FlexZone®

Fence-mounted Locating Perimeter Intrusion Detection Sensor

Product Guide

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April 19, 2024

SENSTAR

Senstar Corporation
Website: www.senstar.com
Email address: info@senstar.com

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The figures included in this document are for illustration purposes only, and may differ from the actual equipment.

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.

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.

Europe: This device conforms to the protection requirement of council directives 89/336/EEC on the approximation of the laws of member states relating to Electromagnetic compatibility, amended by directive 93/68/EEC.

The use of shielded cables is required for compliance.

CE

Senstar Corporation's Quality Management System is ISO 9001:2008 registered.

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1 System planning

Introduction

The FlexZone fence protection system uses loose-tube coaxial sensor cables mounted on a fence to detect vibrations caused by climbing, cutting, lifting, or otherwise disturbing the fence fabric. Each FlexZone processor can monitor the activity from one or two sensor cables, each up to 300 m (984 ft.) long, and will report the alarm status of up to 60 software defined sensor zones. FlexZone will locate the source of a disturbance to within ± 3 m (10 ft.). A single pass of sensor cable can protect a high quality chain-link fence with no middle rail, up to 4.3 m (14 ft.) high. Additional passes of sensor cable are recommended for chain-link fences that are higher than 4.3 m.

There are two models of the FlexZone processor available. Both models process alarm data the same way. However, the FlexZone-4 processor supports up to 4 software defined alarm zones, but does not report target location. The FlexZone-60 processor supports up to 60 distinct alarm zones and reports target location.

This Product Guide covers FlexZone installation and setup for chainlink, welded-mesh, expanded metal and palisade fences.

Installation overview

Installing a FlexZone system is a four step process:

1. Plan and design the system.
2. Inspect and if necessary, repair the fence and the surrounding area.
3. Install the sensor cable, processor and enclosure.
    - ground rod (if required)
    - alarm communication wiring
    - power supply
4. Setup and calibrate the system.

Security factors

There are many important factors to consider when planning a fence-mounted perimeter security system:

- Fence height - The fence must be high enough to present an effective barrier to climb-over intrusions. It should also include climb-over deterrent hardware such as barbed wire or razor ribbon (for flexible fences). Rigid fence types should incorporate a climb over deterrent in their design (pointed stakes or pales). Senstar recommends that the minimum fence height for a FlexZone installation on a flexible fence type is 2.5 m (8 ft.). For rigid fence types the minimum recommended fence height is 2 m (6.5 ft.).
- Fence condition - FlexZone detects intrusions by picking up the minute vibrations or fence noise caused by an intrusion attempt. Therefore, the fence must be in good condition to prevent any metal on metal contact or vibrations caused by environmental factors. It may be necessary to upgrade the perimeter fences to ensure they present sufficient barriers against climb over and crawl under intrusions. If you are not sure of the suitability of your fence for a FlexZone sensor, Senstar recommends hiring a local fencing contractor to inspect, and if required, repair the fence.
- Probability of detection (Pd) vs. nuisance alarm rate (NAR) - With a fence-mounted intrusion detection system there is always a trade-off between the probability of detection and the nuisance alarm rate. A properly calibrated system will provide a high Pd and will minimize the NAR.
- Alarm assessment/response - What happens when the system triggers an alarm? Can the alarm be assessed visually? Does the site include CCTV coverage to verify the event? Senstar recommends engaging a security consultant to discuss the available methods of alarm assessment. To ensure maximum confidence in the sensor you must be able to distinguish between valid alarms and nuisance alarms.

Fence structures

To ensure consistent detection, a sensor cable should be mounted on only one type of fence. All of the fence panels should be similar in type, size and condition. Ensure that there are no loose panels, fittings or metal parts that can move and cause nuisance alarms. A shake test in which you grip the fence fabric in the middle of a panel and gently shake it back and forth with an increasing motion will help identify any loose pieces. Listen for metal-on-metal contact and correct any problems found. Verify that there are no washouts or depressions under the fence that could allow an intruder access. Ensure that there is no vegetation or other objects that can make contact with the fence in windy conditions.

Note	Fences that are covered with vinyl privacy slats or other screening material may not be suitable for the FlexZone sensor due to the vibration dampening characteristics of the screening materials, and the additional fence motion caused by wind. It may be necessary to remove the screening material to ensure optimal FlexZone sensor performance.

Standard flexible fence types

Chain-link fence

Chain-link fence is comprised of steel wires that are bent lengthwise into zig-zag patterns. The zig-zag wires are vertically woven to form the characteristic diamond pattern. The fence fabric is attached to fence posts approximately 3 m (10 ft.) apart. Tension wires are often used to stiffen the fence fabric at the top, bottom and middle of the fence. Chain-link fences are available in different heights and are sometimes vinyl coated.

Welded-mesh fences

A typical welded-mesh fence section consists of steel wire welded into a grid, with horizontal spacing differing from vertical spacing. These fence sections are secured to fence posts and often include top and bottom rails.

Expanded metal fences

Expanded metal mesh is typically comprised of a metal material with diamond shaped holes. Metals can be expanded in a range of material thickness and to a broad choice of patterns to suit specific applications. Expanded metal mesh is available with a variety of diamond size openings and gauges that can be attached to a typical fence framework of round pipe and line rails.

Note	High-security welded-mesh and expanded metal fences are comprised of heavier gauge metal than the standard flexible fence types. Therefore, these high-security fence types may have to be defined as Rigid fences via the UCM. Begin testing with the Flexible fence setting and use the Rigid fence setting only if adequate detection sensitivity cannot be achieved at the Flexible fence setting.

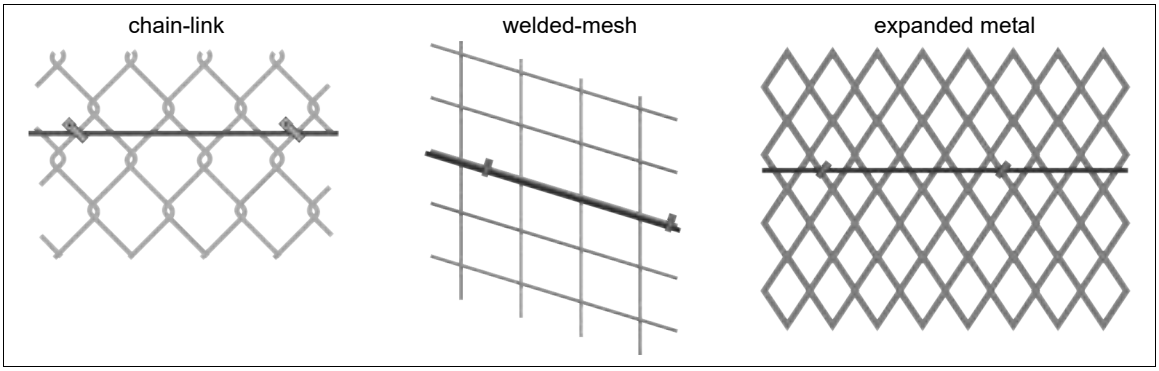


Figure 1: Standard flexible fence types

Rigid fence types

Note	Rigid fence types do not conduct vibrations as well as flexible fence types due to their materials and construction. FlexZone provides an increased sensitivity setting for use with rigid fences. Senstar recommends installing the sensor cable on a limited length section of the rigid fence to test and verify that the detection sensitivity meets the security requirements before installing a full length perimeter.

Palisade fences

A typical palisade fence panel consists of metal pales fastened onto horizontal rails. These fence sections are secured to fence posts which are securely anchored to, or into, the ground.

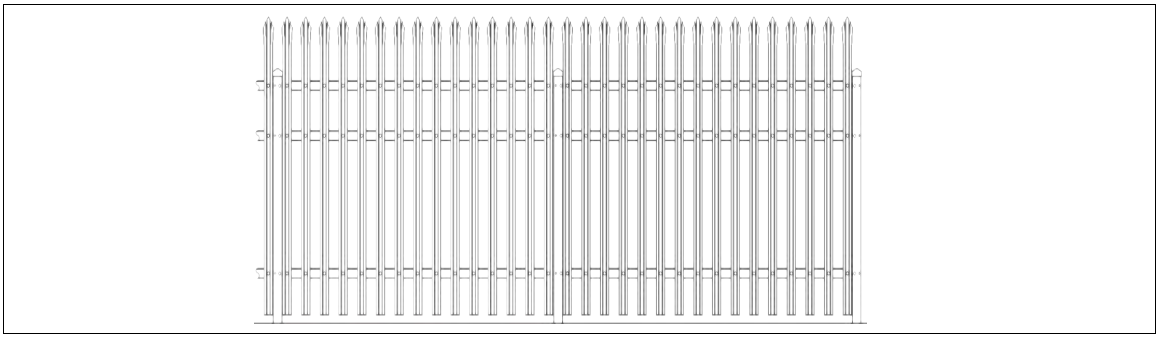


Figure 2: Rigid fence (palisade)

Climb-over deterrent hardware

Barbed wire

Senstar recommends using armored sensor cable on barbed wire. Armored cable is comprised of FlexZone sensor cable inside flexible metal conduit. To protect both the fence and the barbed wire, use armored cable on the barbed wire, and use sensor cable on the fence fabric. Install armored cable on both sides of each outrigger and along the top of the fence (see Figure 3:). These configurations allow both sensor cables to be properly calibrated for the specific mounting surface.

Barbed wire outriggers must be secure to prevent movement due to environmental conditions. Install bracing wires between the outrigger supports to prevent the barbed wires from spreading apart. Each barbed wire strand should be taut and tightly secured at each support. Any extension arms or outriggers attached to post tops should have a tight press-fit or be spot-welded. Remove or fasten any loose or rattling equipment.

Razor ribbon

Senstar recommends using armored cable on razor ribbon. The razor ribbon must be secured so that it does not move in the wind. Use tensioning wires to secure the coil and to prevent the razor ribbon from pulling apart if it is cut (see Figure 4:).

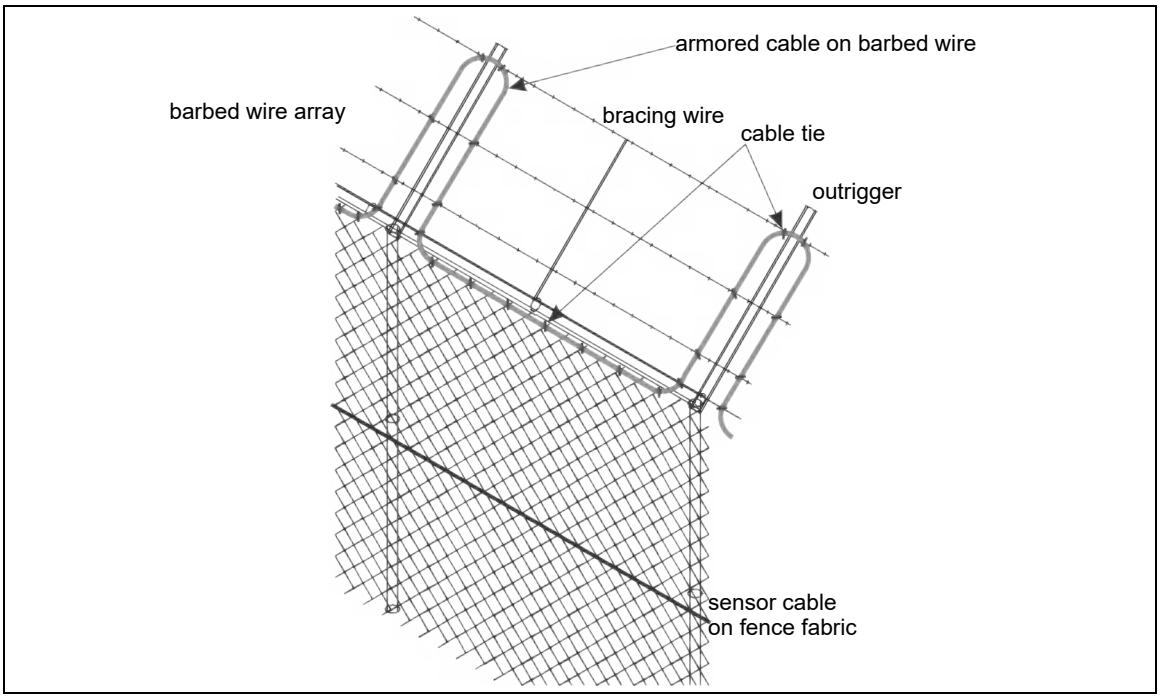


Figure 3: Recommended cable installation on barbed wire

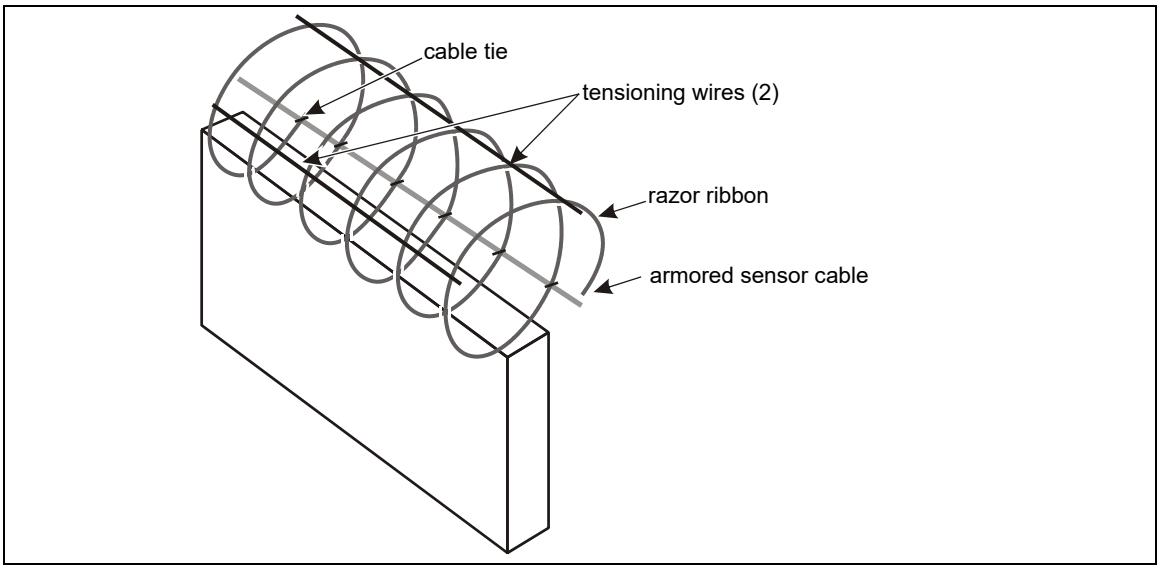


Figure 4: Razor ribbon

Gates

There are generally two types of gates used with fences, swinging gates and sliding gates. The type of gate protection required is determined by:

- the type of gate
- the frequency of gate use
- when the sensor is active
- the type of ground beneath the gate
- the overall protection plan (the number of processors and sensor cables, and their location relative to the gate in question)

Gates should consist of fence fabric on a rigid frame that includes horizontal and vertical bracing.

- Firmly attach all gate hardware accessories (minimum free-play).
- Make sure that double gates have travel stops (rigid anchors).
- Prevent locking hardware from moving in the wind.
- Prevent sliding gate track hardware, supports, guides, etc., from rattling in the wind.

There are three ways to protect gates with the FlexZone sensor system:

- The wireless gate sensor (WGS),
- FlexZone sensor cable,
- An alternate sensor technology (e.g., a microwave sensor).

Gates that are not protected by the wireless gate sensor, or sensor cable, are bypassed via software (see Figure 48:). The sensor cable is installed inside conduit, underground, from one side of the gate to the other, and the bypassing cable is set as non-detecting (it does not report alarms). The sensor cable continues beyond the gate, and another technology is used to provide protection in the area of the gate.

Occasionally, it is not possible to dig underground to continue the active coverage on the other side of a gate. There are three standard solutions for this situation:

- Install the cable on the ground surface, under a secured, protective cable mat.
- Terminate the cable at the gate.
- Connect the cable across the gate using quick-disconnect connectors.

Buildings, walls and other structures

FlexZone can be used to detect intruders attempting to cut, saw, chisel, drill, or smash their way through building walls, ceilings, roofs, floors, or stock cages. FlexZone sensor cable can be attached to the structure using commercially available fasteners such as cable ties or nail-clamps that ensure good contact between the sensor cable and the protected structure. The fastening devices must not flatten or distort the sensor cable at the attachment points. Sensor cable can also be installed inside metal conduit, which is attached to the protected surface. Due to the great variation in building materials used in structures, Senstar recommends a trial installation on a representative section of the structure before making the full installation.

Environment

For installations in environments which include hot sunny periods, install a sun shield to protect the enclosure from direct sunlight, or install the enclosure in a shady area. Extra care must be taken at sites that experience strong winds on a regular basis. The fence must be well-maintained to prevent any metal to metal contact caused by the wind. All vegetation (weeds, brush, trees, etc.) must be cleared from around the fence area. Vegetation must not touch or hang over the fence fabric. Any objects that may contact the fence must also be removed from the perimeter. For sites that experience snowfalls in the winter, the fence must be kept clear of accumulating snow. Snow can dampen the vibrations that the FlexZone sensor uses to detect intrusions. Accumulated snow can also serve as a bridging or tunneling aid for breaching the perimeter fences.

Note	The ambient temperature, as measured inside the enclosure, must be within the range of -40 to +70º C (-40 to +158º F).

Site Survey

Conduct a site survey to ensure that site conditions are suitable for a FlexZone sensor system. The primary concern is the condition of the fences and gates. Use the results of the site survey to create a site plan.

Note	Sites that include a fence line that abuts the primary perimeter fence can be vulnerable to climb over intrusions where the two fences meet. To increase security in this situation, extend the FlexZone cable for at least 2 m onto the abutting fence.

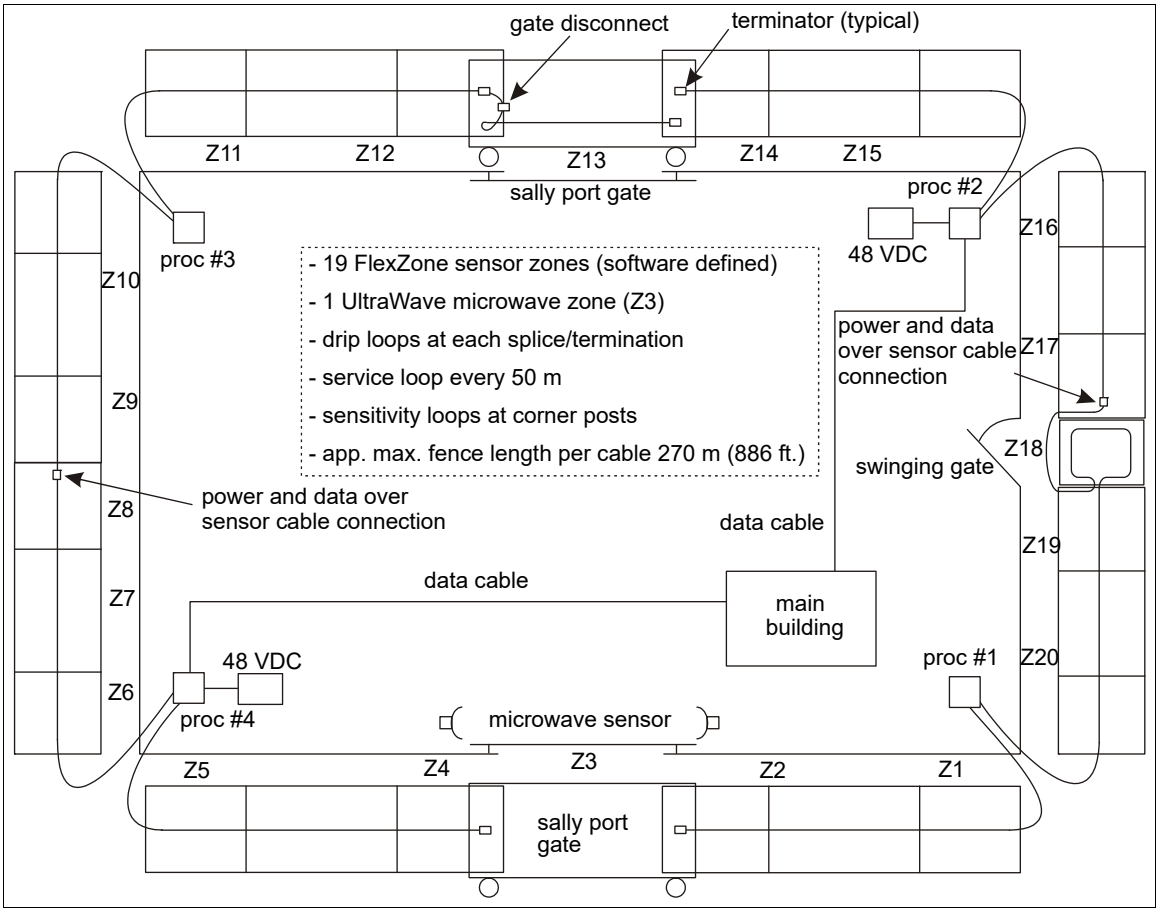


Figure 5: Sample site plan

Indicate the following on the site plan:

- The locations of existing structures (include fences, gates, buildings, roads, etc.). Verify that mounting surfaces comply with established standards for installation and stability.
- The locations of obstacles including vegetation and trees.
- The locations for the FlexZone components:
  - Sensor cable - indicate the cable layout and zone boundaries for each sensor cable.
  - Non-detecting cable - indicate the layout if non-detecting cable is required (at the processor, or for a bypass).
  - Cable connectors - indicate the type of connection (splice, termination).
  - FlexZone processors - note the addresses for network based processors.

- Power supply - indicate the type of power supply and the power distribution plan.
- Alarm communication wiring - relay output or network alarm communications.
- Power/data via sensor cables.

- The locations of other perimeter security equipment.

Perimeter layout guidelines

Note	A FlexZone perimeter with 1, 2, or 3 processors can be fully closed (all sensor cables connected through splices). A FlexZone perimeter with 4 or more processors must be open at the ends (first and last sensor cables must be terminated).

FlexZone sensor cable

There are two types of FlexZone sensor cable, standard and armored. Both Standard FlexZone sensor cable and Armored FlexZone sensor cable come in 150 m (492 ft.) and 220 m (722 ft.) lengths. Two lengths can be spliced together to provide up to a 300 m (984 ft.) long sensor cable.

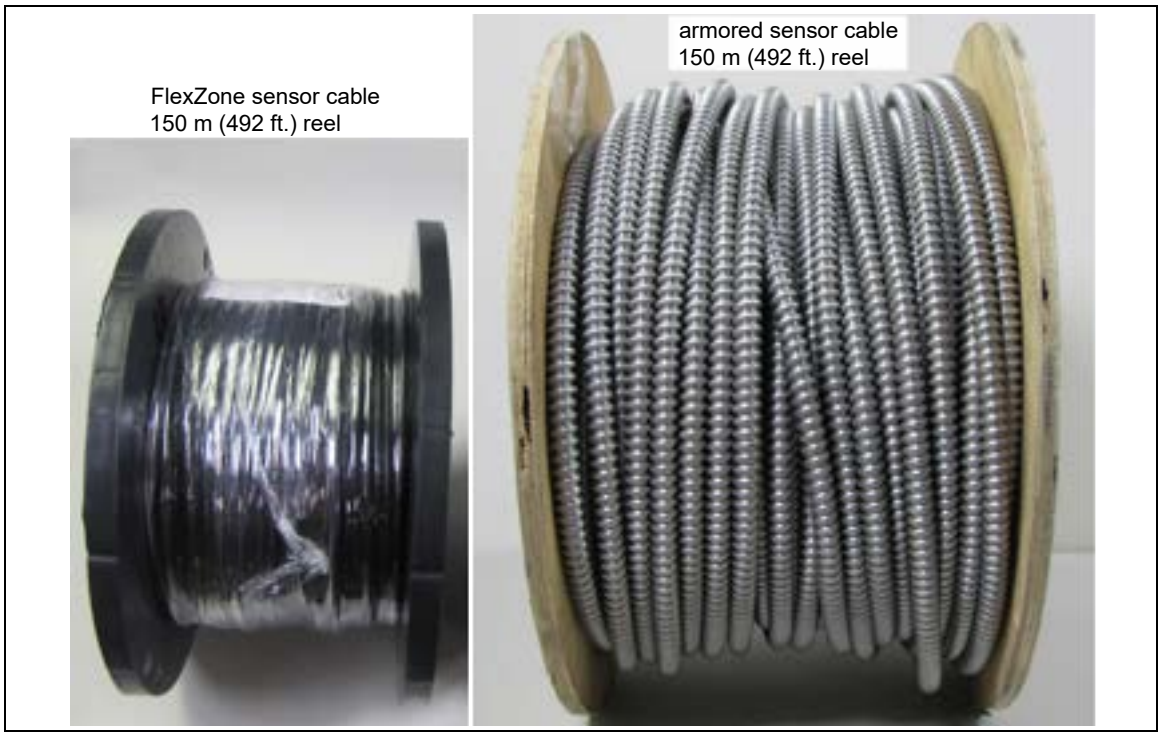
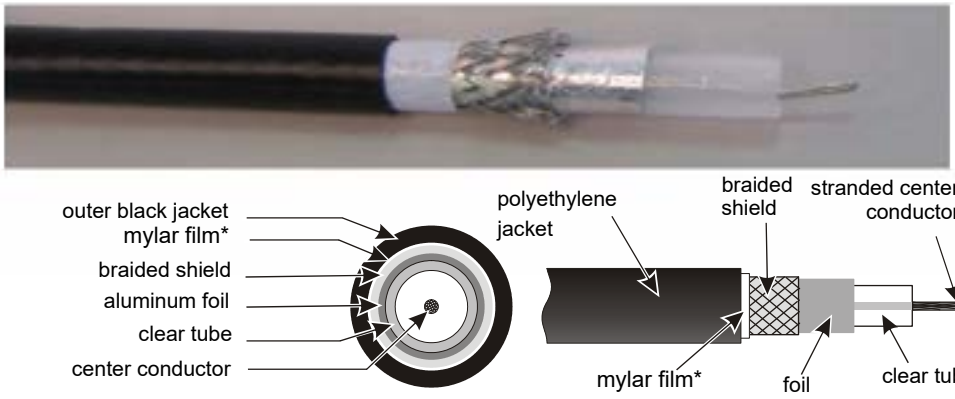


Figure 6: FlexZone and Armored FlexZone sensor cable reels



* FlexZone sensor cable may include a mylar film between the outer black jacket and the braided shield. The mylar film is used in the cable extrusion process and has no effect on the cable's function.

Figure 7: FlexZone sensor cable description

Cable layout guidelines

- The full length of sensor cable must be mounted on the same type of surface.
- The maximum length of cable for each side of the processor is 300 meters (984 ft.).
- The smallest allowable bend radius for FlexZone sensor cable is 10 cm (4 in.).
- The smallest allowable bend radius for armored sensor cable is 15 cm (6 in.).
- Keep vertical drops of sensor cable to less than 1 m (3.3 ft.).
- The sensor cable should follow the ground contour to maintain a constant height above the ground.

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

Cable length calculator (flexible fences)

Typically, fence coverage requires approximately 10% more cable than the linear fence length. The following table provides a guideline for calculating the amount of sensor cable required for a 2.44 m (8 ft.) fence (in meters):

zone element	**required cable length** (in meters)
start point	+ 1 m
service loops	+ 0.75 m X (linear cable length / 50)
zone demarcation loops	+ 3 m X number of zone boundaries
sensitivity loops	+ 3 m X number of corner and heavy gauge posts
cable terminations and splices	+ 0.5 m each
linear fence length	+ _ _ _ _ _ (fence length)
required length of cable per pass	= _ _ _ _ _ (total length)
total length X number of passes	= _ _ _ _ _ cable length (max. 300 m)

Rigid fences

Service loops, zone demarcation loops and sensitivity loops are not recommended on rigid fences. Therefore, the length of cable required on a rigid fence is approximately the length of the fence plus 5% overage (for each cable pass).

Fence height recommendations

The following cable spacing recommendations will provide a high probability of detection on well maintained fences (see Figure 8:):

- For flexible fences up to 4.3 meters (14 ft.) tall - a single pass of sensor cable at 1/2 the fence height.
- For flexible fences greater than 4.3 m tall - a double pass of sensor cable at 1/3 and 2/3 the fence height.

Note	If the lower edge of the fence fabric is embedded in a concrete footing, or below ground, an additional cable pass **may** be required on the lower section of fence (a double pass at 1/3 and 2/3 fence height).

Note	If the fence framework includes an intermediate (middle) rail, it **may** require a double cable pass, with one pass above the rail and one pass below the rail. Senstar recommends installing a single pass of cable 30 cm above the middle rail on a small section of the fence (4 or 5 panels) and then thoroughly testing the protected section to determine if a single cable pass meets your detection requirements.

- For rigid fences (minimum recommended fence height 2 m, 6.5 ft.) - a double pass of sensor cable along the top and bottom rails.

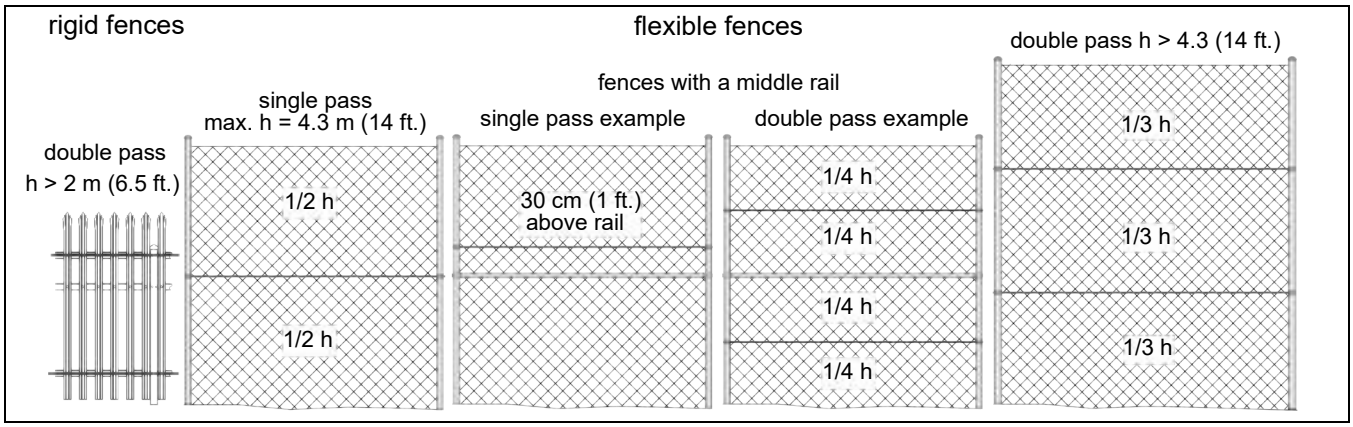


Figure 8: Cable pass recommendations

Non-detecting cable

For instances where the processor is located away from the protected fence, outdoor rated, shielded 75 Ohm coaxial cable with a solid copper center conductor can be used as lead-in cable (e.g., RG6). For cable bypasses along the perimeter, FlexZone sensor cable is used. The bypass cable is set to inactive (Zone 0) in software and will not report sensor alarms. Non-detecting FlexZone cable must be well secured to prevent any cable motion. The length of coaxial cable that is used for lead-in must be deducted from the detecting cable length (maximum cable length detecting plus non-detecting = 300 m, 984 ft.).

Fence corners and heavier gauge posts (flexible fences)

Corner posts and heavier gauge support posts tend to dampen the fence's vibration transmission characteristics. Therefore, use cable loops at corner posts and heavy gauge support posts, to increase the sensitivity. Each sensitivity loop requires approximately 3 m (10 ft.) of sensor cable (see Figure 23:).

Zone demarcation loops (flexible fences)

Zone demarcation loops may be used at software defined zone boundaries for improved location accuracy. It is possible that an alarm that occurs very close to a software defined zone boundary could be reported in the adjacent zone (± 3 m). Zone demarcation loops add extra sensor cable at zone boundaries to help ensure that an alarm is reported in the zone in which it occurs. Allot 3 m (10 ft.) for each zone to adjacent zone boundary (see Figure 24:). Rather than using extra cable for zone demarcation loops, overlapping CCTV coverage can provide visual assessment to verify alarms and alarm location. When setting up the camera views, ensure that there is at least 6 m (20 ft.) of overlapping coverage at each zone boundary.

Service loops (flexible fences)

Service loops provide extra sensor cable along the fence to make cable repairs. Allot 75 cm (30 in.) of cable each 50 m (164 ft.) for a service loop. Locate the U-shaped service loops at fence posts (see Figure 25:).

Drip loops (flexible fences)

Drip loops raise the connector above the sensor cable to prevent water from running along the cable and accumulating in the enclosure. Drip loops also relieve strain resulting from temperature changes that cause the cable to expand and contract. Form the drip loop by raising the connector 15 cm (6 in.) above the level of the cable run. Allot 50 cm (20 in.) of cable for each splice or termination (see Figure 26:).

Termination loops (flexible fences)

Termination loops provide extra sensor cable at the end of the protected section of the fence (at the terminator) to make cable repairs or future sensor cable layout changes. The amount of cable that can be used for a termination loop depends on the length of sensor cable (plus lead-in cable if used) connected to the processor (side A or side B, maximum 300 m). Termination loops are typically comprised of up to 5 coiled loops of sensor cable with a 60 cm (2 ft.) diameter. Termination loops also include the length of 1 fence panel as the cable uses a double pass on the final protected panel (see Figure 27:).

Splice loops (flexible fences)

If there is extra sensor cable at the location of a cable splice, you can save the cable for cable repairs or future sensor cable layout changes by forming a splice loop instead of cutting the cable to length (see Figure 28:). The maximum length of cable per side (300 m) cannot be exceeded, but up to 10 m of cable can be coiled and attached to the fence at each side of a cable splice. A 10 m splice loop is comprised of 5 coiled loops of sensor cable with a 60 cm (2 ft.) diameter. Each 60 cm diameter coil of sensor cable contains approximately 2 m of cable.

Gate bypass

If there is a gate within a FlexZone sensor zone, you require a sufficient amount of inactive cable to bypass the gate, even if the gate is protected by sensor cable. Secure the bypass cable and bury it in PVC conduit. See Figure 48: for an example of a bypassed gate, which uses a microwave system to provide security across the gate.

Armored cable

Armored cable is FlexZone sensor cable encased in a flexible metallic conduit. The armor protects the sensor cable from damage and vandalism, as well as from the sun and weather. Steel cable ties or wire ties are the recommended fasteners for armored cable. Armored cable is available in lengths of 150 m (492 ft.). Two lengths can be spliced together to create a 300 m (984 ft.) cable. Armored cable splices are enclosed inside metal condulet fittings (p/n G6KT0300).

Double pass coverage

For FlexZone installations which require double passes of sensor cable, you use both cable sides of a processor to provide software zoning and precise target location. To accomplish this the processor is located at one end and the two sensor cable sides run parallel for up to 300 m along the fence in an upper and lower cable pass. The ends of the two sensor cables are terminated or spliced together. To enable precise target location, the detection start points of both cables must match, and both cables must be of equal length and have identical features (e.g., service loops, sensitivity loops, etc.). Each FlexZone processor can provide double pass coverage for up to 300 m of cable.

Note	Senstar recommends that both cables for a double pass installation be laid out side by side on the ground beside the fence and marked with tape at 5 m (16 ft.) intervals for the full length of the cable. This will help ensure that the cables are properly length matched which is essential for detection sensitivity and location accuracy in a double pass installation

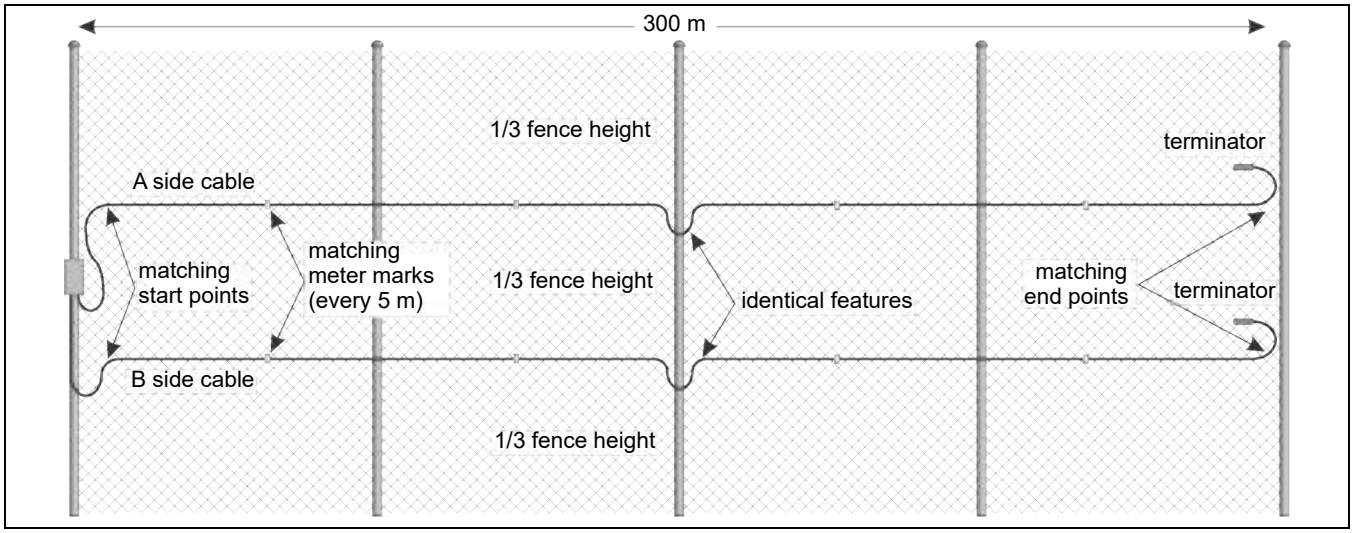


Figure 9: Single processor, double cable pass configuration

For a multi-processor FlexZone installation with a double pass of sensor cable using software zoning, precise target locating, as well as power and data over the sensor cables there are a number of requirements that must be observed. Figure 10: illustrates a 1.8 km FlexZone perimeter with six processors and a double pass of sensor cable.

