Intelli-FIELD®

Electrostatic Field Detection System

Product Guide

C7DA0302-002, Rev E
Second Edition
March 8, 2006

Senstar Stellar

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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.

The Intelli-FIELD sensor system complies with the applicable EU standards for emissions and immunity.

CE

Senstar-Stellar Corporation's Quality Management System is ISO 9001:2000 registered.

Using this guide

This guide provides the information necessary to install, operate and maintain an Intelli-FIELD perimeter protection system.

Chapter 1 is a brief introduction to perimeter security as it relates to Intelli-FIELD. Chapter 2 provides an overview of the Intelli-FIELD system components. Chapter 3 provides site planning and system design information. Chapter 4 outlines the steps necessary for preparing a site for an Intelli-FIELD installation. Chapter 5 details the hardware component installation. Chapter 6 covers retrofitting Intelli-FIELD into existing E-Field installations. Chapter 7 describes the installation of the sensor wires. Chapter 8 outlines the interconnection and wiring of the system. Chapter 9 describes the configuration module. Chapter 10 explains system calibration. Chapter 11 describes the operation of the system. Chapter 12 provides routine maintenance information. Chapter 13 covers troubleshooting. Appendix A includes a list of Intelli-FIELD spare components. Appendix B includes a list of Intelli-FIELD hardware kits. Appendix C provides Intelli-FIELD specifications. Appendix D details the setup procedures for an Intelli-FIELD system that is connected to a StarNeT 1000 network. Appendix E covers the next generation hardware installation.

Figures

The figures contained in this document are for illustration purposes only, they may differ from the actual equipment. Throughout this document, 4-wire configurations have been used as examples.

Abbreviations

The following abbreviations are used throughout this guide:

- EDS - electrostatic field detection system
- FAR - false alarm rate
- NAR - nuisance alarm rate
- N.C. - normally closed
- N.O. - normally open
- PD - probability of detection
- RF - radio-frequency
- TB - terminal block

Service statement - We ensure that our products are correctly applied to achieve the maximum benefits for the end-user. We work hand-in-hand with our customers and remain accessible through all stages of a project - from concept to deployment to long-term support. We provide design assistance, site surveys, installation support, comprehensive documentation, training, post-installation annual calibration and maintenance visits, electronics and software extended warranty, on-site and temporary loaner sparing, rapid factory repair service and on-call/emergency service. Contact Senstar-Stellar at one of the locations listed on the back cover to inquire about how a package can be customized for your unique applications.

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1 Introduction

This section outlines the basic theory of operation of Intelli-FIELD along with its features and benefits.

What is Intelli-FIELD?

Intelli-FIELD is Senstar-Stellar Corporation's terrain-following, volumetric electrostatic field detection system (EDS). An Intelli-FIELD system consists of one or more of the following components: processor, isolation transformer, terminators, sensor wires (sense wires and field wires), non-sensitive coaxial cables, and mounting hardware. Depending on the site requirements, you can mount Intelli-FIELD sensor wires on existing fences, buildings, or as a free-standing system, (i.e., an area with no existing fence).

How Intelli-FIELD works

The Intelli-FIELD processor generates and sends a low frequency signal (9 KHz) through the field wires. This creates an electrostatic field that couples to the parallel sense wires. The sense wires carry the detection field signal back to the processor, for analysis.

When an object enters the electrostatic field, it changes the electrostatic field's characteristics. The sense wires detect the change, and carry the signal to the isolation transformer, which converts the signals and passes them to the processor for analysis. The processor generates an alarm if its detection algorithms interpret the signals as an intruder.

Intrusion detection

The Intelli-FIELD processor analyzes the electrostatic field's characteristics to determine the presence of an intruder. The primary characteristics include:

- the change in the signal strength, which relates to the mass of the intruder
- the rate of change of the signal strength, which relates to the intruder's movements
- the duration of the change, which relates to the time that the intruder is within the field

These factors, when present simultaneously in predetermined values, represent the "signature" of a human being and cause the processor to generate an alarm.

Adaptive signals

The Intelli-FIELD system responds to changes in the electrostatic field. However, it automatically adapts for a stationary object that remains in the field for a long period of time; for example, a vehicle that is parked close enough to disturb the field. An alarm is generated when the vehicle first enters the field, and again when it leaves. However, while the vehicle is parked, or remains stationary, the electrostatic field adjusts to the vehicle's presence and continues to provide undiminished perimeter protection.

Tamper protection

The Intelli-FIELD system provides tamper protection in two ways. The processor enclosure is equipped with a Hall-effect tamper switch, opening the enclosure causes a tamper alarm. In addition, a terminator is installed at the end of each pair of field and sense wires. The terminators provide a signal path that enables processor supervision of the sensor wires. Shorting, cutting, or grounding the sensor wire(s) causes an alarm.

System testing

A self-test input to the processor causes the system to output a small modulation from the field generator. This output mimics the signature of a human intruder and causes a sensor alarm. The self-test feature allows testing a portion of the system, without being physically present at the facility perimeter.

Detection Zones

Intelli-FIELD perimeters are laid out in zones of up to approximately 150 m (500 ft.) as required by the site. Using zones enables you to determine the location of intrusion alarms. A typical zone consists of:

- one processor (monitors 1 or 2 sensor zones) - contains the circuits for field generation, signal processing, tamper supervision, alarm output and power regulation (requires an external DC power source)
- one isolation transformer (1 per zone) - serves as the interface between the sensor wires and the signal processor, and provides lightning protection
- two terminators per zone (3-wire or 4-wire zones) - provides a signal path that is monitored by the processor to supervise the integrity of the sensor wires
- sensor wires - (2 sense wires and 1 field wire per 3-wire zone) (2 sense wires and 2 field wires per 4-wire zone) (3 sense wires and 3 field wires per 6-wire zone) (4 sense wires and 4 field wires per 8-wire zone) - forms the electrostatic detection field
- wire mounting hardware - for fence-mounted, free-standing, wall mounted, or roof-mounted configurations

Detection sensitivity

There are three adjustable parameters that enable you to set the Intelli-FIELD sensor's detection sensitivity to match your site-specific detection requirements:

- the alarm threshold
- the detection gain
- the field excitation voltage

The alarm threshold determines the signal strength at which a sensor alarm is declared. The detection gain boosts the signal from the sense wires before it is analyzed by the processor. The field excitation voltage adjusts the strength and size of the electrostatic detection field. The combination of these three detection parameters gives the Intelli-FIELD sensor the versatility to adapt to almost any environment and detection requirement.

Environmental noise filters

The Intelli-FIELD system includes three adjustable environmental noise filters, which the processor uses to differentiate between valid targets and environmental noise:

- the time constant
- the transition
- the slope threshold

The time constant is used to control severe environmental “clutter” that is caused by rain and wet conditions. The transition is used along with the time constant, to prevent alarms that are caused by environmental factors such as changes from bright sun, to cloud cover, to bright sun, etc. (rolling noise). The slope threshold is used to prevent alarms caused by the electrostatic detection field coupling to ground in wet conditions.

2 System hardware

This section details the Intelli-FIELD components, and includes a physical description of each component's features and function within the system.

Intelli-FIELD components

Processor

The Intelli-FIELD processor transmits the signals required to generate an electrostatic detection field around the sensor wires. The processor monitors changes in the field, and identifies disturbances that could signify an intruder.

Features

The Intelli-FIELD processor features:

- dual alarm zone coverage (protects 1 or 2 zones up to 150 m [500 ft.] each)
- digital electronics
- adjustable for terrain, climate, obstacles, environment, ground conditions
- automatic sense-input nulling, tuning, intrusion speed detection range
- adjustable detection sensitivity
- sensor wire supervision, power status, intrusion alarms, tamper alarms
- lightning and transient protection
- board-mounted BNC connectors
- 6 output relays for reporting intrusion and supervision alarms (Local Aux Control)
- for Intelli-FIELD systems that are connected to StarNeT 1000 systems, the 6 output relays can be controlled by the host computer, and there are two analog inputs that can be used for connecting auxiliary devices to the system

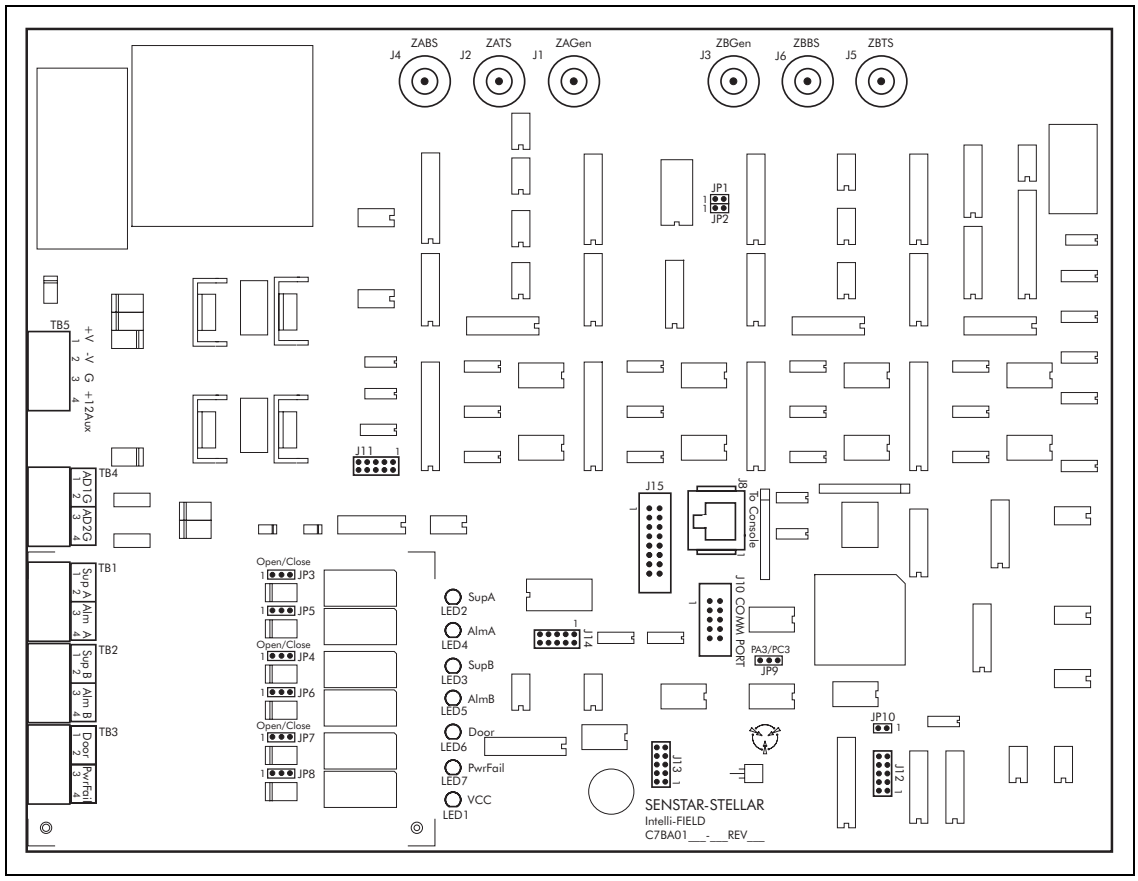


Figure 2-1 Intelli-FIELD processor card

There are no trim-pots to adjust on the Intelli-FIELD processor. All setup and processing parameters are digitally controlled.

The Intelli-FIELD processor includes six form A/B output relays for reporting alarm conditions: Zone A sensor alarm, Zone A sensor wire supervision alarm, Zone B sensor alarm, Zone B sensor wire supervision alarm, enclosure tamper alarm and power fail alarm. Each relay is user-selectable as normally open, or normally closed. The Intelli-FIELD processor generates an alarm signal, which energizes an alarm relay. This provides the means for an alarm reporting system to monitor the processor's alarm output.

For Intelli-FIELD systems that are connected to StarNeT 1000 systems, the six output relays can be used as outputs from the host computer, and the two analog inputs (ADG1, ADG2) can be used to connect auxiliary devices to the system.

If an alarm relay is used to activate an external relay, a diode (1N4001 or equivalent) should be installed across the external relay coil. The diode will suppress voltage spikes that could cause relay chatter and incorrect status reporting at the monitoring equipment.

Isolation transformer

The isolation transformer serves as the electrical interface between the sensor wires and the processor, and includes on-board lightning arrestors and EMI filters. Isolation transformers must be located at the start point of each sensor zone. Each Intelli-FIELD sensor zone requires one isolation transformer. A dual zone processor requires two isolation transformers.

Features

The isolation transformer features:

- NEMA-4 rated weatherproof enclosure
- lightning and transient protection
- screw-terminal blocks for wiring connections
- electrically isolates the signals from the sense wires (with respect to ground)
- jumper-selectable on-board EMI filters
- supervised by the processor

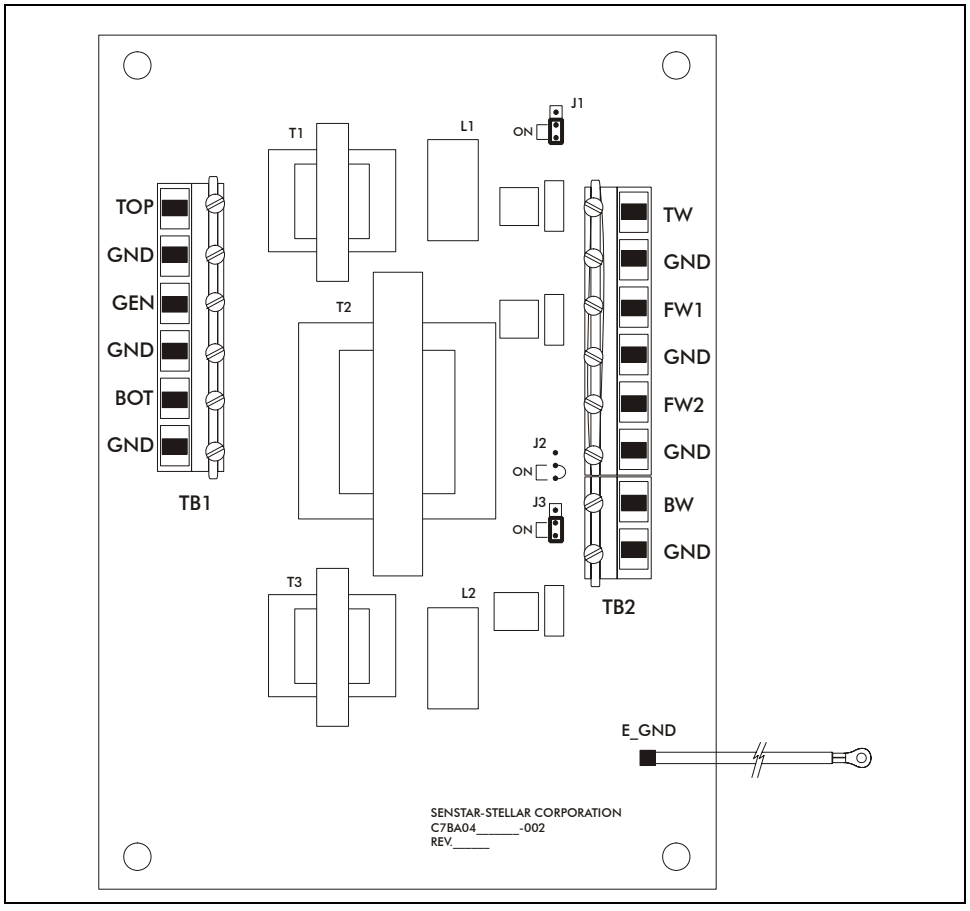


Figure 2-2 Isolation transformer card

Terminator

One terminator is required for each pair of Intelli-FIELD sensor wires (field and sense) a 4-wire system requires two terminators. A 3-wire system also requires two terminators: one between the top sense wire and the field wire, and one between the bottom sense wire and the field wire. The terminator provides a signal path that is monitored by the processor to supervise the integrity of the sensor wires. When the system is operational, shorting, cutting, or grounding any Intelli-FIELD sensor wire causes the processor to generate a tamper alarm. The terminator also enables processor supervision of the isolation transformer and coaxial cables.

Features

The terminator features:

- coaxial cables to connect to the Intelli-FIELD sensor wires
- ground wire
- capacitance matching for sensor wire pairs
- enables processor supervision of the sensor wires, isolation transformer and coaxial cables

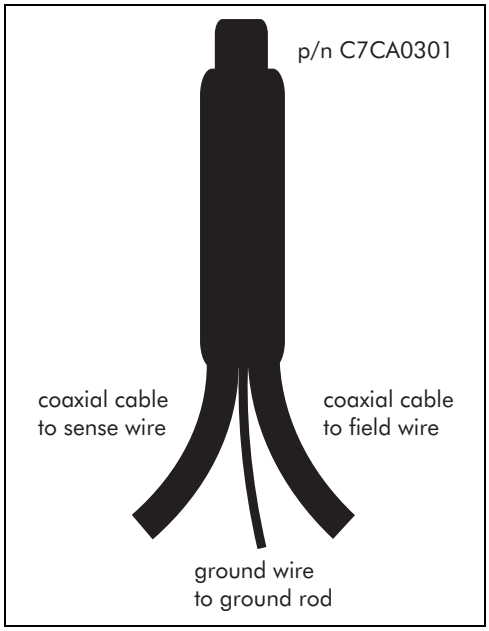


Figure 2-3 Terminator

Powering options

There are three options for powering the Intelli-FIELD system:

- 24 VDC network power supply
- 48 VDC network power supply
- 12 VDC local power supply

Senstar-Stellar has 24 VDC and 48 VDC power distribution systems available for Intelli-FIELD installations.

Coaxial cable

The Intelli-FIELD system uses RG-59 mini coaxial cable to interface between the processor and the isolation transformer, and between the isolation transformer and the sensor wires. The coax provides non-sensitive links by carrying the Intelli-FIELD signals without creating the electrostatic detection field. The coaxial cables are supervised by the processor in the same manner as the sensor wires.

The coaxial cables connecting the processor and the isolation transformer are fitted with BNC connectors at the processor end, only. At the isolation transformer, the coaxial connections are made on screw-terminal blocks. At the start point of the sensor zone, the coaxial cable center conductor is splice-connected to the Intelli-FIELD sensor wire.

Fence-mounting hardware

Fence-mounting hardware is used to install the Intelli-FIELD sensor wires on an existing fence. The mounting brackets can be installed on either side of the fence post (i.e., on the same side as the fence fabric, or on the opposite side). Mounting brackets are generally installed towards the direction of the potential threat.

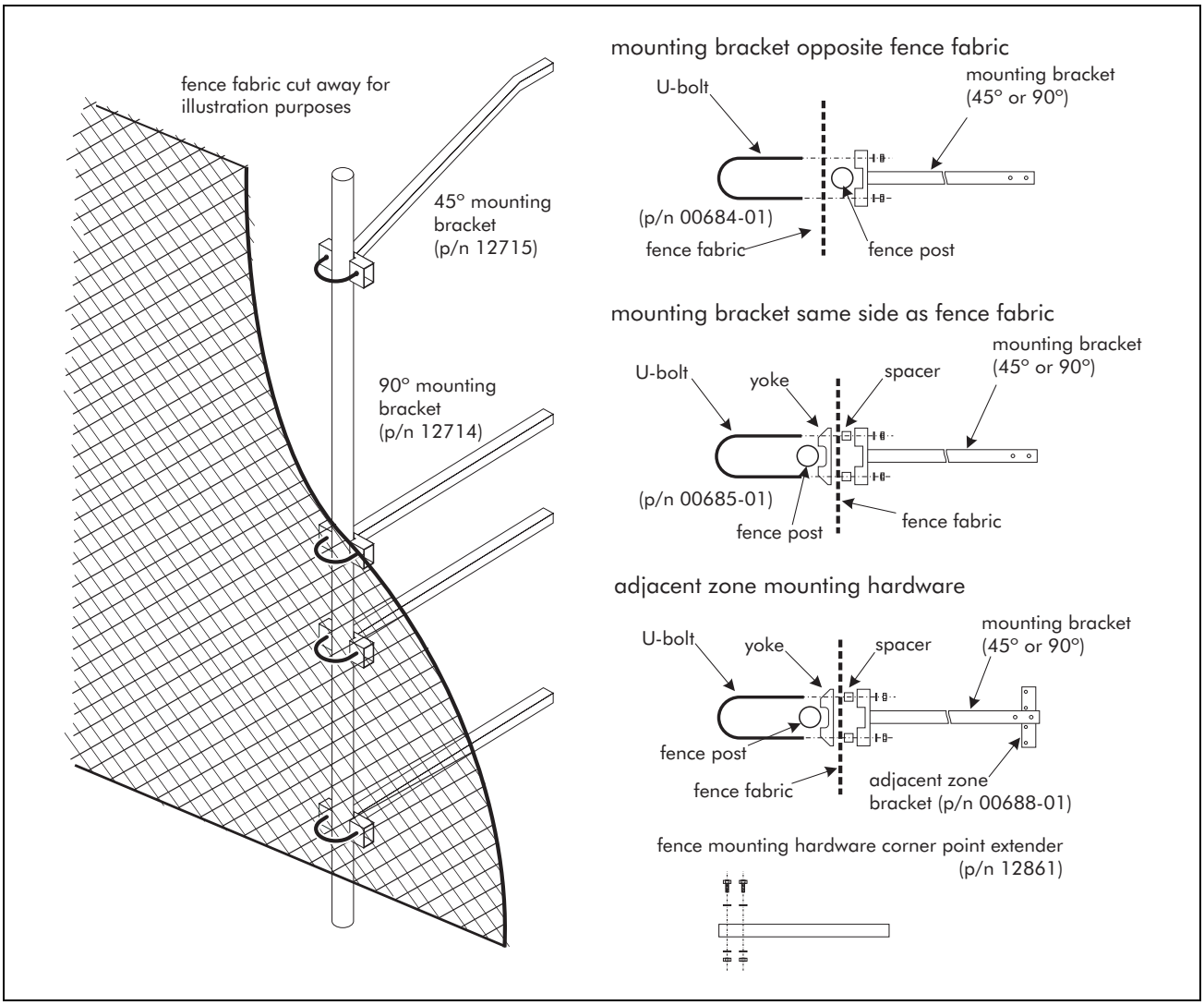


Figure 2-4 Fence-mounting hardware, 4-wire

The basic components of a 4-wire fence mounted hardware kit include:

- one 45° mounting bracket - installed at the top location on the fence post
- three 90° mounting brackets - installed at specific intervals on the fence post
- four U-bolts - with nuts and washers to secure the brackets to the fence post (the U-bolts fit a maximum 7.6 cm (3 in.) O.D. fence post)

The maximum outside diameter (O.D.) of a fence post, or a free-standing mounting post, for an Intelli-FIELD installation is 7.6 cm (3 in.).

Additional components for 4-wire fence mounted hardware kits include:

- four yokes and spacers - for applications where the mounting brackets are on the same side of the fence post as the fence fabric

- adjacent zone brackets - for applications where 2 zones meet physically (Adjacent zones can be start point to start point, start point to end point, or end point to end point.)
- corner point extender - to maintain even spacing between the sensor wire and the fence fabric at corners

Free-standing hardware

Free-standing hardware is used to install the Intelli-FIELD sensor wires along-side, but not attached to, an existing fence; where there is no fence; or on rooftops. In a free-standing installation, galvanized steel fence posts are installed and the free-standing hardware is mounted on the fence posts. For rooftop installations, the fence posts must be securely fastened to the roof. Free-standing fence posts are supplied by the installer.

Free-standing fence posts must be capable of supporting the sensor wires and withstanding the Intelli-FIELD tensioning requirement of 16 kg (35 lbs.) per wire.

Roof-mounted fence posts must be securely anchored to the roof.

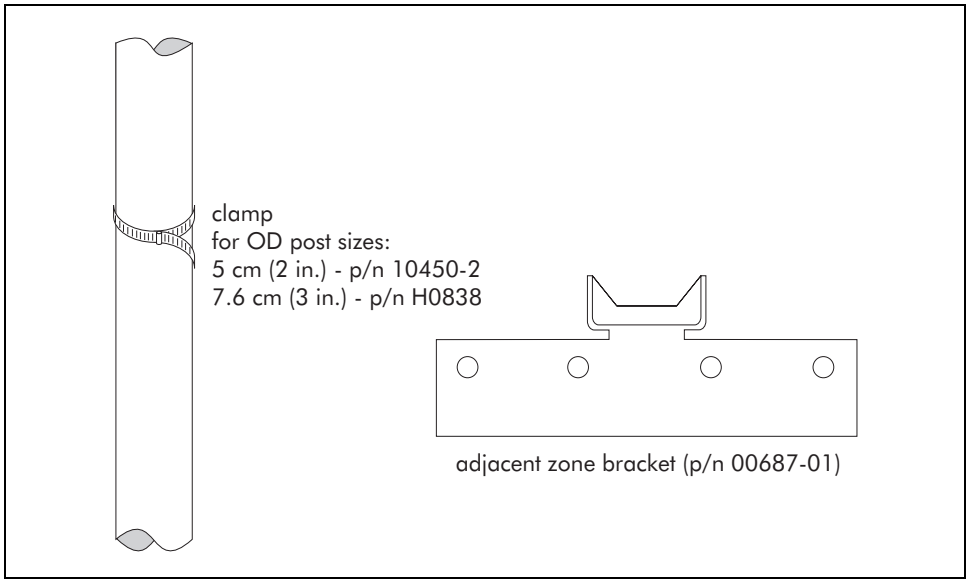


Figure 2-5 Free-standing hardware

The basic components of a four-wire free-standing hardware kit are:

- four post clamps - to secure the insulators to the fence post

Additional components for four-wire free-standing hardware kits include:

- adjacent zone brackets - for applications where 2 zones meet (Adjacent zones can be start point to start point, start point to end point, or end point to end point.)

Vertical wall-mounting hardware

Vertical wall-mounting hardware is used to install the Intelli-FIELD sensor wires in a vertical orientation on the side of a building or structure. Vertical wall-mounting hardware is used with standard cable mounting hardware and offset links.

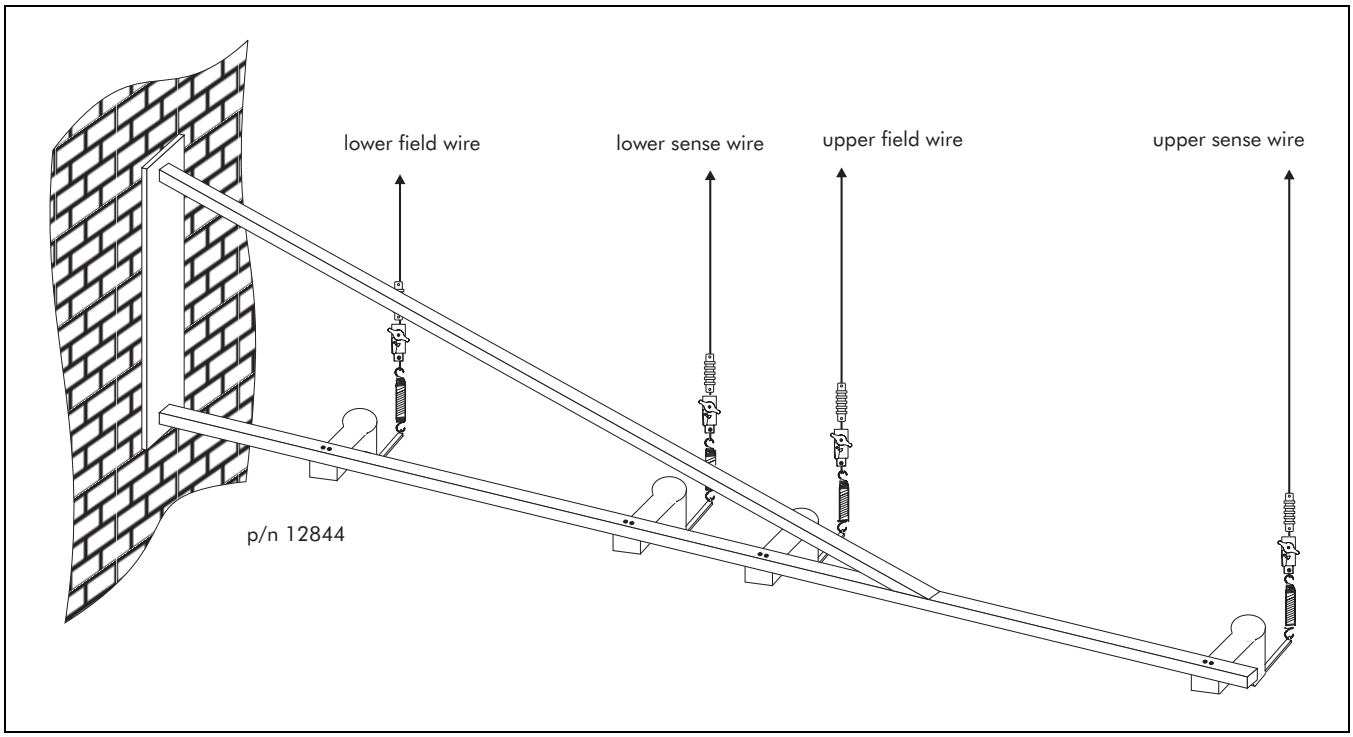


Figure 2-6 Wall-mounting bracket

The basic components of a vertical wall-mounting hardware kit are:

- four-wire wall-mount bracket - to secure the insulators to the structure
- four offset links - to connect the sensor wires to the tension insulators

3-wire wall-topper 45° horizontal mounting bracket

The 3-wire wall-topper mounting hardware is used to install the Intelli-FIELD sensor wires in a horizontal orientation on the side of a building, or structure. The 3-wire hardware is generally mounted at the top of a wall. However, it can be mounted at any level on the side of a building. 3-wire mounting hardware is used with standard cable mounting hardware.

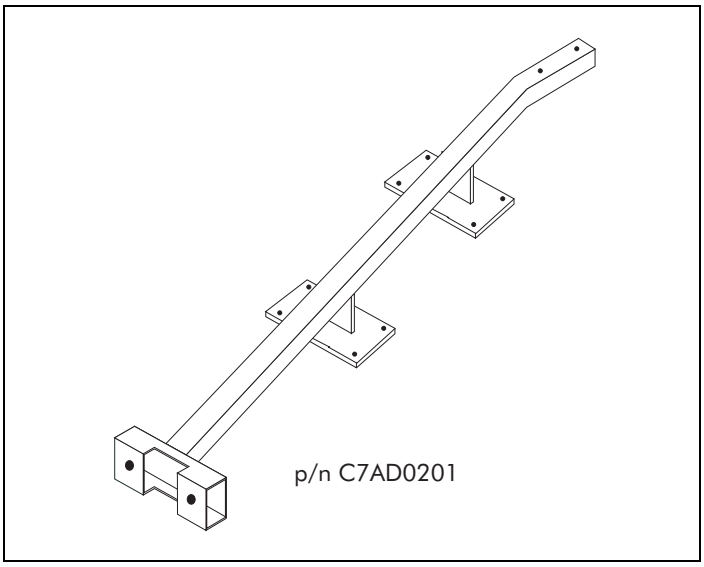


Figure 2-7 3-wire wall-topper bracket

90º outside corner mounting bracket

The 90º outside corner mounting bracket is used to install the Intelli-FIELD sensor wires around the corner of a building, or structure. One bracket is required for each sensor wire in your system, i.e., a 4-wire system requires four 90º mounting brackets.

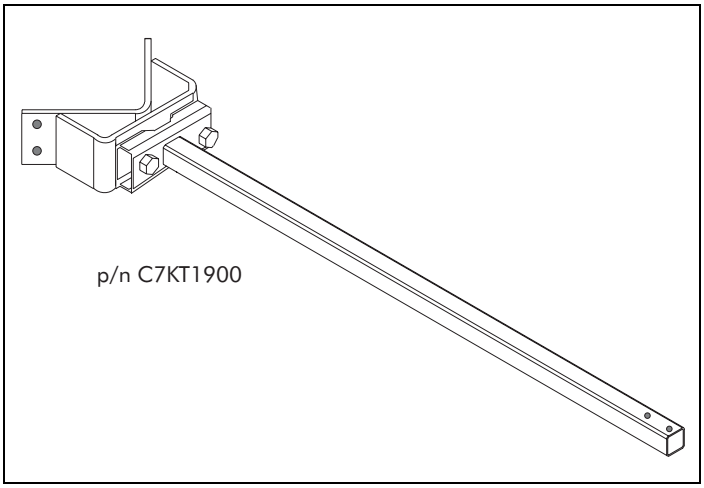


Figure 2-8 90º outside corner mounting bracket

Cable mounting hardware

Cable mounting hardware is used for all Intelli-FIELD configurations. It secures the Intelli-FIELD sensor wires to mounting brackets, or to free-standing fence posts. Cable mounting hardware tensions and supports the sensor wires throughout the zone. The cable mounting hardware isolates the sensor wires from the fence posts, with respect to ground.

There are two types of insulators available for the Intelli-FIELD system. Standard insulators and powder coated insulators. The powder coated insulators are designed for use in harsh weather environments. They provide increased protection from environmental contamination such as salt water spray, wind blown sand, dust, dirt, etc.

The splice-connection kit is used to connect the sensor wires to coaxial cables at the start and end points of the zone. It is also used to splice-connect adjacent sections of sensor wire, for repair.

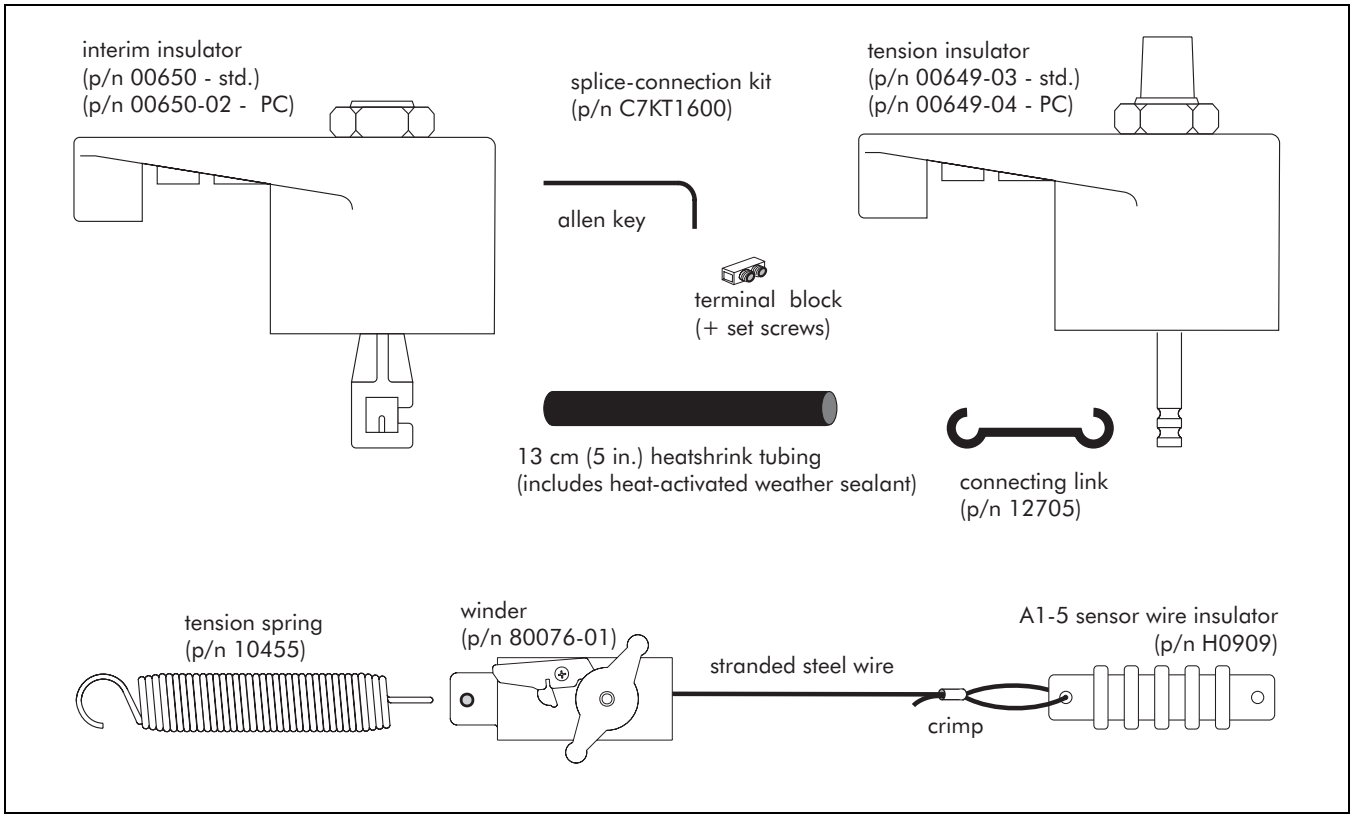


Figure 2-9 Cable mounting hardware

The cable mounting hardware components include:

- interim insulator - located along the cable at 6 m (20 ft.) intervals (The sensor wire is run through, and secured by, the carrier lock.)
- tension insulator - located at start, tension, corner and end points of a zone (Used with the connecting link, tension spring and winder to apply tension at both ends of a long sensor zone, or a non-linear sensor zone. Used as an anchoring point to secure the sensor wire at the end of a sensor zone of 15 m (50 ft.) or less.)
- connecting link - installed at the bottom of the tension insulator (Connects the tension spring and winder/insulator assembly to the tension insulator.)

- tension spring - used with the winder to tension the sensor wires
- winder/A1-5 sensor wire insulator assembly - used with the tension spring to tension the sensor wires, and to isolate the sensor wire from the tensioning hardware (assembly includes 0.5 m stranded steel wire and two crimps, which connect the winder and the A1-5 insulator)
- splice-connector - used to splice-connect sensor wire to coaxial cable, and adjacent sections of sensor wire (for repair)

Processor kit

The processor kit includes either a single or dual zone Intelli-FIELD processor, a mounting plate and a NEMA-4 rated weatherproof enclosure. The processor is shipped mounted in the enclosure. The single zone processor kit includes a loop back cable that is installed on the unused zone connectors. Each processor requires a frequency generating crystal (ordered separately).

Isolation transformer kit

The isolation transformer kit includes an isolation transformer card mounted in a NEMA-4 rated weatherproof enclosure. One isolation transformer kit is required for each Intelli-FIELD sensor zone.

Hardware kits

The hardware kits are derived from the components described in the Cable mounting hardware section. All Intelli-FIELD configurations require a start point and an end point. Depending on the site requirements, a combination of interim, corner, tension, and start/end, end/end and start/start adjacent points may also be required. A specific hardware kit is available for each possible point of the various Intelli-FIELD configurations. Single wire hardware kits are also available for use with additional field wires, or as replacement/spare components. Refer to *Appendix b Hardware kits* for the available hardware kits.

Start/tension point kit

The start point (SP) hardware kit secures the sensor wires to the support posts at the beginning (start point) of the zone. The SP kit includes mounting hardware, brackets, tension insulators, and springs and winders to provide the initial wire tensioning for the zone. It is installed at the beginning of the zone close to the isolation transformer. Zones that are longer than 15 m (50 ft.) and non-linear zones should use tensioning hardware at both the start point and the end point of the zone, to apply tension from both directions.

One start point kit is required for each zone.

The tension point (TP) kit is used to maintain correct wire tension in long zones, and in zones that have sharp changes in direction. Tension points should be located every 50 m (164 ft.) throughout the zone. At tension points, tension is applied to the sensor wires in both directions. The sensor wire is not splice-connected at tension points.

Tension insulators can be used as corner points (no tensioning hardware required) where the zone changes direction by more than 20º horizontally.

TP kits include the same components as SP kits. The number of tension point kits required depends on the configuration of the zone and site requirements.

There is a specific start/tension point kit for each Intelli-FIELD configuration. The following figure illustrates the components of a 4-wire fence-mounted start/tension point kit with the fence fabric on the opposite side of the post. Refer to *Appendix b Hardware kits* for the available hardware kits.

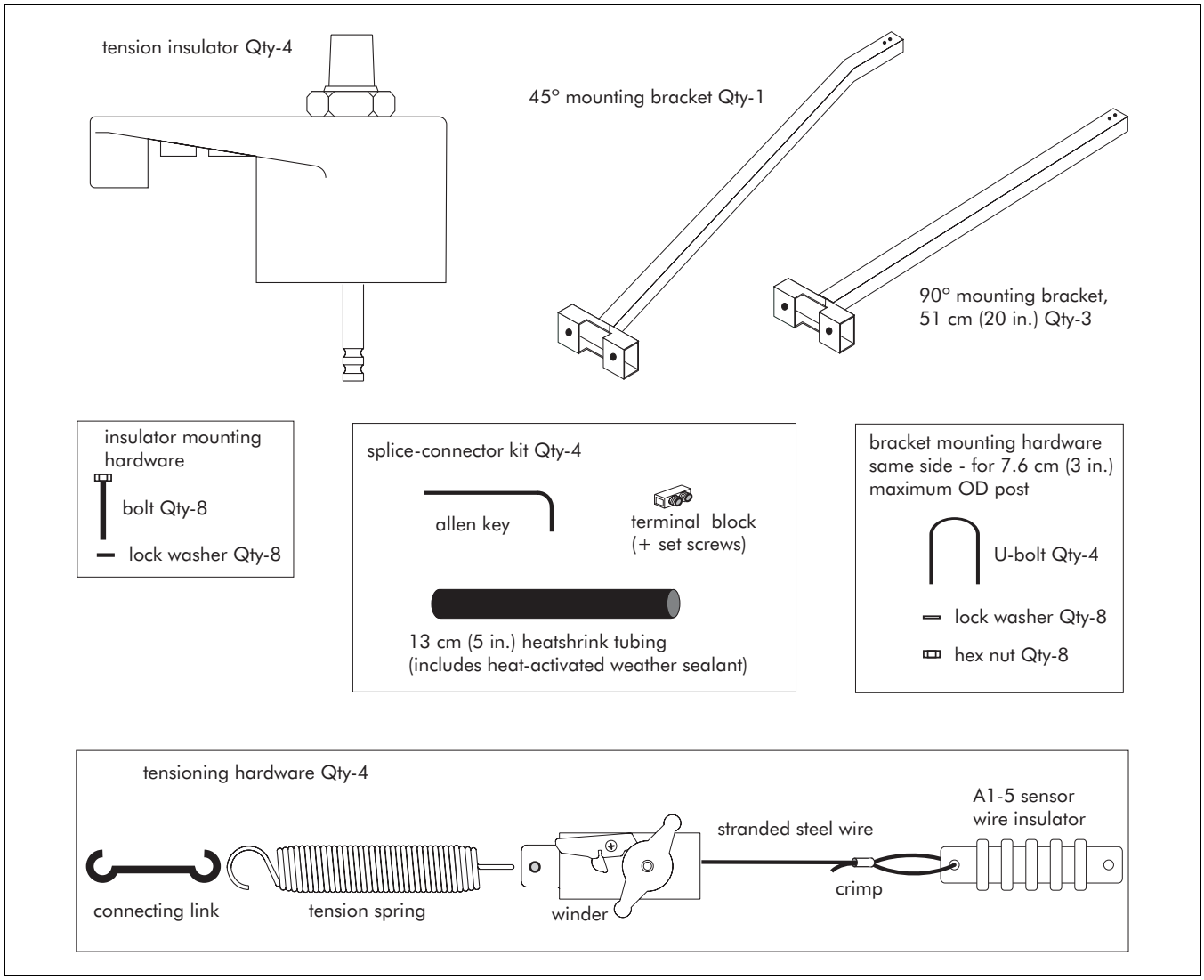


Figure 2-10 Four-wire fence-mounted start/tension point hardware kit (fence fabric opposite side)

Vertical corner point kits

The Intelli-FIELD system requires vertical corner points at locations where there is a change in elevation (vertical direction) greater than 20º. The number of vertical corner point kits required depends on the configuration of the zone.

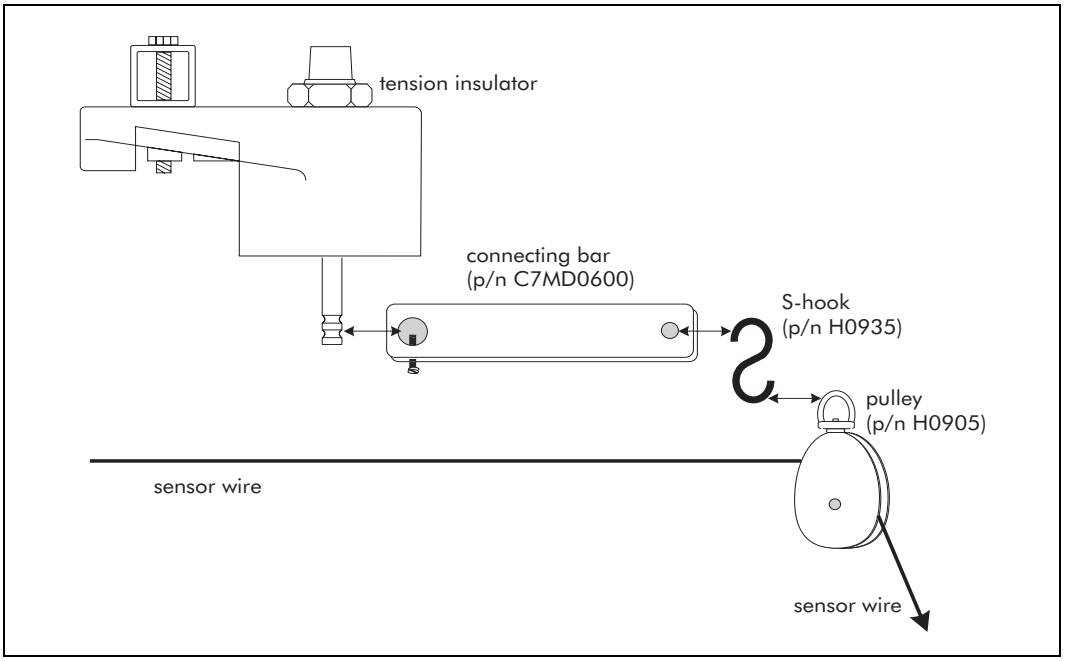


Figure 2-11 Corner point hardware kit

Horizontal corner points

The Intelli-FIELD system requires horizontal corner points at locations where there is a change in horizontal direction, greater than 20º. At horizontal corner points tension insulators are used without tensioning hardware to allow the sensor wire to follow sharp changes in direction. Regular tension points, with tensioning hardware, can also be used as corner points (both horizontal and vertical). In a fence-mounted installation, corner point extenders should be used at horizontal corner points, to maintain consistent spacing between the sensor wires and the fence fabric.

The number of corner points required and the types of corner points that will best suit your application depend on site-specific environmental factors. Contact Senstar-Stellar Customer Service for additional information about Intelli-FIELD corner points.

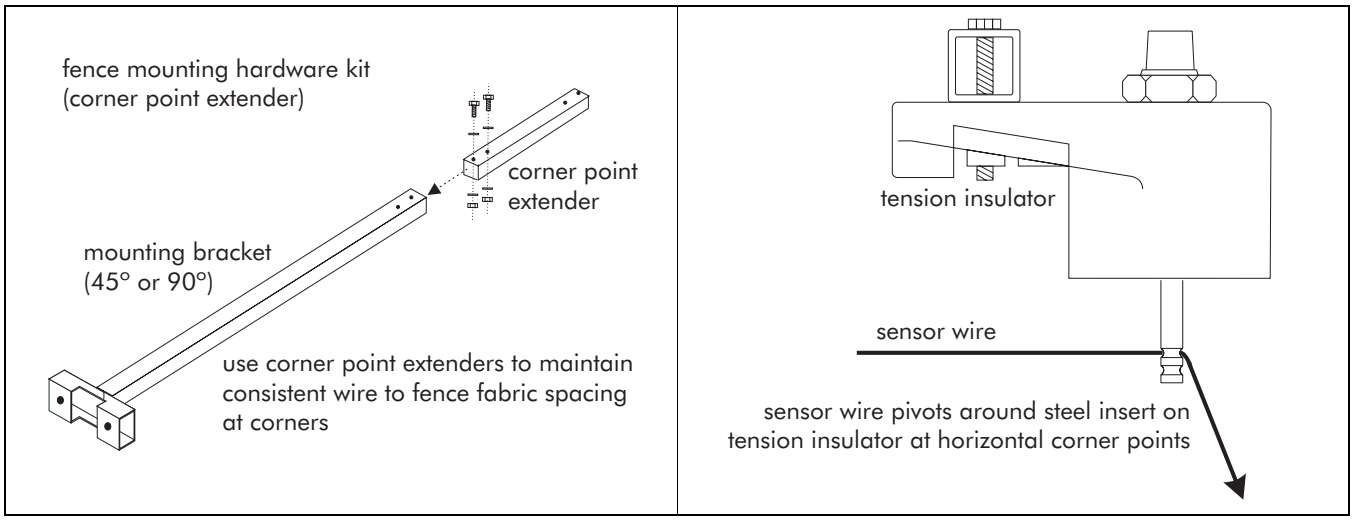


Figure 2-12 Horizontal corner point hardware

End point kit

The end point (EP) hardware kit secures the sensor wires to the support posts at the end of a zone. For zones that are longer than 15 m (50 ft.) and for non-linear zones, tensioning hardware must be used at the end point of the zone to ensure uniform wire tension. One end point kit is required for each 4-wire zone.

