Monitor	**Configuration**
Monitor	Configuration module is in monitor mode	NA
Configuration	NA	Configuration module is in configuration mode
Zone 1	Displayed value is relevant to Zone 1	
Zone 2	Displayed value is relevant to Zone 1	
Zone 1 and Zone 2	Displayed value is relevant to Zone 1 & 2	
Supervision	Supervision alarm has occurred	NA
Alarm	Alarm has occurred	NA
Cut	Display indicates the number of cut events remaining before an alarm occurs	Display indicates the set number of cut events required to generate an alarm
Climb	Display indicates the seconds of climb activity remaining before an alarm occurs	display indicates set amount of climb time that must accumulate before an alarm is initiated
Time Window	Time window is active for indicated zone and threat assessment	display indicates amount of time in seconds that the treat scenario (climb or cut) must occur for alarm to initiate
Threshold	Threshold has been exceeded for indicated zone and threat scenario	Display indicated value of threshold for indicated zone and threat scenario
Cut count	NA	Display indicates the number of cut events required for an alarm to occur in the indicated zone.
Climb time	NA	display indicates climb time that must accumulate for an alarm to occur in the indicated zone.

The following table lists the LEDs and their function in Monitor level mode. Adjustment of these functional parameters requires the use of a cipher code. Contact Senstar for further information.

Lit LED	Functional Parameter description
Relay Time	Displayed value is the: a) length of time, in seconds, that the alarm relay will activate when an intrusion alarm occurs, and b) minimum length of time that the supervision alarm relay will activate if a momentary supervision alarm occurs
Cut Profile	The displayed value is the cut profile parameter for the indicated zone
Peak Trigger	The displayed value is peak trigger parameter for the indicated zone
Ambient Compensation	The displayed value is the ambient compensation parameter for the indicated zone
Common Mode	The displayed value is the common mode parameter for the indicated zone

Monitor mode LED's and display

The following section details the function of each LED that is available when the Configuration module is in Monitor mode.

Monitor LED

Indicates the processor is operating in the monitor mode. In this mode, the operator can monitor the detection activity for the indicated zone and threat scenario.

Zone 1 LED

Indicates that the displayed value is relevant to parameters or status in zone 1. Some parameters, apply to both zones. When this is the case, both zone 1 and zone 2 LEDs will be lit.

Zone 2 LED

Indicates that the displayed value is relevant to parameters or status in Zone 2.

Cut LED

Indicates that the displayed value is relevant to a cut intrusion scenario. It refers to inputs from the sensor cable which are typically classified as cut events. These events are short duration, high amplitude, and occur with short delays between events.

For example, when *Zone 1* and *Cut* are lit, the displayed value is the number of cut events that remain before an alarm is initiated. This number will decrease each time a cut event occurs.

The *Cut* LED will also illuminate along with the *Alarm* LED and appropriate *Zone* LED when a cut scenario from either zone triggers an intrusion alarm.

Climb LED

Indicates that the displayed value is relevant to a climb scenario. It refers to inputs to the sensor cable which are typically classified as climb events. These events are of a more continuous nature.

The *Climb* LED will also illuminate along with the *Alarm* LED and appropriate *Zone* LED when a cut scenario from either zone triggers an intrusion alarm.

Time Window LED

Indicates that the time window is active for the indicated *Zone* and threat scenario.

The window is activated when the first event is recognized, and stays active for a period of time determined by the parameter setting. Subsequent cut or climb events of sufficient quantity to meet the *Cut Count* or *Climb Time* parameters must occur within the time window before an alarm will be initiated.

Threshold LED

Indicates that the *Threshold* for the indicated *Zone* and threat scenario has been exceeded. The threshold LED is activated when the energy from the sensor cable exceeds the threshold value determined by the parameter setting.

For example, when *Zone 1* and *Cut* are lit, and the *Threshold* LED lights (momentarily), the cut threshold has been exceeded. The displayed cuts remaining indication will decrease by one.

Level LED

Indicates the processor is operating in Level mode. The following situations are valid when Level is selected:

- no alarm detection activity occurs. Level mode is a maintenance mode only.
- the fence disturbance signals peak value from the sensor cable will be displayed for the selected zone.
- the processor will automatically operate in *Auto Clear*. The display will hold for approximately 2 seconds, then it will clear to **00**. If you wish to enter *Manual Clear* mode press *Clear*. The level readings will hold until *Clear* is pressed. To return to *Auto Clear* mode press *Function Select* twice.

Alarm LED

Indicates an alarm condition is being reported by the processor.

Supervision LED

Indicates that a supervision condition exists in the processor.

Configure mode parameters and displays

The following section details the function of each LED that is available when the Configuration module is in Configure mode.

Configure LED

Indicates that the processor is operating in the configure mode. The operator can view and change the threat assessment and functional parameters while in this mode. No alarms are reported in this mode.

Zone 1 LED

Indicates that the displayed parameter is relevant to parameters or status in Zone 1. Some parameters, apply to both zones. When this is the case, both Zone 1 and Zone 2 LEDs will be lit.

Zone 2 LED

Indicates that the displayed parameter is relevant to parameters or status in Zone 2.

Cut LED

Indicates that the displayed parameter is relevant to a cut intrusion scenario. It refers to inputs from the sensor cable which are typically classified as cut events. These events are short duration, high amplitude, and occur with short delays between events.

Climb LED

Indicates that the displayed parameter is relevant to a climb scenario. It refers to inputs to the sensor cable which are typically classified as climb events. These events are of a more continuous nature.

Time Window LED

Indicates that the displayed parameter is the Time Window for the indicated threat scenario type. (i.e. Cut or Climb). The displayed value is read in seconds.

The *Time Window* for *Cut* may be set from 1 to 99 seconds. The factory preset value is 30 seconds. The *Time Window* for *Climb* may be set from a minimum of the climb time parameter, to a maximum of 99 seconds. The factory preset value for climb is 20 seconds.

For example, when the *Zone 1*, *Cut* and *Time Window* LEDs are lit, the displayed value is the length of time that the cut window will be activated when the first cut event occurs.

Threshold LED

Indicates that the displayed parameter is the threshold value for the indicated threat scenario. (i.e. Cut or Climb) in the indicated zone. The threshold value is determined by the user. This value may be set from 1 to 20 in increments of 1. The factory preset value is 10 for both Cut and Climb.

Cut Count LED

Indicates that the displayed value is the cut count for the indicated zone. The cut count is determined by the user. It may be set from 1 to 10 in increments of 1. The factory preset value is 4.

For example, when the *Zone 1*, *Cut*, and *Cut Count* LEDs are lit, the display indicates the number of cuts that must occur in zone 1 within the cut window time to initiate an alarm for the zone.

Climb Time LED

Indicates that the displayed value is the climb time for the indicated zone. The climb time is determined by the user. It may be set from 1 second to the maximum climb Time Window value, in increments of 1 second. The factory preset value for Climb Time is 2 seconds.

Monitor Level mode parameters and displays

The following LEDs are active only when in the Configuration module is in Monitor Level mode.

To enter Level mode press *Function Select*. To access the features in this mode you are required to enter a cipher code. Contact Senstar for more information.

Relay Time LED

Indicates that the displayed parameter is the length of time that the alarm relays will activate when there is an alarm condition. It is also the minimum length of time the supervision relays stay activated in the event of a short duration event. The preset value is two (2) seconds. This insures that the Alarm relays will stay activated long enough to meet the input requirements for most multiplex reporting systems.

Cut Profile LED

Indicates that the displayed parameter is the Cut Profile for the indicated zone.

The display shows the percentage (i.e. 01 = 10%) that the cut window is extended for each cut event that is recorded. For example, a displayed value of 01 would extend the cut window time of 30 seconds by three additional seconds each time a cut event is recorded. This allows shorter cut windows to be selected. The factory preset value is 02.

Peak Trigger LED

Indicates that the display shows the Peak Trigger parameter. This parameter determines the value of the input signal used by the processor to distinguish intrusion events from environmental activity. The value may be changed for unusual fence structures or mounting configurations. Factory setting is 03 (30%).

Ambient Compensation LED

Indicates that the display value shows the amount of ambient compensation that is in effect. The user may specify the amount of ambient compensation which will be added to the Cut and Climb base Thresholds. An entry of ten (10) means (100%) ambient compensation will be in effect. The factory setting is 10.

The system constantly evaluates the signal from the sensor cable. This provides considerable information concerning environmental activities which tend to be gradual in nature and of long duration. Wind and Rain for instance, are more gradual and longer lasting than an intruder cutting or climbing a fence. This long term data is evaluated by the micro-processor. This ambient signal can be effectively ignored and only the signals which are outside this ambient, consistent region, will be evaluated for Cut and Climb significance.

Common Mode LED

Indicates if Common Mode is enabled (01) or disabled (00). When enabled, Common Mode evaluates the ambient activity in both zones to determine if Ambient Compensation should be applied to the zones. When Common Mode is enabled (01) the ambient readings in both zones must be similar or Ambient Compensation will not take place, When Common Mode is disabled (00) Ambient Compensation will always take place. The factory setting is 00.

Function key descriptions

The following table describes the operation of the Configuration module function keys.

Key	Monitor mode		Configure mode
	Display	Level	
Mode Select	Toggles to configure mode and displays Zone 1-Cut-Time Window parameter.		Toggles to monitor mode, and executes startup routine. Processor does not reset. Momentarily displays supervisor L2 alarm status, then Zone 1-Cut display status.
Display Select	Sequence to select Zone 1, Cut, or Climb, Zone 2 Cut, or Climb	Sequence to select Zone 1 or Zone 2	Sequence to select Z1-Cut-Time Window, Z1-Cut-Threshold, etc. through to Z2-Climb-Threshold, to Z2-Climb-Time.
Increase	NA	Increases the number of the Level Register that is being viewed. These registers are 0-12.	Increases the selected parameter value by 1 unit.
Decrease	NA	Decreases the number of the Level Register that is being viewed.	Decreases the selected parameter value by 1 unit.
Load	NA	NA	Once a parameter value has been changed, pressing Load will save the value as the new operational parameter. Load must be pressed immediately after Increase or Decrease or the new value will not be saved.
Clear	Clears supervision alarm message from display. The supervision alarm message must be cleared before other buttons will function.	Clears display and display registers to 00. Sets level mode to Manual Clear Mode.	NA.
Function Select	Toggles to Level-Zone 1 mode. Displays level 5. Level mode always comes up in Auto Clear.	Toggles to display mode, Zone 1-Cut status. (i.e., leaves level mode.)	After the appropriate Cipher is entered, Alarm Relay Time, Cut Profile, Peak Trigger, Ambient Compensation and Common Mode can be accessed for Zone 1 and Zone 2.