- Each 48 VDC power supply can power to up to five processors over a maximum length of 1.5 km of sensor cable. The power supply must be connected to the central processor.
- The processors must be divided into blocks of two with network interface cards (NIC) carrying the data between adjacent bocks (use multi-mode fiber optic NICs to isolate the sensor blocks).
- The detection start points of each processor's sensor cables must match, and both cables must be of equal length and have identical features (e.g., service loops, sensitivity loops, zone demarcation loops, etc.).
- Power flow, data flow and synchronization must be setup for each block of sensors via the UCM.

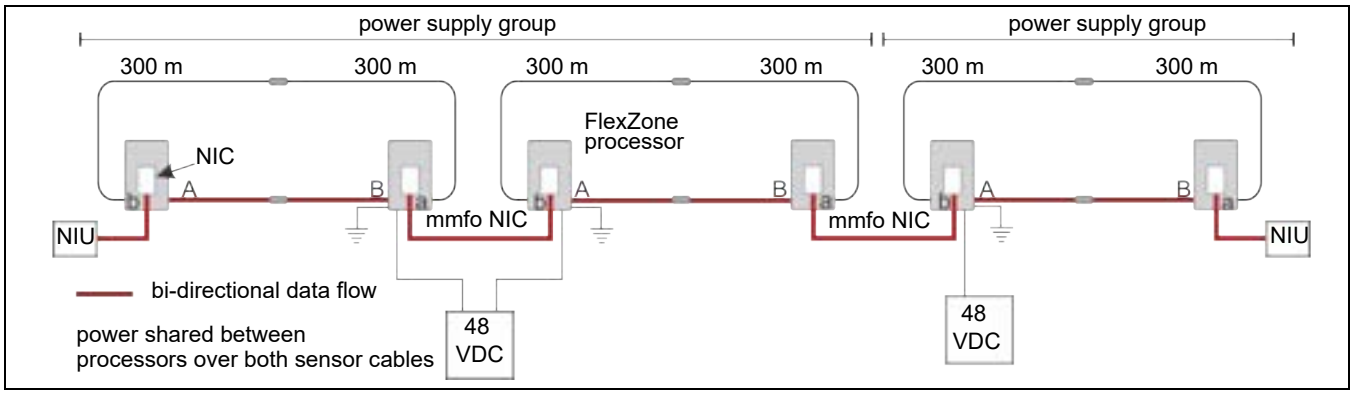


Figure 10: Multi-processor, double pass ranging sensors with isolated power groups

Processor location guidelines

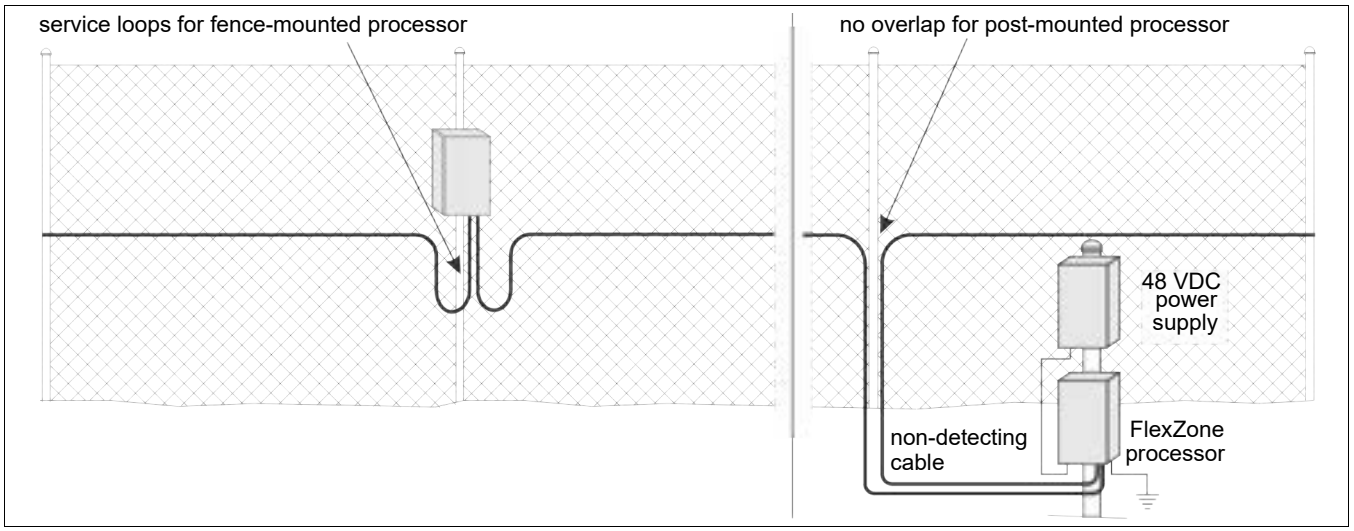


Figure 11: Processor location active cable start points

The FlexZone processor can be mounted outdoors on a post, either on, or separate from, the fence on which the sensor cables are installed (see Figure 11:). A rigid fixed post is recommended for outdoor applications. The FlexZone processor can also be installed indoors or outdoors on a flat stable surface. Post-mount hardware is supplied for post sizes from 4.5 cm to 12.7 cm

(1.75 in. to 5 in.). The hardware required for surface-mounting the processor is customer-supplied. The FlexZone enclosure is hinged and includes a lockable latch (requires a Customer-supplied pad lock).

Power source and wiring

The FlexZone processor can operate on a wide range of input voltages (12 to 48 VDC). The power supply, the number of processors, and the lengths of the power cable runs will determine the gauge of the power cable wiring that is required. In locations where AC power may not be stable or reliable, an uninterruptable power supply (UPS) should be used for primary power. Assume a maximum power consumption of 2.5 W per FlexZone processor (with NIC).

Power over the sensor cables

A group of up to five FlexZone processors can share power via the connected sensor cables. In this case, the central processor is connected to a 48 VDC power supply. The sensor cables from the central processor are connected to the two adjacent processors (one on each side). The processor connected to the power supply requires a stable, low resistance earth ground connection, which also serves as the ground reference for the connected block of processors. Power and data distribution is setup via the UCM. Figure 12: illustrates a 7.2 km (4.5 mi.) 12 processor FlexZone perimeter with power and data over the sensor cables, and redundant Silver Network communications.

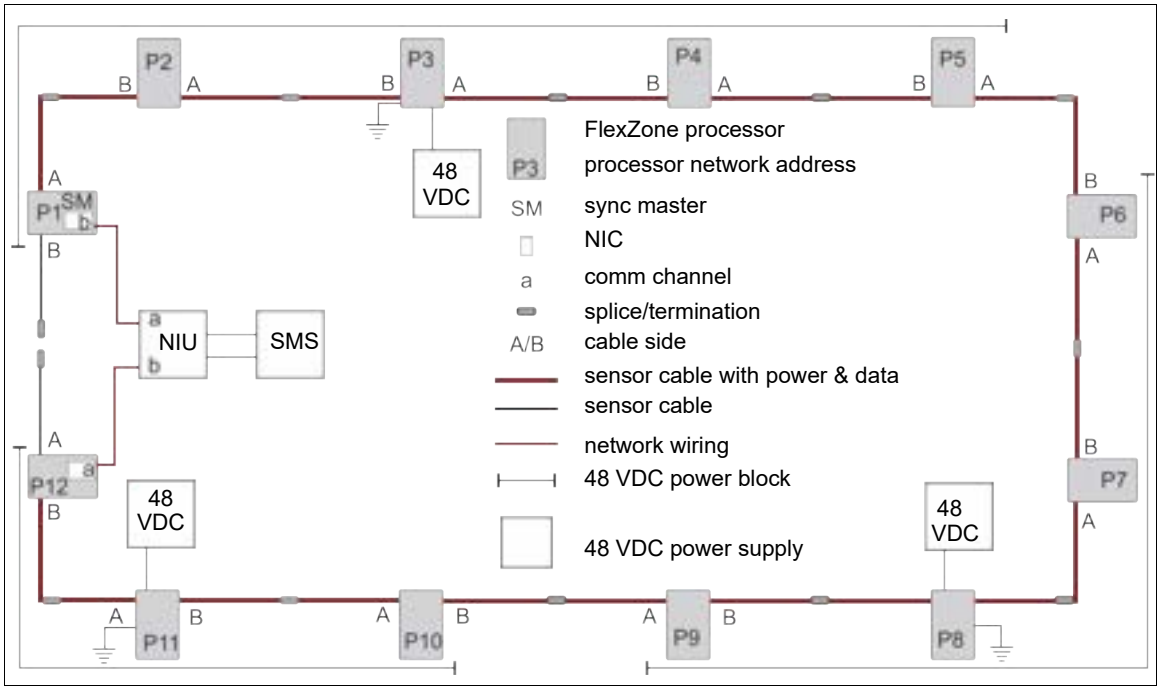


Figure 12: Power and data distribution via sensor cables

Auxiliary device output power

Processors that are receiving power over the sensor cables can supply up to 2 W of power to an auxiliary security device through T4, the power connector. The output power is at the same voltage as the received power input via the sensor cables. The minimum required voltage to enable power over the sensor cables is 38 VDC. Figure 75: illustrates connection diagrams of a FlexZone processor supplying power and carrying alarm data for an UltraWave microwave sensor in both Local and Remote control modes.

Power over Ethernet

Silver Network based processors using Ethernet communications have the option of using Power over Ethernet (Figure 73: illustrates an Ethernet based Silver Network). To use this powering option requires a PoE class 3 switch that is located within 100 m (328 ft.) of the processor, and minimum Category 5 network cable. Power over Ethernet is supplied to the processor's Network Interface card (NIC) and the power output on the NIC is connected to the power input on the processor. Each processor receiving PoE requires an earth ground connection.

Note	Senstar recommends using a fully managed PoE switch, to supply power to a FlexZone processor.

Grounding considerations

A stable low resistance earth ground connection is required by each processor that is connected directly to a power supply. Use a short length of heavy gauge copper wire to connect the ground lug on the bottom of the processor's enclosure to an approved earth ground. Processors receiving PoE also require a ground connection via the enclosure ground lug. Processor's receiving power over the sensor cables do not require a direct ground connection. These processors use the ground of the processor that is connected to the network power supply as their ground reference. Consult the local electrical code for grounding information.

Alarm data communications

Note	Senstar recommends setting up a Silver Network, even when using Local control mode. This enables remote calibration, maintenance and diagnostic access to your FlexZone processors from a central control facility.

There are two selectable control modes for the FlexZone processor's inputs and outputs (I/O) local control mode and remote control mode. You set the control mode in software, via the Universal Configuration Module (UCM) which is a Windows-based software application. The default setting is local control mode, in which the processor controls the on-board relays to signal alarm and supervision conditions. In local control mode, the two Aux (auxiliary) inputs are self-test inputs to the processor. In remote control mode, the alarm data is carried over the Silver Network to a host security management system (SMS). Remote control mode enables the SMS to control the processor's relays as output points to operate other security equipment. The two Aux inputs provide inputs to the host SMS for reporting the status of auxiliary devices. In both modes, you can configure the processor's input/output response according to your site-specific requirements.

- **local control mode** - hard-wired contact closure alarm data connections and self-test input wiring connections are made between the processor and the annunciation equipment (4 output relays, 2 self-test inputs) (the optional Relay Output card provides 4 additional outputs for reporting alarm conditions)
- **remote control mode** - the alarm data communications are via the Silver Network - EIA-422 copper wire data paths or fiber optic cables connect one or two processors to the Network Interface Unit (NIU), the remaining processors can be connected via EIA-422 wiring, fiber optic cable, or data can be carried between processors via the sensor cables the 4 output relays are available as output control points from the host system (the optional Relay Output card provides 4 additional relays, which are also available as output control points), the 2 auxiliary device inputs are available for reporting the status of auxiliary equipment to the host system (the optional dry contact input card provides 4 additional inputs, which are also available for connecting auxiliary equipment to the host system)

Alarm communication options

- contact closure alarm communications (local control mode) up to 8 distinct alarm zones per processor (requires optional ROC)
- built-in data communication network, secure data passes between processors over the sensor cables (one or two processors must have a Silver Network connection to the NIU.)
- Silver Network data communications are daisy-chained to each processor around the perimeter using either EIA-422 copper wire data paths or fiber optic cable (Silver Loop)
- Silver Network data communications are via Ethernet to each processor using category-5 cable and a PoE switch (Silver Star)

Note	You can use a combination of the above methods for powering and data communications.

Note	A Silver Network based processor can use local control mode to operate its output relays and Aux inputs.

Fail-safe relay operation

In the default configuration, the processor's relays operate in fail-safe mode. During normal operation, the relays latch in the non-alarm state. In the event of a total processor failure all relays switch to the alarm state. Relays 1 and 2 indicate fail and supervision conditions and relays 3 and 4 report sensor alarms.

Relay Output Card

The relay output card (ROC) (P/N 00BA2500) includes four relays to supplement the four relays available on the processor. In remote control mode, the host security management system operates the ROC's relays, as output control points, (e.g., to activate lights, doors, sirens, CCTV equipment, etc.). You can configure the relays as latching (ON by command, OFF by command), in flash mode (ON-OFF-ON-OFF, etc. by command, then OFF by command), or pulse mode (ON for a period, then OFF). For flash and pulse modes, the Active/Inactive times are selectable.

Dry Contact Input Card

The dry contact input card (DRIC) (P/N 00BA2400) includes four inputs to supplement the two inputs available on the processor. In remote control mode, the DRIC's inputs connect auxiliary devices to the host security management system (e.g., to report the status of other security equipment such as a microwave or magnetic contact). The Filter Window parameter allows you to set the time period for which an input must be active, before an event is reported.

Data over the sensor cables

A group of FlexZone processors can communicate via the connected sensor cables. In this case, at least one processor requires a network interface card (NIC) to enable Silver Network communications. The sensor cables from that processor are connected to the two adjacent processors (one on each side). Processors that are using the sensor cables for data distribution must be synchronized to prevent mutual interference.

To take advantage of the Silver Network's redundant communications capability, two of the connected processors require NICs and connections to a Network interface unit (NIU). In this way network communications will travel in both directions over the sensor cables, so that a single break in a sensor cable will not interrupt communications.

Processor synchronization

A group of FlexZone processors that are connected through the sensor cables must be synchronized to prevent mutual interference. For a fully closed 2 or 3 processor perimeter, one processor must be set as the Sync Master for the group. The Sync Master generates a synchronization signal and transmits the signal through its A-side sensor cable. The next processor receives the Sync signal through its B-side cable, synchronizes itself accordingly and then sends the Sync signal on to the next connected processor (A-side to B-side). The Sync Master will not accept a signal from another processor and always restarts the synchronization process. To set a processor as the Sync Master connect the UCM to the processor and uncheck the Accept Sync Signal check box.

Note	Only one processor in a connected group can be set as the Sync Master or mutual interference will occur.

For an open loop sensor configuration where at least one sensor cable ends with a terminator (not connected to another sensor cable) the synchronization process is automatic and requires no configuration changes. Each processor that is set to Accept Sync Signal will receive the Sync signal through its B-side cable, synchronize itself accordingly and then send the Sync signal on to the next connected processor. By default, the processor on the end of the perimeter that is connected to the next processor through its A-side cable will generate the Sync signal that starts the synchronization cycle.

Alarm monitoring

Alarm monitoring is site specific and depends on whether you are using relay outputs for alarm reporting (Local control mode) or Silver Network based alarm reporting (Remote control mode). Each processor has four user-configurable Form C relay outputs. In Local control mode, the four relays are used to signal alarm and supervision conditions. For network based processors, alarm data is carried over the network cables and the four relays are available as output control points from the security management system (SMS).

NM Mode

The FlexZone processor can be configured to report alarm and supervision conditions through the UltraLink modular I/O system. In NM Mode, the UltraLink I/O processor acts as the Network Manager, providing alarm outputs for a connected network of up to eight Silver devices. In NM Mode, the Silver devices do not require a connection to a PC running Silver Network Manager software. Sensor alarms and supervision conditions are assigned to UltraLink I/O outputs (relay or open collector). When an alarm occurs on a connected sensor, the corresponding UltraLink I/O output is activated (see NM Mode on page 99 for additional details).

Cable connectors

The splice kit is used to join two FlexZone cables together, and to join lead-in cable to sensor cable. The splice kit is also used to make cable repairs. The termination kit is used in situations where a FlexZone sensor cable is not connected to another FlexZone sensor cable. In this case, the termination kit is connected to the end of the sensor cable to enable processor supervision. The cable connectors are mounted horizontally on the fence using two cable ties.

Note	Senstar recommends limiting cable repair splices to one splice per 150 m (492 ft.) cable length.

High security installations

The FlexZone sensor can provide redundancy for high-security installations, providing certain rules are followed. If these rules are followed, then the system will continue to provide perimeter detection even if one processor fails, or a sensor cable is cut or if one power supply fails. With this configuration, each 300 m of sensor cable is monitored simultaneously, by two processors.

Note	If a sensor cable is cut, location accuracy may be diminished and an increased system noise level (clutter) and NAR may occur. In the event of a cut cable, repairs must be made as quickly as possible to return the system to its full detection capabilities.

Note	A fully redundant system requires that there be no single point of failure. Therefore, the system requires two Network Interface Units, two Network Manager PCs, two Security Management System PCs (NM and SMS can reside on one PC) and two UPS systems.

High-security installation rules

- maximum sensor cable length for one side of a processor is 150 m (492 ft.) except terminated open ends of perimeter (max 300 m)
- maximum length of sensor cable between 2 processors is 300 m (984 ft.)
- a minimum of two 48 VDC power supplies (depending on total number of processors)
- power supplies must be connected to processors on the ends of the perimeter
- two Silver Network connections to two Network Manager PCs at opposite ends of the loop, OR, star network configuration setup using PoE with redundant switches

Figure 13: shows a seven processor high-security perimeter up to 2.1 km (1.3 mi.) in length.

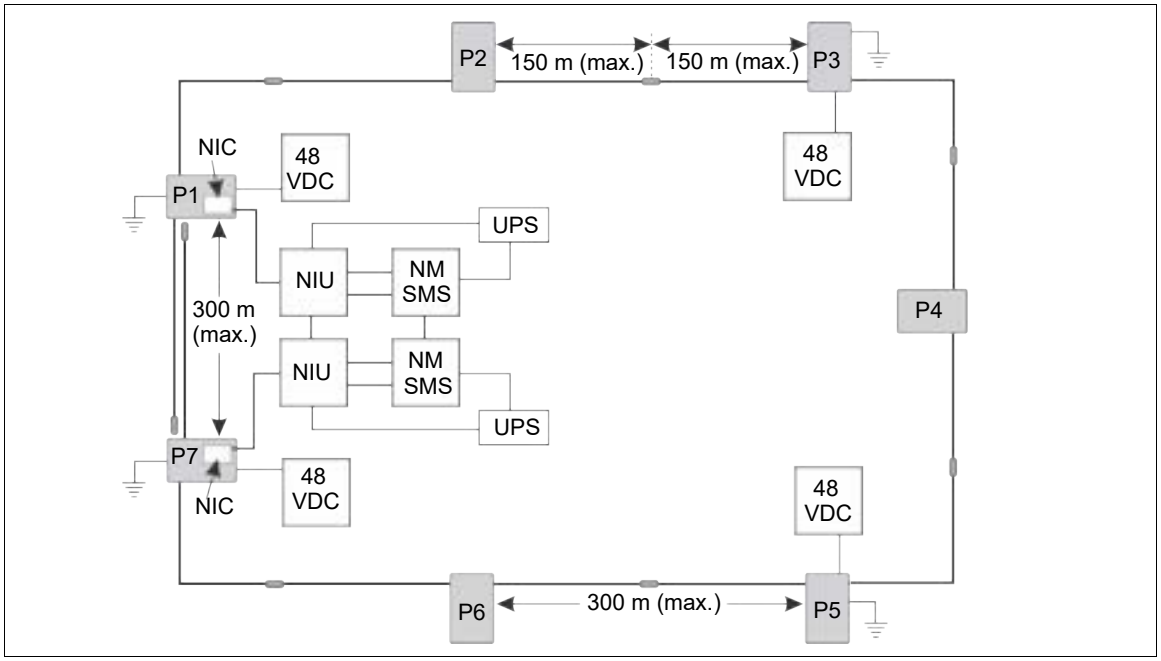


Figure 13: High-security redundancy (2.1 km example)

2 Installation

Installing the sensor cable

CAUTION	FlexZone sensor cable **must be conditioned** before it is attached to the fence.

CAUTION	When installing FlexZone sensor cable during periods of freezing weather (below 0º C, 32º F) extra care must be taken as the sensor cable is less flexible, and the polypropylene cable ties can be prone to failure.

Cable handling rules

The FlexZone sensor cable converts minute vibrations in the fence fabric into electrical signals. Any damage to the cable from mishandling or poor installation practices will have a negative effect on the system's performance.

- DO NOT bend, twist, jerk, knot, or kink the sensor cable.
- DO NOT nick or scrape the sensor cable's outer jacket.
- Avoid tight turns in the sensor cable, the minimum bend radius for FlexZone sensor cable is 10 cm (4 in.) and for armored FlexZone cable is 15 cm (6 in.).
- DO NOT place objects on the sensor cable or allow anyone to stand or walk on the cable.
- DO NOT allow the cable to fall off the side of the cable reel.
- DO NOT apply excessive tension to the sensor cable at any time.
- When using cable ties to attach the sensor cable to a fence, install the ties by hand and pull them hand-tight until snug.
- DO NOT use mechanical tighteners to attach cable ties to a fence.
- DO NOT allow the sensor cable to be pinched between the fence and a fence post, or any other object.
- Keep the ends of the sensor cable clean and dry. If water enters the loose tube it can cause corrosion and potentially freeze in the winter, which will have a negative effect on sensitivity.

Note	The number of cable passes required on a fence depends on the height of the fence, the type of fence, and the required level of security (see Fence height recommendations on page 16).

FlexZone sensor cable conditioning

Before installing FlexZone sensor cable, the cable must be conditioned. Prior to conditioning, there may be excess center conductor in the cable, or the center conductor may be adhered to the cable side walls after the manufacturing process. Conditioning frees the center conductor and maximizes its movement, thereby providing the greatest sensitivity. Cable conditioning is best done by two people and typically takes about 10 minutes for a 150 m sensor cable. FlexZone cable conditioning can be done by a single person, but it can take significantly longer to complete due to repeatedly walking back and forth.

Cable conditioning procedure (part 1 - cable preparation)

Note	This procedure applies to both standard FlexZone sensor cable and armored FlexZone sensor cable.

1. Dispense the sensor cable alongside the fence in a long straight line.

Note	If site conditions prevent the cable from being laid out in a straight line, minimize the number of turns and use as large a turn radius as possible. Turns in the cable will require an increase in the amount of pulling force needed to move the center conductor back and forth.

Note	If the cable is moved to a more open area to be conditioned, move it carefully back to the installation location following the process. Avoid using excessive pulling force and do not pull the cable around corners or fence posts when it is repositioned.

2. Carefully remove 30 cm (12 in.) of the black outer jacket, shield and clear tube to expose 30 cm of the center conductor at both ends of the cable. For armored cable, remove 45 cm (18 in.) of the armor from each end of the cable, then expose 30 cm (12 in.) of center conductor at each end.

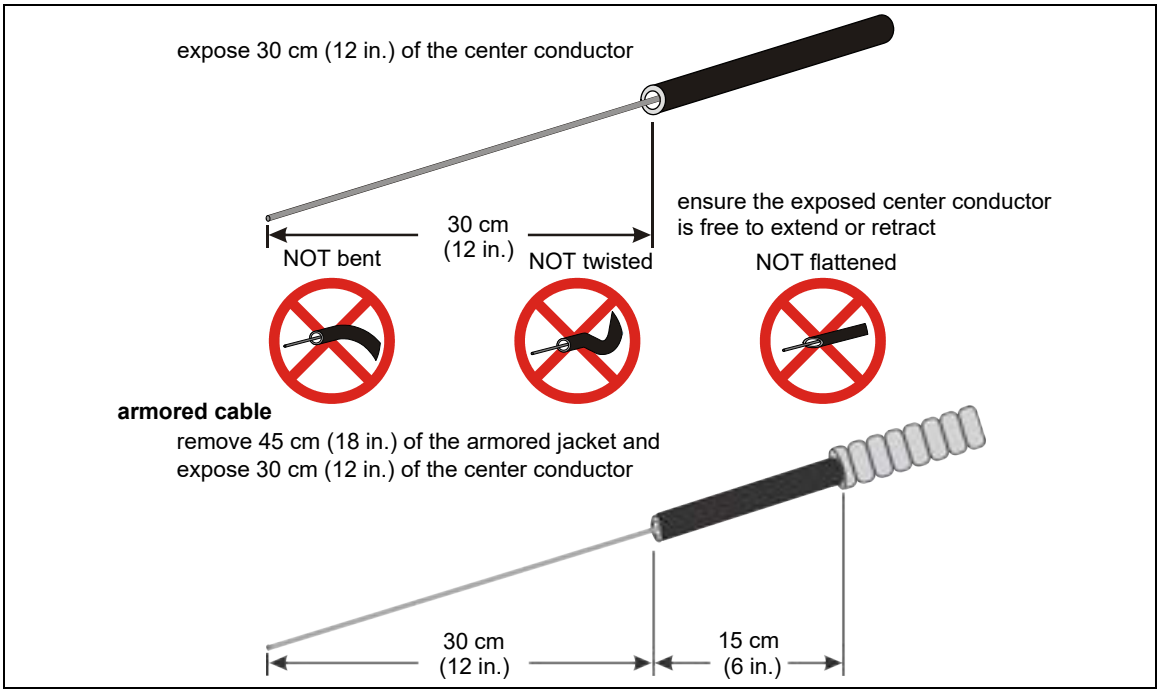


Figure 14: Exposing the center conductor

3. Check the ends of the cable to verify that the center conductor is free to retract or extend (i.e., the center conductor is straight and 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, cut off the damaged section and re-strip the cable.
4. At both ends of the cable, tie a loop through a 2.5 cm (1 in.) piece of the black jacket, to prevent the center conductor from retracting into the cable during the conditioning procedure.

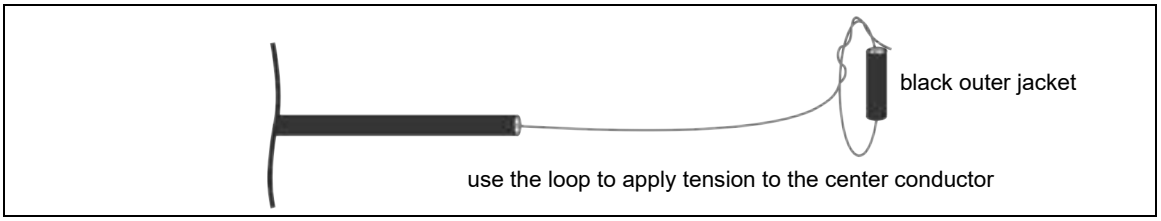


Figure 15: Securing the center conductor

Cable conditioning procedure (part 2 - cable flossing)

Pull the cable by the black jacket to remove any slack and then use a “flossing” motion to pull the center conductor back and forth to ensure the center conductor is floating freely over the full length of the sensor cable.

Note	Initially, there may be resistance as well as some “stretching” as the center conductor is freed inside the cable (i.e., the center conductor pulls out at one end but remains the same length at the other). Once the center conductor moves back and forth easily so that pulling it out 15 cm (6 in.) at one end causes it to retract 15 cm at the other end, the conditioning is complete.

Note	You can hear the motion of the floating center conductor as it rattles when you tap a properly conditioned sensor cable.

Note	Maintain a firm grip and consistent pulling tension, and keep the sensor cable taut and in-line during the cable conditioning procedure.

1. The first person begins by holding the cable by the black jacket with one hand and applying light pulling tension to the center conductor with the other (see Figure 16:).
   The second person holds the cable by the black jacket and allows the center conductor to move freely (no tension applied). The first person stops pulling when they encounter an increase in resistance or the center conductor can be pulled no further.

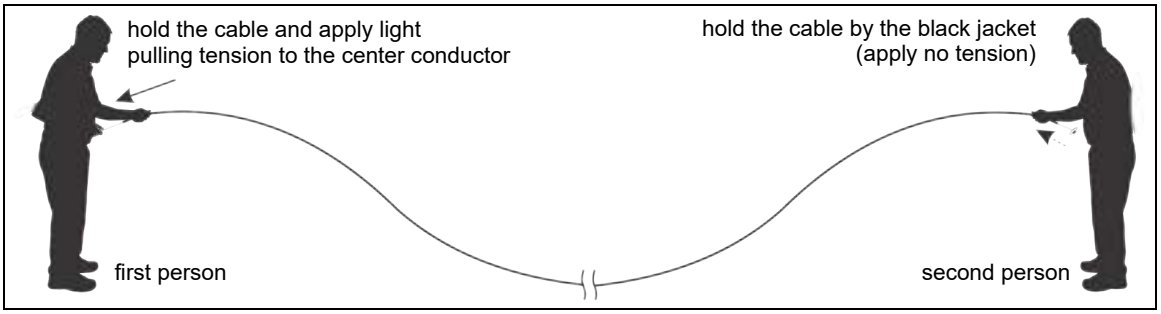


Figure 16: FlexZone cable conditioning (part 2 cable flossing)

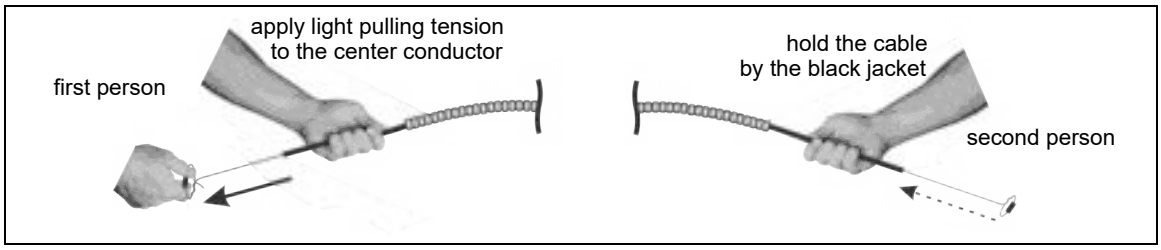


Figure 17: FlexZone armored cable conditioning (part 2 cable flossing)

2. When the second person observes that the center conductor has been pulled to its limit, the second person waits 10 seconds and then applies light pulling tension to the center conductor while holding the cable by the black jacket with the other hand (see Figure 18:).
   The first person holds the cable by the black jacket and allows the center conductor to move freely (no tension applied). The second person stops pulling when they encounter an increase in resistance or the center conductor can be pulled no further.

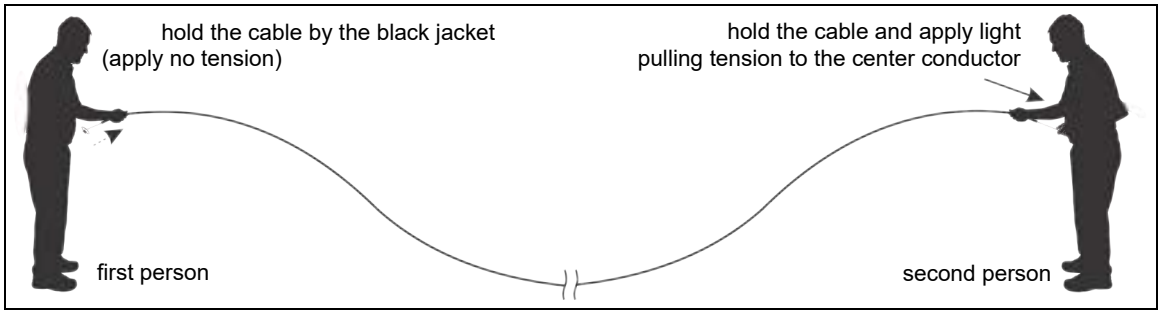


Figure 18: FlexZone cable conditioning (part 2 cable flossing)

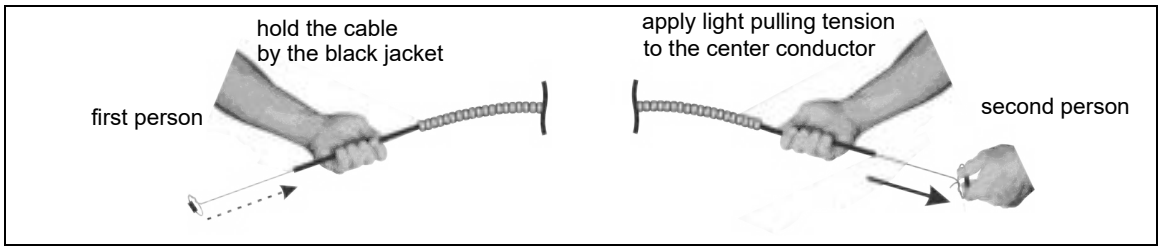


Figure 19: FlexZone armored cable conditioning (part 2 cable flossing)

3. Continue this flossing motion back and forth until the center conductor moves easily with very little resistance.
4. When the conditioning procedure is complete, release the tension on the center conductor, and cut off any center conductor that was damaged during conditioning.

Note	When conditioning is complete, the center conductor slides easily in both directions, and it may extend an additional 15 to 30 cm out of the cable jacket at both ends.

Note	If the center conductor does not move back and forth easily (or at all) during the flossing process, straighten any turns in the cable (relocate the cable if necessary). Have one person grip the cable at one end and apply light tension to the center conductor while the second person walks the length of the cable from the other end shaking and tapping the cable. Next, repeat the cable flossing procedure until the center conductor moves freely and easily.

Installing cable on chain-link fences

- Attach the sensor cable to the secure side of the fence (the side opposite the threat).
- Secure the cable to the fence so that it maintains a constant height above ground (i.e., if the fence steps up a hill, the cable should also step up the hill).
- Use UV resistant polypropylene cable ties spaced 25 to 30 cm (10 to 12 in.) apart to attach the sensor cable to the fence.
- Pull the cable ties until they are hand tight and the cable is snug to the fence.
- Attach the cable ties to the center of a link (one wire) NOT at the junction of two fence wires.
- Optionally, for increased security use two steel cable ties per fence panel in addition to the polypropylene cable ties. Hand-tighten the steel cable tie on a fence wire adjacent to a polypropylene cable tie to hold the cable snuggly against the fence without crushing or distorting the sensor cable in any way. DO NOT use a mechanical tightening device.
- 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 other cables.
- For a single cable pass, attach the sensor wire to the middle of the fence.
- Avoid vertical drops greater than 1 m (3.3 ft.) when installing FlexZone sensor cable. Vertical drops of 1 m or more can result in an area with excessive sensitivity, which may cause nuisance alarms. Install vertical cable drops that are greater than 1 m with a minimum 15º slope.
- Use armored sensor cable if the cable is being installed in an area where it may be prone to damage from vandalism, equipment, or materials.
- Keep the ends of the cable clean and dry.

Note	Galvanized fences occasionally have rough patches from the galvanizing process. Avoid attaching the sensor cable at locations where rough galvanizing can potentially damage the cable.

Note	Tap the sensor cable occasionally as you attach it to the fence and listen for the rattle of the floating center conductor to ensure the cable is properly conditioned.

Installing cable ties

- Using UV resistant polypropylene cable ties, secure the cable to the fence fabric at the midpoint of the chain-link. Install the cable ties by hand, tightening them enough to hold the cable securely against the fence.