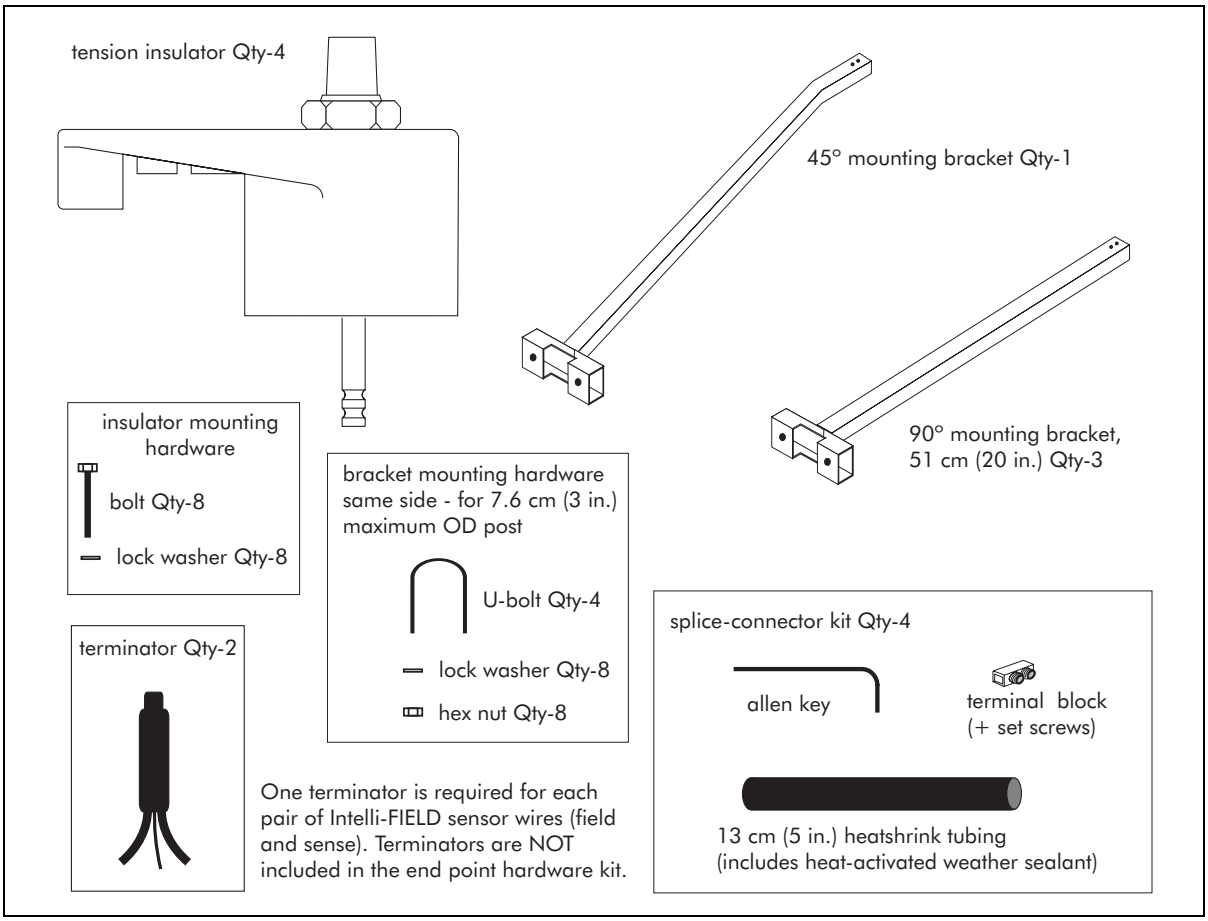


Figure 2-13 Four-wire fence-mounted end point hardware kit (fence fabric opposite side)

Interim point kit

Interim points (IP) support the sensor wires without applying tension at 6 m (20 ft.) intervals throughout the zone in typical environmental conditions. Under severe conditions (i.e., strong winds, heavy snow or ice) the interim point spacing should be reduced to 3 m (10 ft.). Interim points should be installed at points where the horizontal or vertical direction changes less than 20°. These additional interim points allow the Intelli-FIELD sensor wires to follow a non-linear perimeter and to maintain consistent ground to wire spacing over hills and depressions.

Interim point kits include interim insulators and mounting hardware.

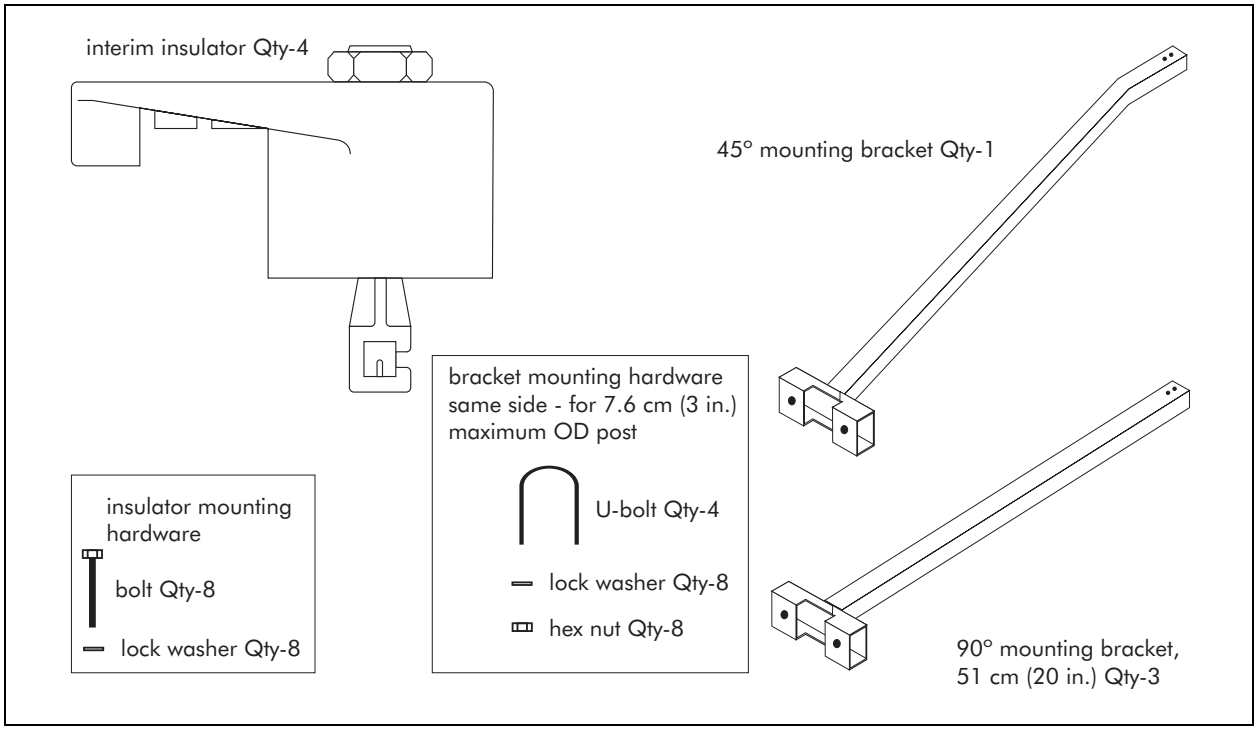


Figure 2-14 Four-wire fence-mounted interim point hardware kit (fence fabric opposite side)

The number of interim point kits required depends on the length of the zone and the environmental conditions.

Adjacent zone kits

Adjacent zone (AZ) kits are used where two Intelli-FIELD zones physically meet. The possible configurations include start point to start point; start point to end point; and end point to end point. Adjacent zone kits include adjacent zone brackets and the hardware kits required for the specific configuration.

The number of adjacent zone kits required depends on the configuration of the Intelli-FIELD system.

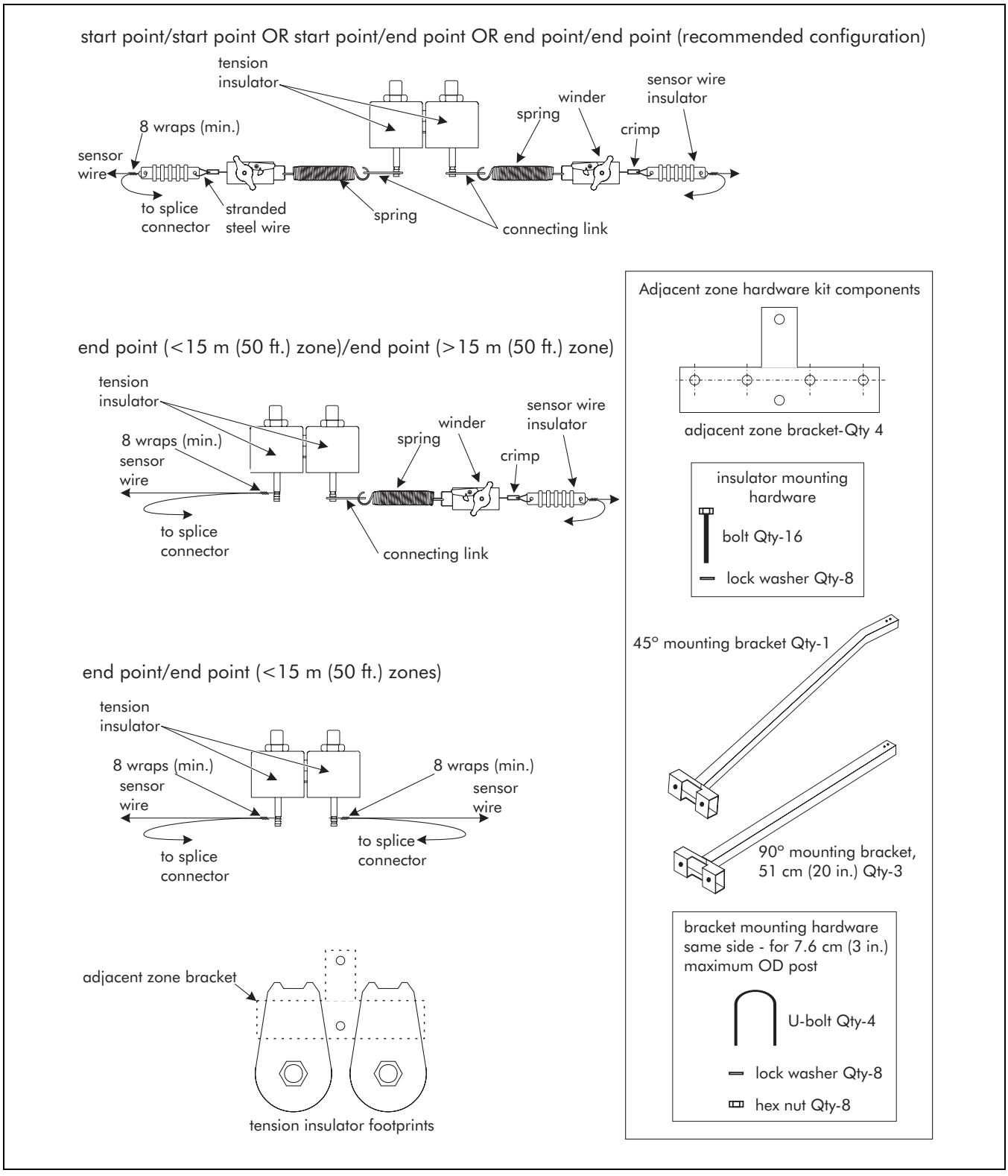


Figure 2-15 Four-wire fence-mounted adjacent zone hardware kits (fence fabric opposite side)

One adjacent zone kit is required at points where two Intelli-FIELD zones physically meet.

3 Site planning & design

This section details the procedures required to plan and design an Intelli-FIELD system. Designing an Intelli-FIELD system is a three step procedure, beginning with a detailed site survey. The second step is the selection of the Intelli-FIELD configurations that are required by the site. Finally, comes the system design.

- site survey/analysis - obstacles, terrain, environmental factors, etc.
- configurations - fence-mounted, free-standing, roof-mounted, wall-mounted
- system design - perimeter layout, equipment requirements, powering requirements, equipment location

Site survey

Conduct a site survey before ordering or installing any system hardware to verify that site conditions are suitable for an Intelli-FIELD system. Ensure that potential mounting posts and surfaces comply with established standards for stability. If the Intelli-FIELD will be used in conjunction with a fence, the fence must meet the minimum standards (see *Fence specifications* on page 4-3) and each fence post must be connected to a common ground. The ground over which the system will be installed must provide an adequate ground reference (soil conductivity). Include accurate measurements on a scale diagram, or CAD drawing, of the site.

The maximum separation between support posts for an Intelli-FIELD installation is 6 m (20 ft.). Under severe weather conditions (strong wind, heavy snow or ice) reduce the post spacing to 3 m (10 ft.)

The maximum outside diameter (O.D.) of a start, end or tensioning post for an Intelli-FIELD installation is 7.6 cm (3 in.). The maximum O.D. for an interim post is 6 cm (2 3/8 in.).

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

- location of existing structures (fences, gates, buildings, roads, paths, etc.)
- location of obstacles (trees, vegetation, large rocks, etc.)
- location of soil types with low conductivity (shale, rocky soil, sand, gravel, and other natural soil types with little or no organic content) Typically, an area of low conductivty soil is devoid of vegetation, as few plants grow under such conditions. If any vegetation is present, it is sparse and loosely rooted.
- location of changes in terrain or elevation (include angle of inclination)
- location of areas that are exposed to severe environmental conditions
- location of existing power sources

Configurations

Intelli-FIELD system configurations are adaptable to a wide range of site requirements. A basic system can consist of a single zone processor and a four-wire fence-mounted sensor. A complex system might include numerous dual zone processors, an assortment of sensor mounting options and a Crossfire™ communication network connected to a StarNeT 1000™ centralized control and maintenance facility.

Follow the wire spacing guidelines provided in the configuration illustrations. Contact Senstar-Stellar Customer Service if special circumstances dictate alternate wire spacing requirements.

Fence-mounted

Fence-mounted Intelli-FIELD configurations can be installed on existing perimeter fence posts, providing the fence meets the minimum fence requirements (see *Fence specifications* on page 4-3).

The maximum outside diameter of a tensioning post used for an Intelli-FIELD installation is 7.6 cm (3 in.).

The hardware can be mounted on any sound existing fence that meets the following requirements:

- the fence is strong enough to support the hardware at 16 kg (35 lb.) tension, per wire (A 4-wire system puts 64 kg (140 lb.) of tension on the start and end posts.)
- the maximum separation between fence posts is 6 m (20 ft.)
- the O.D. of each tensioning post is 7.6 cm (3 in.) or less
- the O.D. of each interim post is 6 cm (2 3/8 in.) or less
- the fence fabric is securely fastened and reasonably taut
- the fence posts are firmly set and plumb

See Fences on page 4-2 for detailed fence specifications.

All fence posts within each zone MUST be connected to a common ground.

A fence-mounted configuration provides electronic protection against climb-over, crawl-under, and cut-through intrusion attempts. The fence fabric serves as a shield to prevent alarms from being generated by movement of personnel or vehicles on the side of the fence opposite the Intelli-FIELD sensor wires.

The mounting brackets can be installed on the same side of the fence posts as the fence fabric, or on the opposite side.

Four-wire fence-mounted

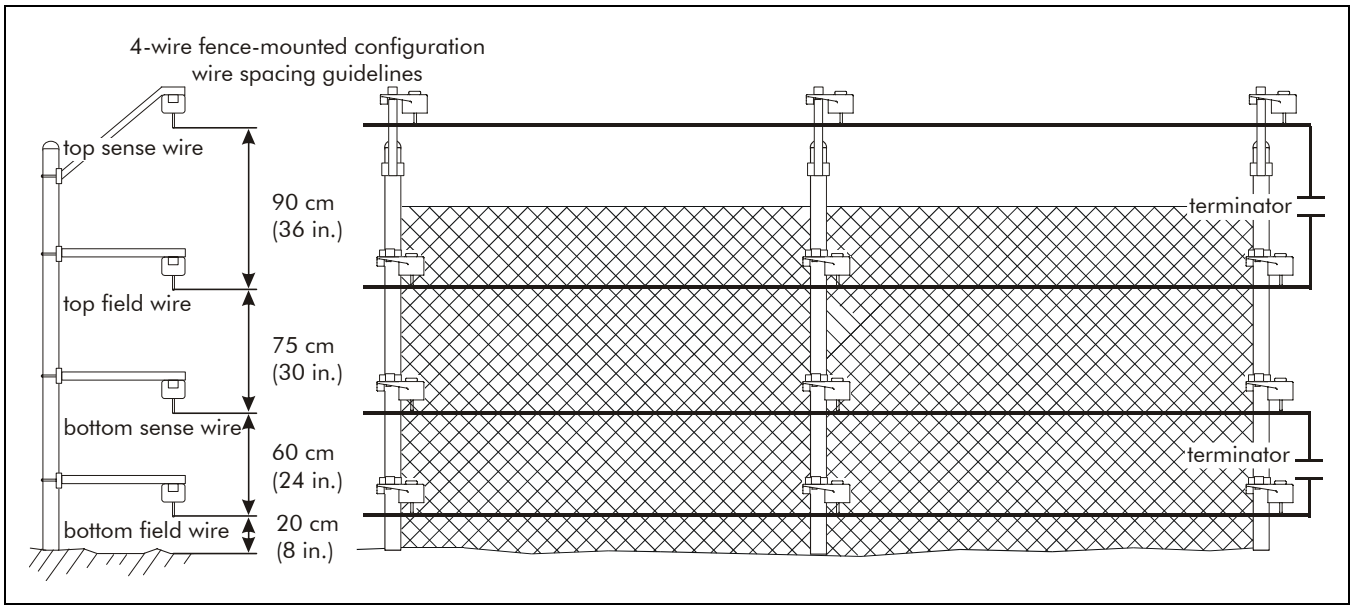


Figure 3-1 Four-wire fence-mounted configuration

The four-wire fence-mounted configuration uses 2 pairs of sensor wires (each pair includes a field wire and a sense wire) with specific wire spacing (see Figure 3-1). This configuration places the top sense wire approximately 2.4 m (8 ft.) above ground level. It is possible to reduce the vertical wire spacing in a 4-wire configuration. Contact Senstar-Stellar Customer Service for additional details.

Two terminators are installed at the end point of each four-wire sensor zone; one between each pair of field and sense wires.

Four-wire fence-mounted (bottom wire inset application)

The bottom wire inset application is a special Intelli-FIELD configuration used for fence-mounted configurations that are installed at the edge of an abutment or structure. In this application, the bottom wire is mounted on a 23 cm (9 in.) long inset bracket to prevent crawl under intrusion attempts. All other wires are mounted in the standard 4-wire fence mounted configuration.

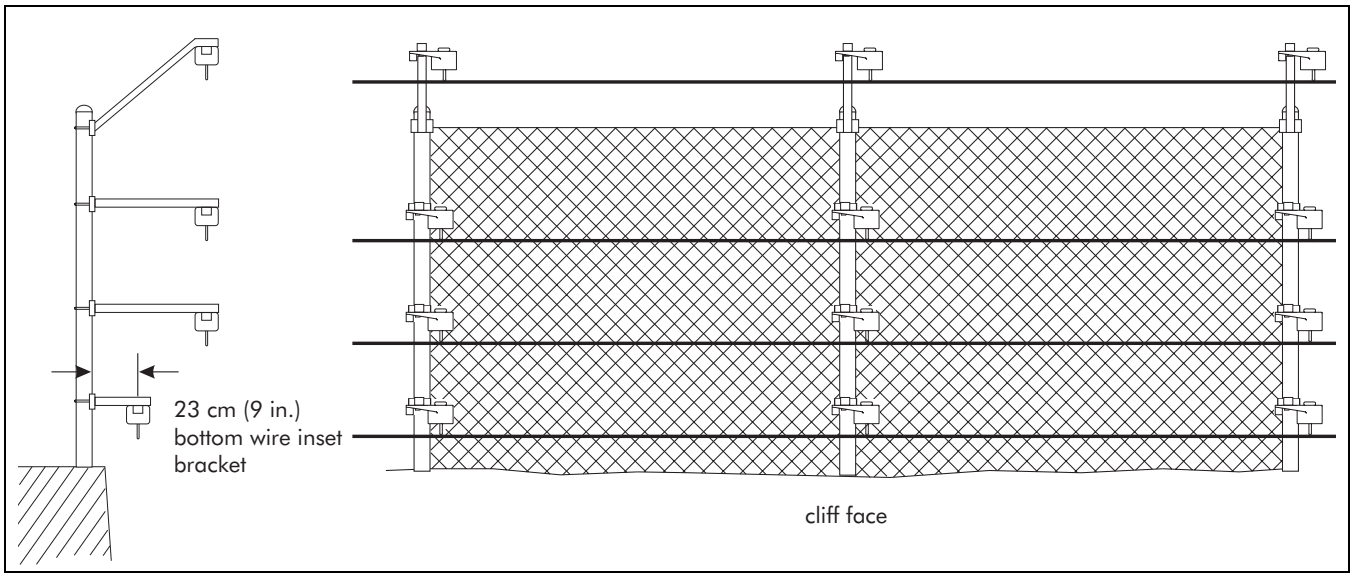


Figure 3-2 Four-wire fence-mounted bottom wire inset configuration

Six-wire fence-mounted

The six-wire fence-mounted configuration places the top sense wire at more than 4 m (14 ft.) above the ground. In the six-wire configuration, the top field and sense wires are wired in parallel from the isolation transformer, to create an additional wire pair (field and sense)(see Figure 3-3).

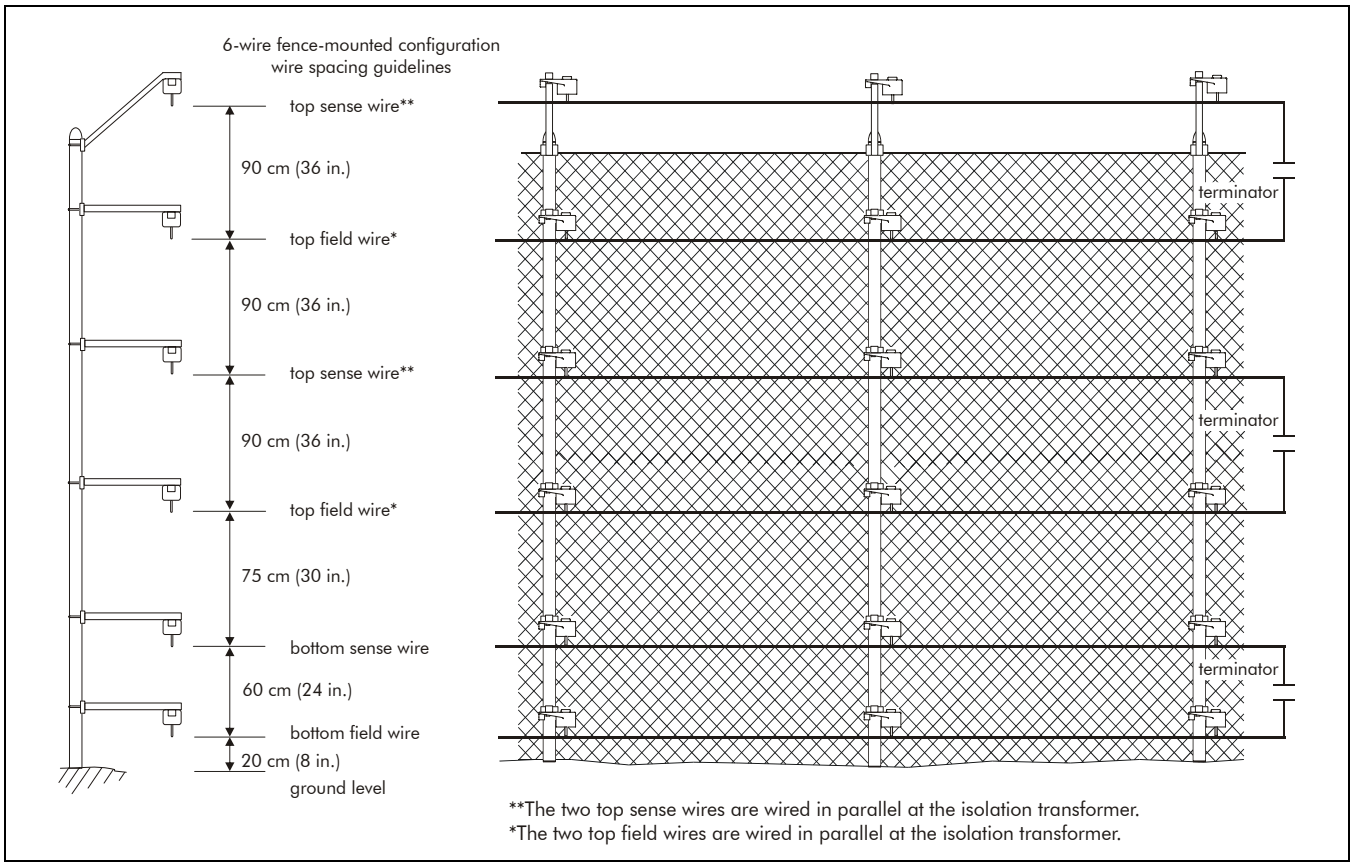


Figure 3-3 Six-wire fence-mounted configuration

Eight-wire fence-mounted

The 8-wire fence-mounted configuration uses both sides of a dual zone processor, effectively stacking two four wire configurations. The upper section top sense wire is located up to 6 m (20 ft.) above the ground, making this configuration suitable for the fences used in high-security applications such as correctional facilities.

One dual-zone processor and two isolation transformers are required for a single 8-wire zone. One zone is used on the lower half of the fence (lower section) and the second zone is used on the upper half (upper section). Four terminators are required, one between each pair of field and sense wires. Contact Senstar-Stellar Customer Service for more information about the 8-wire fence-mounted configuration.

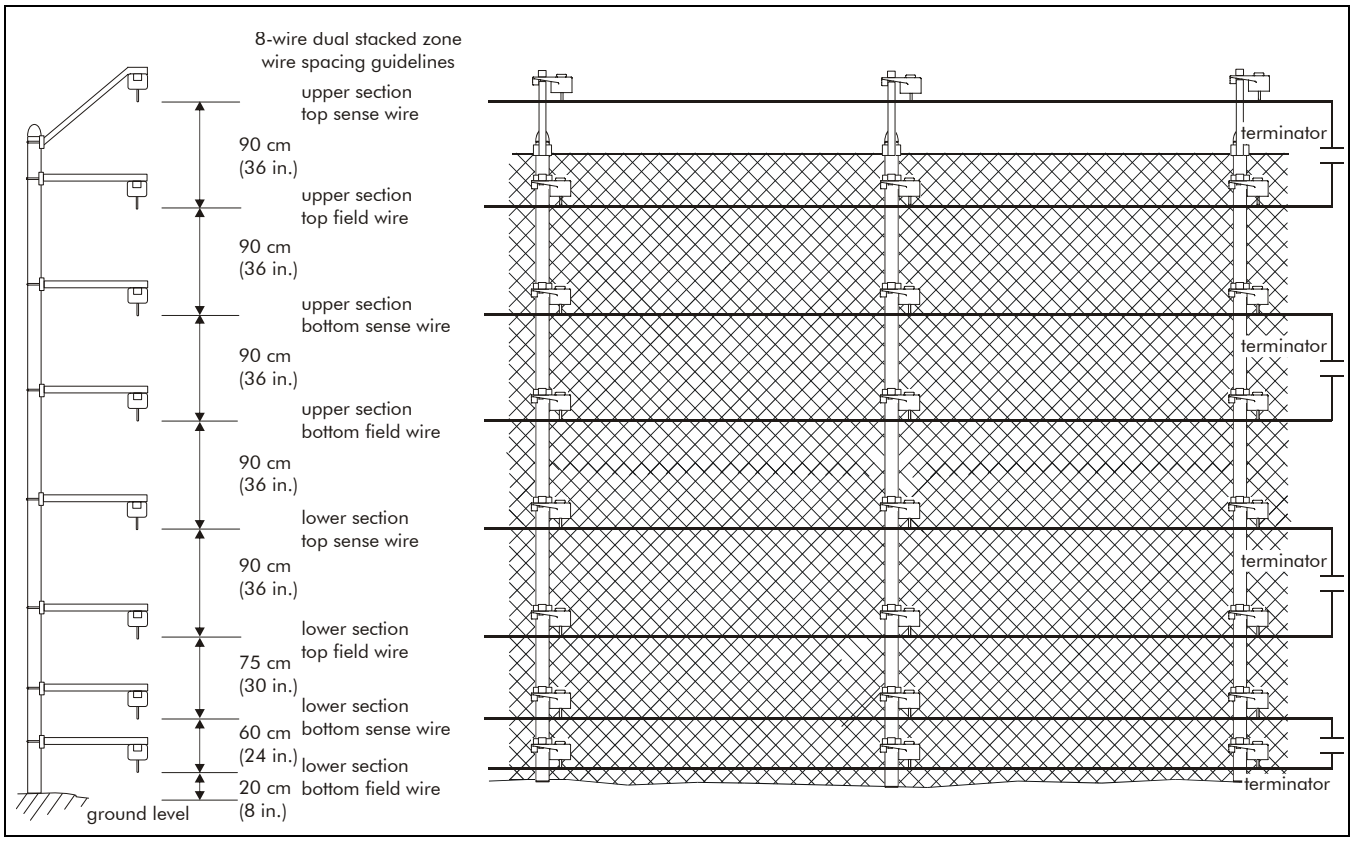


Figure 3-4 Eight-wire fence-mounted configuration (stacked dual zone)

Free-standing

Free-standing configurations use cable supporting hardware mounted on galvanized steel posts. They are well suited for the protection of unfenced areas within a controlled perimeter, and for use in conjunction with single or parallel security barriers. Free-standing configurations are an excellent defence against bridging attempts.

The maximum O.D. of a free-standing tensioning mounting post is 7.6 cm (3 in.) (max. 6 cm [2 3/8 in.] for interim posts).

All free-standing mounting posts within each zone must be connected to a common ground.

Four-wire free-standing

The four-wire free-standing configuration places the top sense wire about 2 m (6 ft., 8 in.) above the ground. It is similar to the 4-wire fence-mounted configuration, with slightly reduced wire spacing to better detect fast moving targets.

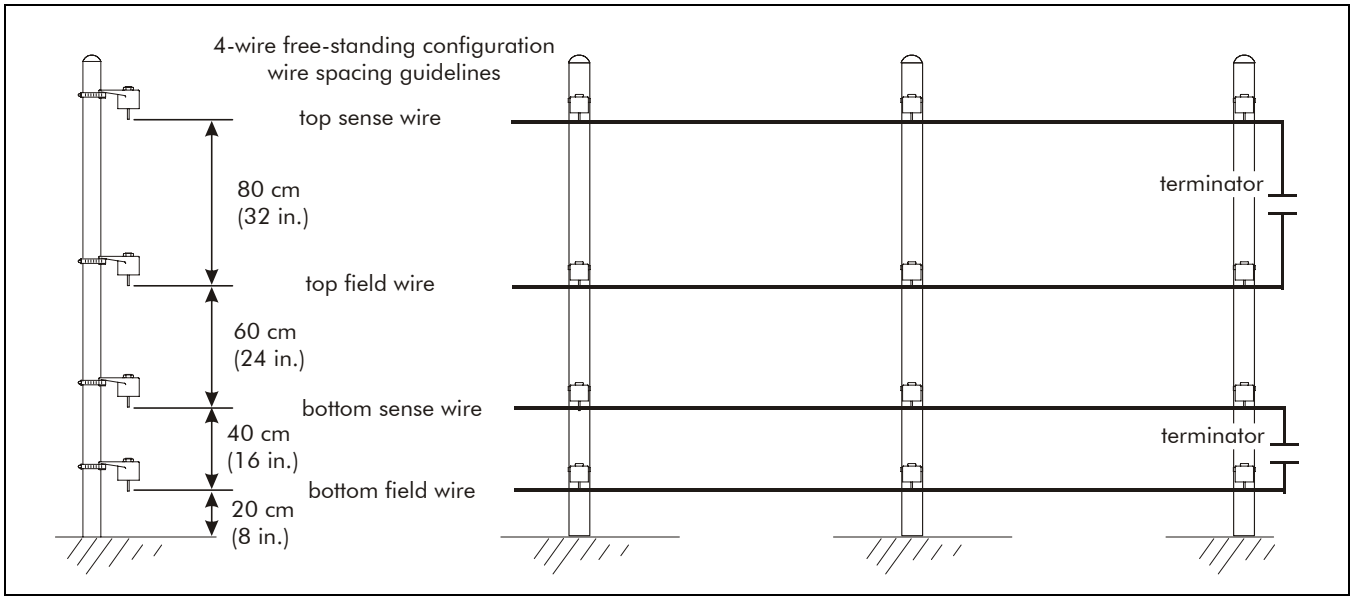


Figure 3-5 Four-wire free-standing configuration

Six-wire free-standing

The six-wire free-standing configuration puts the top sense wire approximately 3 m (10 ft.) above the ground. It is similar to the 6-wire fence-mounted configuration, with slightly reduced wire spacing to better detect fast moving targets.

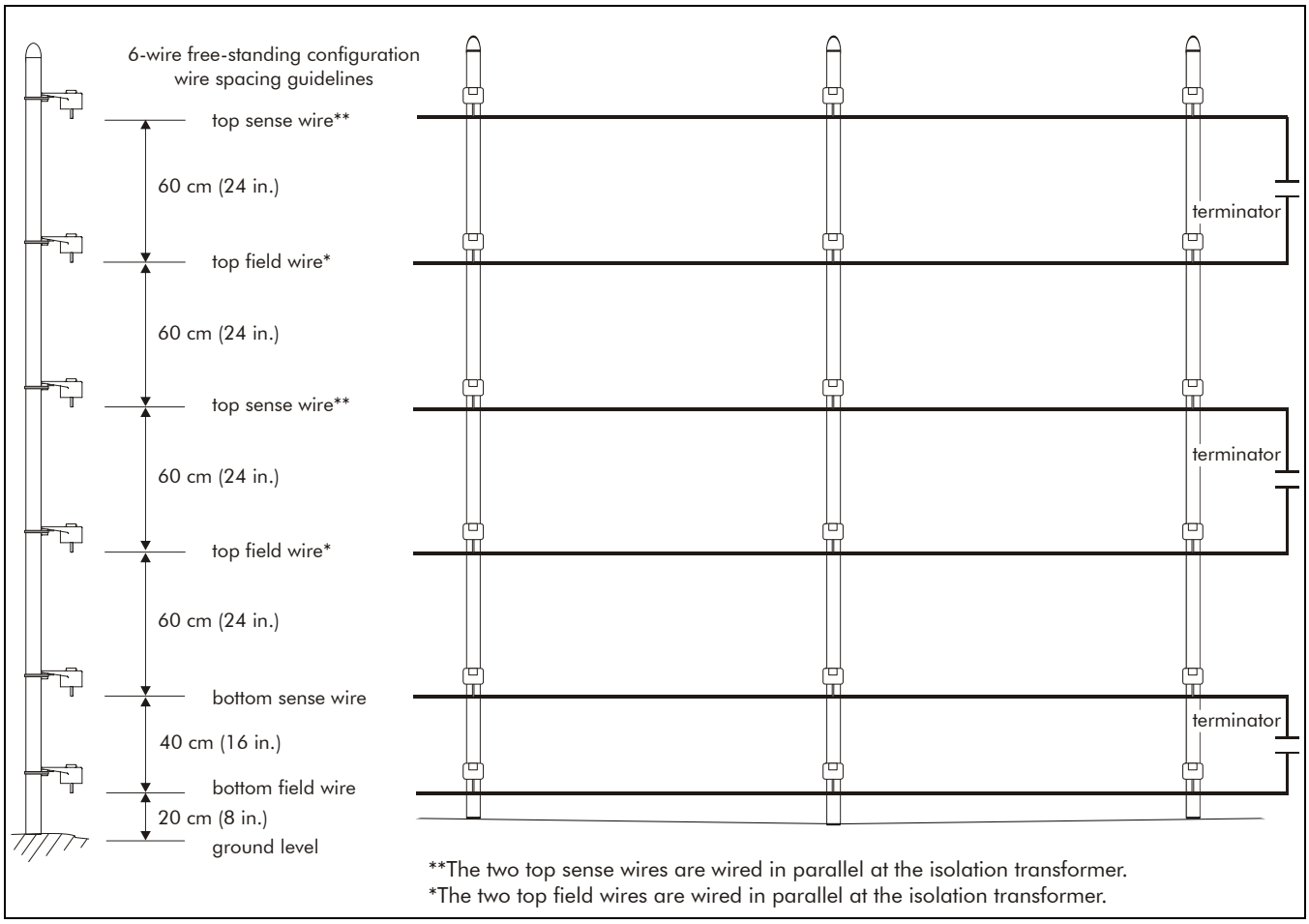


Figure 3-6 Six-wire free-standing configuration

Eight-wire free-standing

An eight-wire free-standing configuration using a stacked dual zone puts the top sense wire approximately 4.2 m (14 ft.) above the ground. It is similar to the 8-wire fence-mounted configuration, with slightly reduced wire spacing to better detect fast moving targets.

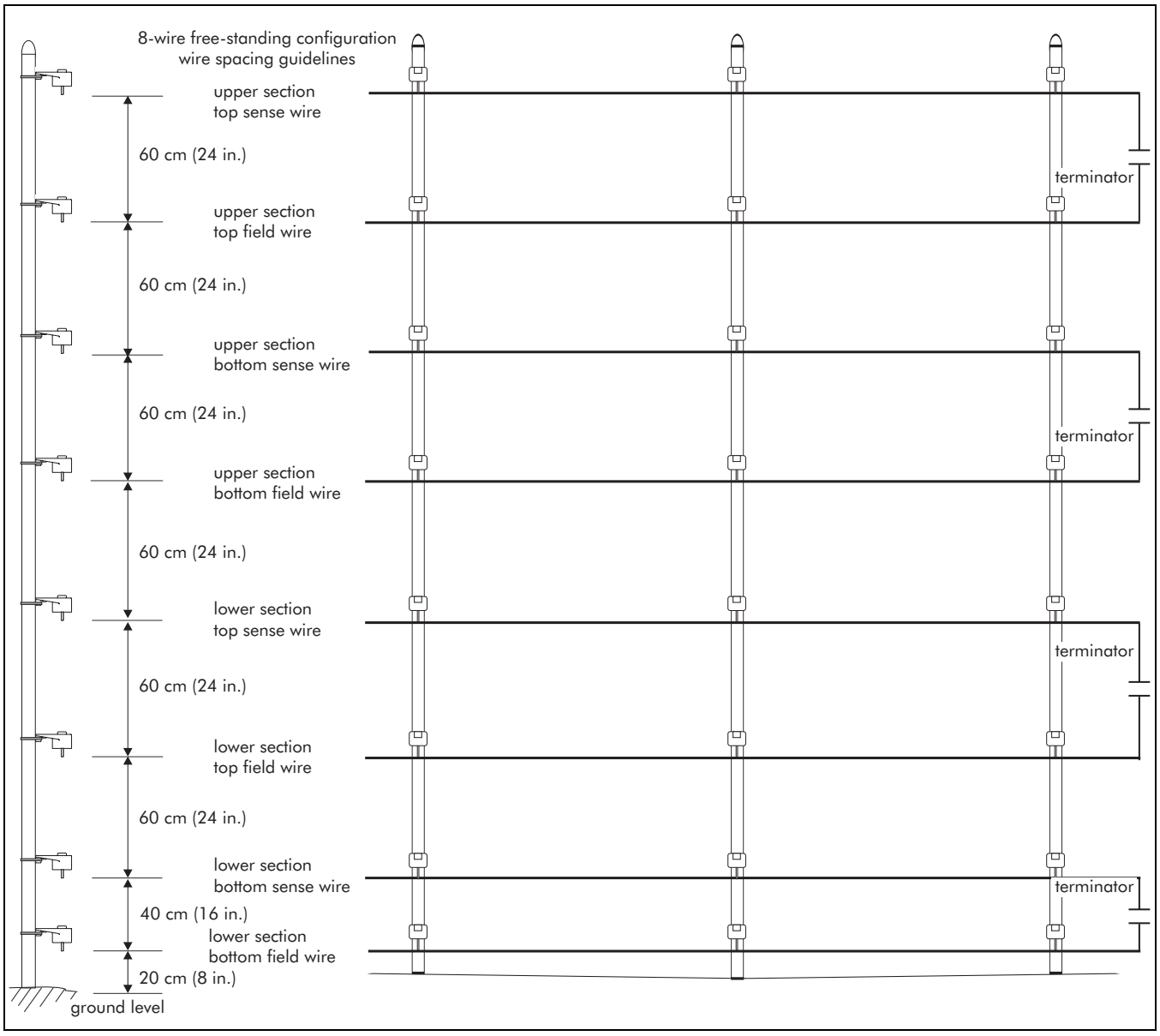


Figure 3-7 Eight-wire free-standing configuration

Roof-mounted

Roof-mounted configurations are free-standing installations that protect a rooftop or similar locations on top of a structure. Roof-mounted configurations are installed in the same manner as free-standing configurations. Contact Senstar-Stellar Customer Service for information about roof-top Intelli-FIELD installations.

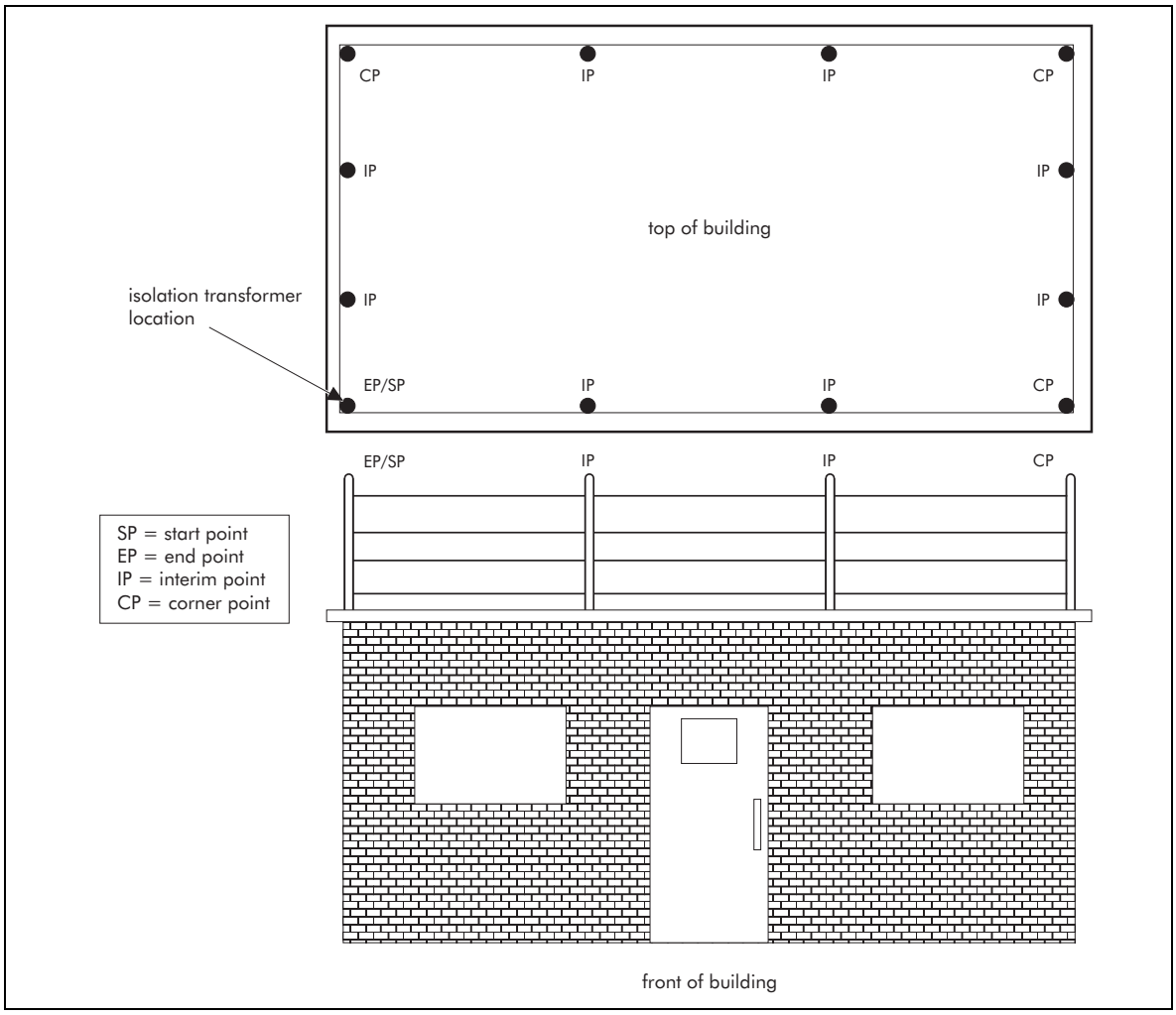


Figure 3-8 Roof-mounted configuration

Vertical wall-mounted

Vertical wall-mounted installations provide protection for buildings that require extra security, and buildings that are a physical part of the security perimeter. Wall-mounted configurations are attached to the side of a building, or structure, with 4-wire vertical wall-mount brackets. Standard cable mounting hardware is used with vertical wall-mounted applications.

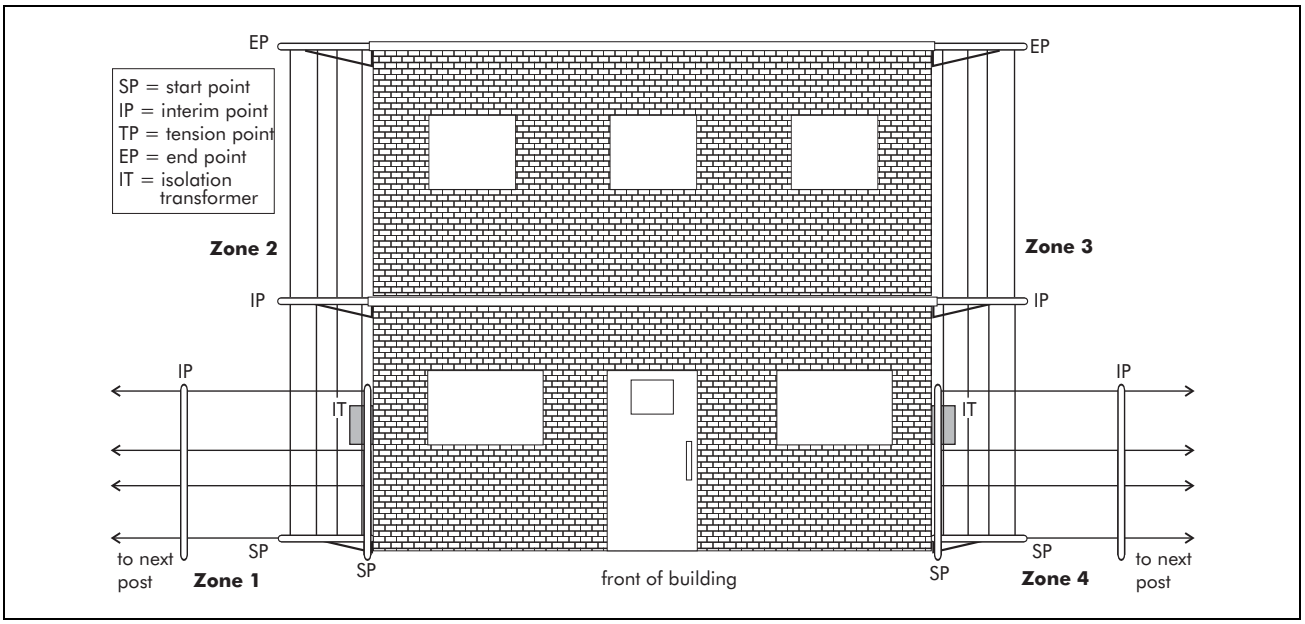


Figure 3-9 Vertical wall-mounted configuration (building is part of perimeter)

Vertical wall/roof-mounted

The vertical wall/roof-mounted application is a special Intelli-FIELD configuration that requires installation assistance. Please contact Senstar-Stellar Customer Service when this configuration is being planned.

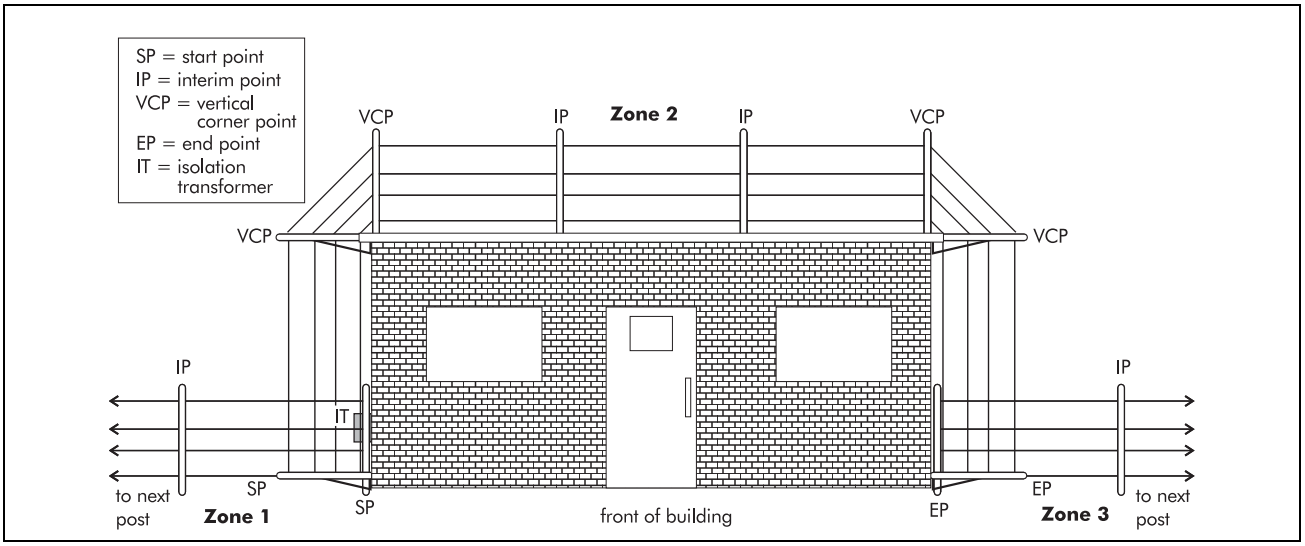


Figure 3-10 Vertical wall/roof-mounted configuration (building is part of perimeter)

3-wire wall topper

The 3-wire wall topper is a special Intelli-FIELD configuration that uses 45º mounting brackets to mount a 3-wire Intelli-FIELD system around the circumference, or across the side of a building or structure. This configuration can be mounted at any level on the side of a structure, and is ideal to provide electronic intrusion protection for windows, or roof-tops. Contact Senstar-Stellar Customer Service if you are considering a 3-wire wall-topper application.