Function key operation in monitor mode

The following section describes the Configuration module key functions. When the configuration module is in the Monitor mode (*Monitor* LED lit) the keys function as described below.

Mode Select

The *Mode Select* key toggles the Configuration module between configure and monitor mode. The *Monitor* LED must be lit in order for the keys to function as described in this section.

When the Configuration module is not installed the processor automatically operates in Monitor mode.

Display Select

Pressing *Display Select* causes the system to sequence the display parameter as indicated by the LEDs. The sequence is as follows:

LED LIT	Value Displayed
Zone 1 - Cut	Cut Count Remaining
Zone 1 - Climb	Climb Time Remaining
Zone 2 - Cut	Cut Count Remaining
Zone 2 - Climb	Climb Time Remaining

Function Select

Pressing *Function Select* toggles the processor to View Level and back to the Display parameters. When Level is selected the default register viewed is 5. When entering the Level mode, the Clear mode is "automatic clear". Alarms are not reported while in Level mode.

Increase

This key functions only while viewing Level mode. When the processor is in Level mode this button will increase the number of the Level Register that is being viewed. These registers are 0 to 12.

Decrease

This key functions only while viewing Level mode. When the processor is in Level mode this button will decrease the number of the Level Register that is being viewed.

Clear

This key is used to acknowledge a supervision alarm message if one has been output to the module.

In Level mode, pressing *Clear* will reset the display value to **00** and will set the processor to Manual Clear Mode.

Function key operation in Configure mode

The following section describes the Configuration module key functions. When the configuration module is in the Configure mode (*Configure* LED lit) the keys function as described below.

Mode Select

The *Mode Select* key toggles the Configuration module between configure and monitor mode. The *Configure* LED must be lit in order for the keys to function as described in this section.

In the Configure mode, pressing *Mode Select* causes the system to initialize and come up in Monitor mode. This will take a few seconds to process.

Display Select

Pressing *Display Select* causes the system to sequence the Threat Assessment parameter as indicated by the LEDs.

Reset to factory defaults

The configuration parameters can be automatically reset to factory default values by:

1. Enter configure mode. The decimal point is lit if parameters differ from factory default.
2. If already in configure mode select *Zone 1-Cut-Time Window*.
3. Press *Function Select*, then *Clear*.
4. Observe decimal point goes out, if it was on.
5. Check configuration parameters. They should all be the factory default values.

Factory default settings for configuration parameters

Zone	Threat	Operation	Factory setting
1	Cut	Time Window	30 sec
		Threshold	10
		Cut Count	4
	Climb	Time Window	20 sec
		Threshold	10
		Climb Time	2 sec
2	Cut	Time Window	30 sec
		Threshold	10
		Cut Count	4
	Climb	Time Window	20 sec
		Threshold	10
		Climb Time	2 sec

Load

Once a parameter value has been changed, pressing *Load* will save the value as the new operational parameter. Load must be pressed immediately after *Increase* or *Decrease* or the new parameter will not be saved.

Function Select

Pressing *Function Select* has no effect unless the proper Cipher code has been entered.

Factory default settings for Level mode functional parameters

Functional parameter	Factory setting
Relay time	2 seconds
Cut Profile	02 (20%)
Peak Trigger	03 (30% of maximum)
Ambient Comp	10 (100% of maximum)
Common Mode	00 (OFF)

Increase

Pressing *Increase* will increase the value of a parameter displayed by one unit.

Decrease

Pressing *Decrease* will decrease the value of a parameter displayed by one unit.

Clear

The *Clear* key has no effect in Configure mode.

7 System calibration

Connecting the Configuration module

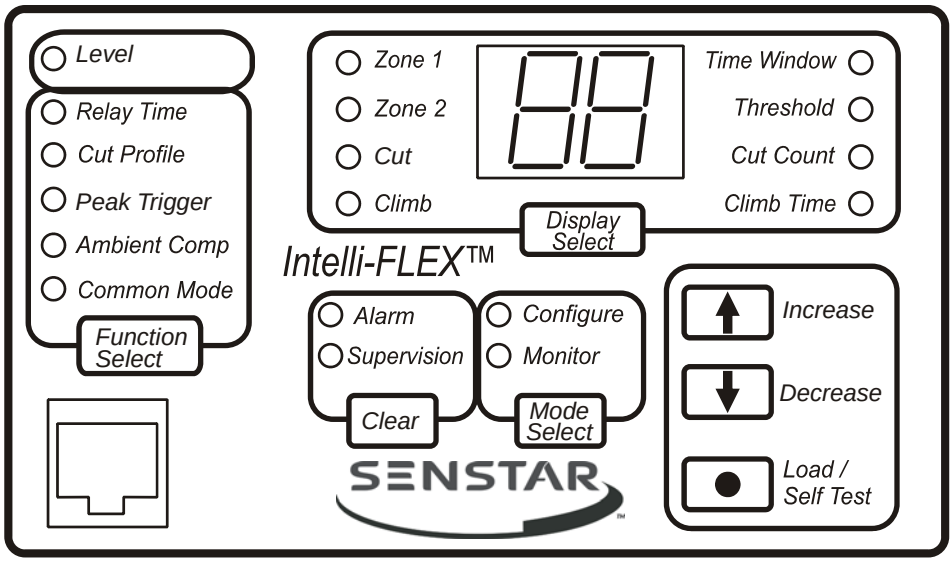


Figure 7-1: Configuration Module

Before any of the operations can be performed, the Configuration module must be connected to the processor. Proceed as follows:

1. Plug one end of the 8-pin cable into the Configuration module.
2. Plug the other end into the processor at J5.
3. Power up the processor.

As soon as the connection is made the Configuration module will begin to operate. It will sequence through the following steps:

- On the Configuration module - the Monitor LED will light up.

  AND

  On the processor - the 2 alarm, 2 supervision and 1 power LEDs will light up.

- On the Configuration module - Zone 1 and Zone 2 LEDs will light up, and for approximately 2 seconds "**dr**" will be displayed on the Configuration module. This indicates that the enclosure door is open.

  AND

  On the processor - the 2 alarm LEDs will clear.

- If no cable or power faults are present, the 2 supervision alarm LEDs on the processor will clear automatically.
- On the Configuration module - the *Monitor*, *Zone 1* and *Cut* LEDs will light, and the digital display will indicate the number of cuts in zone 1 required within the cut *Time Window* to cause an alarm.

If the Configuration module is attached with a supervision alarm active, the *Supervision* LED will light, along with the LED for the zone affected. The display will read **L1** or **L2** depending on which zone is affected. The configuration module will not respond to key inputs until the supervision alarm has been acknowledged.

- Press *Clear* to continue operation.

If the Configuration module is attached, and a power fail (PF) supervision alarm occurs both zone LEDs will light along with both *Supervision* LEDs. The display will read **PF** to indicate that input power is low.

- Press *Clear* to continue operation. (The power fail supervision alarm may be disabled by removing the jumper cap from JP5 on the processor board).

Configuration settings

Before the system is ready to use it must be configured and the parameters must be set to suit the site requirements. This section provides instructions to configure the system using the Configuration module.

The Intelli-FLEX system is shipped with factory preamplifier gain preset and parameter settings that are based on the "average" chain link fence for "typical" threat level scenarios. In many cases these settings can be used as supplied. If the fence type varies from the average, or if the threat is perceived as non-typical, the processor configuration parameters may be changed to accommodate these differences. These changes can be made using the Configuration module.

This initial calibration procedure must be performed before the system can be ready for use.

Preamplifier gain setting

The preamplifier gain is set at the factory to give good detection of intrusion activity on a typical chain link fence, while preventing nuisance alarms caused by bad weather. The gain setting may be changed if the fence characteristics vary substantially from that of a typical chain link fence, or if the user requires intruder response characteristics that vary substantially from a typical installation.

Gain setting procedure - Zone 1

To check and adjust the gain for zone 1 proceed as follows:

1. Connect the Configuration module.

   When the Configuration module is first connected, *Zone 1* and *Cut* LEDs light. The displayed value indicates the number of cut events that have yet to occur in zone 1 for an alarm to initiate. The supervision LED and the display momentarily indicate a supervision alarm, such as tamper, when the door is opened.

2. Press *Function Select* to select Level mode.

   The *Zone 1* and *Level* LEDs are lit. This indicates that you are viewing level values in zone 1. If there is some sensor input the value may immediately change from **00**. The reading will automatically clear.

   If you wish to change to manual Clear Mode, press *Clear*. This will hold the peak value until *Clear* is pressed.

3. To simulate a cut event, tap the fence once with a medium size screw driver, approximately 20 cm (8 in.) long, at the intensity level at which minimum detection is desired. See *Tapping the fence*.

   The level reading captured on the Configuration module display should be between **20** and **30**.

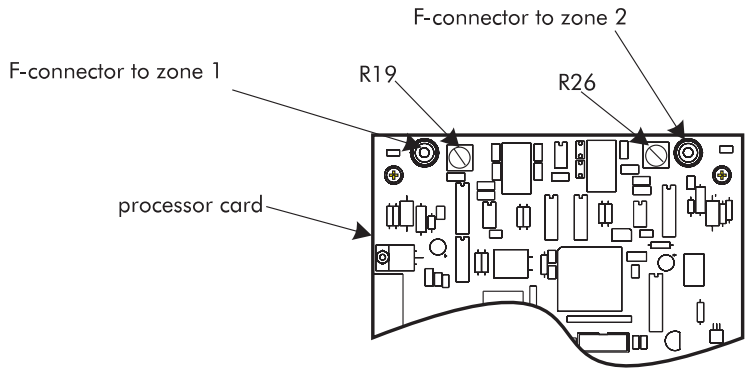


Figure 7-2: Adjusting the gain

4. If the Level displayed is less than **20**, increase the gain by turning R19, on the processor board, slightly clockwise.