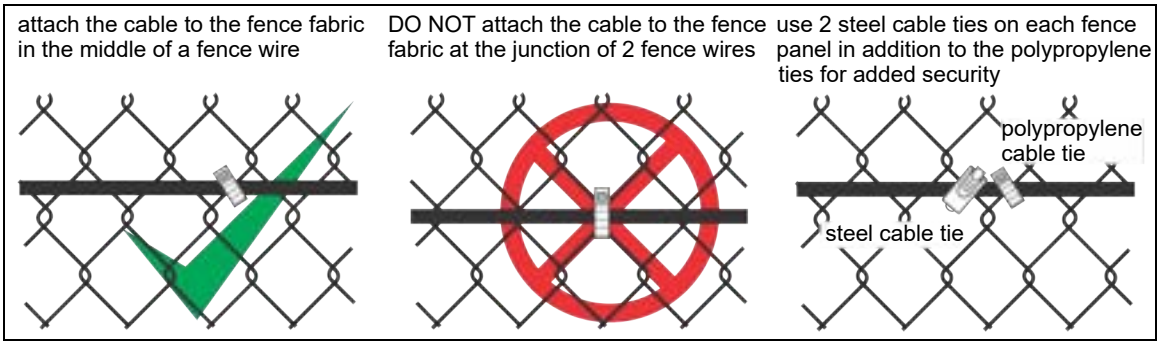


Figure 20: Securing cable to a chain-link fence

Bend radius

- The smallest allowable radius for FlexZone sensor cable is 10 cm (4 in.).
- The smallest allowable radius for armored sensor cable is 15 cm (6 in.).

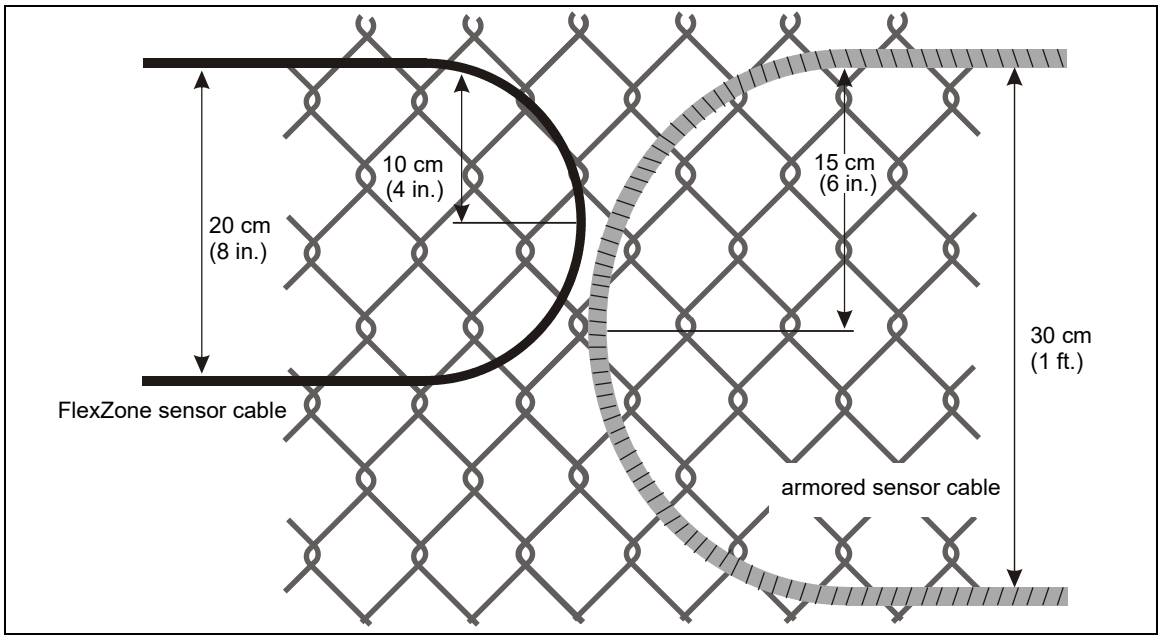


Figure 21: Smallest allowable bend radius

At fence posts

- Secure the cable at both sides of each fence post so the cable is in contact with the post. The cable should have enough slack so that it is not stretched tightly or flattened. Once cable ties are attached at each side of the post, it should be easy to move the sensor cable with your fingertips.

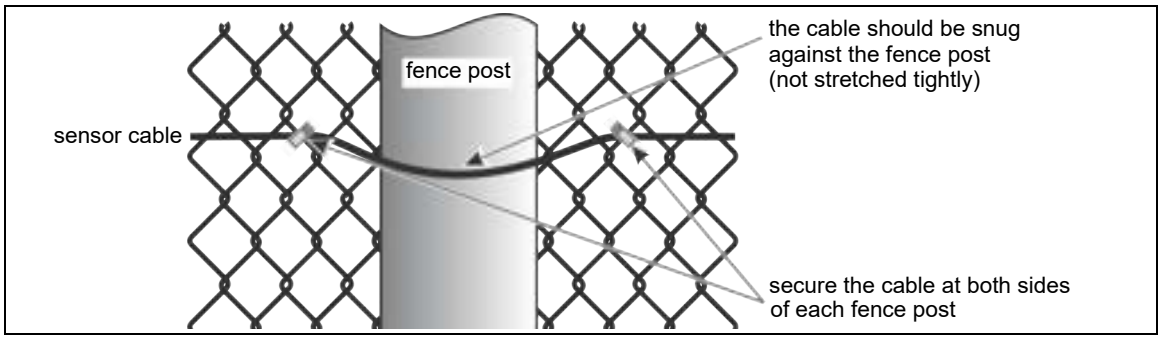


Figure 22: Cable at fence posts

At corners or heavy gauge posts

Install sensitivity loops at all fence corners and at any heavy gauge fence posts.

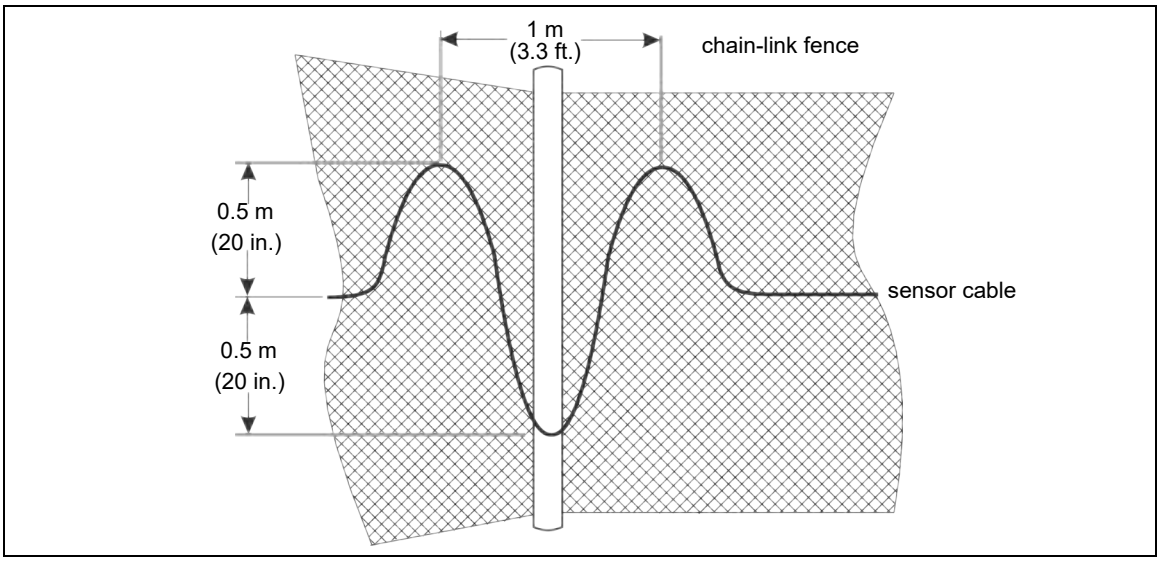


Figure 23: Sensitivity loops at corner and at heavy gauge posts

At software defined zone boundaries

- Optionally, install zone demarcation loops at soft zone boundaries for increased zone isolation. The extra cable helps ensure that valid targets are located accurately in the correct zone. See Figure 23: for sensitivity loop and zone demarcation loop layout recommendations. See Figure 24: for an illustration of how to use zone demarcation loops.

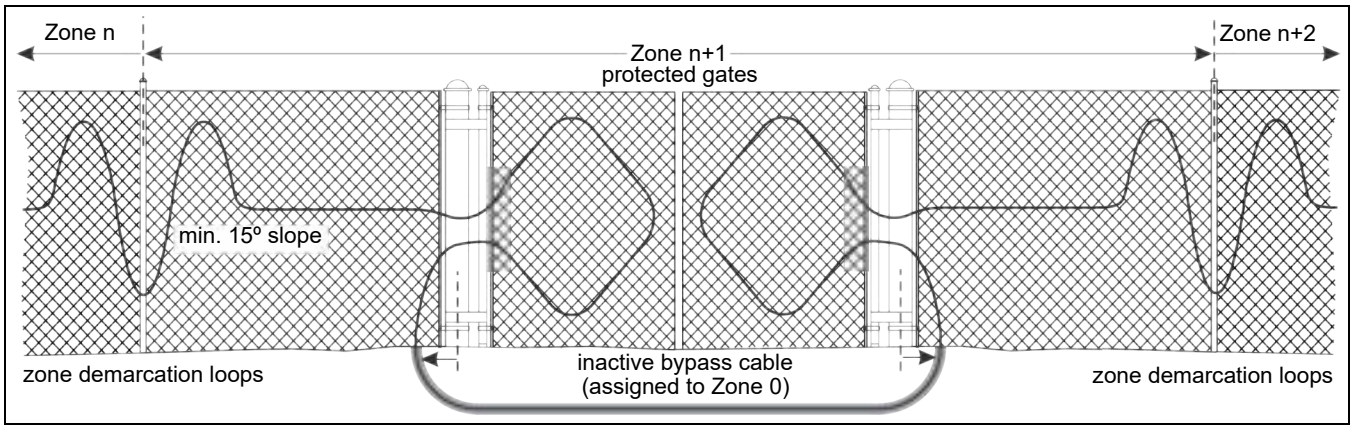


Figure 24: Optional Zone demarcation loops for software defined zone boundaries (protected gate access)

Service loops

- Install U-shaped service loops approximately 50 m (164 ft.) apart along the sensor cable run. The loop should measure 30 to 45 cm from top to bottom. Install service loops at fence posts.
- For a double cable pass create two equally spaced service loops in the same manner as for a single cable pass.

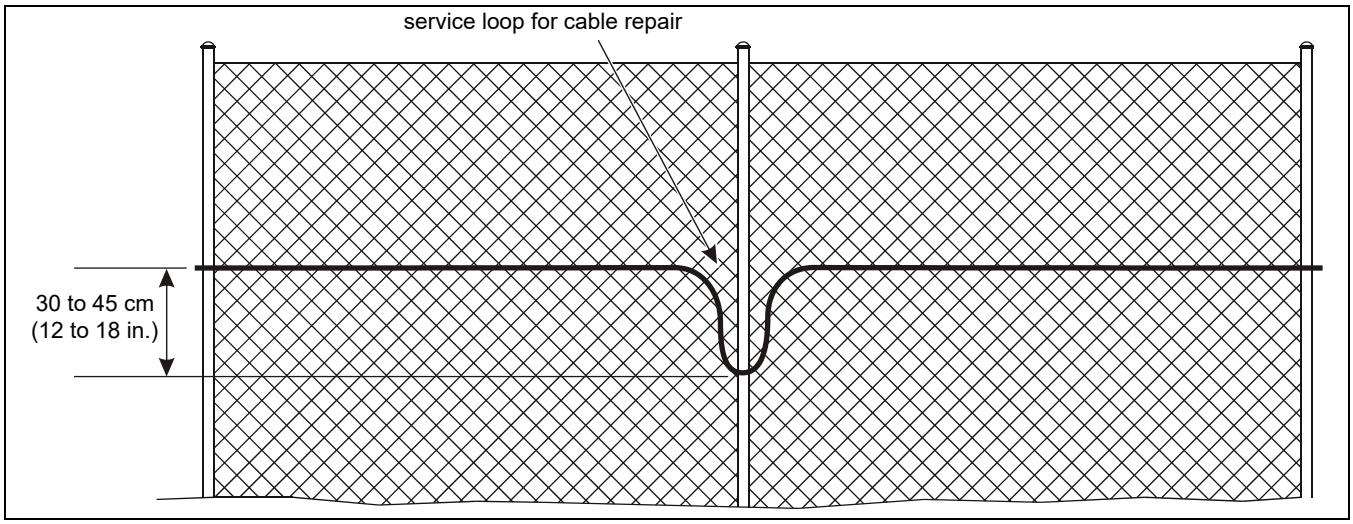


Figure 25: Single cable pass service loop

Drip loops

- Install drip loops at every cable connector. Form the drip loop by raising the connector above the level of the cable run before securing it, horizontally, to the fence fabric (15 cm {6 in.} for splices, or 20 cm {8 in.} for terminations).

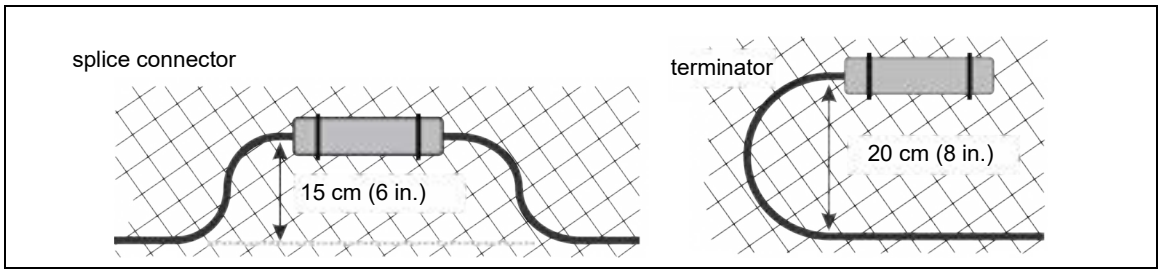


Figure 26: Drip loops

Termination loops

- If there is excess cable at a terminator location, loop the cable back for one fence panel and form a termination loop by creating up to 5 loops of sensor cable with a 60 cm (2 ft.) diameter. This will provide up to 13 m of sensor cable that can be used for future repairs or for changes in the sensor cable layout. Figure 27: illustrates the recommended configuration for a termination loop.

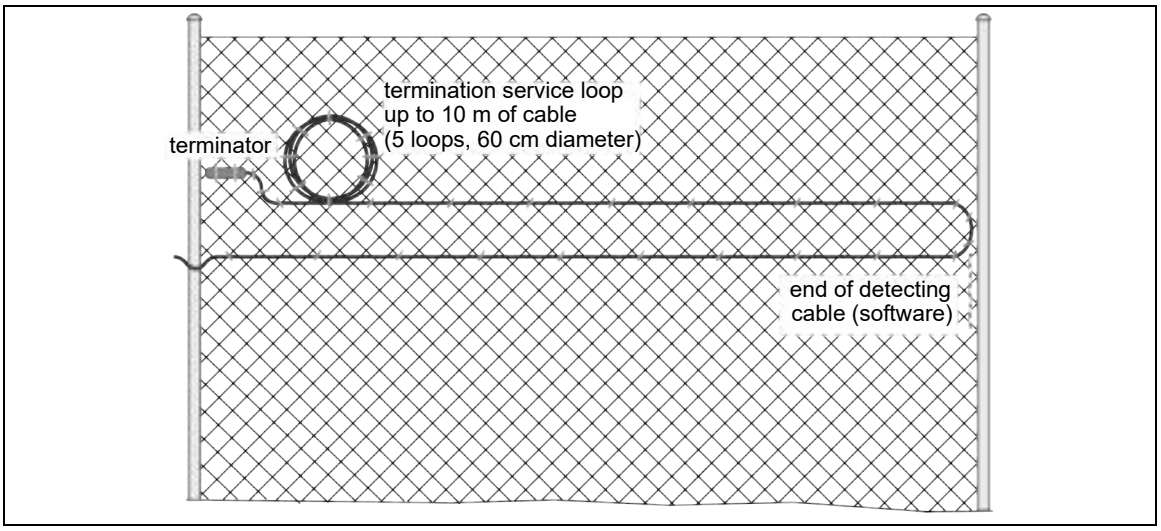


Figure 27: Termination loop example

Splice loops

- If there is excess cable at a cable splice location, form splice service loops by creating up to 5 loops of sensor cable with a 60 cm (2 ft.) diameter. This will provide up to 10 m of sensor cable at each side of the splice that can be used for future repairs or for changes in the sensor cable layout. Figure 28: illustrates the recommended configuration for splice loops.

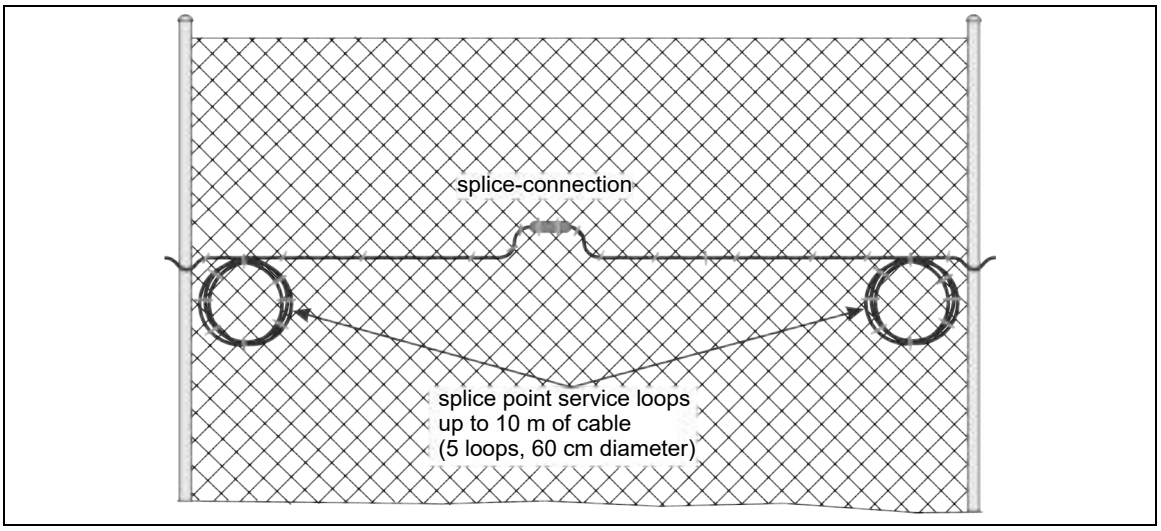


Figure 28: Splice loop example

Installing cable on chain-link

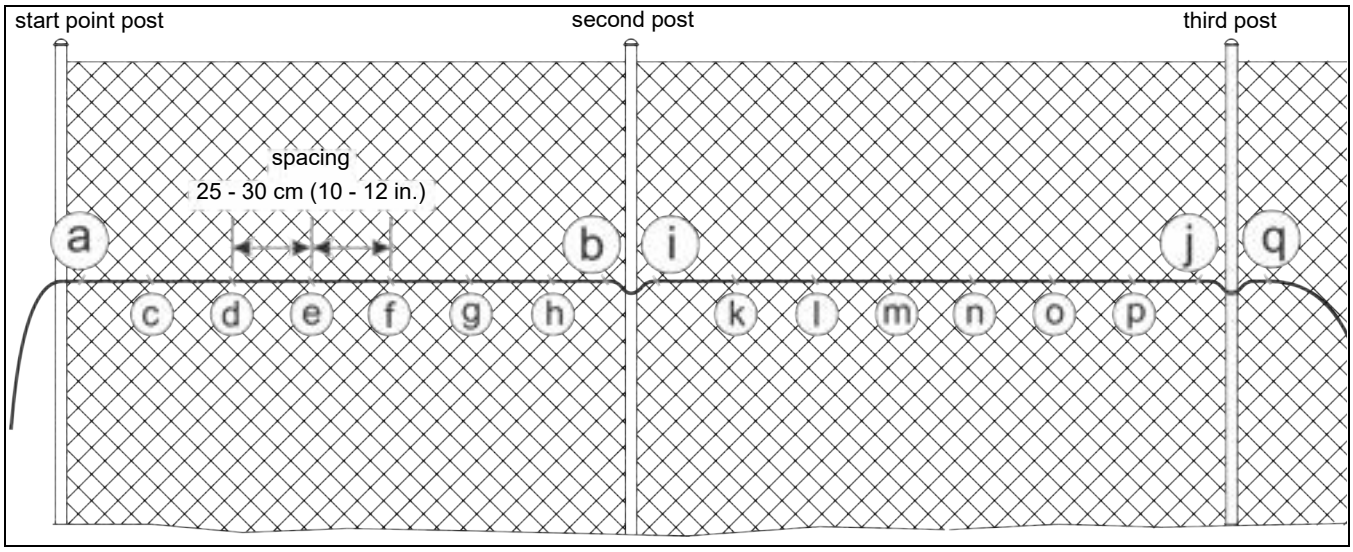


Figure 29: Installation procedure diagram

1. Dispense the sensor cable alongside the installation location on the secure side of the fence. Do not allow the sensor cable to fall off the spool, as it may twist and kink. (The FlexZone cable should have been deployed at the installation location for the conditioning procedure.)
2. Beginning at the start point, attach the sensor cable to the fence fabric at point a (see Figure 29:). Leave enough extra sensor cable at this point to install a splice kit, or to connect the sensor cable to the processor (refer to the site plan for the processor's installation location).
3. Hold the sensor cable straight and level along the fence while you attach the cable to the fence fabric beside the second post at point b. Ensure that there is no slack in the sensor cable.
4. Return to the start point and install cable ties every 25 to 30 cm (10 to 12 in.) along the first fence panel at points c to h.
5. Attach the cable to the fence beside the second post at point i. Ensure the cable is not stretched tightly, but that it is snug across the fence post.
6. Hold the sensor cable straight and level along the fence while you attach the cable to the fence fabric beside the third post at point j.
7. Return to the second post and install cable ties every 25 to 30 cm (10 to 12 in.) along the second fence panel at points k to p.
8. Continue this procedure, one fence panel at a time, until the cable is fully installed.
9. Verify that there are no slack or loose sections of cable, and that the cable ties are properly tightened. Trim and properly discard the ends of the cable ties.

Installing cable on welded-mesh fence

Note	Follow the installation instructions and use the height recommendations for chain-link fences when installing sensor cable on welded-mesh fence.

- Install the sensor cable on the secure side of the fence (the side opposite the threat).
- Sensor cable being installed on the same side of the fence as the horizontal wires should be placed directly below the horizontal wire and attached every 25 cm (10 in.).
- Sensor cable being installed on the opposite side of the fence as the horizontal wires should be attached at the intersection points of the two wires every 25 cm (10 in.).

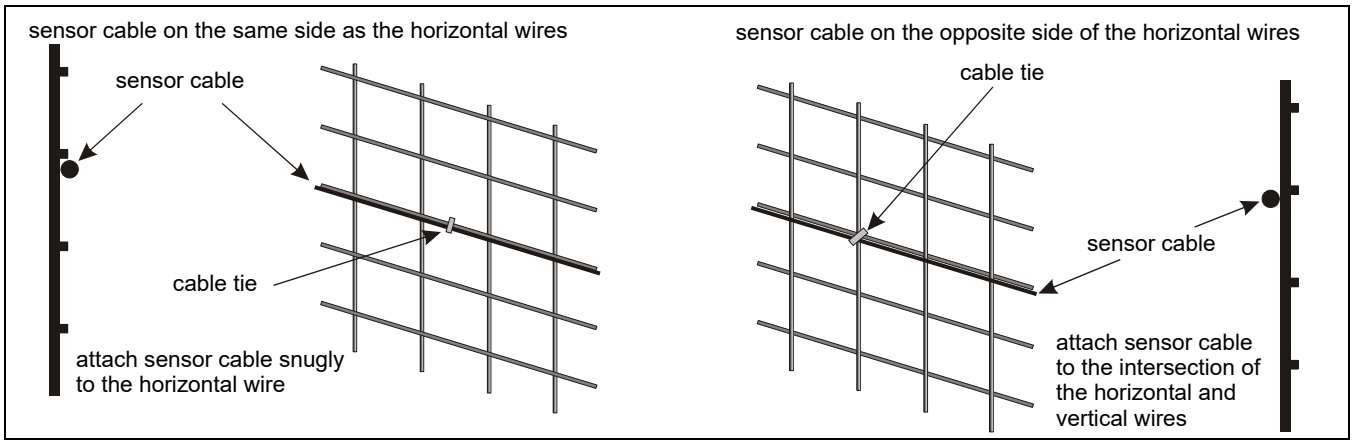


Figure 30: Welded-mesh fence

Double pass cable installation

For double cable pass installation use both sides of one processor for the upper and lower cable runs. The FlexZone sensor monitors the received signals from both sensor cables to determine intrusion activity. Therefore, it is critical that the features and lengths of both cables are properly matched. Figure 31: illustrates the double pass concept for a single processor installation. For multiple processor installations the upper cables and lower cables of two processors are joined by spice kits (see Figure 10:). Refer to Figure 31: and Installing cable on chain-link fences on page 29 to attach FlexZone sensor cable in a double pass configuration. The cable spacing for a double pass configuration is 1/3 the fence height for the lower pass and 2/3 the fence height for the upper pass. If the double pass is required because the fence has a middle rail, then the lower pass should be 1/2 way between the middle rail and the ground, while the upper pass should be 1/2 way between the middle rail and the top of the fence.

Note	Lay the two cables side by side on the ground beside the fence after the conditioning procedure, and mark the two cables with tape every 5 m (16 ft.). This will facilitate length matching during cable installation.

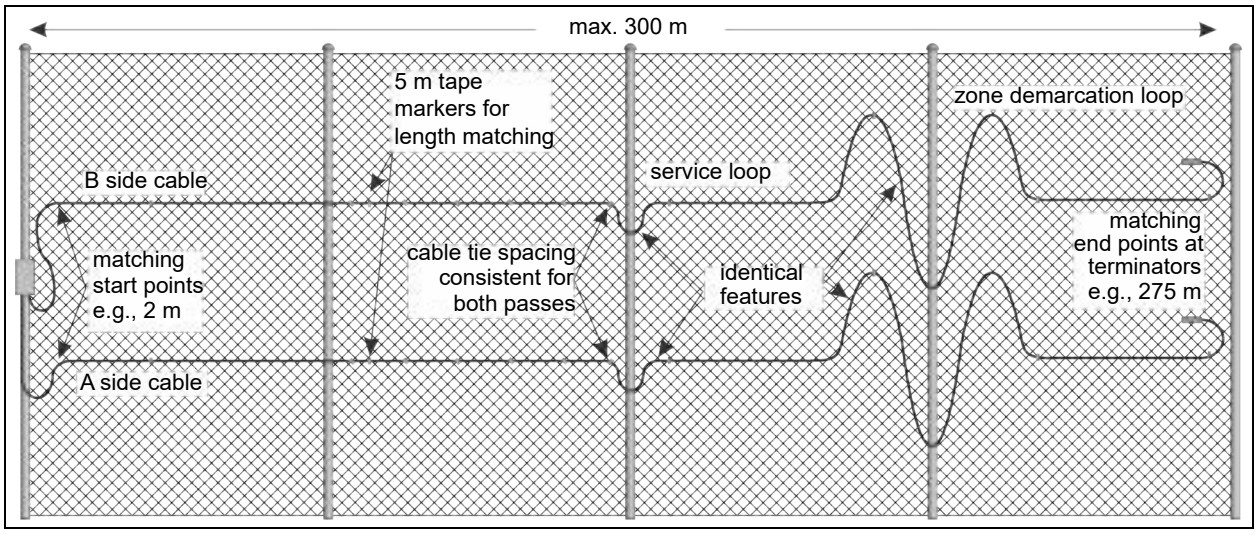


Figure 31: Double pass cable installation

Installing cable on rigid fences

The technique used to install sensor cable on rigid fences depends on the type, and brand, of fence. In some instances, cable ties are used to attach the sensor cable. Some manufacturers offer cable clamps that are specific to their fence type (see Figure 32:). Service loops, sensitivity loops and zone demarcation loops are not recommended on rigid fence types. Refer to application note G6DA0309-001 (Using FlexZone on palisade fences) if you are considering installing the FlexZone sensor on a rigid fence type.

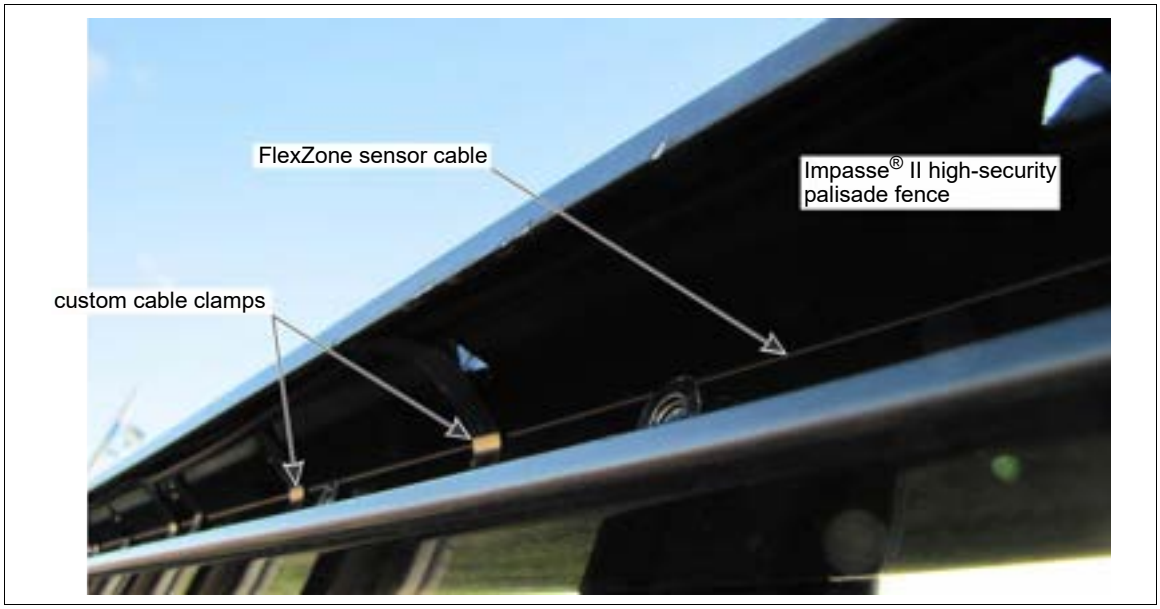


Figure 32: Palisade fence with FlexZone sensor cable on top rail

Sensor cable connections

There are three FlexZone sensor cable connections: processor connections, splices and terminations. The sensor cable to processor connections are made on removable terminal blocks, which plug into connectors on the processor. Splice and termination connections are made on terminal blocks that are mounted on small circuit card assemblies (CCA).

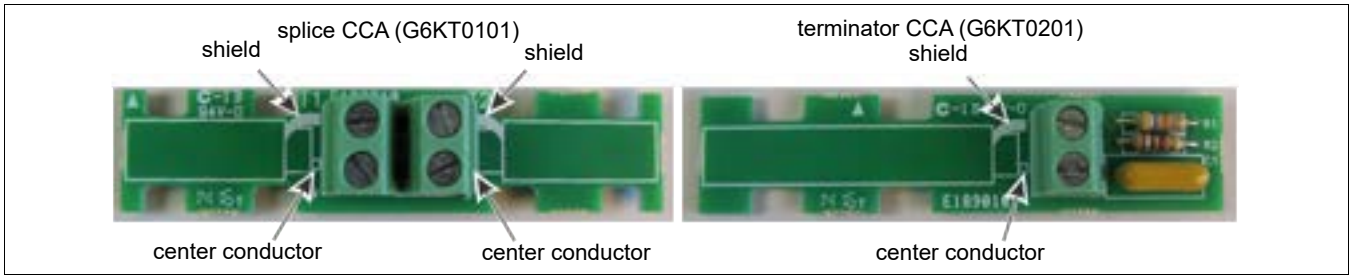


Figure 33: Splice CCA & Terminator CCA

TIP	Follow the silk screening when connecting the sensor cable to the CCA.

Note	If there is excess sensor cable at the location of a cable splice or termination, you can coil up to 10 m of sensor cable and attach it to the fence. Then cut the cable to the proper length for the connection.

Note	Keep the sensor cable and enclosure clean and dry during installation.

Cable preparation (all connections)

1. Cut the sensor cable to the correct length for the application:
   - For splice connections, cut the sensor cable 15 cm (6 in.) past the specified location of the splice.
   - For terminations, cut the cable 0.5 m (20 in.) past the specified termination point.
   - For processor connections, pull approximately 60 cm (2 ft.) of sensor cable into the enclosure through the two cable glands on the right side of the enclosure.
2. Carefully, remove 20 mm (0.8 in.) of the outer jacket and the mylar film from the end of the sensor cable. DO NOT nick the braided shield.

TIP	Cut only part way into the outer jacket and then twist the two sections apart.

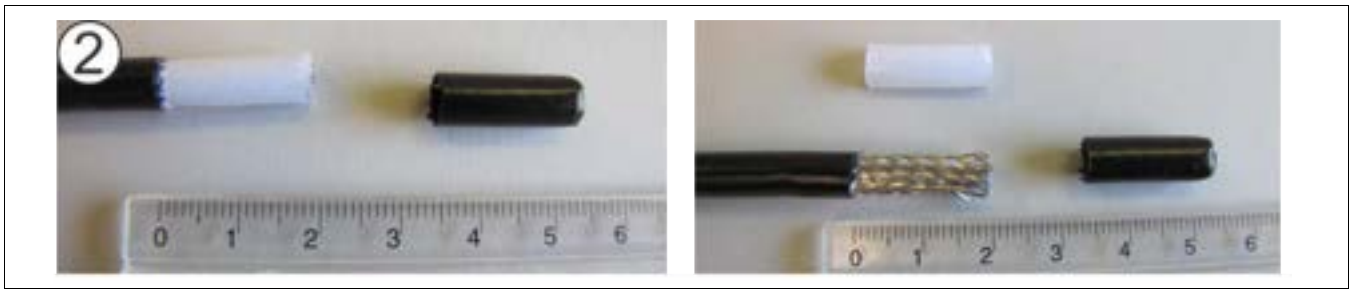


Figure 34: Preparing FlexZone sensor cable step 2

3. Separate the strands of the exposed braided shield, and twist the strands into two separate conductors, on opposite sides of the cable.
4. Peel back and remove the foil covering flush with the black outer jacket.

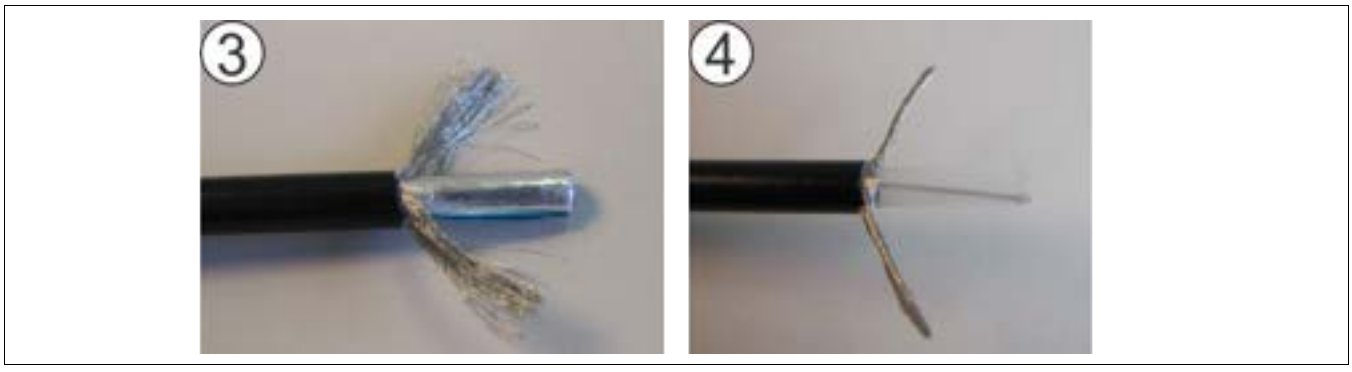


Figure 35: Preparing FlexZone sensor cable steps 3 & 4

5. Trim back the clear tube to a length of 5 mm (1/5 in.) by carefully removing app. 15 mm (3/5 in.) from the end of the cable. DO NOT nick the center conductor.
6. Bend and form the two sections of twisted braided shield into conductors that are parallel with, and separated from, the center conductor by 5 mm (1/5 in.) on opposite sides of the cable.