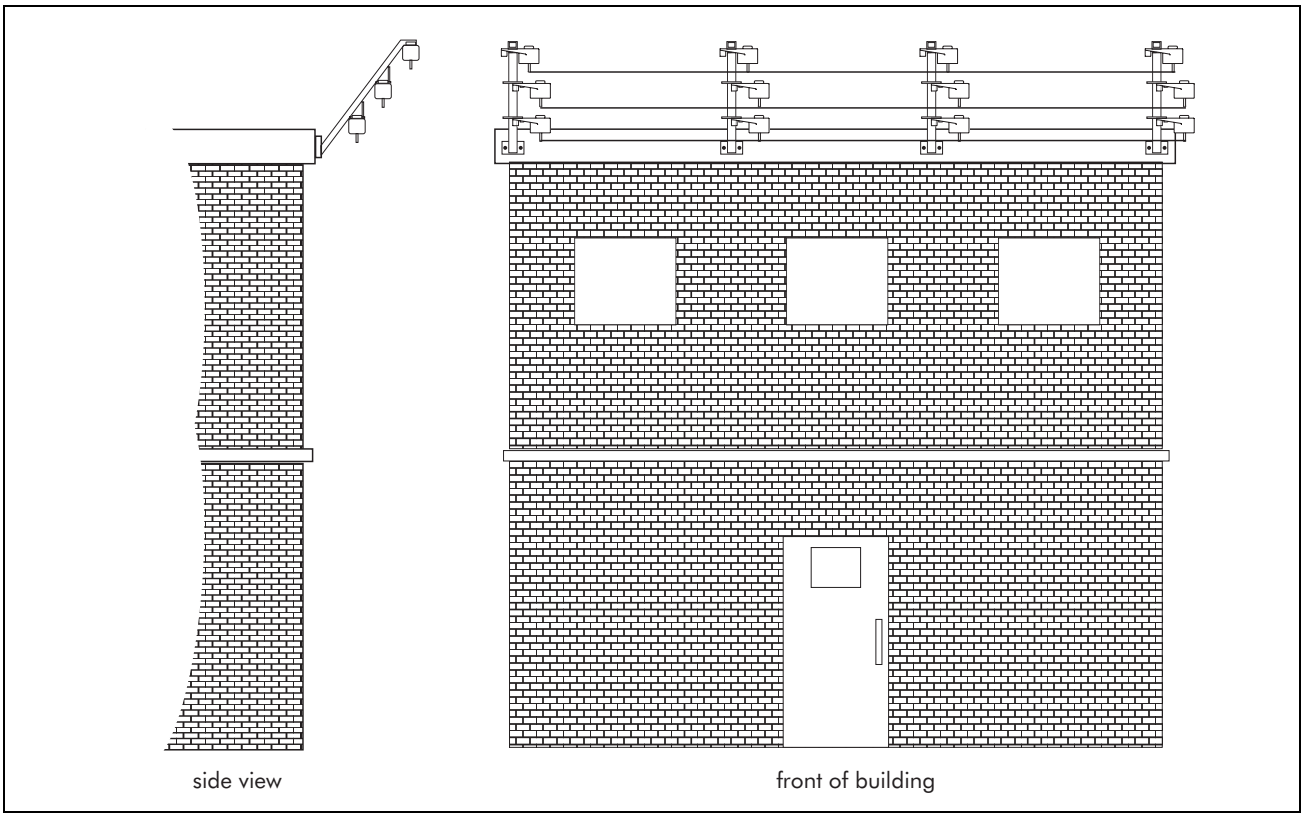


Figure 3-11 Three-wire wall-topper configuration (roof-top protection)

Contour wall-mounted

The contour wall-mounted application provides coverage for the top of a wall or structure that features stepped increases in height. For example, a wall built over a hill. For high steps in wall height the lower section of the wall is covered with a standard installation. At the step, a tension point is installed on a longer post. The four sensor wires are connected to a second set of insulators (without splicing) that are installed at the correct spacing for the height of the next step. This is repeated at each step, providing uniform coverage for the entire wall.

For short steps in height, angled mounting can be used with either regular interim points or corner points. However, when angled mounting is used the triangular area at the base of the step may be vulnerable to intrusion. This can be prevented by filling in the triangular area with bricks or concrete.

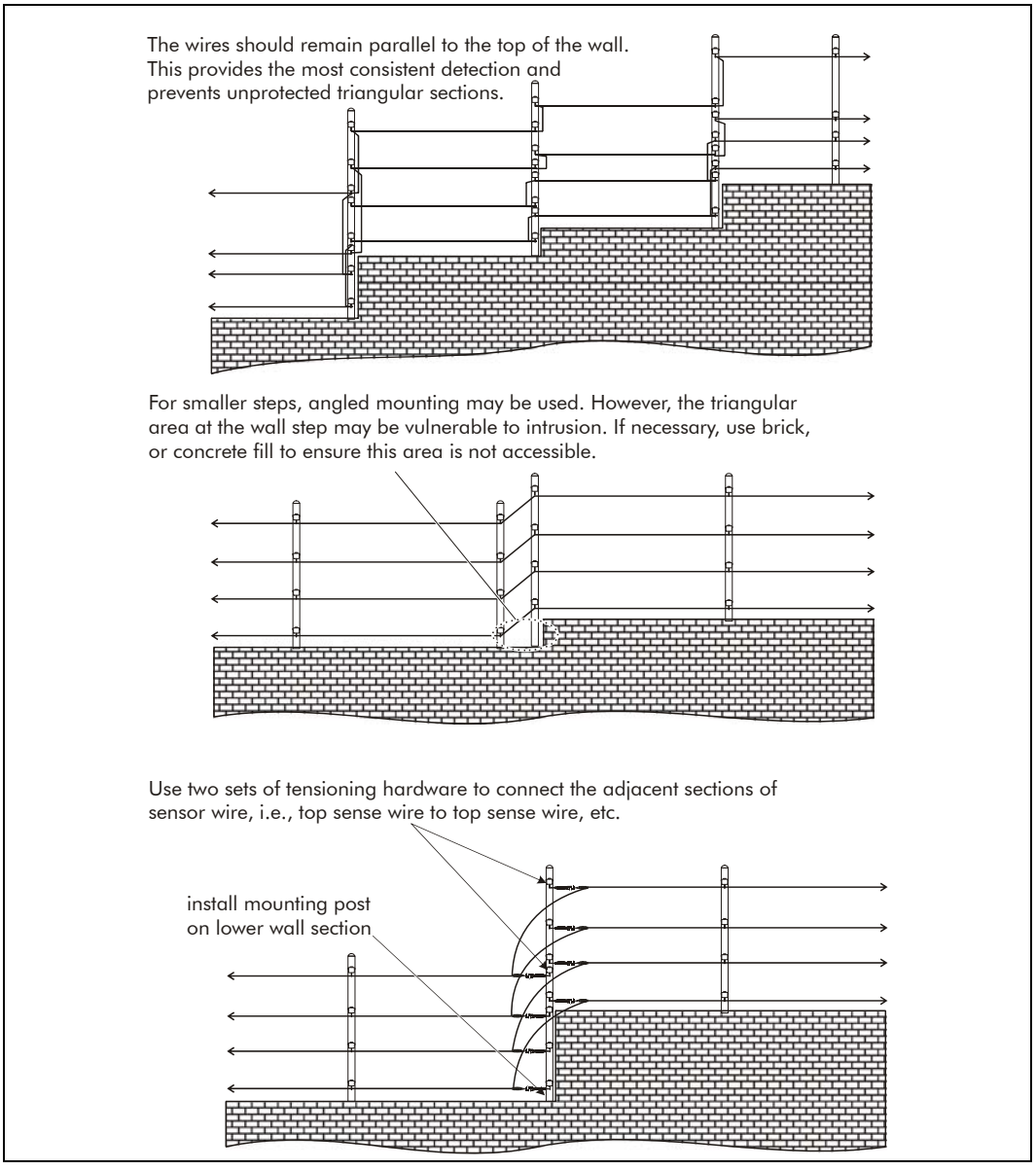


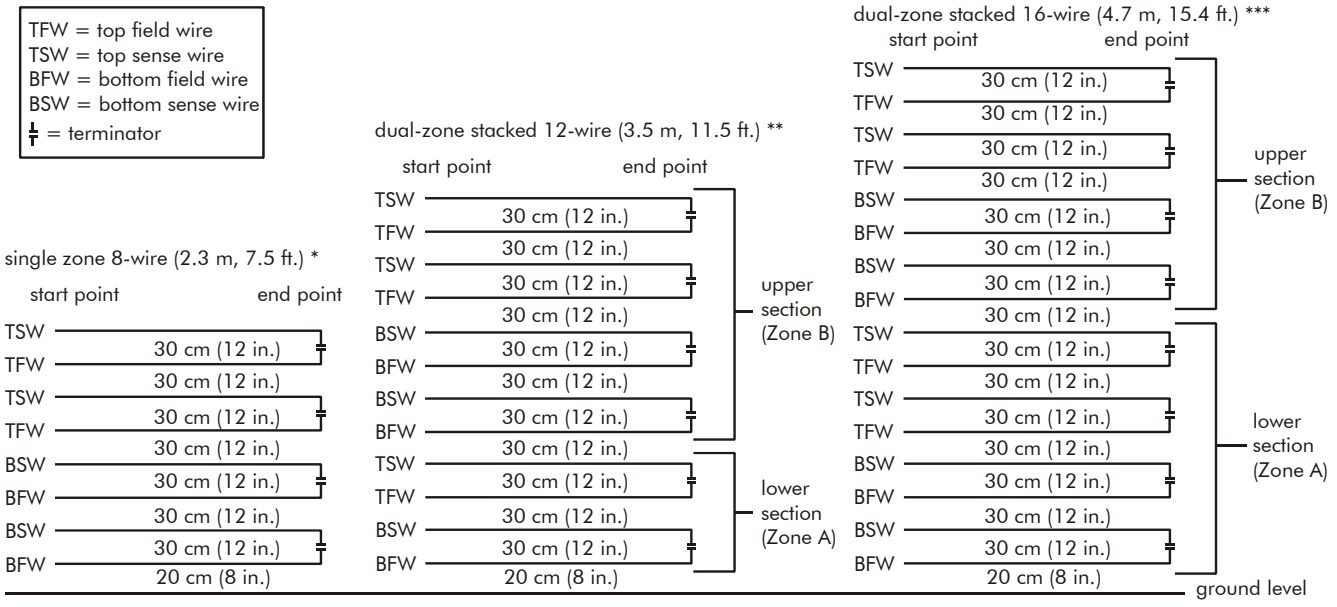
Figure 3-12 Contour wall-mounted application

Enhancing the detection field - maximum security applications

There are three special Intelli-FIELD configurations, which are recommended for maximum security applications. All three use parallel wiring connections at the isolation transformer, to increase the number of sensor wires in each zone. As in all Intelli-FIELD configurations, the bottom field wire is installed 20 cm above the ground. For maximum security applications, the rest of the sensor wires are installed 30 cm apart.

A single zone eight wire system places the top sense wire approximately 2.3 m (7.5 ft.) above the ground. A twelve wire dual-zone stacked system places the top sense wire approximately 3.5 m (11.5 ft.) above the ground. A sixteen wire dual-zone stacked system places the top sense wire approximately 4.7 m (15.4 ft.) above the ground.

Contact Senstar-Stellar Customer Service for additional information on maximum security applications.



* For the single zone 8-wire configuration, each TB2 terminal on the isolation transformer has a parallel connection (2 sensor wires per terminal) doubling the number of sensor wires from 4 to 8.

** For the dual-zone stacked 12-wire configuration, the lower sensor wire section (Zone A) has a single sensor wire connected at each TB2 terminal on the isolation transformer. The upper sensor wire section (Zone B) has a parallel connection at each TB2 terminal (2 sensor wires per terminal). Both zones of a processor are stacked to create the 12-wire zone.

*** For the dual-zone stacked 16-wire configuration, each TB2 terminal on both isolation transformers has a parallel connection (2 sensor wires per terminal). Both zones of a processor are stacked to create the 16-wire zone.

Figure 3-13 Maximum security configurations

Protecting the sensor wires - bird wires

A bird wire can be installed above the top sense wire, or above each sensor wire, to protect the Tefzel insulation. Bird wires are also useful in sensor zones with high sensitivity settings. In a typical Intelli-FIELD zone the processor rejects the presence of birds and small animals within the electrostatic envelope. However, in zones where the sensitivity setting is unusually high, or in areas where large numbers of birds frequently perch on the sensor wires, nuisance alarms may occur. In this case, installing bird wires provides the birds with non-sensitive wires, upon which to perch. Bird wires can be made from bailing wire, or ordinary fence wire. No special mounting hardware is required. However, the bird wire must be taut and securely fastened to the mounting brackets or insulators.

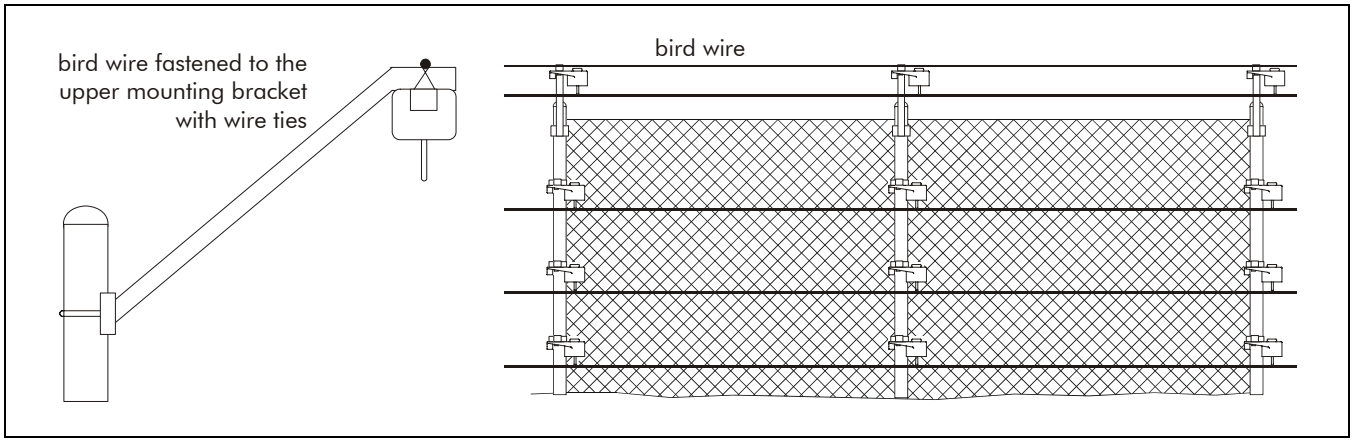


Figure 3-14 Protecting the sensor wires - bird wire

System design

Perimeter security systems are usually divided into separate zones to aid in locating the exact point of an intrusion or escape attempt. Separate zones also facilitate periodic maintenance without having to place the entire perimeter into access mode.

The higher the security requirement is, the shorter the zone length should be. For ease of installation and uniform system performance, the environment of each zone should be as homogeneous as possible. Do not attempt to incorporate many changes of terrain, soil type, elevation, or contour into a single zone.

Create a perimeter plan based on the facility's security plan and the site survey. Zone segments are defined by the specific requirements of the site, and environmental factors.

Develop individual zone plans for each separate zone in the perimeter plan. Specify the configuration for each zone along with its overall length. Note any elevation changes or changes in soil media within the zone from point-to-point.

Record the Intelli-FIELD components required for each zone's configuration on the individual zone plans.

Note the location and type of processor (P), isolation transformers (IT) terminators (T) and mounting hardware, i.e., start point (SP), end point (EP), tension point (TP), corner point (CP), interim point (IP), on the individual zone plans. Each zone must contain, as a minimum, a start point and an end point.

For free-standing configurations, also note the location of the mounting posts. Free-standing posts are supplied by the installer. The components of the Intelli-FIELD system and any other hardware requirements are identified on the site-specific drawings. The typical mounting hardware requirements for a four-wire zone are listed below. Double the hardware requirements for an eight-wire zone.

- Start point - one start point is required for each zone
- End point - one end point is required for each zone (Zones that are longer than 15 m (50 ft.) and zones with sharp changes in elevation, or horizontal direction, must use tensioning hardware at the end point to ensure uniform tensioning throughout the zone.)
- Terminators - one terminator is required for each pair (field and sense) of sensor wires

- Tension points (start/tension point kit) - tension points should be used every 50 m (164 ft.) throughout a sensor zone, to apply tension to the sensor wires
- Corner points - a corner point is required for changes in horizontal or vertical direction greater than 20º (Extenders should be used at horizontal corner points in fence-mounted installations to maintain even spacing between the sensor wires and the fence fabric.)
- Interim points - under typical conditions, interim points are required every 6 m (20 ft.) (Under severe conditions such as high winds, heavy snow or ice load, interim point spacing should be reduced to 3 m (10 ft.). Interim points should be used to maintain consistent spacing between the bottom sensor wire and the ground for hills or depressions. Interim points can also be used at changes in horizontal direction of less than 20º.)

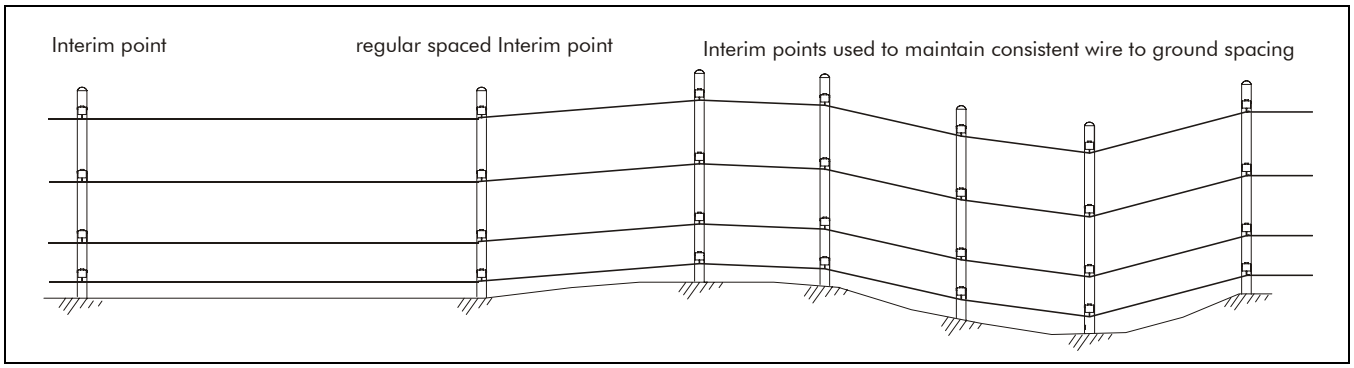


Figure 3-15 Interim points - maintaining consistent ground to wire spacing

Use the perimeter plan, the individual zone plans, and Chapter b, to order the components for an Intelli-FIELD system.

Draw the perimeter plan cable path

The perimeter plan serves as the blueprint for the Intelli-FIELD installation. It outlines the cable path and identifies the sensor zones. The perimeter plan also gives general descriptions of the Intelli-FIELD configurations, equipment locations and power requirements for the site. A detailed perimeter plan is essential for the planning phase of an installation and is a useful resource when the system is operational.

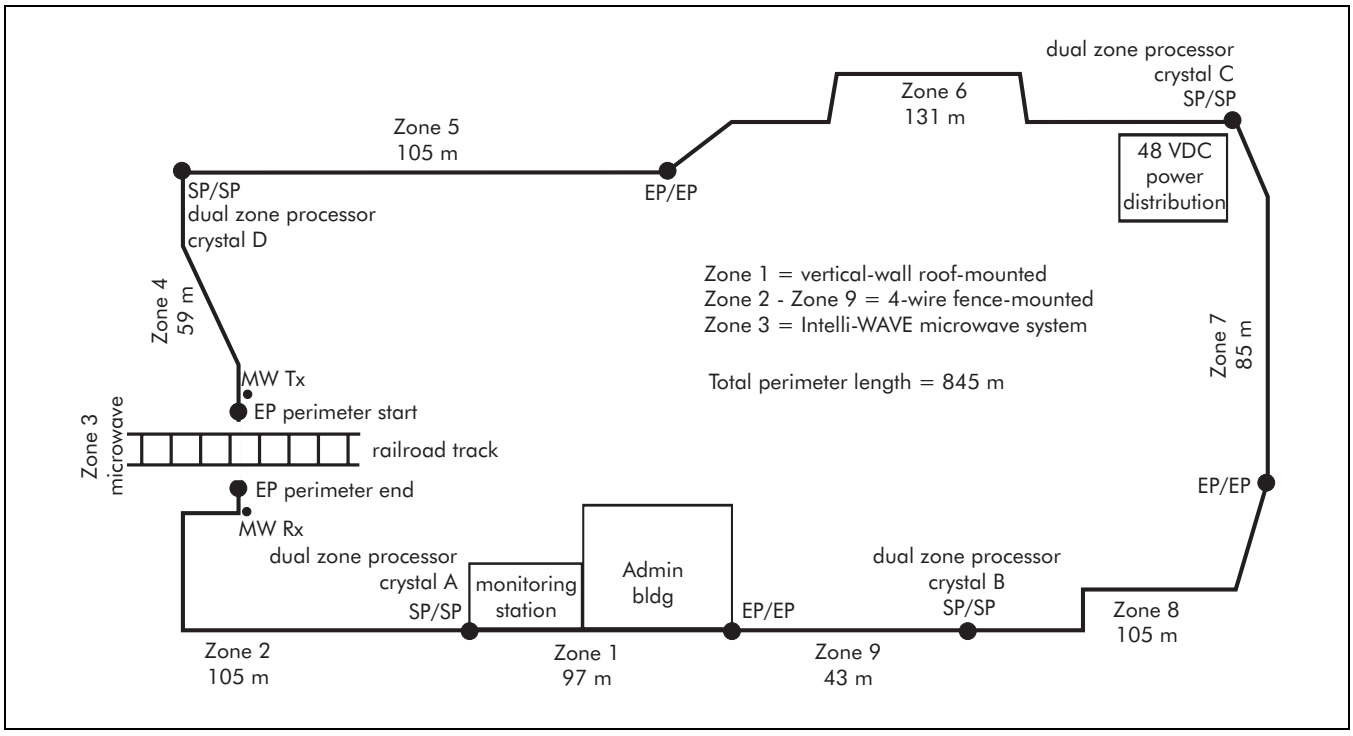


Figure 3-16 Sample perimeter plan

Indicate the following details on a scale diagram of the perimeter:

- the total perimeter length and the beginning and end of the perimeter
- the physical zone boundaries, buildings, structures, obstacles, roads, paths, etc.
- a unique zone label for each zone
- the Intelli-FIELD configuration required for each zone
- the individual zone lengths and the beginning and end of each zone
- the location and type of processors including operating frequency
- the location and type of power sources

Individual zone layout details

The individual zone plan includes the information necessary for ordering the Intelli-FIELD components. It also provides the layout details required for completing the installation.

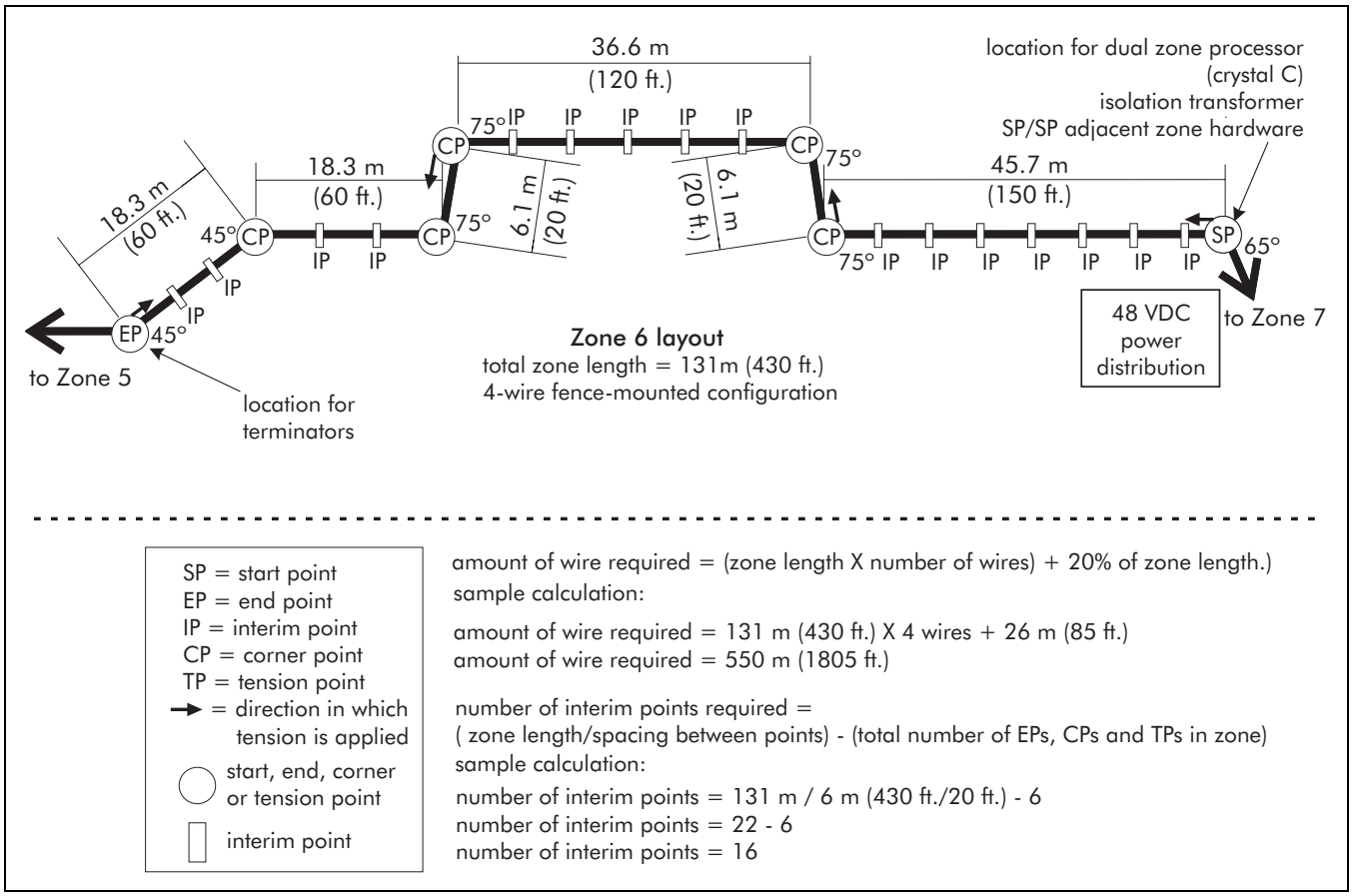


Figure 3-17 Individual zone details

Indicate the following details on a scale diagram of each sensor zone:

- a unique zone identification label and the adjacent zone labels
- the zone length and the start and end points of the zone
- the physical zone boundaries, buildings, structures, obstacles, roads, paths, etc.
- the Intelli-FIELD configuration required for the zone
- direction and elevation changes along the zone (include the angle of change)
- the location and type of Intelli-FIELD hardware required
- the location and direction of tensioning hardware required
- the location of free-standing fence posts (installer supplied)
- the length of coaxial cable required
- the location and type of power source for the processor

Use the information in the perimeter plan and the individual zone plans to order the Intelli-FIELD components and sensor wire required for the installation:

- the amount of sensor wire required = (total zone length **X** the number of wires) + 20% of zone length

- the number of interim points required equals (total zone length) divided by (spacing between points) minus (total number of corner points, tension points and end points)

  Additional interim points are required for zones with horizontal or vertical direction changes of less than 20º.

Free-standing configurations require securely anchored galvanized steel mounting posts (tension post - max. 7.6 cm [3 in.] O.D.; interim post - max. 6 cm [2 3/8 in.] O.D.). The mounting posts are supplied by the installer and must be capable of supporting the sensor wires at the specified tension of 16 kg (35 lbs.) per wire.

Fence post grounding

All of the mounting posts in both fence-mounted and free-standing Intelli-FIELD sensor zones MUST be connected to a common ground strap. The ground strap should be zinc strapping (0.033 gauge, 0.433 width, alloy 75 - see appendix a). The ground strap must be securely fastened to each fence post, as close to the ground as possible. Zinc-plated steel conduit hangers, suitable for mounting on the fence posts (post size is site-specific) should be used to attach the zinc strapping to the fence posts. Alternatively, the ground strap can be CAD-welded to the posts and ground rods. The zinc strapping must be connected to properly installed ground rods (10 Ω max.) at the start point, end point, and every 50 m (164 ft.) (maximum) throughout the zone. Zinc or zinc-plated hardware should be used to prevent potential ground loops and current flow (battery effect) which will interfere with the operation of the Intelli-FIELD system.

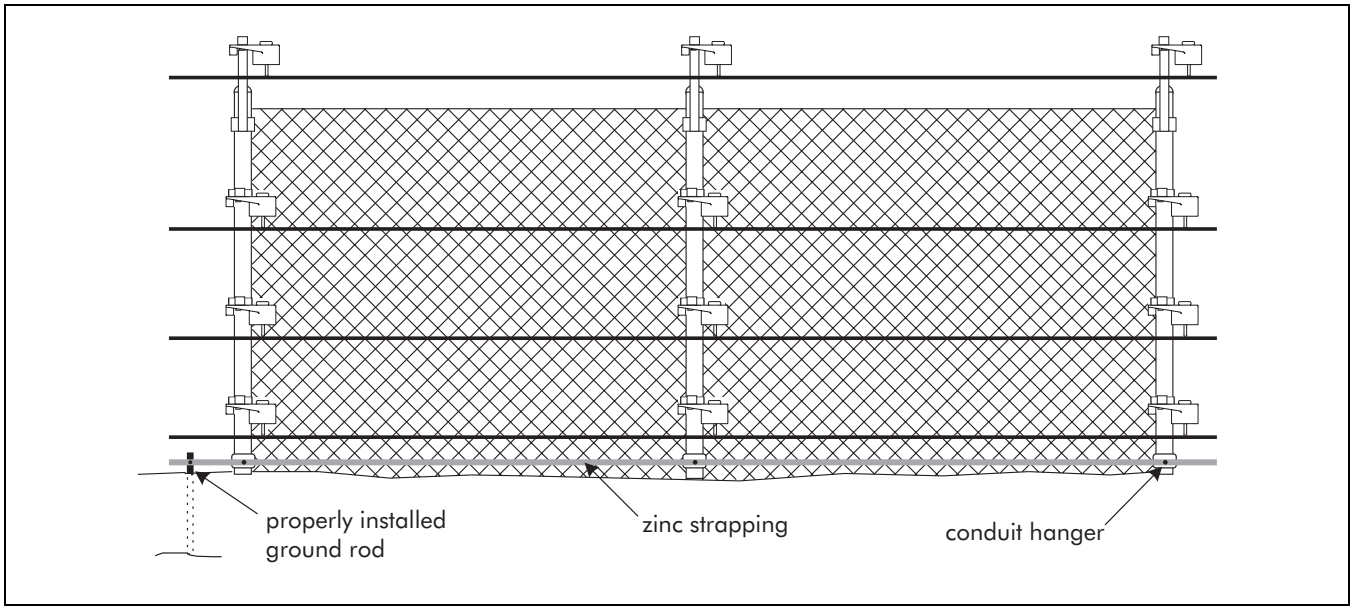


Figure 3-18 Fence post grounding

Processor location

The Intelli-FIELD processor should be mounted near the start point of its sensor zone(s). Locating the processor near the start point facilitates system calibration and maintenance, and avoids long runs of coaxial cable between the processor and the isolation transformer. However, for security purposes and other special circumstances, the processor can be mounted up to 150 m (app. 500 ft.) away from the isolation transformer(s) of its sensor zone(s). The distance between the processor and the isolation transformer(s) depends on the capacitance of the coax cable used for interconnection (see *Coaxial cable capacitance* on page 8-1).

The processor is mounted in a NEMA-4 rated weatherproof, lockable enclosure. The enclosure may be mounted on a post, wall, or other secure structure. Conduit is required for the power lines, ground wire, alarm reporting cables and the coaxial cables. Both ends of the conduit must be sealed with non-conductive sealant, to prevent insects from entering the enclosure and water from entering the conduit. The processor requires a connection to a properly installed, low resistance (10 Ω max.) ground rod.

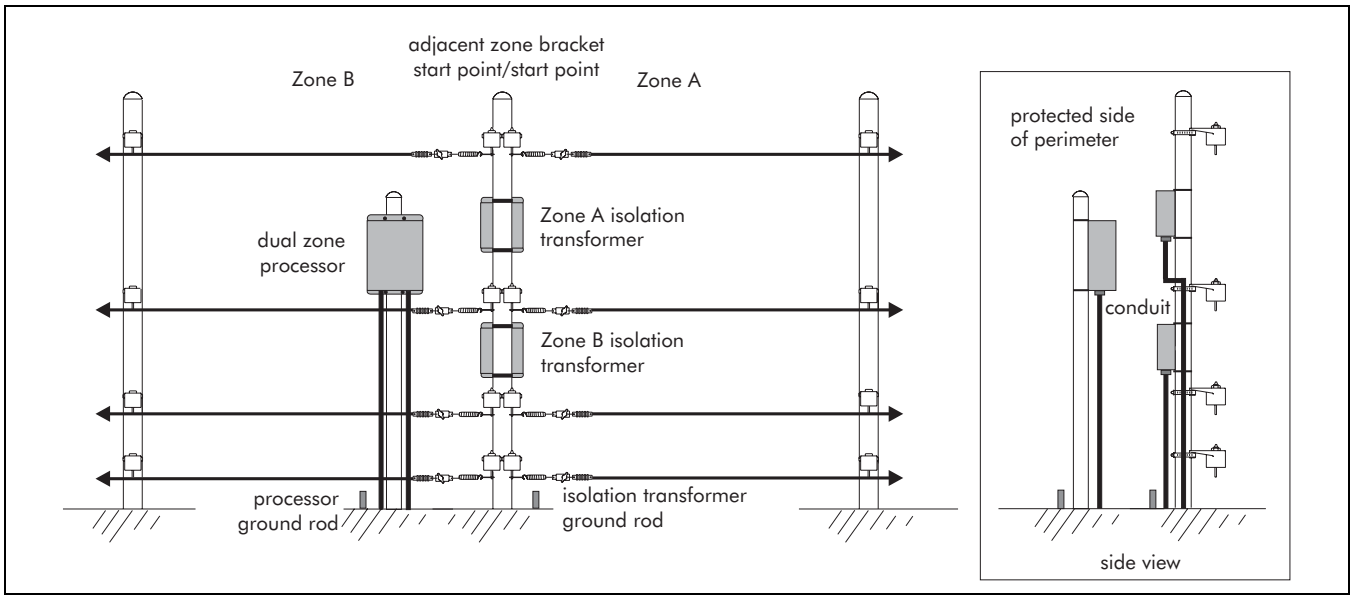


Figure 3-19 Processor mounting

Processor operating frequencies

The Intelli-FIELD processor has four distinct operating frequencies. The operating frequencies are not affected by 50 Hz or 60 Hz power generation frequencies. The dual-zone processor operates both of its sensor zones on the same frequency. However, two adjacent zones that are connected to two different processors must use different operating frequencies to prevent possible interference and cross-talk. Zones that are separated by at least 20 m (65 ft.) can operate on the same frequency. Senstar-Stellar recommends using the operating frequencies in an A, B, C, D repetitive pattern for multi-processor installations.

The Intelli-FIELD processor requires, but does NOT include, a crystal frequency generator. You must order a crystal frequency generator for each Intelli-FIELD processor in your installation. Use your site plan, the following table and appendix a to order the crystal frequency generators that are required at your site.

Crystal	Crystal Operating Frequency (MHz)	Field Generator Frequency (kHz)
frequency A (p/n C7AD0401)	9.190	8.975
frequency B (p/n C7AD0402)	8.883	8.675
frequency C (p/n C7AD0403)	8.576	8.375
frequency D (p/n C7AD0404)	8.269	8.075

Isolation transformer location

The isolation transformer should be located directly at the start point of the sensor zone. Isolation transformers are frequently mounted on the same post as the start point hardware. (Contact Senstar-Stellar Customer Service if site requirements prevent the installation of the isolation transformer at the start point of the zone.) The coaxial cable runs between the isolation transformer and the start point of the sensor zone should be kept as short as possible. The isolation transformer requires a connection to a properly installed, low resistance (10 Ω max.) ground rod.

Power supply options

There are two network power supply options available for the Intelli-FIELD system:

- 24 VDC power distribution from a central source
- 48 VDC power distribution from a central source

The Intelli-FIELD processor can also be powered by a local 10.5 to 15 VDC power supply.

24 VDC power distribution

A centrally located 24 VDC power source is appropriate when several processors are deployed around a perimeter. This option is also suitable for installations where the power source is located away from the processor. The DC power source is located indoors and is powered by an uninterruptible AC power source. The processors are daisy chained, with an equal number of processors on both sides of the DC source. Processors using 24 VDC power are capable of supplying 12 VDC @ 300 mA to an auxiliary device.

48 VDC power distribution

A centrally located 48 VDC power source is appropriate when multiple processors are deployed around a large perimeter. This option is also suitable for installations where the power source is located away from the processor. The DC power source is located indoors and is powered by an uninterruptible AC power source. The processors are daisy chained, with an equal number of processors on both sides of the DC source. Processors using 48 VDC power are capable of supplying 12 VDC @ 300 mA to an auxiliary device.

12 VDC local power supply

The Intelli-FIELD processor can be powered by a 10.5 to 15 VDC power supply, providing the power supply can meet the processor's 12.2 W power consumption requirement. The power supply should be powered by an uninterruptibe AC power source. If the processor is installed outdoors, the power supply must be mounted in a suitable enclosure and must be rated for outdoor usage.

Processors using 12 VDC local power can NOT supply power to an auxiliary device.

The Intelli-FIELD processor can use ONLY one power input option, either 12 VDC local power OR 24/48 VDC network power.

Backup power (UPS)

The 12, 24 and 48 VDC power supply options should be powered from an uninterruptible AC power source. The uninterruptible power source supplies backup power to the Intelli-FIELD system in the event of AC failure.

4 Preparing the site

This section details the site preparation that is required before an Intelli-FIELD system installation can begin.

Intelli-FIELD zones that are installed above soil media with very low conductivity and poor earth grounding qualities may be prone to inconsistent detection sensitivity and nuisance alarms. Rocky soil, shale, gravel, sandy soil, and soil with very little organic content may feature low conductivity and poor grounding. For soils with low conductivity, rainy weather can be a source of nuisance alarms. If your site includes any of these soil types, you may have to establish a continuous ground plane beneath the sensor wires by installing conductive, galvanized or zinc-plated wire mesh fencing (min. 16 AWG). The fencing should extend 1 m (3 ft. 3 in,) beyond both sides of the sensor wires (2 m total). The ground plane MUST be securely fastened to the ground, and connected to one or more properly installed ground rods.

Site preparation

To ensure optimum performance of your Intelli-FIELD system prepare the site by performing the following steps, as required by the site:

- Ensure that the soil media is consistent throughout each Intelli-FIELD zone, and that the soil type provides adequate conductivity.
  Contact Senstar-Stellar Customer Service for information on methods of soil assessment.

- Grade the perimeter to a smooth surface ± 5 cm (2 in.) beneath the location where the sensor wires will be installed. The bottom sensor wire must remain at a constant height of 20 cm (8 in.) above the ground, throughout the installation.
- Remove obstacles, if possible. Keep trees, vegetation and other obstacles at least 2 m (6 ft. 6 in.) from both sides of the sensor wires. Metal objects, in particular, can cause areas of low sensitivity in an Intelli-FIELD zone.
  - Vegetation under the sensor wires must be cropped short at all times Do not allow vegetation under the wires to exceed 7.5 cm (3 in.).

    Moist or wet vegetation contacting the lower sense wire will cause nuisance alarms.

  - Senstar-Stellar recommends inhibiting weed growth by placing a perforated, non-woven geotextile ground sheet covered with gravel directly under the sensor wires. The gravel should be less than 2 cm (3/4 in.) in diameter, and less than 5 cm (2 in.) deep.

    The ground sheet MUST be perforated with small holes to prevent water from accumulating beneath the sensor wires.

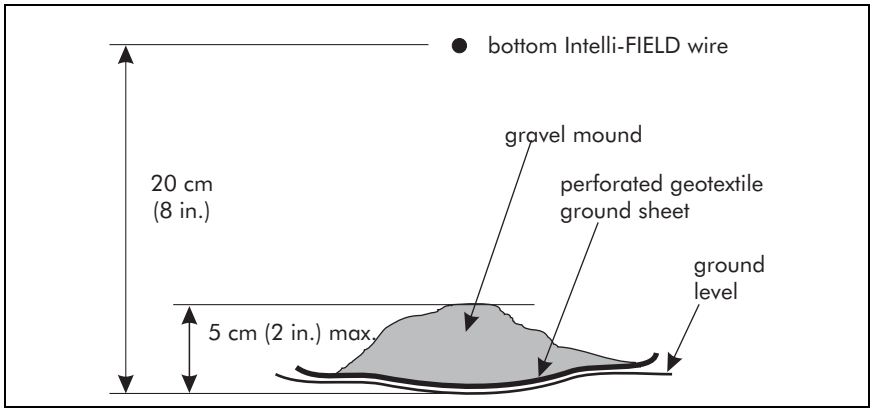


Figure 4-1 Inhibiting weed growth

Fences

This section provides guidelines to minimize environmental noise sources that can be caused by fence conditions. Fence condition is critical to the trouble-free, efficient operation of the Intelli-FIELD sensor. The fence must be sound, (i.e., properly installed, tensioned and maintained) to provide effective intrusion detection with the Intelli-FIELD sensor system. The fence should be uniform in height and quality. Breaks in the fence structure or slack areas in the fence fabric may interfere with the formation of the electrostatic field.

All fence posts within each zone of a fence-mounted configuration MUST be connected to a common ground strap.

The maximum separation between support posts for an Intelli-FIELD installation is 6 m (20 ft.). Under severe weather conditions (strong wind, heavy snow or ice) reduce the post spacing to 3 m (10 ft.)

The maximum O.D. of a tensioning fence post used in an Intelli-FIELD installation is 7.6 cm (3 in.). The maximum O.D. of an interim fence post is 6 cm (2 3/8 in.)

Fence specifications

Chain-link fence must meet the following minimum specifications. Use these guidelines when installing a new fence. Repair existing fences as required:

- 9 GA (0.378 cm dia.) galvanized steel, 2.5 to 7.5 cm (1 to 3 in.) mesh chain-link
- selvages - top sides twisted and barbed; bottom side knuckled
- stretcher bars threaded through the fence fabric - 1 bar for each gate and end post, and 2 bars for each corner and pull post
- tension is maintained by securing stretcher bars to posts with metal bands spaced a maximum of 38 cm (15 in.) apart
- the fence fabric is fastened to the steel framework with 9 gauge steel wire ties spaced a maximum of 30 cm (12 in.) apart - for all posts, rails, braces, and tension wires
- all stretcher bar bands, wire ties, and any other fasteners are tightened securely (none of the fence hardware and fabric should be free to move)
- the maximum fabric deflection is 5 cm (2 in.) when a 14 kg (30 lb) pull is exerted perpendicular to the center of a panel
- the maximum separation between fence posts is 6 m (20 ft.)
- fill any spaces under the fence with native soil to prevent nuisance alarms caused by animals
- the O.D. of the tensioning fence posts is 7.6 cm (3 in.) or less
- the O.D. of the interim fence posts is 6 cm (2 3/8 in.) or less
- ensure that all fence posts are firmly set in the ground and plumb
- all of the fence posts within a zone are connected to a common ground strap
- remove fence-top barbed wire as it can interfere with the electrostatic field
- secure any loose items or metal bits that are on the fence
- ensure that any metal objects that are mounted on the fence are grounded to a fence post

Free-standing

All mounting posts within each zone of a free-standing configuration MUST be connected to a common ground strap.

The maximum separation between support posts for a free-standing Intelli-FIELD installation is 6 m (20 ft.). Under severe weather conditions (strong wind, heavy snow or ice) reduce the post spacing to 3 m (10 ft.)

The maximum O.D. for an Intelli-FIELD free-standing tensioning mounting post is 7.6 cm (3 in.). The maximum O.D. of an interim post is 6 cm (2 3/8 in.)

Free-standing installations must be located within a controlled perimeter to prevent nuisance alarms.

- the posts must be securely anchored, plumb and capable of withstanding the 16 kg (35 lb) tension per wire (64 kg {140 lb} for 4 wires)
- the maximum separation between support posts is 6 m (20 ft.)
- the O.D. of the tensioning mounting posts is 7.6 cm (3 in.) or less
- the O.D. of the interim mounting posts is 6 cm (2 3/8 in.) or less
- each post within a zone must be connected to a common ground strap
- the posts must be galvanized steel and are supplied by the installer
- the bottom sense wire must remain a consistent 20 cm (8 in.) above the ground, throughout the installation
- fill any small depressions under the sensor wire location with native soil

Fence post/free-standing post grounding requirements

All of the fence posts in both fence-mounted and free-standing Intelli-FIELD sensor zones MUST be connected to a common ground strap. The ground strap should be zinc strapping (0.033 gauge, 0.433 width, alloy 75 - see appendix a). The ground strap must be securely fastened to each fence post, as close to the ground as possible. Zinc-plated steel conduit hangers can be used to attach the zinc strapping to the fence posts. The conduit hangers must be selected to fit tightly on the mounting posts.

Conduit hangers that are specified to fit a 7.6 cm (3 in.) EMT conduit are TOO LARGE to fit tightly on a 7.6 cm (3 in.) OD post (e.g., for a 7.6 cm O.D. post select conduit hangers that are specified for 6.4 cm (2.5 in.) EMT conduit).

Alternatively, the ground strap can be CAD-welded to the posts and ground rods. The zinc strapping must be connected to properly installed ground rods (max. 10 Ω) at the start point, end point, and every 50 m (164 ft.) maximum for the full length of the zone. Zinc or zinc-plated hardware should be used to prevent potential ground loops and current flow (battery effect) which will interfere with the operation of the Intelli-FIELD system.

Roof-mounted

Roof-mounted installations use standard wire spacing on free-standing posts. The bottom sense wire must remain a constant 20 cm (8 in.) above the roof surface throughout the installation.

- mounting posts must be securely anchored to the roof, plumb and capable of withstanding the 16 kg (35 lb) tension per wire (64 kg (140 lb) for 4 wires)
- a ground plane that extends 1 m (3 ft., 3 in.) beyond each side of the sensor wires is required (in instances where space is limited, the ground plane should extend 1 m (3 ft., 3 in.) beyond the sensor wires in the direction of potential intrusion or escape attempts. The ground plane must be connected to earth ground and should consist of a conductive, galvanized wire mesh fencing that is securely fastened to the roof.)
- all roof-mounted posts must be connected to a common ground strap

System upgrades

Care must be taken when upgrading an existing E-Field installation, to prevent damage to the fence posts, fence mounting hardware and fence fabric. Refer to Chapter 6 Retro-fit applications for details on system upgrades. Repair or replace any part of the fence that does not meet the minimum standards, before beginning the upgrade.

Other obstacles

When planning an Intelli-FIELD installation, certain environmental factors play an important role in the effectiveness of the system. The following list includes some of the potential obstacles to optimum system performance:

- tension points should be used every 50 m (162 ft.) throughout the zone
- tensioning hardware should be used at the end point of zones exceeding 15 m (50 ft.) in length
- under severe conditions, including high wind, or heavy ice and snow, the interim point spacing should be reduced to 3 m (10 ft.)
- the Intelli-FIELD sensor wires should not be installed near buried lines, if possible, to prevent potential electrical interference

- variations in the landfill beneath the sensor wires may cause ground plane variations, which could result in inconsistent detection capabilities (The ground media should remain consistent throughout each zone.)
- changes in elevation, or horizontal direction, greater than 20º require the use of corner points or tension points
- interim points should be used to maintain consistent spacing between the bottom sensor wire and ground for hills and depressions with slopes of less than 20º
- interim points should be used for horizontal direction changes of less than 20º
- moving objects such as people, vehicles, equipment and animals must be kept a minimum of 1.5 m (5 ft.) from the sensor wires
- standing or running water must be kept a minimum of 1.5 m (5 ft.) from the sensor wires
- stationary metallic objects close to the sensor wires may result in weak detection performance near the object
- vegetation beneath and beside the sensor wires should be kept cropped to a maximum height of 7.5 cm (3 in.) (Trees, bushes and large plants should be kept a minimum of 1.5 m (5 ft.) away the sensor wires.)

Contact between the bottom wire and wet vegetation may cause nuisance alarms.

If you have any questions or concerns about any potential obstacles at your site, contact Senstar-Stellar Customer Service.

5 Hardware installation

This section details the hardware installation instructions for the Intelli-FIELD components.

> *For information about installing the next generation Intelli-FIELD hardware, see appendix e.*

Installing the components

Installing an Intelli-FIELD system requires the installation of some, or all, of the following components:

- system grounding
- processor enclosure and processor
- conduit
- isolation transformer enclosure and isolation transformer
- power supply
- fence-mounted perimeter hardware
- free-standing perimeter hardware
- roof-mounted perimeter hardware
- wall-mounted perimeter hardware
- tension insulators
- Intelli-FIELD sensor wires (Chapter 7, Sensor wire installation)
- terminators (Chapter 8, System interconnections)

Tools and equipment

The following equipment is required for an Intelli-FIELD installation:

long nose pliers, linesman's pliers	step ladder 2.5 m (8 ft.)	measuring tapes 30 m (100 ft.) & 5 m (16 ft.)
coax cable stripper	coax cable crimper	wire cutter
wire stripper	wire markers/labels	multimeter
non-conductive RTV sealant	electrical tape	cable ties (varied sizes)
ratchet drive 10 mm (3/8 in.) *	socket wrenches	open ended wrenches
ground rods (Refer to the local electrical code for earth grounding requirements. The number of ground rods required depends on the configuration and size of the Intelli-FIELD system.)		
zinc strapping - for ground strap (0.033 gauge, 0.433 width, alloy 75) (The length of zinc strapping required is equal to the length of the Intelli-FIELD sensor zones.)		
conduit hangers - to connect the zinc strapping to the mounting posts (Conduit hangers must be zinc-plated, include hardware, and be correctly sized to fit tightly on the posts.)		
zinc plated mounting hardware for connecting the zinc strapping to the conduit hangers - 1 set of hardware is required for each conduit hanger (#20 x 1/2 in. bolt, 2 flat washers, 1 lock washer, 1 nut)		
screw drivers slot and Phillips # 1 & 2		2.5 m (8 ft.) piece of lumber
* a battery operated ratchet drive with several reserve batteries (recommended)		portable heat gun for splice-connection heatshrink
a battery operated drill and drill bits for metal OR a number 5 junior punch with 4 mm (5/32 in.) bit (for making the holes to connect the zinc strapping to the mounting posts)		

System grounding requirements

Consult the national and local electrical codes for grounding information and requirements. All Intelli-FIELD earth ground connections must be 10 Ω or less.