   If the Level is more than **30**, decrease the gain by turning R19, on the processor board, slightly counter-clockwise.

   If the Level is between **20** and **30** continue to the next step.

5. Tap the fence again as close to the same intensity as before.

6. Repeat steps 3 through 5 until the Level readings consistently fall within a range of **20** to **30**. If you obtain a reading between **20** and **30**, at least four out of five times, the gain is properly set.

Gain setting procedure - Zone 2

To check and adjust the gain for zone 2 proceed as follows:

1. Press *Display Select* to select Zone 2.

   The *Zone 1* LED goes off and the *Zone 2* LED turns on. You are now ready to view the level in Zone 2.

2. If zone 2 is on the same type of perimeter fence as in zone 1, preset R26, on the processor board, to the same physical position as R19, before proceeding.

3. Procedure as in steps 3 to 5 in for Gain setting procedure - Zone 1, but adjust R26, on the processor board, instead of R19.

4. Exit the level mode by pressing *Function Select*. This will toggle the Configuration module back to the Monitor mode display.

Tapping the fence

The following procedure is used to simulate cut events. It is used when setting the preamplifier gain. The purpose of this simulation is to copy the noise that is made by cutting through a fence link.

There is quite a bit of variability in the noise that is made by cutting through a fence link.

Some of the factors that affect this variability are the thickness and hardness of the fence material, the sharpness of the cutters, the leverage of the cutters, and whether or not the cutters push or pull on the link as the cut is made. Another factor that affects the amount of noise made while cutting, is the tightness of the fence fabric. If the fabric is under tension considerable secondary noise is generated as the links of the fence pull back after being cut. After a number of cuts are made to the fence, the fabric is usually pulled back to make a hole large enough to pass through. This action creates even more noise.

> *Enough energy is generated during this process to set off an alarm several times.*

To adjust the gain for a fence it is necessary to create enough noise to reach threshold. This can be accomplished simply with an object such as a screwdriver. The impulse that is created by tapping a fence with a screwdriver is similar to that caused by a bolt cutter snapping through the links of a fence.

How hard should the tap be?

The answer to this depends on how sensitive to intrusion the fence is required to be.

as sensitive as possible The gain of the system may be set to respond to a pin drop. With this level of sensitivity nuisance alarms would be a constant problem, for instance with inclement weather.

just sensitive enough is the preferred alternative. This level of sensitivity would have a high probability of detection when a valid intrusion attempt is made, but would not be affected by bad weather, (i.e., nuisance alarms would not be caused by bad weather).

- To simulate a threshold event use a medium length screwdriver 20 to 30 cm (8 to 12 inches) long.

- Hold the screwdriver loosely in your hand and flip your wrist so that the blade of the screwdriver solidly impacts a link of the fence. This impact should occur at least 30 cm (12 inches) from where the sensor cable is mounted to the fence. This is a Medium Tap.
- Practice this tap a few times until you become consistent. Practice tapping consistently lighter, then consistently harder. These variations are similar to those that occur when the fence is being cut.
- You can read the intensity of your taps (set gain for about 25) on the Configuration Module while it is in Level Mode.

You can also simulate a cut event by weaving a scrap piece of fence fabric wire through the actual fence. Cut this piece and record the level. Now tap the fence until you achieve the same level. This is an alternate method of simulating a cut event. Tapping the fence using a screwdriver will achieve sufficient results.

Testing for proper intrusion detection

With the Gain adjustments confirmed, the system is ready to detect intrusion events. Used the following procedures to confirm system response along the fence.

Testing cut detection response in zone 1

1. Connect the Configuration module to the processor board. After it has initialized, check to make sure that the Configuration module is in Monitor mode with the *Zone 1* and *Cut* LEDs lit. The display will indicate the number of Cuts that must occur to initiate an alarm. (Factory default is 4)
2. If the Configuration module is already connected press *Display Select* as many times as required to set the Configuration module as described in step 1.
3. To simulate a cut event, tap the fence once with a medium size screw driver at the intensity level at which minimum detection is desired. Use the same intensity as you used during the gain setting procedure. (or slightly harder)

   The *Time Window* LED is lit, the *Threshold* LED lights momentarily, and the display has decreased in value by one.
4. Repeat step 3 until a cut alarm initiates.
5. When the cut alarm initiates the following will occur:
   - the *Zone 1*, *Cut* and *Alarm* LED's light
   - the audible alarm is heard
   - **L1** is displayed indicating that Zone 1 is in alarm
   - on the processor board, the *Zone 1* alarm LED is lit

6. When the alarm clears, the Configuration module display returns to the state it was in before the alarm occurred, the *Zone 1* alarm LED on the processor board goes off, the *Cut Count* and *Climb Time* are reset to their initial values, and the Cut and Climb Windows are reset.

Climb detection testing in zone 1

1. Connect the Configuration module to the processor board.
2. Press *Display Select* as many times as necessary to light the *Zone 1,* and *Climb* LED's.

   The display shows the number of seconds of climb activity that must accumulate before the *Climb Window* times out to initiate an alarm.
3. Attempt to climb the fence. The following events should take place:
   - the *Time Window* and *Threshold* LED's light.
   - the display will decrease in value as climb activity accumulates until the alarm is initiated. A climb alarm will not occur immediately. Sufficient climb activity above the climb threshold must accumulate to cause a climb alarm.
4. When the alarm initiates the following should occur:
   - the *Alarm*, *Zone 1* and *Climb* LED's are lit.
   - the display shows **L1**
   - the audible alarm is heard
   - on the processor board, the *Zone 1* alarm LED is lit
5. When the alarm clears, the Configuration module display returns to the state it was in before the alarm occurred, the *Zone 1* alarm LED on the processor board goes off, the *Cut Count* and *Climb Time* are reset to their initial values, and the *Cut* and *Climb Windows* are reset.

> *Occasionally the cut alarm will occur when a climb attempt is made. This might occur if the intruder pauses several times during the climb attempt. This allows the processor to decrement the cut count and may cause a cut alarm before the climb alarm. Although each is reported separately by the Configuration module, they energize the same alarm relay.*

Cut and climb detection testing in Zone 2

To perform the cut and climb detection testing for zone 2, set up the configuration module so that the *Monitor* and *Zone 2* LEDs are lit and the desired threat assessment LED (*Cut* or *Climb*) is lit, then proceed with the instructions described for Zone 1.

Configuration settings

The following are detailed step-by-step examples of how to view and change the Intelli-FLEX II configuration settings. A procedure similar to the examples below is used to sequence, view or change the other configuration settings.

Cut Count - Zone 1

To view or change the number of Cuts required to initiate an alarm in Zone 1 proceed as follows:

1. Connect the Configuration module to the processor.
2. Enter configuration mode by pressing *Mode Select*.

   The *Configure*, *Zone 1*, *Cut* and *Time Window* LEDs are lit. The display shows the number of seconds that the time window is currently set to.
3. Press *Display Select* twice to sequence the display and LEDs to show *Zone 1*, *Cut* and *Cut Count*.

   The display now shows the number or cuts that must be detected within the cut window to initiate an alarm.

   If your intent was to view the parameter you are finished. To change the parameter, continue.
4. Use *Increase* or *Decrease* as necessary to change the value for the *Zone 1, Cut, Cut Count*.
   - Pressing *Increase* will increase the parameter value by one unit each time the key is pressed.
   - Pressing *Decrease* will decrease the parameter value by one unit each time the key is pressed.
5. When the desired value is displayed, press *Load*.

> *Load must be pressed immediately after Increase or Decrease for the new value to the saved, otherwise the original value will be retained.*

Cut Count - Zone 2

To view or change the number of Cuts required to initiate an alarm in Zone 2, set up the Configuration module so that Zone 2 is selected instead of Zone 1, then proceed with the instructions for Zone 1.

Climb Window - Zone 1

To view or change the length of time for the Climb Window in Zone 1, proceed as follows:

1. Connect the Configuration module to the processor.
2. Enter configuration mode by pressing *Mode Select*.

   The *Configure*, *Zone 1*, *Cut* and *Time Window* LEDs are lit. The display shows the number of seconds that the time window is currently set to.
3. Press *Display Select* to sequence the display and LEDs to show *Zone 1*, *Climb* and *Climb Window*.

   The display now indicates the number of seconds that the *Zone 2, Climb Window* will remain active once it is activated.

   If your intent was to view the parameter you are finished. To change the parameter, continue.
4. Use *Increase* or *Decrease* as necessary to change the value for the *Zone 1, Climb, Climb Window*.
   - Pressing *Increase* will increase the parameter value by one unit each time the key is pressed.
   - Pressing *Decrease* will decrease the parameter value by one unit each time the key is pressed.
5. When the desired value is displayed, press *Load*.

> *Load must be pressed immediately after Increase or Decrease for the new value to the saved, otherwise the original value will be retained.*

Climb Window - Zone 2

To view or change the length of time for the Climb Window in Zone 2, set up the Configuration module so that Zone 2 is selected instead of Zone 1, then proceed with the instructions for Zone 1.

Zone profile evaluation

After all of the system calibration procedures have been performed proceed with a zone profile evaluation.

A zone profile is a set of level readings taken from each fence panel in a particular zone that is used to asses the performance of that zone after the preamplifier gain has been set.

- For each panel, tap the fence consistently 1 to 3 times and record the level reading in a table similar to the one illustrated. These Level readings give a profile of the fence response to cut events.

Zone ____	**By _____**		**Date_____**	
panel number	**Tap 1**	**Tap 2**	**Tap 3**	**Avg.**
1				
2				
3				
4				
5				
etc.				

- Make a graph of the level reading versus the panel number. The performance of the zone can be assessed using this graph.