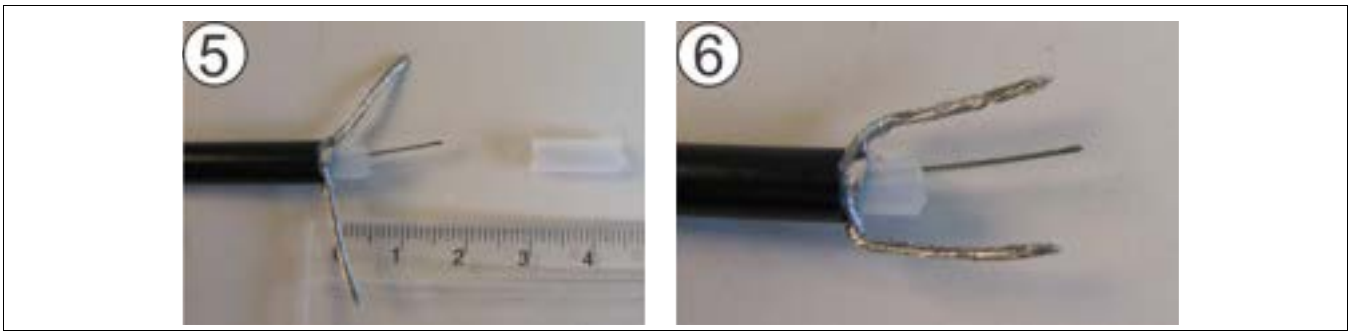


Figure 36: Preparing FlexZone sensor cable steps 5 & 6

Note	For cable splices proceed to Sensor cable splices on page 39. For terminations proceed to Sensor cable terminations on page 40.

Processor connections

See Cable preparation (all connections) on page 37 for steps 1 - 6.

7. Trim the twisted braided shields and the center conductor to a length of 6 mm (1/4 in.) past the end of the clear tube.
8. Remove the A Side terminal block from T9. Connect the A Side cable to the three position terminal block by inserting the center conductor and the two twisted braided shield conductors into the terminal block and tightening the screws. The center conductor goes into the center (second) terminal.

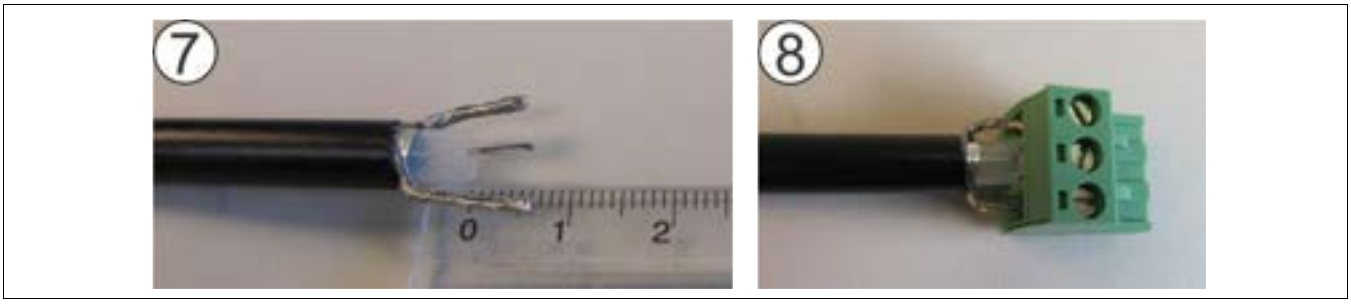


Figure 37: Processor sensor cable connections steps 7 & 8

9. Repeat this procedure for the B Side sensor cable.
10. Pull the sensor cables back out through the cable glands until they are the correct length to plug into T9 (A Side to terminals 1, 2, 3; B Side to terminals 4, 5, 6). Tighten the cable glands.

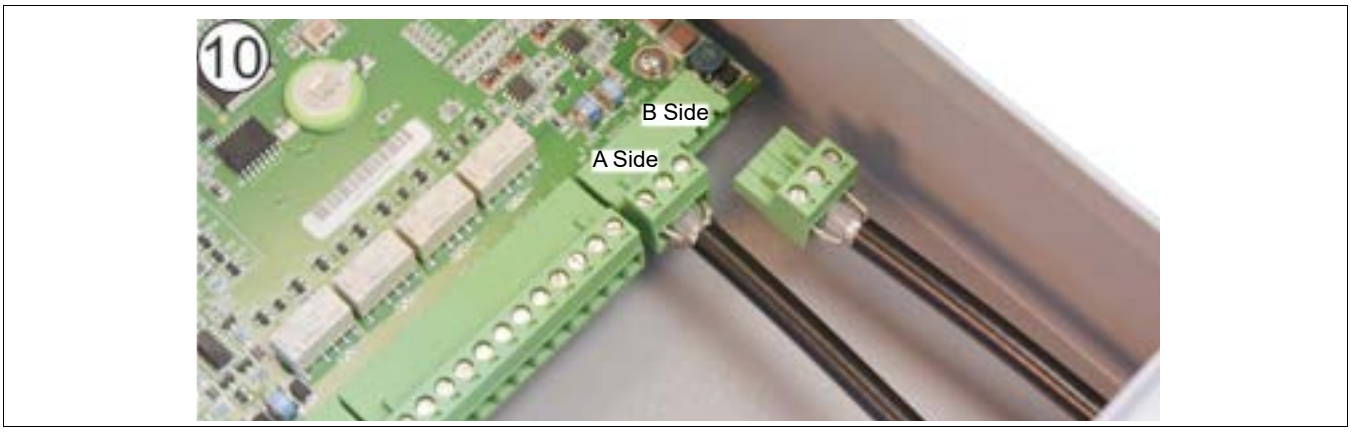


Figure 38: Processor sensor cable connections step 10

Sensor cable splices

See Cable preparation (all connections) on page 37 for steps 1 - 6.

7. For splice connections bend and form the section of twisted braided shield on the left side of the cable into a conductor that is parallel with, and separated from, the center conductor by 5 mm (1/5 in.). Trim the second section of twisted braided shield flush with the black jacket.
8. Trim the twisted braided shield and center conductor to a length of 6 mm (1/4 in.) past the clear tube.

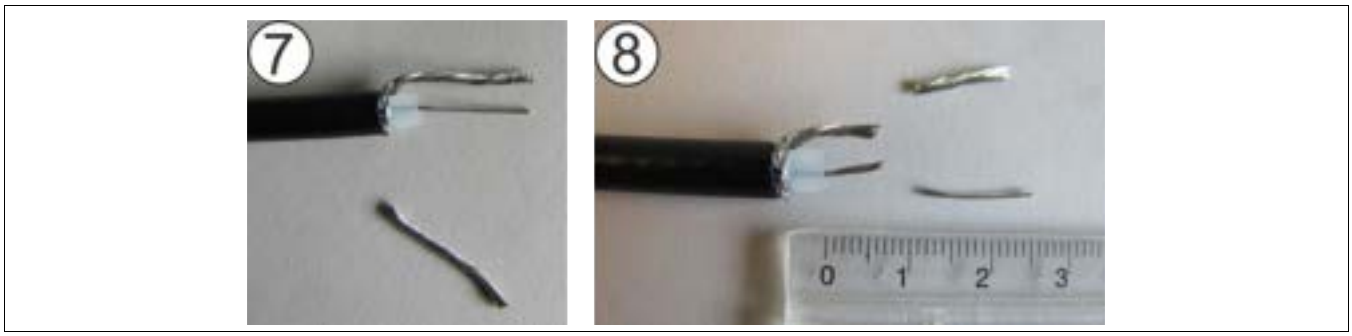


Figure 39: Sensor cable splices steps 7 & 8

9. Repeat this procedure for the second sensor cable.
10. Insert the center conductors into opposing terminals on the splice circuit card assembly (CCA) and tighten the screws. Insert the twisted braided shields into the adjacent opposing terminals on the splice CCA, and tighten the screws.

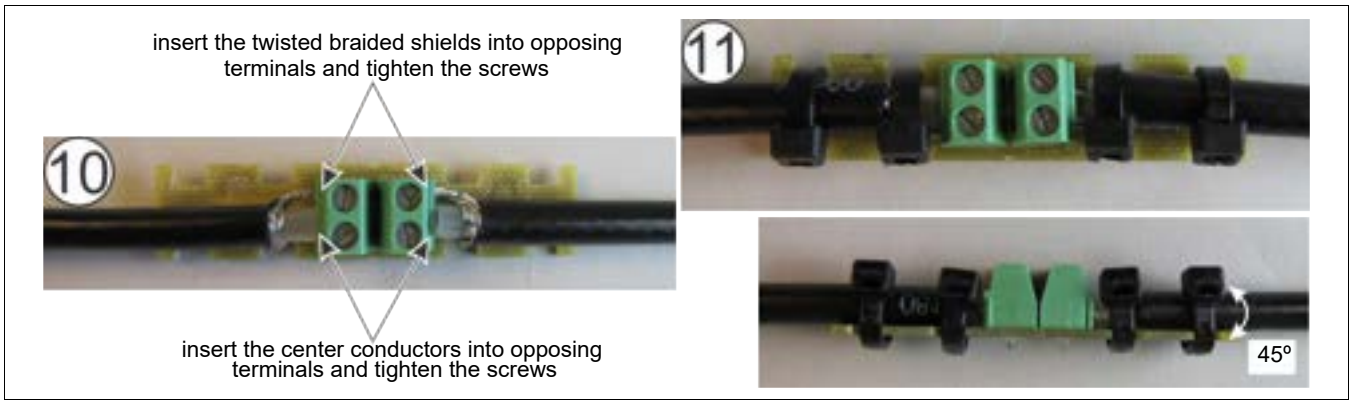


Figure 40: Sensor cable splices steps 10 & 11

11. Secure both sensor cables to the splice CCA using the supplied cable ties. Ensure that the heads of the cable ties are all on the same side of the CCA and that they are at a 45º angle from the flat plane of the CCA.
12. Place the CCA in the center of the gel filled cavity and press the cables and CCA firmly into the gel.
    If the enclosure includes cable guide bars, press the CCA into the center of the side that has two sets of guide bars.
13. Snap the enclosure shut ensuring that both tabs are securely locked in the slots.

Note	The weather-proofing protective gel may be oozing out of the gel snap enclosure.

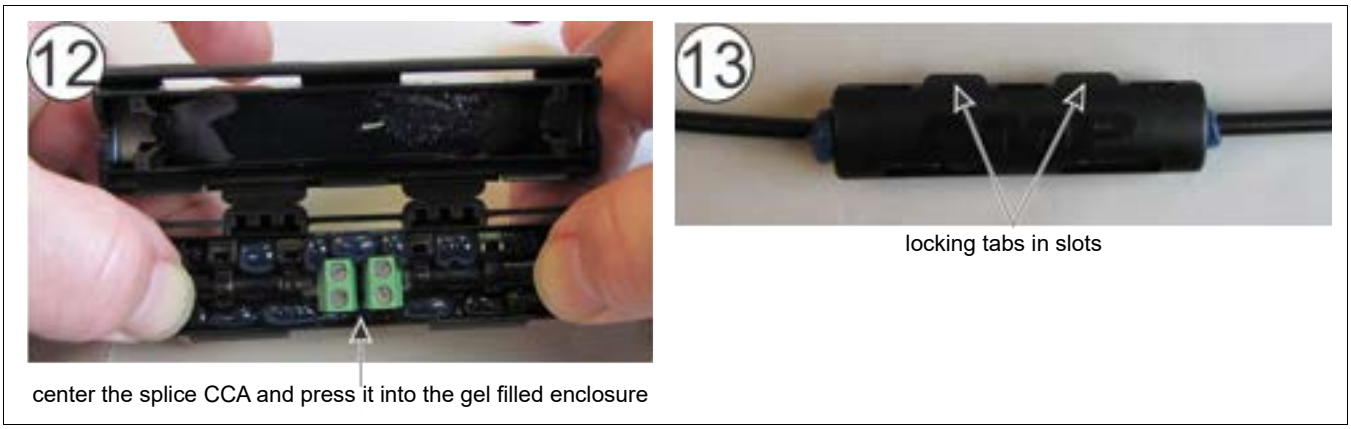


Figure 41: Sensor cable splices steps 12 & 13

14. Form two 15 cm (6 in.) drip loops and attach the splice enclosure to the fence.

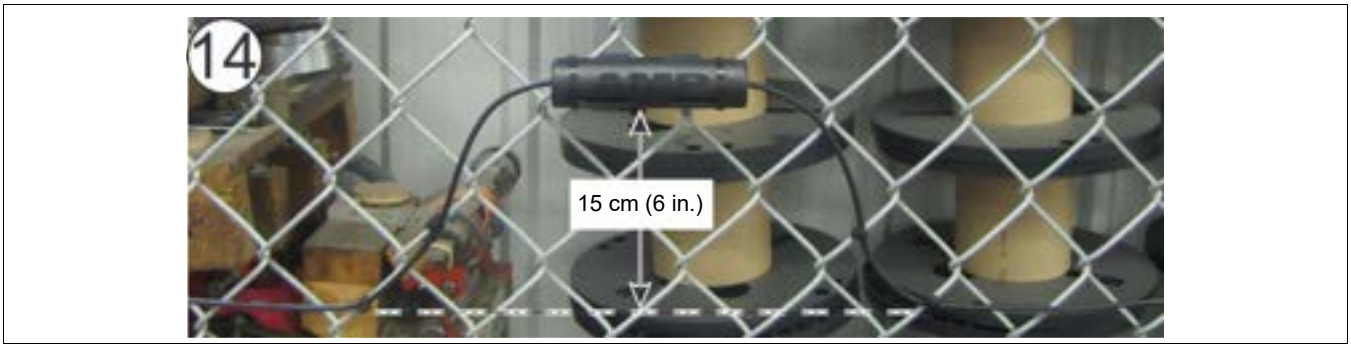


Figure 42: Mounting the splice enclosure

Sensor cable terminations

See Cable preparation (all connections) on page 37 for steps 1 - 6.

7. For terminations bend and form the section of twisted braided shield on the left side of the cable into a conductor that is parallel with, and separated from, the center conductor by 5 mm (1/5 in.). Trim the second section of twisted braided shield flush with the black jacket.

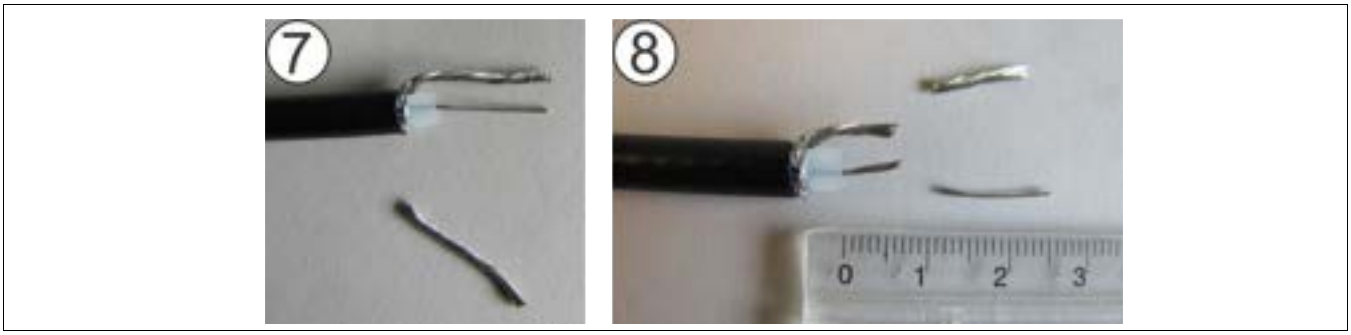


Figure 43: Sensor cable terminations steps 7 & 8

8. Trim the twisted braided shield and center conductor to a length of 6 mm (1/4 in.) past the clear tube.
9. Insert the center conductor into the right side terminal (+) and tighten the screw. Insert the twisted braided shield into the left hand terminal (-) and tighten the screw. Observe polarity.
10. Secure the sensor cable to the termination CCA using the supplied cable ties. Ensure that the heads of the cable ties are both on the same side of the CCA and that they are at a 45º angle from the flat plane of the CCA.

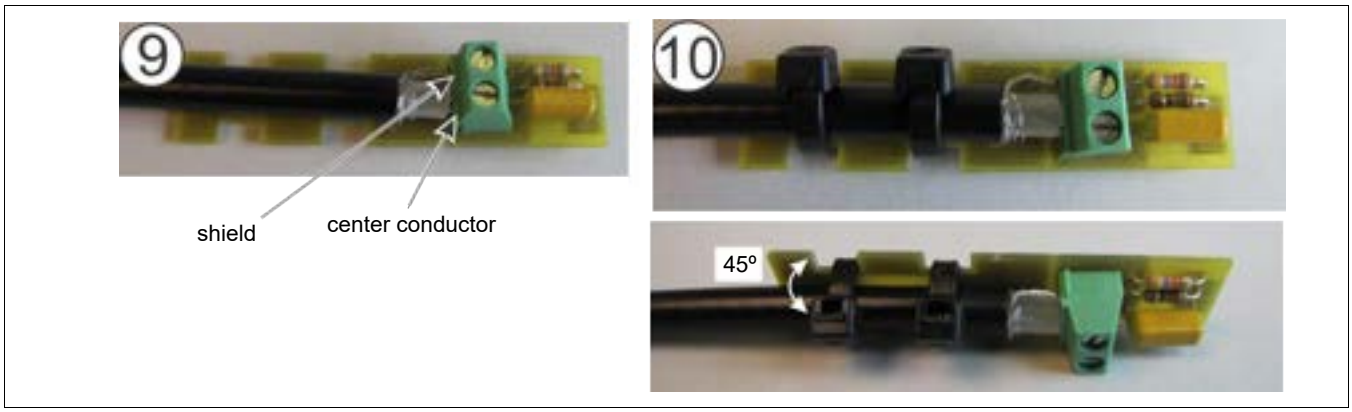


Figure 44: Sensor cable terminations steps 9 & 10

11. Place the termination CCA in the center of the gel filled cavity and press the cable and CCA firmly into the gel.
    If the enclosure includes cable guide bars, press the CCA into the center of the side that has two sets of guide bars.
12. Snap the enclosure shut ensuring that both tabs are securely locked in the slots.

Note	The weather-proofing protective gel may be oozing out of the gel snap enclosure.

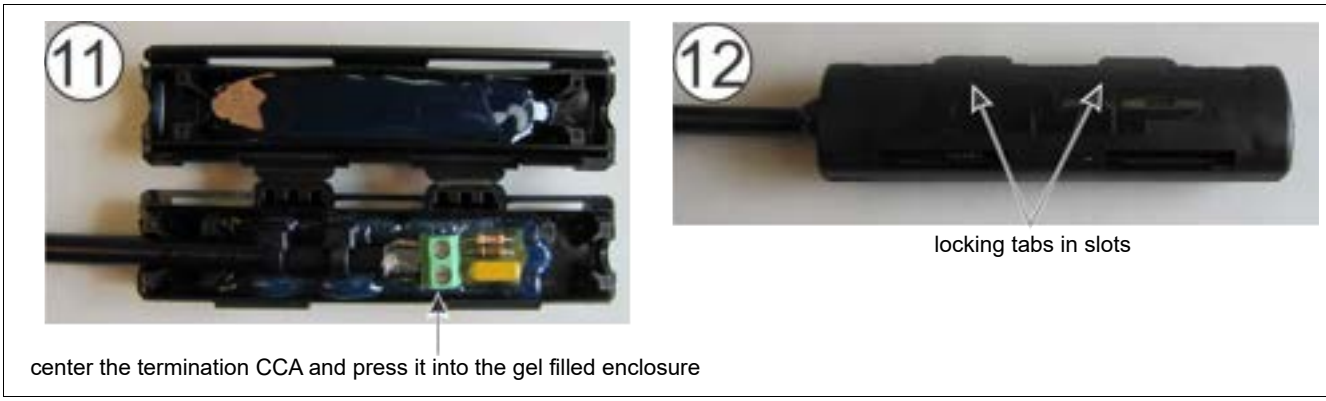


Figure 45: Sensor cable terminations steps 11 & 12

13. Attach the enclosure to the fence. Form a 20 cm (8 in.) drip loop and install the enclosure horizontally to protect the cable entry points from rain and run off.

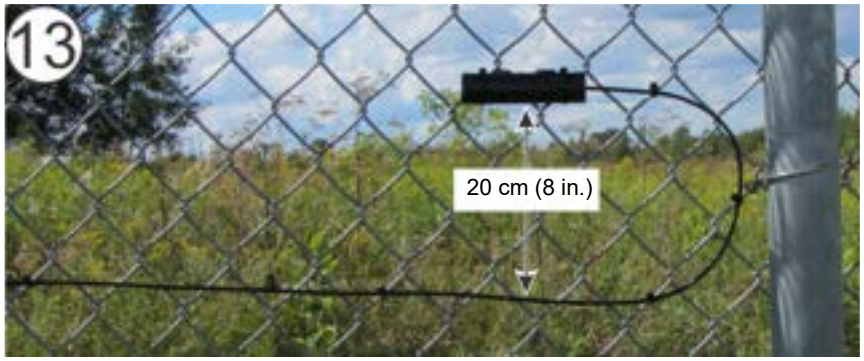


Figure 46: Mounting the termination enclosure

Using the Wireless Gate Sensor to protect gates

The Wireless Gate Sensor (WGS) operates in conjunction with the FlexZone processor to provide RF-based wireless security protection for gates. The WGS is comprised of two components. The gate sensor module (GSM) a high-sensitivity accelerometer, is attached to the protected gate. The GSM analyzes signals picked up from the fence fabric on the gate and will transmit an alarm when it detects vibration, motion, or positional changes. A gate sensor receiver (GSR) that is mounted on the FlexZone processor receives the transmission and passes on the alarm signal to the FlexZone processor. A rubber whip antenna is mounted on the processor enclosure to facilitate the WGS communications. Alarm data communications are via the FlexZone processor over the Silver Network or by contact closures.

Note	See Installing the Wireless Gate Sensor (E7DA0103) for information on installing and configuring the WGS.

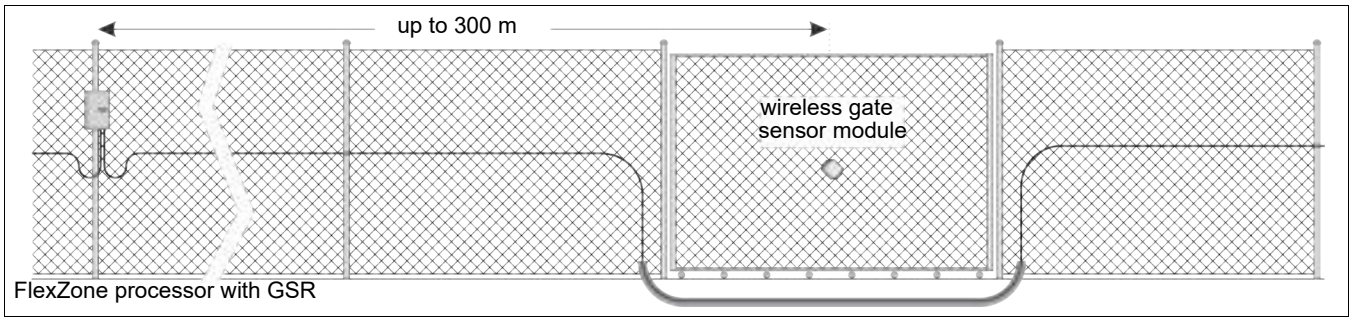


Figure 47: Wireless Gate Sensor example

Installing sensor cable on gates

Note	This section provides details about protecting swinging gates with FlexZone sensor cable. Refer to application note G6DA0109 for information about protecting sliding gates with FlexZone sensor cable.

Swinging gates usually require the same level of protection as the fence.

- 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, or both directions, leave enough slack in the sensor cable so that the gate can be fully opened in either direction.
- Make sure that there is no loose sensor cable when the gate is closed.
- Run the cable from the fence to the gate at the hinged side of the gate, and then back to the fence on the same side.
- Ensure that the cable cannot be caught and pinched when the gate opens and closes.
- Run the cable once completely around the gate in a diamond pattern, app. 30 cm (1 ft.) from the edge (respect the minimum bend radius - no sharp corners).
- Install a bypass cable below ground inside conduit.
- Continue installing the cable on the remainder of the fence.

Gate bypass cable

To bypass a gate in a FlexZone zone, run the sensor cable from one side of the gate to the other, underground inside conduit. Secure the bypass cable at both sides of the gate. The bypass cable is then specified as non-detecting during the calibration process (cable set as non-detecting does not report alarms). The gate can be protected with another technology, such as a microwave sensor. Optionally, create a 3 m (10 ft.) isolation loop at each end of the software bypassed cable.

Bypass cable installation instructions

1. Install the sensor cable on the fence leading up to the gate in the usual manner.
2. Cut a piece of PVC conduit to the required length, and bury the conduit at a depth of at least 45 cm (18 in.). Consult the local building code for conduit burial depth recommendations.

Note	Use minimum 2.5 cm (1 in.) diameter conduit and 90º sweeps (not elbows).

3. Pull the sensor cable through the buried conduit.
4. Seal the ends of the conduit.
5. Use cable ties to tightly secure any exposed bypass cable to the fence fabric.
6. Continue installing the sensor cable on the fence beyond the gate.

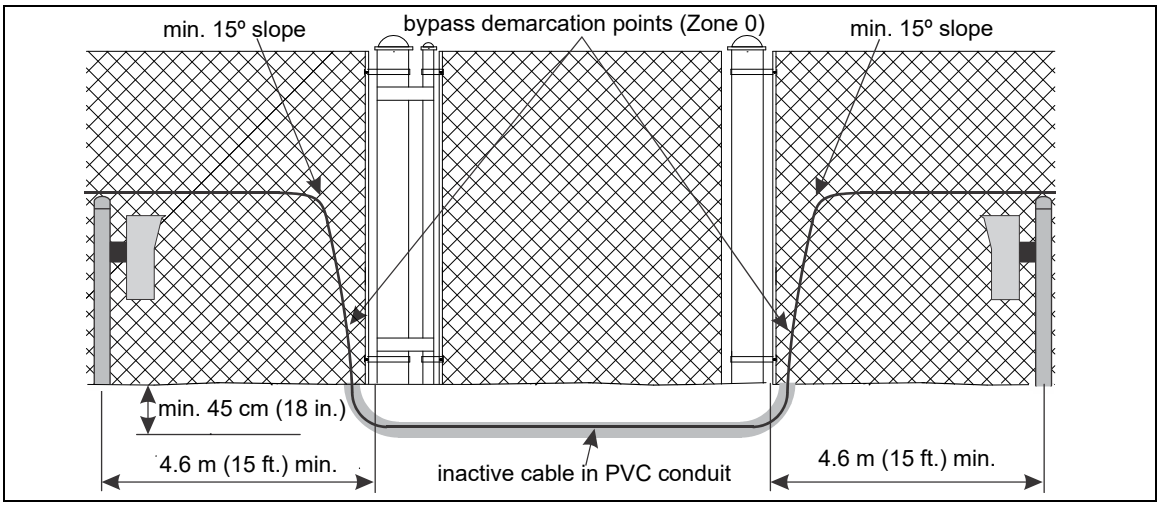


Figure 48: Gate bypass (using microwave protection)

Installing sensor cable on swinging gates

1. Run sensor cable to the hinged 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 in a diamond pattern, app. 30 cm (12 in.) in from the edges.
   (For a double panel swinging gate install the sensor cable on both gate panels.)
4. Pull the sensor cable through the buried conduit.
5. Seal the ends of the conduit.
6. Use cable ties to tightly secure any exposed bypass cable to the fence fabric.
7. Continue installing the sensor cable on the fence beyond the gate. (For a double panel gate, install the sensor cable on the second gate panel before continuing the cable run.)

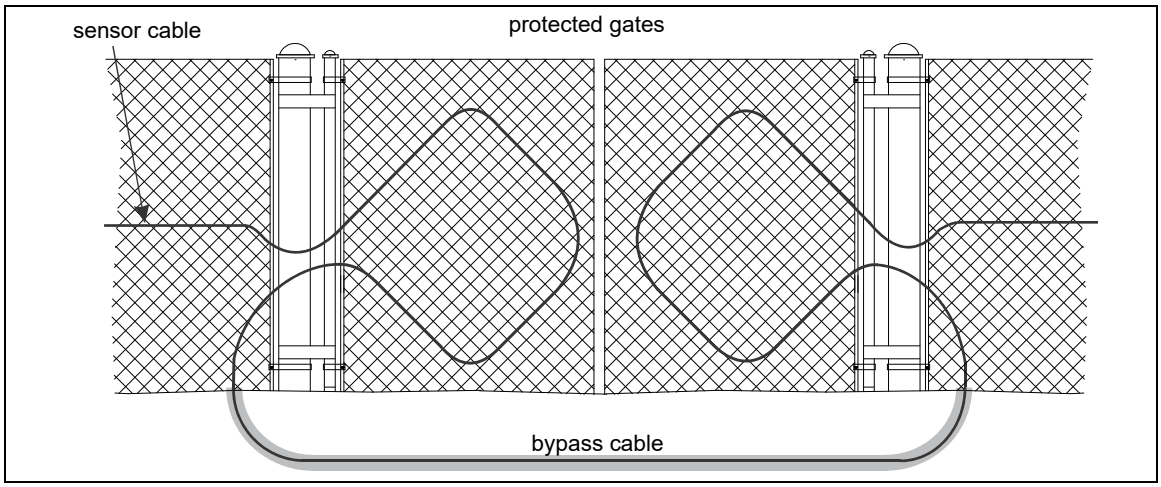


Figure 49: Installing sensor cable on swinging gates

Gate disconnect assembly

Note	The gate disconnect assembly can be used only with sensor cables that are not carrying power and data to other FlexZone processors. Otherwise, using the gate disconnect will interrupt power and data to any processor further down the line.

The gate disconnect assembly protects gates that are infrequently used. The gate can be opened and closed by manually separating the connection (see Figure 50:). When the assembly is opened, a supervision alarm is generated. When the assembly is closed the gate is protected.

Installation instructions

1. Place the male cap stay wire over the open end of the non-detecting cable on the male connector. Put the cap in place on the connector during installation.
2. Wrap a gear 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-bracket against the post under the clamp.
4. Tighten the clamp until the assembly is firmly attached to the post.
5. Dress the non-detecting cables to the splice kits with cable ties.
6. Follow the directions for a standard splice.
7. Attach the rubber cover over the disconnect assembly.

Note	When caps are not in use, they fit into one another for protection and storage. Cap the connectors when the gate will be open for extended periods.

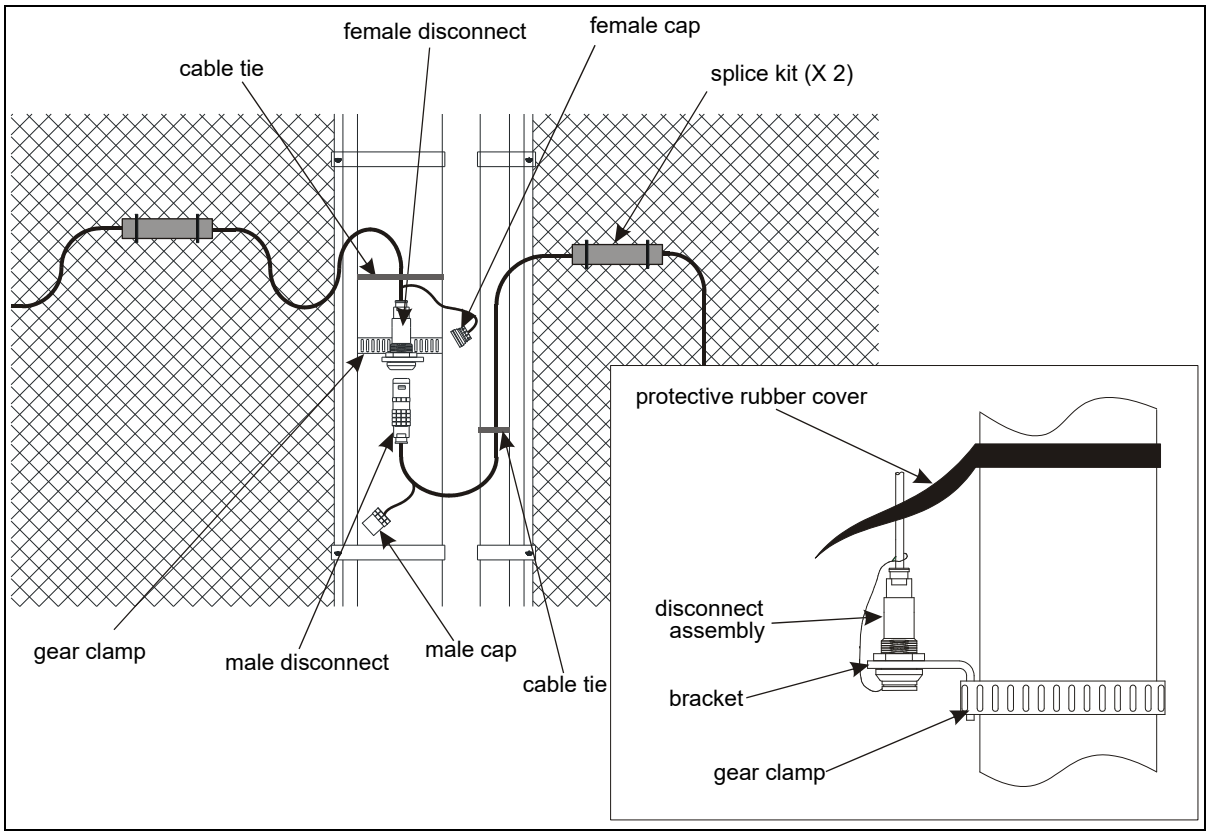


Figure 50: Gate disconnect assembly

Installing armored FlexZone sensor cable

Note	Armored FlexZone sensor cable must be conditioned before it is attached to the fence (see FlexZone sensor cable conditioning on page 26).

FlexZone armored sensor cable (P/N G6FG0200) is comprised of FlexZone sensor cable encased in a flexible, protective 13 mm (1/2 in.) aluminum conduit.

- Handle armored cable carefully to prevent twisting, bending, kinking, jerking, or stretching the cable. Take extra care when deploying armored cable around curves and corners. Mishandling the cable can damage the jacket, and adversely affect the sensor cable.
- The smallest allowable bend radius for armored sensor cable is 15 cm (6 in.).
- DO NOT subject armored cable to excessive tension (max. 3.4 kg, 7.5 lb).
- Armored cable comes in 150 m (492 ft.) and 220 m (722 ft.) lengths. You can splice two sections of armored together to create a 300 m (985 ft.) cable.
- Use the armored shell (G6KT0300) to protect cable splices and terminations (see Figure 55:).
- If you must move armored cable after dispensing the cable on the ground, carefully move it in 5 m (16 ft.) lengths, to prevent cable damage.
- Use stainless steel cable ties, or wire ties to secure the armored cable to the fence fabric.
- Secure armored cable tightly to the fence fabric at the midpoint of the chain-link. Do not attach the cable at the junction of two fence links.
- Keep the ends of the armored sensor cable clean and dry.

Installing armored FlexZone sensor cable

Note	Refer to Installing cable on chain-link on page 34 for additional details.

1. Carefully deploy the entire roll of armored sensor cable in a straight line on the ground beside the installation location.
2. Condition the armored sensor cable (see FlexZone sensor cable conditioning on page 26).
3. Secure the armored cable to the fence using stainless steel cable ties or wire ties.

Installing cable on barbed wire

Note	Senstar recommends the use of armored sensor cable for instances where the cable is attached to barbed wire or razor ribbon.

Refer to Climb-over deterrent hardware on page 10.

- Take care not to damage the sensor cable on the barbs during installation.
- Attach the sensor cable to the barbed wire using UV-resistant cable ties.
- Attach the cable to the top wire at two points to ensure the minimum bend radius is not exceeded.
- Attach the cable on both sides of each outrigger and run the cable along the top of the fence.

Armored cable installed beside outriggers

Ensure the minimum bend radius is not violated at the top of each outrigger.

Figure 51: Armored cable installation on barbed wire

On razor ribbon

- Attach the sensor wire to the outer perimeter of the coil (see Figure 4:).
- Use stiffening wires to prevent the concertina from moving.

Splicing armored sensor cable

Armored sensor cable splices use the standard splice kit (P/N G6KT0101) and are protected by an armored metal shell (G6KT0300).

Note	Senstar strongly recommends the use of a conduit stripping tool to prevent burrs and sharp protrusions at the cut edge of the conduit. Use the supplied bushings to protect the cable at the armor strip point.

Fit the protective bushing over the cable and slide it under the armor to protect the sensor cable.

Figure 52: Using the supplied bushings to protect FlexZone sensor cable

1. Cut the two sections of armored cable so there is a 10 cm (4 in.) overlap at the location of the splice.

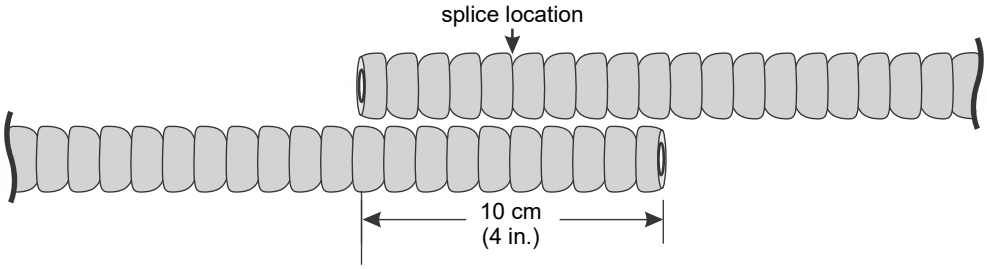


Figure 53: Cutting armored sensor cables for splicing

2. Prepare the two sensor cables for splicing.

a. Carefully, remove 6.5 cm (2.6 in.) of the metal jacket.

b. Remove 2 cm (0.8 in.) of the black jacket.

c. Separate the strands of the braided shield.

d. Tightly twist the strands of the braided shield into two separate conductors. Remove the exposed foil shield.