The Intelli-FIELD system requires proper earth ground connections at the following points:

- processor
- isolation transformer
- terminator
- each mounting post - common ground strap (max. 10 Ω earth ground connections at the start point, end point, and every 50 m (164 ft.) throughout each zone)
- power supply

System grounding is covered in each component installation subsection.

Processor enclosure

The Intelli-FIELD processor enclosure is a painted aluminum weatherproof NEMA-4, rated for outdoor installation. The lockable (lock not included) hinged, enclosure is 35.5 cm (14 in.) high, by 30.5 cm (12 in.) wide, by 17 cm (6.75 in.) deep. It can be post-mounted using enclosure mounting clamps (C7SP0500) or mounted on any solid surface.

Senstar-Stellar recommends that the processor enclosure be mounted on a post or structure near the start point of the Intelli-FIELD zone(s) on the protected side of the perimeter. The Intelli-FIELD processor can be retro-fitted into existing E-Field enclosures for system upgrades.

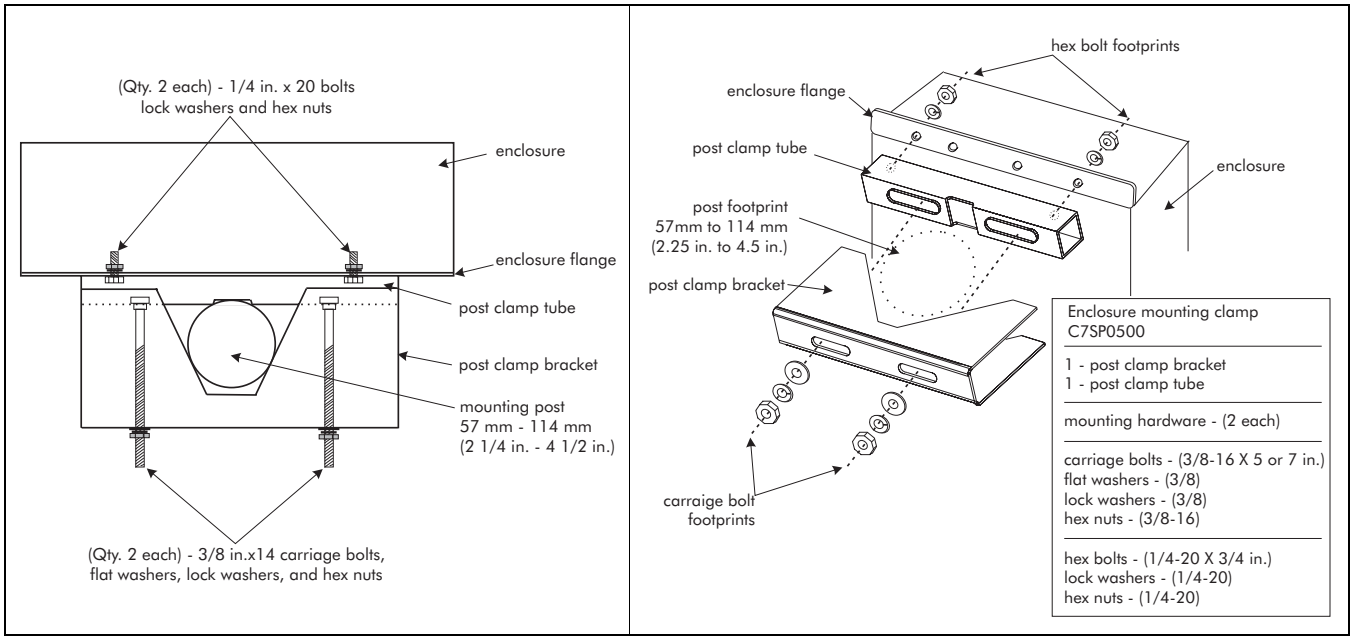


Figure 5-1 Post-mounting Intelli-FIELD enclosures

Hardware requirements

The mounting hardware for the Intelli-FIELD enclosure is specific to the mounting surface/structure.

- post mounting (57 to 114 mm (2.25 to 4.5 in.) O.D. steel post) - two enclosure mounting clamps plus four each hex-nuts, flat washers, lock washers and carriage bolts (C7SP0500 - Qty. 2)
- surface mounting - four 6.5 mm (1/4 in.) holes are provided on the enclosure flange for mounting the enclosure to a stable, fixed structure (surface mounting hardware is supplied by the installer)

Conduit

Conduit, and conduit fittings are supplied by the installer. There are two 28 mm (1.09 in.) cable entry ports on the enclosure's bottom for the interconnecting coaxial cables and alarm reporting wiring. The cable entry ports are suitable for 19 mm (3/4 in.) conduit and conduit fittings. The length of conduit required depends on the distance between the processor and isolation transformer enclosures, and between the processor and the alarm annunciation equipment. When selecting conduit, ensure that there is sufficient space for a total of six RG-59 mini coaxial cables (2.62 mm [0.103 in.] OD). The second conduit will contain up to twelve alarm communication wires.

A cable gland is provided on the enclosure's bottom for the power cable, and the ground wire. Depending on local electrical codes, a separate hole may have to be drilled in the bottom of the enclosure for the ground wire. In this case, the installer MUST take care not to damage the processor card when drilling the additional hole.

The cable entry ports and conduit at the enclosure must be sealed with non-conductive RTV sealant, to prevent insects from entering the enclosure and causing nuisance alarms.

The outside end of the conduit MUST be sealed with non-conductive RTV sealant to prevent water from entering the conduit. If water enters the conduit it will cause nuisance alarms and inconsistent detection.

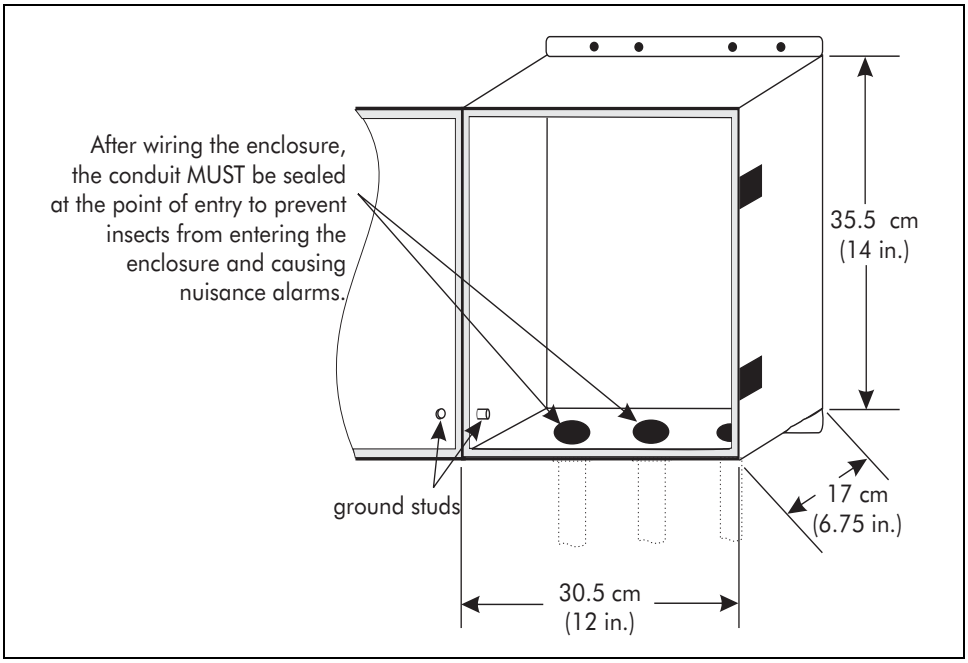


Figure 5-2 Processor enclosure

Enclosure ground

CAUTION *Do NOT use the fence post or mounting surface as an earth ground.*

The Intelli-FIELD processor requires a low resistance (10 Ω max.) earth ground connection.

Consult the local electrical code for grounding information and requirements.

1. Install a ground rod in close proximity to the enclosure's mounting location. Senstar-Stellar recommends using a zinc, or zinc-plated, ground rod, providing that it meets the local electrical code.
2. Measure and cut a suitable ground wire and pull the wire through the cable gland, or through an installer drilled hole. Senstar-Stellar recommends using a zinc ground wire, providing that it meets the local electrical code.
3. Connect one end of the wire to the ground rod and the other to the ground stud inside the enclosure.
4. Connect the ground stud on the enclosure to the ground stud on the enclosure's door.
5. Verify that the earth ground is 10 Ω or less.

Processor

The Intelli-FIELD processor is shipped mounted in a NEMA-4 rated weatherproof enclosure. The field generator crystal is shipped separately and must be installed in socket U8 before power is applied to the processor. The connections to the isolation transformer(s) are made with RG-59 mini coaxial cables fitted with BNC connectors, at one end (processor). The power and alarm connections are made on removable terminal blocks. The alarm relays are jumper-selectable as normally open or normally closed.

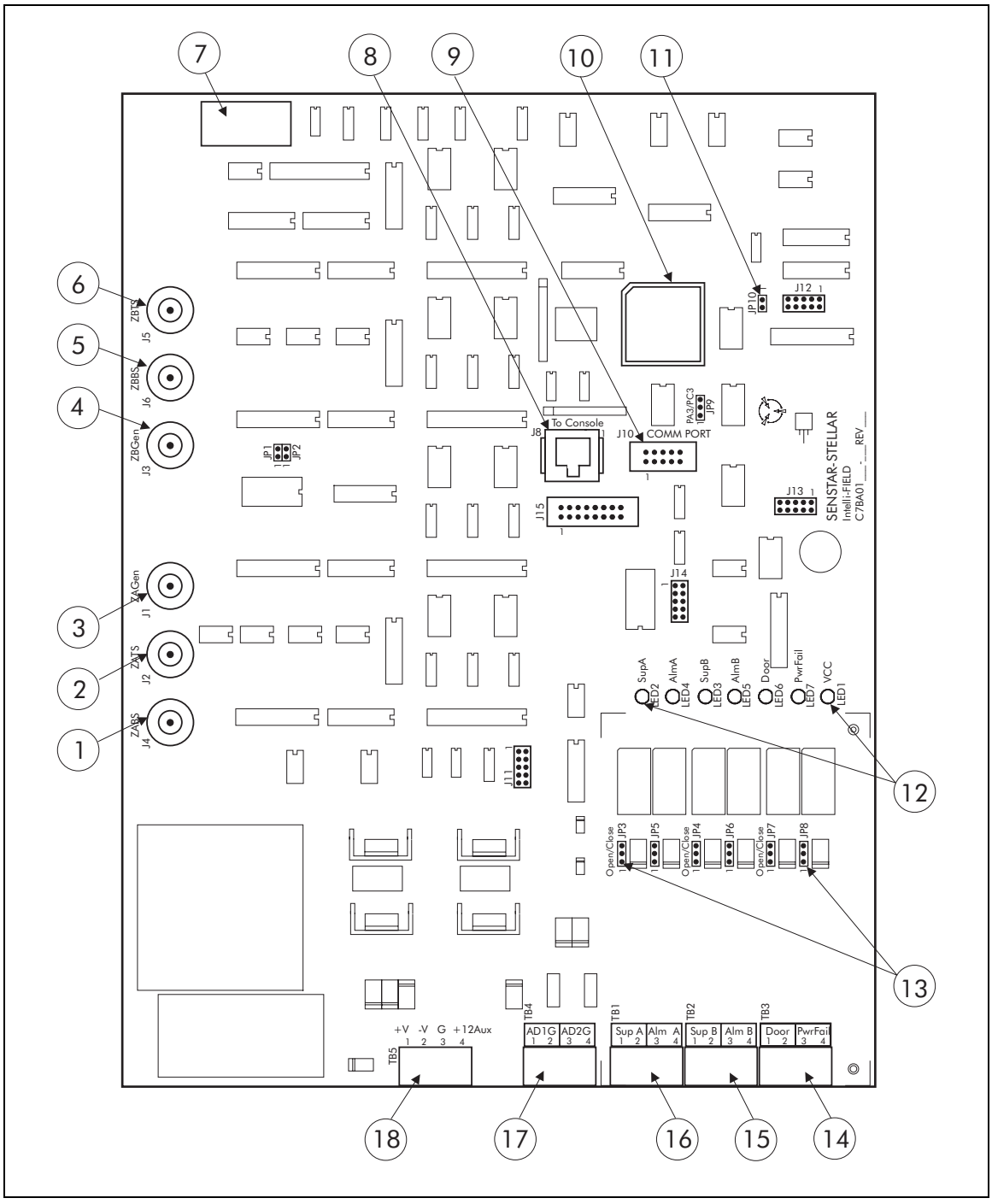


Figure 5-3 Processor card assembly

item	description	item	description
1	connector **J4** - Zone A bottom sense connect to **TB1 BOT** on Zone A Isolation Transformer	4	connector **J3** - Zone B field generator connect to **TB1 GEN** on Zone B Isolation Transformer
2	connector **J2** - Zone A top sense connect to **TB1 TOP** on Zone A Isolation Transformer	5	connector **J6** - Zone B bottom sense connect to **TB1 BOT** on Zone B Isolation Transformer
3	connector **J1** - Zone A field generator connect to **TB1 GEN** on Zone A Isolation Transformer	6	connector **J5** - Zone B top sense connect to **TB1 TOP** on Zone B Isolation Transformer
7	**U8** field generator crystal - adjacent zone processors require different operating frequencies; refer to the site plan for the correct operating frequency for each processor	14*	removable terminal block **TB3** pins 1 & 2-Door (Tamper alarm, output from relay K5) pins 3 & 4-PwrFail (main power source failure, output from relay K6 - fail-safe, relay energized when power is ON)
8	connector **J8** To Console connect to configuration module for setup and test functions (The tamper switch is bypassed when the configuration module is connected.)	15*	removable terminal block **TB2** pins 1 & 2-SupB (Zone B cable supervision alarm, output from relay K2) pins 3 & 4-AlmB (Zone B sensor alarm, output from relay K4)
9	connector **J10** - CommPort connect to StarNeT 1000 communication interface card (see appendix d for additional information)	16*	removable terminal block **TB1** pins 1 & 2-SupA (Zone A cable supervision alarm, output from relay K1) pins 3 & 4-AlmA (Zone A sensor alarm, output from relay K3)
10	**U76** - E^2 microprocessor	17*	removable terminal block **TB4** Self-test inputs (active low) - pins 1 & 2 - Zone A self-test input - pins 3 & 4 - Zone B self-test input
11	jumper **JP10** - pass mode jumper (used ONLY with processors that report to StarNeT 1000 systems AND use the auxiliary device inputs ADG1 & ADG2) - jumper OFF = normal operation (default setting) - jumper ON = pass mode Contact Senstar-Stellar for details	18	removable terminal block **TB5**, input power Only 1 input power option can be used. 12 VDC power option - pin 3 - VDC, pin 4 +12 VDC 24 VDC power option - pin 1 +12 VDC, pin 2 -12 VDC auxiliary power output - 12 VDC @ 300 mA - pin 3 ground, pin 4 +12 VDC 48 VDC power option - pin 1 +24 VDC, pin 2 -24 VDC auxiliary power output - 12 VDC @ 300 mA - pin 3 ground, pin 4 +12 VDC
12	indicator LEDs: LED1 VCC (green) - LED ON = main power ON LED2 SupA (yellow) - LED ON = Zone A cable supervision alarm LED3 SupB (yellow) - LED ON = Zone B cable supervision alarm LED4 AlmA (red) - LED ON = Zone A sensor alarm LED5 AlmB (red) - LED ON = Zone B sensor alarm LED6 Door (yellow) - LED ON =tamper alarm LED7 PwrFail (yellow) - LED ON = main power source failure, operating on backup power		
13	relay jumpers: install a shunt on pins 1 & 2 for normally open (normally open contact opens to indicate an event) install a shunt on pins 2 & 3 for normally closed (normally closed contact closes to indicate an event) JP3 = K1 = SupA JP6 = K4 = AlmB JP5 = K3 = AlmA JP7 = K5 = Door (Tamper) JP4 = K2 = SupB JP8 = K6 = PwrFail	The following jumpers and connectors are used for factory testing or are factory installed and should NOT be used or removed: jumpers - JP1, JP2, JP9 connectors - J7, J9, J11, J12, J13, J14	

* The listed functions apply to standalone Intelli-FIELD processors, and to StarNeT 1000 connected processors that use the Local Aux Control default setting (see Appendix d for additional information).

Unpacking and inspection

The Intelli-FIELD processor contains static sensitive components. Follow anti-static grounding procedures when handling the card.

Keep the field generator crystal in the protective packaging until you are ready to install it.

Do not remove the processor card from the enclosure during installation.

Perform a visual inspection of the packaging, enclosure and processor card to ensure that no damage occurred during shipping.

Installation

Install the field generator crystal in socket U8 on the processor card.

Processor grounding

The Intelli-FIELD processor must be properly grounded.

Verify the ground connection between the processor card's ground plane (mounting holes on the card) and the ground stud on the mounting plate.

Verify that the earth ground is 10 Ω or less. (Consult the local electrical codes for grounding requirements.)

Isolation transformer enclosure

The isolation transformer enclosure is a weather-proof NEMA-4, rated for outdoor installation. The lockable (lock not included) hinged, painted aluminum enclosure is 20 cm (8 in.) high, by 15 cm (6 in.) wide, by 12 cm (4.75 in.) deep. It can be post-mounted using enclosure mounting clamps (C7SP0500) or mounted on any solid surface. Generally, the isolation transformers are mounted on the start point mounting posts.

Although the isolation transformer should be mounted directly at the start point of the zone, it does not have to be mounted near the processor to which it is connected. If the isolation transformer is mounted away from the processor due to site requirements, refer to the *Coaxial cable capacitance* on page 8-1 for maximum allowable cable runs.

Hardware requirements

The mounting hardware for the isolation transformer enclosure is specific to the mounting surface/structure.

- post mounting (57 to 114 mm (2.25 to 4.5 in.) O.D. steel post) - two enclosure mounting clamps plus four each hex-nuts, flat washers, lock washers and carriage bolts (C7SP0500 - Qty. 2) refer to Figure 5-1
- surface mounting - four 6.5 mm (1/4 in.) holes are provided on the enclosure flange for mounting the enclosure to a stable, fixed structure (surface mounting hardware is supplied by the installer)

Two cable entry ports are provided for the interconnecting coaxial cables. One conduit requires sufficient space for three coaxial cables (to the processor) and a ground wire. The second conduit requires space for four coaxial cables (to the start point sensor wires). The conduit must be sealed at the point of entry with non-conductive sealant, to prevent insects from entering the enclosure and causing nuisance alarms. The outside end of the conduit must be sealed with non-conductive RTV sealant to prevent water from entering the conduit.

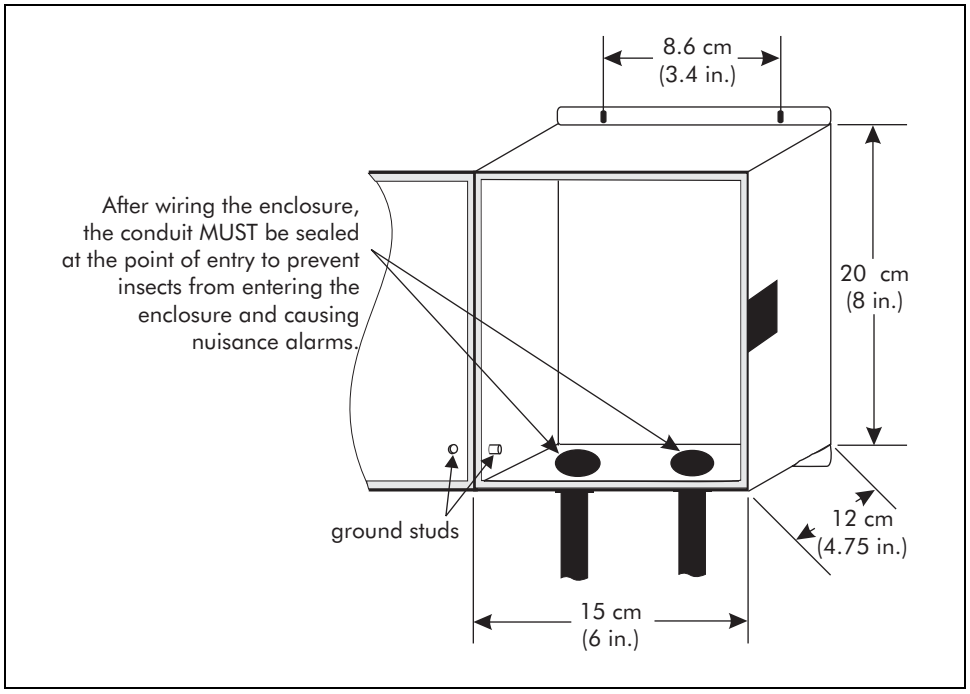


Figure 5-4 Isolation transformer enclosure

Enclosure ground

CAUTION	*Do NOT use the fence post or mounting surface as an earth ground.*

Consult the local electrical code for grounding information and requirements.

1. Install a ground rod in close proximity to the enclosure's mounting location. Senstar-Stellar recommends using a zinc, or zinc-plated, ground rod, providing that it meets the local electrical code.
2. Measure and cut a suitable ground wire and pull the wire through the conduit on the left side of the enclosure (near the ground stud). Senstar-Stellar recommends using a zinc ground wire, providing that it meets the local electrical code.
3. Connect one end of the wire to the ground rod and the other to the ground stud inside the enclosure.
4. Connect the ground stud on the enclosure to the ground stud on the enclosure's door.
5. Verify that the earth ground is 10 Ω or less.

Isolation transformer

The isolation transformer serves as the electrical interface between the processor and the Intelli-FIELD sensor wires. It electrically isolates (with respect to ground) the signals from the sensor wires. The isolation transformer also provides lightning and transient protection. The isolation transformer requires a 10 Ω (maximum) earth ground connection.

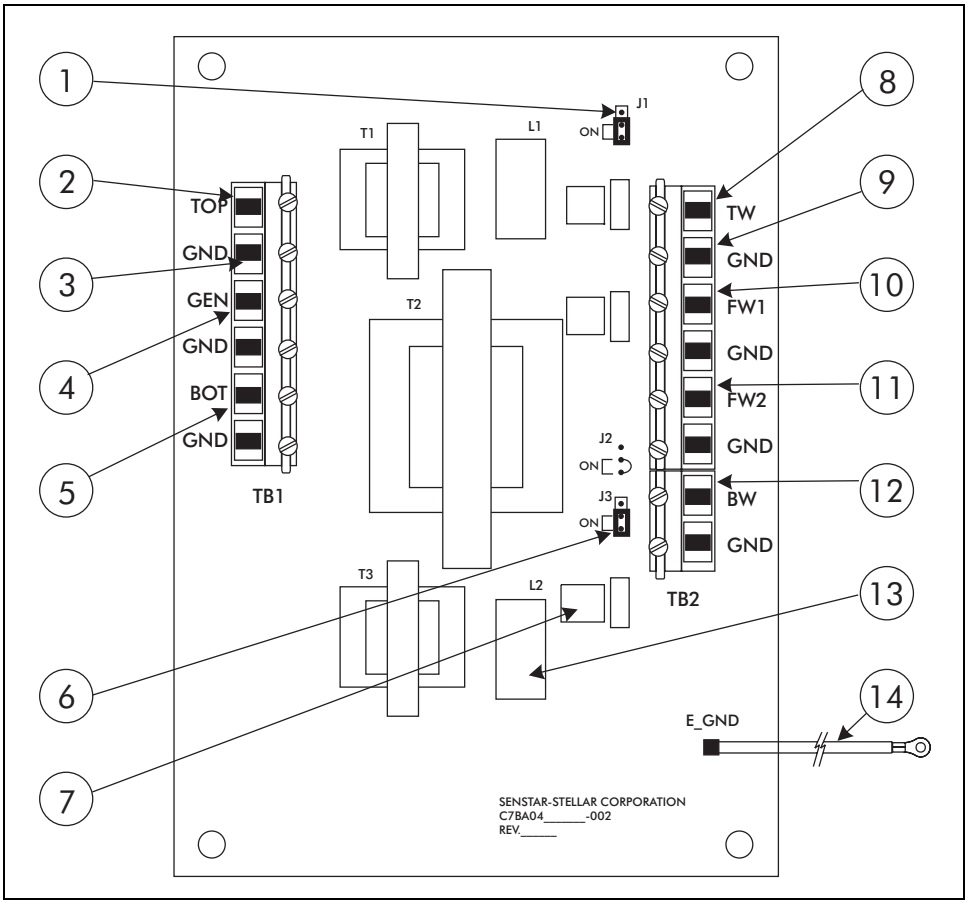


Figure 5-5 Isolation transformer card

item	description	item	description
1	jumper **J1** - top sense wire EMI-filter; shunt in the ON position enables filter; default setting - shunt in the ON position; DO NOT adjust this shunt setting without first consulting Senstar-Stellar Customer Service	8	TB2 TW - top sense wire connection to sensor zone; connect coaxial cable shield ground wire to adjacent TB2 terminal (GND)
2	TB1 TOP - top sense wire connection to processor; connect coaxial cable center conductor from (Zone A - J2) or (Zone B - J5); connect coaxial cable shield ground wire to adjacent TB1 terminal (GND)	9	TB2 GND - there is a signal ground connection for each isolation transformer/sensor zone connection (coaxial cable shield): • top sense wire • field generator wire(s) (1 and 2) • bottom sense wire connect the coaxial cable shield ground wire to the adjacent TB2 GND terminal for each isolation transformer/sensor zone connection
3	TB1 GND - there is a signal ground connection for each processor/isolation transformer connection (coaxial cable shield): • top sense wire (Zone A - J2; Zone B - J5) • field generator wire (Zone A - J1; Zone B - J3) • bottom sense wire (Zone A - J4; Zone B - J6) connect the coaxial cable shield ground wire to the adjacent TB1 GND terminal for each processor/isolation transformer connection	10	TB2 FW1 - upper field generator wire connection to sensor zone; connect coaxial cable shield ground wire to adjacent TB2 terminal (GND)
4	TB1 GEN - field generator wire connection to processor; connect coaxial cable center conductor from (Zone A - J1) or (Zone B - J3); connect coaxial cable shield to adjacent TB1 terminal (GND)	11	TB2 FW2 - lower field generator wire connection to sensor zone; connect coaxial cable shield ground wire to adjacent TB2 terminal (GND)
5	TB1 BOT - bottom sense wire connection to processor; connect coaxial cable center conductor from (Zone A - J4) or (Zone B - J6); connect coaxial cable shield to adjacent TB1 terminal (GND)	12	TB2 BW - bottom sense wire connection to sensor zone; connect coaxial cable shield ground wire to adjacent TB2 terminal (GND)
6	jumper **J3** - bottom sense wire EMI-filter; shunt in the ON position enables filter; default setting - shunt in the ON position; DO NOT adjust this shunt setting without first consulting Senstar-Stellar Customer Service	13	on board EMI filter - qty 2 (L1 and L2)
7	on-board lightning arrestor - qty. 3 per card	14	ground harness for earth ground connection - connects to enclosure ground stud

Isolation transformer grounding

There are two separate ground planes on the isolation transformer, signal ground and earth ground. The isolation transformer signal ground is connected to the processor signal ground via the shields of the interconnecting coaxial cables. The earth ground harness (Figure 5-5 item 14) is connected to the ground stud on the isolation transformer enclosure.

If the processor is installed at a considerable distance from the isolation transformer, it may be necessary to connect the isolation transformer signal ground to a separate ground rod. Please contact Senstar-Stellar Customer Service for more information.

Verify that the isolation transformer's earth ground connection is 10 Ω, or less.

Mounting post grounding

All of the fence posts in both fence-mounted and free-standing Intelli-FIELD sensor zones MUST be connected to a common ground strap. The ground strap should be zinc strapping (SSC part no. C7SP0600 - 67 m (220 ft.) roll 0.033 gauge, 0.433 width, alloy 75, see appendix a). The ground strap must be securely fastened to each fence post, as close to the ground as possible. Zinc-plated steel conduit hangers should be used to attach the zinc strapping to the fence posts. The conduit hangers must be selected to fit tightly on the mounting posts.

Conduit hangers that are specified to fit a 7.6 cm (3 in.) EMT conduit are TOO LARGE to fit tightly on a 7.6 cm (3 in.) OD post (e.g., for a 7.6 cm O.D. post select conduit hangers that are specified for 6.4 cm (2.5 in.) EMT conduit).

Alternatively, the ground strap can be CAD-welded to the posts and ground rods. The zinc strapping must be connected to properly installed ground rods (10 Ω max.) at the start point, end point, and every 50 m (164 ft.) throughout the zone. Zinc or zinc-plated hardware should be used to prevent potential ground loops and current flow (battery effect) which will interfere with the operation of the Intelli-FIELD system. Do NOT use copper wire to connect the ground strap to the ground rods.

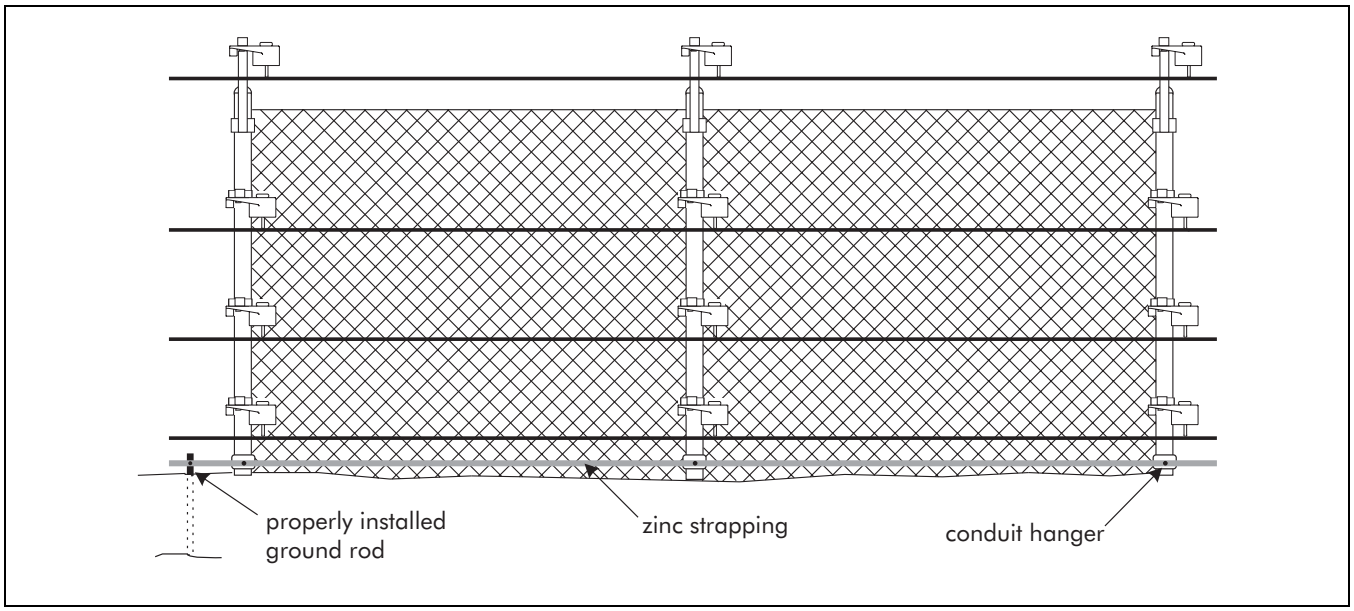


Figure 5-6 Fence post grounding

Mounting post grounding procedure

Install the ground strap on the mounting posts, as close to ground level as possible.

The mounting post earth ground connection MUST be 10 Ω or less.

All materials used for mounting post grounding MUST be zinc, zinc-plated, or galvanized steel.

Equipment required for mounting post grounding:
ground rods (Use galvanized steel or zinc/zinc-plated ground rods for mounting post grounding. The number of ground rods required depends on the configuration and size of the Intelli-FIELD system.)
zinc strapping - for ground strap (SSC part no. C7SP0600 - 67 m (220 ft.) roll 0.033 gauge, 0.433 width, alloy 75, see appendix a) (The length of zinc strapping required is equal to the length of the Intelli-FIELD sensor zones.)
conduit hangers - to connect the zinc strapping to the mounting posts (Conduit hangers must be zinc, or zinc-plated, include zinc-plated hardware, and be just large enough to fit tightly on the posts. Conduit hangers specified for a 6.4 cm (2½ in.) conduit will generally fit a 7.6 cm (3 in.) OD post.)
zinc-plated mounting hardware for connecting the zinc strapping to the conduit hangers - 1 set of hardware is required for each conduit hanger (#20 x 1/2 in. bolt, 3 flat washers, 1 lock washer, 1 nut)
a battery operated drill and drill bits for metal OR a number 5 junior punch with 4 mm (5/32 in.) bit (for making the holes to connect the zinc strapping to the mounting posts)

1. Install a zinc-plated or galvanized steel ground rod at the start point of the sensor zone.
2. Connect the zinc ground strap (SSC part no. C7SP0600 - 67 m (220 ft.) roll 0.033 gauge, 0.433 width, alloy 75, see appendix a) to the ground rod.
3. Pull the ground strap tightly to the start point mounting post and mark the strap where it intersects the center of the mounting post.
4. Drill, or punch, a 4 mm (5/32 in.) hole in the ground strap at the point of the mark. (The hole must have a suitable diameter for the hardware that will be used to connect the ground strap to the conduit hanger.)
5. Connect the ground strap to the conduit hanger.
6. Attach the conduit hanger to the mounting post, as tightly and as close to the ground as possible.
7. Pull the zinc strap to the next mounting post and repeat the procedure. Continue the procedure for each mounting post in the zone.
8. There must be at least one ground rod every 50 m (164 ft.) throughout the sensor zone. Additional ground rods are required at the start point and end point of the zone.

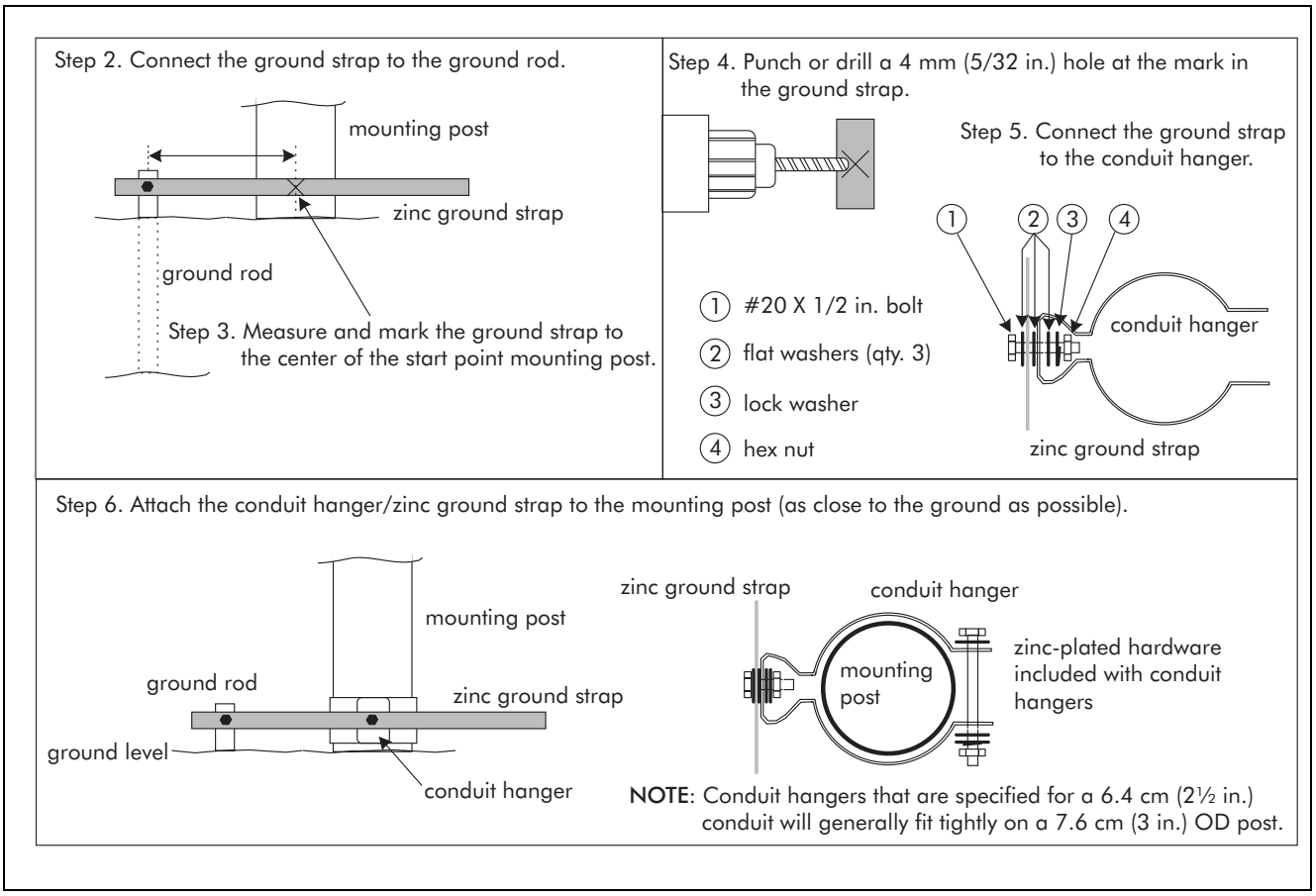


Figure 5-7 Grounding the mounting posts

Fence-mounted perimeter hardware

Ensure that the fence meets the minimum Intelli-FIELD requirements (Chapter 4, Preparing the site) before beginning the installation.

All fence posts in each zone MUST be connected to a common ground strap.

The maximum O.D. of a tensioning fence post is 7.6 cm (3 in.). The maximum O.D. of an interim fence post is 6 cm (2 3/8 in.)

Mounting bracket considerations

- each point (start, corner, tension, interim and end) in a 4-wire Intelli-FIELD installation includes three 90º mounting brackets and one 45º mounting bracket
- yokes and spacers are used ONLY when the mounting brackets are on the same side of the fence post as the fence fabric (Yokes and spacers keep the mounting brackets away from the fence fabric.)

- an adjacent zone bracket is required at points where two zones physically meet (EP to EP; SP to SP; or SP to EP)

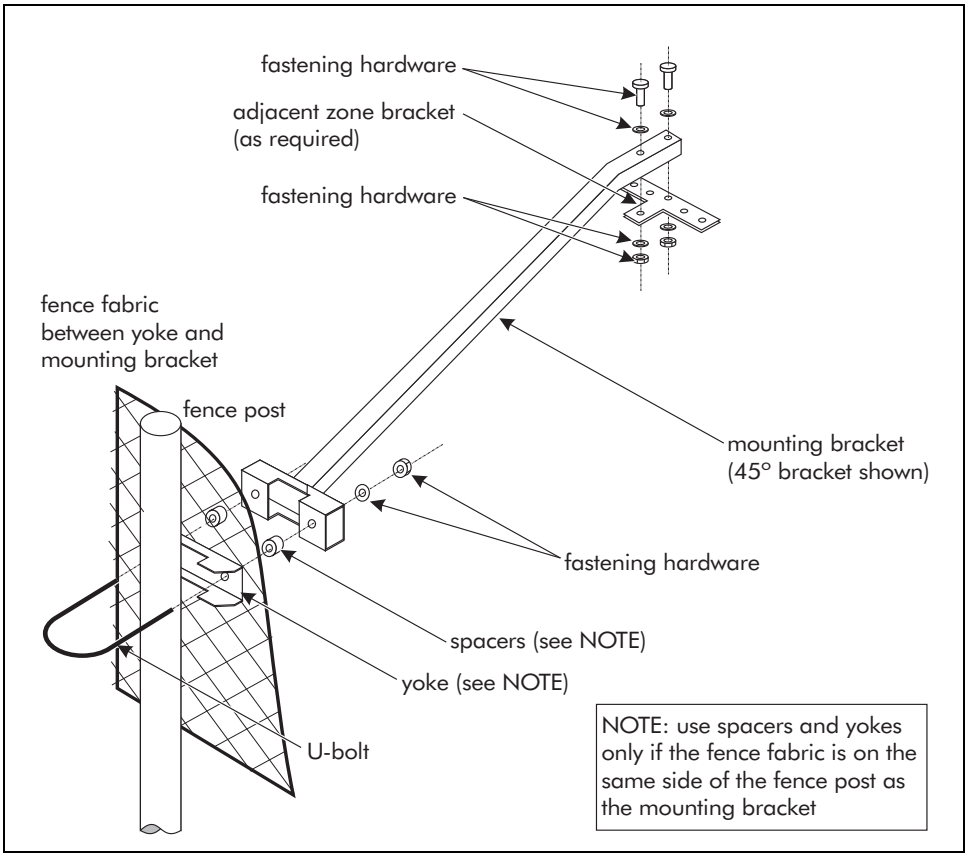


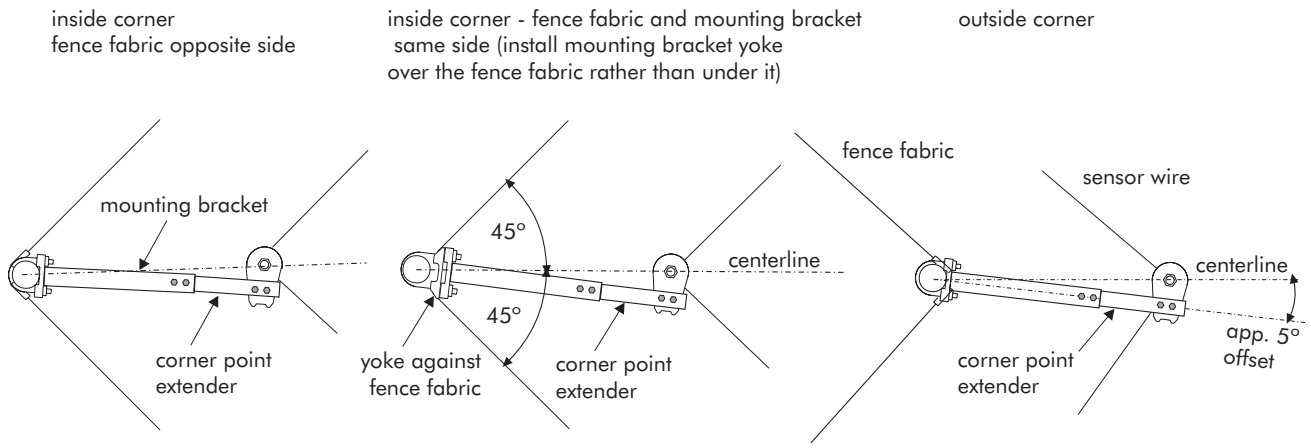
Figure 5-8 Fence-mounted hardware (fence fabric on same side)

Adjacent zone mounting bracket considerations

When adjacent zone brackets are used, the sensor wires from the two separate sensor zones MUST overlap slightly, to prevent an area of low detection sensitivity (dead zone) in the area of the dual zone mounting post. At adjacent zones, the sensor wire to coaxial cable splice-connections are made so that the sensor wires from the two zones overlap. The sensor wire overlap provides detection coverage in the area of the adjacent zone mounting post.

Corners point considerations

Uniform spacing between the fence fabric and the sensor wires is necessary for consistent detection sensitivity.



Use corner point extenders to maintain consistent sensor wire to fence fabric spacing at corners.
Slide the extender into the mounting bracket and adjust the length of the extender (inside the mounting bracket) so that the sensor wires will be evenly spaced from the fence fabric on both sides of the corner.
(The length of the extension required depends on the angle of the corner.)
Once the length of the extension is determined, drill one or two holes through the extender (use the 2 holes on the end of the mounting bracket as a drilling template) and use the supplied hardware to attach the extender to the mounting bracket.
Attach the tension insulator to the two predrilled holes at the outside end of the extender.
Use a slight offset (app. 5°) between the mounting bracket/extender assembly and the perpendicular centerline at the corner.
Align the bracket, by eye, so that the steel insert on the tension insulator is on the corner's perpendicular centerine.

Figure 5-9 Corner point mounting bracket installation

Mounting bracket installation (4-wire fence-mounted)

Consistent wire spacing throughout the installation is essential to the performance of the Intelli-FIELD system.

The bottom sensor wire MUST NOT be more than 20 cm (8 in.) above the ground at any point in the installation. Otherwise, crawl under intrusion attempts may go undetected at that point.

Senstar-Stellar recommends the following wire spacing. If special circumstances require the use of different wire spacing, contact Senstar-Stellar Customer Service.

Install the mounting brackets and insulators on one fence post so that the wire spacing is as follows (see Figure 5-10):

- bottom field wire - 20 cm (8 in.) above the ground
- lower sense wire - 60 cm (24 in.) above the bottom field wire
- upper field wire - 75 cm (30 in.) above the lower sense wire
- top sense wire - 90 cm (36 in.) above the upper field wire

Install the mounting brackets and insulators on one fence post in accordance with the wire spacing recommendations. Mark the levels of the mounting bracket U-bolts on a 2.5 m (8 ft.) length of lumber. Use the marked lumber as a template when installing the mounting brackets on the remaining posts.

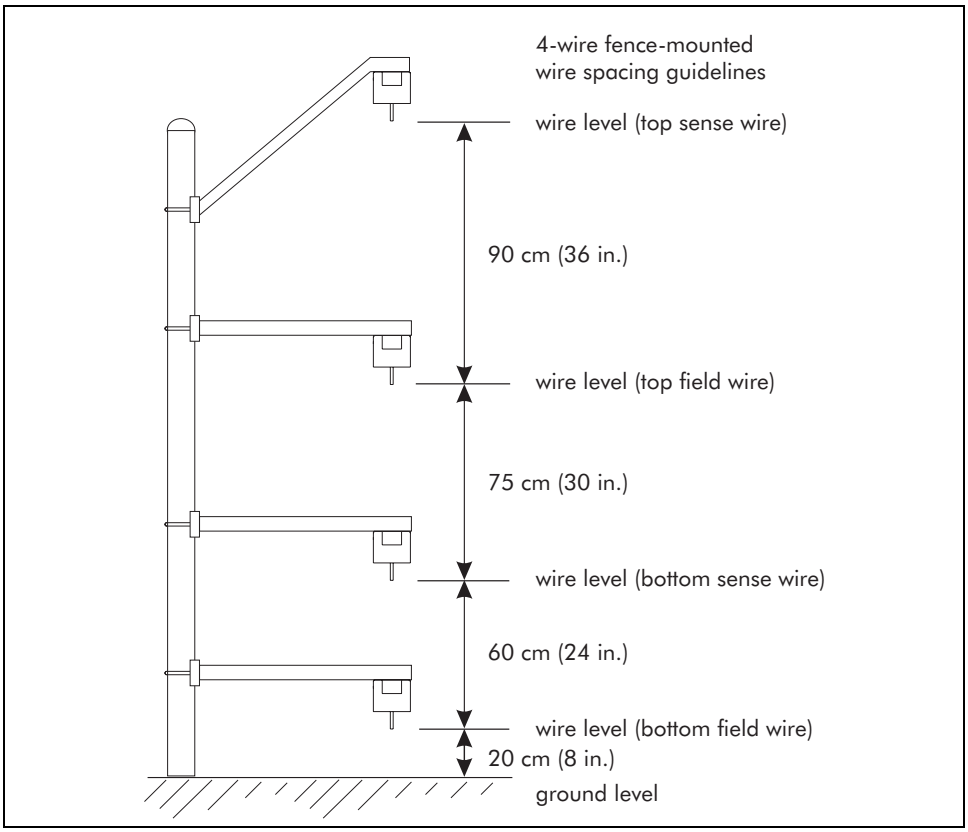


Figure 5-10 Fence-mounted bracket installation - wire spacing

Installing insulators on mounting brackets

Insulator considerations

- use powder coated insulators in harsh weather environments
- install tension insulators at all start, tension, corner and end points
- install interim insulators at all Interim points
- on fence-mounted installations, the start point and end point insulator housings face each other
    - all other insulators in the zone should face the same direction as the start point insulator

- on free-standing installations, the insulator housings must be perpendicular to the perimeter with all housings on the same side of the perimeter line

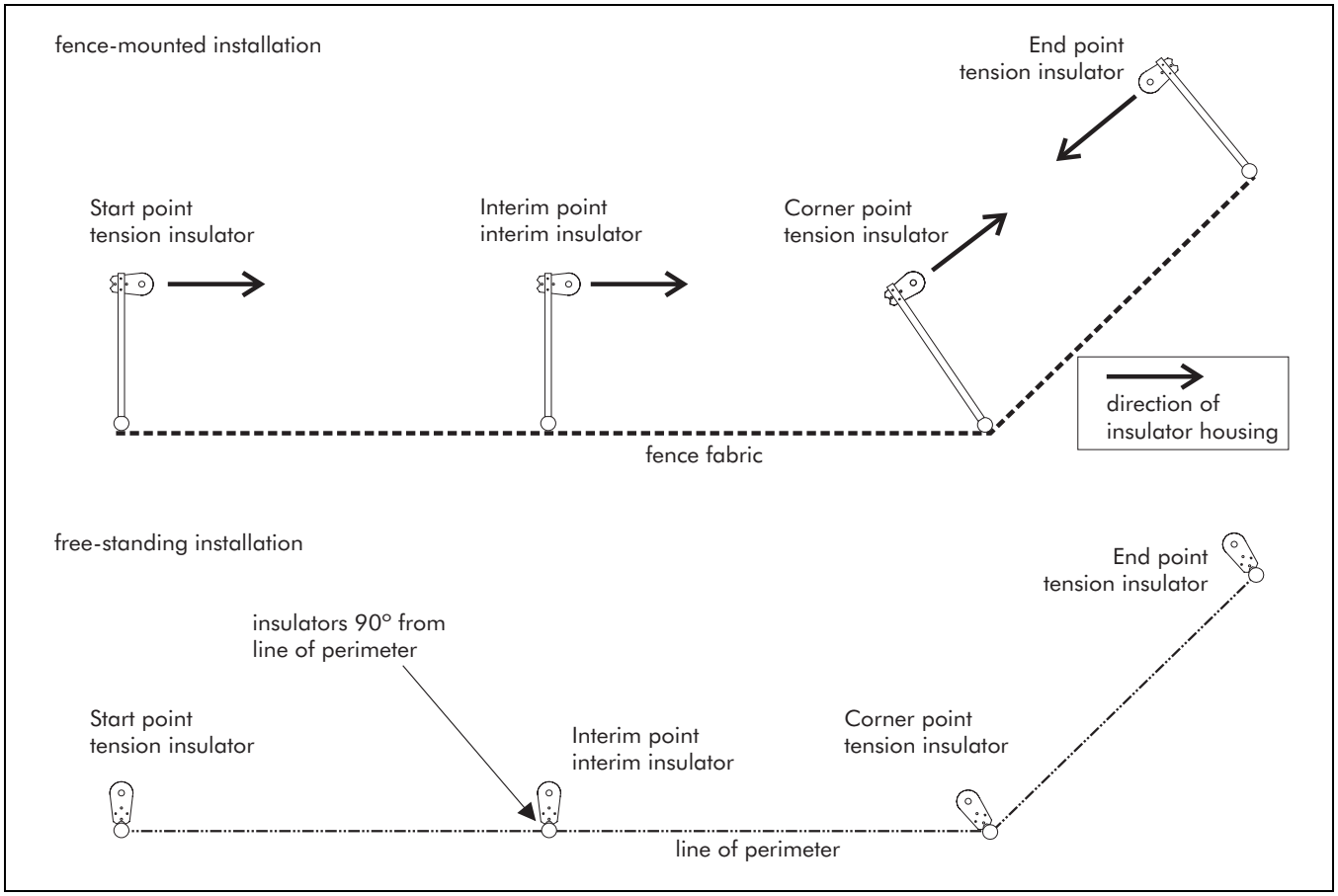


Figure 5-11 Installing insulators

Installing bracket-mounted insulators

Ensure that the sensor wire spacing follows the requirements outlined in mounting bracket installation.