Excellent zone profile

If the preamplifier gain is adjusted for a Level reading of 25 and all panels tested in that zone give level readings between 20 and 30, the result is an EXCELLENT zone profile.

Excellent profiles are most often found on new fences that are in excellent condition. The poles are rigid, and the fabric is tight and consistently tensioned.

Good zone profile

A zone with level reading that range from 15 to 45 would be considered as having a GOOD zone profile.

Often a zone may have only a few panels that are 15 or 45. Such a profile would be considered closer to EXCELLENT than GOOD.

It usually takes only minor work on a fence to improve its condition enough to achieve an EXCELLENT zone profile, however, an Intelli-FLEX II system will run effectively in a zone with a GOOD zone profile.

Poor zone profile

If Level readings on 2 or more panels are below 15, increase the preamplifier gain in order to achieve a level reading of 15. If doing this increases the high value level readings to greater than 60, the zone would be rated as having a POOR zone profile.

The system will be effective with a POOR zone profile, but may be susceptible to nuisance alarms from heavy wind and rain.

POOR zone profiles are caused by large variances in the character of the fence. These changes are most often caused by variance in the toughness of the fabric, arrangement of supporting poles, changes or overlaps in the fence fabric material, or material on the fence that dampens vibrations in the fabric.

If a high level of performance is expected from the Intelli-FLEX II system, the fence must be improved, so that the zone profile can rate at least GOOD.

Contact Senstar Customer Service for information on correcting poor zone profiles.

a Maintenance/Troubleshooting

Maintenance

The Intelli-FLEX system requires minimal maintenance to ensure proper operation. However, setting up and following a maintenance schedule based on your site-specific requirements can ensure proper detection performance, prevent nuisance alarms and extend the operational lifetime of the system. The frequency at which the maintenance should be scheduled depends on your security requirements and on the installation environment. This section includes the recommended maintenance activities along with suggested intervals.

1. Perform a visual inspection of the installation (once per month).
    - fence condition - ensure the fence is in good condition and that there are no loose panels, loose fittings or metal bits that can move with the wind and cause nuisance alarms (a shake test in which you grip the fence fabric in the middle of a panel and gently shake it with an increasing motion can help identify any loose pieces)
    - there are no washouts or depressions under the fence
    - vegetation beside and above the fence is cut back and cannot make contact with the fence
    - the sensor cables are held snugly against the fence fabric and the cable ties are holding the cable securely in place
    - there is no loose sensor cable
    - connectors and terminator enclosures are properly mounted according to the installation instructions
    - there is no corrosion or moisture inside the processor enclosure
2. Physically test the system (once per week).
    - use a screwdriver to simulate a cut intrusion and verify a cut alarm is declared

- if your system includes self-test terminators perform electronic self-tests of each sensor zone
- if desired, you can also perform a climb test and verify that a climb alarm is declared

3. Repeat the zone profile procedure and compare the results with the initial zone profile (twice per year at major seasonal changes). If there is a significant change between the profiles, recalibrate the sensor zone.
4. Battery test (once per year)
   If your Intelli-FLEX processor(s) include battery back-up, disconnect the power to the processor and allow it to run on battery power, until the battery runs down and the system shuts down. Record the length of time the processor runs on the battery power. Replace the battery when the battery run-time no longer meets your site requirement.

Troubleshooting

This section provides information that will be useful when attempting to locate and correct problems with the Intelli-FLEX II system. It is organized by problem symptom as follows:

- Supervision related problems
- Detection problems
- False/Nuisance alarm problems
- Power problems
- Configuration module problems
- Audio module problems

Because these problems can interact, it may be difficult to determine which problem to deal with first. If the observed symptom(s) cannot be classified into one or more of the above areas, it is advisable to determine if proper supply voltages are present first. If proper voltages are present, correct processor operation should be verified.

On the processor board, to verify that the microcontroller is running properly, proceed as follows:

- Remove power by removing the power connector from TB-1 for at least 5 seconds.
- Re-insert the power connector to TB-1 taking care to insert power connector in the correct place.

- Make sure that the startup sequence occurs properly on power up.

The correct startup sequence on the processor board is as follows:

1. Alarm and Supervision relays are energized. (LED's on processor board light up.)
2. After the Alarm Relay Time (factory setting is 2 seconds) the Alarm relays clear. (The relays will click and the Alarm LEDs will go off.) If there are no supervision alarms, the supervision relays will clear (Supv LEDs off).

If the Configuration module is connected, the start up sequence is as follows:

1. The display will initially be undefined. Some or all of the LED's will light.
2. The display will momentarily indicate **dr** to show the enclosure door is open.
3. The Configuration module will display the current status. If there are no supervisory alarms, the *Zone 1* and *Cut* LEDs will be lit, and the display will show 04.
4. The *Monitor* mode LED will be lit.

Supervision related problems

Supervision alarms occur in the Intelli-FLEX II system for the following reasons:

- The supervision current in a sensor line is outside of prescribed limit. (Supervision alarm in affected zone.)
- Power fail (**PF)** occurs when the DC PWR input to the processor is below a voltage that is sufficient to Provide 11.5V from the converter (Supervision alarm in both zones.)
- A tamper alarm occurs when the door to the enclosure is not tightly closed, and the Configuration module is not attached. (Supervision alarm in both zones.)

Supervision alarms can displayed on the Configuration module only while it is in Monitor mode.

Pressing *Clear* on the Configuration module will clear the supervision report from the display and unlock the Configuration module for normal use. The Supervision Relays on the processor will remain closed, and the *Supervision* LED's on the processor board and on the Configuration module will remain lit as long as the Supervision alarm persists.

Sensor line supervision

A supervision alarm occurs when the supervision current on the Intelli-FLEX II sensor line falls outside the prescribed design limits. This usually occurs when there is an open or a short in the sensor cable

Indication

A sensor line supervision alarm is indicated on the processor board when the supervision relay, normally-closed contacts close, and the amber colored *supervision* LED for the affected line is lit.

If the Configuration module is attached, a sensor line supervision alarm is indicated when the display indicates **L1** for Line 1 and the *Zone 1* LED is lit, or **L2** for Line 2 and the *Zone 2* LED. If both Zones are in supervision at the same time the Configuration module will display **L2** and both *Zone 1* and *Zone 2* LEDs will be lit.

If there is a sensor line supervision alarm, check the following for the affected line.

Conditions

1. If the sensor line is connected, is the correct jumper cap removed? Remove JP1 for Line 1, and JP2 for Line 2.
2. Is the sensor line open or shorted? Check the resistance between the center conductor and shield. Resistance should read between 950 K Ohms, and 1.05 M Ohms.

   If the resistance is outside this range, check the line for opens or shorts.
3. If the sensor line is not connected, the Jumper cap should be in place to effect “Local Supervision”. Insert jumper cap on JP1 for Zone 1, (JP2 for Zone 2).
4. If items 1 through 3 check out and a sensor line supervision alarm persists, check voltage at TP4 for Zone 1 and TP5 for Zone 2. The voltage should read between 2.2 volts and 2.8 volts DC.

   A voltage reading outside this range indicates a problem on the processor board.

5. If a voltage within the range specified in step 4 is read, and a sensor line supervision alarm persists there is a problem with the processor board.

12 volt low supervision

A 12 volt low supervision alarm occurs when the DC voltage on the VDD line drops below 10.0 volts. The 12 volt low supervision alarm should clear, when the VDD line voltage is greater than 10.5 volts DC.

Indication

A 12 volt low supervision alarm is indicated on the processor board when the normally-closed contacts on the supervision alarm relays for both zones close. Both amber *Supervision* LEDs on the processor will light.

A 12 volt low supervision alarm is indicated on the Configuration module when the display reads **dc** and both *Zone 1* and *Zone 2* LEDs are lit.

Conditions

If 12 volt low supervision alarm does not occur when VDD voltage falls below 10 volts proceed as follows:

1. Check that jumper cap JP5 is in place between pins 1 and 2. This jumper cap must be in place to report an DC 12 volt low condition.
2. If a 12 volt low supervision alarm does not occur when VDD voltage is less than 10 volts and jumper cap JP5 is in place, there is a problem with the processor board.

If a 12 volt low supervision alarm occurs when DC Power Distribution voltage is presumed to be applied:

1. Measure DC voltage at TB1 terminals 1, and 2. The DC voltage must be greater than 18 VDC for the supervision alarm to clear.
2. If a voltage greater than 18 VDC is measured in step 1, and the supervision alarm persists there is a problem with the processor board.

Tamper supervision

A tamper supervision alarm occurs when the door of the enclosure that houses the Intelli-FLEX II processor is opened. When the door is tightly closed, a small magnet is held close to a Hall-effect sensor. The output from the sensor to the

processor is low when the door is closed. (The magnet held close.) The output from the sensor to the processor increases when the door is opened. (Magnet moved away.) This initiates a tamper supervision alarm.

Indication

A tamper supervision alarm is indicated on the processor board, when the normally-closed contacts of the supervision alarm relays close, and the amber *Supervision* LEDs for both zones are lit.

A tamper supervision alarm is momentarily indicated on the Configuration module, when the module is initially connected to the processor. The display momentarily shows **dr** indicating that the door is ajar, and the *Zone 1*, *Zone 2* and *Supervisor* LEDs light. This alarm is cleared while the Configuration module is connected, but reappears when the Configuration module is disconnected and the enclosure door is still open.

The tamper supervision alarm may be cleared by placing a jumper between TP-8 (door) and TP-11 (gnd) on the processor board.

Conditions

If the tamper supervision alarm does not clear when the enclosure door is closed, proceed as follows:

1. Ensure the door is tightly closed. You should hear the supervision relays switch (click) when the door is tightened down or loosened up.
2. If the alarm does not clear with the door tightly closed, remove the magnet from the door by twisting it counter-clockwise. Place the magnet on the Hall Effect sensor (HS1) to simulate a closed door.
3. If the magnet clears the door tamper, it is possible the magnet on the door needs to be repositioned. Contact Senstar for instructions on how to reposition the magnet. This should be done with care, since it is possible to damage the processor board and the Hall effect sensor if it is not done properly.
4. If the magnet does not clear the tamper alarm, there is a problem with the processor board.