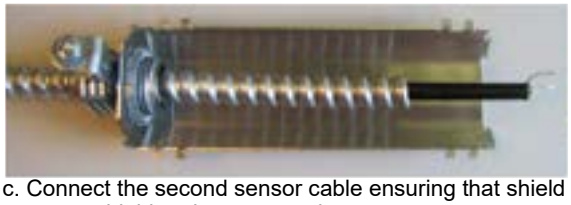
e. Trim off the lower shield/conductor (leave no loose strands).

f. Trim the clear tube back to a length of 5 mm (0.2 in.). Trim the center conductor and twisted shield to a length of 6 mm (¼ in.) past the end of the clear tube.

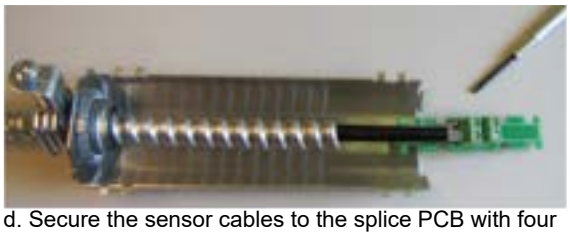
Figure 54: Armored cable preparation for splicing

3. Make the splice connection.

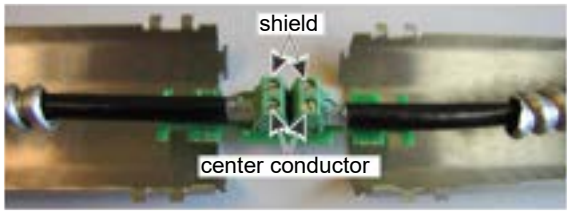
a. Feed each cable through one section of the shell.



b. Insert the center conductor into the lower terminal and the shield into the upper terminal and tighten the screws (follow the screening on the PCB).



c. Connect the second sensor cable ensuring that shield meets shield and center conductor meets center conductor.



d. Secure the sensor cables to the splice PCB with four cable ties. Keep the cable ties on the same side, and at a 45º angle from the flat plane of the CCA.

e. Center the splice CCA in the gel filled enclosure, then press the sensor cables and the splice CCA firmly into the gel. If the enclosure includes cable guide bars, center the CCA on the side with double guide bars.

f. Snap the enclosure shut so that the two locking tabs are latched in the slots, and the enclosure is closed and locked with gel oozing out of the ends.

g. Rotate one half of the armored shell so both screw clamps are pointed toward the ground and fit the two halves of the shell together with the enclosure centered inside. Tighten the screw clamps.

h. Raise the armored shell 15 cm (6 in.) above the cable run and attach it to the fence horizontally with four cable ties. For increased security, use stainless steel straps or wire ties.

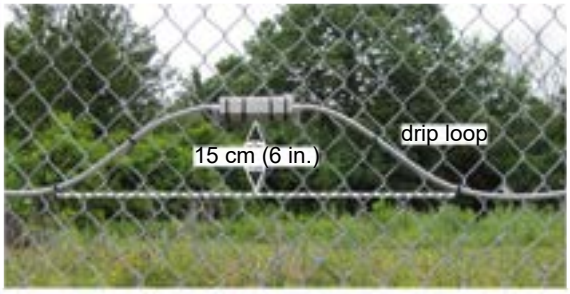


Figure 55: Making the splice connection

Armored cable terminations

Armored sensor cable terminations use the standard termination kit (P/N G6KT0201) and are protected by an armored metal shell (G6KT0300).

Note	Senstar strongly recommends the use of a conduit stripping tool to prevent burrs and sharp protrusions at the cut edge of the conduit. Use the supplied bushings to protect the cable at the armor strip point.

Fit the protective bushing over the cable and slide it under the armor to protect the sensor cable.

Figure 56: Using the supplied bushings to protect FlexZone sensor cable

1. Cut the armored cable 53 cm past the specified location of the cable termination.

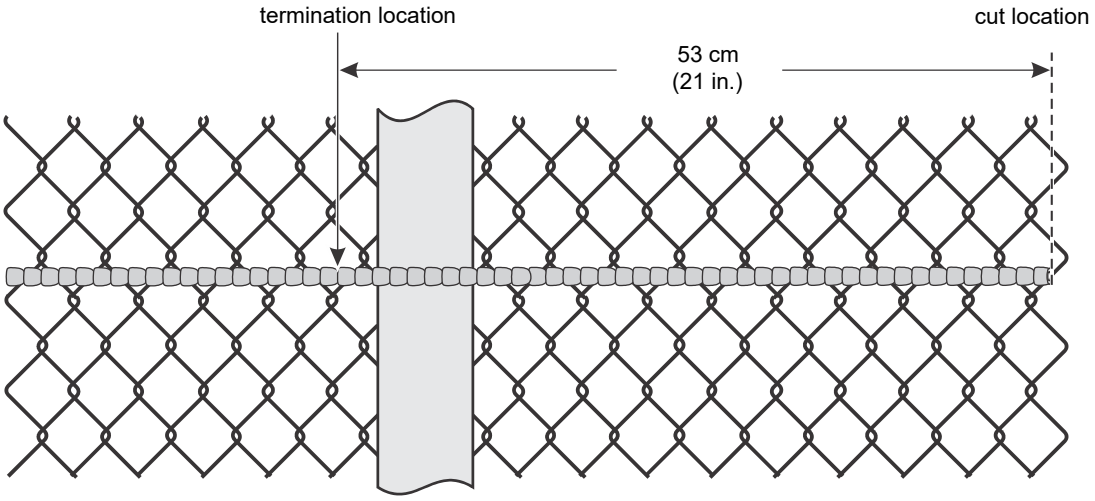


Figure 57: Cutting armored sensor cable for terminations

2. Prepare the sensor cable for termination.

a. Carefully, remove 7.5 cm (3 in.) of the metal jacket.

b. Remove 2 cm (0.8 in.) of the black jacket.

c. Separate the strands of the braided shield.

d. Tightly twist the strands of the braided shield into two separate conductors. Remove the exposed foil shield.

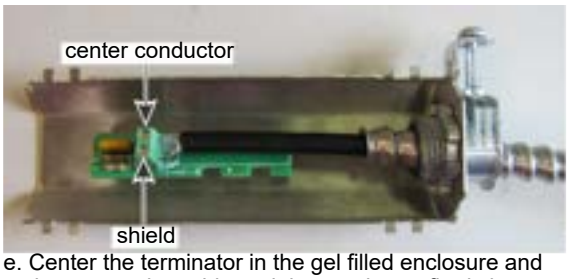
e. Trim off the lower shield/conductor (leave no loose strands).

f. Trim the clear tube back to a length of 5 mm (0.2 in.). Trim the center conductor and twisted shield to a length of 6 mm (¼ in.) past the end of the clear tube.

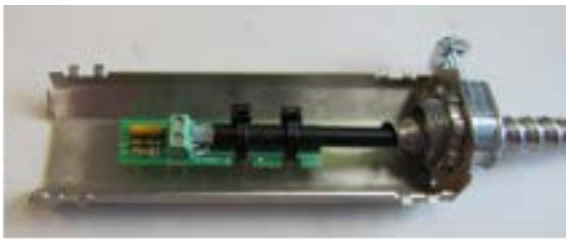
Figure 58: Armored cable preparation for terminations

3. Make the termination.

a. Feed the cable through 1/2 of the armored shell, and follow the screening to connect the center conductor and shield to the terminal block on the CCA.



b. Secure the sensor cable to the CCA with two of the cable ties. Keep the cable ties on the same side and at a 45º angle to the flat plane of the CCA.



e. Center the terminator in the gel filled enclosure and then press the cable and the terminator firmly into the gel. If the enclosure includes cable guide bars, center the CCA on the side with double guide bars.

f. Snap the enclosure shut so that the two locking tabs are latched in the slots, and the enclosure is closed and locked with gel oozing out of the end.

g. Fit the two halves of the armored shell together with the enclosure centered inside. Ensure the clamps are oriented upward, then tighten the clamps.

h. Raise the shell 30 cm (12 in.) above the cable run, and attach it to the fence horizontally with 4 large cable ties. For increased security, use stainless steel straps or wire.

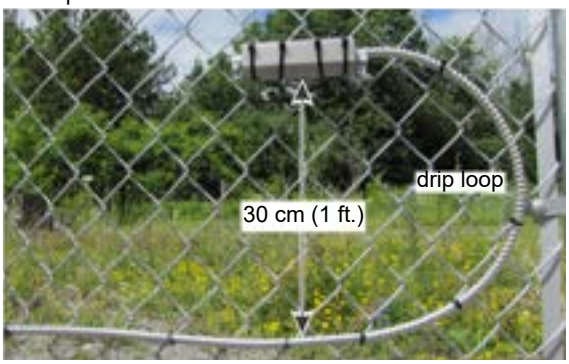


Figure 59: Making the termination

Connecting armored sensor cable to the processor

CAUTION	Remove the processor circuit card from the enclosure BEFORE drilling the cable ports to fit the 1/2 in. cable glands (see Removing the processor assembly on page 90).

1. Remove the two 3/8 in. sensor cable glands from the enclosure's right side (see Figure 61:).
2. Carefully drill the 2 holes to fit the 1/2 in. cable glands (22 mm; 7/8 in. bit size).
3. Ensure that all metal shavings from the drilling are removed from the enclosure.
4. Remove the split rubber grommets from inside the 1/2 in. cable glands.
5. Remove 3 in. of the armored jacket.
6. Prepare the sensor cable for connecting to the processor (see Figure 34:).
7. Pass the sensor cable through the cable gland into the enclosure then through the nut.
8. Loosely install the 1/2 in. cable glands.

9. Insert the protective grommet under the armor (see Figure 56:).
10. Remove the terminal block and connect the sensor cable.
11. Plug the sensor cable into the appropriate connector (A Side or B Side) and tighten the nut on the cable gland to secure the armored cable. There should be about 2.5 cm (1 in.) of armor inside the enclosure.
12. Use a thin bead of silicone on the inside of the cable gland to seal the fitting.

Installing the FlexZone processor

Do not remove the processor circuit card when installing the enclosure. The processor is shipped with two gear clamps that are used for securing the enclosure to a post. The hardware required to mount the enclosure on another type of surface is customer supplied. Figure 62: shows a fence-mounted FlexZone processor. Figure 60: illustrates the FlexZone processor features and Table 1 includes feature descriptions.

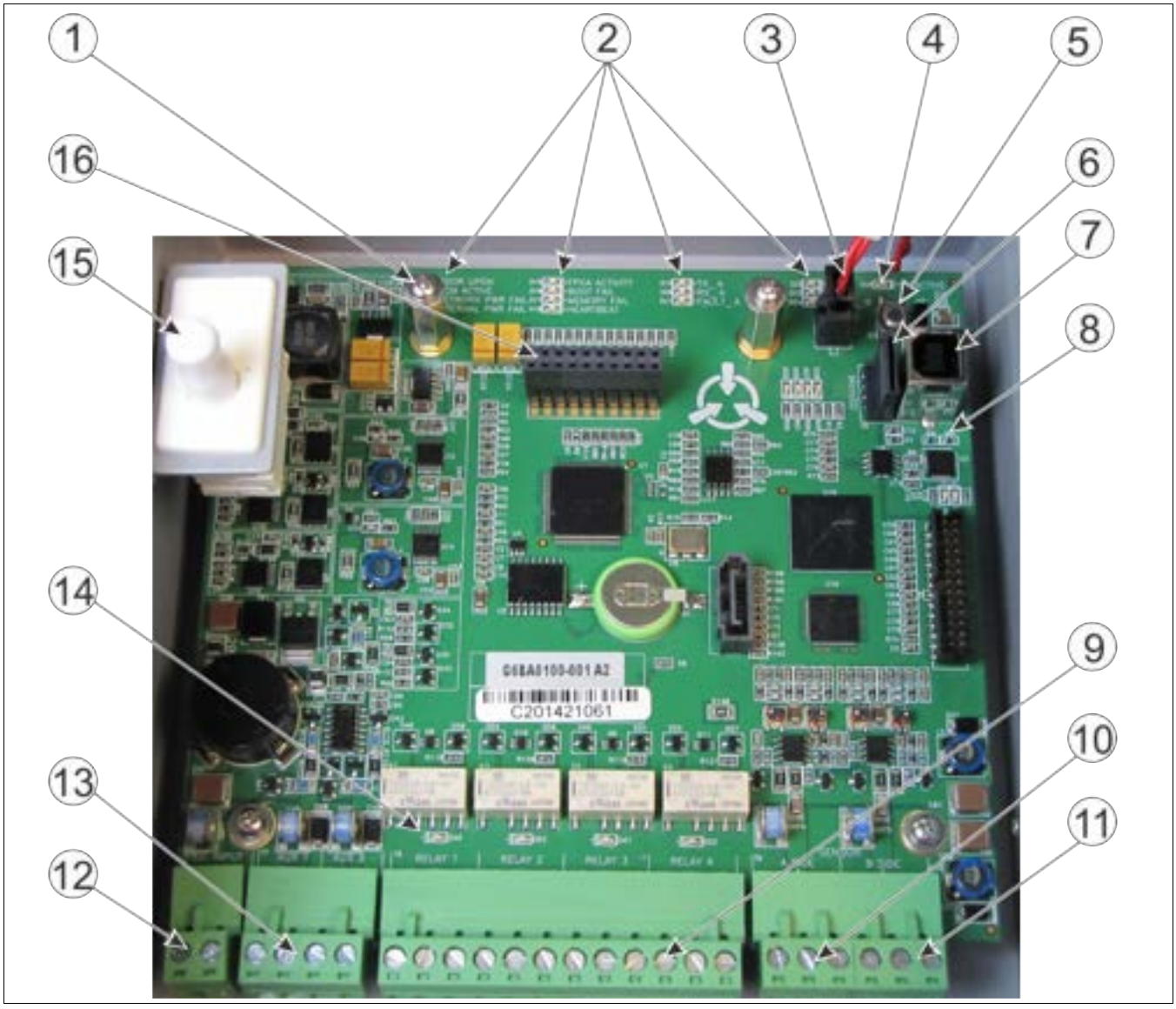


Figure 60: FlexZone processor features

Item	Description	Item	Description
1	Network interface card mounting hardware (X 2)	9	T8 - Form C relay output connections (X4) Normally Closed, Common, Normally Open
2	Activity LEDs - DOOR OPEN, UCM ACTIVE, NETWORK POWER FAIL, INTERNAL POWER FAIL, FPGA ACTIVITY, BOOT FAIL, MEMORY FAIL, HEARTBEAT, TXA, RXA, FAULT A, TXB, RXB, FAULT B (LED ON = condition active)	10	T9 (terminals 1, 2, 3) - A Side sensor cable input (1 & 3 = shield, 2 = center conductor)
		11	T9 (terminals 4, 5, 6) - B Side sensor cable input (4 & 6 = shield, 5 = center conductor)
3	T1 - tamper input	12	T4 - power input (- +) 12 to 48 VDC
4	SD Active LED	13	T7 - Auxiliary inputs (self-test/auxiliary device inputs) AUX 1 - +, AUX 2 - +
5	SD record button (ON/OFF)	14	Relay activity LEDs (X4) - LED ON = relay active
6	microSD card slot	15	Tamper switch - open = tamper alarm
7	T3 - USB connection to UCM PC	16	T2 - Expansion header for network interface card, gate sensor receiver and I/O card
8	UCM activity LEDs (TX, RX)		

Table 1 Processor features

Cable entry ports

The bottom of the FlexZone enclosure includes five cable entry ports fitted with compression glands for the sensor cables, power cable, and alarm data cables. The central port includes a 12.7 mm (1/2 in.) cable gland, which fits cables ranging between 4.3 - 11.4 mm (0.17 to 0.45 in.). The other four ports (two on each side) provide 9.5 mm (3/8 in.) compression glands, which fit cables ranging between 2.9 - 7.9 mm (0.115 to 0.312 in.). Five weatherproof plugs are included for instances where not all of the cable entry ports are required. The bottom of the enclosure also includes an exterior ground lug for the earth ground connection.

If FlexZone armored cable is being connected to the processor, the two sensor cable ports must be drilled out and fitted with 1/2 in. cable glands (included with armored shell; see Connecting armored sensor cable to the processor on page 50).

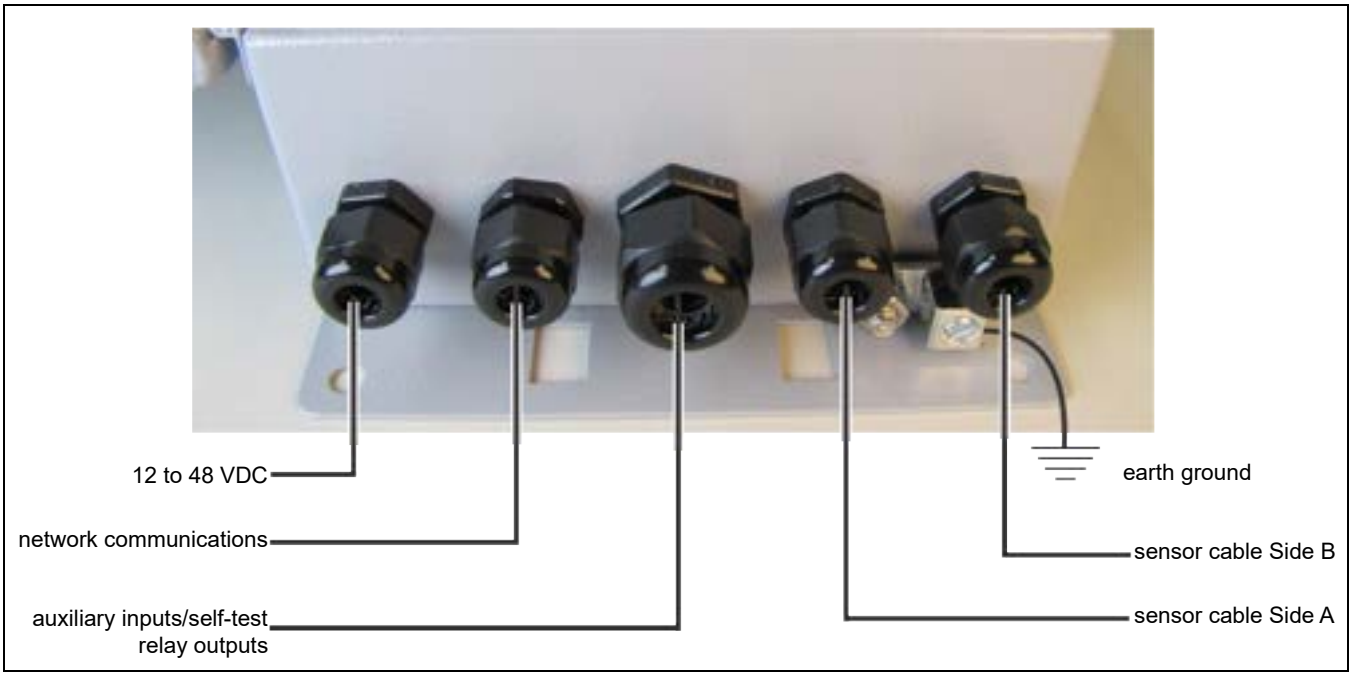


Figure 61: Cable entry recommendations

Free-standing or fence post mounting the enclosure

- Install the processor near eye-level on the secure side of the perimeter.
- Mount the enclosure with the cable entry ports on the bottom toward the ground.
- Install an approved earth ground at the processor location, if required (see Grounding considerations on page 21).
- Mounting the enclosure away from the protected fence on the secure side of the perimeter can help prevent tampering.
- If razor ribbon is installed along the bottom of the fence, mount the processor on the secure side of the perimeter, away from the fence and razor ribbon.

CAUTION	For installations in environments which include hot sunny periods, Senstar recommends that a sun shield be installed to protect the enclosure from direct sunlight, or that the enclosure be installed in a shady area. The maximum operating temperature, as measured inside the enclosure, is 70º C (158º F).

Figure 62: FlexZone single pass dual zone fence-mounted processor

1. Hold the enclosure against the fence at the specified installation location.
2. Feed the end of the gear clamp through an upper flange slot, around the fence post, and back through the second slot.
3. Insert the end of the gear clamp into the gear mechanism and tighten the screw.
4. Repeat this with the second gear clamp on the lower flange at the bottom of the enclosure.

Figure 63: Post-mounting the enclosure (on the fence)

Surface mounting

1. Hold the enclosure against the mounting surface, and mark the positions of the 4 mounting holes.
2. Drill 4 holes in the mounting surface.
3. Using appropriate hardware, mount the enclosure.
   use 7mm (¼ in.) hardware

Figure 64: Surface-mounting the enclosure

Grounding

The FlexZone sensor requires a single ground reference. For standalone processors, PoE powered processors, and processors that are connected directly to a network power supply, connect the enclosure ground lug to an approved earth ground. For a connected block of processors receiving power over the sensor cables, the processor that is connected directly to the power supply provides the ground reference for the other processors (do not make ground connections at the other processors). The earth ground connection should be stable and noise free. An improper or unstable earth ground can induce noise in the FlexZone sensor.

CAUTION	Consult the local electrical code for grounding information. Do not use the fence structure as an earth ground. Keep the ground wire as short, straight and direct as practicable.

Relay outputs

The FlexZone processor includes four Form C relay outputs available through a removable terminal block. Each relay has a common connection to either a Normally Open (NO) or Normally Closed (NC) contact. Each relay has an associated LED, which indicates when the relay is active (LED ON = relay active). The optional relay output card includes four additional relays.

Relay contact ratings

The dry contact relays are Form C, latching, rated for 30 V @ 1 A max. In Remote control mode, you can configure the relays as latching (ON by command, OFF by command), in flash mode (ON-OFF-ON-OFF... by command, then OFF by command), or pulse mode (ON for a period, then OFF). For flash and pulse modes, the relay Active/Inactive times are selectable. In Local control mode the relays remain active for the event's duration or for the selectable Hold Time, whichever is longer.

Auxiliary inputs /Self-test inputs

CAUTION	The contact closure inputs to AUX 1 and AUX 2 MUST be voltage-free.

AUX 1 and AUX 2 are voltage sensing inputs. The processor determines an input's status via an internal reference voltage, and the configuration of the contact closures and supervision resistors. Figure 65: provides wiring diagrams for self-test and auxiliary device inputs. In Local control mode the inputs activate an internal self test with AUX 1 activating the relays assigned to A Side cable alarms and AUX 2 activating the relays assigned to B side cable alarms. In Remote control mode the AUX inputs serve as auxiliary device inputs for reporting their status to the SMS. The optional dry contact input card includes four additional inputs.

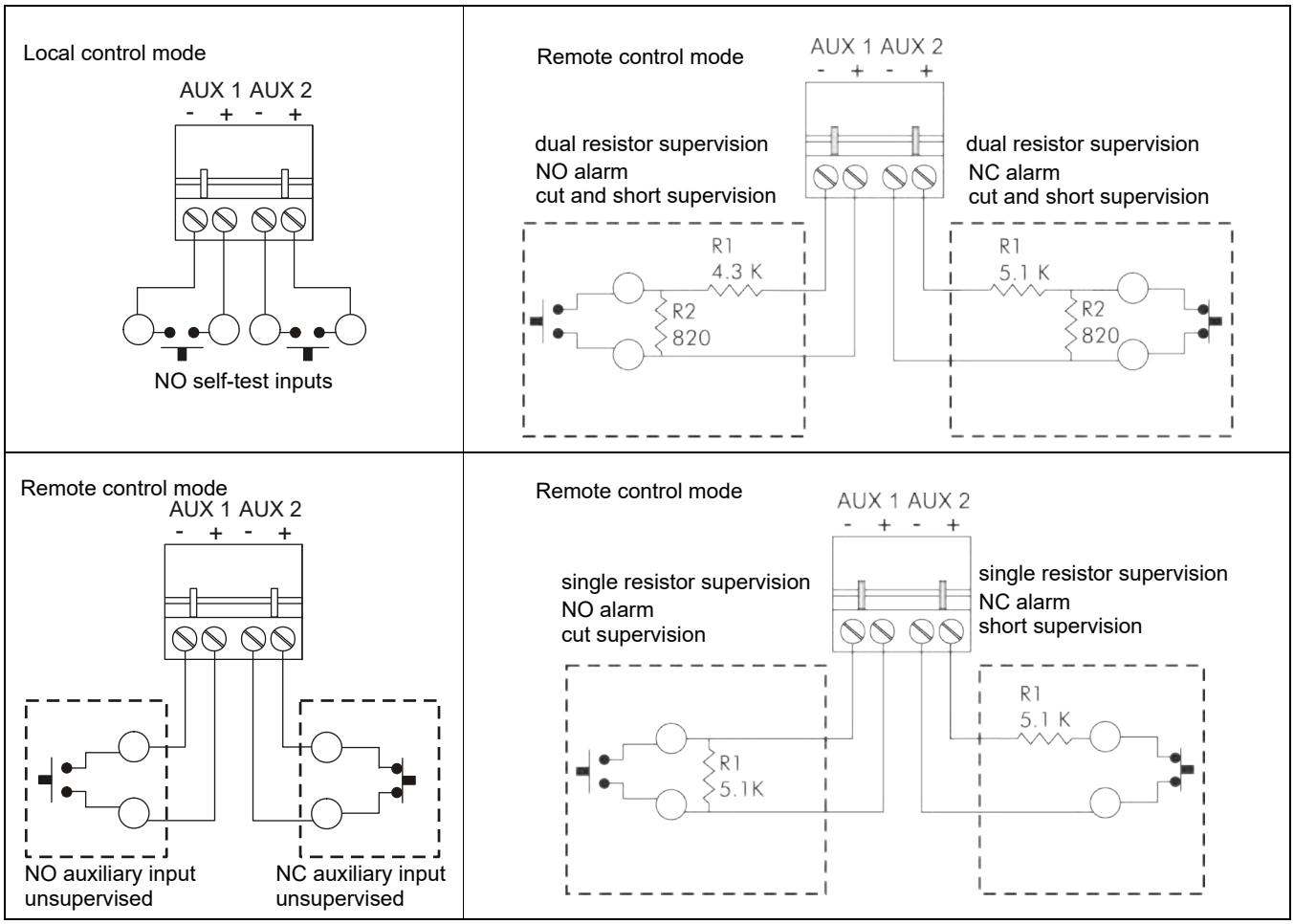


Figure 65: Self-test/Auxiliary device input wiring examples

Processor wiring connections

You make FlexZone processor wiring connections on removable terminal blocks. The screw terminals accept wire sizes from 12 to 24 AWG, with a 6 mm (¼ in.) strip length. Remove the terminal blocks to make the wiring connections. Reinstall the blocks after the connections are complete, and verified. Figure 38: shows the sensor cable to processor connection procedure. Figure 66: shows the input/output wiring connections to the FlexZone processor. Figure 67: shows the input/output wiring connections to the FlexZone option cards. Figure 68: to Figure 73: show the Silver Network wiring options.

Note	See instruction sheet 00DA1503 for information about installing the optional relay output card and dry contact input card.

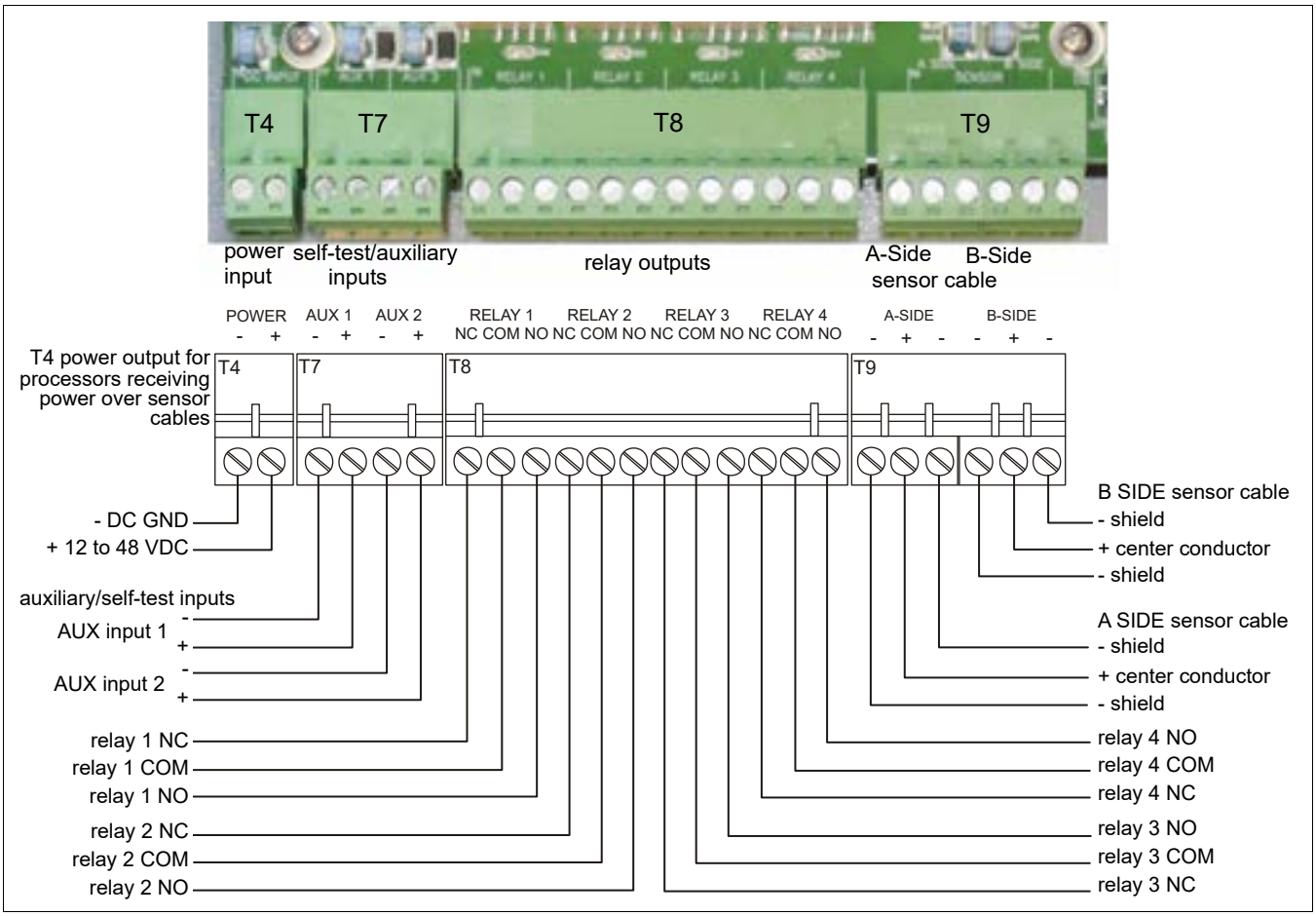


Figure 66: FlexZone processor wiring diagram

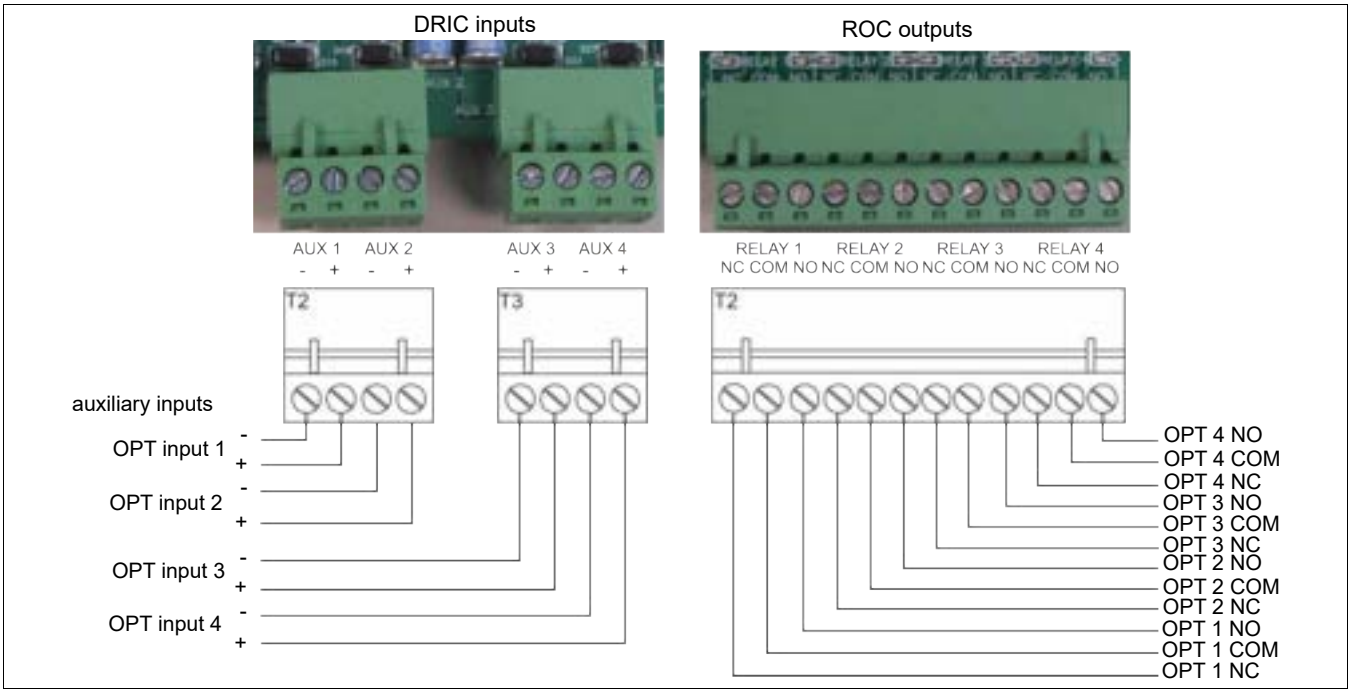


Figure 67: FlexZone option card wiring diagram

Silver Network wiring connections

Note	A network interface card is required to enable Silver Network communications between a FlexZone processor and the Silver Network manager.

Note	For groups of FlexZone processors that communicate over the sensor cables, only the processor that is connected directly to the Silver Network requires an NIC.

Silver Network specifications

- Data rate - fixed 57.6 k bps
- Maximum 60 devices spread over up to 4 independent network loops
- Two communication Channels (Side A, Side B)
- Response time - 1 second, or less from alarm source to Network Manager (per loop)
- Network termination - not required
- Transmission media/maximum separation distances between processors:
  - EIA-422 copper wire - 1.2 km (0.75 mi.) - 2 pairs per Channel
  - Multi-mode fiber optic cable (820 nm) - 2.2 km (1.4 mi.) - 2 fibers per Channel - optical power budget 8 dB
  - Single-mode fiber optic cable (1310 nm) - 10 km (6.2 mi.) - 2 fibers per Channel - optical power budget 8 dB
  - Ethernet - Category 5 cable, 100 m between PoE switch and processor location

Note	Use low capacitance shielded twisted pair data cable for EIA-422, 62.5/125 multi-mode fiber optic cable, 9/125 single-mode fiber optic cable, and Category 5 Ethernet cable. The maximum separation distances require high quality transmission media and sound installation practices.

CAUTION	Both the FlexZone processor and the network interface cards contain static sensitive components. Follow proper ESD handling procedures when handling the cards. Ensure the expansion header on the NIC is properly lined up and fully seated in T2 on the processor.