The start point and end point insulator housings face each other.

All other insulators in the zone face the same direction as the start point insulator.

Secure the insulators to the mounting brackets using the supplied fastening hardware (see Figure 5-12).

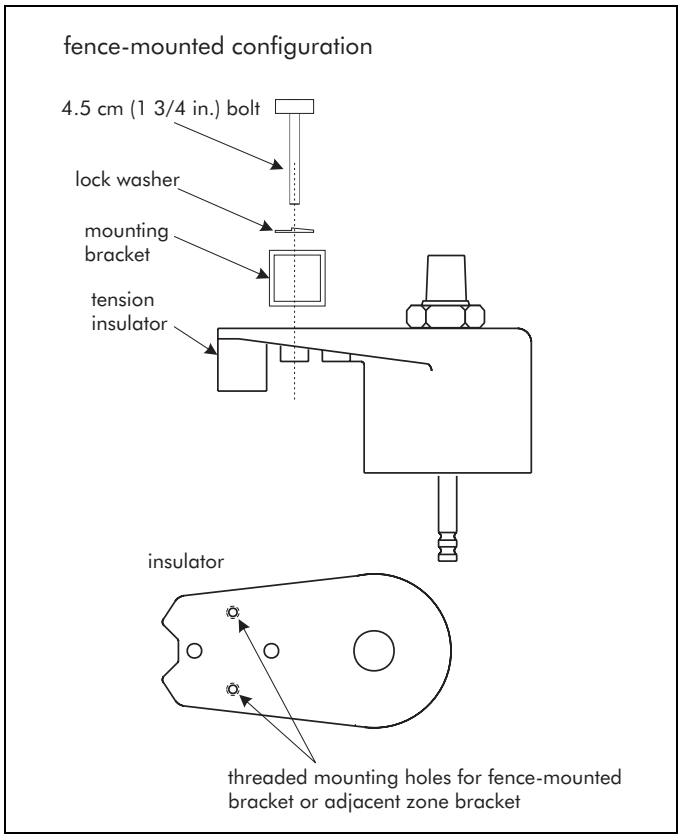


Figure 5-12 Fence-mounted insulators

Free-standing perimeter hardware

Free-standing considerations

The maximum O.D. of a free-standing tensioning mounting post is 7.6 cm (3 in.). The maximum O.D. of an interim mounting post is 6 cm (2 3/8 in.).

- use galvanized steel posts for free-standing installations

Post type	Length	Outside diameter	Wall thickness (schedule 40 steel)
Start point Tension point End point Corner point	3 m (10 ft.)	7.6 cm (3 in.) max.	5.2 mm (0.203 in.)
Interim	3 m (10 ft.)	6.0 cm (2 3/8 in.) max.	3.9 mm (0.154 in.)

The maximum spacing between interim support posts is 6 m (20 ft.). In severe weather conditions (i.e., heavy ice and snow or strong wind) space the posts 3 m (10 ft.) apart. Interim support posts should also be used, as required, for low hills and shallow depressions to maintain consistent ground to wire spacing.

For zones over 100 m (328 ft.) and zones with multiple direction changes, tension points should be installed at 50 m (164 ft.) intervals, throughout the zone.

Either corner points or tension points must be used for changes in horizontal or vertical direction greater than 20º.

Make sure that all metal attachments on each post are securely fastened.

Fence post common ground strap

All free-standing posts within a zone must be connected to a common ground strap. The ground strap must be connected to a properly installed ground rod (see *Mounting post grounding* on page 5-12).

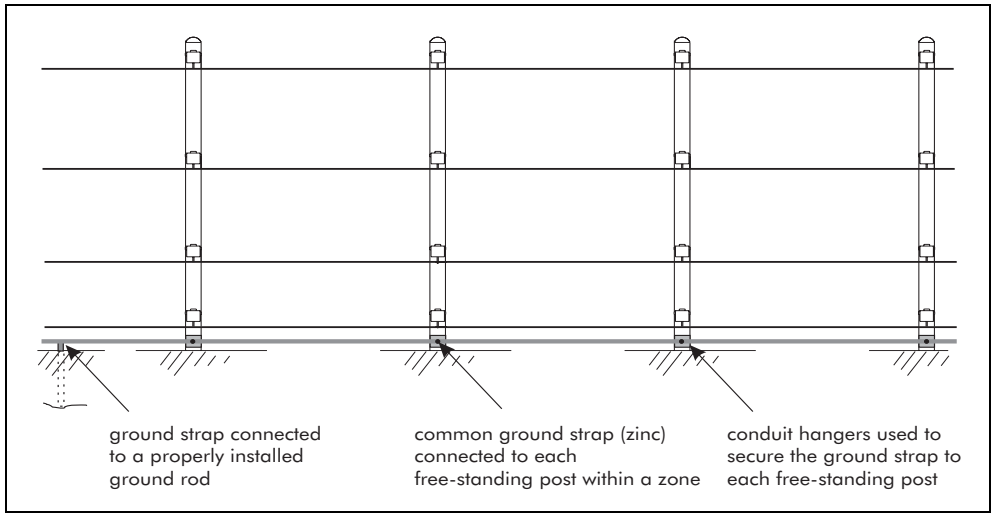


Figure 5-13 Common ground strap

Post installation

Post installation is largely dependent on site-specific environmental conditions and requirements. The type of soil, weather conditions, number of wires and length of the posts must be taken into consideration. Senstar-Stellar recommends engaging a local fencing contractor for the installation of the posts, or to verify the suitability of existing posts. The maximum O.D. of tensioning posts is 7.6 cm (3 in.). The maximum O.D. of interim posts is 6 cm (2 3/8 in.).

Installing insulators on free-standing posts

Consistent wire spacing throughout the installation is essential to the performance of the Intelli-FIELD system.

The bottom wire MUST NOT be more than 20 cm (8 in.) above the ground at any point in the installation. Otherwise, crawl under intrusion attempts may go undetected at that point.

Senstar-Stellar recommends the following wire spacing. If special circumstances require the use of different wire spacing, contact Senstar-Stellar Customer Service.

Install the insulators on one fence post so that the wire spacing is as follows:

- bottom field wire - 20 cm (8 in.) above the ground
- bottom sense wire - 40 cm (16 in.) above the bottom field wire
- top field wire - 60 cm (24 in.) above the lower sense wire
- top sense wire - 80 cm (32 in.) above the upper field wire

Install the insulators on one fence post in accordance with the wire spacing recommendations. Mark the levels of the mounting bracket clamps on a 2.5 m (8 ft.) length of lumber. Use the marked lumber as a template when installing the clamps on the remaining posts.

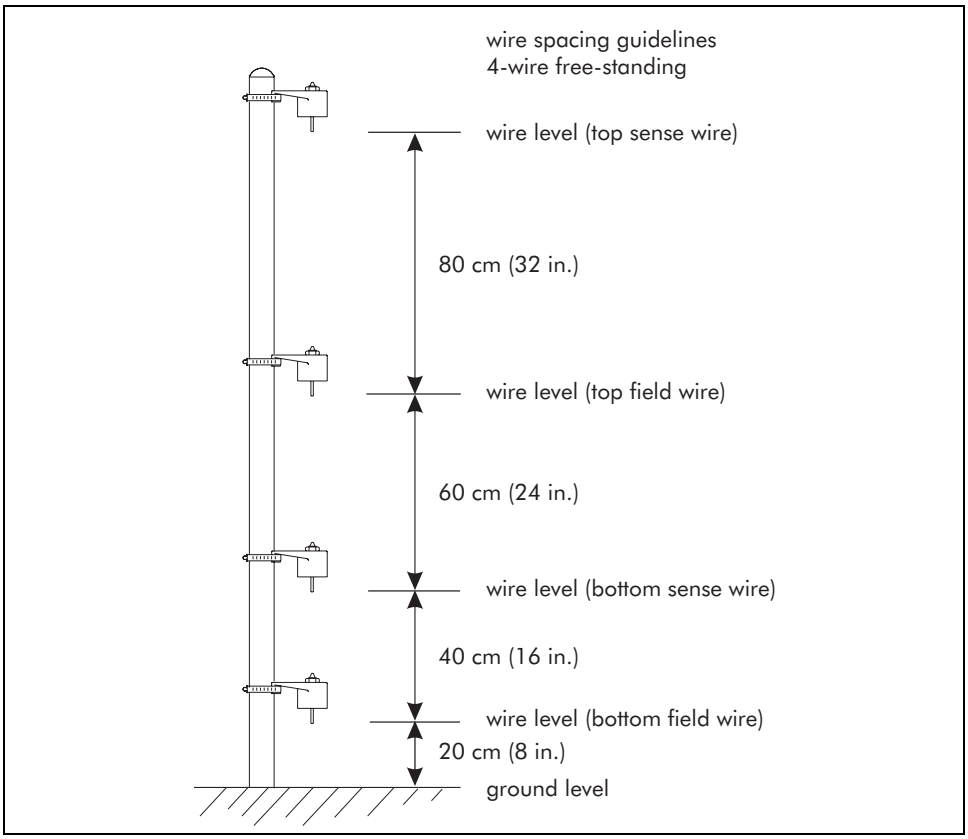


Figure 5-14 Free-standing mounting bracket locations

Free-standing

Secure the insulators to the free-standing posts using the supplied mounting clamps. Ensure that the sensor wire spacing follows the recommendations outlined in mounting bracket installation (see Figure 5-14).

The insulator housings must be perpendicular to the perimeter with all housings on the same side of the perimeter line (see Figure 5-11).

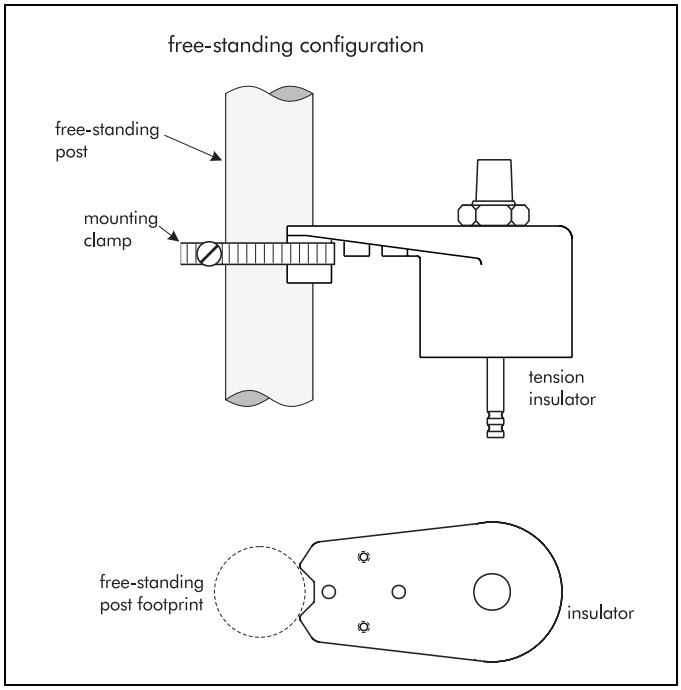


Figure 5-15 Free-standing insulators with mounting clamps

Roof-mounted applications

If you are considering an Intelli-FIELD roof-top installation please contact Senstar-Stellar Customer Service for additional information.

The mounting surface for a roof-mounted installation must provide an adequate ground reference for proper system operation. If the roofing material is not electrically conductive, an adequate ground reference cannot be established. This condition may result in inconsistent detection and nuisance alarms.

Establish a ground plane by securing conductive, galvanized wire mesh fencing to the roof. The ground plane must be electrically connected to earth ground, and should extend a minimum of 90 cm (3 ft.) on each side of the sensor wires. If the minimum ground plane width cannot be established due to site considerations, install a short test section to evaluate the system's performance.

The mounting posts must be securely anchored to the roof and be capable of withstanding the 16 kg (35 lb) tension per wire {64 kg (140 lb} for 4 wires). Each post must be connected to the ground plane. Use the type of posts and post spacing outlined in Free-standing installations.

After the ground plane is established and the mounting posts are installed, the system wiring can be installed. Follow the instructions in the Free-standing perimeter hardware section to install roof-mounted hardware.

Wall-mounted perimeter hardware

The vertical wall-mounted application uses custom wall-mounting brackets to attach the sensor wires to the side of a structure. Wire spacing is determined by the mounting brackets. Wire tension is 16 kg (35 lb.).

A ground plane is required beneath the sensor wires for vinyl, plastic and other non-conductive wall surfaces. Create the ground plane by securing conductive, galvanized wire mesh fencing to the wall. The ground plane must be electrically connected to earth ground, and should extend a minimum of 90 cm (3 ft.) on each side of the sensor wires. If the minimum ground plane width cannot be established, install a short test section to evaluate the system's performance.

Interim support hardware should be installed at 6 m (20 ft.) maximum intervals, under normal conditions. Tension point spacing follows the standard fence-mounted guidelines. Please contact Senstar-Stellar Customer Service when this configuration is being planned.

Vertical wall-roof-mounted

The vertical wall-roof-mounted application requires a combination of installation techniques. Please contact Senstar-Stellar Customer Service when this configuration is being planned.

3-wire wall topper

The 3-wire wall topper is a special Intelli-FIELD configuration that uses 45º mounting brackets to mount a 3-wire Intelli-FIELD system around the circumference, or across the side of a building or structure. This configuration can be mounted at any level on the side of a structure, and is ideal to provide electronic intrusion protection for windows, or roof-tops.

Interim support hardware should be installed at 6 m (20 ft.) maximum intervals, under normal conditions. Tension point spacing follows the standard fence-mounted guidelines. Please contact Senstar-Stellar Customer Service when this configuration is being planned.

Contour wall-mounted

The contour wall-mounted application provides coverage for the top of a wall or structure that features stepped increases in height. For example, a wall built over a hill. For high steps in wall height the lower section of the wall is covered with a standard installation. At the step, a tension point is installed on a longer post. The four sensor wires are connected to a second set of insulators (without splicing) that are installed at the correct spacing for the height of the next step. This is repeated at each step, providing uniform coverage for the entire wall.

For short steps in height, angled mounting can be used with either regular interim points or corner points. However, when angled mounting is used the triangular area at the base of the step may be vulnerable to intrusion. This can be prevented by filling in the triangular area with bricks or concrete.

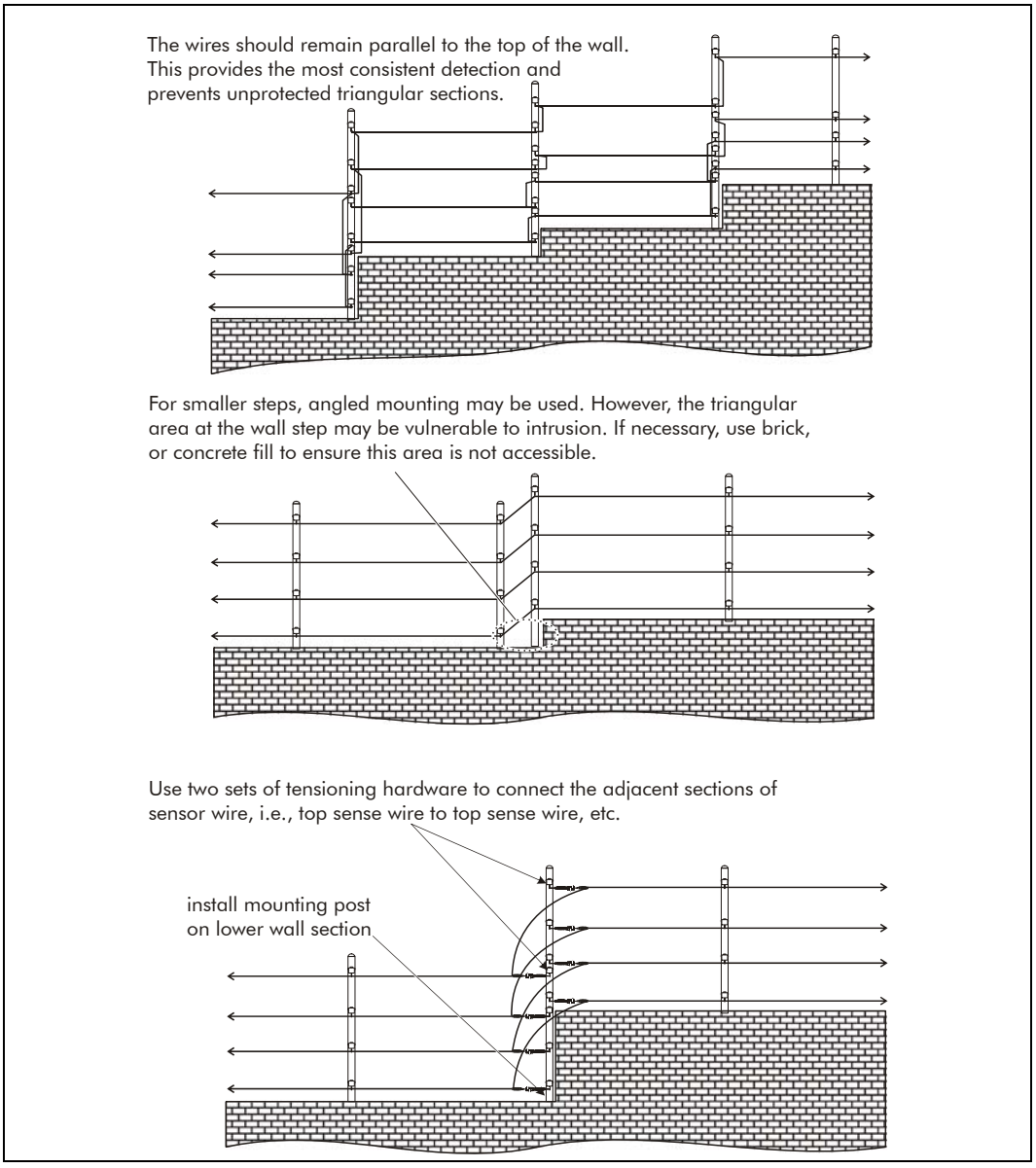


Figure 5-16 Contour wall-mounted application

6 Retro-fit applications

This section details the installation instructions for retro-fitting Intelli-FIELD components into E-Field systems.

Contact Senstar-Stellar Customer Service BEFORE retro-fitting Intelli-FIELD components into E-Field systems.

Retro-fitting Intelli-FIELD to E-Field®

The following E-Field components must be replaced with Intelli-FIELD components:

E-Field component		Intelli-FIELD component
processor	◄►	processor
sense filter	◄►	isolation transformer
power supply	◄►	power supply
terminator	◄►	terminator
coaxial cable terminations	◄►	BNC connectors (at processor)
system grounding	◄►	system grounding

Senstar-Stellar strongly recommends changing the E-Field start and tension point hardware configurations and all splice-connections to the Intelli-FIELD start and tension point configurations and splice-connections.

There is an E-Field tensioning hardware upgrade kit (C7KT1700) and an E-Field splice-connection upgrade kit (C7KT1800) available for converting E-Field tension points and splice-connections into Intelli-FIELD tension points and splice-connections. The following table includes the tensioning hardware upgrade kit, and the splice-connection upgrade kit components:

C7KT1700			C7KT1800		
Qty.	**P.N.**	**Description**	**Qty.**	**P.N.**	**Description**
1	C7KT1600	Intelli-FIELD® splice-connection kit	1	C7KT1600	Intelli-FIELD® splice-connection kit
1	H0919	end cap	1	H0919	end cap
1	T0787	mounting clip	1	T0787	mounting clip
2	H0910	nylon cable ties	2	H0910	nylon cable ties
1	H0909	A1-5 sensor wire insulator	1	C7DA0403	Splice-connection instruction sheet
1	W0291	0.5 m (20 in.) stranded steel wire			
2	H0908	crimps (for stranded steel wire)			
1	C7DA0303	Tension point instruction sheet			

The following E-Field components can be used with the Intelli-FIELD system:

- processor enclosure
- mounting hardware
- insulators *
- sensor wires **
- coaxial cable ***

* All tension points should be upgraded using the tensioning hardware upgrade kit (C7KT1700). The sensor wire should be installed on an A1-5 sensor wire insulator. The splice-connections should be removed from inside the terminal boots and remade using Intelli-FIELD splice-connection kits. The terminal boots should be replaced with end caps. The steel inserts should be sealed with non-conductive RTV sealant.

** Sensor wire spacing and tensioning must follow the Intelli-FIELD guidelines.

*** Additional coaxial cable and BNC connectors are required to connect the processor, isolation transformers and sensor wires.

Site inspection

The first step in upgrading an E-Field system to an Intelli-FIELD system is conducting a detailed site inspection. It is essential to verify that all of the E-Field components that will be used with the Intelli-FIELD system are undamaged, clean, corrosion free and installed according to the Intelli-FIELD guidelines. If fencing is used in conjunction with the system, the fence must meet the minimum acceptable standards as described in Chapter 4, Preparing the site. All mounting posts must be grounded in both fence-mounted and free-standing installations. Sensor wires must have the correct Intelli-FIELD wire spacing and tensioning. The ground in the vicinity of the sensor wires must meet the Intelli-FIELD requirements.

Component inspection

Inspect the processor enclosure for signs of weather damage and corrosion, especially the seals and ground connections. Inspect all tension and interim insulators to ensure that they are clean, in good condition and support the sensor wires properly. Check the condition of the sensor wires throughout the installation. Verify that field and sense wires are properly tensioned at all tensioning points. Ensure that the sensor wire spacing meets the specifications for the particular Intelli-FIELD configuration, throughout the installation. Verify that all system wiring connections and ground connections are in good condition. All ground lugs, screws and terminations must be tight and free of corrosion. All coaxial cables should be inspected for cracks in the insulation and corrosion on the center conductor. If there is damage to some of the coaxial cables, it is best to replace all of the coaxial cables.

Replace any E-Field components that do not meet the minimum Intelli-FIELD standards before proceeding with the upgrade.

Fence or free-standing post inspection

All mounting posts in each sensor zone must be connected to a common ground strap in both fence-mounted and free-standing installations. Verify that the fence is not slack, damaged, or able to move with the wind. Check the integrity of the fence hardware and posts. Make sure that there are no loose fittings or objects on the fence. Ensure that there are no holes in the fence that could allow animals to enter and cause nuisance alarms. Check that there are no washouts or depressions under the fence or sensor wires. The bottom sensor wire must be 20 cm (8 in.) above the ground throughout the installation.

Repair or replace any fencing or posts that do not meet the minimum Intelli-FIELD standards before proceeding with the installation.

Ground inspection

Make sure that no vegetation (bushes, plants, trees, etc.) or running water are within 2 m (6 ft. 6 in.) on either side of the sensor wires. Keep any vegetation directly below the sensor wires cropped shorter than 7.5 cm (3 in.). Keep the area around the sensor wires clean and free of debris. Verify that all nearby objects are immobile. If possible, remove any nearby objects. If geotextile fabric and a gravel bed are used under the sensor wires, ensure that both the fabric and the gravel remain consistent throughout the zone. The geotextile fabric MUST be perforated with small holes to prevent water from accumulating beneath the sensor wires.

Ensure that the ground below and adjacent to the sensor wires meets the minimum Intelli-FIELD standards before proceeding with the installation.

Replacing the processor

WARNING	*Disconnect the power at the source BEFORE installing or servicing E-Field/Intelli-FIELD system components.*

The Intelli-FIELD retro-fit processor is mounted on a backing plate. The field generator crystal is shipped separate and must be installed in socket U8 before power is applied to the processor.

The Intelli-FIELD processor contains static sensitive components. Follow anti-static grounding procedures when handling the card.

Keep the processor card and the field generator crystal in the protective packaging until you are ready to install them.

1. Label and disconnect all wiring to the E-Field processor.
2. Remove the E-Field processor from the enclosure.
3. Install the field generator crystal in socket U8 on the Intelli-FIELD processor card.
4. Mount the processor card and backplate assembly in the enclosure.
5. Connect the ground strap on the mounting plate to the ground stud on the enclosure.

   Verify that the earth ground is 10 Ω or less. (Consult the local electrical codes for grounding information and requirements.)
6. Refer to Chapter 8, System interconnections, for the Intelli-FIELD wiring connections.

The conduit MUST be sealed at both ends with non-conductive sealant to prevent insects from entering the enclosure and water from entering the conduit. Insects in the enclosure or water in the conduit will cause nuisance alarms and inconsistent detection.

Tamper connection

The tamper switch on the E-Field enclosure door can be connected to the Intelli-FIELD processor.

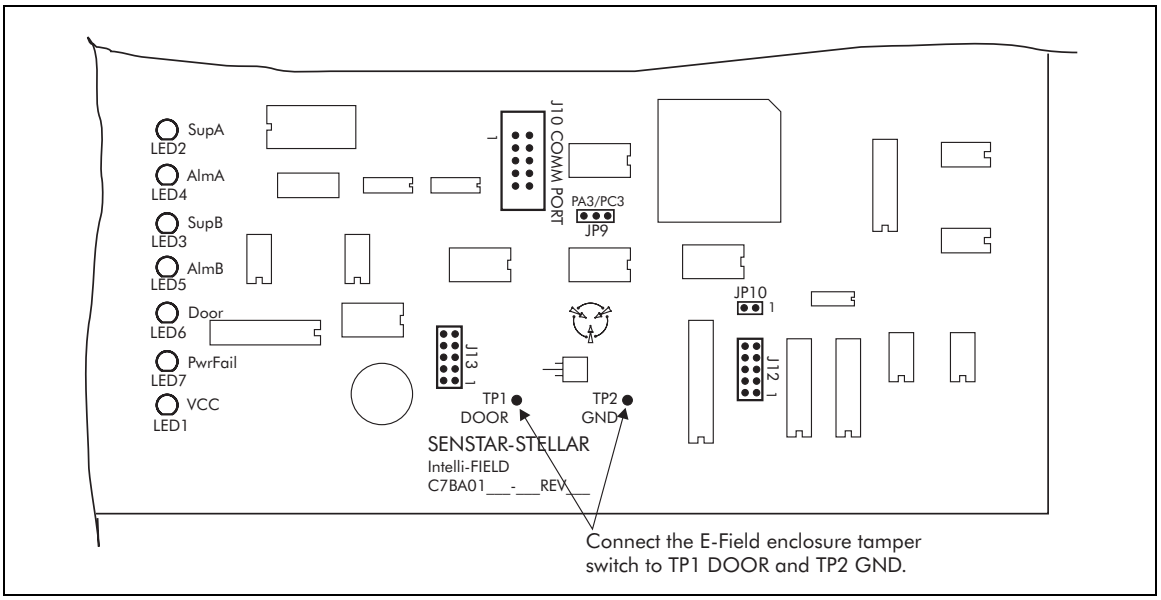


Figure 6-1 Retro-fit tamper connection

Connect the leads from the tamper switch to the Intelli-FIELD processor card test points labelled TP1 DOOR and TP2 GND.

Replacing the sense filters with isolation transformers

The E-Field sense filters must be replaced with Intelli-FIELD isolation transformers. Each Intelli-FIELD sensor zone requires one isolation transformer to interface between the sensor wires and the processor. The isolation transformers must be installed at the start point of the zone. Isolation transformers are generally mounted on the start point mounting posts. Each isolation transformer is shipped mounted in a NEMA-4 rated weatherproof enclosure.

1. Label and disconnect the coaxial cables from the sense filter.

   A four-wire Intelli-FIELD system requires 3 coaxial cables to connect the processor and the isolation transformer.

   The isolation transformer to sensor wire connection requires 4 coaxial cables.

   The existing coaxial cables can be reused provided there is no corrosion or damage.

2. Remove the MC-20 enclosure.
3. Mount the isolation transformer enclosure in place of the MC-20 enclosure. Refer to *Isolation transformer enclosure* on page 5-8.

The existing conduit can be reused if there is sufficient space in the conduit between the processor and the isolation transformer to allow the passage of 3 coaxial cables (RG-59 mini), and sufficient space in the conduit between the isolation transformer and the sensor wires for 4 coaxial cables. Otherwise, replace the conduit.

4. Follow the directions for connecting the processor and isolation transformer (Chapter 8).
5. Follow the directions for making start point wiring connections (Chapter 7).

The conduit MUST be sealed at both ends with non-conductive sealant to prevent insects from entering the enclosure and water from entering the conduit. Insects in the enclosure or water in the conduit will cause nuisance alarms and inconsistent detection.

Replacing the terminators

The Intelli-FIELD system uses different terminators than the E-Field system. Replace the existing E-Field terminators with Intelli-FIELD terminators.

Follow the directions for installing terminators at end points to replace the E-Field terminators (Chapter 8).

Changing the start/tension point hardware configuration

To change the start/tension point hardware configuration, you require a tensioning hardware upgrade kit (C7KT1700). One kit is required for each tension point in the zone. When you change the hardware configuration you also change the splice-connections.

Changing the splice-connections

The Intelli-FIELD splice-connection enhances system performance. E-Field splice-connections, if left unchanged, can be a source of nuisance alarms, especially during adverse weather conditions. To change the E-Field splice-connections, you require a splice-connection upgrade kit (C7KT1800). One kit is required for each splice-connection in the zone.

Replacing the power supply

There are three options available for powering the Intelli-FIELD system. The power option best suited to an installation depends on site-specific factors.

Refer to Chapter 3, Site planning & design - Power supply options and Chapter 8 Power connections to determine which option is best suited for your installation.

System test

Perform continuity tests on all sensor wires (see Chapter 7) and test-run the sensor zone before sealing the splice-connections.

System calibration

Once the E-Field components have been replaced with Intelli-FIELD components the system is ready for calibration. Read Chapter 9, System settings - The Configuration module, and refer to Chapter 10, System setup to calibrate the Intelli-FIELD system for your site-specific detection requirements.

7 Sensor wire installation

This section details the installation, connection and termination of the Intelli-FIELD sensor wires.

For information about installing sensor wire on the next generation Intelli-FIELD hardware, see appendix e.

Installing Intelli-FIELD sensor wires

An Intelli-FIELD sensor zone can be up to approximately 150 m (500 ft.) in length. A sensor zone should be made up of a continuous wire run, with no sensor wire splices. To maintain proper tension throughout the zone, the zone is divided into segments with tension applied to the sensor wires every 50 m (164 ft.) or less, depending on environmental factors. Each end of a zone segment is connected to a tension, start, or end point. The sensor wires are supported every 6 m (20 ft.) throughout the zone, by interim points. Changes in horizontal direction or elevation greater than 20º, require the use of corner points or tension points.

Sensor wire installation considerations

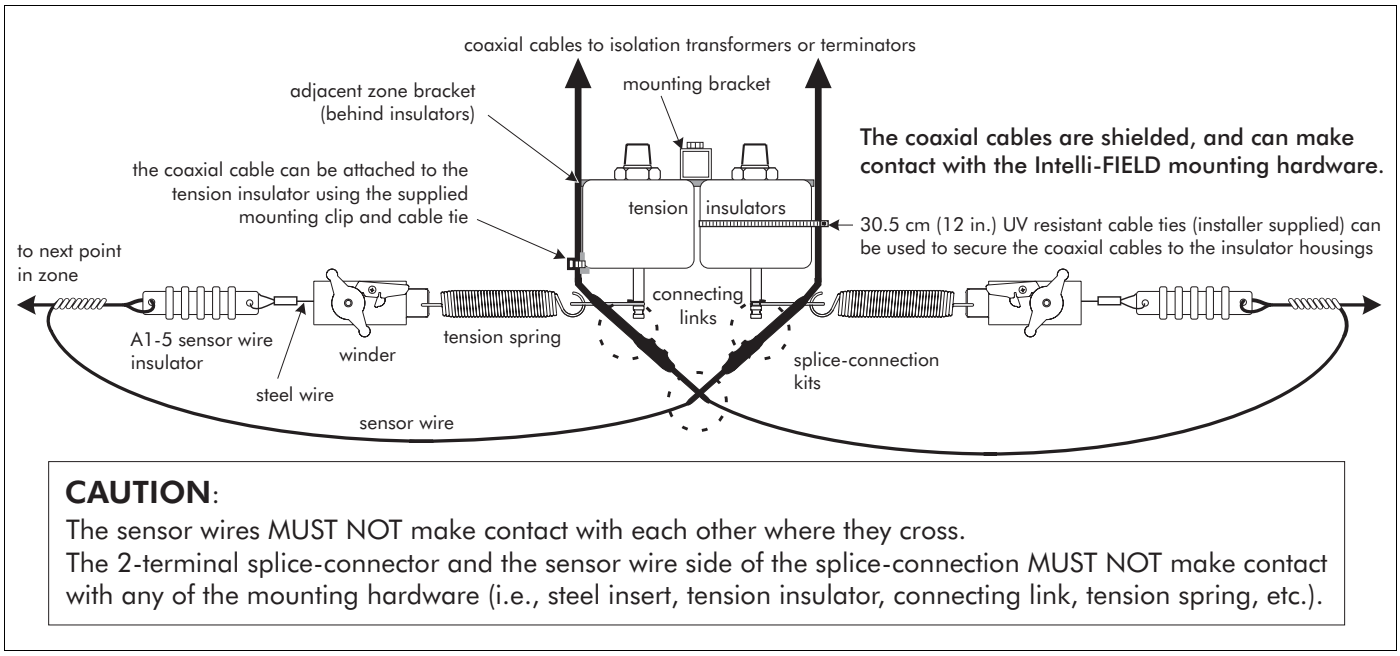
- Before installing the sensor wires, all of the Intelli-FIELD mounting hardware must be installed (i.e., posts, mounting brackets, insulators, ground straps).
- When installing the sensor wire, begin at the start point and work successively, point by point, towards the end of the zone.
- At the start point, place the spool of wire on a cable dispenser, and unspool the sensor wire until you reach the first corner point, or tension point. At corner points with pulleys, feed the sensor wire over the pulley and then continue unspooling the wire. At tension points, feed the sensor wire through one of the holes on two A1-5 insulators, and then continue unspooling the wire. Repeat this for each corner and tension point in the zone.

- As a precaution, add a few extra meters (yards) of sensor wire to the zone length before cutting the sensor wire at the spool.
- Measure and cut the remaining sensor wires for the zone.
- In a sensor zone of 15 m (50 ft.) or more, tensioning hardware is used at the end point to ensure uniform sensor wire tensioning. For sensor zones that are less than 15 m long, the sensor wire can be attached at the end point without using tensioning hardware.
- Each pair of sensor wires (field and sense) is splice-connected to a terminator at the end point of a zone. The terminators provide a signal path that enables the processor to supervise the integrity of the Intelli-FIELD sensor wires.
- Tension points provide wire tension at 50 m (162 ft.) intervals throughout the sensor zone. Tension points should be used with continuous wire runs (no splice-connections). Tension points can also be used with splice-connections to repair damaged sensor wire. Tension points apply tension in opposite directions to two zone segments.
- Corner points use pulleys and connecting hardware, or tension insulators, to allow the Intelli-FIELD wire to follow a non-linear pattern (direction changes greater than 20° vertically or horizontally); for example, a 90º change in direction at a corner, or up the side of a steep hill. Tension points can also be used as both vertical and horizontal corner points.
- Interim points provide support for the Intelli-FIELD sensor wire without applying tension. An interim point is required every 6 m (20 ft.). Under severe weather conditions, interim point spacing should be reduced to 3 m (10 ft.). Interim points are used to maintain consistent ground to wire spacing at changes in elevation of less than 20º. Interim points can also be used at horizontal direction changes of less than 20°. The number of interim points and the interim point spacing depends on site-specific environmental factors.
- At the start point of a zone, tensioning hardware is used to apply tension to the sensor wires. The sensor wires are splice-connected to coaxial cables, which are connected to the isolation transformer.
- Adjacent zone brackets are used when two Intelli-FIELD zones physically meet (start point/start point, start point/end point, end point/end point). At adjacent zones, special brackets are used to allow two sets of Intelli-FIELD hardware to be mounted on one post.
- Splice-connections are used to connect coaxial cables to sensor wires at start points and terminators. Splice-connections can also be used to connect sensor wire to sensor wire at tension points for sensor wire repair.
- The number of splice-connections in a sensor zone should be limited to the start point and terminator wiring connections. Additional splice-connections can decrease system reliability, and increase nuisance alarms.

Adjacent zone considerations

There are several important factors to consider when installing Intelli-FIELD adjacent zones. Following these guidelines will provide complete detection coverage in the area of adjacent zones:

- The sensor wires MUST overlap to prevent a dead zone near the adjacent zone mounting post.
- The sensor wire MUST NOT make contact with any mounting hardware, or with the other splice-connector, or with the other sensor wire.
- The sensor wire inside the splice-connection kit MUST NOT make contact with any mounting hardware, or with the other splice-connector, or with the other sensor wire.
- The splice-connector in the splice-connection kit MUST NOT make contact with any mounting hardware, or with the other splice-connector.
- The coaxial cables are shielded and can make contact with the mounting hardware.



CAUTION:
The sensor wires MUST NOT make contact with each other where they cross.
The 2-terminal splice-connector and the sensor wire side of the splice-connection MUST NOT make contact with any of the mounting hardware (i.e., steel insert, tension insulator, connecting link, tension spring, etc.).

Figure 7-1 Adjacent zones (sensor wire overlap)

Secure the assemblies by attaching the coaxial cables to the tension insulator with either the supplied mounting clips and cable ties, or 30.5 cm (12 in.) UV-resistant cable ties. Do NOT attach the sensor wire, or the splice-connector assembly, to the tension insulator.

Sensor wire installation overview

Each point in an Intelli-FIELD sensor wire installation is explained in detail, in this chapter. Before beginning the installation, read this overview. It provides a standard methodology that should be followed for all types of sensor wire installations.

1. At the start point, place the spool of wire on a cable dispenser, and unspool the sensor wire until you reach the first corner point, or tension point. At corner points with pulleys, feed the sensor wire over the pulley and then continue unspooling the wire. At tension points, feed the sensor wire through the unused hole in two A1-5 insulators, and then continue unspooling the wire. Repeat this for each corner and tension point in the zone. (Use a piece of loose wire to attach the pulley or A1-5 insulator to the tension post to prevent it from sliding along as you unspool the sensor wire.)
2. As a precaution, add a few extra meters (yards) of sensor wire to each section, before cutting the wire at the spool.
3. After cutting all of the wires for the zone, begin installing the sensor wires at the start point of the zone. Attach the sensor wires to the mounting hardware without applying tension.
4. Install the sensor wires at all of the interim points between the start point and the first tension point (or end point if there are no tension points).
5. Make sure that the sensor wires are properly installed at any corner points in the zone segment.
6. Pull the sensor wires hand tight, and attach the sensor wires and tensioning hardware at the first tension point (or end point if there are no tension points).
7. Apply light tension to all of the sensor wires in the zone segment at both the start point, and the first tension point (or end point if there are no tension points).
8. Repeat this procedure for each successive zone segment until you reach the end point of the zone.
9. Apply full tension to all of the sensor wires at each tensioning point in the zone.
10. After the sensor wire is completely installed and tensioned, begin making the splice-connections at the start point, and the terminators.

Start points

At the start point of the zone the 16 kg (35 lb) tension is applied to the sensor wires and the sensor wires are splice-connected to coaxial cables. The coaxial cables are connected to the appropriate TB2 terminals on the isolation transformer (see *Connecting the isolation transformer to the sensor zone* on page 8-4).

Ensure that the sensor wire is fed through all of the pulleys and A1-5 sensor wire insulators in the zone, BEFORE connecting the start point.

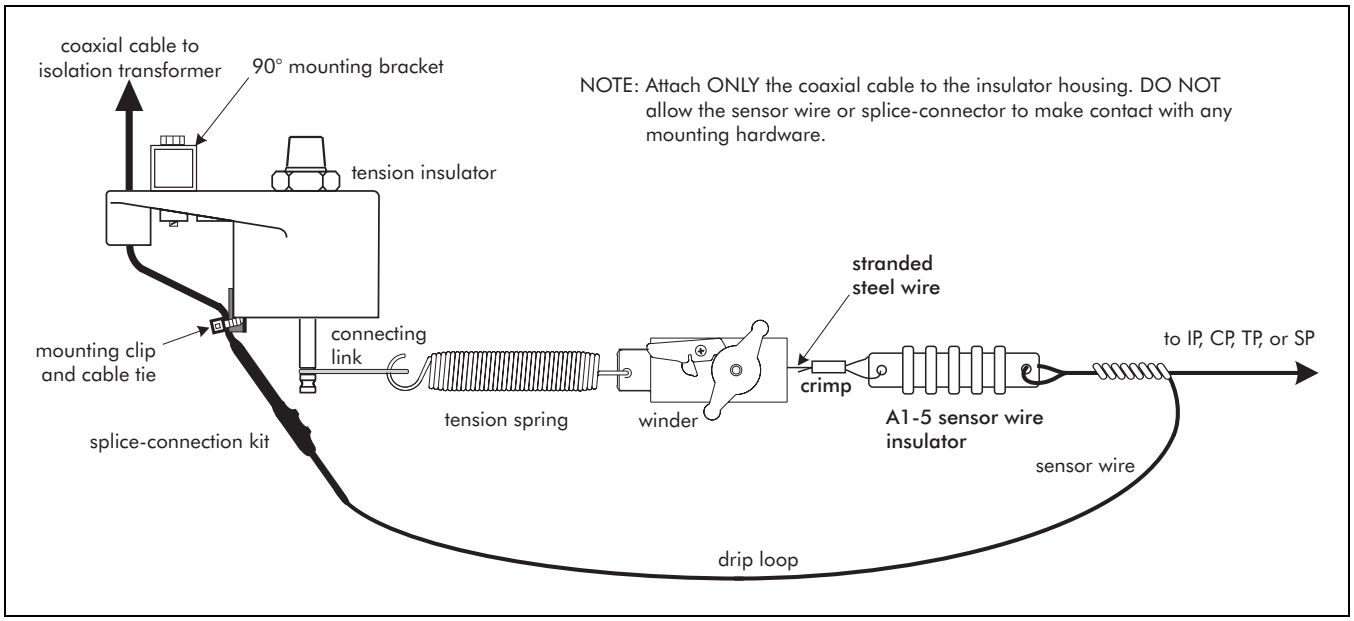


Figure 7-2 Completed start point wiring connection

1. Fit the connecting link into the upper groove on the tension insulator's stainless steel insert.
2. Attach the tension spring to the connecting link.
3. Attach the winder/insulator assembly to the tension spring.
4. Cut the sensor wire so that it extends about 0.5 m (20 in.) beyond the steel insert on the bottom of the tension insulator.
5. Feed the sensor wire through the unused hole in the sensor wire insulator. Fold the wire back toward the zone and wrap the cut end around the sensor wire from the zone segment 8 times using close, tight loops.
6. Form a drip loop by looping the sensor wire back toward the tension insulator. With the drip loop formed, the sensor wire must reach slightly beyond the bottom of the steel insert (app.10 cm {4 in.}).

DO NOT apply tension at this time. Apply light tension, after the sensor wire is connected to the next tensioning point in the zone. Apply full tension after the sensor wire is completely installed at all points in the zone.

7. Apply tension by turning the winder handle until the spring stretches to approximately 16.5 to 17.8 cm (6.5 to 7 in.) from hook to hook.

Repeat this procedure for each sensor wire at the start point, then proceed to the next point in the zone.

Corner point wiring

There are two methods for making Intelli-FIELD corner points:

- Pulleys can be used for horizontal and vertical corner points, where there is a change in direction of greater than 20º. The pulleys provide pivot points, which allow the sensor wires to follow sharp changes in direction.
- Tension insulators, without tensioning hardware, can be used as horizontal corner points. When tension insulators are used without tensioning hardware the sensor wire changes direction by wrapping around the steel insert.

Install the Intelli-FIELD sensor wire at all corner points in a zone segment, BEFORE connecting the next tension, or end point.

It is also possible to use tension points with tensioning hardware to make corner points. However, additional hardware is required.

Corner points (using pulleys)

Install corner points with pulleys, wherever the sensor wires change direction by more than 20º.

Feed the sensor wires through the pulleys at corner points, as the sensor wires are unspooled.

Attach the pulleys to the corner point mounting post with a piece of wire to prevent the pulleys from sliding along as wire is unspooled.

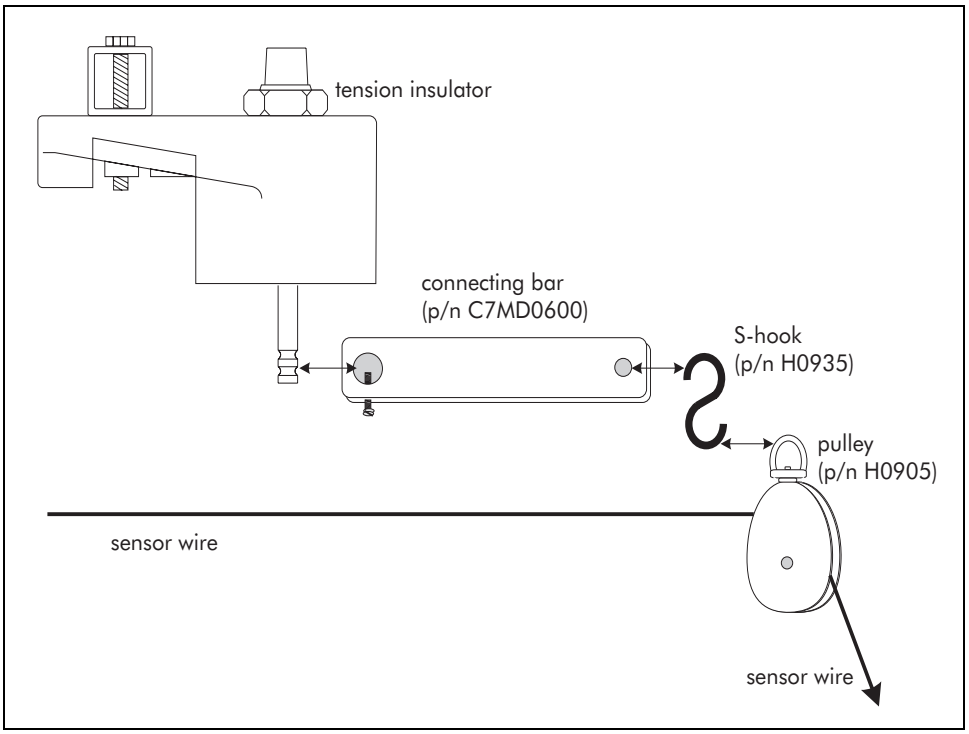


Figure 7-3 Corner point wiring

1. Assemble the connecting bar, S-hook, and pulley.
2. Attach the connecting bar to the steel insert at the bottom of the tension insulator.

Repeat this for each sensor wire at the corner point, then proceed to the next point in the zone.

Horizontal corner points (tension insulators without tensioning hardware)

Install horizontal corner points wherever the sensor wires change direction by more than 20º. Horizontal corner points can also be used at direction changes of less than 20º.

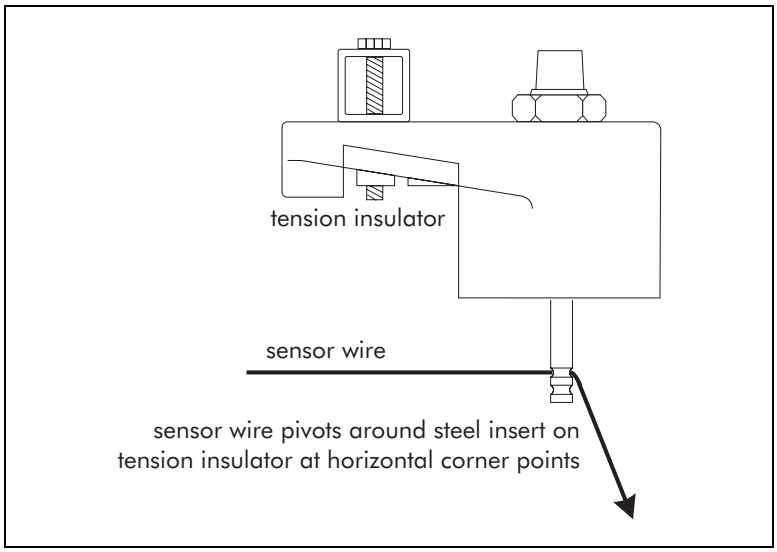


Figure 7-4 Horizontal corner point wiring

1. Use the steel insert as a pivot point to allow the sensor wires to follow sharp changes in horizontal direction.
2. Use cable ties to hold the sensor wire loosely in place on the steel insert, until tension is applied to the zone segment.