If the tamper alarms does not occur when the enclosure door is opened, proceed as follows:

1. Make sure that there is no jumper wire between TP8 and TP11.
2. Assure yourself that the processor is working properly in other respects.

3. Check the voltage on TP8 (sensor) to TP11 (GND). If it is less than 2 volts, the sensor is probably defective. If the voltage is more than 3.5 volts, the sensor is probably OK but there is a problem with the processor board.

Detection problems

The most likely causes for detection problems are discussed in this section along with simple tests that can be made to locate and fix them. Lack of detection can be caused by problems in three major areas:

- sensor cable and sensor cable installation
- processor parameter settings and adjustments
- methods used to confirm detection

Sensor cable and installation problems

The Intelli-FLEX sensor cable is 100% pre-tested to a minimum sensitivity specification at the factory. Although the cable is rugged, it can be damaged during installation by applying excessive tension, or by kinking it.

> *Carefully follow the cable installation instructions detailed in chapter 5. Do not over tighten the tie wraps. Be sure to install drip loops at all junctions and splices to help prevent water from getting into the cable.*

If you are experiencing detection problems after properly installing the sensor cable, check the following items:

1. Measure resistance between the center conductor and outer shield of the female F-connector on the cable that attaches to the processor. Resistance should measure between 950 K ohm and 1.05 M ohm. A resistance reading in this range indicates good cable continuity and terminating resistance. If the reading is outside this range the problem with the cable or terminating resistor must be found and corrected.
2. Visually inspect all junctions and connections to insure they are well mated. Be suspicious of any connection that is not “Perfect”.

Be sure that the cables are connected center-to-center, and shield-to-shield.

3. Switch the processor to Level mode on the Configuration module, and tap the fence in the selected zone to obtain a level reading. If a level reading is obtained, go to step 4. If a Level reading is not obtained and/or you do not see a response when the fence is tapped, it is likely that the processor board is defective. Repeat this step with a known good processor board to verify that the problem is in the sensor cable.
4. Attach a high impedance input amplified speaker to the pre-amp test point for the zone you are testing. (Contact Senstar for availability.) Compare the sound of the zone that is not working properly with one that is for clues that might lead to the cause of the problem.

When you have established that the sensor cable is providing a signal to the processor, proceed with *Preamplifier gain setting* on page 7 - 3 and *Testing for proper intrusion detection* on page 7 - 6. If the zone passes these tests proceed with *Zone profile evaluation* on page 7 - 10.

Uneven detection profiles are often due to differences in fence fabric tension on different panels of the fence, some differences may also be due variations in the sensor cable installation. Some variation in response is normal and acceptable. The preamplifier gain setting should be set just high enough to provide adequate performance in the low response areas.

Be sure you have selected, and are monitoring the zone you are testing. The cut count should decrease each time the fence is tapped. If this does not happen each time, tap harder until the tap intensity required for detection is established. This should not be excessive.

If you find that taps which produce a level reading above 20 are not detected, contact Senstar Customer support.

Adjusting low detection spots

The following procedure is used to correct areas of low detection sensitivity on standard Intelli-FLEX sensor cable. For information about correcting low spots on Mark 2 sensor cable, refer to instruction sheet 15 at the back of this manual.

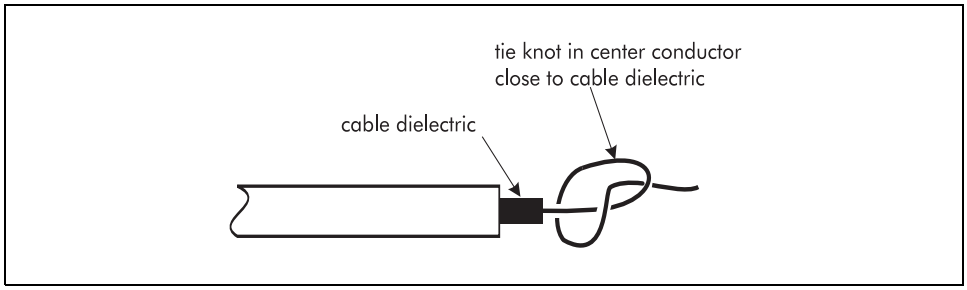
Occasionally low detection spots can occur along the installed cables. These may be caused by mishandling the sensor cable, which may have altered the relative lengths of the cable dielectric and center conductor. This can result in an excess of center conductor bunching up inside the cable.

- Verify that the cable is correctly installed and is not slack in the area of the low spot. If there are any visible installation problems, remove the sensor cable and reinstall it correctly, under 2.2 to 4.5 kg of tension.
- Ensure that the fence fabric is not loose and that the sensor cable is not installed to closely to tension wires, support posts, or other cables.

If the above steps do not correct the problems, adjust the low spots as follows:

Low spot near the end of the cable

1. Remove the cable from the fence at that end where the low spot is located, back to a point beyond the low spot. Lay it carefully on the ground in a straight line.
2. Using pliers to grip the center conductor, apply 2.2 to 4.5 kg (5 to 10 lb.) of tension on the center conductor while lightly tapping the cable at 1 m (3 ft.) intervals back to a point beyond the area of low detection sensitivity.
3. Tie off the center conductor close to the cable dielectric to keep it from slipping back into the cable.



4. Cut off any excess center conductor, re-terminate the cable, and re-install the cable on the fence.

Low spot in the middle of a long section of cable

1. Remove the cable from the fence over the length of the low spot.
2. Cut the cable at the mid-point of the low spot.
3. Adjust the length of the center conductor as described above for both sections of the cable.
4. Splice the cable back together using the standard splice kit.
5. Re-install the sensor cable on the fence.

If the methods described above DO NOT eliminate the low spot, replace the cable section with a new length of Intelli-FLEX cable.

False/Nuisance alarm problems

An alarm is considered a *False alarm* when the cause for the alarm cannot be determined. When no cause can be determined, the alarm is considered to have arisen due to a defect or failure in the alarm system.

An alarm is considered a *Nuisance alarm* when a cause for the alarm can be determined. It may be an entirely proper sensor response to a stimulus on the fence. It may also be caused by a sensor response to a stimulus on the fence that should not cause an alarm.

False alarms can occasionally be traced to legitimate events that triggered the alarm. For example, alarms in adjacent zones were traced to deer feeding near the fence and occasionally bumping against it; and alarms were also traced to a hawk that perched next to the fence and proceeded to bang its prey against the fence. These examples illustrate that unexplained false alarms are often legitimate nuisance alarms.

An alarm should be considered valid until it is proven to be invalid.

An excessive number of false or nuisance alarms can usually be traced to one or more problem areas.

- Noisy or intermittent connection in sensor cable
- Poor fence condition
- Attaching center conductor to shield at any splice point
- Poor system grounding
- Incorrect system setting and adjustment

Noisy or intermittent connection in sensor cable

One of the most common causes of false alarms, is a poor connection at a junction or splice in the sensor or non-sensitive feed cable. Inspect the cable for problems in this area. Often a cable that has a noisy connection will give a correct resistance reading.

- Wiggle the junction slightly while listening to the signal to see if the problem is at the junction. The difference between the sound of the cable reacting to some movement and the sound due to a loose connection is obvious.

Poor fence condition

The second most common cause of false and nuisance alarms is poor fence condition. The Intelli-FLEX II processor discriminates between weather related noise and intruder noise by distinguishing impulse characteristics from the general background. The impulse energy produced when a loose fence element rattles, or when a loose fence wire swings and impacts the fence, is similar to that produced by an intruder. This can cause nuisance alarms. Poor fence condition is the leading cause of nuisance alarms on windy days.

Refer to *chapter 4, Site planning*, for fence upgrade or installation guidelines.

Attaching center conductor to shield

If the center conductor is attached to a shield of a sensor cable or non-sensitive feed cable there will be a very large amount of noise picked up which will cause alarms to continuously occur.

You can listen for this using an amplified speaker. You may find that in order to stop the repeated alarms you have to turn the preamplifier gain down so far that tapping cannot be detected.

If you experience this even at low gain settings, check each splice to make sure the center and shield wires are not crossed.

Poor system grounding

Poor system grounding can cause excessive 50/60 Hz hum pickup.

Switch to Level mode and observe the display reading. It should be **00** or **01**. If the reading is greater than **01** on a calm, quiet day, attach a high impedance battery powered amplified speaker to the preamplifier test point for the zone you wish to monitor. There should be very little or no discernible hum from the speaker.

If there is excessive hum, ensure that there is a good earth ground connection to the processor mounting plate ground lug located inside the enclosure. This earth ground provides for lightning protection as well as reducing or eliminating 50/60 Hz hum pick up in the system.

Do not use the fence structure as an earth ground reference. *See Grounding on page 5 - 47.*

Incorrect system settings and adjustments

When the system is installed properly, on a tight, well maintained fence, and all possible problems with the sensor cable and system power have been eliminated, but a high nuisance alarm rate is still experienced, the system settings and adjustments must be inspected to make sure the processor is matched to the fence.

The Adaptive algorithms used by the Intelli-FLEX II processor are most effective when the preamplifier gain, and the event thresholds are set properly.

Power problems

This section describes typical problems that might be encountered when operating the Intelli-FLEX II processor from different types of power sources.

Power fail shutdown

A power fail shutdown is not a supervision alarm, because when this condition occurs the processor goes off line. This condition causes the supervision alarm relay, normally-closed contacts to close. The normally-closed contacts of the alarm relays also close.

Indication

A power fail shutdown is indicated on the processor board when the supervision and alarm relays for both zones, normally-closed contacts close, and all the LEDs on the processor board light. The LEDs will remain lit until the voltage drains.

A power fail shutdown is indicated briefly on the Configuration module when the display momentarily shows **dc** the *Alarm* and *Supervisor* LEDs light, and the alarm beeper momentarily sounds. The display and all LEDs go off, except the *Monitor* LED which stays lit until DC voltage is too low to light it.

Conditions

The power fail shutdown occurs when DC voltage on the VDD line TP-2 drops below 8 volts. The condition clears and the processor restarts when the voltage on the VDD line is 11 volts.