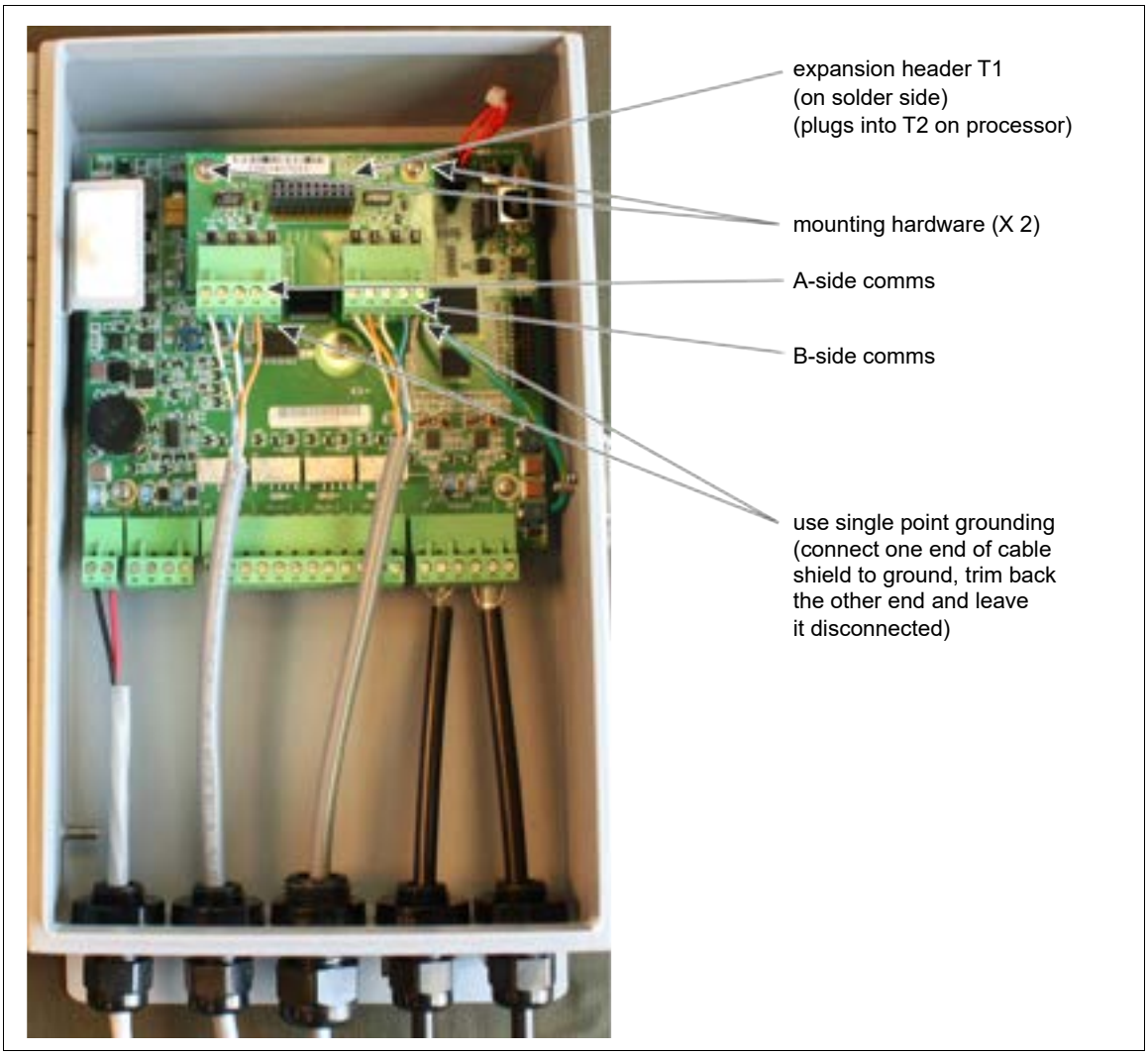


Figure 68: Silver Network EIA-422 wiring connections

The PoE NIC typically receives power over its Ethernet connection. It provides power to the processor through T4, the processor power input. The processor then supplies power to the NIC through the expansion header.
If the PoE NIC is not receiving power over its Ethernet connection, the processor must have another source of DC power connected to T4.

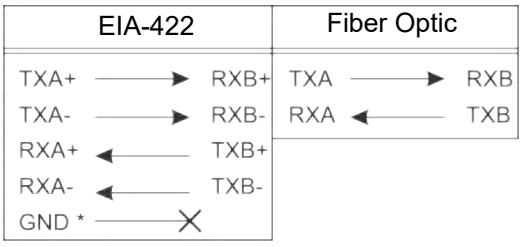
Connect the PoE NIC ground strap to a ground lug on the enclosure.

Connect the enclosure ground lug to a nearby approved earth ground.

Figure 69: Silver Network Ethernet wiring connections

Silver Network data path connections

In the standard Silver Network setup, a point to point loop configuration is used for network communications. Figure 70: shows the processor to processor network connections for the EIA-422 and fiber optic communication options. Figure 71: illustrates an EIA-422 based Silver Network and Figure 72: shows a fiber optic based Silver Network. Silver Network's using Ethernet communications use a star configuration. Figure 73: illustrates an Ethernet based Silver Network (Star configuration).



* Use single point grounding. Connect one end of the cable shield to ground, trim back the other end and leave it disconnected.

Figure 70: Silver Network data connections (loop configurations)

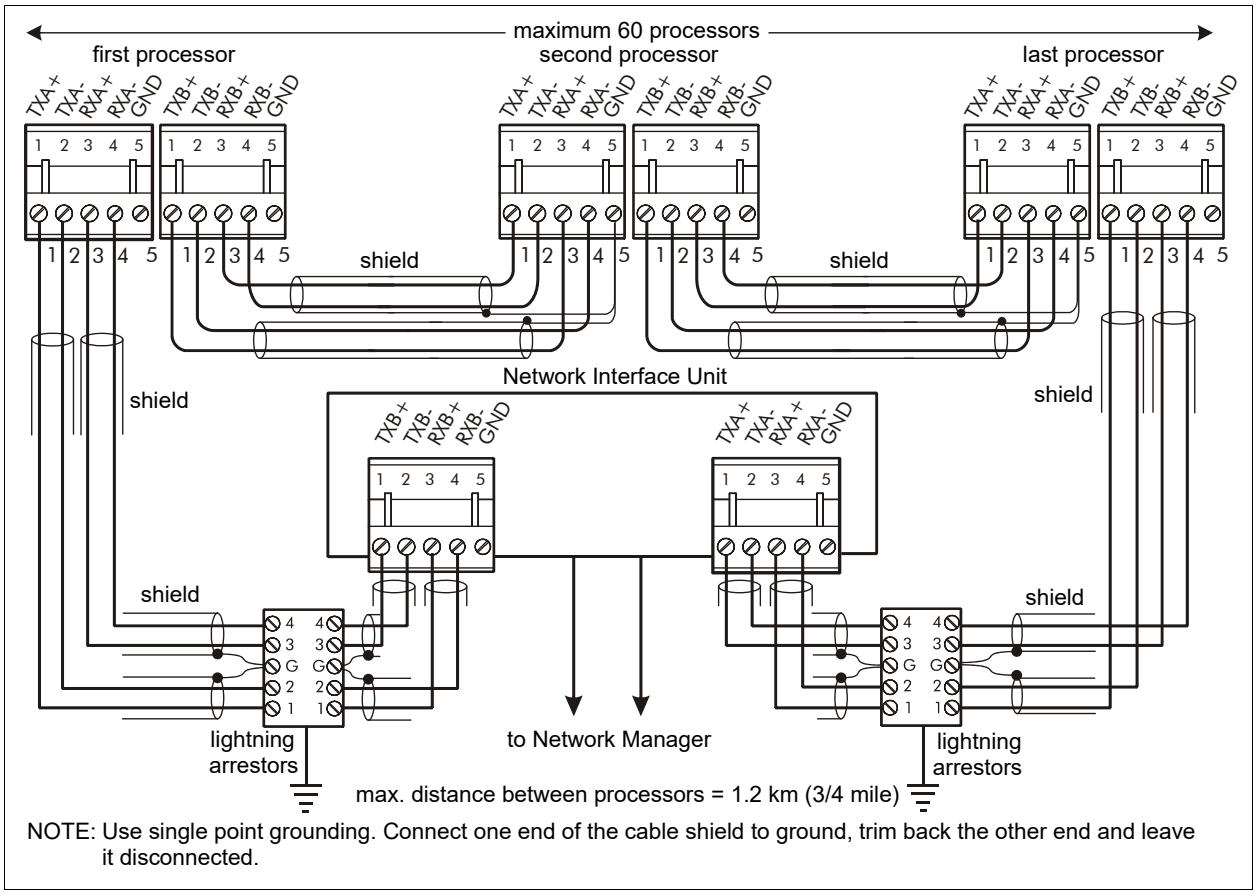


Figure 71: Silver Network EIA-422 wiring diagram

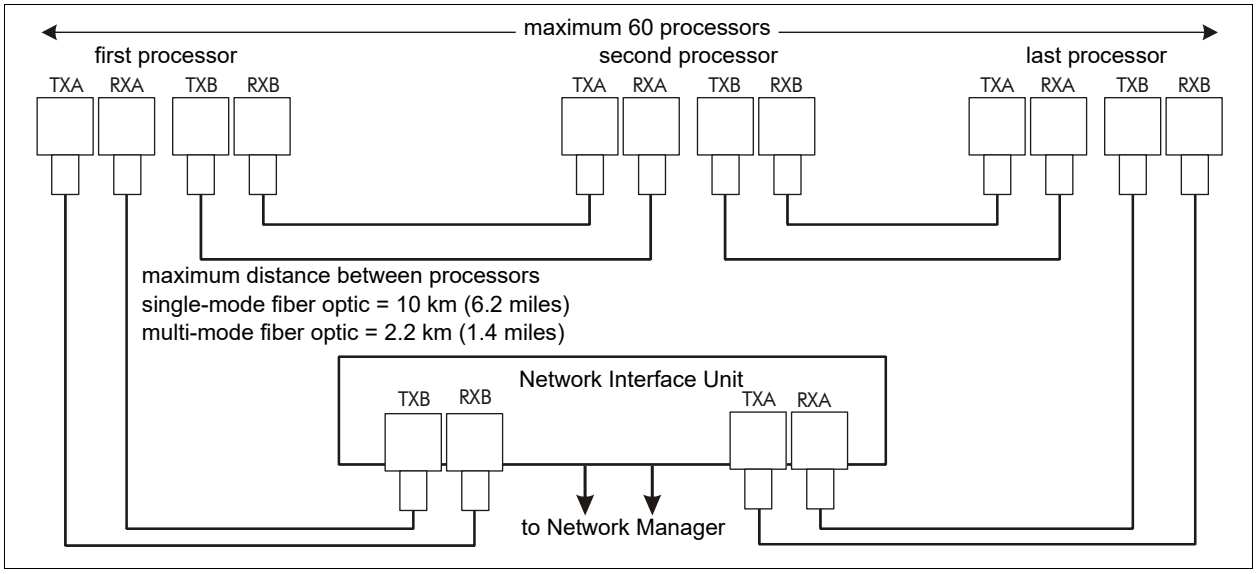


Figure 72: Silver Network fiber optic wiring diagram

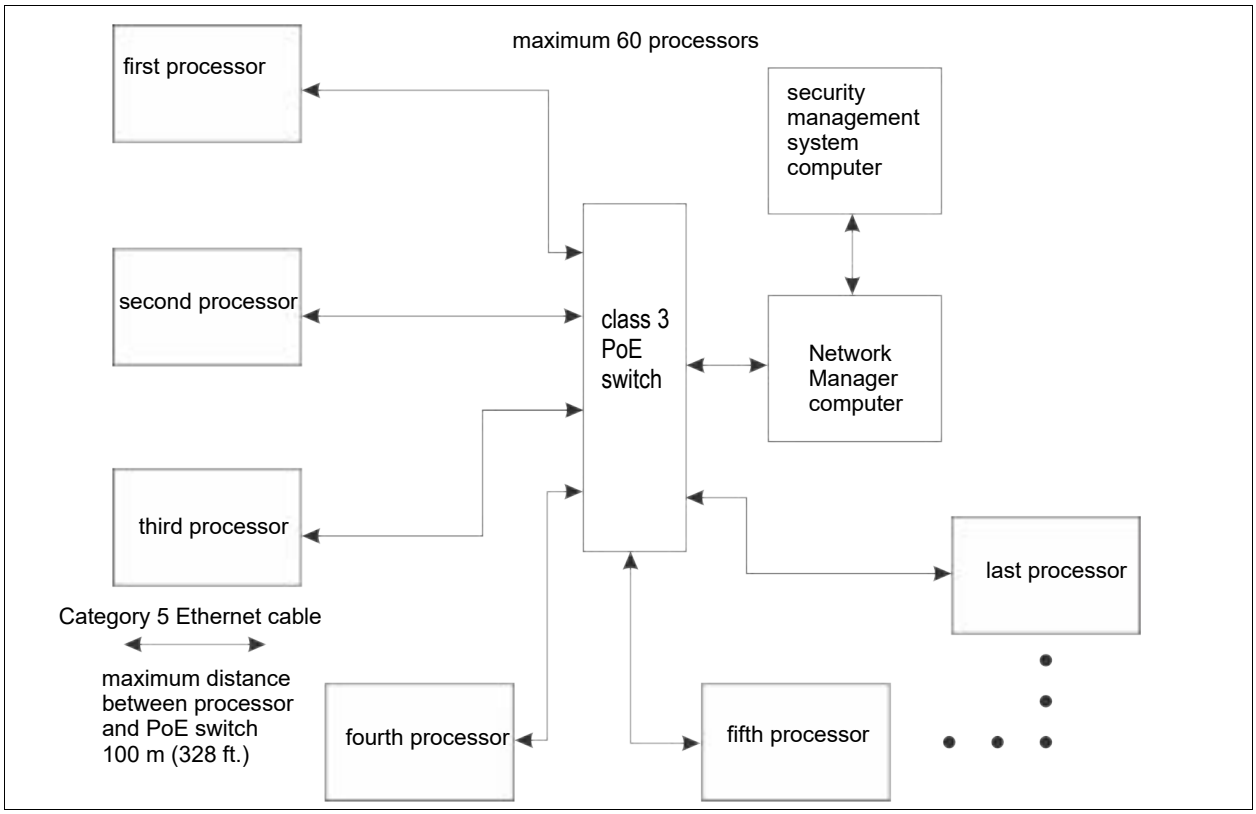


Figure 73: Silver Network Ethernet wiring diagram

Power connections

WARNING!	DO NOT bring AC mains power into the FlexZone enclosure. If a local power supply is being used, it must be installed in its own weatherproof enclosure. Consult the local electrical code for information about the connection of AC mains to your power supply.

Note	When a central low voltage power supply is being used for primary power, it should be powered from an uninterruptible power source.

Power over sensor cables

Power can be supplied to a group of up to five FlexZone sensors by connecting the central processor to a 48 VDC power supply, and then connecting its two sensor cables (one on each side) to one of the sensor cables of the two adjacent processors through splice kits. The second sensor cable of each adjacent processor is then connected to one of the sensor cables of the two outside processors. This configuration also enables data communication over the sensor cables. Setting up power distribution and data communication over the sensor cables is done via the

UCM. To enable alarm data communication over the sensor cables, at least one processor requires a data link connection to the Silver Network through a network interface card. Figure 74: illustrates the power and data over the sensor cables concept.

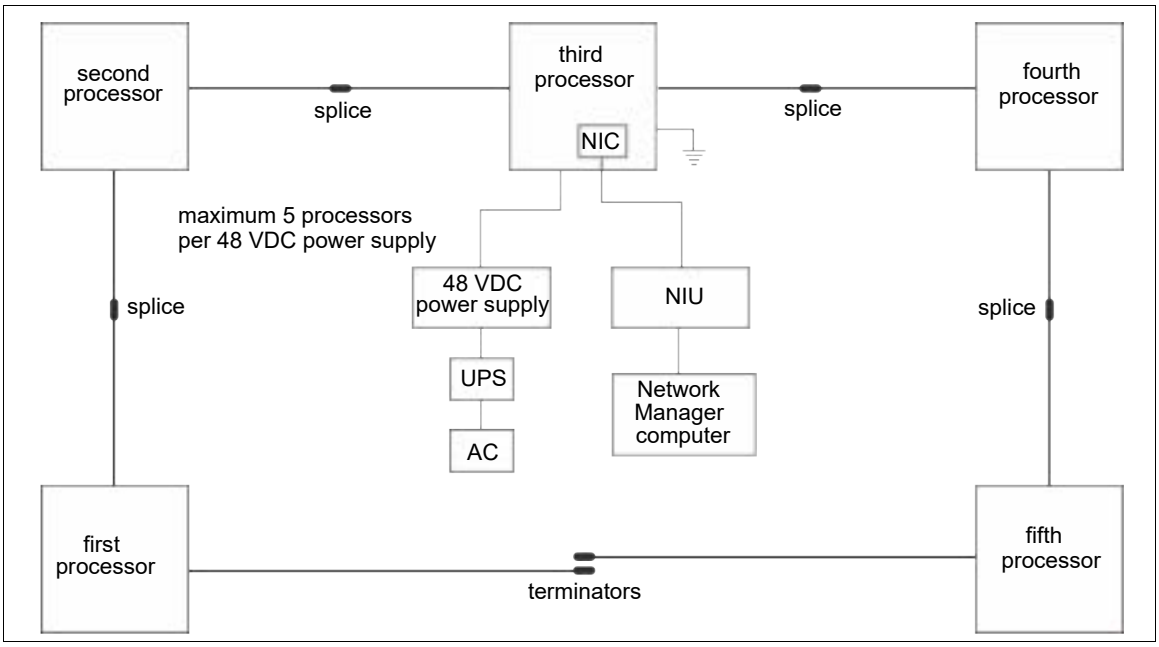


Figure 74: Silver Network power and data over sensor cables

Local power supply

It is possible to use a local DC power supply when a source of AC power is readily available near the processor. The DC power supply must be installed in its own weatherproof enclosure. The local supply can be mounted on the same post as the processor to keep the wire runs to a minimum. Each processor being powered by a local DC power supply requires an earth ground connection.

Power over Ethernet

For power over Ethernet, a class 3 PoE switch is required. In this configuration, minimum Category 5 cable is required and the maximum distance between the FlexZone processor and the PoE switch is 100 m (328 ft.). Each processor receiving PoE requires an earth ground connection.

CAUTION	The PoE NIC is intended to supply power only to the processor on which it is mounted. Do not attempt to power an auxiliary device with the PoE NIC.

CAUTION	Do not attempt to power the processor with both PoE and an external power supply.

Auxiliary device power output

Processors that are receiving power via the sensor cables can be setup (via the UCM) to supply power (2 W) to an auxiliary device. In this case the power connector T4 is used to make the auxiliary device power connection. The output voltage at T4 is equal to the input voltage over the sensor cables. The auxiliary device can communicate its alarm status through the FlexZone processor's Aux inputs (in Remote control mode).

Senstar's UltraWave microwave sensor can receive power from a FlexZone processor, as well as communicate alarm status via the Silver Network or through the FlexZone processor's Aux inputs. The recommended method is via the Silver Network which requires network interface cards on both the FlexZone processor and the UltraWave receiver. Figure 75: illustrates connection diagrams for the UltraWave microwave sensor in both Local and Remote control modes. Contact Senstar Customer Service for additional details.

Backup power

Senstar recommends that the FlexZone sensor system be powered from an uninterruptible power supply (UPS). Connect AC mains to the UPS and the UPS to the DC power source. In this way, if AC power is interrupted, the FlexZone sensor system can operate on battery power while AC power is being restored.

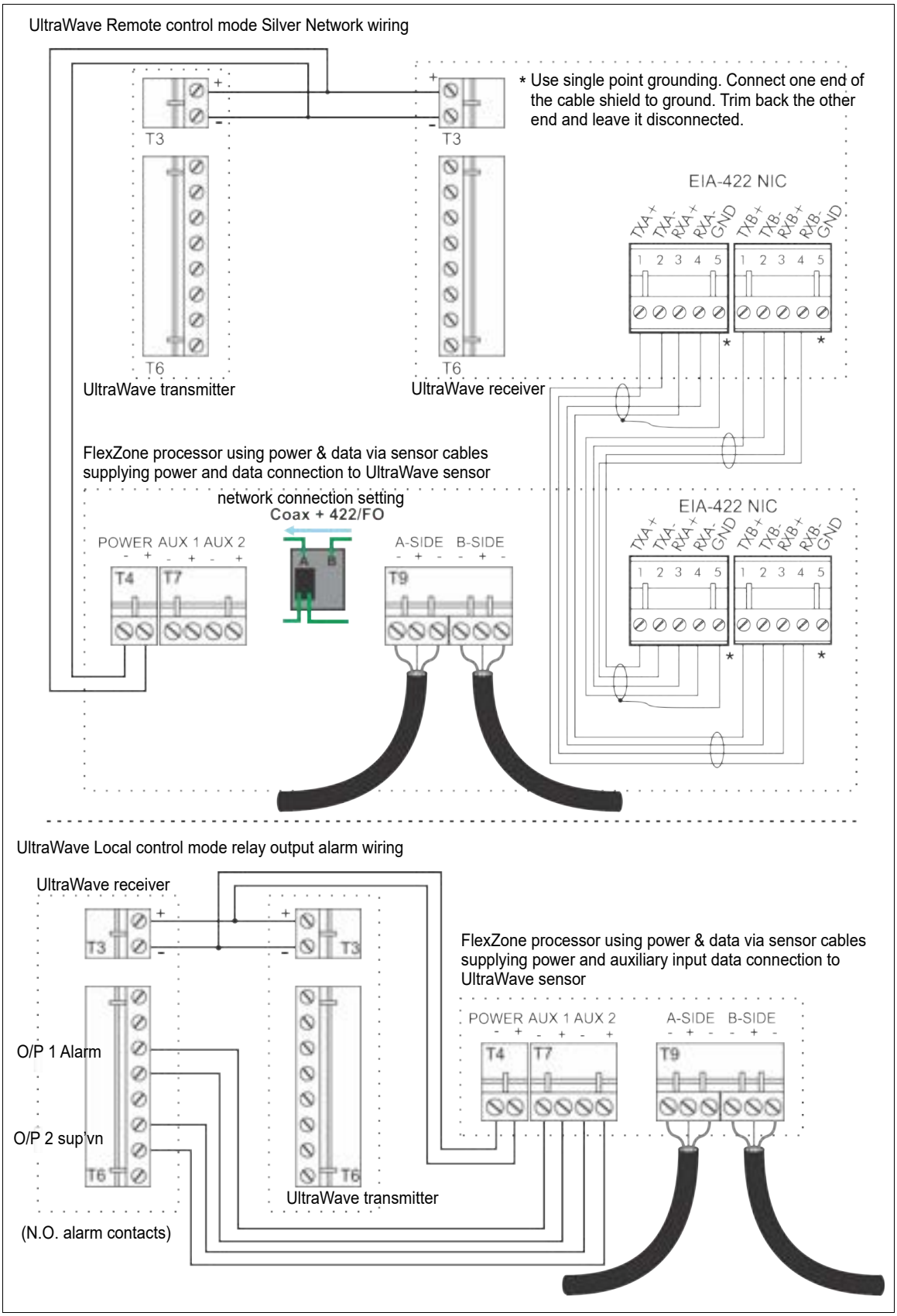


Figure 75: UltraWave connection diagrams (Silver Network & Relay)

3 Calibration & setup

The Universal Configuration Module

Note	Consult the online help for detailed information on UCM operation.

The Universal Configuration Module (UCM) is a Windows based software application, which serves as the calibration, setup and maintenance tool for the FlexZone sensor system. The UCM communicates with the FlexZone processor locally through a USB connection, or remotely via the Silver Network Manager. When you start the UCM, a window displays that enables you to specify the device to which you are connecting.

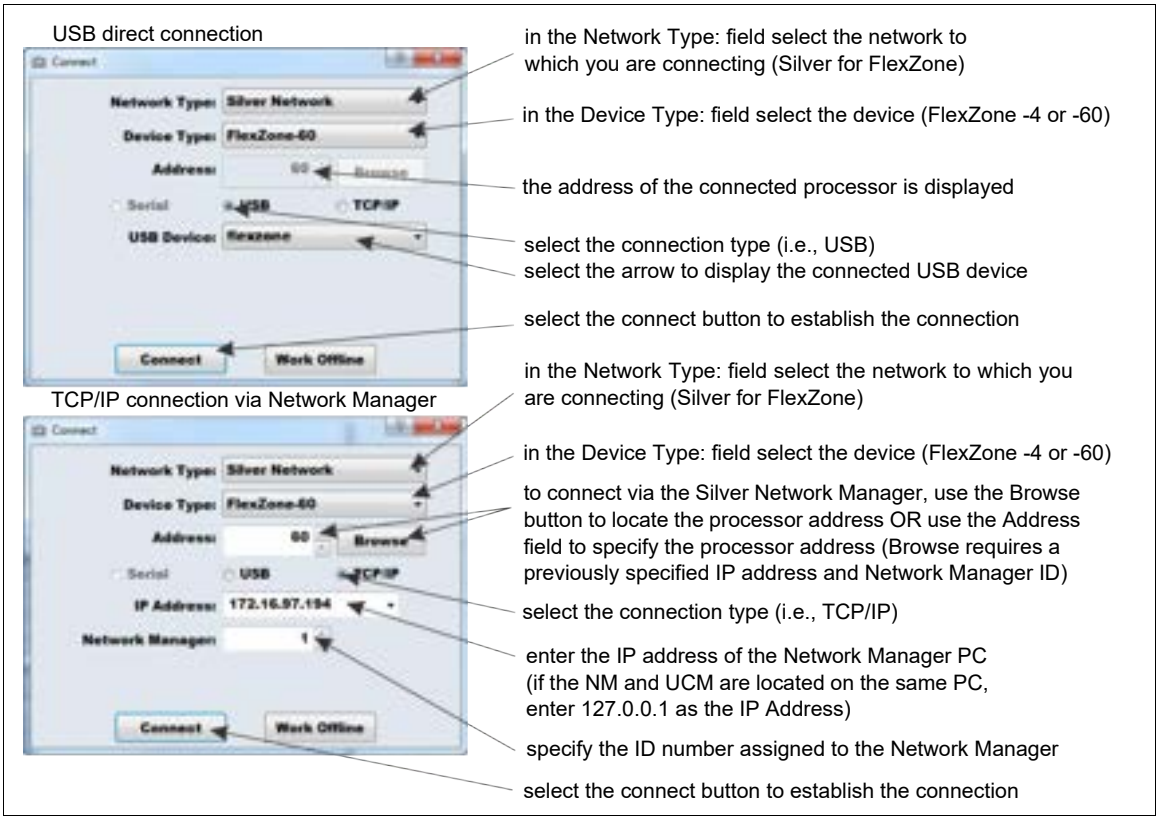


Figure 76: Connecting the UCM

Tip	Save UCM files with a meaningful name, which includes the time and date. The files can then be reopened at a later time (Work Offline).

FlexZone setup and calibration requires:

1. Setting the initial configuration parameters as required (Cable Supervision, Network Address, Network configuration, processor Synchronization, single or double cable pass).
2. Setting up the power distribution and alarm data communication schemes.
3. Conducting a Sensitivity Profile for each sensor cable (A-Side, B-side).
4. Adjusting the cables' threshold settings and detection parameters (Event Window, Event Count, Alarm Window).
5. Defining and setting up the cable segments and alarm zone boundaries.
6. Setting up the Auxiliary input/output control.
7. Testing the installation.

FlexZone definitions

- **meter** - The meter is the basic unit of measure for FlexZone sensor cable. The meter is used to define cable segments. The sensitivity profile records the cable sensitivity for each meter of detecting sensor cable.
- **cable segment** - A cable segment is made up of a contiguous group of meters, and is used for display and control purposes. Cable segments are software-defined during setup. The cable segment is the smallest unit that is defined by the end-user. Each sensor cable can be divided into up to 50 cable segments. Cable segments are used to create alarm zones, and therefore, must begin and end where alarm zone boundaries are required. A single cable segment, or multiple cable segments, can be assigned to one zone. A cable segment can have one of the four onboard relays associated with it for alarm reporting. In addition to the event Threshold that is set for the full length of detecting cable, an independent Threshold adjustment can be made for each cable segment. Cable segments can also be defined as inactive, whereby detecting cable will not report valid targets (by assigning a cable segment to Zone 0).
- **alarm zone** - An alarm zone is made up of one or more cable segments, and is used for the control and annunciation of sensor alarms (access/secure, graphic map display with precise target location). There can be up to 60 alarm zones per FlexZone-60 processor (over two sensor cables) and up to four for a FlexZone-4 processor. Alarm zones are defined in software to match the site-specific zone layout details (e.g., CCTV coverage, fence sections, gates, buildings, etc.). Any grouping of segments can be assigned to an alarm zone. The cable segments do not have to be contiguous, and can come from both sensor cables on one processor (not two processors). There can be a zone within another zone, and a zone can bridge inactive cable segments. Zone 0 does not report alarms, and is used for cable bypasses, and to set detecting cable to inactive (non-detecting). Zone 0 does not count in the 60, or 4 zone total.

Understanding FlexZone alarm detection

The FlexZone processor constantly evaluates the input signals from the sensor cables to discriminate between intrusion events and environmental activity. The characteristic response of a cut event is a sharp spike with a fast rising and fast falling edge. For a climb event, the response includes the fast rising edge caused by the initial contact with the fence, which is followed by a series of peaks and valleys resulting from the continued presence and changing stresses on the fence. Environmental activity is generally of longer duration, lower magnitude, and has more gradual increases and decreases. The FlexZone processor analyzes the received signals from the sensor cables and records separate Events independently. As a result, the processor can record and report multiple disturbances over the length of the sensor cable.

Note	FlexZone's minimum target resolution for perfectly synchronized disturbances is 24 m (79 ft.).

The Threshold is the received signal strength at which an Event is added to the Event Count. It is measured in dB and can be set globally for the full length of detecting cable. An independent Threshold can also be set for each defined cable segment.

- When the rising edge of the received signal from the sensor cable exceeds the Threshold, the Event Count is incremented by one.
- The next Event will not be recorded until the period specified by the Event Window has expired.
- Once the Event Window time has expired, when the rising edge of the received signal from the sensor cable exceeds the Threshold, the Event Count is incremented by one.
- If the received signal remains above the Threshold for the period specified by the Event Window (i.e., a climbing intrusion) the Event Count is incremented by one.
- Each time the Event Count is incremented, the Alarm Window time is reset to zero.
- When the value specified as the Event Count is reached within the Alarm Window time, a sensor alarm is triggered, and the Event Count is reset to zero.
- If the Alarm Window Time expires the Event Count is reset to zero without triggering an alarm.

Intruder detection

The FlexZone sensor guards against three intrusion scenarios:

- An intruder attempts to cut through the fence fabric.
- An intruder attempts to climb over the fence.
- An intruder attempts to crawl under the fence by lifting the fence fabric.

An intrusion alarm resets automatically when the event is over or when the Alarm Hold Time lapses. The Alarm Hold Time is a factory setting which is used to prevent subsequent alarms from being declared at the same location. The Alarm Hold Time is three seconds, and cannot be adjusted. Once the processor declares an alarm at a location, another alarm will not be triggered at that location for three seconds.

Intrusion detection

Cutting the fence fabric produces a high amplitude signal that exceeds the Threshold. The first time the detection signal exceeds the Threshold, the Event Count is incremented, and the Alarm Window time count begins. The Event Window time setting must lapse before another Event will be counted. Each time the Event Count is incremented the Alarm Window time count is reset to zero. When the Event Count reaches the specified value within the Alarm Window time setting, the system generates a sensor alarm. If a subsequent Event is not recorded before the Alarm Window time runs out, the Event Count and the Alarm Window reset to zero.

When an intruder attempts to climb over the fence, or lift the fence fabric, a large number of energy pulses rapidly occur causing the received signal to exceed the Threshold. When the signal first exceeds the Threshold, the Event Count is incremented by one, and the Alarm Window time count begins. Typically, during a climb or lift type intrusion, the received signal remains above the Threshold as a result of the continued flexing and stressing of the fence fabric. The initial contact with the fence activates the Event Window time counter. Each time the Event Window time is reached, and the received signal strength remains above the Threshold, the Event Count is incremented by one. Each time the Event Count is incremented the Alarm Window time count is reset to zero. When the Event Count reaches the specified number within the Alarm Window time period, the processor generates a sensor alarm at that location.

Initial processor setup

Senstar recommends that the initial setup be done at the processor location using a direct USB connection to the UCM.

Note	An enclosure tamper condition must exist to enable UCM communication via a USB connection.

Note	The processor's Address and Network Configuration settings can be adjusted only through a direct USB connection.

Connecting the UCM via USB

1. Open the enclosure cover and connect the UCM computer to the processor via USB (T3).
2. Start the UCM software (the UCM Connect dialog displays see Figure 76:).
3. Specify the connection details:
   (e.g., Network Type: = Silver Network; Device Type = FlexZone-60 or FlexZone-4; Address = 1 {default address}; select USB radio button; USB Device = FlexZone)
4. Select Connect to establish a connection to the processor.
   The FlexZone Status window opens.

Setting the processor address

Note	Processors that do not use Silver Network communications can use the default address of 1.

1. In the Program field select the Address button.
   The change Device Address dialog displays.
2. In the Change Device Address dialog, specify the New Address for the connected processor.
3. Select the Program button.
   The new address takes effect when communications are reestablished.

Network configuration

For FlexZone processors that use Silver Network alarm data communications, you must define the network Protocol and Connection scheme under the Network Cfig tab. The network configuration can be adjusted only by using a direct USB connection between the UCM computer and the processor. For Silver Network based processors, there are two selectable Protocols based on the network configuration:

- The Silver Star Protocol uses an IP backbone and a direct Ethernet connection to each processor. This configuration is most commonly used when the sensor network is distributed over a large area and consists of isolated blocks of sensors with only a few processors in each block.
- The Silver Loop Protocol is designed to encircle a perimeter using a ring topology to provide communication redundancy. The Silver Loop Protocol can use EIA-422 wiring, fiber optic cables, or sensor cables to connect the distributed processors; and the Silver Loop can use a Network Interface Unit or Ethernet NIC(s) to connect to the Silver Network Manager.

1. Specify the network Protocol - Silver (Loop) or Silver (Star).
2. Specify the Connection scheme for network communications (see Figure 77:).
3. For the Silver Star configuration, and for Silver Loop configurations that use combined Ethernet and Coax communications specify the IP address, the subnet mask and the gateway IP address for each processor (if applicable).
4. Save and download the configuration changes to the processor.

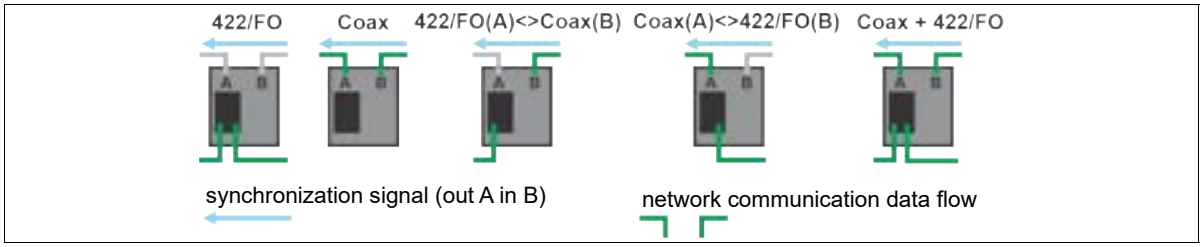


Figure 77: FlexZone network connections

Sensor cable supervision

You must specify the sensor cable supervision method for each connected FlexZone sensor cable. Several other functions depend on this setting including power and data distribution over the sensor cables as well as auxiliary power output.