Tensioning corner points (tension insulators with tensioning hardware)

Tension insulators with tensioning hardware can be used as corner points wherever the sensor wires change direction by more than 20º, horizontally or vertically. Tensioning corner points can be used to ensure consistent wire tensioning for long, non-linear zones that have more than one sharp change in direction. In this case, use a tensioning corner point that applies tension in both directions, at the second corner.

- Follow the directions for tension point wiring to use tension points as corner points.

Interim point wiring

Install the Intelli-FIELD sensor wire at all interim points in a zone segment, BEFORE connecting the next tension, or end point.

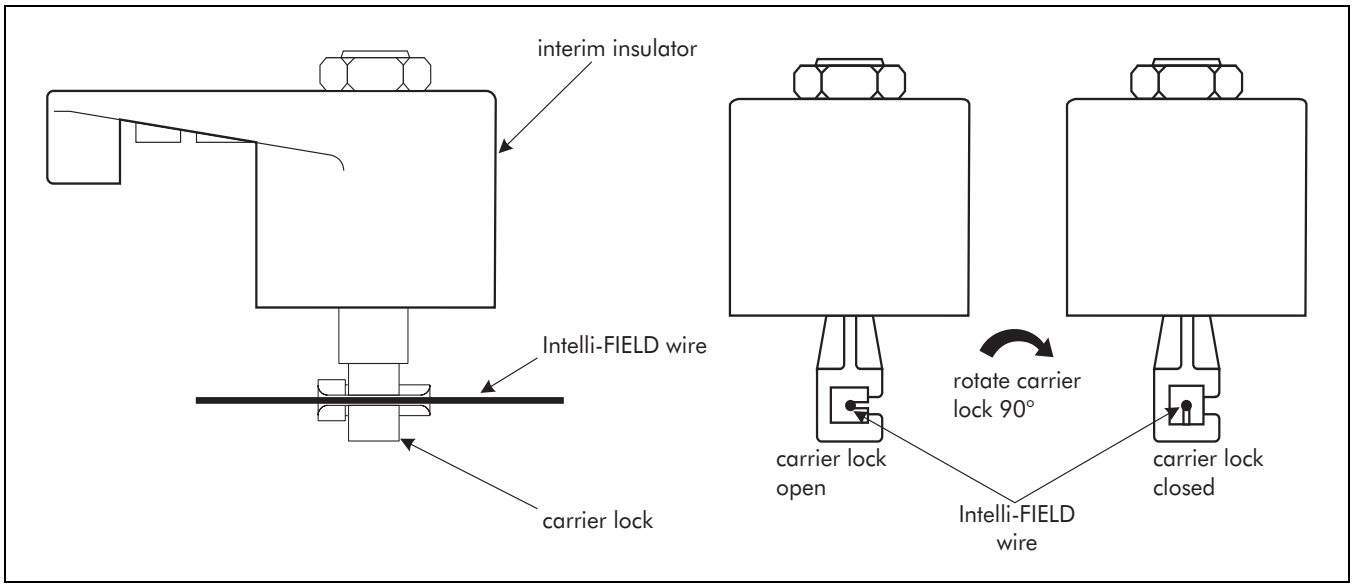


Figure 7-5 Interim point wiring

1. Fit the sensor wire into the carrier lock opening on the interim insulator.

Use care when turning the carrier lock. Do NOT force the lock to turn or it may be damaged.

2. Rotate the carrier lock 90° to close-capture the wire.

Repeat this procedure for each sensor wire at the interim point, then proceed to the next point.

Tension points

WARNING *If you are adjusting a tensioned wire, hold the winder crank in place while releasing the latch. Do not allow the winder crank to turn freely.*

A tension point should be used approximately every 50 m (164 ft.) in a long sensor zone, or a non-linear zone. Tension points divide a zone into zone segments and ensure uniform sensor wire tension throughout the installation. Tension points should be used with continuous runs of sensor wire with no splice-connections (recommended method). However, tension points can be used with splice-connections to repair damaged sensor wires. Tension points secure the sensor wires while applying the 16 kg (35 lb.) tension to the wires in two directions (see Figure 7-6).

Install the Intelli-FIELD sensor wire at all corner points and interim points in the zone segment BEFORE connecting the wire at the tension point.

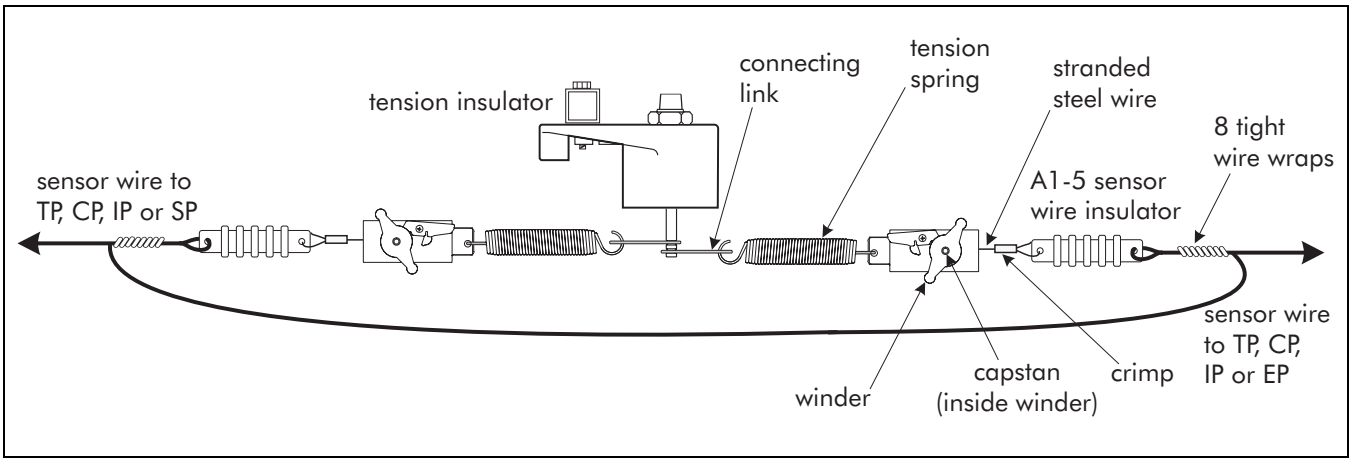


Figure 7-6 Tension point wiring (tension applied to both segments)

Tension point tensioning connections

Each sensor wire at the tension point, must be fed through the unused hole in an A1-5 insulator, before beginning the following procedure.

1. Fit the connecting link into the upper groove on the tension insulator's stainless steel insert.
2. Attach the spring to the connecting link.
3. Approximately 75 cm (30 in.) away from the steel insert on the tension insulator, take the sensor wire insulator in one hand and fold the sensor wire back at that point. Hold the two sections of sensor wire and rotate the winder/insulator assembly to form at least 8 close, tight loops. The wire wraps secure the sensor wire to the A1-5 insulator (see Figure 7-7).

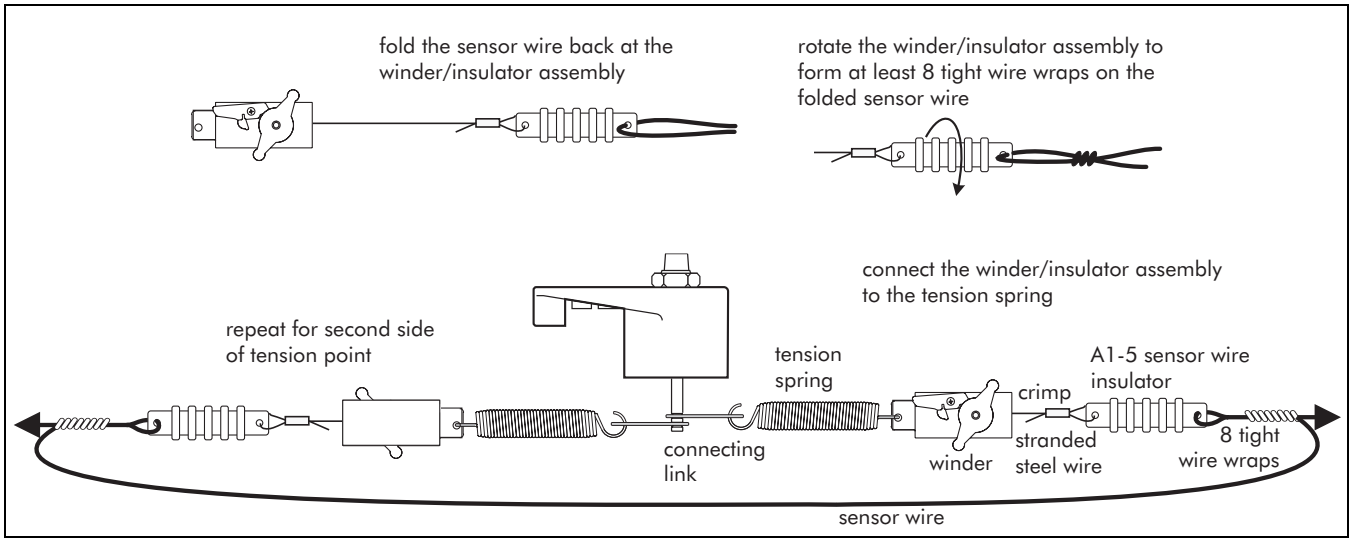


Figure 7-7 Connecting the sensor wire to the winder/insulator assembly

4. Attach the winder to the tension spring.

5. Repeat this procedure for the second side of the tension point. Do not apply tension to the second side until the sensor wires are connected to the next tension point, or to the end point of the zone.

   If the sensor wire drip loop at the tension point is overly large, shorten the loop by wrapping the wire around a long screwdriver to form a spiral pattern.

   Apply only light tension to the zone segment at this time. DO NOT apply full tension until the sensor wire is installed at all points in the zone.

6. Apply tension by turning the winder until the spring stretches to 16.5 to 17.8 cm (6.5 to 7 in.) from hook to hook.

Repeat this procedure for each sensor wire at this point.

End points

For sensor zones that are 15 m (50 ft.) or more, tensioning hardware is used at the end point to ensure uniform tensioning of the sensor wires (see Figure 7-8). In this case, the tensioning hardware and sensor wire is installed loosely. Tension is applied at the end point after tension is applied at the start point and any tension points in the zone.

For sensor zones of less than 15 m (50 ft.) the sensor wire can be anchored at the end point without using tensioning hardware (see Figure 7-9). In this case, the tension for the zone segment is applied at the start point of the zone.

It may be necessary to adjust the length of the sensor wire at the end point to ensure adequate tension.

Tensioning hardware should be used at the end point of senor zones that are 15 m (50 ft.) or longer, and for zones that follow a non-linear pattern.

End point wiring (with tensioning hardware)

For sensor zones of 15 m (50 ft.) or more, and non-linear zones, tension is applied to the sensor wires from both directions (i.e., at the start point side and end point side). After connecting the sensor wires to the start, corner, interim, and any tension points within the zone, begin making the end point connections.

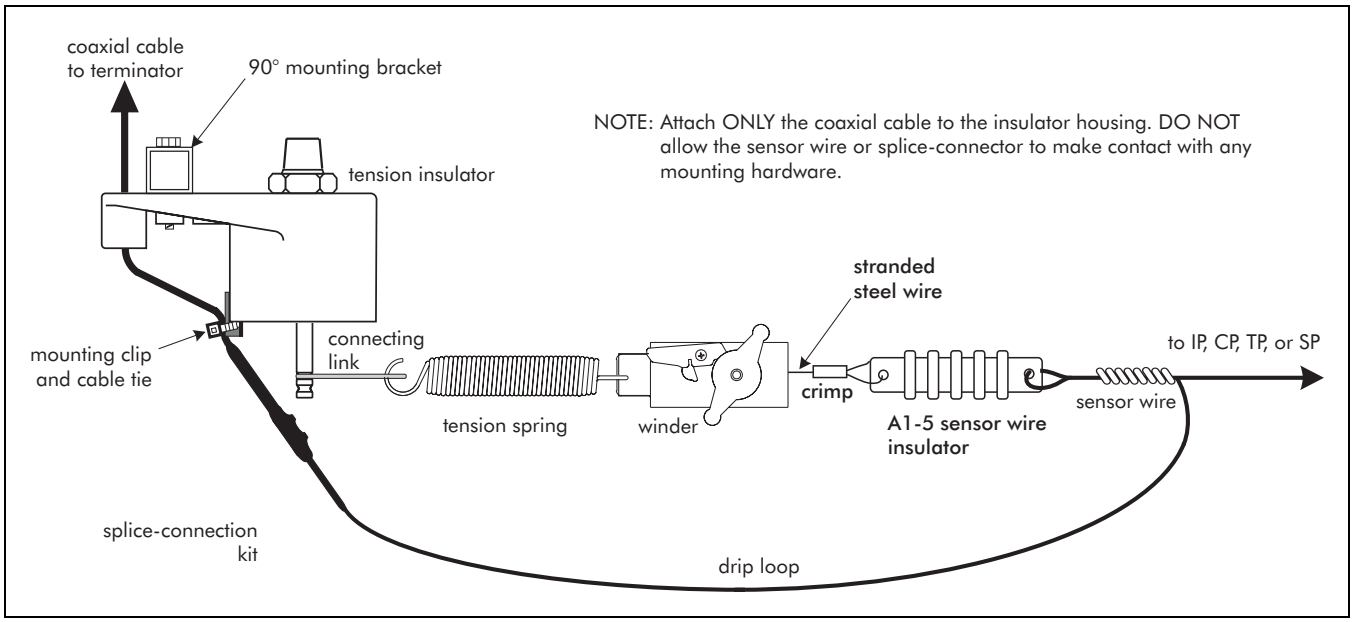


Figure 7-8 End point wiring (with tensioning hardware)

1. Carefully pull the wire hand-tight, ensuring that there are no kinks in the wire before tightening. (The sensor wire must be at least 0.5 m (20 in.) longer than is required to reach the bottom of the steel insert on the tension insulator. The extra wire is required for the drip loop, wire wraps and splice-connection.)
2. Fit the connecting link into the upper groove on the tension insulator's stainless steel insert.
3. Attach the tension spring to the connecting link.
4. Attach the winder/insulator assembly to the tension spring.
5. Feed the sensor wire through the unused hole in the sensor wire insulator, pull the sensor wire hand-tight and wrap the cut end around the sensor wire from the zone segment 8 times using close, tight loops.
6. Form a drip loop to beneath the steel insert on the tension insulator.

   DO NOT apply tension until the sensor wire is completely installed at all points, throughout the zone.

7. Apply tension by turning the winder handle until the spring stretches to approximately 16.5 to 17.8 cm (6.5 to 7 in.) from hook to hook.

Repeat this procedure for each sensor wire at the end point, then proceed to installing splice-connectors.

End point wiring (short, linear zone [< 15 m] - no tensioning hardware)

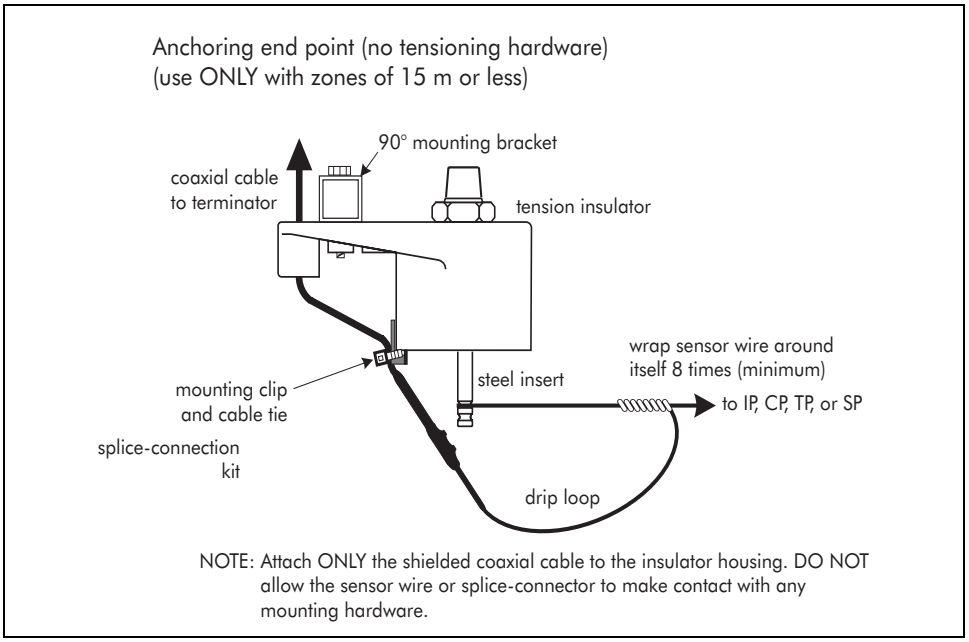


Figure 7-9 End point wiring (no tensioning hardware)

After connecting the sensor wires to the start, corner, interim, and tension points in the zone, begin making the end point connections. At the end point of a sensor zone of 15 m (50 ft.) or less, which does not require tensioning, proceed as follows:

1. Carefully pull the wire hand-tight, ensuring that there are no kinks in the wire before tightening. (The sensor wire must be at least 0.5 m (20 in.) longer than is required to reach the bottom of the steel insert on the tension insulator. The extra wire is required for the drip loop, wire wraps and splice-connection.)
2. Fit the sensor wire in the upper groove of the stainless steel insert and loop the wire once completely around the insert.
3. Wrap the end section of wire around the wire going to the sensor zone at least 8 times using close, tight loops.
4. Form a drip loop back to below the steel insert.

Repeat this procedure for each sensor wire at the end point.

Do not make the splice-connections to the terminators at this time.

Installing splice-connectors

All materials must be completely dry and contaminant-free BEFORE making splice-connections.

Make splice-connections ONLY in clear, dry weather. Do NOT leave the splice-connections unsealed for more than a few moments while testing the zone. Never leave splice-connections unsealed overnight, or in damp conditions (i.e., fog, rain, high humidity, snow, wet wind - especially salt water spray, etc.).

Senstar-Stellar strongly recommends using a heat gun rather than a torch to seal the splice-connections. The coaxial cable dielectric is easily damaged by excessive heat.

- At start points and terminator points, Intelli-FIELD wire is splice-connected to coaxial cable.
- Intelli-FIELD sensor wire can be spliced to Intelli-FIELD sensor wire for repair.

Senstar-Stellar strongly recommends that splice-connections be used only at start points and terminator points. Additional splice-connections within a sensor zone can decrease reliability and increase nuisance alarms.

Splice-connection considerations

- The sensor wire and the 2-terminal splice-connector inside the splice-connection kit MUST NOT make contact with any mounting hardware.
- ONLY the shielded section of coaxial cable can make contact with the mounting hardware.

Splice-connecting coaxial cable to Intelli-FIELD wire

Sensor wire to coaxial cable splice-connections are made on terminal blocks. The completed splice-connection assembly is covered with heatshrink tubing, which includes heat activated weather sealant. The heatshrink provides mechanical support and weather protection for the splice-connection.

Do NOT make splice-connections in wet weather.

Sensor wire to coaxial cable splice-connections are required at the following points in an Intelli-FIELD system:

- Start point connections (to isolation transformer)
- Terminator connections

The following table includes the splice-connection kit (P.N. C7KT1600) components:

Qty.	P.N.	Description
1	W0305	13 cm (5 in.) heatshrink
1	H0969	terminal block (2 screw terminals)
3	H0970	2.5 X 5 mm set screws (2 + 1 spare)
1	H0971	1.3 mm allen key
1	C7DA0103	Splice-connection instruction sheet

C7KT1600 components

Start point

At the start point of the zone, the sensor wires are splice-connected to coaxial cables, which are connected to TB2 on the isolation transformer. Each sensor wire must be connected to the correct point on the isolation transformer. Refer to *Isolation transformer to sensor zone connections* on page 8-7 for the isolation transformer wiring connections.

End point/terminator connections

At the end point of the zone each pair of sensor wires (top field & top sense, bottom field & bottom sense) is splice-connected to a terminator. The terminator includes 2 coaxial cables for making the splice-connections. One coaxial cable is splice-connected to the field wire and the other is splice-connected to the sense wire (see *Installing terminators* on page 8-8).

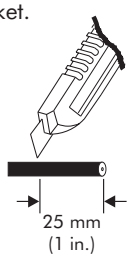
For a 3-wire Intelli-FIELD system, one terminator is splice-connected between the top sense wire and the field wire, and the second terminator is splice-connected between the bottom sense wire and the field wire (i.e., the single field wire is splice-connected to two coaxial cables).

Making the coaxial cable to sensor wire splice-connection

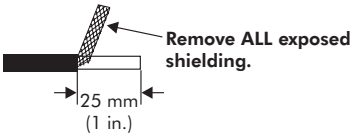
The coaxial cables and sensor wires must be prepared for making the splice-connections. Use the following procedure (see Figure 7-10) to make the coaxial cable to sensor wire splice-connections at start points and end points. For 3-wire systems you must splice connect 2 coaxial cables to the single field wire. To accomplish this, you must increase the length of the coaxial cable strip to fit 2 coaxial cables into one side of the field wire splice-connection kit terminal block.

1 Measure and remove 25 mm (1 in.) of the coaxial cable's outer black jacket.

DO NOT cut into the dielectric core.



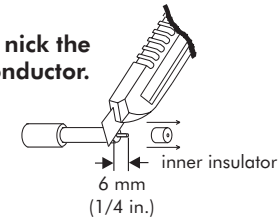
2 Peel back and completely remove the exposed braided shield.



The cable shield MUST be completely removed from the inner insulator, all the way back to the outer jacket.

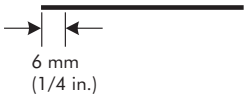
3 Carefully remove 6 mm (1/4 in.) of the dielectric core (white inner insulator).

DO NOT nick the center conductor.



4 Measure and remove 6 mm (1/4 in.) of the insulation from the sensor wire.

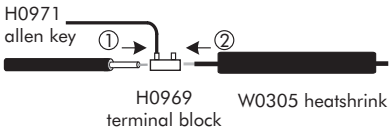
DO NOT nick the sensor wire.



5 Feed the sensor wire through the heatshrink.

6 Insert the coax cable center conductor into one end of the terminal block and tighten the screw.

Insert the sensor wire into the other end and tighten the screw.



7 **DO NOT apply heat to the splice-connection assembly at this time.**

Senstar-Stellar strongly recommends completing the installation of each sensor zone and test-running it BEFORE applying heat to seal the splice-connections. Installation problems usually involve mechanical connections, and the splice-connections can NOT be easily adjusted after the heatshrink is sealed.

Test the sensor wires for continuity.

Test the coax cable for isolation between the center conductor and shield.

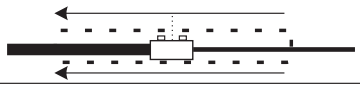
Install, test and then heat-seal one zone at a time. Do NOT leave splice-connections unsealed for more than a few moments.

8 Slide the heatshrink so that it is centered over the splice-connector and apply heat with a heat gun.

Apply heat evenly on all sides, and along the full length of the heatshrink.

A seal must form completely around the coaxial cable and sensor wire.

DO NOT use excessive heat. Excessive heat WILL damage the coax cable dielectric.



Make sensor wire to sensor wire splice-connections ONLY to repair damaged sensor wire or to add an additional field wire in an area of low detection sensitivity.

To splice-connect sensor wire to sensor wire, follow steps 4 to 8, substituting a second piece of sensor wire for the coaxial cable.

sensor wire to sensor wire splice-connection

Figure 7-10 Coaxial cable to sensor wire splice-connection

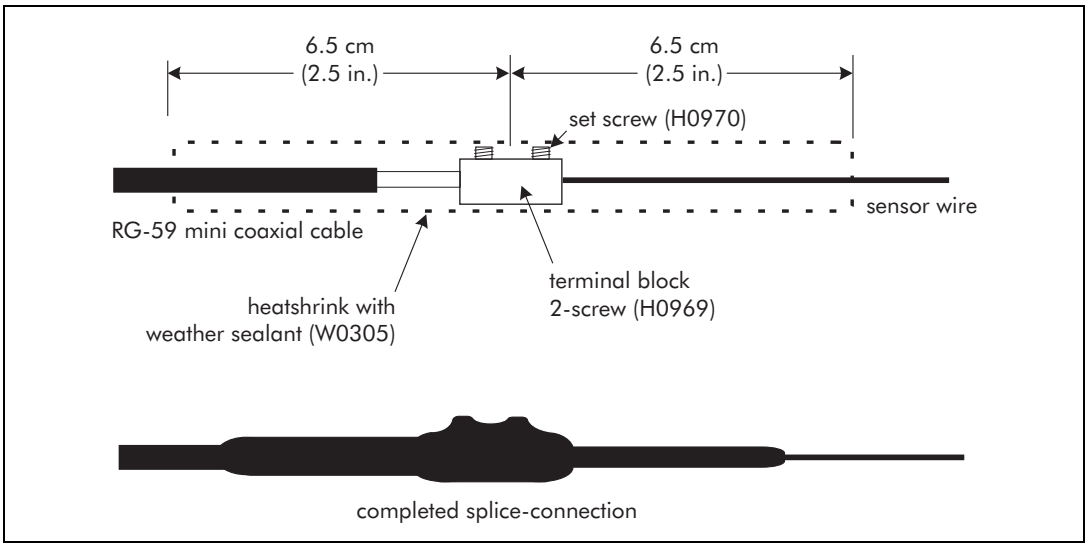


Figure 7-11 Completing the splice-connection

Splice-connecting sensor wire to sensor wire

Senstar-Stellar strongly recommends that Intelli-FIELD zones be made up of continuous wire runs with NO splice-connected sections of sensor wire. Sensor wire to sensor wire splice-connections should be used only to repair damaged sensor wire.

To splice-connect two sections of sensor wire at a tension point follow the procedure in Figure 7-10, steps 4 to 8, substituting a second section of sensor wire for the coaxial cable. Figure 7-12 illustrates a completed sensor wire to sensor wire splice-connection at a tension point.

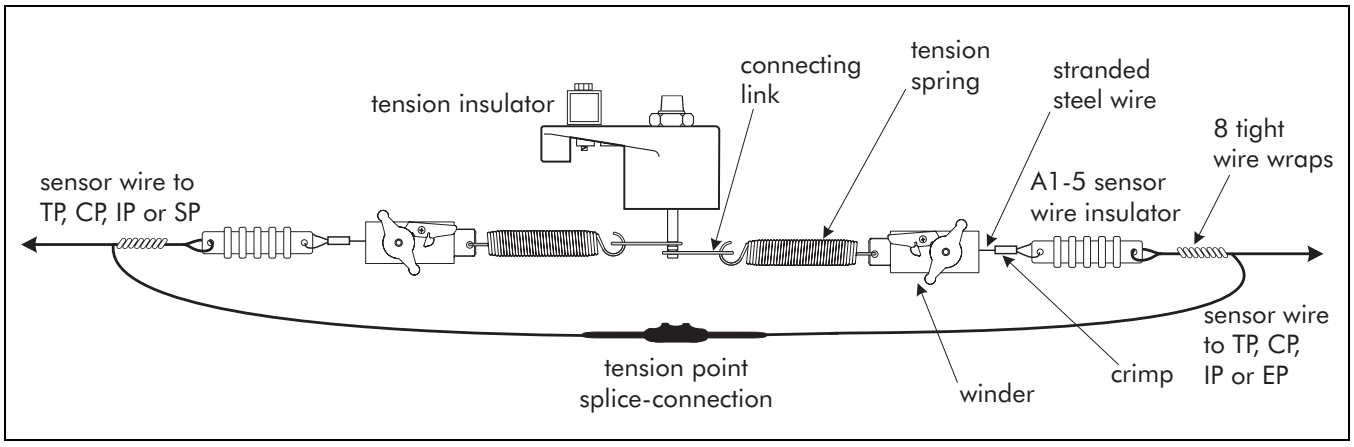


Figure 7-12 Completed sensor wire to sensor wire splice-connection

Testing the zone for continuity

After all of the splice-connections within a zone have been made, test the Intelli-FIELD sensor wires for continuity (from start point to end point).

1. At the end point, connect the sensor wire pairs with jumpers (upper field wire to top sense wire and lower field wire to bottom sense wire).
2. At TB2 on the isolation transformer, measure the resistance between each pair of sensor wire connections (i.e., TW and FW1, BW and FW2).

   The resistance should not exceed 1 Ω per meter of sensor wire. (e.g., a 130 m zone = approximately 260 Ω or 130 Ω per sensor wire)

   If the resistance is significantly higher than 1 Ω per meter of sensor wire there may be faulty connections in the zone.

   Check the jumper connection at the end point before making any repairs to the sensor zone.
3. Repair any loose or faulty connections, if required.

   When all sensor wires within the zone have tested satisfactorily, complete the installation and test-run the sensor zone BEFORE applying heat and sealing the splice-connections.

Testing the coaxial cable shield to center conductor isolation

Test the coaxial cables at the isolation transformer and terminators for isolation between the center conductor and shield (should be infinite resistance).

Repeat the test at the isolation transformer, AFTER the spice-connections are heat sealed, to ensure the coaxial cable dielectric was not damaged during the sealing process.

Completing the splice-connections

Senstar-Stellar strongly recommends using a heat gun rather than a torch to seal the splice-connections. The coaxial cable dielectric is easily damaged by excessive heat.

After testing for continuity, and test-running the sensor zone, heat-seal the splice connections as follows:

1. Slide the weather sealant heatshrink so that it is centered over the splice-connector assembly as indicated in Figure 7-11.
2. Using a heatgun, apply heat evenly on all sides and across the full length of the heatshrink until it fits tightly over the assembly.

   DO NOT use excessive heat or the coaxial cable dielectric WILL be damaged.

   The weather sealant MUST form a seal completely around the coaxial cable and sensor wire where they enter the heatshrink.

3. Use the supplied mounting clip and cable tie, or a 30.5 cm (12 in.) cable tie to attach the coaxial cable to the tension insulator (see Figure 7-1).

   Do NOT allow the sensor wire or the splice-connector to make contact with any mounting hardware or fence hardware.

8 System interconnections

This section details the wiring and cable connections between the Intelli-FIELD components.

Wiring the system

The Intelli-FIELD processor, isolation transformer and sensor wires are interconnected with coaxial cable. RG-59 mini or equivalent (75 Ω) coaxial cable is used to make the connections. The coaxial cable uses a solid, tinned center conductor and a polyethylene outer jacket, and is suitable for outdoor installation. See Figure 8-1 for an Intelli-FIELD system wiring diagram.

Senstar-Stellar recommends installing the coaxial cables inside split loom cable covers, at the start point and end point of the zone. The cable covers protect the coaxial cable from the weather and can greatly extend its life-expectancy (see appendix b for supplier's information).

The processor and isolation transformer should be mounted in close proximity to the start point of the Intelli-FIELD zone. If site conditions require that the processor be mounted away from the isolation transformer, the total capacitance of the cable run must not exceed 10 nF. The following table provides coaxial cable capacitance ratings and the maximum allowable cable run for RG-59 mini coaxial cable.

coaxial cable	capacitance per meter (ft.)	maximum length of cable run
RG-59 mini (75 Ω)	59.1 pF/m (18.0 pF/ft.)	150 m (app. 500 ft.)

Coaxial cable capacitance

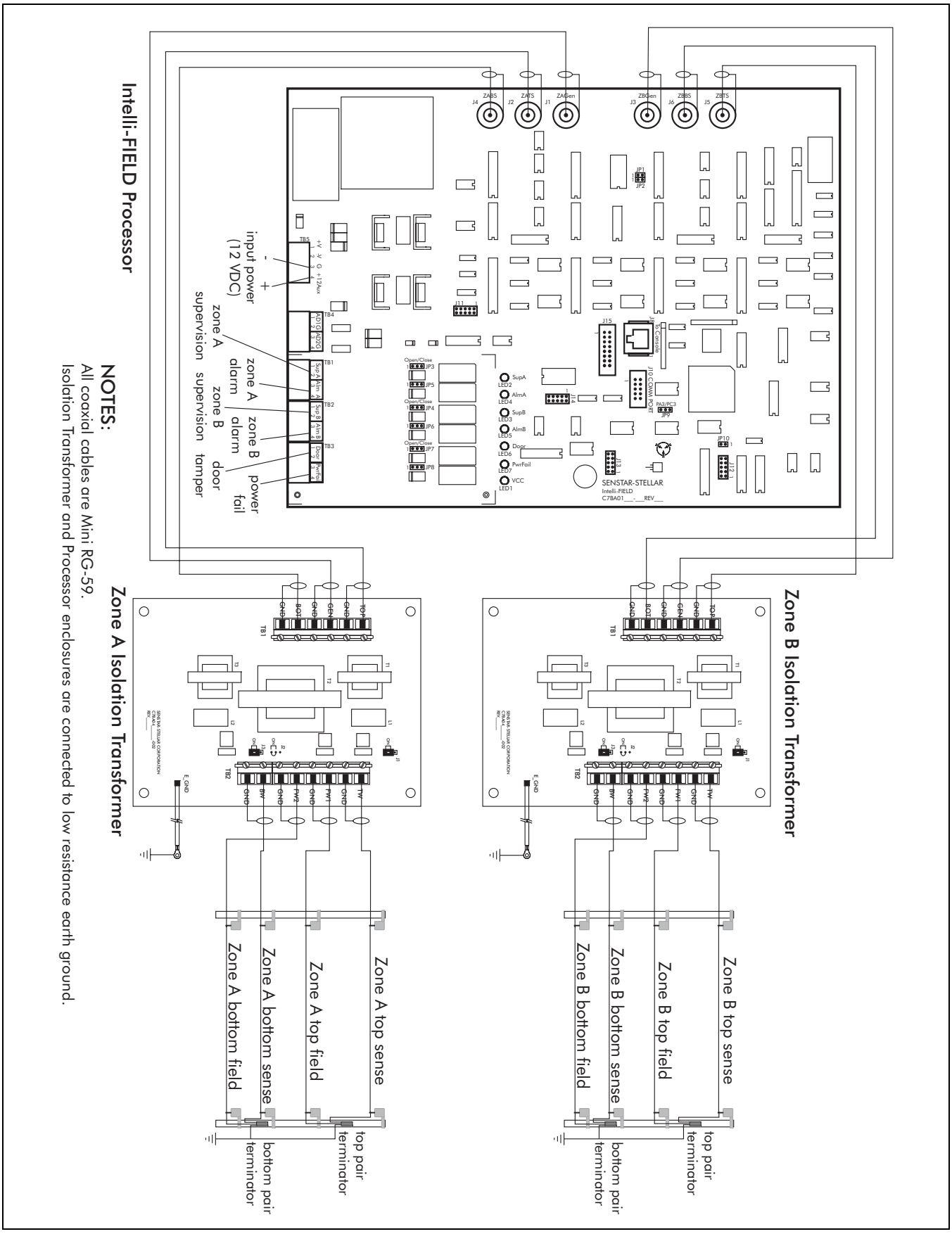


Figure 8-1 Intelli-FIELD system wiring diagram

Connecting the processor and isolation transformers

Coaxial cables between the Intelli-FIELD processor and isolation transformer require properly installed BNC connectors at the processor end. The coaxial cables should be routed through appropriate conduit that is installed between the enclosures. Each Intelli-FIELD zone requires three coaxial cables to connect the processor and the isolation transformer:

- one for the field generator wires
- two for the sense wires

The BNC connectors on the coaxial cables at the processor end are critical to system performance. They must be installed and tested exactly as indicated in the manufacturers' directions. Even a slight deviation can result in inconsistent detection and false alarms.

The coaxial cables connecting the processor and isolation transformer should be installed in conduit. The conduit MUST be sealed at both ends with non-conductive RTV sealant, to prevent insects from entering the enclosure and to prevent water from entering the conduit. Insects in the enclosure or water inside the conduit will cause nuisance alarms and inconsistent detection. (RTV sealant: Senstar-Stellar part numbers 40011 - 3 oz. tube, X0251 - 10 oz. tube)

1. Measure the length of the cable run between the cable entry ports on the processor and isolation transformer enclosure.
   - Add 1 m (3 ft., 3 in.) to each measured length.
2. Cut three lengths of coaxial cable accordingly.
3. Label each of the cables at both ends.
4. Follow the manufacturer's directions to install a BNC connector at the processor end of each cable, and then pull the three cables through the conduit, and into the isolation transformer enclosure. (Allow 0.5 m (1.65 ft.) of coaxial cable to extend into each enclosure.)
5. Test the coaxial cables (shield to center conductor) according to the manufacturer's directions before connecting the processor and isolation transformer.
6. Follow the directions in Figure 8-2 to prepare the coaxial cables for installation in the isolation transformer enclosure.
7. Follow the Zone A connections tables to make the processor to isolation transformer wiring connections.

8. For a dual zone processor, repeat this procedure for the Zone B isolation transformer.

Zone A connections

Connect the coaxial cables for Zone A as follows:

Processor connector		Zone A isolation transformer connection
J2 - ZATS	◄►	TB1 - TOP Coaxial shield to GND
J1 - ZAGen	◄►	TB1 - GEN Coaxial shield to GND
J4 - ZABS	◄►	TB1 - BOT Coaxial shield to GND

Zone B connections

Connect the coaxial cables for Zone B as follows:

Processor connector		Zone B isolation transformer connection
J5 - ZBTS	◄►	TB1 - TOP Coaxial shield to GND
J3 - ZBGen	◄►	TB1 - GEN Coaxial shield to GND
J6 - ZBBS	◄►	TB1 - BOT Coaxial shield to GND

Single zone processor

For a single zone processor, make the Zone A connections and install a loop-back cable (part number C7CA0400) on the processor's Zone B connectors.

Connecting the isolation transformer to the sensor zone

Each sensor wire is splice-connected to coaxial cable at the start point of the zone. The coaxial cable center conductor and shield are then connected to the appropriate TB2 terminals on the isolation transformer.

Do NOT attach the coaxial cables to the fence or mounting bracket until after the splice-connections are made.

1. Measure the length of the cable run between the cable entry port on the right side of the isolation transformer enclosure and each start point tension insulator.
2. Add 1.5 m (5 ft.) to each measurement and cut 4 lengths of coaxial cable accordingly.
3. Refer to Figure 8-2 to prepare the isolation transformer end of the coaxial cables:

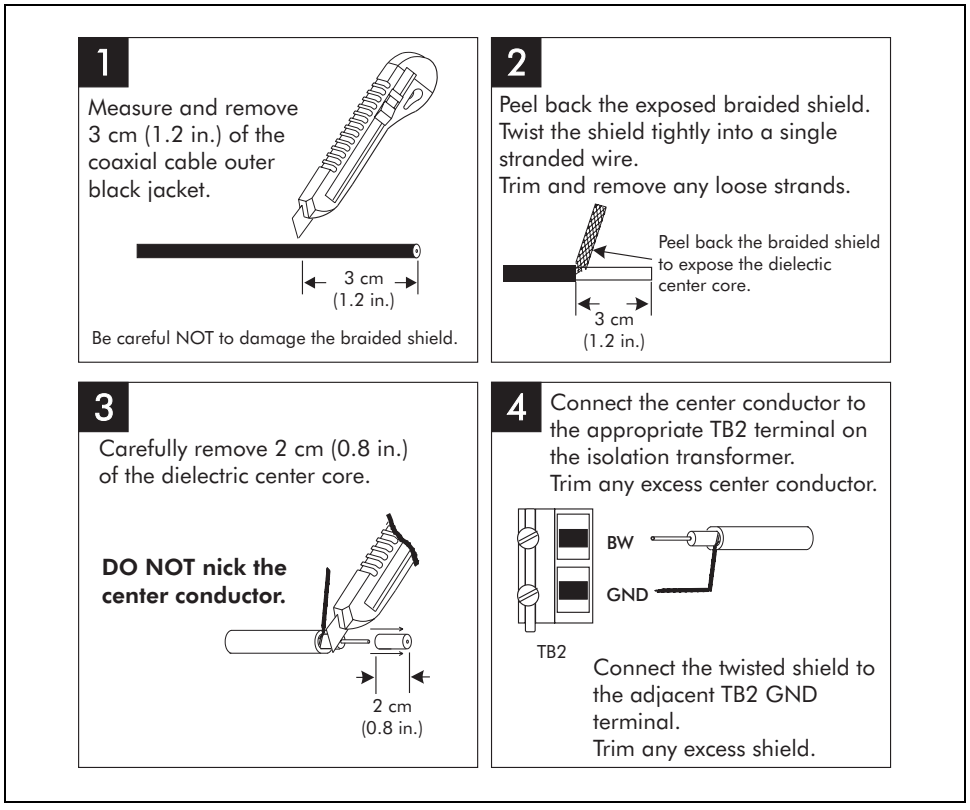


Figure 8-2 Isolation transformer coaxial cable preparation

4. Identify and label the sensor wire end of each coaxial cable.
5. Form a 15 cm (6 in.) minimum radius curve to the top of the tension insulator and feed the coaxial cable through the back hole on top of the insulator.
6. Cut the coaxial cable below the bottom of the steel insert on the appropriate tension insulator.

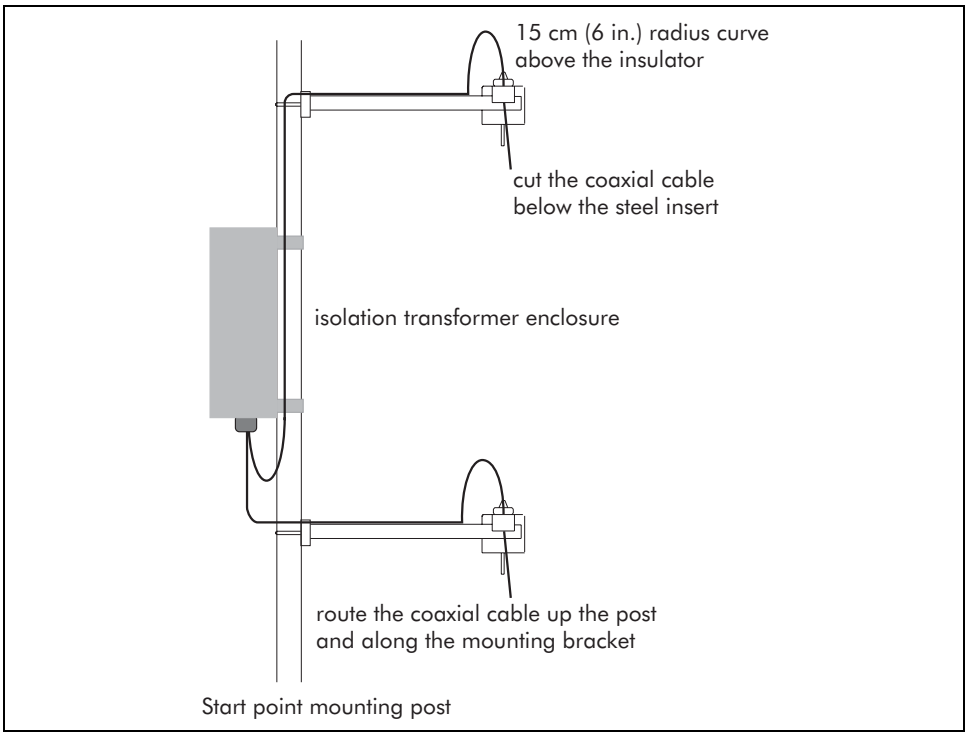


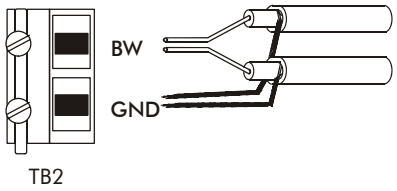
Figure 8-3 Start point coaxial cable routing

7. Follow the directions in Figure 8-2 to prepare the isolation transformer end of each cable.
8. Connect the coaxial cables and shields at the isolation transformer.
9. Follow the directions in *Splice-connecting coaxial cable to Intelli-FIELD wire* on page 7-14, for coaxial cable to Intelli-FIELD sensor wire splice-connections.

Parallel wiring connections at the isolation transformer

For any of the configurations (6-wire, 8-wire) which require parallel wiring connections at the isolation transformer, follow the above procedure and Figure 8-4.

To make parallel wiring connections at TB2 on the isolation transformer, double the recommended strip length for each coaxial cable, then insert two center conductors and two twisted shields in the appropriate terminals.



Make sure that there is no contact, and no possibility of contact, between the center conductors and the shields. Use electrical tape or heatshrink on the exposed twisted shield to prevent the possibility of shorting.

Figure 8-4 Parallel wiring connection (two wires)

Isolation transformer to sensor zone connections

Connect the coaxial cables between the isolation transformer and the sensor zone as follows:

Isolation transformer connection		Sensor zone connection
TB2 - TW		top sense wire
Coaxial shield to GND	↔	Coaxial shield trimmed (no connection)
TB2 - FW1 *		top field wire
Coaxial shield to GND	↔	Coaxial shield trimmed (no connection)
TB2 - FW2 *		bottom field wire
Coaxial shield to GND	↔	Coaxial shield trimmed (no connection)
TB2 - BW		bottom sense wire
Coaxial shield to GND	↔	Coaxial shield trimmed (no connection)
* Connect only TB2 - FW1 to the single field wire in a 3-wire system.		
Make any parallel wiring connections required for 6 or 8-wire configurations, at TB2 on the isolation transformer (see Figure 8-4).		

Installing terminators

Each pair of Intelli-FIELD sensor wires (top field & top sense) (bottom field & bottom sense) is connected to a terminator at the end point of the zone. The terminator provides a signal path, which enables the processor to supervise the sensor wires. Two terminators are required for a 3-wire, or a 4-wire, Intelli-FIELD zone. Three terminators are required for a 6-wire zone, and four terminators are required for an 8-wire zone. Each terminator includes two 1.5 m (5 ft.) coaxial cables for making the splice-connections to the sensor wire pairs. One coaxial cable is splice-connected to the field wire, and the other is splice-connected to the sense wire. In a 3-wire system, 2 coaxial cables (one from each terminator) are connected to the field wire. The terminator also includes a ground wire that must be connected to a properly installed ground rod (maximum 10 Ω earth ground connection). Consult the local electrical code for grounding information and requirements.

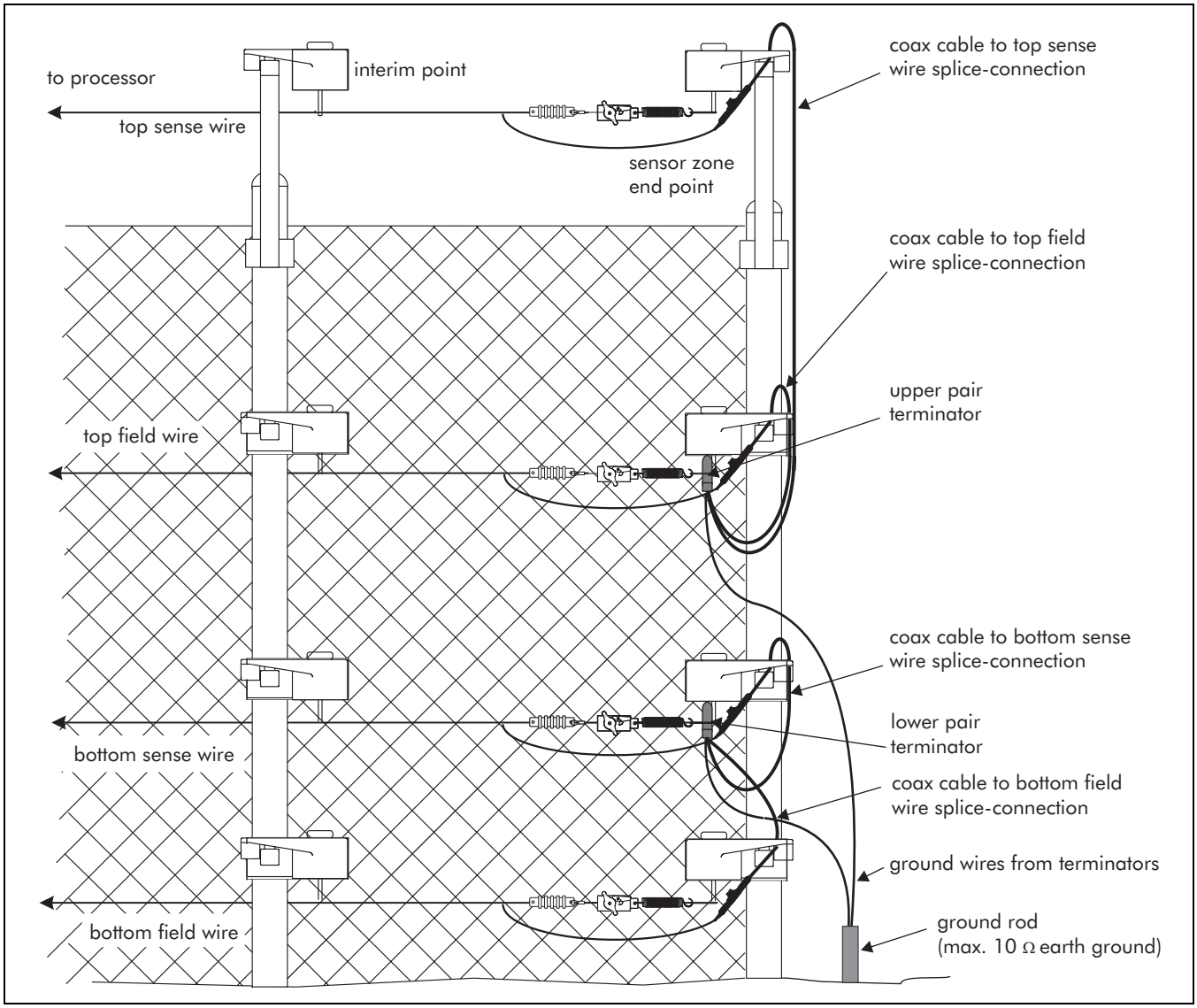


Figure 8-5 Installing terminators

1. Using UV resistant cable ties, secure the terminator to the steel insert on the upper field wire tension insulator. Use a VERTICAL orientation, with the coaxial cables and ground wire extending toward the ground.