DC power operation

If the Intelli-FLEX II Processor is being operated on 12 VDC power using the DC power/float charger and Gel Cell battery, and a low voltage DC shutdown appears to be indicated, proceed as follows:

1. Measure DC voltage applied to TB1 terminals 3 (—) and 4 (+). If voltage is less than approximately 11 VDC, the shutdown indication is correct. Voltage must reach 11 VDC or greater for the power fail shutdown to clear.
2. If DC voltage measured in step 1 is greater than 11 volts, and the power fail shutdown persists, there is a problem with the processor board.

If the Intelli-FLEX II processor is operating on 12 VDC power using the DC power/float charger and Gel Cell battery, and the DC voltage is known to be too low, (less than approximately 8 VDC), and a power fail shutdown does not occur there is a problem with the processor board.

Battery operation

The only time the Intelli-FLEX II system is powered by battery is when AC power is lost to the DC power/float charger or it is temporarily disconnected. Follow the same steps as for DC power operation.

AC power operation with no battery backup (not recommended)

If the DC power/float charger is used without a backup battery, an AC power shutdown can result in the DC power/float charger not powering up properly when AC power is restored. Always connect an approved battery across the outputs of the DC power/float charger.

12 volt low supervision alarm

If 12 volt low supervision alarm is indicated (See “Supervision related problems” on page 3):

1. The 12 volt low supervision alarm trips at 10.0 VDC and resets at 10.5 VDC on the VDD line TP-2.
2. If the voltage to TB1-1 and 2 is greater than 18.0 VDC, there is a problem with the processor board.

3. If the DC voltage is less than 18.0 VDC, find the cause and correct it. Check output from the central power supply. It should read at least 24 volts. Is there too much voltage drop in the line to the processor?

System shutdown

The system will operate with a 12 volt low (Power fail) supervision alarm, (11.0 VDC) but will shut down if the DC voltage at VDD drops below 8.0 VDC. The system will come back on line when DC voltage rises to 11.0 VDC. The 12 volt low supervision alarm will clear when the converter output voltage rises to 10.5 VDC.

1. If the DC voltage input to the processor at TB-1 terminals 3 and 4 is greater than 11.5 VDC, and the processor does not operate, there is probably a problem with the processor. Be sure to investigate other symptoms in this troubleshooting section before concluding the processor board has failed.

AC operation with battery backup

An individual processor may be powered from 115 VAC by using the DC power/ float charger and battery provided, and by applying the +12 VDC to TB1 pins 3 (—) and 4 (+).

If the backup battery has been fully discharged, it may take some time after AC power is restored to charge the battery to a sufficient voltage to operate the Intelli-FLEX II processor. When this occurs, the power fail shutdown will be in effect until the battery voltage reaches approximately 11 VDC. It may take a few minutes for the voltage on a fully discharged good battery to reach 11 volts.

A defective battery may never charge to reach 11 volts. If the 0.8 amp-hour battery that is supplied with the Intelli-FLEX II processor does not reach 11 volts after about 10 minutes of charging, it is defective and should be replaced. A defective battery that is fully discharged may quickly charge to a voltage of 11 volts, but not hold a charge. Be sure to replace the backup battery at the recommended intervals suggested by the battery manufacturer for your local environment. Avoid placing gell cell batteries in extreme temperature environments if possible.

If a known good battery fails to charge to at least 11 VDC after about 10 minutes the DC Float charger module should be suspect.

Operation on distributed low voltage DC

If the system is powered by distributed low voltage (24 or 48 VDC) a backup battery should not be connected at the processor.

The converter used on the Intelli-FLEX II processor will operate over an input range of 18 to 56 VDC. If the input voltage is in this range and you measure less than 11 volts at TP2 (VDD), check to make sure the total load on the processor is less than 250 mA. (Remove other loads that may be attached to the processor and drawing power, including the Configuration module.) If the total load is less than 250 mA, and the voltage is less than 11V the processor is probably bad.

Configuration module problems

The Configuration module that attaches to the Intelli-FLEX II processor is a device that receives data from the processor then lights the appropriate LEDs and displays the appropriate message on the LCD. The switch information is encoded by the Configuration module and read by the processor. Problems that might occur with the Configuration module can be classified as follows:

Indications

The following indicate a possible problem with the Configuration module.

- Malfunctioning display segment or LED.
- Erratic display output during update.
- Improper or erratic response (or no response) to switch operation.

Almost all instances of improper Configuration module operation are caused by a poor connection to the processor.

Conditions

If you are experiencing problems with the Configuration module, check the following:

1. Be sure that the cable between the processor and the Configuration module is in good repair, and is the correct pin configuration (Pin 1 to Pin 1).

Cables that have not been supplied by Senstar may have Pin 1 connected to Pin 8.

2. Do not use a cable longer than 2.5 m (8 ft.).
3. Be sure cable connectors are seated securely (snapped) in the socket on the processor and Configuration module.
4. Be sure the sockets on the processor and Configuration module are not dirty, contaminated or damaged.

The Intelli-FLEX II processor functions without the Configuration module. A malfunction in the Configuration module generally will not cause the processor to malfunction. Do not confuse improper Configuration module operation with improper Intelli-FLEX II processor operation.

After the cable and connections have been eliminated as the cause of improper operation, check the following items.

1. If only one display segment or LED does not light when it should, it is defective, and the Configuration module requires service.
2. If more than one display segment or LED indicator is always on or off, there may be a problem with the interface. Check for proper switch response. If switch response appears OK, the interface is good. The problem is likely in the Configuration module. If possible confirm by testing the Configuration module with a known good processor.
3. If the Configuration module works fine with a known good processor, the other processor should be suspect, but this is a rather rare occurrence.

Always confirm the Configuration module is defective by attaching to another processor, if available, and by trying a new cable, before concluding the Configuration module is defective.

b Spare parts list

Component name	Part number	Model number	Description
Sensor cable	C6SP0300	2386-01	300 meter (1000 ft.) Intelli-FLEX/E-FLEX, sensor cable
	C6SP0301	2386-02	150 meter (500 ft.) Intelli-FLEX/E-FLEX, sensor cable
	C6CA0400	2388-R1	7.5 meter (25 ft.) Intelli-FLEX/E-FLEX, non-sensitive feed cable complete with right-angled F-connector
Mark 2 Sensor cable	C6SP1001	IFC-Mark2-150	152 meter (500 ft.) Intelli-FLEX/E-FLEX, Mark 2 sensor cable
Tie wraps	H0824	2366	UV-rated plastic cable ties (1000 pieces)
Cable terminator/splice kit	C6KT0200	SK-8	Single cable terminator/splice kit
	C6KT2600	SK-9	Single cable terminator/splice kit for Mark 2 sensor cable
Configuration module	C6EM0200	2495	Required for system calibration and configuration
Float charge 115/230 VAC	P0119	IFL-PS100-230	Power supply/float charger, wide input voltage 100-230 VAC, 13.5 VDC, indoor, requires battery
Back-up battery	E0392	—	Rechargeable gel-cell type battery, 12.0 VDC, 0.8 Ah.
24 VDC power supply (85-265 VAC 50/60 Hz)	C6AD0300	IFL-NPS	Network power supply, 85-265 VAC/24 VDC @ 2.5 A, 50/60 Hz (order specific line cord for destination country)
Local gate bypass module	C6EM0300	2490-2	Provides security across a sliding or swinging gate. Operated locally.
Remote gate bypass module	C6EM0400	2490-1	Provides security across a sliding or swinging gate. Operated remotely.
Sliding gate disconnect assembly	C6KT0100	EJ-8	Provides security across a sliding or swinging gate.
	C6KT0101	EJ-9	Sliding gate disconnect assembly for Mark 2 sensor cable, provides security across a sliding or swinging gate

Component name	Part number	Model number	Description
Intelli-FLEX II dual zone processor	C6BA0102	—	Intelli-FLEX II dual zone processor board complete with mounting plate.
Intelli-FLEX II dual zone processor & enclosure	C6EM0701	—	Intelli-FLEX II dual zone processor board complete with mounting plate, mounted in a fiberglass NEMA 4 rated enclosure.

C Component specifications

Intelli-FLEX II Processor

Maximum sensor cable length	305 meters (1000 feet) for each zone
Operating power - AC	115 VAC (nom) or 230 VAC (nom) float charger/power supply and back-up battery included with processor
	+13.5 VDC from float charger is applied to TB1 3(-) and 4(+)
Operating power - DC	+18 VDC (50 ma) minimum to 56 VDC maximum (15 mA) applied to DC/DC converter via TB1-1 (+) and TB1-2(-)
Power consumption	3 W maximum (including configuration module)
Environmental	-40 to +70°C ambient temperature, inside the enclosure
	Up to 95% relative humidity, non-condensing
Outputs	One supervision and one intrusion relay for each zone.
Controls: (one for each zone)	
Pre-amplifier gain	R19 and R26 variable resistors on the processor control the preamplifier gain.
Cut-through count select	User defined using the Configuration module 1 to 10 cuts may be selected.
Climb-over time select	User defined using the Configuration module 1 second up to the value of the Climb Window of accumulated climb time may be selected.
Alarm output duration	Adjust time that alarm relay will respond per detected intrusion attempt. (0.5 to 5.0 seconds) Factory set at 2 seconds.
Cut-through window	Selects the time duration before the cut count is reset (10 to 99 seconds) Factory set at 30 seconds, each zone cut through window may be set independently.
Climb-over window	Selects the time duration before the climb time is reset (Minimum=Climb time; Maximum=99 seconds) Factory set at 20 seconds, each zone cut-through window can be set independently.
Adjustable event threshold	User definable using the Configuration module. Adjust threshold level at which an event is recognized. Cut and climb threshold can be independently set for each zone.
Enclosure	NEMA 4 fiberglass Enclosure - dimensions 30.0 cm high x 25.0 cm wide x 15.0 cm deep (12.00 x 10.00 x 6.00 inches) nominal
Connector	Type-F coaxial cable input. Other connections made via removable terminal blocks
Tamper switch	PCB-mounted magnetic Hall-effect sensor

Gate bypass module

	2490-1 Local Unit	2490-2 Remote Unit
Operational	No alarm generated when switching to access or secure modes	
	Tamper terminals to protect the housing	
	Status terminals to indicate to the annunciation system the state of the bypass unit, (bypass, secure).	NA
Housing	steel, epoxy paint, rain proof, hasp closure (with provisions for lock)	valox, moisture/rainproof (with silicone seal applied)
Electrical switch	MEDECO high security, DPDT, 28 VDC, 7 amps	NA
Terminating resistor	internal 1 meg ohm, can be used to terminate the sensor cable	
Tamper switch	single-pole, single-throw (SPST) microswitch	double-pole, single-throw (DPST) microswitch
Environmental temperature	-40 to +66 ºC	

Glossary

Ambient compensation Refers to the ability of the Intelli-FLEX II to sense the environmental signal levels in the zone. Adjustments are made to the detection algorithms based on these signal characteristics so that response to weather conditions is minimized without reducing detection capability. This is a technician level adjustment. See Chapter 6 for more information.