1. Select the Side A Cfig tab.
2. In the Cable Side Configuration field, select the Cable Supervision Mode for the Side A cable:

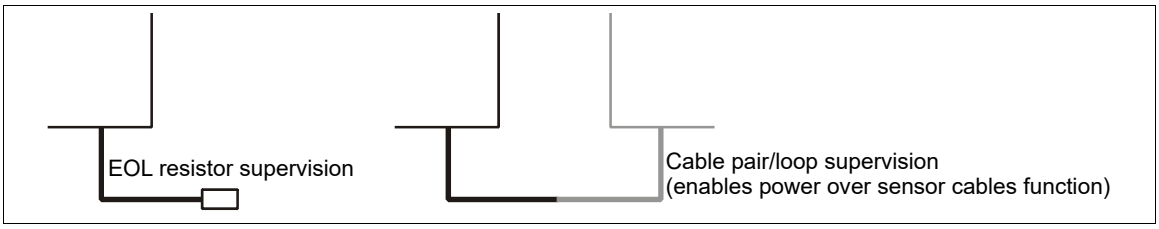


Figure 78: FlexZone sensor cable supervision

3. Repeat for the Side B cable.
4. Save and download the configuration changes to the processor.

Adjacent Processor (m) setting

If the selected cable side is connected to another processor via the sensor cables, you must specify the total length of sensor cable between the 2 processors:

1. Select the Side A Cfig tab.
2. Select the total length of the 2 connected sensor cables from the Adjacent Processor (m) drop down menu:

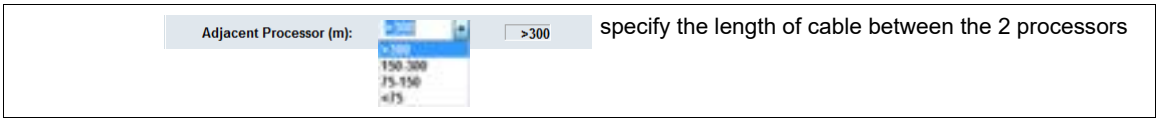


Figure 79: FlexZone sensor cable supervision

3. Repeat for the Side B cable (if necessary).
4. Save and download the configuration changes to the processor.

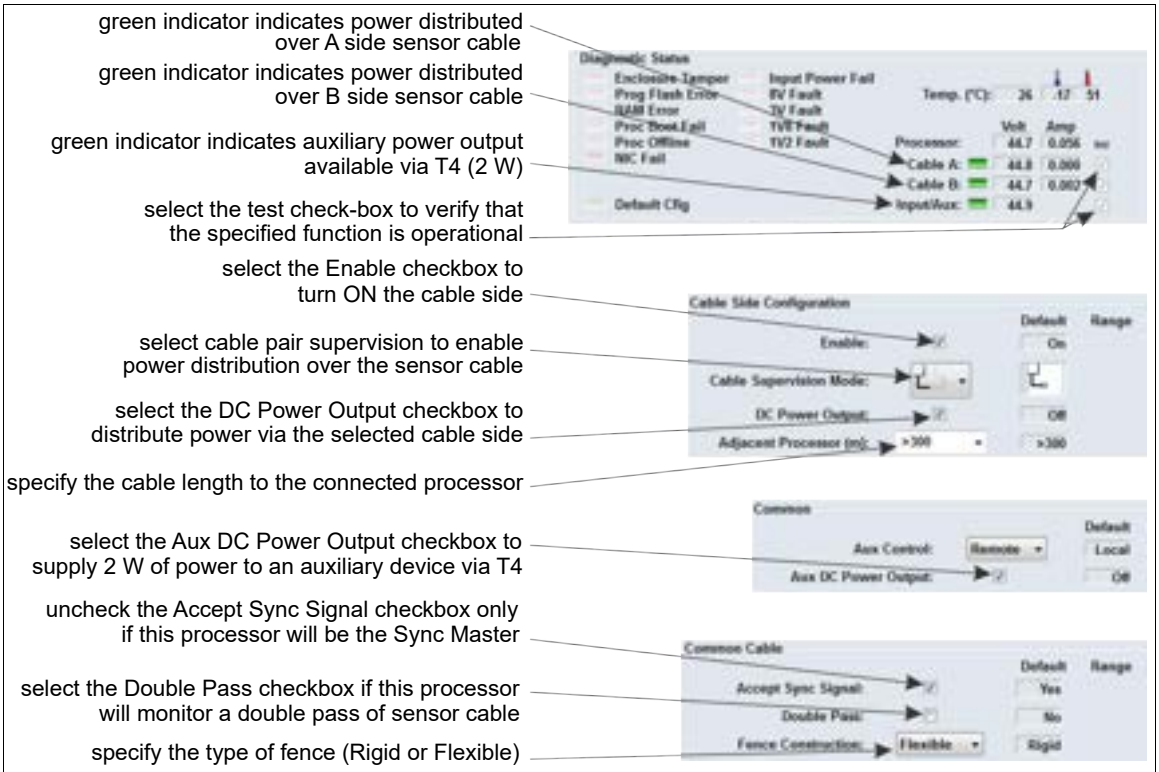
Power over sensor cables

If this processor receives power from a 48 VDC power supply and will distribute power over the sensor cables to other processors, you must setup the power distribution scheme via the UCM. If this processor receives power over the sensor cables, and will provide power to an auxiliary device via the power connector (T4) you must setup the auxiliary power output function via the Aux Cfig tab on the UCM.

The UCM Diagnostics Status field includes three indicators along with voltage and current readings for Cable A, Cable B and Input/Aux (Auxiliary power output - Volt readings only). There are also three test checkboxes that are used to test and verify the selected power distribution function.

Use the test checkboxes on the Status screen to temporarily change the power distribution function (Cable A power distribution, Cable B power distribution, Auxiliary power output via T4). Changes made go into effect immediately and revert to the original configuration when the UCM is disconnected.

Note	The Cable Supervision Mode must be set to cable pair supervision before the test function can be used.



NOTE: The Aux Power Output voltage is equal to the voltage received over the sensor cables. Power over the sensor cables and auxiliary DC power output are available only when the processor's input voltage is 38 VDC or greater.

Figure 80: FlexZone power over sensor cable settings

1. On the UCM Status tab in the Diagnostic Status field, select the Cable A checkbox to verify the power distribution function, if this processor will distribute power over the A side cable.
2. Select the Cable B checkbox to verify the power distribution function, if this processor will distribute power over the B side cable.

3. Select the Input/Aux checkbox to verify the auxiliary DC power output function, if this processor will supply power to an auxiliary device via T4.

Note	The test functions are temporary settings and the processor will revert to the Side A, Side B and Aux configuration settings when reset.

Once the functions are tested and verified on the UCM Status tab:

1. For power distribution via the A Side cable, on the Side A Cfig tab, select DC Power Output and Cable pair/loop supervision.
2. For power distribution via the B Side cable, on the Side B Cfig tab, select DC Power Output and Cable pair/loop supervision.
3. If this processor will provide power to an auxiliary device via T4, select the Aux DC Power Output checkbox on the Aux Cfig tab.
4. Save and download the configuration changes to the processor.

Processor synchronization

For fully closed perimeters with 2 or 3 processors uncheck the Accept Sync Signal checkbox on one of the processors (see Figure 80:).

For open ended perimeters, leave the Accept Sync Signal checkbox checked for all of the connected processors (default setting).

Processor calibration

When calibrating the FlexZone processor for the first time, begin with the detection parameters in the default settings.

The Sensitivity Profile

A Sensitivity Profile should be recorded for each FlexZone sensor cable (Side A cable, Side B cable). The Sensitivity Profile records the sensor's measured response to a fence disturbance along the full length of the detecting cable. The profile will verify the sensor cable's performance and can identify problems on the fence. The Sensitivity Profile also serves as the baseline for setting the Threshold at which Events are recorded and added to the Event Count.

Recording the Sensitivity Profile

Note	For a double pass installation drag the screwdriver along the fence approximately halfway between the upper and lower cable passes. See the UCM online help for additional details.

The recommended method for creating the Sensitivity Profile is to drag a screwdriver or similar instrument along the fence fabric 15 to 30 cm (6 to 12 in.) above, or below, the sensor cable. Beginning at the start point of the detecting cable, place the screwdriver against the fence fabric and apply consistent pressure as you walk along the side of the fence. Keep the pressure steady

and maintain a uniform pace as you drag the screwdriver along the fence fabric. When you reach the first fence post, lift the screwdriver over the post. Continue dragging the screwdriver along the fence fabric maintaining a consistent distance from the sensor cable until you reach the end of the detecting cable. Keep the pressure of the screwdriver and your walking pace as consistent as possible. Repeat this process from the end of the detecting cable back to the start point.

Note	If a sensitivity profile indicates a drop of 20 dB within a 10 m length of cable, it indicates that there is likely a problem with either the cable at that location (e.g., improper conditioning, kinked, damaged cable) or with the fence condition at that location (e.g., loose, sagging, stretched).

Tip	Senstar recommends that you save a UCM file that includes the recorded sensitivity profile. This can be useful for future maintenance and troubleshooting activities.

The Sensitivity Profile procedure is best conducted with two people, one to cause the fence disturbance and one to operate and monitor the UCM Profile window.

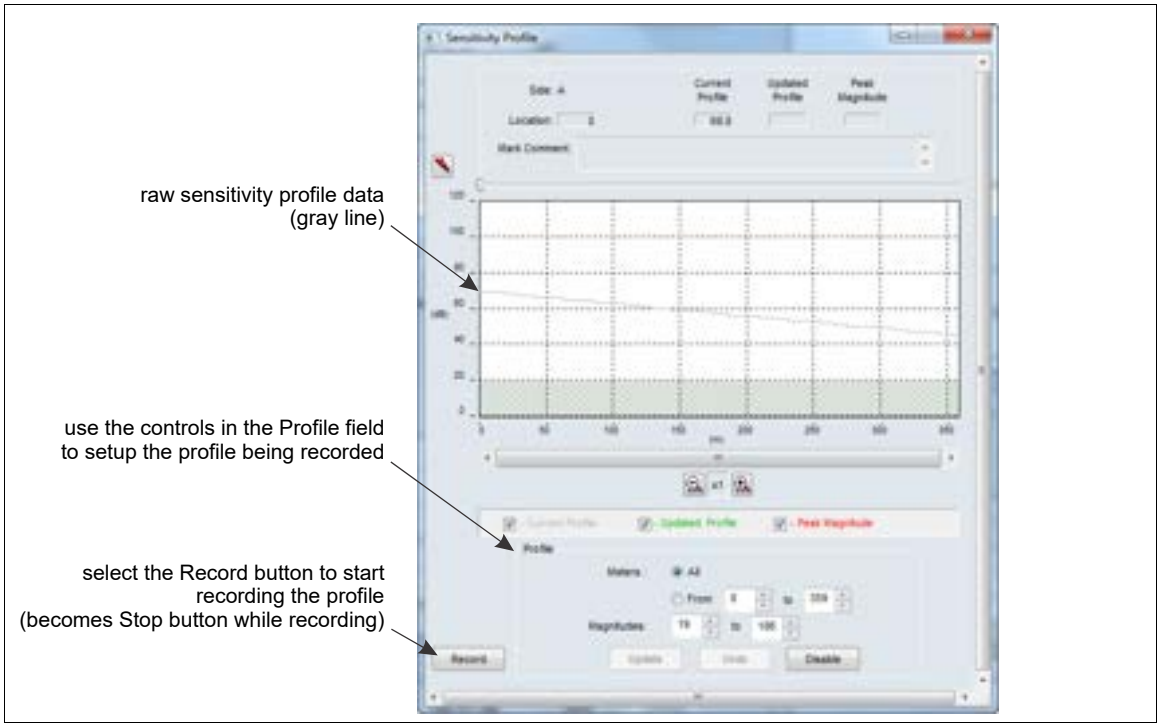


Figure 81: Sensitivity Profile

1. Establish a connection between the UCM and the processor.
2. Select the Side A Cfig tab and then select the Profile button.
3. Verify that the All radio button is selected, and then select the Record button to begin recording the Sensitivity Profile for Side A.
4. At the start point of detecting cable for Side A, begin dragging the screwdriver along the fence fabric.
5. Maintain consistent pressure and a steady pace and continue dragging the screwdriver along the fence fabric near the sensor cable until reaching the end of the detecting cable.
6. Repeat this process, dragging the screwdriver from the end point back to the start point.
7. Select the Stop button to stop recording the Sensitivity Profile.
8. Review the Sensitivity Profile to verify that it was successful. Look for a reasonably flat response that is somewhat lower near the end of the cable than at the beginning (typically a

20 dB drop over a 300 m cable).

Note	You can use the Disable function on the Profile window to trim out the areas with low signal responses at the beginning and end of the Sensitivity Profile by specifying the range of Meters and selecting the Disable button.

9. Once you are satisfied with the profile, select the Update button to load the Sensitivity Profile data. If the recorded Sensitivity Profile is not acceptable, select the Undo button and repeat the profile procedure.
10. Close the Profile window and download the Sensitivity Profile data to the processor.
11. Repeat this procedure for the Side B sensor cable.

Detection parameter setup

The FlexZone detection parameters are setup independently for each cable side. The Side A Cfig tab settings apply only to the A side sensor cable and the Side B Cfig tab settings apply only to the B side sensor cable. FlexZone detection parameters include the cable Threshold, the segment Threshold, the Event Window, the Event Count and the Alarm Window.

Each FlexZone installation includes many site-specific factors, therefore, each FlexZone processor must be calibrated to meet the site's detection requirements. You can adjust the cable Threshold to increase or decrease the detection sensitivity for the full length of detecting cable. You can adjust the segment Threshold to increase or decrease the detection sensitivity of a defined cable segment. You can specify the number of Events required to trigger an alarm, and the period of time that must lapse before a subsequent Event will be recorded at the same location. You can also specify the period of time in which a subsequent Event must occur.

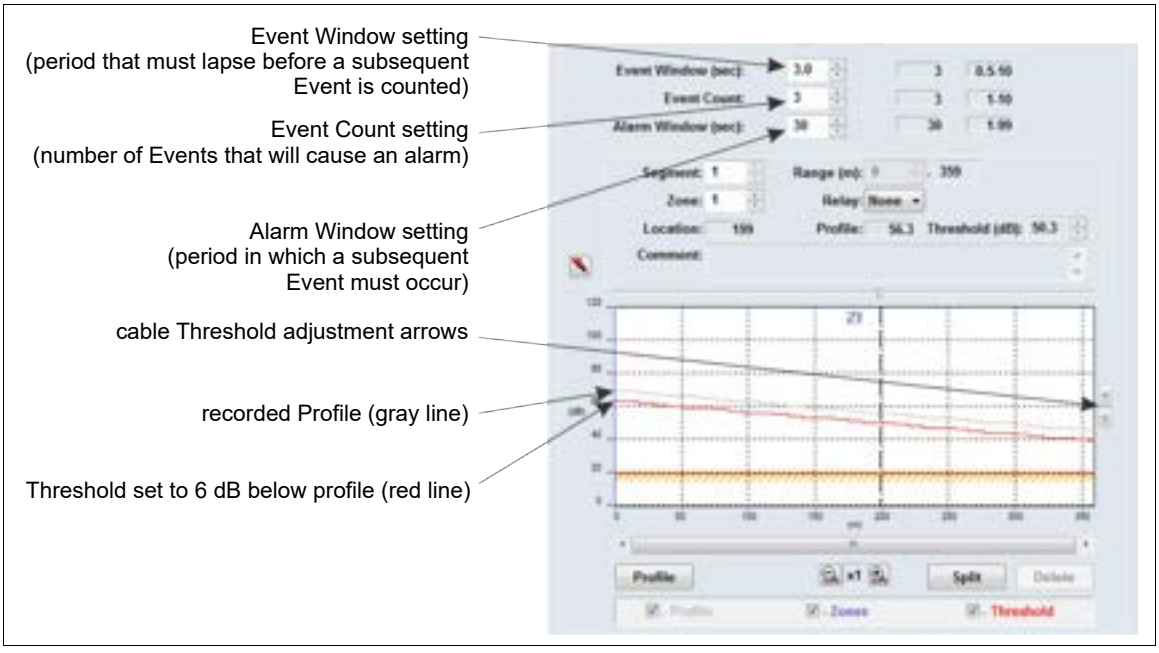


Figure 82: Detection parameter setup

Defining a zone

When the profile is completed and updated, the sensor cable will have a single segment which is not assigned to a zone (Zone 0). Begin by assigning Segment 1 to Zone 1.

Setting the cable Threshold

Before recording a sensor plot to locate and identify the cable segments and zones, set the full length cable Threshold. Use the arrows beside the Cable Settings chart to lower, or raise the Threshold. A good starting point is to set the Threshold at 6 dB below the recorded Profile.

Note	You can also adjust the Threshold by left-clicking in the window and using the up and down arrows on the keyboard, or the mouse wheel.

The cable Threshold represents the received signal level at which the Event Count is incremented. The cable Threshold is set with respect to the recorded Sensitivity Profile This provides a uniform Event Threshold for each meter of detecting cable.

Once the Sensitivity Profile is completed and downloaded to the processor, you can set the cable Threshold.

1. Establish a UCM connection to the processor and select the Side A Config tab.
2. Use the cable Threshold adjustment arrows to set the Threshold for the full length of detecting cable.
3. Save the UCM file and download the configuration data to the processor.
4. Repeat this procedure for the Side B cable.

Defining the cable segments and alarm zones

Each FlexZone sensor cable can be divided into as many as 50 cable segments (100 per processor). The defined cable segments can then be assigned to as many as 60 distinct alarm zones per FlexZone-60 processor, or 4 zones per FlexZone-4 processor. In addition, there is Zone 0, which does not report alarms, and does not count against the total number of zones. You use the UCM software to divide the sensor cable into cable segments, according to your site-specific requirements for alarm zone layouts. You can also adjust the Threshold independently for each cable segment to increase or decrease the sensitivity in that segment.

Locating the cable segment boundaries

Note	Senstar strongly recommends marking the zone boundaries on the fence to ensure that the zone boundary tap tests are done at the correct locations. Pieces of tape or string tied to the fence can identify boundary locations for the tap tester.

Tip	You can accurately locate cable segment boundaries by tapping the fence at the boundary location.

1. Establish a UCM connection to the processor and select the Side A Config tab.
2. Select File > Magnitude plot and set the FlexZone response plot to Display Format Magnitude vs Location, Absolute and Peak Capture.
3. Select the Record button to start the plot.

4. Have the tester tap the fence at the boundary location (or feature) with the blade of a screwdriver (or similar object).
5. Repeat the fence tap at the same location, using the same amount of force, 5 times waiting 3 seconds between each tap. Move along the cable and continue tapping the fence to mark all of the required cable segment boundaries. (e.g., start point of detecting cable, end of detecting cable, site specific alarm zones - beginning and end of each zone).
6. Refer to the response plot to define the cable segments and alarm zones on the Segment Settings window.
7. Repeat this procedure for the Side B cable.

Defining the cable segment boundaries

The following procedures are performed in the Cable Settings field of the Side A or B Cfig tab.

Refer to the magnitude response plot created during the locating the cable segment boundaries tap test procedure to calculate and note the average location of each segment boundary.

Note	To precisely locate the segment boundaries, you can use the UCM's Range (m) spin control to enter the meter where a segment begins. You can adjust only the start point of each segment using the Range control. The end of a segment is determined by the beginning of the next segment, or the end of the detecting cable.

Defining sensor cable as non-detecting (setting the start point of detecting cable)

Note	Any sensor cable that is located before the designated start point and after the designated end point of detecting cable must be set as non-detecting. Any cable bypasses must also be set as non-detecting.

1. Below the Segment Setting window on the Side A Cfig tab, select the Split button.
   The Profile graph is divided into 2 sections, the white section is the currently selected Segment.
2. Use the Range (m) spin control to enter the meter at which detection will begin (the beginning of the second segment).
3. Use the Segment spin control to select segment 1 (or left-click on the gray portion of the window).
4. Use the spin controls to assign Segment 1 to Zone 0.
5. Save the UCM file and download the configuration data to the processor.

Defining the detecting cable segments

Once you have defined the lead-in cable section as Zone 0 you can define the detecting cable according to the site plan. Each time you select the split button, you divide the selected segment into two equal sections. You then adjust the length of the selected segment and assign the

segment's zone number for alarm reporting. Each processor can include up to 100 cable segments (50 per cable side) and up to either 60 (FlexZone-60) or 4 (FlexZone-4) distinct alarm zones (plus zone 0).

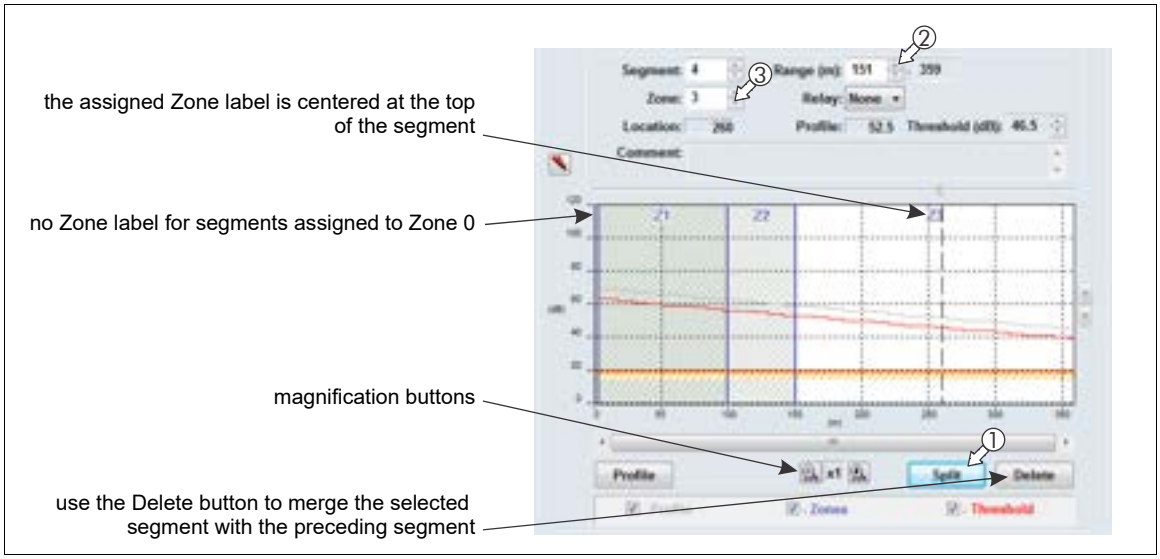


Figure 83: Defining cable segments

1. Below the Segment Setting window, select the Split button.
   The selected cable segment is divided into 2 sections, the white section is the currently selected Segment.
2. Use the Range (m) spin control to enter the meter at which this cable segment begins.

Note	You can also drag the zone boundary to the appropriate point in the profile window.

3. Use the Zone: spin control to assign the segment to an alarm Zone (label the zone according to the site plan; more than one cable segment can be assigned to an alarm zone).

Note	Any sections of detecting cable that should NOT report alarms must be assigned to Zone 0 (e.g., cable bypasses across gates).

4. Repeat this procedure to define each cable segment and zone, as specified in the site plan.
5. Save the UCM file and download the configuration data to the processor.
6. Repeat this procedure for the B Side sensor cable.

Setting the endpoint of detecting cable

Use the results of the location tap testing to specify the end point of the detecting cable.

1. Select the last defined cable segment (the segment that includes the meter at which detection ends).
2. Select the Split button.
3. Use the Range (m) spin control to enter the meter at which detection ends.
4. Use the spin controls to assign the last Segment to Zone 0.
5. Save the UCM file and download the configuration data to the processor.

6. Repeat this procedure for the B Side sensor cable.

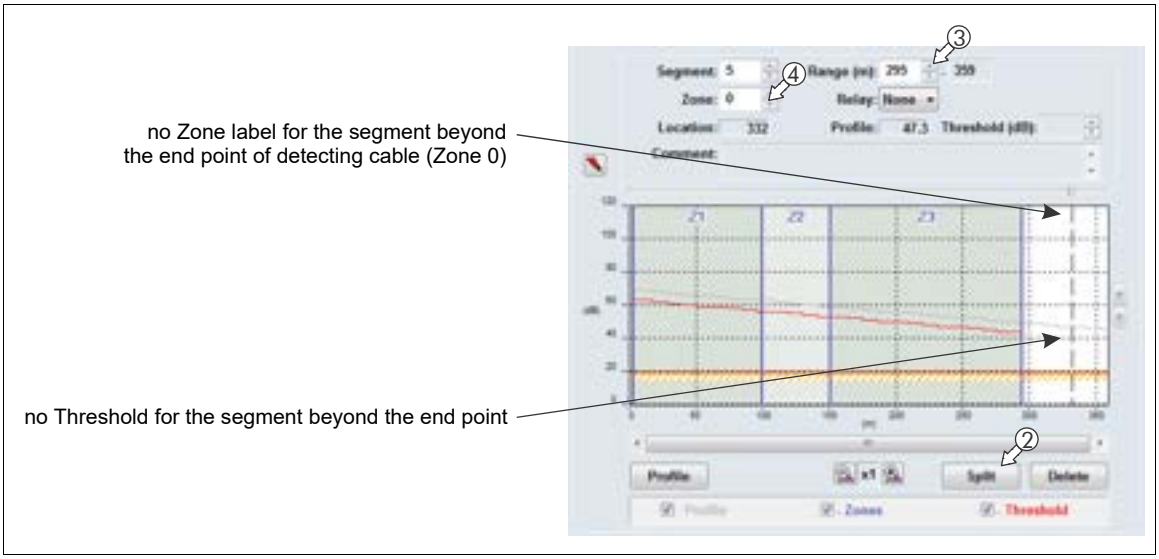


Figure 84: Defining the end point of detecting cable

Setting individual cable segment thresholds

In addition to the threshold for the full length of cable, you can also set independent thresholds for the defined cable segments. Cable segment thresholds are used for any high risk, or low threat, areas, as well as any areas that may be subject to a higher NAR such as an open stretch of fencing that is exposed to strong winds. Lowering the threshold in high risk areas will increase the Pd in that area. However, a lower threshold can also lead to an increased nuisance alarm rate. For an area where the threat is considered low, you can raise the threshold, which will reduce the chances of nuisance alarms occurring, while still providing an acceptable Pd.

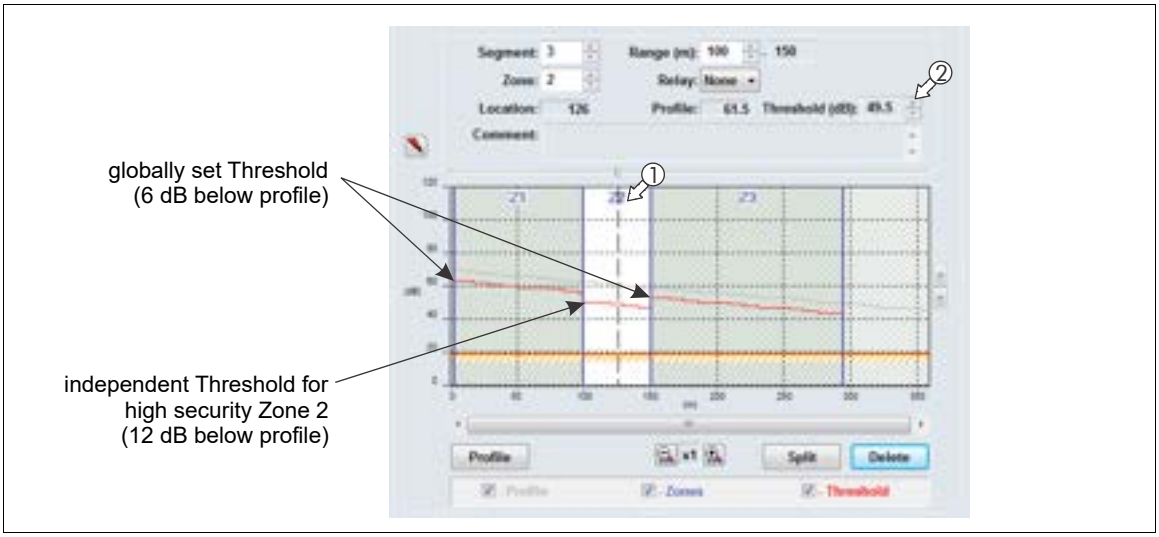


Figure 85: Setting individual cable segment Thresholds

Figure 85: illustrates a cable, which has been split into 5 segments and 3 zones. The first segment is non-detecting cable at the processor location. The fifth segment is past the end point of detecting cable. Segments 1 and 3 (Zones 1 and 3) use the globally set threshold of 6 dB below the profile. Segment 2 (Zone 2) is a high threat area and the threshold has been lowered to 12 dB below the profile.

Setting the segment threshold

1. Select the defined segment to which you will apply a cable segment Threshold.
2. Use the Threshold (dB) spin control to set the Threshold for the selected segment.
3. If required, repeat this procedure to set a cable segment Threshold for other segments (or Zones) as specified in the site plan.
4. Repeat this procedure for the B side sensor cable.
5. Save the UCM file and download the configuration data to the processor.

Intrusion simulations

To test the FlexZone sensor you conduct simulations for both cut and climb intrusions. The easiest method for simulating a cut intrusion is to tap the fence with the blade of a medium sized screwdriver. Hold the screwdriver by the handle, and flip your wrist to bring the blade into contact with the fence. The metal on metal contact generates an impulse that is similar to the cutting of a fence wire.

Rather than tapping the fence, you can also simulate a cut intrusion by weaving a length of fence wire into the panel and then cutting the inserted wire. Both methods generate a signal that is similar to the response of an actual cut intrusion. An actual fence cut also creates a significant amount of secondary fence noise as the cut section of wire pulls apart.

For a simulated climb intrusion, the best method is to actually climb the fence. It is not necessary to climb over the fence. The tester simply needs to climb on the fence for a period that exceeds the Event Window time setting X the Event Count setting (e.g., 1 second X 3 Events = 3 seconds). If climbing on the fence is not possible, dragging a screwdriver across the surface of the fence can be used as a climb simulation. Place the blade of a screwdriver against the fence fabric and drag the screwdriver across the fence panel while applying light pressure. Continue this for the Event Window time setting X the Event Count setting.

Start a UCM magnitude response plot and then thoroughly test the detection along the full length of the sensor cable, while running the plot. Adjust the detection parameters if any of the test intrusions fails to report an alarm simulation. Next, run a long term UCM magnitude response plot to monitor the sensor for nuisance alarms, especially during periods of inclement weather. Adjust the detection parameters if bad weather causes a high nuisance alarm rate. Once the system is detecting all intrusion simulations and the NAR is at an acceptable rate, The sensor is properly calibrated for your site. Save a UCM file that includes the processor's current settings.

Input/output configuration

This section details the procedures for configuring the processor's I/O for Local control and Remote control operation.

Note	See NM Mode on page 99 for details on using the UltraLink modular I/O system to report FlexZone alarm conditions.

Specify the Auxiliary I/O control mode and option card

1. On the Aux Cfig tab select the Arrow beside the Aux Control: field.
2. Specify the control mode for this processor (Local or Remote).
3. If the processor includes an option card, specify the type (Input or Output).
4. Save the UCM configuration file and download the configuration changes to the processor.

Auxiliary (Aux) inputs

The two Aux inputs on the FlexZone processor are voltage sensing inputs. The processor determines an input's status via an internal reference voltage, and the configuration of the contact closures and supervision resistors. Input contact closures MUST be voltage-free. You define the inputs as normally open (NO) or normally closed (NC) with single resistor supervision, dual resistor supervision, or unsupervised. The Filter Window parameter allows you to set the time period for which an input must be active, before the processor reports an event.

Note	The four inputs on the DRIC function the same as the two inputs on the processor. Follow the directions for setting up the processor's AUX inputs to setup the inputs on the DRIC (remote control only).

Local control mode

In local control mode, the two Aux inputs are used to activate electronic self-tests (AUX1 = A-side, AUX2 = B-side). To activate the self-test function, close a momentary switch across the input. You must close the momentary switch for the time specified in the Filter Window. Leave the AUX inputs open if you do not want to use the self-test function.

Remote control mode

In Remote control mode, the two Aux inputs serve as auxiliary device inputs to the host Security Management System (SMS). The inputs are available for reporting the status of other security devices. The processor reports any change of an input's state to the SMS via the Silver Network Manager. Table 2: includes the selectable Remote Control input wiring configurations, and Table 3: includes the selectable supervision resistor values.

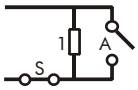
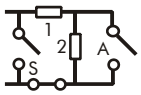
Input option	UCM selection	Alarm relay	Supervision	R1	R2
unsupervised		NO	---	---	---
single resistor supervision		NO	cut	5.1 k	---
dual resistor supervision		NO	cut & short	4.3 k	820
unsupervised		NC	---	---	---

Table 2: Selectable input configurations

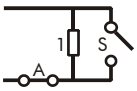
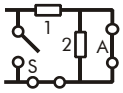
Input option	UCM selection	Alarm relay	Supervision	R1	R2
single resistor supervision		NC	short	5.1 k	---
dual resistor supervision		NC	cut & short	5.1 k	820

Table 2: Selectable input configurations

R1 values (single resistor supervision)	R1 values (double resistor supervision)	R2 values (double resistor supervision)
820	1.1 k	820
1 k	2.2 k	1.1 k
1.1 k	4.3 k	2.2 k
1.2 k	4.7 k	3.3 k
1.5 k	5.1 k	5.6 k
2.2 k	5.6 k	
3.3 k		
4.7 k		
5.1 k		
5.6 k		

Table 3: Selectable resistor values

Input configuration procedure (Remote control mode)

1. Select the Aux Cfig tab on the UCM window.
2. From the Supervision drop down, select the desired supervision scheme for the input.
3. Select the Resistor 1 value, if applicable.
4. Select the Resistor 2 value, if applicable.
5. Set the Noise Tolerance, if required.
6. Set the Line Drop, if required.
7. Set the Filter Window.
8. Repeat this procedure if there is a second connected input.
9. Save the UCM configuration file and download the configuration changes to the processor.

Output relays

Note	The four outputs on the ROC function the same as the four outputs on the processor. Follow the directions for setting up the processor's relay outputs to setup the outputs on the ROC (local or remote control).

Output relay setup (Local control mode)

Note	To assign relays to specific zones, see Linking cable segments to relays (local control mode) on page 84.

In Local control mode, the four relays are setup via the Local Aux Control Activation check boxes to report alarm conditions. The relays are then controlled by the processor to activate on the user-specified conditions. The relays remain active for an event's duration or for the selectable relay Active Time, whichever is longer.

1. Use the Output selection arrows to select a relay.
2. Specify the Hold/Active Time parameter.
3. Specify the conditions from the Local Aux Control Activation field under which this relay will activate.
4. Repeat this procedure for the other relays.
5. Save the UCM configuration file and download the configuration changes to the processor.

Output relay setup (Remote control mode)

In Remote control mode, the relays are controlled by the host SMS to operate auxiliary equipment as output control points (e.g., to activate lights, doors, sirens, CCTV equipment, etc.). You configure the relays response to commands from the host computer. You can configure the relays as latching (ON by command, OFF by command) or in flash mode (ON-OFF-ON-OFF etc. by command, OFF by command) or in pulse mode (ON for a period, then OFF). For flash and pulse modes, the ON-OFF time duration is configurable.

1. Use the Output selection arrows to select a relay.
2. Select the type of relay Activation (latching, or flash mode, or pulse mode).
3. Select the Hold/Active Time parameter, if applicable.
4. Select the Inactive Time parameter, if applicable.
5. Repeat this procedure for the other relays.
6. Save the UCM configuration file and download the configuration changes to the processor.

Linking cable segments to relays (local control mode)

You can link the defined cable segments to processor relays 1, 2, 3 and 4 and to the four relays on the ROC (OPT 1, OPT 2, OPT 3, OPT 4). This provides up to 8 relays per processor, for signaling sensor alarm conditions.

1. Under the Side A Cfig tab, on the Segment Settings window, select the cable segment to which you will associate a relay.
2. Select the relay from the pull down menu, which will be associated with the segment (the selected relay activates to annunciate a sensor alarm in the cable segment).
3. Repeat steps 1 and 2 until you have associated the available relays to the defined cable segments.
4. Save the UCM configuration file and download the configuration changes to the processor.
5. Repeat this procedure for the B side cable.

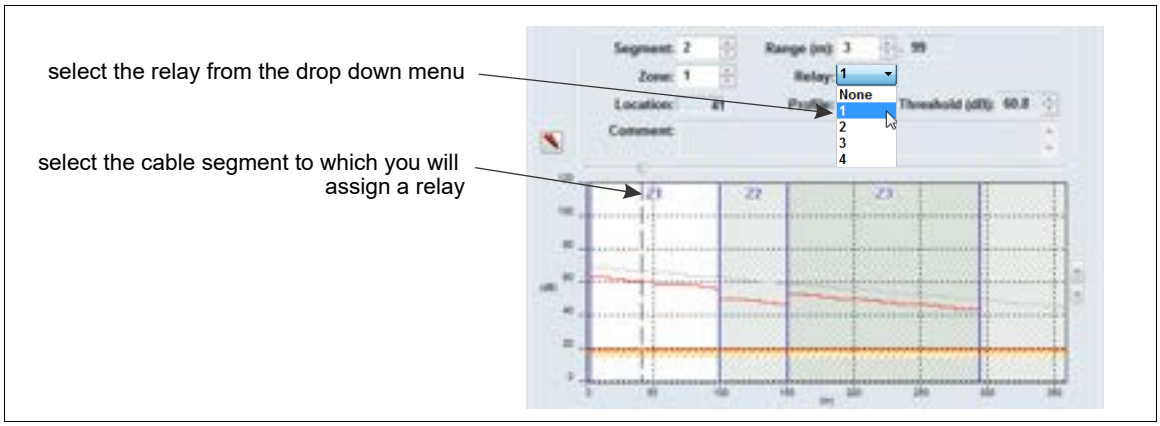


Figure 86: Linking relays to cable segments

System test procedure

Once the system is calibrated and setup, you should conduct a series of tests to verify detection. Run a UCM Response plot during the testing. Network based processors can be tested over the network to verify network communications.

Note	The following tests can be used to verify FlexZone system operation. The tests are described in a generic manner, which does not take into account site specific details.

- **Cut detection** - Use the tap test, or weave a piece of scrap fence wire into the fabric of the fence and cut the scrap wire. Test each zone in at least three separate locations.
  At each location, tap the fence fabric, or cut the scrap wire, the number of times specified by the Event Count parameter. Wait at least 2 seconds between taps.

  PASS ____ FAIL____

- **Climb detection** - Have a tester climb on the fence fabric for at least as long as the Event Time X the Event Count (or use the screwdriver drag method). Repeat the climb simulation in at least three locations per zone.

  PASS ____ FAIL____

- **Fence lift detection** (This test may not be possible on all fence types. Use care to ensure that the fence is not damaged during this test.) - Have a tester lift or pry up the bottom the fence fabric for a minimum of the Event Time X the Event Count (depending on the amount of fence noise being generated, the test may have to exceed the Event Time setting by several seconds). Repeat the lift test in at least three locations per zone.