   Do NOT attach the terminator to the mounting post.

   Attach the terminator with the coaxial cables and ground wire pointing toward the ground.

   The sensor wires and splice-connection assemblies MUST NOT make contact with any mounting hardware, or with the fence post, or fence fabric.

2. Form a 15 cm (6 in.) drip loop at the bottom of the terminator assembly, and route one of the coaxial cables along the post and mounting bracket to the top sense wire's tension insulator.
3. Form a 15 cm (6 in.) minimum radius curve to the top of the tension insulator and feed the coaxial cable through the back hole on the top of the insulator.
4. Cut the coaxial cable below the bottom of the steel insert.
5. Form a 15 cm (6 in.) drip loop at the bottom of the terminator assembly for the top field wire connection and loop the coaxial cable up and through the back hole on the tension insulator.
6. Cut the second coaxial cable below the bottom of the steel insert on the field wire's tension insulator.
7. Repeat the procedure for the second terminator (bottom field wire and bottom sense wire).
8. Connect the terminator's ground wire to a properly installed ground rod and secure the ground wire to the post.

Proceed to *Splice-connecting coaxial cable to Intelli-FIELD wire* on page 7-14.

9. After making the splice-connections and testing the zone, attach the coaxial cables and ground wire to the mounting brackets and fence post.

Alarm and supervision relays

There are two modes of control for the six output relays and two inputs on the Intelli-FIELD processor. Local Aux Control is the default setting, in which the relays are controlled by the processor and the inputs are self-test inputs for Zone A and Zone B. The second mode is available for processors, which report to StarNeT 1000 alarm display and control system. In this mode the Local Aux Control is deselected and the six output relays are controlled as output points, by the host computer. The two inputs (ADG1 and ADG2) become auxiliary device inputs to the system. The inputs can then be used to report the status of other sensors to the StarNeT 1000.

The following section applies to standalone Intelli-FIELD systems, and to systems connected to StarNeT 1000 networks, which use the Local Aux Control default setting. See appendix d for information about using Intelli-FIELD with StarNeT 1000.

The dual zone Intelli-FIELD processor can be connected to many types of alarm monitoring/reporting systems via six form A/B, single pole, double throw, dry contact relays rated at 30 V, 1.0 A. The relays are jumper-selectable as normally open or normally closed.

For the Intelli-FIELD processor, the normally open (N.O.) relay remains closed until an event, and then opens to signal the event.
The normally closed (N.C.) relay remains open until an event, and then closes to signal the event.

Each relay has an associated status indicator LED. When a relay is energized, the associated LED is ON. Alarm relays are indicated by red LEDs and supervision relays are indicated by amber LEDs. The time that each alarm relay remains activated after an event can be set using the configuration module.

Each sensor zone has an alarm relay to report sensor alarms and a supervision relay to report cable supervision alarms. There is also a tamper alarm relay that activates when the enclosure door is opened, and a power-fail relay that activates if the main power source to the processor is interrupted. The supervision, tamper and power-fail alarm relays are cleared when the condition that caused the alarm is corrected.

If an alarm relay is used to activate an external relay, a diode (1N4001 or equivalent) should be installed across the external relay coil. The diode will suppress voltage spikes that could cause relay chatter and incorrect status reporting at the monitoring equipment.

Setting the relay's active status (N.O./N.C.)

Depending on your alarm reporting requirements, each relay can be set to be either N.O. (**the relay opens to signal an alarm**) or N.C. (**the relay closes to signal an alarm**). The following table indicates the relationship between the relays, the indicator LEDs and the relay jumpers:

Alarm condition	Relay	Alarm output connections	Relay jumper * N.O.	N.C.	Indicator LED
Zone A supervision	K1	TB1 - 1 & 2	JP3 - 1 & 2	JP3 - 2 & 3	LED 2 SupA
Zone A sensor alarm	K3	TB1 - 3 & 4	JP5 - 1 & 2	JP5 - 2 & 3	LED 4 AlmA
Zone B supervision	K2	TB2 - 1 & 2	JP4 - 1 & 2	JP4 - 2 & 3	LED 3 SupB
Zone B sensor alarm	K4	TB2 - 3 & 4	JP6 - 1 & 2	JP6 - 2 & 3	LED 5 AlmB
Enclosure door tamper	K5	TB3 - 1 & 2	JP7 - 1 & 2	JP7 - 2 & 3	LED 6 Door
Power fail	K6	TB3 - 3 & 4	JP8 - 1 & 2	JP8 - 2 & 3	LED 7 PwrFail

* To select the active status of an output relay as normally closed or normally open place a shunt over the indicated pins on the corresponding jumper, (for example, to set the Zone A supervision alarm relay to normally open, place a shunt on JP3 pins 1 and 2).

Alarm communication wiring

The alarm communication wiring between the Intelli-FIELD system and the alarm annunciator should be installed inside conduit. The type and gauge of wire used depends on site-specific factors such as the length of the cable runs and local EMI conditions. Another important consideration is lightning protection. Contact Senstar-Stellar Customer Service for additional information on alarm communication wiring. Figure 8-6 illustrates the inputs and outputs available on the Intelli-FIELD processor for both modes of operation (Local Aux Control and control by the host computer).

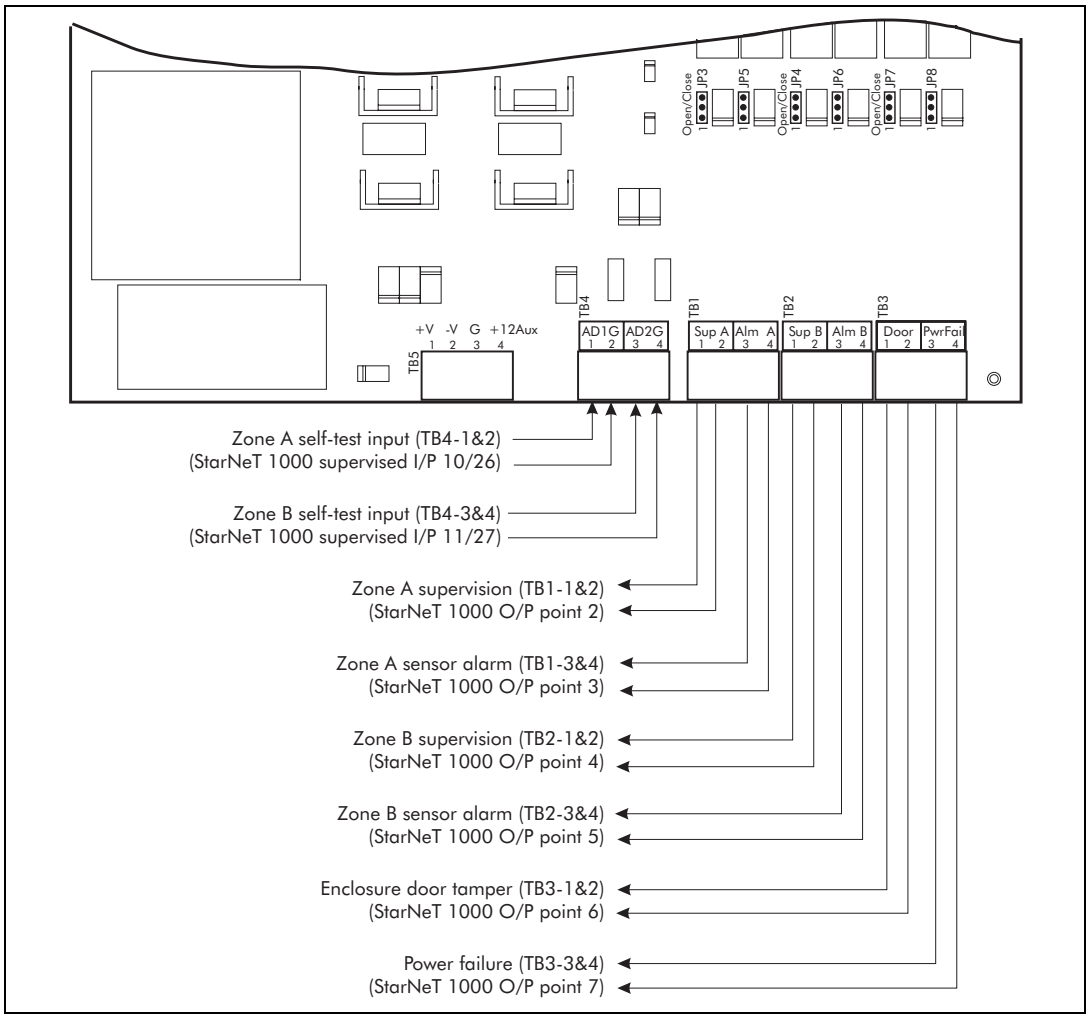


Figure 8-6 Alarm output & self-test input wiring and StarNeT 1000 I/O points

Remote self-test input connection

The remote self-test input connections are available on standalone Intelli-FIELD systems. Intelli-FIELD systems, which are connected to StarNeT 1000 systems, can use the self-test inputs as described (Local Aux Control), or can optionally use the inputs for connecting auxiliary devices to the StarNeT 1000.

The Intelli-FIELD processor is capable of generating a pulse that simulates an intrusion attempt, independently in each sensor zone. The self-test pulse causes the processor to declare a sensor alarm in the affected zone.

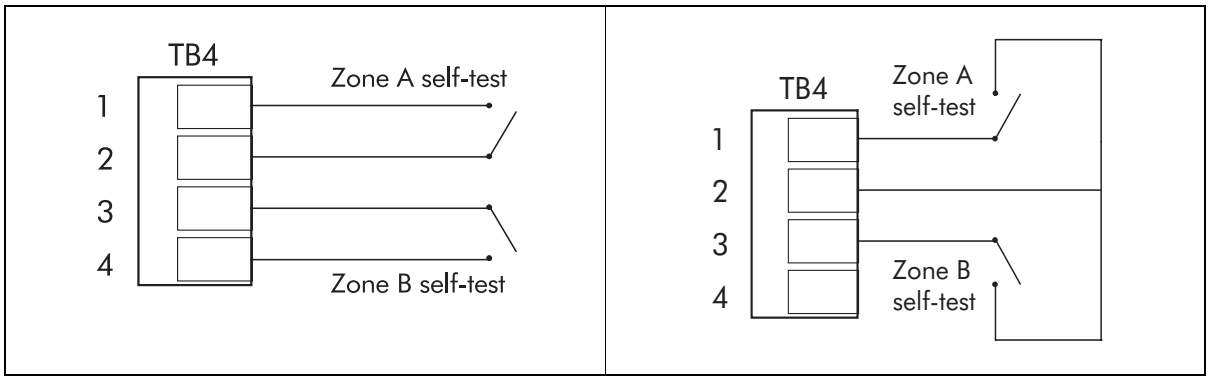


Figure 8-7 Remote self-test input wiring diagrams

Zone A remote self-test

An active low input on pin one of TB4 generates a self-test pulse in Zone A. Pin two of TB4 is connected to ground. Therefore, shorting pins one and two of TB4 causes the processor to generate a self-test pulse for Zone A.

1. Connect a switch (at a remote location) to pins one and two of TB4. When the switch is closed, the Zone A self-test pulse is generated.

Zone B remote self-test

An active low input on pin three of TB4 generates a self-test pulse in Zone B. Pin four of TB4 is connected to ground. Therefore, shorting pins three and four of TB4 causes the processor to generate a self-test pulse for Zone B.

1. Connect a switch (at a remote location) to pins three and four of TB4. When the switch is closed, the Zone B self-test pulse is generated.

   OR (to reduce wiring)

2. Connect a switch (at a remote location) to pins one and two of TB4. Connect a second switch to pin three of TB4. Tie the other side of the second switch to the wire connected to pin two of TB4.

Auxiliary device input connection

For Intelli-FIELD systems, which are connected to StarNeT 1000 systems and do NOT use the default setting of Local Aux Control, TB4 can be used as inputs to the StarNeT 1000 (see appendix d). In this case the two TB4 inputs (ADG1 and ADG2) are voltage sensing analog inputs, which are used to connect auxiliary devices to the StarNeT 1000 system. Figure 8-8 illustrates the typical wiring of an auxiliary device input to determine the status of the alarm relay and tamper switch of an auxiliary device.

If an auxiliary device input is not used, a 5.11 kΩ 1% resistor must be connected between the unused pins of the auxiliary device connector (TB4).

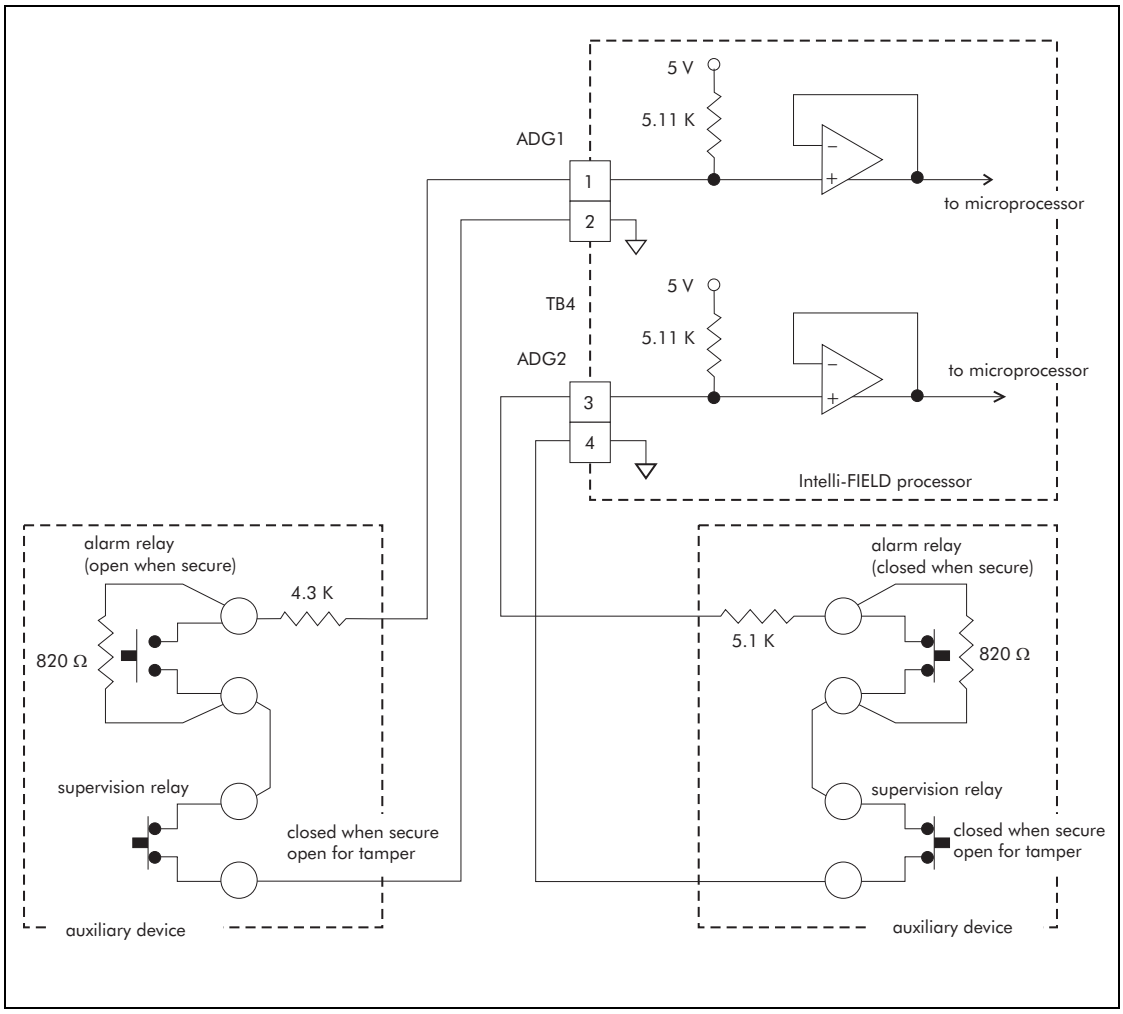
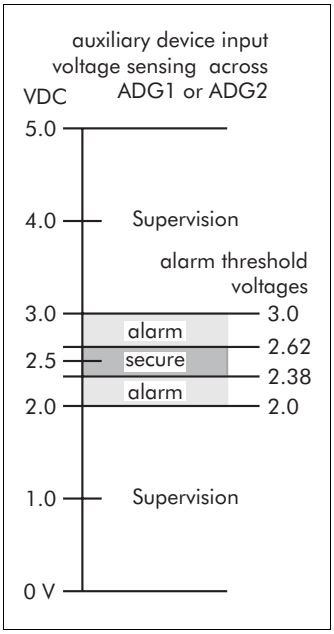


Figure 8-8 Auxiliary device input wiring diagram

When an auxiliary device is connected to TB4 at either ADG1 or ADG2, the processor can report the status of the auxiliary device to the StarNeT 1000 system. The inputs sense a voltage that is determined by the configuration of the auxiliary device relays and supervision resistors.

The following examples are based on the auxiliary device wiring diagram in Figure 8-8.

If the auxiliary device's alarm relay remains open to indicate a secure state, and the tamper switch is closed, then 2.5 volts are read at ADG1 between pins 1 and 2 of TB4. This voltage is read by the processors AD circuit and is interpreted as a "*Secure*" condition.



When an alarm occurs, the alarm relay closes. The 820 Ω resistor is taken out of the circuit, and causes the voltage at the auxiliary device input pins to decrease to approximately 2.25 volts. This is interpreted as an "*Alarm*" condition.

If the auxiliary device's alarm relay remains closed to indicate a secure state, and the tamper switch is closed then 2.5 volts are read at ADG2 between pins 3 and 4 of TB4. This voltage is read by the processors AD circuit and is interpreted as a "*Secure*" condition.

When an alarm occurs, the alarm relay opens. The 820 Ω resistor becomes part of the circuit, and causes the voltage at the auxiliary device input pins to increase to approximately 2.75 volts. This is interpreted as an "*Alarm*" condition.

If the door of an auxiliary device is opened, the tamper switch opens, and the auxiliary device circuit is open. This causes a voltage near 5 VDC to be read at the input pins. This is interpreted as a "*Tamper*" (supervision) condition.

A tamper condition over-rides an alarm condition. When a tamper supervision alarm is reported the associated sensor is considered to be out of service until the condition is corrected.

For added security a PASS mode option is available. Contact Senstar-Stellar Customer Service for details.

Power connections

The Intelli-FIELD system can be powered in three ways:

- a 24 VDC power distribution system
- a 48 VDC power distribution system
- a 12 VDC local power supply

WARNING *Disconnect the power at the source BEFORE making any Intelli-FIELD power connections.*

The Intelli-FIELD processor can operate on 24 VDC and 48 VDC network power. It can also operate on 10.5 to 15 VDC providing the local power supply can meet the processor's 12.2 W power consumption requirement.

The Intelli-FIELD processor can use ONLY one power input option, either 12 VDC local power OR 24/48 VDC network power.

24 and 48 VDC power distribution system

The 24 and 48 VDC power distribution systems are suitable for Intelli-FIELD installations featuring continuous, adjacent sensor zones. They are also suitable for installations that require lengthy power cable runs. The processors are daisy chained to a central power supply. The power cables should be installed in conduit and can be installed above or below ground. The conduit can be attached to the fence structure, thereby gaining the protection of the Intelli-FIELD sensor.

The 24 and 48 VDC power distribution systems should be powered from an uninterruptible source of AC power.

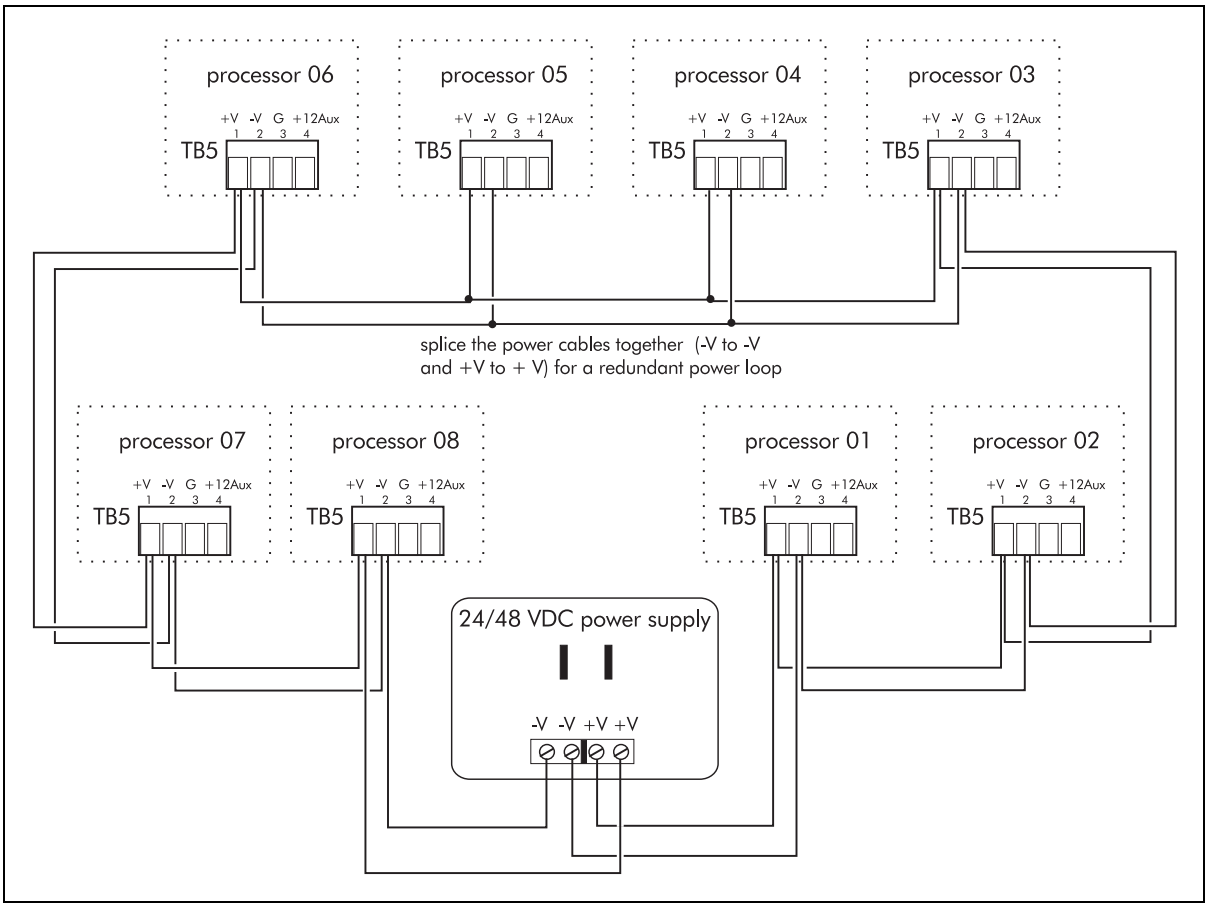


Figure 8-9 24/48 VDC power distribution wiring diagram

For power cable runs up to 1.2 km (4000 ft.) use minimum 14 AWG wire. For longer runs use minimum 12 AWG wire.

The maximum number of processors that can be powered by each supply may be reduced by lengthy power cable runs.

1. Using conduit, install the power distribution cable around the perimeter.
2. At each processor location, splice two 16 or 18 AWG leads to the power cable (+ VDC and - VDC).

   Use non-corrosive RTV sealant and heat-shrink tubing to protect the power cable splices from the weather. (RTV sealant: Senstar-Stellar part numbers 40011 - 3 oz. tube, X0251 - 10 oz. tube)

3. Pull the leads through the conduit into the processor enclosure.
4. Connect the + VDC power line to TB5-1.
5. Connect the - VDC power line to TB5-2.
6. Repeat the procedure at each processor along the perimeter.

Auxiliary power output (24 and 48 VDC power options only)

Intelli-FIELD processors receiving 24 or 48 VDC power are capable of supplying 12 VDC @ 300 mA to an auxiliary device.

Do NOT connect a device that draws more than 300 mA to the Intelli-FIELD processor.

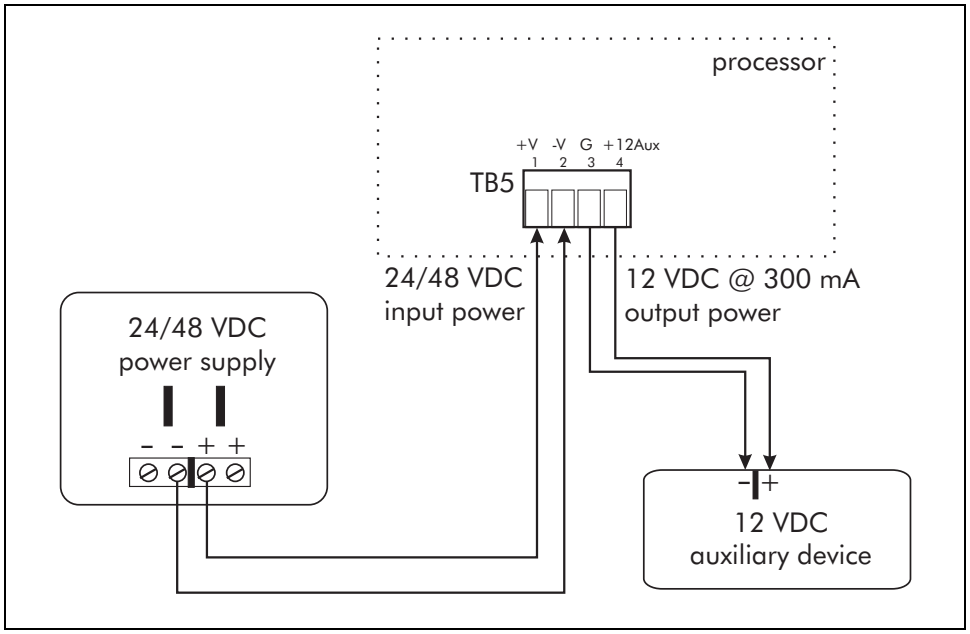


Figure 8-10 Auxiliary device output power wiring diagram

1. Connect TB5-4 (+12Aux) to the +12 VDC input on the auxiliary device.
2. Connect TB5-3 to the (-) or gnd input on the auxiliary device.

12 VDC input power connections

The 12 VDC power input connections are made on TB5 terminals 3 and 4. Terminal 4, labelled +12Aux, is used for the + 12 VDC power input connection. Terminal 3, labelled G, is used for the - VDC connection. The following 2 illustrations detail the 12 VDC input wiring connections, and the position of TB5 on the processor card.

Processors using the 12 VDC local input power option can NOT supply power to an auxiliary device.

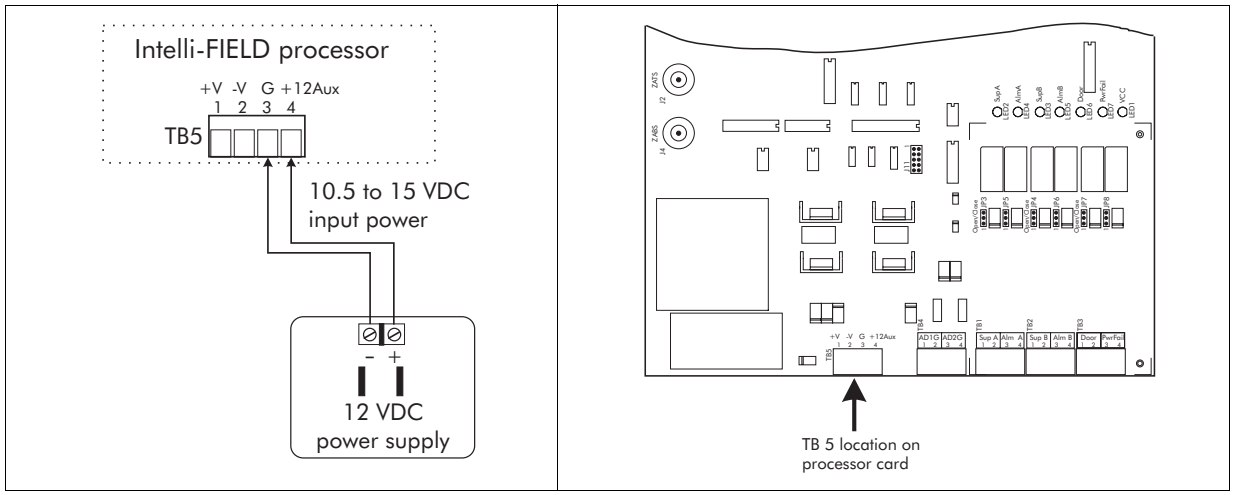


Figure 8-11 12 VDC local power input option

System power verification

For processors using 24 VDC or 48 VDC power distribution, verify that the voltage at TB5 terminals 1 and 2 is between 18 and 56 VDC.

For processors using 12 VDC local power, verify that the voltage at TB5 terminals 3 and 4 is between 10.5 and 15 VDC.

9 System settings

This section details the Intelli-FIELD configuration module with descriptions of its features and functions.

The configuration module

The Intelli-FIELD configuration module is a support tool for the Intelli-FIELD sensor. It allows you to configure the Intelli-FIELD operating parameters for the specific detection requirements and environmental conditions of each sensor zone. The configuration module also functions as a system monitoring and testing device. It allows you to observe Intelli-FIELD system activity during setup, test and operation.

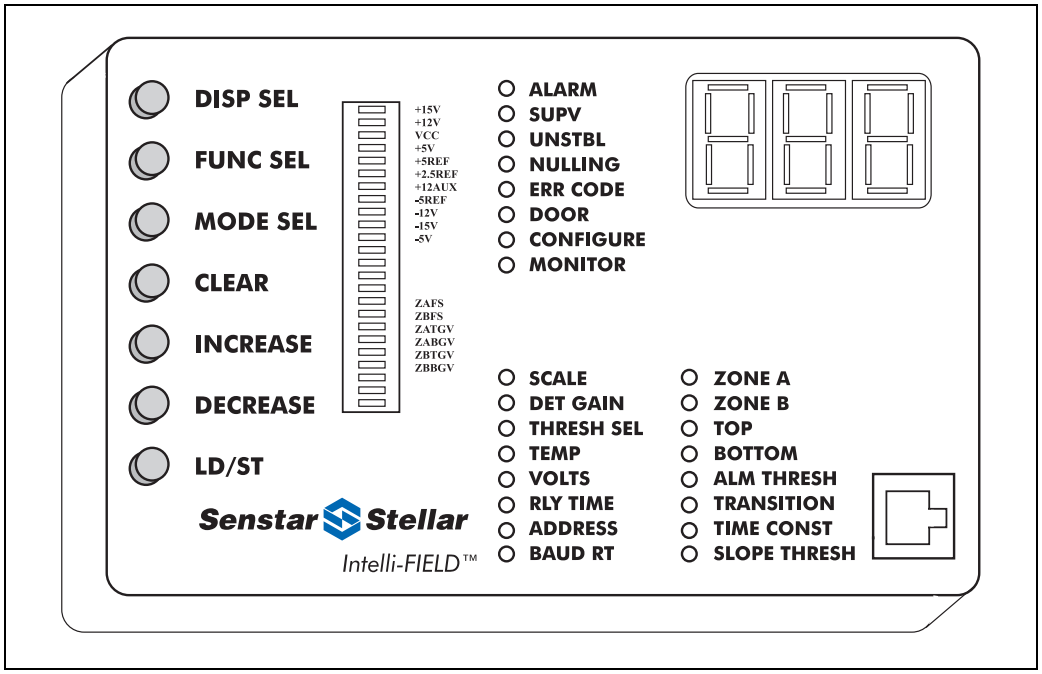


Figure 9-1 Intelli-FIELD configuration module

Intelli-FIELD systems, which are connected to StarNeT 1000 alarm display and control systems, can also be calibrated via the StarNeT 1000 station. However, the baud rate and network address parameters must be set via the configuration module BEFORE the Intelli-FIELD processor can communicate with the StarNeT 1000.

The configuration module is used to calibrate the Intelli-FIELD processor. It is connected to a processor that is being calibrated and disconnected when the calibration is complete. A single configuration module can be used to configure all of the processors in a multiple processor Intelli-FIELD installation.

The Intelli-FIELD processor's mode of operation, detection parameter settings and current status are indicated on the configuration module by a 24 segment bar LED scale, a digital display and 24 LEDs. The configuration module includes seven push-button function keys that allow you to select the processor's mode of operation, monitor system activity, program the detection parameters and test the system.

The configuration module is packaged in a rugged metal case. The interconnect cable uses snap-in connectors for easy installation and removal. Power is received directly from the Intelli-FIELD processor. No batteries or maintenance are required.

Modes of operation

The Intelli-FIELD system has two modes of operation, monitor mode and configure mode. Monitor mode is the Intelli-FIELD system's default setting. In configure mode, the processor's detection parameters can be adjusted to meet site specific requirements. Configure mode must be selected manually.

Monitor mode

In monitor mode you observe system activity, processor enclosure temperature and system operating voltages. You can also test the system. You can temporarily set the dB/LED value of the Bar scale display in monitor mode. However, you cannot change detection parameter settings.

Configure mode

In configure mode you adjust the Intelli-FIELD processor's parameters to provide the level of detection required in each sensor zone. The specific functions and parameters are identified by LED indicators and the digital display.

The Intelli-FIELD functions, parameters and modes of operation are selected by pressing the function keys while observing the LED indicators on the configuration module as they sequence through the possible selections.

Features

The configuration module includes a 24 segment bar scale, a digital display and 24 LEDs to indicate the operation and settings of the Intelli-FIELD processor. Seven push-button function keys are used to select the processor's mode of operation, test the system and set the detection parameters. A snap-in connector allows easy connection and disconnection to the Intelli-FIELD processor.

Bar scale

The 24 segment LED bar scale is a dual function display. It displays the detection signal level from the sense wire and the alarm threshold setting for each sensor zone. The bar scale also works in conjunction with the digital display to indicate Intelli-FIELD system operating voltages.

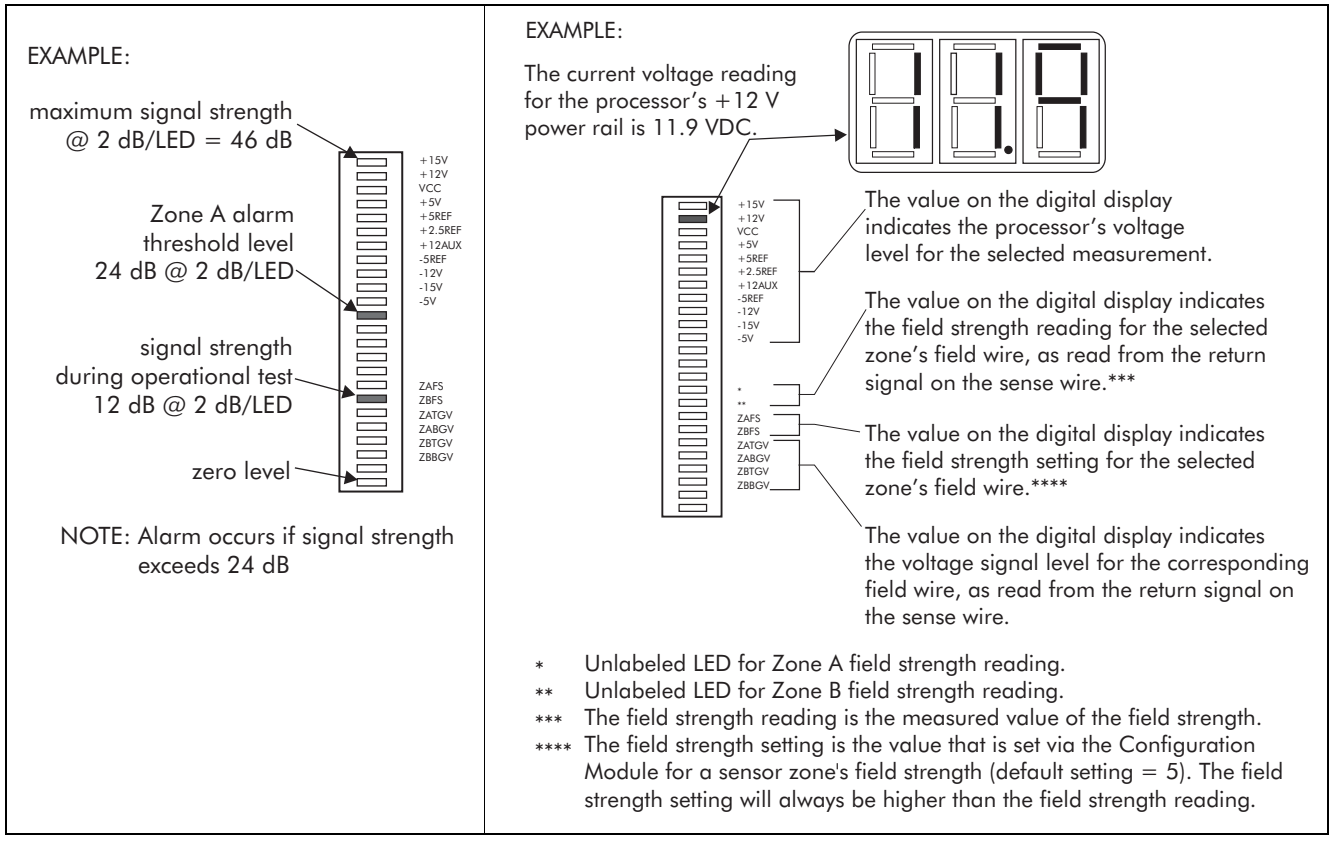


Figure 9-2 Bar scale and digital display

Signal level display

The bottom LED on the bar scale represents zero. Each subsequent LED represents a selectable voltage level (decibels). The bar scale display can be adjusted to indicate different dB/LED levels for each of the parameters that it monitors. The possible settings are:1, 2 and 4 dB/LED. You set the dB/LED level for each parameter in all alarm zones. It is important to select a dB/LED level that allows you to observe both the alarm threshold level and the maximum signal strength for the selected parameter. For example, in figure 9-2 the Zone A alarm threshold setting is 24 dB. Setting the bar scale to 2 dB/LED allows a maximum signal display of 46 dB. If the maximum signal exceeds 46 dB the top LED will remain lit for as long as the signal is above 46 dB. In such a case a setting of 4 dB/LED would be appropriate.

Operating voltage display

The bar scale works in conjunction with the digital display to indicate various Intelli-FIELD system operating voltages. When you select an Intelli-FIELD system voltage measurement the value is indicated on the digital display. For example, in figure 9-2 the +12V measurement is selected and the digital display indicates 11.9. Hence, the voltage level of the +12V power rail is 11.9 VDC when the measurement was taken.

The configuration module displays voltage readings for the following Intelli-FIELD system operating voltages and parameters:

+15V power rail	+12V power rail	VCC	+5V power rail
+5V reference	+2.5V reference	+12V auxiliary	-5V reference
-12V power rail	-15V power rail	-5V power rail	
Zone A field strength reading (0 - 14)		Zone B field strength reading (0 - 14)	
Zone A field strength setting (1 - 14)		Zone B field strength setting (1 - 14)	
Zone A top gain baseline voltage (-9V to +9V)*		Zone A bottom gain baseline voltage(-9V to +9V)*	
Zone B top gain baseline voltage (-9V to +9V)*		Zone B bottom gain baseline voltage (-9V to +9V)*	
* Gain voltage baseline readings above +9V or below -9V indicate a system problem. Readings of -12V indicate a sensor wire/cable fault.			

Digital display

The digital display works in conjunction with the bar scale to display selected Intelli-FIELD system operating voltage measurements. It also displays error codes and detection parameter values.

LED indicators

The configuration module includes 3 groups of LED indicators. The first group indicates Intelli-FIELD system activity:

LED	Function
ALARM	Indicates an Intelli-FIELD sensor alarm Indicates the cumulative alarm count (value from 0 to 255) for the selected sense wire (configure mode)
SUPV	Indicates an Intelli-FIELD supervision or tamper alarm
UNSTBL	Indicates an unstable condition within the system
NULLING	Indicates that the processor is nulling a signal level
ERR CODE	Indicates a processor error - the code is indicated on the digital display
DOOR	Indicates the enclosure door is open
CONFIGURE	Indicates the processor is in configure mode
MONITOR	Indicates the processor is in monitor mode

The second group of single LED displays indicates Intelli-FIELD adjustable parameters.

LED	Function
SCALE	Indicates the value shown on the digital display is the value in decibels represented by each LED of the bar scale for the selected parameter (The dB/LED level of the bar scale is set independently for each adjustable parameter in each sensor zone. The possible dB/LED settings are 1, 2, 4.)
DET GAIN	Indicates the value shown on the digital display is the detection gain setting for the selected sense wire (The detection gain controls the level of sensitivity. The signal from the sense wires is boosted by a factor equal to the detection gain setting before it is analyzed by the processor. The detection gain is set independently for each sense wire (zones A and B, top and bottom). The higher the detection gain setting, the more sensitive the sense wire. The possible detection gain settings are: 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10.)

LED	Function
THRESH SEL	Indicates the value shown on the digital display is the zone configuration for the sense wires. The possible zone configurations are: 4 - (four independent 2-wire alarm zones; roof top configuration) - four distinct alarm threshold settings - each sense wire has an independent alarm threshold setting 5 - (one 8-wire alarm zone) - five distinct alarm threshold settings - each sense wire has an independent alarm threshold setting - one independent alarm threshold setting for the combined signal from all four sense wires 6 - (two independent 4-wire alarm zones; standard configuration) - six distinct alarm threshold settings - each sense wire has an independent alarm threshold setting - one independent alarm threshold setting for the combined signal from the Zone A top and bottom sense wires - one independent alarm threshold setting for the combined signal from the Zone B top and bottom sense wires
TEMP	Indicates the value shown on the digital display is the approximate temperature reading from the processor enclosure (monitor mode) Indicates the value shown on the digital display is the time, in seconds, that further alarms from the associated sense wire will be masked (disabled) following the initial alarm (selectable value from 1 to 40 seconds) (configure mode)
VOLTS	Indicates that the bar scale and the digital display are displaying Intelli-FIELD operating voltage levels (monitor mode) Indicates the value shown on the digital display is the field strength setting for the selected zone (configure mode)
RLY TIME	Indicates the value shown on the digital display is the time, in seconds, that the sensor alarm relays will remain activated by an alarm condition (selectable value from 1 to 5 seconds) (configure mode) StarNeT 1000 ONLY (press the DISP SEL button to select this feature): Indicates the value shown on the digital display is the Local Aux Control feature; when the digital display shows lrl, the six O/P relays are controlled locally by the Intelli-FIELD processor and the two analog inputs (ADG1, ADG2) are self-test inputs to the system (default setting) When the digital display shows lr0, the six O/P relays are controlled remotely, by the StarNeT 1000 and the two analog inputs (ADG1, ADG2) are auxiliary device inputs to the StarNeT 1000 system (see appendix d)
ADDRESS	StarNeT 1000 ONLY - Each device on a StarNeT 1000 network requires a unique address (between 0 and 127) set with configuration module default = 3
BAUD RT	StarNeT 1000 ONLY - Each device on a StarNeT 1000 network MUST communicate at the same baud rate default = 19200

The third group of single LED displays indicates the specific zone and parameter that is being displayed or adjusted:

LED	Function
ZONE A	Indicates the values shown on all displays are relevant to Zone A
ZONE B	Indicates the values shown on all displays are relevant to Zone B
TOP	Indicates the values shown on all displays are relevant to the top sense wire of the selected zone
BOTTOM	Indicates the values shown on all displays are relevant to the bottom sense wire of the selected zone
ALM THRESH	Indicates the value shown on the digital display is the alarm threshold level (in decibels) for the selected sense wire (selectable value from 6 to 68)
TRANSITION *	Indicates the value shown on the digital display is the setting for the time constant transition between the secure state and the alarm threshold state for the selected zone (selectable value of 0, 1, 2, 3, or 4)
TIME CONST *	Indicates the value shown on the digital display is the time constant setting for the selected zone (selectable value from 5 to 14)
SLOPE THRESH *	Indicates the value shown on the digital display is the slope threshold filter setting for the selected zone (selectable value from 1 to 999 in increments of 1)
* The TRANSITION, TIME CONST AND SLOPE THRESH parameters each have four settings: Each sensor zone (A and B) has an independent setting. The combined signal from the Zone A top and bottom sense wires has an independent setting. The combined signal from the Zone B top and bottom sense wires has an independent setting.	

Function keys

Seven push-button function keys are used to select and adjust Intelli-FIELD functions and detection parameters. The function keys allow you to adjust each sensor zone in the system for site-specific requirements. The following table describes the operation of the configuration module function keys:

Function key	Function
Display Select (DISP SEL)	Scrolls through and displays the various parameters that are available for each Intelli-FIELD function
Function Select (FUNC SEL)	Scrolls through and displays the available Intelli-FIELD functions
Mode Select (MODE SEL)	Switches the processor between monitor mode and configure mode
CLEAR	Clears the alarm count for the selected sense wire (the max. alarm count is 255, the value must be cleared when it reaches 255, to return the count to 0) (configure mode)
INCREASE	Increases the dB/LED level of the bar scale (monitor mode) Increases the selected parameter by one unit (configure mode)

Function key	Function
DECREASE	Decreases the dB/LED level of the bar scale (monitor mode) Decreases the selected parameter by one unit (configure mode)
LD/ST (Load/Self test)	Self tests the selected zone by generating a signal that the processor interprets as an intruder (monitor mode) Loads and saves the selected/changed value into the processor's non-volatile E^2 memory (configure mode)

Intelli-FIELD functions

The following table lists the Intelli-FIELD functions that are available via the FUNC SEL key. It also includes the parameters that can be selected for each function via the DISP SEL key:

Intelli-FIELD Function (FUNC SEL)	Purpose	Individual parameters (DISP SEL)
SCALE (bar scale display)	Set the value in decibels represented by each LED in the bar scale display for monitoring system activity	THRESH SEL = 4 (four independent 2-wire alarm zones; roof top configuration) Zone A top sense wire alarm; Zone A bottom sense wire alarm; Zone B top sense wire alarm; Zone B bottom sense wire alarm THRESH SEL = 5 (one 8-wire alarm zone) Zone A top sense wire alarm; Zone A bottom sense wire alarm; Zone B top sense wire alarm; Zone B bottom sense wire alarm; Zone A top & bottom and Zone B top & bottom sense wire alarm THRESH SEL = 6 (two independent 4-wire alarm zones; standard configuration) Zone A top sense wire alarm; Zone A bottom sense wire alarm; Zone B top sense wire alarm; Zone B bottom sense wire alarm; Zone A top & bottom sense wire alarm; Zone B top & bottom sense wire alarm default setting = 4 dB/LED
DET GAIN (Detection Gain)	Set the sensitivity of each Intelli-FIELD sense wire (the higher the setting, the more sensitive the sense wire)	Zone A top sense wire; Zone A bottom sense wire; Zone B top sense wire; Zone B bottom sense wire default setting = 1.0 for top sense wires 1.5 for bottom sense wires

Intelli-FIELD Function (FUNC SEL)	Purpose	Individual parameters (DISP SEL)
ALM THRESH (Alarm Threshold)	Set the signal level at which the processor will declare a sensor alarm (high alarm threshold settings result in a less sensitive sensor zone)	THRESH SEL = 4 (four independent 2-wire alarm zones; roof top configuration) Zone A top sense wire alarm; Zone A bottom sense wire alarm; Zone B top sense wire alarm; Zone B bottom sense wire alarm THRESH SEL = 5 (one 8-wire alarm zone) Zone A top sense wire alarm; Zone A bottom sense wire alarm; Zone B top sense wire alarm; Zone B bottom sense wire alarm; Zone A top & bottom and Zone B top & bottom sense wire alarm THRESH SEL = 6 (two independent 4-wire alarm zones; standard configuration) Zone A top sense wire alarm; Zone A bottom sense wire alarm; Zone B top sense wire alarm; Zone B bottom sense wire alarm; Zone A top & bottom sense wire alarm; Zone B top & bottom sense wire alarm Alarm threshold default setting for top sense wires = 40 dB Alarm threshold default setting for bottom sense wires = 37 dB Combined alarm threshold setting = 68 dB Senstar-Stellar recommends leaving the combined alarm threshold default settings at 68 dB. For more information on the combined threshold contact Senstar-Stellar Customer Service.