Climb A threat scenario in which an intruder attempts to climb over the fence.

Climb time The amount of accumulated time above a prescribed threshold that a climbing activity must be present, within a selected period of time, to generate an alarm output from the Intelli-FLEX II processor.

Common mode A criteria for determining if the ambient noise seen on a sensor wire may be used to determine if ambient compensation should be applied in the zone. When enabled, it requires that the noise level in one zone be within 1/2 of the noise level in the other zone for ambient compensation to be applied to the zone.

Cut A threat scenario in which an intruder uses a mechanical aid to cut through the fabric of the fence.

Cut count The number of cuts required within a selected period of time to generate an alarm output from the Intelli-FLEX II processor.

Cut profile A parameter that determines the percentage that the cut window is extended for each cut event. It may be set from 01 (10%) to 10 (100%). For example, if the cut profile is set at 02 (default 20%) and the cut window is set for 30 seconds, each cut will extend the cut window by six (6) additional seconds.

Proper use of this parameter allows the cut window to be set for a shorter time than might ordinarily be necessary, because it is automatically extended when the fence is attacked. The effect is to reduce false alarms.

Intrusion alarm An output generated by the Intelli-FLEX II signal processor when predetermined alarm requirements are met.

Level The peak or average signal that is captured by the processor from the sensor cable.

Peak trigger Refers to a reference value that an event must exceed in order to be recognized as a cut event. Proper setting of this parameter allows the adaptive algorithms to effectively ignore heavy rain, without affecting detection capability.

Supervision alarm An output generated by the Intelli-FLEX II processor when the sensor cable has been shorted or opened, the A/C power fails, or the enclosure is opened.

Threshold A level setting that an input signal from the sensor cable must exceed to be considered a cut or climb event. These events are accumulated by the processor to determine alarm status.

Time window A period of time that is initiated when a cut or climb event is first detected. During this time window, cut and climb events are recorded. If the cut count or climb time requirement is reached while the time window is still active, an alarm will occur. If the cut count or climb time requirement is not reached, the time window will reset after a specified period of time. If neither the cut count or climb time requirement is met before the time window resets, the cut count and climb time accumulations are reset.

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Intelli-FLEX™

Instruction Sheet #15

September 5, 2008
C6DA1503-001, Rev F

Mark 2 sensor cable installation procedure

Introduction

Before installing Mark 2 sensor cable (PN C6FG0902) you MUST stabilize the cable. Prior to stabilization, the center conductor may be bunched up in places, or misaligned with the dielectric. Stabilizing the sensor cable eliminates any bunching, and aligns the center conductor with the dielectric. The result is uniform detection sensitivity over the full length of the sensor cable.

Intelli-FLEX Mark 2 sensor cable includes a solid center conductor. You must handle the cable carefully to prevent any twisting, bending, kinking or stretching of the cable. Mishandling the cable will adversely affect the center conductor, resulting in reduced sensitivity in the affected area.

Cable stabilization procedure

This procedure requires three people to complete (2 grippers and 1 stabilizer).

1. Carefully, unspool the sensor cable alongside the fence in a long straight line (recommended). Otherwise, unspool the cable in as long and straight a line as site conditions allow, and then form a gentle bend (with a large turn radius) doubling the cable back toward the starting point. Or, unspool the cable around a fence corner (with a large turn radius). Ensure that the cable is NOT pulled tightly against a fence post, or bent, as it goes around the corner.
2. Once the sensor cable is fully dispensed, check the ends of the cable to verify that the center conductor is free to retract or extend (i.e., the cable end is not pinched, flattened, twisted, bent, or distorted). If an end is damaged enough to prevent the free movement of the center conductor, you must cut off the damaged section.

There must be at least 30 cm (12 in.) of exposed center conductor at each end of the sensor cable.

3. Carefully remove 30 cm (12 in.) of the outer jacket, shield and dielectric to expose 30 cm of the center conductor at both ends of the cable.

DO NOT nick the center conductor.

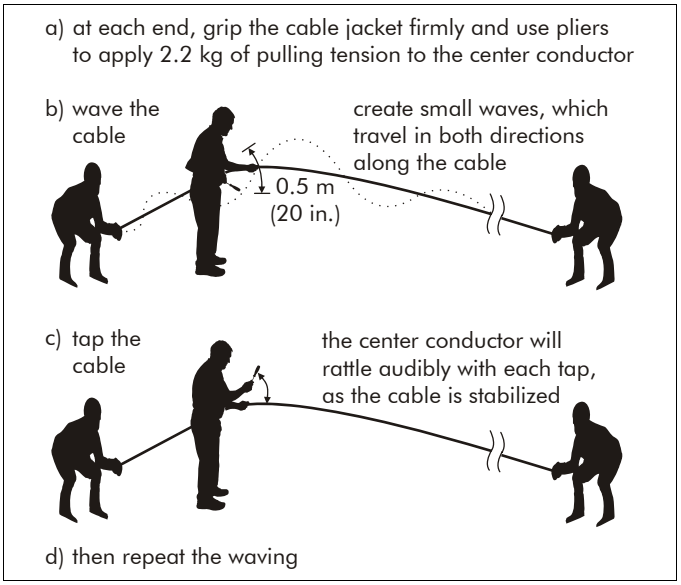

Figure 1 Stabilizing the sensor cable

Keep the sensor cable taut and in-line with the person who is doing the waving and tapping during the stabilization procedure.

4. At each end of the sensor cable, one gripper firmly holds the sensor cable by the black jacket with one hand, while gripping the center conductor near the end with a pair of pliers, with their other hand.
5. Both grippers simultaneously apply 2.2 kg (5 lb) of pulling tension to the center conductor while maintaining a firm grip on the cable's black jacket.

Both grippers must maintain the firm grip and equal pulling tension for the duration of the stabilization procedure.

6. The stabilizer picks up the sensor cable near one end and gently waves it up and down a few times (creating small waves, which travel approximately 3 to 5 m in both directions along the cable).

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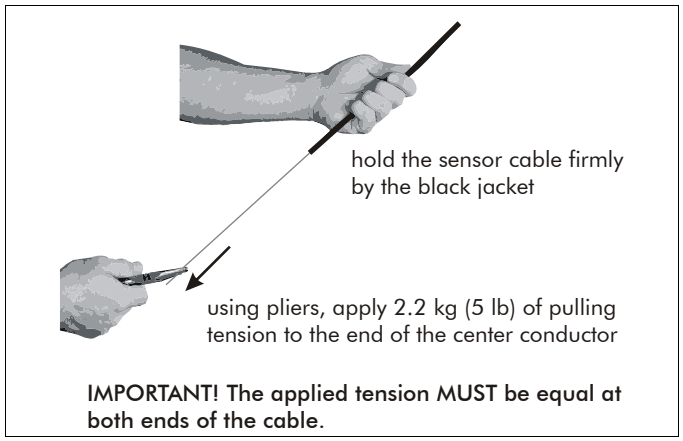

Figure 2 Applying tension

7. At the same location the stabilizer lightly taps the cable with the handle of a screwdriver a few times, and then repeats the waving.

As you tap the sensor cable, you will hear the center conductor rattle inside, as it stabilizes.

8. Move along the sensor cable, waving and tapping the cable as you go (at least once per meter). Listen for the rattle, as you tap the cable. Continue waving and tapping the cable, until you reach the end.

It may take more than one pass of the sensor cable to ensure that the cable is fully stabilized.

Once you can hear the rattle with each tap of the screwdriver for the full length of the sensor cable, the stabilization is complete.

9. When the stabilization procedure is complete, have both grippers simultaneously release the tension on the center conductor.

During stabilization, the center conductor usually extends by up to 1 m (3 ft. 3 in.). However, occasionally it may retract toward the cable jacket. If the center conductor retracts to the outer jacket, stop the procedure and carefully remove an additional 15 cm (6 in.) of outer jacket and dielectric. Reapply the tension at both ends and continue the stabilization.

If the center conductor retracts into the jacket at either end, locate it by tapping the cable back from the end, until you hear the rattle. Cut back the cable until the center conductor and the dielectric are the same length. Ensure that any center conductor that was gripped by the pliers is also removed.

Sensor cable installation guidelines

For applications that require protection for the sensor cable, DO NOT attempt to install Intelli-FLEX cable in conduit. Use Senstar's pre-assembled Armour-FLEX™ cable.

- Handle the cable carefully. Sensor cable MUST NOT be jerked, stretched, bent, twisted, knotted, kinked, nicked, or scraped.
- Do NOT subject the sensor cable to more than 4.5 kg (10 lbs) of tension at any time during the installation.
- Always apply consistent tension during the installation.
- Secure the sensor cable to the fence fabric at the midpoint of the chain-link (See Figure 3).
  DO NOT secure the cable at the crossing points of the fence links.