  PASS ____ FAIL____

- **Enclosure tamper** - Open the enclosure. The DOOR OPEN LED (D1) turns ON, and the UCM Enclosure Tamper indicator turns ON, and the Event log reports an Enclosure Tamper alarm. If a relay is configured to activate for an enclosure tamper, the designated Relay activates.

  PASS ____ FAIL____

- **Self-test** - Activate the self-test for the A-side. The processor performs electronic self-tests of the A-side. (All relays assigned to the A-Side cable should activate.)
  Activate the self-test for the B-side. The processor performs electronic self-tests of the B-side. (All relays assigned to the B-Side cable should activate.)

  PASS ____ FAIL____

- **Auxiliary device inputs** - For Local control mode the Aux inputs activate the system self-test. In this case, activate the appropriate switch, and verify that the self-test occurs. Repeat for both cable sides.
  For Remote control mode, the Aux inputs serve as auxiliary device inputs to the host Security Management System. In this case, activate the connected device, and verify the status change is reported by the host SMS. Repeat for each input.

  PASS ____ FAIL____

- **Relay outputs** - For Local control mode the relay outputs are used to report events. Cause an event, and verify that the specified relay activates for a minimum of the relay hold time. Repeat this procedure for each specified event (in the Output Configuration field).
  For Remote control mode, the relays serve as output control points for the host SMS. Send an activation command from the host SMS to one of the relays and verify that the relay activates. Repeat this procedure for each relay.

  PASS ____ FAIL____

4 Maintenance

Recommended maintenance

The FlexZone sensor 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). Check for the following:
   - 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
   - there is no loose sensor cable; the sensor cables are held snugly against the fence fabric and the cable ties are holding the cable securely in place
   - 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 series of cut intrusions and verify that alarms are declared and accurately located each time
   - climb the fence at several locations and verify that alarms are declared and accurately located each time
3. Record a UCM sensor response plot (quarterly).
   Connect the UCM to the processor and record a sensor response plot while conducting tap tests of the protected fence. Note the environmental conditions at the time of the recording. Review the plot to examine the response and the ambient noise level, and compare the plot to any previously recorded plots. Depending on the weather conditions, the recorded plots should be quite similar. During inclement weather the noise level will be higher, and during good weather with very little wind, the noise level should be extremely low. If there is a significant amount of noise indicated during good weather, examine the cable and cable connections for possible problems.

4. Snow removal (as required)
   If the weather conditions at your site include snow falls, the fence should be kept clear of accumulating snow. If snow accumulates against and around the fence, it will absorb and dampen the vibrations caused by an intrusion attempt. In addition, if there is significant snow accumulation, the snow can serve as a bridging or tunneling aid to defeat the sensor.

Preventing weather related nuisance alarms

Note	For network based systems, after completing the initial calibration Senstar recommends running a magnitude response plot through the Network Manager during the first periods of inclement weather. If the weather causes an unacceptable number of nuisance alarms, you can adjust the cable Threshold to exclude the effects of the weather. For standalone systems that encounter an unacceptable number of nuisance alarms during inclement weather, adjust the cable Threshold to exclude the effects of the weather. After adjusting the cable Threshold, retest the system to ensure that the sensor's detection meets your security requirements.

If your FlexZone system is having a problem with nuisance alarms during inclement weather, inspect the fence to ensure it is in good condition and there are no loose fittings that can cause metal on metal contact. Next, connect the UCM to the processor and review the clutter and the alarm history to try to determine the source of the nuisance alarms.

Using the SD card function

The FlexZone processor includes a microSD card slot to enable long term recording of the sensor's activity. The SD recording can be activated by a hardware button on the processor or by a software control on the UCM SD Card tab. For details on the SD card operation and function refer to the UCM online help files.

Note	To review the recorded plot data on the SD card, connect the SD card to the PC, start the UCM (work offline) and import the plot file(s) from the SD card.

Testing the fence condition

To determine if there are any loose fittings or parts of the fence that can cause nuisance alarms in windy weather, grip a fence panel in the middle and gently push and pull on the fence with an increasing motion. Run a UCM magnitude response plot to record the tests, and listen for any metal on metal contact. When you review the plot, look for any response spikes that are over the threshold. If the shake test causes metal on metal contact, or generates response spikes over the threshold, locate and correct the problems on the fence. This will help to prevent weather related nuisance alarms.

Ground faults

If excessive noise is present, or becomes evident after installation, check the system's ground connection and examine the sensor cable installation. (Excessive noise can be identified by a high clutter signal on a connected UCM.) In particular, ensure that there is no inadvertent ground connection to the coaxial cable shield at a splice connection or terminator. Verify that the center conductor and shield have not been swapped at the terminal blocks.

Adjusting the Target Filters

Each cable side includes both a high pass and a low pass filter which can be used to screen out some sources of nuisance alarms. Before adjusting the Target Filters, verify that the fence is not loose and that there are no objects or vegetation that can contact the fence in strong winds. The default value for the high pass filter is 10 Hz, the default value for the low pass filter is 40 Hz.

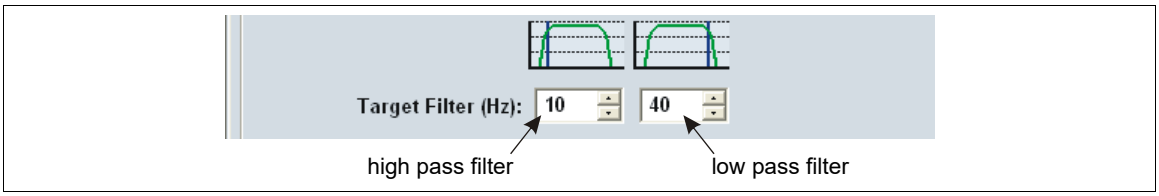


Figure 87: Cable Side Configuration Target Filters

- If you are encountering an unacceptably high NAR during moderate to strong winds, increase the high pass filter slightly and continue monitoring for nuisance alarms. If you increase the high pass filter, you should also increase the low pass filter by the same value to ensure that there is adequate bandwidth for reliable detection.
- If you have a very stable fence and would like to increase the detection sensitivity, you can lower the high pass filter. If you do lower the high pass filter, monitor the fence to ensure that the NAR has not increased.
- If you are encountering detection problems (low sensitivity) rather than nuisance alarms, the most likely source of the problem is the sensor cable. Sensor cable problems typically result from improper conditioning, handling damage, or incorrect installation. Review the current clutter level to see if there are any areas of the cable where the clutter signal is particularly high. Repeat the profiling procedure and compare it to the original cable profile. Once you have determined the location of the cable problems, correct the problems by reconditioning the cable, or correcting any installation problems, or repairing the damaged section with a cable splice.

Note	If you adjust the Target Filters or make any cable repairs, always reprofile and retest the sensor cable.

Replacing the processor

The processor PCB is mounted inside the enclosure on four standoffs.

CAUTION	The processor and the NIC include static sensitive components. Follow proper ESD handling procedures when working on the PCB. Place both assemblies into anti-static bags once they are removed from the enclosure.

Removing the processor assembly

1. Label and disconnect the removable terminal blocks.
2. Disconnect the tamper switch connector from the processor.
3. If required, remove the network interface card and its ground wire.
4. Remove and retain the mounting hardware from the processor CCA (2 standoffs, 2 machine screws + washers).
5. Lift the processor CCA out of the enclosure. Place the CCA into an anti-static bag.

Replacing the processor assembly

1. Fit the replacement processor inside the enclosure so the 4 mounting holes are lined up with the standoffs.
2. Use the retained mounting hardware to secure the CCA to the enclosure.
3. If required, replace the network interface card and its ground wire.
4. Reconnect the tamper switch connector.
5. Reinstall the removable terminal blocks.
6. Apply power to the processor, connect the UCM and download the replaced processor's configuration file to the replacement processor.
7. Thoroughly test the replacement processor.

Updating the firmware

To update the processor's firmware, begin by establishing a UCM connection.

CAUTION	Update the FPGA firmware first, before updating the MSP firmware.

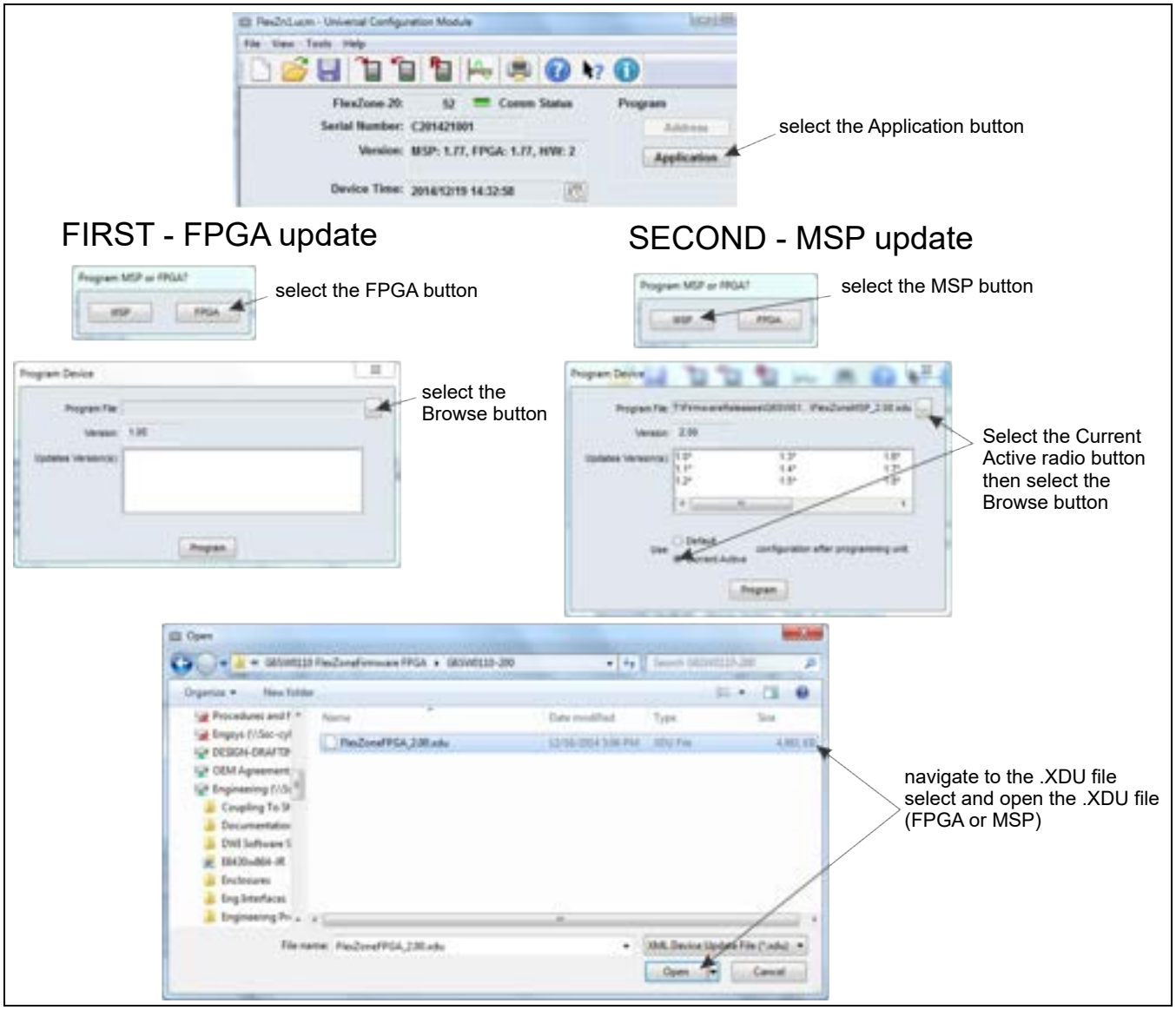


Figure 88: Updating the firmware

1. Update the FPGA firmware first:
   - Start the UCM and make a connection to the FlexZone processor.
   - Select the Application button.
   - Select the FPGA button.
   - Select the Browse button.
   - Navigate to the location of the XDU file.
   - Select and open the FlexZoneFPGA_x.xx.XDU file (x.xx = firmware version).

Note	After the FPGA firmware update, the processor's two CPUs will be unable to communicate with each other. As a result, a boot fail or processor offline error may be reported. Ignore this error and proceed with the update.

1. Once the FPGA firmware is updated, update the MSP firmware.
   - Select the Application button.
   - Select the MSP button.
   - Select the Current Active radio button to specify that the Current configuration be used.
   - Select the Browse button.
   - Navigate to the location of the XDU file.
   - Select and open the FlexZoneMSP_x.xx.XDU file (x.xx = firmware version).

CAUTION	If the MSP firmware is updated first (before the FPGA firmware), it will then be impossible to upgrade the FPGA firmware. In this case, you must reload MSP version 1.00 and then start over; updating the FPGA firmware first.

a Parts list

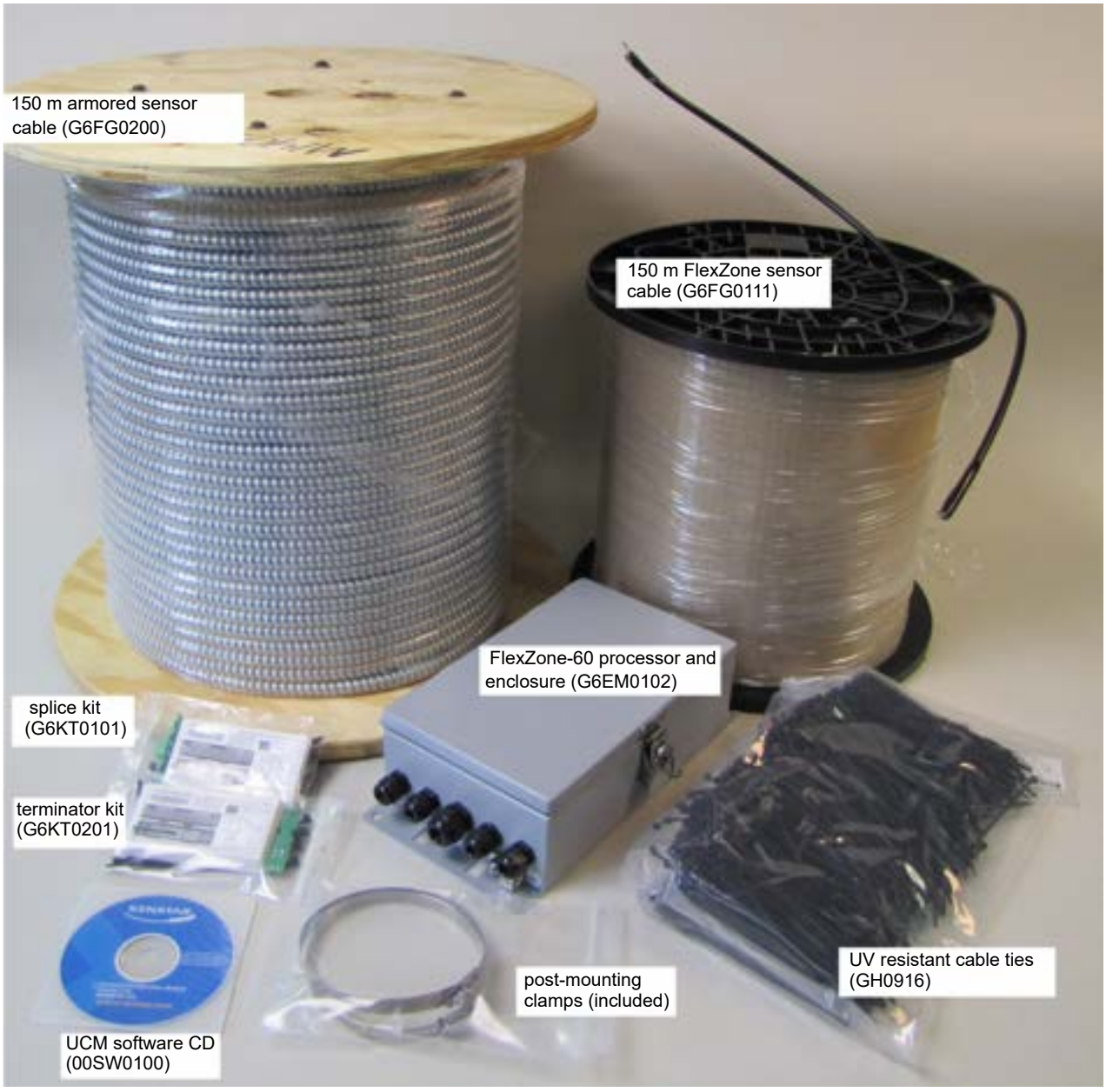


Figure 89 FlexZone general system components

Component	Part Number	Description
FlexZone processor		
4 zone Processor and enclosure	G6EM0101	FlexZone-4 processor mounted in an outdoor rated painted aluminum enclosure, provides electronic processing for up to 4 software defined sensor zones with up to up to 300 m (984 ft.) of sensor cable per side
60 zone Processor and enclosure	G6EM0102	FlexZone-60 processor mounted in an outdoor rated painted aluminum enclosure, provides electronic processing for up to 60 software defined sensor zones with up to up to 300 m (984 ft.) of sensor cable per side
4 zone Processor card	G6FG0301	replacement FlexZone-4 processor circuit card assembly
60 zone Processor card	G6FG0302	replacement FlexZone-60 processor circuit card assembly
Enclosure	G6MD0400	replacement FlexZone enclosure (tamper switch not included)
FlexZone sensor cable		
FlexZone sensor cable	G6FG0111	FlexZone sensor cable, 150 m (492 ft.) reel
FlexZone sensor cable	G6FG0113	FlexZone sensor cable, 220 m (722 ft.) reel
armored sensor cable	G6FG0200	FlexZone sensor cable inside flexible metal jacket, 150 m (492 ft.) reel
FlexZone accessories		
splice kit	G6KT0101	FlexZone splice kit components
termination kit	G6KT0201	FlexZone termination kit components
UV resistant cable ties	GH0916	UV resistant polypropylene cable ties, 1000 piece bag
dry contact input card	00BA2400	plug-in option card provides 4 dry contact (voltage sensing) inputs
relay output card	00BA2500	plug-in option card provides 4 relay outputs
stainless steel cable ties	GH1080	stainless steel cable ties for armored sensor cable, 100 piece bag
stainless steel cable tie tool	GX0310	manual installation tool for stainless steel cable ties
double loop steel bar ties	82-130020	steel bar ties for armored sensor cable, 15 cm (6 in.) 18 AWG, 1000 piece bundle
armored shell	G6KT0300	protective junction box for armored cable splices and terminations a ½ in. cable gland is included for connecting the armored cable to the processor's enclosure
Gate accessories		
wireless gate sensor module (GSM)	E7EM0201	battery powered wireless gate sensor module mounts on gate and communicates via RF with plug-in module on FlexZone processor
wireless gate sensor module (GSM)	E7EM0202	solar powered wireless gate sensor module mounts on gate and communicates via RF with plug-in module on FlexZone processor
gate sensor receiver card for WGS	E7FG0301	plug-in module for FlexZone processor, communicates via RF with GSM
gate disconnect assembly	C6KT0101	Sensor cable disconnect assembly for swinging and sliding gates (1 required for swinging gates and 2 required for sliding gates)

Component	Part Number	Description
Power supplies		
DIN rail mount	GP0154-050	50 W, 48 VDC, DIN rail mount indoor power supply (-10 to 70º C)
DIN rail mount	GP0154-480	480 W, 48 VDC, DIN rail mount indoor power supply (-25 to 70º C)
Indoor/outdoor	GP0160-185	185 W, 48 VDC, indoor/outdoor power supply (IP65)
Indoor/outdoor	GP0160-480	480 W, 48 VDC, indoor/outdoor power supply (IP65)
Outdoor power supply	A4EM0200	100 W, 48 VDC network power supply in a painted aluminum enclosure (CSA type 4 / NEMA 4/IP 66)
Network accessories		
Silver Network Interface Unit	00EM0200	Silver Network data converter for EIA-422 and multi-mode fiber optic applications
Silver Network Interface Unit	00EM0201	Silver Network data converter for EIA-422 and single-mode fiber optic applications
Mini Silver Network Interface Unit	00EM1301	Silver Network data converter for USB to EIA-422 and multi-mode fiber optic applications DIN rail mount
Mini Silver Network Interface Unit	00EM1302	Silver Network data converter for USB to EIA-422 and single-mode fiber optic applications DIN rail mount
Data converter	GB0360-ST	Ethernet to dual EIA-422 data converter (0 to 60º C operating temp)
Data converter	GB0360-ET	Ethernet to dual EIA-422 data converter (-40 to +75º C operating temp)
Data converter mounting kit	GB0360-MK	35 mm DIN rail mounting kit for Ethernet to dual EIA-422 data converters
Network Interface Card (multi-mode fiber)	00BA1901	Network interface card for multi-mode fiber optic communications
Network Interface Card (EIA-422)	00BA2000	Network interface card for copper wire communications
Network Interface Card (single-mode fiber)	00BA2101	Network interface card for single-mode fiber optic communications
Network Interface Card (Ethernet PoE)	00BA2200	Power over Ethernet network interface card for Ethernet communications
Network Manager Suite software	00FG0220	Network Manager service software CD for Silver Network plus Alarm Integration Module software (AIM requires hardware key for operation)
AIM hardware key	00SW0230	USB security dongle for AIM software operation
UCM software		
UCM cable	GE0444	UCM interface cable, 3 m, USB (connects PC running UCM to processor)
UCM	00SW0100	Universal Configuration Module software, Windows-based application, setup, calibration and diagnostic tool

b Specifications

Processor	**Model**	• processor card and enclosure
	PCB dimensions (L x W)	• 13.2 x 14.5 cm (5.2 x 5.7 in.)
	Quantity	• one processor per two sensor cables
	Enclosure	• IP66/NEMA 4 painted aluminum, outdoor rated • L x W x D 26 cm (+2.5 for cable glands) x 16 cm x 9 cm 10.25 in. (+1 for cable glands) x 6.3 in. x 3.5 in.
	Cable entry ports	• 4 small cable ports (17 mm, 0.67 in.) fitted with 9.5 mm (3/8 in.) compression glands: cable range: 2.9 - 7.9 mm (0.115 to 0.312 in.) • 1 large cable port (22.2 mm, 0.875 in.) fitted with compression gland: cable range: 4.3 - 11.4 mm (0.17 to 0.45 in.) • for armored cable, the 2 right side small cable ports must be drilled out to accommodate 1/2 in. cable glands (22.2 mm, 0.875 in.)
	Probability of detection	• 95% with a 95% confidence factor for cutting the fence, lifting the fence fabric, or climbing over the fence unaided (based on a high quality chain link fence, and following manufacturers' installation and calibration recommendations)
	Maximum sensor cable length	• 300 m (984 ft.) max. cable length - app. 10% less for linear fence coverage - 270 m (886 ft.)
	Power consumption	• 2.0 W nominal; 2.5 W nominal with NIC and option card
	Power input	• 12 to 48 VDC (nominal) • absolute minimum 10 VDC • absolute maximum 60 VDC • min. 38 VDC input required for power over sensor cables and auxiliary power output capability
	Connectors	• removable terminal block for power input • removable terminal block for relay output connections • removable terminal block for auxiliary input/self-test connections • removable terminal block for sensor cable input • USB port for UCM connection • 20-pin socket for network interface card • micro SD card slot to record sensor response data to removable media

Processor	**Controls**	• calibration adjustments via the Universal Configuration Module (Windows-based software application)
	Inputs	• 2 sensor cable inputs (1 per zone) • 2 voltage sensing auxiliary device/self-test inputs
	Outputs	• 4 form C relay outputs 30 VDC @ 1 A maximum, non-inductive load user-configurable relay response
	LED indicators	• power • one per relay • UCM connected • Enclosure door open • diagnostic activity
	Supervision	• mechanical enclosure tamper switch • sensor cables • processor operation
	Temperature	• -40º to +70ºC (-40º to +158º F) (as measured inside the enclosure)
	Relative humidity	• 0 to 95%, non-condensing

c NM Mode

The UltraLink I/O processor can be configured to operate in Network Manager Mode (NM Mode). In NM Mode, the UltraLink I/O processor acts as the Network Manager, providing alarm outputs for a connected network of up to eight Silver devices. In NM Mode, the Silver devices do not require a connection to a PC running Silver Network Manager software. The supported Silver devices include FlexZone, FlexPS, Senstar LM100, OmniTrax, XField and XField LT. Sensor alarms and supervision conditions are assigned to UltraLink I/O outputs (relay or open collector). When an alarm occurs on a connected sensor, the corresponding UltraLink I/O output is activated. If Multiple alarm conditions are assigned to a single UltraLink I/O output, the conditions are OR'd. A maximum of four output expansion modules can be used in NM Mode enabling up to 136 distinct output points.

Note	NM Mode supports only the Silver Loop configuration. The Silver Star configuration (PoE NIC) cannot be used with NM Mode.

Use NM Mode to setup a network of up to eight Silver Network based sensors that will report alarm, supervision and diagnostic conditions via UltraLink I/O outputs. The 4 onboard relays on each sensor are also available for use in NM Mode. UltraLink I/O inputs are not used in NM Mode. Figure 90: illustrates an UltraLink I/O system operating in NM Mode with eight connected sensors and a temporary connection to a Silver Network Manager to enable remote maintenance access.

Note	The UltraLink I/O output point assignments for each node are made at the sensor level through a direct UCM (USB) connection to the sensor (or via a temporary remote connection to the Silver Network Manager). Each sensor allows the user to specify the alarm, supervision and diagnostic fault conditions, and the UltraLink I/O outputs they activate. The Aux Control for each sensor must be set to Remote control mode.

Note	The UltraLink processor's Silver Network address is not used in NM Mode, and does not count against the NM Mode address limit of 8 nodes. By convention, set the UltraLink I/O processor's Silver Network address to 9.

Note	The output activation buttons located below the outputs on the UCM status screen do not function in NM Mode.

Note	Each sensor connected to the UltraLink I/O system (operating in NM Mode) requires a Network Interface card with the exception of a connected block of FlexZone processors. For a connected block of FlexZone sensors, one FlexZone requires an NIC to connect to the UltraLink I/O processor and the other FlexZone processors can communicate over their connected sensor cables.

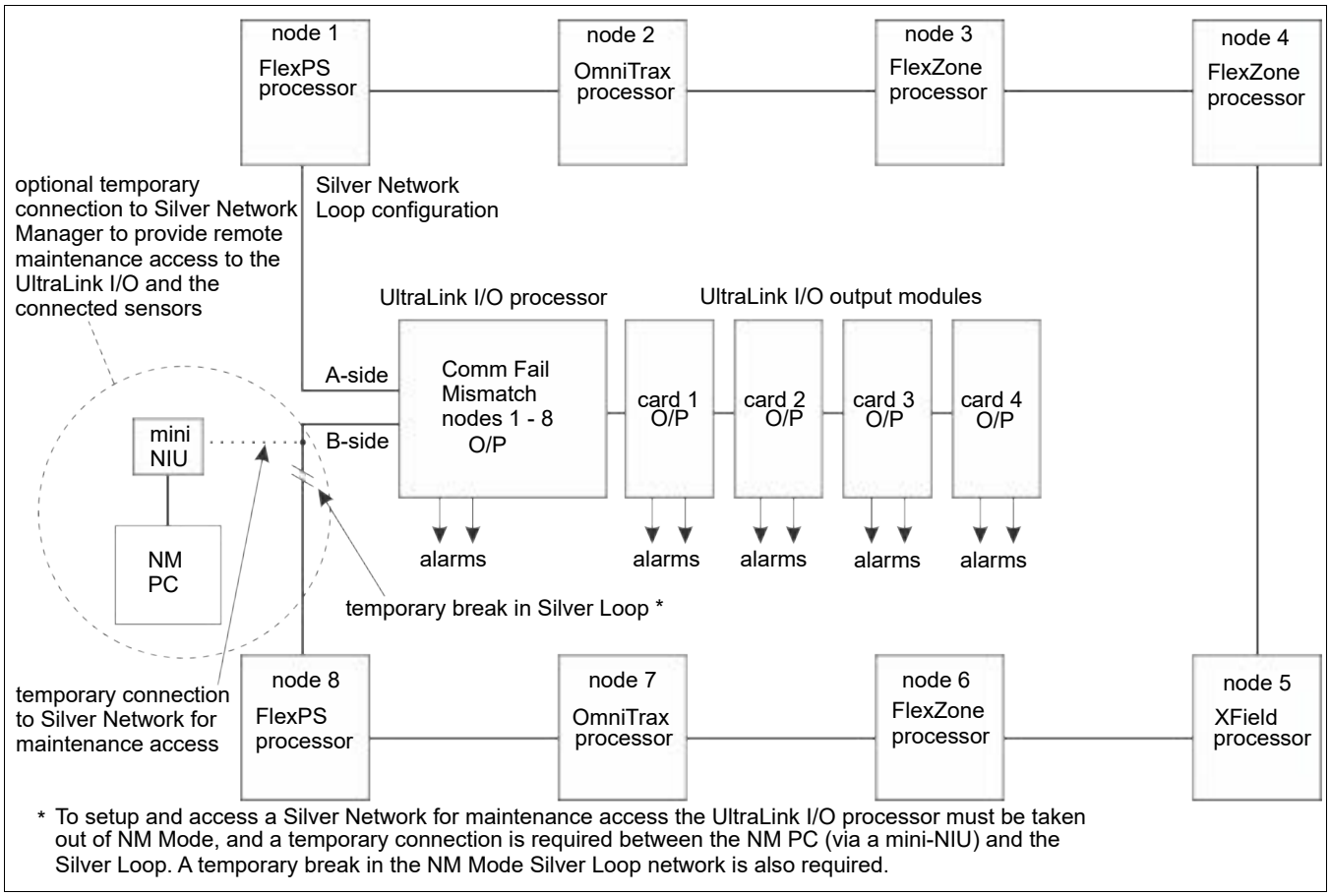


Figure 90: NM Mode block diagram

UCM configuration

To use UltraLink modular I/O system outputs to report FlexZone alarm and supervision conditions establish a UCM connection to the FlexZone processor.

Note	Refer to the UltraLink Modular I/O system instruction sheet and the UCM help file for additional details on NM Mode operation.

Select the Remote Cfig tab and specify the outputs that will activate to annunciate the required alarm and supervision conditions (see Figure 91:).

Note	Output assignments for Comm Fail and device mismatch for each connected device are made via a UCM connection to the UltraLink processor (see 00DA1003-001).

Select the Side A Cfig or Side B Cfig tabs to assign outputs to Cable segments for reporting Zone alarms (Figure 92:).

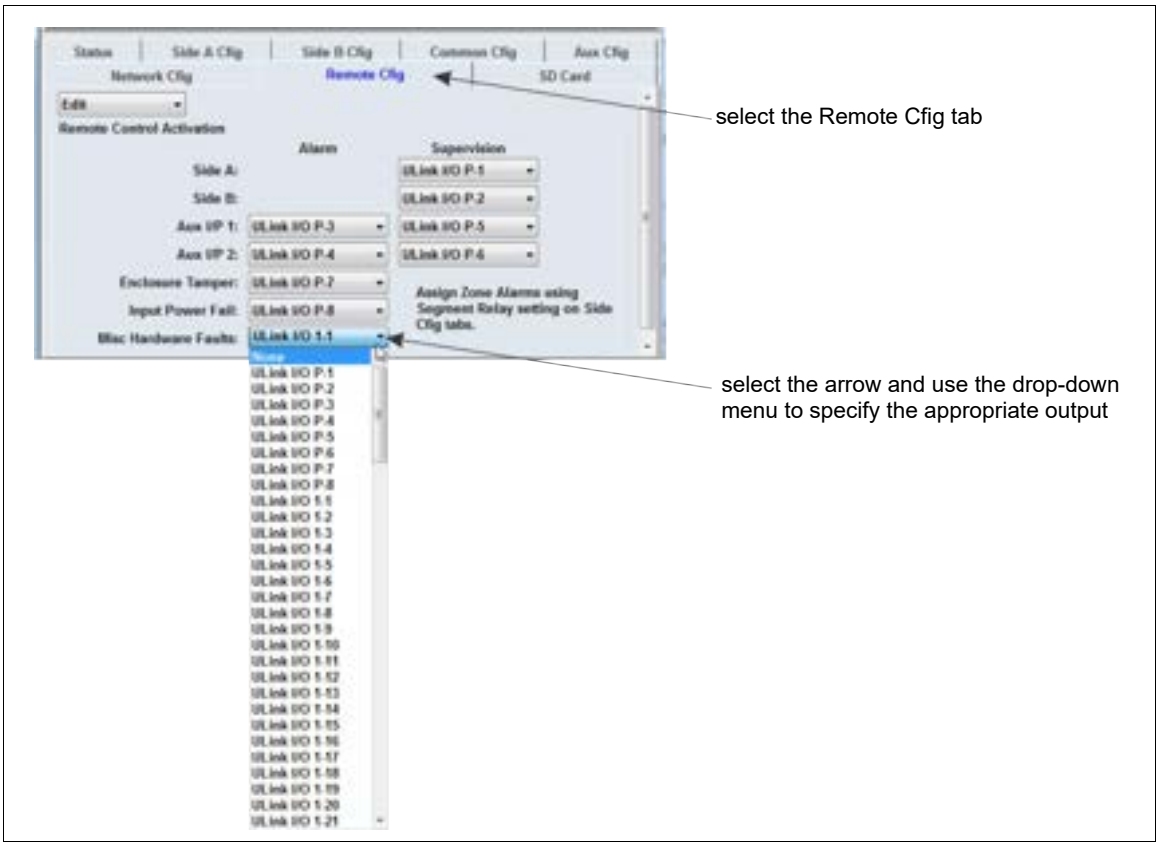


Figure 91: Setting up the Remote Configuration outputs

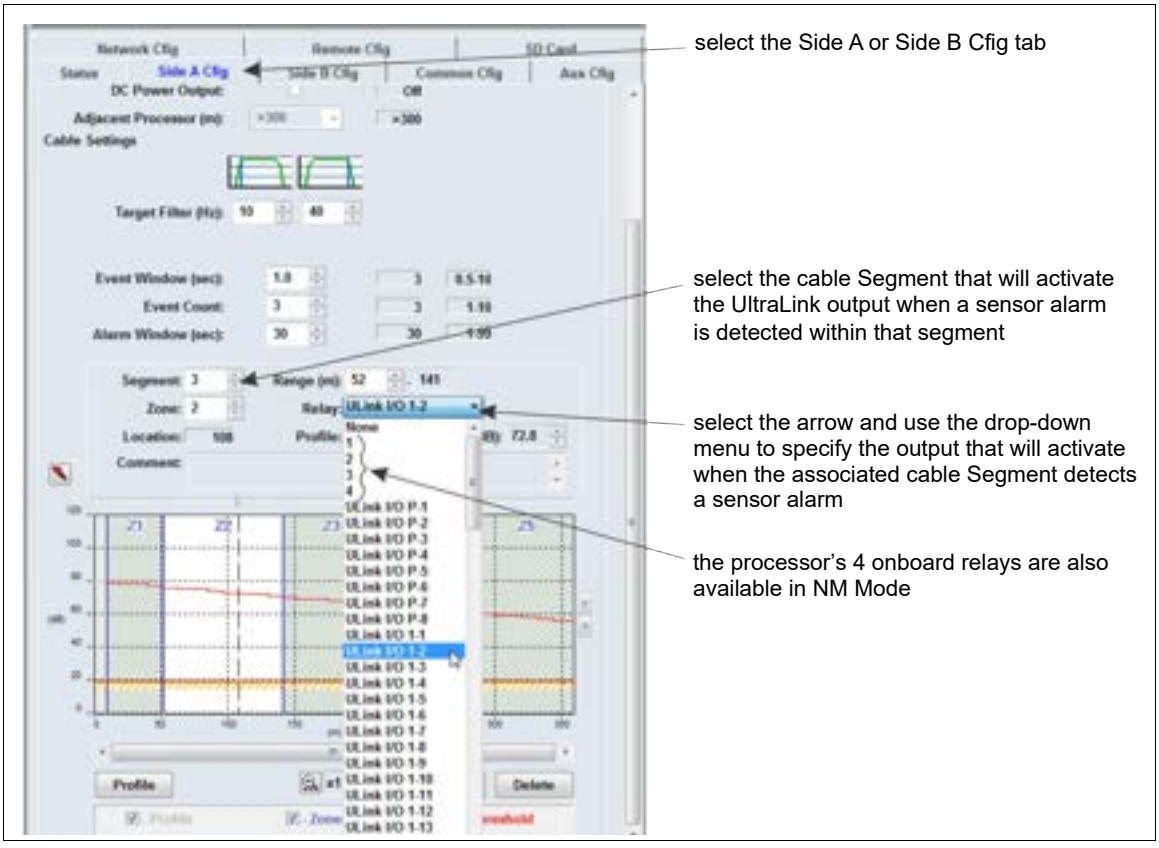


Figure 92: Selecting the UltraLink I/O outputs