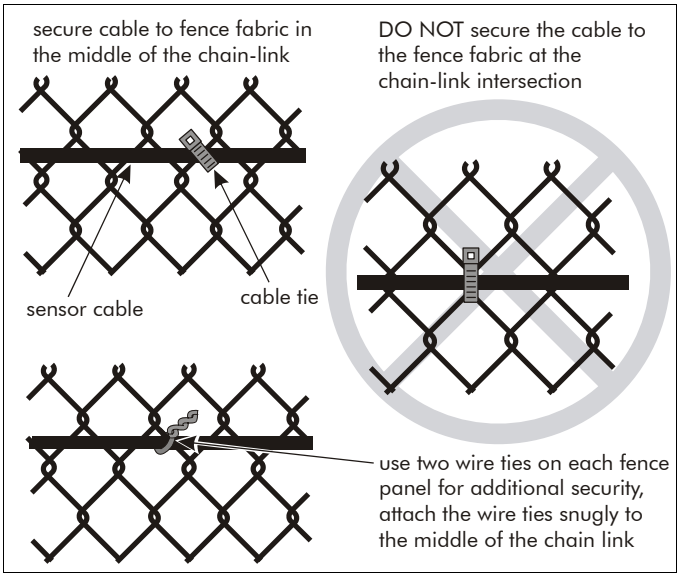

Figure 3 Secure cable at midpoint

- The sensor cable can be mounted on either side of the fence (site dependent).

Senstar strongly recommends installing the sensor cable on the secure side of the fence.

- If you require a sensor cable longer than 152 m (500 ft.) splice two sections of Mark 2 cable together.
- Ensure that the sensor cable is not pinched between the fence fabric and the support posts at any point.
- The smallest allowable bend radius for Intelli-FLEX sensor cable is 7.5 cm (3 in.).
- Use UV resistant nylon cable ties to secure the cable to the fence fabric.
- Space the cable ties every 25 to 30 cm (10 to 12 in.) along the sensor cable.

For high security applications, or for additional security for all applications, Senstar recommends using two galvanized wire ties on each fence panel, in addition to the nylon cable ties. Twist the wire ties to hold the sensor cable snugly against the fence fabric, then flatten the twisted wire against the fence. Do not over-tighten the wire ties, or the sensor cable response may be affected.

- Secure the cable at both sides of each fence post (See Figure 4). Ensure that the cable is not stretched tightly, but that it is snug against the fence post so that it cannot move.

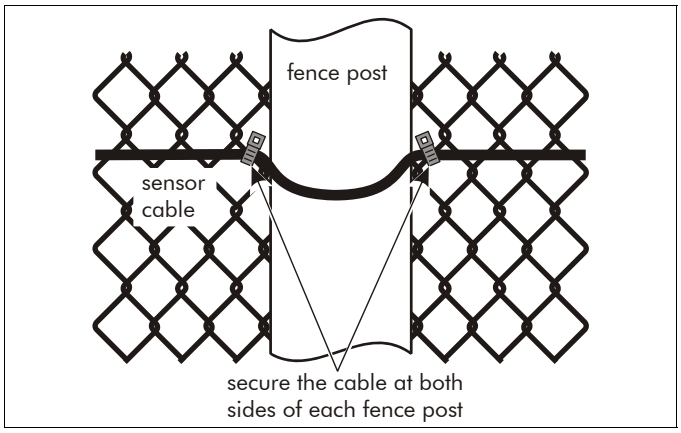

Figure 4 Securing the cable at the fence post

- Tap the sensor cable with your hand as you install it, to ensure that the cable is properly stabilized. (If you do not hear the rattle of the center conductor, remove one panel of cable ties, apply tension to the center conductor at both ends of the cable, and wave and tap the cable in the suspect area.
- Install the cable ties by hand, tightening them enough to hold the cable securely against the fence. Do not use mechanical tightening devices.
- Do not attach the sensor cable to tension wires.
- Attach the sensor cable at least 30 cm (1 ft.) away from horizontal support bars and any other cables.
- Senstar recommends that you create a 30 to 45 cm (12 to 18 in.) U-shaped service loop, located at a fence post, every 15 m (app.) for the length of the zone (See Figure 5).

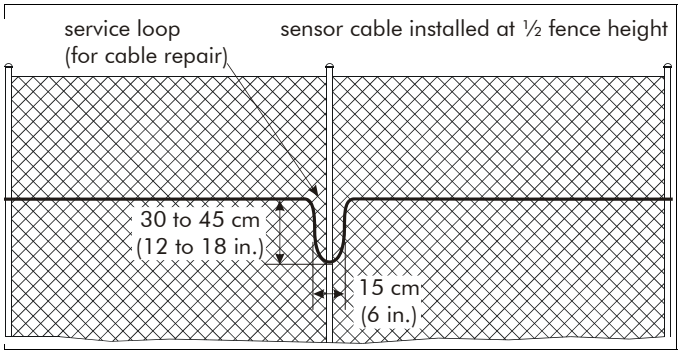

Figure 5 Service loop

- Install a corner loop at all fence corners and at any heavy gauge fence posts (See Figure 6).

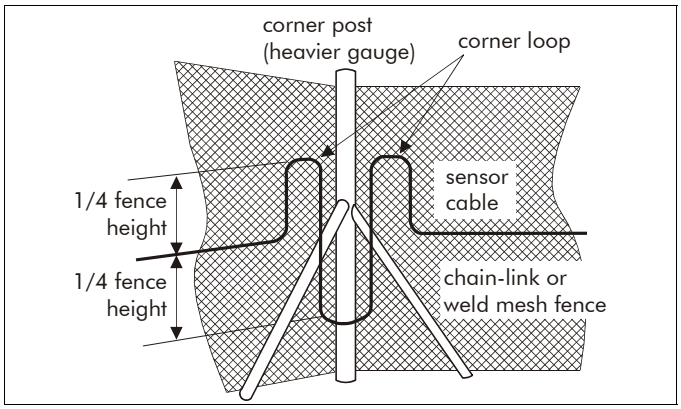

Figure 6 Corner loop

Installation procedure

For chain link or weld-mesh fences:

This procedure requires two people.

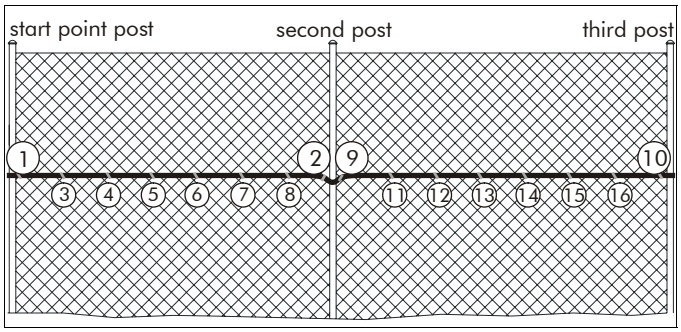

Figure 7 Installing the cable

1. Beginning at the start point of the zone, attach the sensor cable to the fence fabric (point 1). Leave 0.5 to 1 m (1.6 to 3.3 ft.) of extra sensor cable at the start point to install a splice kit (for connecting the sensor cable to the lead-in cable).

Ensure that consistent tension is applied to the sensor cable, throughout the installation.

2. Have the second person apply 2.2 to 4.5 kg (5 to 10 lbs.) of tension to the sensor cable beyond the second post, while you attach the cable to the fence fabric adjacent to the second post (point 2).
3. Return to the start point and install cable ties every 25 to 30 cm (10 to 12 in.) along the first fence panel (points 3 to 8).
4. Once the sensor cable is completely attached to the first fence panel, have the second person apply the same amount of tension to the sensor cable beyond the third post, while you attach the cable to the other side of the second post (point 9).

5. Continue applying the tension to the sensor cable, while you attach the cable to the fence fabric adjacent to the third post (point 10).
6. Return to the second post and install cable ties every 25 to 30 cm (10 to 12 in.) along the second fence panel (points 11 to 16).
7. Repeat this procedure, one fence panel at a time, until the cable is fully installed in the zone.
8. Verify that the tension on the cable is consistent along the entire length. Loose sections of sensor cable can result in low detection sensitivity.

Adjusting low sensitivity detection spots

Occasionally, areas with low detection sensitivity can occur along the installed cables. Low spots can result from incorrect or incomplete cable stabilization, or from mishandling the cable.

> Mishandling the cable may alter the relative lengths of the dielectric and center conductor, resulting in an excess amount of center conductor, which bunches up inside the cable. Mishandling the cable can also cause a kink in the center conductor, which may require a splice to repair.

- Verify that the cable is correctly installed, and is not slack around the low spot. If there are any visible installation problems, remove the cable and re-install it correctly, under 2.2 to 4.5 kg of tension.
- Ensure that the fence fabric is not loose, and that the cable is not installed too close to tension wires, tension bars, or other cables.

If the above steps do not correct the low detection spot, make the following adjustment:

Low spot near the end of the cable

1. Beginning at the end of the sensor cable, remove the cable from the fence to a point several meters beyond the low spot's location. Lay the cable carefully on the ground in a straight line.
2. Remove and discard the connector shell and terminal block from the end of the cable.
3. Have someone grip the sensor cable's black jacket near the end, while applying 2.2 kg (5 lb) of pulling tension to the center conductor with a pair of pliers.
4. Pick up the sensor cable near the end, and wave and lightly tap the cable at 1 m intervals, back to a point beyond the low detection spot.
   As you tap the cable, listen for the rattle, which indicates that the center conductor is stabilized.
5. Cut off any excess center conductor.
   OR
   If the center conductor is retracted, tap back from the end until you locate the center conductor (by listening for the rattle).
6. Cut back the cable so that the center conductor and dielectric are the same length.
7. Reinstall the cable, test the sensor zone and recalibrate as required.

Low spot in the middle of a long section of cable

1. Remove the cable from the fence over the length of the low spot.
2. Cut the cable at the mid-point of the low spot.
3. Adjust the length of the center conductor as described in "Low spot near the end of the cable" on both sections of sensor cable.
4. Splice the two sections of cable together using the standard splice kit and re-install the cable.
5. Test the sensor zone and recalibrate as required.

> If these methods DO NOT eliminate the low spot, replace the low sensitivity cable section with a new length of Intelli-FLEX Mark 2 sensor cable.

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