Intelli-FIELD Function (FUNC SEL)	Purpose	Individual parameters (DISP SEL)
THRESH SEL (Threshold Select)	Set the zone configuration for the four sense wires	4 (four independent 2-wire alarm zones; roof top configuration) - each sense wire is configured as a single sensor; you set the alarm threshold independently for each sense wire 5 (one 8-wire alarm zone) - each sense wire is configured as a single sensor; and the Zone A top and bottom sense wires and Zone B top and bottom sense wires are configured as a single sensor; you set an independent alarm threshold for each sense wire plus one alarm threshold for the combined signal form all four sense wires 6 (two independent 4-wire alarm zones; standard configuration) - each sense wire is configured as a single sensor; and the Zone A top and bottom sense wires are configured as a single sensor; and the Zone B top and bottom sense wires are configured as a single sensor; you set an independent alarm threshold for each sense wire plus an alarm threshold for the Zone A top and bottom sense wires plus an alarm threshold for the Zone B top and bottom sense wires default setting = 6
TEMP (Temperature)	Provides processor enclosure temperature	(monitor mode)
(Mask Time)	Sets the alarm mask time	single setting for all alarms (configure mode) selectable from 1 to 40 seconds default setting = 2 seconds
VOLTS (Voltage Measurement & Field Strength Setting)	Provides Intelli-FIELD system operating voltage measurements for troubleshooting	+15V; +12V; VCC; +5V; +5 Reference; +2.5 Reference; +12 Auxiliary; -5 Reference; -12V; -15V; -5V; (* no label) - Zone A field strength reading; (** no label) - Zone B field strength reading; ZAFS - Zone A field strength setting; ZBFS - Zone B field strength setting; ZATGV - Zone A top gain baseline voltage; ZABGV - Zone A bottom gain baseline voltage; ZBTGV - Zone B top gain baseline voltage; ZBBGV - Zone B bottom gain baseline voltage (Monitor mode: display readings only - not adjustable)
	Sets the field strength voltage level for the field generators	Zone A - Zone A field strength setting; Zone B - Zone B field strength setting (Configure mode - adjustable settings; one setting per zone; 1 V to 14 V) default setting = 5

Intelli-FIELD Function (FUNC SEL)	Purpose	Individual parameters (DISP SEL)
RLY TIME (Relay Time)	Sets the time in seconds that the processor's sensor alarm output relays remain active during an event Sets the Local Aux Control mode	Single setting for both sensor alarm relays; Zone A and Zone B (selectable value from 1 to 5; 1 = minimum; 5 = maximum) default setting = 2 StarNeT 1000 ONLY Selectable values are lrl (Local Aux Control) and lr0 (StarNeT 1000 control) default setting = lrl
TRANSITION *	Sets the transition in the Time Constant between the non alarm state and the alarm threshold state	Available settings are 0, 1, 2, 3, or 4 default setting = 4
TIME CONST (Time Constant) *	Sets the Time Constant used by the processor to discriminate between environmental background noise and genuine intrusion signals - increasing the Time Constant increases the sensitivity to slow moving intruders	Available settings from 5 to 14 (5 is less sensitive to environmental noise, 14 is the most sensitive to all conditions) default setting (single wire) = 8 default setting (combined wires) = 6
SLOPE THRESH (Slope Threshold) *	Sets the rate of signal change at which the processor will reset to the baseline level - used to reduce nuisance alarms caused by "*fast*" environmental noise such as the onset of rain	Available settings from 1 to 999; wrap-around at 999 increments to 1 999 is not sensitive (OFF); 1 is the most sensitive to all conditions default setting (single wire) = 80 default setting (combined wires) = 999
* The TRANSITION, TIME CONST AND SLOPE THRESH parameters each have four settings: Zone A, Zone B, Zone A top and bottom, Zone B top and bottom.		
AlARM	Displays the cumulative alarm count for the selected sense wire(s) (max. alarm count = 255 the alarm count for the selected sense wire is reset to 0 by selecting CLEAR in configure mode)	Available readings for: Zone A top sense wire; Zone A bottom sense wire; Zone B top sense wire; Zone B bottom sense wire; Zone A top and bottom sense wires; Zone B top and bottom sense wires

Setting parameters

1. Open the processor enclosure.
2. Connect the configuration module to J8 on the processor.

   The processor must be in configure mode to set or change system parameters.
3. Press the MODE SEL function key to toggle between monitor mode and configure mode.
   The CONFIGURE LED is ON; the MONITOR LED is OFF.
4. Press the FUNC SEL key to select the function that you want to adjust.
   LEDs turn ON to indicate the selected function, sensor zone and parameter. For example, the DET GAIN, ZONE A and TOP LEDs ON indicate that you can set the detection gain for the Zone A top sense wire.
5. Press the DISP SEL key to select the sensor zone and parameter that you want to adjust.
   Observe the LEDs as you press the DISP SEL key to select the parameter that you want to adjust. The digital display indicates the current value of the selected parameter.
6. Press the INCREASE key to increase the value of the selected parameter.
   The value on the digital display increases each time the INCREASE key is pressed. (When the maximum limit is reached, the next INCREASE causes the value to wrap around to the minimum setting.)

OR

Press the DECREASE key to decrease the value of the selected parameter.
The value on the digital display decreases each time the DECREASE key is pressed. (When the minimum limit is reached, the next DECREASE causes the value to wrap around to the maximum setting.)

7. When the desired value for the selected parameter is indicated on the digital display, press the LD/ST key to save the value to the E^2 memory.

   The LD/ST key must be pressed immediately following an adjustment for the change to take effect.
8. Repeat this procedure for each parameter that you want to adjust.

   When you adjust the DETECTION GAIN or VOLTS settings, the Configure LED begins to flash. You can continue to adjust parameters while the Configure LED flashes. When you switch to Monitor Mode, the processor resets and performs the startup calibration routine. When the startup routine is completed, the new parameter settings take effect.

Resetting the parameters to the factory default values

Occasionally, it may be useful to reset all of the Intelli-FIELD operating parameters to the factory default settings. Before resetting the operating parameters to the default values, you should make a record of the current settings.

1. Turn OFF the power to the Intelli-FIELD processor.
2. Apply power to the processor while pressing the MODE SEL key.
3. Once the LEDs have all turned OFF and then ON again, release the MODE SEL key (approximately 3 - 4 seconds).
4. With the configuration module set to DET GAIN, ZONE A, TOP, and with the CONFIGURE LED flashing; press the following keys in order:
   CLEAR
   CLEAR
   LD/ST
   The CONFIGURE LED will turn OFF momentarily, and then begin flashing again.
5. Press the MODE SEL key.
   The system will restart with the default operating parameters.

10 System setup

This section details the steps required to calibrate the Intelli-FIELD system to meet your site-specific detection requirements.

Intelli-FIELD processors, which include the Intelli-FIELD com card, can be calibrated via Senstar-Stellar's Universal Configuration Module (UCM). Multiple processors, which include the com card, can be connected to a StarNeT 1000 alarm display and control system via the Crossfire network. However, the processor's baud rate and network address parameters must be set via the hand-held configuration module.

The UCM is a calibration, diagnostic and maintenance tool for Senstar-Stellar's family of intrusion detection sensors.

StarNeT 1000 is an alarm display and control system for Senstar-Stellar's family of intrusion detection sensors.

Calibrating Intelli-FIELD

When the Intelli-FIELD system is initially powered up the operating parameters are at the factory default settings. You can configure the system for your site-specific requirements by using the configuration module to adjust the operating parameters. Before attempting to calibrate the system you should read Chapter 9 The configuration module.

Contact Senstar-Stellar Customer Service BEFORE calibrating your Intelli-FIELD system.

Senstar-Stellar recommends that each sensor zone be configured for your site-specific conditions BEFORE the system is put into operation.

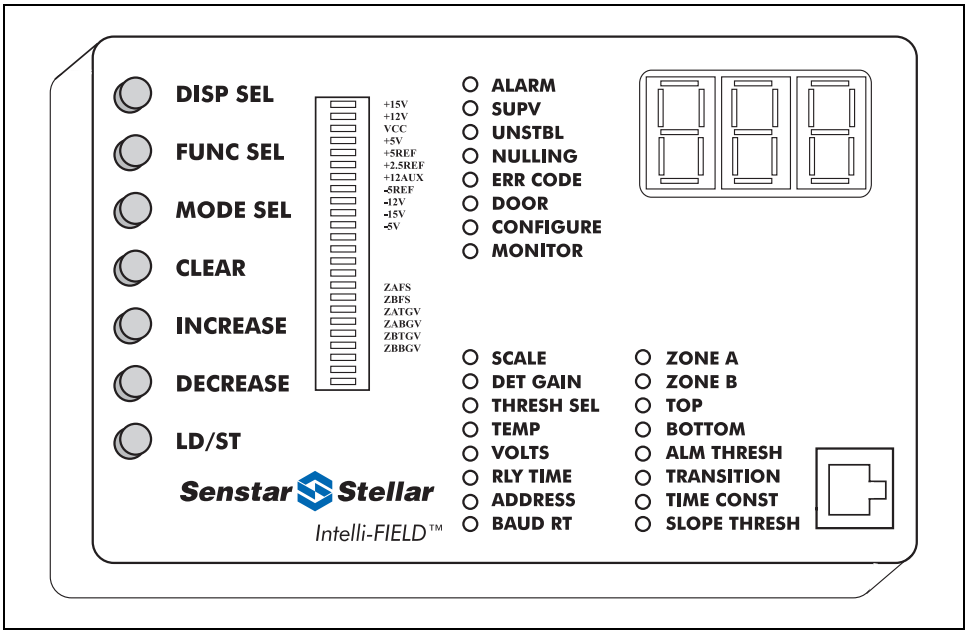


Figure 10-1 Intelli-FIELD configuration module

Connecting the configuration module

The configuration module can be connected to the processor with the processor power OFF or ON. The advantage to connecting the configuration module with the processor power OFF is that you can then monitor the progress of the startup routine and the self-test diagnostics. If there are any problems or errors encountered, the configuration module will indicate at which step the problem occurred.

Processor power OFF

1. Disconnect the power to the processor, and open the processor enclosure.
2. Plug one end of the 8-pin cable into the configuration module.
3. Plug the other end into J8 on the processor.
4. Power up the processor.

When power is applied to the processor the configuration module begins to operate:

- all LEDs turn ON for approximately 1 second
- a series of processor self-test diagnostics are indicated on the digital display and bar scale (The bar scale will begin indicating the self-tests at the zero level and will sequence through to segment 21. The complete range of tests take approximately 90 seconds to complete.)

- when self-testing is completed the processor is in monitor mode and the system is operational
  (The MONITOR, SCALE, ZONE A, and TOP LEDs are ON; the digital display indicates the current dB/LED setting.)

It is possible to bypass the startup routine when power is applied to the processor by pressing the MODE SEL button.

If you press the MODE SEL button when power is first applied to the processor the Configure LED begins flashing, and you can adjust operating parameters. If you press MODE SEL again, the processor resets and performs the startup routine.

Processor power ON

1. Plug one end of the 8-pin cable into the configuration module.
2. Plug the other end into J8 on the processor.

Processor self-test problems

If the processor detects any system problems during the self-test, the self-test stops, the ERR CODE LED turns ON and an error code is indicated on the 3-digit display. In addition, the configuration module indicates at which step the problem occurred (between steps 8 and 21 on the bar scale). Refer to Chapter 13 Troubleshooting for additional information.

Configuration settings

The Intelli-FIELD system should be configured for your site-specific requirements before it is put into use. The factory default settings are based on average environmental conditions and typical threat scenarios. Although these settings may be appropriate for many installations, it is strongly advised that you test the system and make adjustments according to your specific requirements.

The Intelli-FIELD sensor is a volumetric penetration detector that can be adjusted to various volumetric widths to match your site requirements. Higher thresholds and lower volts settings will narrow the electrostatic detection field to be directly above, between and below, the sensor wires. Higher volts and lower threshold settings will widen the electrostatic detection field to a maximum of approximately 0.5 m (20 in.) on each side of the sensor wires. At the maximum field width, the electrostatic detection field is approximately 1 m (40 in.) wide, with the sensor wires at the center point.

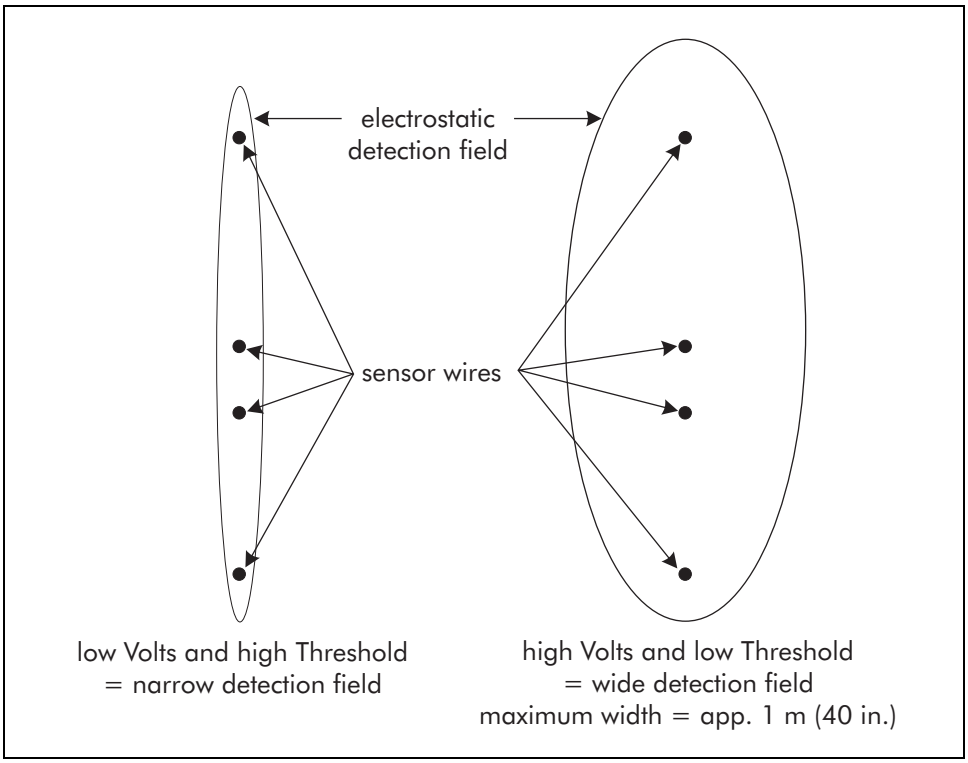


Figure 10-2 Electrostatic detection field volumetric widths

Calibration detection testing

CAUTION	*Contact with the sensor wires during operation can result in an electrical shock.*

There are three standard tests that should be conducted throughout each Intelli-FIELD sensor zone, the walk test, the crawl test, and the shuffle-walk and stoop test. The first two tests provide a set of signal strength measurements, which are used to set the alarm thresholds. The alarm thresholds should be set to the highest possible levels, which provide adequate detection of valid intruders. The third test is used to validate the system.

The top sense wire alarm threshold is used to detect elevated bridging attempts. The bottom sense wire alarm threshold is used to detect ground level intrusion attempts. The combined alarm threshold is used only in special circumstances where a very narrow detection field is required. The factory setting for the combined alarm threshold is 68 dB (alarm disabled). Contact Senstar-Stellar Customer Service for additional information about the combined alarm threshold.

The mass and speed of the person performing the test has a direct bearing on the test results. Therefore, each test should be performed by the same person moving at a consistent speed. The person performing the tests must weigh at least 35 kg (77 lbs.).

The Intelli-FIELD tests require two people, one to observe and operate the configuration module and one to simulate intrusion attempts (walker). During each test, make detailed notes about the exact location of the intrusion simulations, and the measured test results. A detailed copy of the individual zone layout is useful for this purpose. Communication between the parties is essential throughout the test process.

Perform each test throughout each sensor zone at all mounting posts and half-way between each pair of mounting posts. Test all points in each zone where the sensor wires pass over different media, or are near objects. Test all zones in a multi-zone installation.

The THRESH SEL must be set to 6 for a dual zone 4-wire system, or 5 for a stacked 8-wire system, or 4 for a four zone 2-wire system.

The following test procedures make reference to Zone A selections. Test both zones of a dual zone processor (A and B).

Configuration module - monitor mode

Place the configuration module into monitor mode to observe sensor alarm activity during the tests.

The dB/LED level of the bar scale display must be set for each parameter so that you can observe the maximum signal strength.

Walk test

The walk test is used to test for uniform detection within each sensor zone. It will locate any potential low spots within the zone. There will probably be a significant difference between the signal strength measurements that are taken at posts, and between posts. However, the detection signal strength should be consistent throughout the zone for all of the at post measurements. The detection signal strength should also be consistent for all of the between post measurements.

To use the bar scale to measure the signal strength in a zone, set all alarm thresholds to 68 dB.

The walker should approach the sensor wires as closely as possible, without making contact.

Typically, the measurements for the Top signal strength are much lower than the Bottom signal strength.

To determine the detection signal strength:

1. Connect the configuration module to the Intelli-FIELD processor.
2. Use the **FUNC SEL** and **DISP SEL** keys to select Scale, Zone A, and Bottom.
3. At the start point, have the walker approach the sensor wires at a normal walking pace.
   Record the maximum signal strength at this point.
4. Have the walker move to the half-way point between the first two posts and approach the sensor wires.
   Record the maximum signal strength at this point.
5. Repeat this at each post and half-way point throughout the zone.
6. Use the **FUNC SEL** and **DISP SEL** keys to select Scale, Zone A, and Top, and repeat the Walk test.

Examine your recorded signal strength levels to determine the minimum and maximum within the zone. A typical range of measurements might be between 30 dB and 40 dB. The difference between the minimum and maximum signal strengths for the at post measurements should not exceed 25%, within a zone. The difference between the minimum and maximum signal strengths for the between post measurements should not exceed 25%, within a zone. If there is a greater than 25% difference in the measurements corrective zone configuration action is required. Contact Senstar-Stellar Customer Service for more information.

Crawl test

The crawl test is used to set the alarm thresholds for the sensor zone(s). In the crawl test, the walker lies belly-down on the ground, perpendicular to and facing the sensor wires at a distance of at least 1 m. The walker slowly crawls forward (approximately 2.5 cm (1 in.) per second) keeping as close to the ground as possible. The walker attempts to pass beneath, or through the sensor wires. The walker must not make any sudden movements and should avoid touching the sensor wires. There will probably be a significant difference between the at post and between post signal strength measurements. However, the detection signal strength for the at post measurements should be consistent throughout the zone. The detection signal strength for the between post measurements should also be consistent throughout the zone.

To use the bar scale to measure the signal strength in a zone, set all alarm thresholds to 68 dB.

1. Connect the configuration module to the Intelli-FIELD processor.
2. Use the **FUNC SEL** and **DISP SEL** keys to select Scale, Zone A and Bottom.
3. At the start point, have the walker lie down perpendicular to the sensor wires at a distance of approximately 1 m. Have the walker crawl slowly toward the sensor wires keeping as close to the ground as possible. The walker should attempt to pass through the sensor wires without touching them.
   Observe the bar scale as the walker approaches the sensor zone. Record the maximum signal strength at this point.
4. Have the walker move to the half-way point between the first two posts and repeat the crawl procedure.
   Record the maximum signal strength at this point.
5. Repeat this at each post and half-way point throughout the zone.

Examine your recorded signal strength levels to determine the minimum and maximum within the zone. The difference between the minimum and maximum signal strengths for the at post measurements should not exceed 30%, within a zone. The difference between the minimum and maximum signal strengths for the between post measurements should not exceed 30%, within a zone. If there is a greater than 30% difference in the measurements, corrective zone configuration action is required. Contact Senstar-Stellar Customer Service for more information.

Setting the alarm thresholds

Note the lowest signal strength reading recorded during the crawl test and the specific location of the measurement (for both at post and between post measurements). Repeat the crawl test 5 times at the point of the lowest measurement and record the results. Set the bottom alarm threshold to the lowest of the 6 measurements taken at this location. For example, if the measurements were 32 dB, 34 dB, 33 dB, 31 dB, 33 dB, and 32 dB, set the bottom alarm threshold to 31 dB.

Set the top alarm threshold at the same level, or slightly higher (by 1 - 5 dB) than the bottom alarm threshold.

The following test is used to verify the operation of the system. If the system fails to declare an alarm during a test, lower the alarm threshold 1 dB and repeat the test.

Shuffle-walk and stoop test

In the shuffle-walk and stoop test, the walker slowly shuffles toward the sensor wires with both feet remaining on the ground. The walker slides one foot forward about 5 cm (2 in.), then slides the other foot forward 5 cm. When the walker reaches the sensor wires he turns sideways, and crouches to an almost kneeling position. This test is successful (pass) if an alarm is declared at any point in the procedure.

1. Connect the configuration module to the Intelli-FIELD processor.
2. At the start point, the walker approaches the sensor wires using a slow shuffle-walk.
   Observe the ALARM LED as the walker approaches the sensor zone and stop the walker when the ALARM LED turns ON.
   If the ALARM LED does not turn ON during the shuffle-walk, the walker continues until the sensor wires are reached. Do NOT make contact with the sensor wires.
3. The walker turns parallel to the sensor wires and remains motionless.
4. The walker stoops or crouches to an almost kneeling position.
   The imbalance between the upper and lower pair of sensor wires should cause an alarm.
5. Repeat this test at all posts and at the half-way point between posts, throughout the zone.

Adjusting the detection parameters

You can adjust the Intelli-FIELD detection parameters to meet your site-specific requirements, by placing the configuration module in configure mode (MODE SEL). The detection parameters are set for the entire zone length. Therefore, increasing the sensitivity makes the entire zone more sensitive. Some areas of slightly lower detection sensitivity are normal within a zone. However, if there are areas where the detection sensitivity is significantly lower than in the remainder of the zone, action should be taken to correct the low spot. For example, low spots can be corrected by splicing in an additional field wire at the area of lower detection sensitivity, or by removing any nearby objects. Contact Senstar-Stellar Customer Service for information about correcting low spots in a zone.

There are three adjustable detection parameters used to increase or decrease the sensitivity of the Intelli-FIELD system:

- alarm threshold
- detection gain
- field excitation voltage

The alarm threshold and the detection gain parameters are used internally by the processor when it analyzes the signals from the sense wires. The field excitation voltage controls the size and strength of the electrostatic detection field surrounding the sensor wires.

Record the detection parameter settings for each zone of each processor. The record can be taped to the processor's enclosure door or stored in a safe location. These records are useful for troubleshooting and recalibration.

ALM THRESH (Alarm Threshold)

The alarm threshold is an adjustable setting used to determine the signal strength that must be detected for the processor to declare a sensor alarm. Setting the alarm threshold is a 2-step process:

1. Select the zone configuration for the sense wires (THRESH SEL). The possible settings are 4, 5, or 6.
2. Set the alarm thresholds for the sense wires, based on the selected zone configuration (ALM THRESH).

Zone configuration setting (THRESH SEL)	Zone configuration - sense wires (ALM THRESH)
4 (fence top/roof top)	(four independent 2-wire alarm zones) four distinct alarm threshold settings - each sense wire has an independent alarm threshold setting default setting for top sense wires = 40 dB default setting for bottom sense wires = 37 dB
5 (8-wire stacked configuration)	(one 8-wire alarm zone) five distinct alarm threshold settings - each sense wire has an independent alarm threshold setting default setting for top sense wires = 40 dB default setting for bottom sense wires = 37 dB - one independent alarm threshold setting for the combined signal from all four sense wires (The combined alarm threshold default setting is 68 dB. Contact Senstar-Stellar Customer service for information about the combined alarm threshold.)
6 (4-wire applications most common dual zone configuration)	(two independent 4-wire alarm zones) six distinct alarm threshold settings - each sense wire has an independent alarm threshold setting default setting for top sense wires = 40 dB default setting for bottom sense wires = 37 dB - one independent alarm threshold setting for the combined signal from the Zone A top and bottom sense wires - one independent alarm threshold setting for the combined signal from the Zone B top and bottom sense wires (The combined alarm threshold default settings are 68 dB. Contact Senstar-Stellar Customer service for information about the combined alarm threshold.)

If you increase the alarm threshold setting, it takes a stronger detection signal from the sense wires to cause an alarm. A high alarm threshold setting results in a less sensitive system. The benefit of a high alarm threshold is a lower nuisance alarm rate.

Lowering the alarm threshold setting results in a weaker detection signal causing an alarm. A low alarm threshold setting results in a very sensitive system. A low alarm threshold may result in a higher nuisance alarm rate.

Always retest the system after making any changes to the detection parameters.

Setting the zone configuration (THRESH SEL)

1. Press the MODE SEL key to place the processor in configure mode. The CONFIGURE LED is ON.
2. Press the FUNC SEL key repeatedly until the THRESH SEL LED turns ON.

   When the THRESH SEL LED turns ON, the current zone configuration setting is indicated on the digital display.
3. Use the INCREASE key to select the sense wire zone configuration setting for this processor.

   The possible settings are 4, 5 and 6 (see THRESH SEL on page 9-10).
4. To enter the new sense wire zone configuration setting into the processor's E^2 memory press the LD/ST key.

   The LD/ST key must be pressed immediately following a configuration adjustment for the change to take effect.

Setting the alarm threshold (ALM THRESH)

The possible range of alarm threshold settings is from 6 to 68.

1. Press the MODE SEL key to place the processor in configure mode. The CONFIGURE LED is ON.
2. Press the FUNC SEL key repeatedly until the ALM THRESH LED turns ON. When the ALM THRESH LED turns ON, a combination of other LEDs turn ON, depending on the selected sense wire zone configuration.

   You can now adjust the alarm threshold setting for the indicated zone(s) and sense wire(s). The digital display will indicate the current setting of the parameter (6 = most sensitive; 68 = alarm OFF).
3. To increase the alarm threshold setting, press the INCREASE key. To decrease the setting, press the DECREASE key.

   The value on the digital display increases or decreases by one unit each time that the INCREASE or DECREASE key is pressed.

4. To enter the new alarm threshold into the processor's E^2 memory, press the LD/ST key.

   The LD/ST key must be pressed immediately following a threshold adjustment for the change to take effect.

5. Repeat this procedure to adjust all alarm thresholds for the sense wire zone configuration setting of this processor.

DET GAIN (Detection gain)

The detection gain is an adjustable setting used to boost or attenuate the signal from the sense wires before it is analyzed by the processor. The detection gain can be set independently for each sense wire. Increasing the detection gain increases the sensitivity of the system. Decreasing the detection gain decreases the sensitivity of the system.

The possible settings for the detection gain are 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10. Each value represents the factor that the signal from the sense wire will be multiplied by before the processor analyzes the signal. The Intelli-FIELD detection gain default setting is 1.0 for the top sense wires and 1.5 for the bottom sense wires.

Senstar-Stellar strongly recommends leaving the detection gain at the default setting.

Setting the detection gain

1. Press the MODE SEL key to place the processor in configure mode.

   The CONFIGURE LED is ON.

2. Press the FUNC SEL key repeatedly until the DET GAIN LED turns ON.

   When DET GAIN turns ON, the ZONE A, and TOP LEDs turn ON. This indicates that you can now adjust the detection gain for the Zone A top sense wire. The digital display will indicate the current setting of the parameter.

3. To increase the detection gain setting, press the INCREASE key. To decrease the setting, press the DECREASE key.

   The value on the digital display increases or decreases by one unit each time that the INCREASE or DECREASE key is pressed.

4. To enter the new detection gain into the processor's E^2 memory, press the LD/ST key.

   The LD/ST key must be pressed immediately following a Detection Gain adjustment.

   When you adjust the Detection Gain setting the Configure LED will begin to flash. You can continue to adjust parameters while the Configure LED flashes.

When you press MODE SEL the processor resets and performs the self-test, calibration startup routine. When the startup routine is completed, the configuration changes take effect.

If the processor encounters errors during the startup routine, press MODE SEL when power is applied to the processor. This will bypass the startup routine.

5. Press the DISP SEL key to select the Zone A bottom detection gain.

   The ZONE A and BOTTOM LEDs turn ON. This indicates that you can now adjust the detection gain for the Zone A bottom sense wire. The digital display will indicate the current setting of the parameter.

6. Repeat this procedure to adjust the Zone B top sense wire, and the Zone B bottom sense wire detection gains.

Always retest the system after making any changes to the detection parameters.

VOLTS (Field strength voltage)

The field strength voltage is an adjustable parameter that controls the size and strength of the electrostatic detection field. This parameter sets the voltage level of the signal that is generated and transmitted through the field wires, by the processor. The field strength voltage is set independently for each zone. Increasing the field strength voltage setting increases the size and strength of the electrostatic detection field.

A high field strength voltage setting results in a wider detection field and a more sensitive system. High settings should be used if the installation is in a strictly controlled area that is not subject to moving or unstable objects. Lowering the field strength voltage setting reduces the size of the electrostatic detection field, and decreases the sensitivity of the system. Lower field strength voltage settings should be used for installations with nearby moving or unstable objects.

The range of settings for the field strength voltage, from lowest to highest, is from 1 to 14 (in increments of 1). Each value corresponds to a voltage level that is generated by the processor and transmitted through the field wires to create the electrostatic detection field. The default setting of the Field excitation voltage is 5.

The higher the setting for the field strength voltage, the higher the voltage carried by the field wires. Contact with the field wires of an active Intelli-FIELD system can result in an electrical shock.

The configuration module can be used to check the setting of the field strength voltage, and to take a measurement of the field strength voltage as read from the return signal on the sense wire.

The field strength reading will always be lower than the field strength setting.

Setting the field strength voltage

1. Press the MODE SEL key to place the processor in configure mode.

   The CONFIGURE LED is ON.

2. Press the FUNC SEL key repeatedly until the VOLTS and ZONE A LEDs are both ON.

   This indicates that you can now adjust the field strength voltage setting for the Zone A field generator. The digital display will indicate the current setting of the parameter.

3. To increase the field strength voltage setting, press the INCREASE key. To decrease the setting, press the DECREASE key.

   The value on the digital display increases or decreases by one unit each time that the INCREASE or DECREASE key is pressed.

4. To enter the new field strength voltage into the processor's E^2 memory, press the LD/ST key.

   The LD/ST key must be pressed immediately following a VOLTS adjustment for the change to take effect.

   When you adjust the VOLTS setting the Configure LED will begin to flash. You can continue to adjust parameters while the Configure LED flashes. When you press MODE SEL, the processor resets and performs the startup routine. When the startup routine is completed, the configuration changes take effect.

   If the processor encounters errors during the startup routine, press MODE SEL when power is applied to the processor. This will bypass the startup routine.

5. When the VOLTS and ZONE A LEDs are both ON, press the DISP SEL key to select Zone B. The VOLTS and ZONE B LEDs are both ON indicating that you can now adjust the field strength voltage setting for the Zone B field generator.

   Always retest the system after making any changes to the detection parameters.

Adjusting the environmental noise filters

The Intelli-FIELD system includes three configuration settings, which are used by the processor to filter out environmental noise:

- time constant
- transition
- slope threshold

Senstar-Stellar recommends leaving the environmental noise filters at the default settings. Adjust the environmental noise filters only if environmental factors are a source of nuisance alarms (e.g., frequent nuisance alarms at the onset of rain).

The time constant is used to control severe environmental "clutter" that is caused by rain and wet conditions. The transition is used, along with the time constant, to prevent alarms that are caused by environmental factors such as changes from bright sun, to cloud cover, to bright sun, etc. (rolling noise). The slope threshold is used to prevent alarms caused by the electrostatic detection field coupling to ground in wet conditions.

There is no hard "rule of thumb" on how to set the environmental noise filter parameters. These settings may have to be adjusted on a seasonal basis, depending on your site conditions and requirements.

Record the environmental noise filter parameter settings for each processor. The record can be taped to the processor's enclosure door or stored in a safe location. These records are useful for troubleshooting and recalibration.

Time constant

The possible range of settings for the time constant is from 5 to 14. The default setting is 8 for single wire processing, and 6 for combined wires processing. Increasing the time constant increases the sensitivity of the system, primarily to slow moving intrusion attempts. However, increasing the time constant also increases the system's susceptibility to alarms caused by environmental factors. Decreasing the time constant setting reduces the system's sensitivity to slow moving intruders, and the system's susceptibility to alarms caused by environmental factors.

The setting of the time constant should be based on the site-specific threat detection requirements, and the typical environmental conditions. (i.e., How great is the need for detection and what level of FAR/NAR is acceptable?)

1. Press the MODE SEL key to place the processor in configure mode.

   The CONFIGURE LED is ON.

2. Press the FUNC SEL key repeatedly until the TIME CONST and ZONE A LEDs are both ON.

   You can now adjust the time constant setting for Zone A. The digital display will indicate the current setting of the parameter (default setting = 8; minimum sensitivity = 5; maximum sensitivity = 14).

3. To increase the TIME CONST setting, press the INCREASE key. To decrease the setting, press the DECREASE key.

   The value on the digital display increases or decreases by one unit each time that the INCREASE or DECREASE key is pressed.

4. To enter the new TIME CONST into the processor's E^2 memory, press the LD/ST key.

5. Press the DISP SEL key to select Zone B.

   The TIME CONST and ZONE B LEDs are both ON.

   You can now adjust the time constant setting for Zone B.

6. Press the DISP SEL key to select Zone A combined wires.

   The TIME CONST, ZONE A, TOP, and BOTTOM LEDs are ON.

   You can now adjust the time constant setting for the Zone A combined wires.

7. Press the DISP SEL key to select Zone B combined wires.

   The TIME CONST, ZONE B, TOP, and BOTTOM LEDs are ON.

   You can now adjust the time constant setting for the Zone B combined wires.

The LD/ST key must be pressed immediately following a time constant adjustment for the change to take effect.

Transition

The transition setting works in conjunction with the time constant to provide a high level of detection sensitivity along with increased immunity to environmental noise. When the detection signal is less than ¼ of the alarm threshold, the transition decreases the time constant value by the setting of the transition parameter. This makes the processor less susceptible to environmental noise. When the detection signal is greater than ¼ of the alarm threshold, the time constant value is at its actual setting. This makes the processor more sensitive to slow moving intruders.

There are five possible settings for the transition parameter, 0, 1, 2, 3, or 4. A setting of 0 is the lowest level, and does not change the time constant. The default setting is 4, the highest value, which changes the time constant by a value of 4.

For example, if the time constant is set at 7 and the transition is set at 3, then when the detection signal is below ¼ of the alarm threshold level, the processor uses a time constant value of 4 (time constant 7 minus transition 3 = 4). The lower time constant value, when the detection signal is less than ¼ of the alarm threshold level, will greatly reduce the possibility of nuisance alarms from environmental conditions. When the detection signal exceeds ¼ of the alarm threshold level, the processor uses a time constant value of 7 (the actual setting). This provides a high probability of detection.

1. Press the MODE SEL key to place the processor in configure mode.

   The CONFIGURE LED is ON.

2. Press the FUNC SEL key repeatedly until the TRANSITION and ZONE A LEDs are both ON.

   You can now adjust the transition setting for Zone A. The digital display will indicate the current setting of the parameter (default setting = 4; 0 = lowest value; 4 = highest value).

3. To increase the TRANSITION setting, press the INCREASE key. To decrease the setting, press the DECREASE key.

   The value on the digital display increases or decreases by one unit each time that the INCREASE or DECREASE key is pressed.

4. To enter the new TRANSITION into the processor's E^2 memory, press the LD/ST key.

5. Press the DISP SEL key to select Zone B.

   The TRANSITION and ZONE B LEDs are both ON.

   You can now adjust the transition setting for Zone B.

6. Press the DISP SEL key to select Zone A combined wires.

   The TRANSITION, ZONE A, TOP, and BOTTOM LEDs are ON.

   You can now adjust the transition setting for the Zone A combined wires.

7. Press the DISP SEL key to select Zone B combined wires.

   The TRANSITION, ZONE B, TOP, and BOTTOM LEDs are ON.

   You can now adjust the transition setting for the Zone B combined wires.

The LD/ST key must be pressed immediately following a transition adjustment for the change to take effect.

Slope threshold

The slope threshold is used to prevent alarms caused by the electrostatic detection field coupling to ground in wet conditions. The slope threshold filters out rapidly changing detection signals. The possible range of slope threshold settings is from 1 to 999 (in increments of 1). The slope threshold wraps around from 999 to 1. A setting of 999 disables the filter and allows all signals to be analyzed by the processor. A setting of 1 filters out all detection signals. The default setting is 80 for single wires, which will filter out a high percentage of environmental noise while still detecting a signal from a slow moving target. The default setting is 999 for combined wires (the filter is disabled).

1. Press the MODE SEL key to place the processor in configure mode.

   The CONFIGURE LED is ON.

2. Press the FUNC SEL key repeatedly until the SLOPE THRESH and ZONE A LEDs turn ON.

   You can now adjust the slope threshold setting for Zone A. The digital display will indicate the current setting of the parameter (default setting = 80; 1 = maximum filter value (alarm disabled); 999 = filter disabled).

3. To increase the SLOPE THRESH setting, press the INCREASE key. To decrease the setting, press the DECREASE key.

   The value on the digital display increases or decreases by one unit each time that the INCREASE or DECREASE key is pressed.

4. To enter the new SLOPE THRESH into the processor's E^2 memory, press the LD/ST key.

   The LD/ST key must be pressed immediately following a slope threshold adjustment for the change to take effect.

5. Repeat the procedure for the Zone B SLOPE THRESH.

6. Repeat the procedure for the Zone A top and bottom combined SLOPE THRESH.

7. Repeat the procedure for the Zone B top and bottom combined SLOPE THRESH.

Disconnecting the configuration module

1. Unplug the 8-pin connector from J8 on the processor.
2. Close and secure the enclosure door.
   The enclosure tamper alarm is cleared.

11 Operation

This section details the operation of the Intelli-FIELD sensor and includes the self-test procedure.

See appendix d for information about Intelli-FIELD systems, which are connected to StarNeT 1000 alarm display and control systems.

Operating Intelli-FIELD

Once the Intelli-FIELD system is installed and calibrated it is ready to be put into operation. Simply apply power to the unit. After approximately 1 to 2 minutes of self-test diagnostics the processor begins functioning as a volumetric intrusion detection system. When the system detects a target entering the electrostatic field a sensor alarm is declared. Sensor alarms are cleared automatically by the processor, when the condition that caused the alarm becomes stable. The method of alarm annunciation is site-specific.

The Intelli-FIELD processor clears sensor alarms automatically if:

- the cause of the alarm leaves the detection field
- the cause of the alarm remains stationary

If the alarm is cleared because the target remains stationary, another alarm will be declared when the target begins to move.

If the processor enclosure door is opened, or the sensor wires, coaxial cables, or isolation transformer are tampered with, a supervisory alarm is declared. Supervision alarms are cleared automatically when the condition that caused the supervision alarm is corrected.

System self-test

The Intelli-FIELD processor is capable of generating a pulse that simulates an intrusion attempt. The self-test can be initiated at the processor with the configuration module, remotely using the remote self-test inputs (the processor must use the Local Aux Control default setting) or via the StarNeT 1000 alarm display and control system (see appendix d for details on the StarNeT 1000 self-test).

Each Zone, of a dual zone processor, can be tested independently. The processor must be in monitor mode to conduct a self-test. The following procedures apply to Intelli-FIELD systems set for Local Aux Control (default setting).

1. Connect the configuration module to the processor.
2. Press the DISP SEL key until the SCALE, ZONE A, and TOP LEDs **OR** the SCALE, ZONE A, and BOTTOM LEDs are all ON.
3. Press the LD/ST key to generate a self-test pulse on the Zone A top and bottom sense wires.

   The ALARM indicator LED turns ON, and the ALARM A relay is activated. (For StarNeT 1000 connected processors using host control [Local Aux Control deselected] the alarm is reported on the system monitor.)
4. Wait for the alarm to clear.
5. Press the DISP SEL key to select the Zone B top or bottom sense wire.

   The SCALE, ZONE B, and TOP LEDs **OR** the SCALE, ZONE B, and BOTTOM LEDs are all on.
6. Press the LD/ST key to generate a self-test pulse on the Zone B top and bottom sense wires.

   The ALARM indicator LED turns ON, and the ALARM B relay is activated. (For StarNeT 1000 connected processors using host control [Local Aux Control deselected] the alarm is reported on the system monitor.)
7. Wait for the alarm to clear.

Remote self-test (Local Aux Control only)

The remote self-test can be performed independently for each zone of a dual zone processor using the Local Aux Control default setting. The remote self-test input connection must be made to perform a remote self-test (see Remote self-test input connection in Chapter 8).

1. Close the switch for the Zone A self-test.
   A sensor alarm is declared in Zone A.

2. Close the switch for the Zone B self-test.
   A sensor alarm is declared in Zone B.

Self-test alarms are cleared automatically by the processor.

Refer to Chapter 13, Troubleshooting if the processor encounters problems during a self-test.

StarNeT 1000 remote self-test

The StarNeT 1000 database can be configured to perform a remote self-test of each zone of an Intelli-FIELD processor. The test is performed by activating Screen Icons on the system monitor. The Intelli-FIELD default database includes examples of this setup. For additional details contact Senstar-Stellar Customer Service.

12 Maintenance

This section details the maintenance that is required for an Intelli-FIELD installation.

WARNING	*Disconnect the power at the source BEFORE servicing Intelli-FIELD system components.* *Contact with the field generator wiring during operation can result in an electrical shock.*

Preventive maintenance

Senstar-Stellar recommends scheduling preventive maintenance inspections four times a year in harsh environments or twice a year in mild environments. In addition, a site inspection should be conducted if there is an increase in nuisance or false alarms, or any problems with system performance. The final determination of a preventive maintenance schedule should be based on the unique requirements of each site.

A walk test of the sensor zones should be conducted along with the visual inspection of the site. The results of the test can be compared to the initial calibration test results to determine if any recalibration is required. Walk tests should be conducted following major seasonal changes. A walk test should also be conducted if there are any unexplained problems with system performance.

Intelli-FIELD fence inspection

When Intelli-FIELD is used in conjunction with a chain link fence (whether free standing or fence-mounted) inspect the fence periodically. Verify that the fence is not slack or damaged, and that it cannot move with the wind. Check the integrity of the fence hardware and posts. Make sure that there are no loose fittings or objects on the fence. Ensure that there are no holes through which animals could enter and cause nuisance alarms. Check that there are no washouts or depressions under the fence or sensor wires. The bottom sensor wire must remain a constant 20 cm (8 in.) above the ground throughout the installation.

Intelli-FIELD free-standing post inspection

Check the integrity of the mounting hardware and posts. Make sure that there are no loose fittings or objects on the posts. Inspect the common ground strap and ground connection for each post. Check that there are no washouts or depressions under the sensor wires. The bottom sensor wire must remain a constant 20 cm (8 in.) above the ground throughout the installation.

Intelli-FIELD ground inspection

Ensure that no vegetation (bushes, plants, trees etc.) or running water is within 1.5 m (5 ft.) on either side of the Intelli-FIELD sensor wires. Keep any vegetation directly below the sensor wires cropped shorter than 7.5 cm (3 in.). Keep the area around the sensor wires clean and free of debris. Verify that all nearby objects are immobile. If geotextile fabric and a gravel bed is used under the sensor wires, ensure that both the fabric and the gravel remain consistent throughout the zone. The geotextile fabric must be perforated to prevent water from accumulating under the wires. Ensure that the ground beneath and around the sensor wires has good drainage.

> *Fill any holes or depressions under the fence or sensor wires with native soil.*

Intelli-FIELD component inspection

Inspect the enclosures and circuit card assemblies for weather damage, dirt, insects, and corrosion. There must be no moisture or condensation inside the enclosures. Verify that both ends of the conduit is completely sealed with RTV sealant. Ensure that no water is inside the conduit. Inspect all insulators to ensure that they are in good condition and support the sensor wires properly. Clean all of the insulators thoroughly with water mixed with a mild detergent and a soft brush (do NOT use a wire brush) or use a high pressure hose. Cobwebs in, on, or around the insulators can be a source of nuisance alarms. Verify that field and sense wires are properly tensioned at all tensioning points throughout the zone. Verify that all system wiring connections, interconnections and grounds are in good condition. All ground lugs, screws and terminations must be free of corrosion. All coaxial cables should be inspected for cracks in the insulation and corrosion on the center conductor. Examine the splice-connectors for any sign of damage. Ensure that the splice-connectors are positioned correctly, according to the installation instructions.

Intelli-FIELD hardware maintenance

Verify that all mounting hardware, fastening hardware, connectors, ground lugs, ground straps, and any other Intelli-FIELD system hardware are properly tightened, at least once every two years.

Coaxial cable intended for outdoor installation may have to be replaced every 5 years.

Senstar-Stellar recommends using split loom cable covers to protect the coaxial cables.

If the insulation on an Intelli-FIELD sensor wire is damaged, cover the damaged area completely with non-corrosive RTV compound (part numbers 40011 - 3 oz. tube, X0251 - 10 oz. tube).

The following table may be used as a guide when conducting visual site inspections:

Intelli-FIELD Inspection	Description	Check		Notes
Fence or free-standing	fence fabric	✔		
	fence hardware and posts	✔		
	ground under fence	✔		
Ground condition	vegetation within 1.5 m	✔		
	standing or running water within 1.5 m	✔		
	vegetation directly below sensor wires	✔		
	nearby objects or debris	✔		
	geotextile fabric and gravel bed	✔		
Components	enclosures	✔		
	processor / isolation transformer PCBs	✔		
	tension and interim insulators	✔		
	sensor wire tensioning (springs/ winders/insulators)	✔		
	sensor wires	✔		
	system interconnections	✔		
	system ground connections	✔		
	coaxial cables	✔		
	splice-connections	✔		
	terminators	✔		

13 Troubleshooting

This section provides information that is useful when troubleshooting the Intelli-FIELD system.

Troubleshooting Intelli-FIELD

Excessive loading is an intermittent problem that generally occurs during moist or wet environmental conditions. To eliminate the problem, clean all insulating hardware. It is very important to clean the mounting hardware associated with the field wires. A build up of contamination on the insulator housings can provide a path to ground, which in turn disrupts the detection field.

Minor differences in detection sensitivity are normal due to variations in the terrain. However, large differences are cause for concern. A major consideration when dealing with these detection changes is the spacing between the lower field wire and the ground. Consistent ground-to-wire spacing of 20 cm (8 in.) is essential for uniform detection throughout the zone.

If detection range problems persist look for changes in terrain, soil type, or the presence of large structures or objects that are not uniform throughout the zone. Also look for large variations in soil moisture content.

Isolating problems

When troubleshooting the Intelli-FIELD system divide the system into the following subunits:

Power supply	Processor	Isolation transformer
Coaxial cables	Sensor wires	Splice-connectors
Insulators	Terminators	Tamper switch

WARNING *Disconnect the power at the source BEFORE servicing Intelli-FIELD system components. Contact with the sensor wires during operation can result in an electrical shock.*

Power supply

Measure the power supply voltage at the processor inputs:

- 24 VDC or 48 VDC power distribution
  Verify the voltage at TB5, terminals 1 and 2 is between 18 and 56 VDC.
- 12 VDC local power
  Verify the voltage at TB5, terminals 3 and 4 is between 10.5 and 15 VDC.

If the voltage is not within the specified limits, check the power wires or replace the power supply, as required.

Processor

A loop-back cable (C7CA0400) is a useful tool for isolating Intelli-FIELD system problems. Power-down the processor. Label and disconnect the coaxial cables from the processor's sensor zone connectors on the zone being tested. Install the loop-back cable on the zone connectors. Apply power to the processor. The processor will perform a series of self-test diagnostics. If the sensor zone signal nulls after the self-test is completed, the problem lies somewhere in the wiring. If the sensor zone signal does not null and a null related error code is displayed, the problem is with the processor. Repeat the procedure on the second sensor zone. If the problem is with the processor, record the error code that is displayed and a detailed description of the problem and contact Senstar-Stellar Customer Service.

If the processor encounters errors during the startup routine, you can bypass the startup routine by pressing MODE SEL when power is first applied.

The following table includes internal voltage measurements that are available via the Intelli-FIELD configuration module.

+15V power rail	+12V power rail	VCC	+5V power rail
+5V reference	+2.5V reference	+12V auxiliary	-5V reference
-12V power rail	-15V power rail	-5V power rail	
Zone A field strength reading (0 - 14)		Zone B field strength reading (0 - 14)	
Zone A field strength setting (1 - 14)		Zone B field strength setting (1 - 14)	
Zone A top gain baseline voltage (-9V to +9V)*		Zone A bottom gain baseline voltage(-9V to +9V)*	
Zone B top gain baseline voltage (-9V to +9V)*		Zone B bottom gain baseline voltage (-9V to +9V)*	
* Gain voltage baseline readings above +9V or below -9V indicate a system problem. Readings of -12V indicate a sensor wire/cable fault.			

An auto-recalibration will occur in both configure and monitor modes if the system reads a gain voltage level between +9V and +11.5 V or -9V and -11.5 volts for 0.75 seconds. The 0.75 second time is required to prevent a self-test pulse from causing an auto-recalibration.

If the system reads a gain voltage level above +11.5 V or below -11.5 volts for 2.0 seconds a supervisory alarm is declared and the system will NOT perform an auto-recalibration. Such a reading indicates a major cable fault, for example, a cut sense wire. If the reading is caused by a temporary condition such as someone touching a sense wire, the system will return to normal operation when the condition clears.

Isolation transformer

Label and remove all of the coaxial cables. Use a multimeter to perform the following resistance tests on TB1 and TB2:

terminal	measurement	terminal	resistance Ω
TB1 - TOP	◄►	TB1 - GEN	210 Ω (+/- 10%)
TB1 - BOT	◄►	TB1 - GEN	210 Ω (+/- 10%)
TB2 - FW1	◄►	TB2 - TW	920 Ω (+/- 10%)
TB2 - FW2	◄►	TB2 - BW	920 Ω (+/- 10%)

Replace the coaxial cables from the processor, but do not reconnect the coaxial cables from the sensor zone. On TB2, install a 150 pF capacitor between FW1 and TW, and install a second 150 pF capacitor between FW2 and BW. Power up the processor. If the startup routine is successful (configuration module counts to 21) then the isolation transformer is good.

Check jumpers 1 and 3 to ensure that they are in the ON position and are properly installed. Verify that the earth ground connection is 10 Ω or less.

Conduit

The conduit MUST be completely sealed at both ends with non-conductive RTV sealant. The enclosure end must be sealed to prevent insects from entering the enclosure and causing nuisance alarms. The outside end of the conduit must be sealed to prevent water from entering the conduit. Insects in the enclosure or water in the conduit will cause nuisance alarms and inconsistent detection.

Coaxial cable

Most problems with coaxial cables involve the BNC connectors at the processor end. Inspect the coaxial cable and BNC connectors. Test each cable individually according to the manufacturer's directions (the center conductor to shield should

be open). Power down the processor. At the isolation transformer, label and remove the coaxial cables from TB1. Use jumpers to connect the center conductors of the 3 coaxial cables. Power up the processor. If the processor passes the start up routine, the problem is not with the coaxial cables.

Even coaxial cable that is specified for outdoor installation may have to be replaced every five years.

Sensor wires (splice-connectors, insulators)

If the processor passes the self-test start-up routine with the loop-back cables installed, the problem is generally with the sensor wire installation. The following table indicates the most likely cause of system problems based on the processor self-test diagnostics:

Processor start-up routine stops at step (as indicated on bar scale):	Probable source of problem
8	Zone A wiring
9	Zone B wiring
10	Zone A top pair wiring
11	Zone A bottom pair wiring
12	Zone B top pair wiring
13	Zone B bottom pair wiring
14	Zone A top pair wiring
15	Zone A bottom pair wiring
16	Zone B top pair wiring
17	Zone B bottom pair wiring
18	Zone A top pair wiring
19	Zone A bottom pair wiring
20	Zone B top pair wiring
21	Zone B bottom pair wiring

Test the individual sensor wires for continuity between the start point (TB2 on isolation transformer) and the end point of the zone (see Testing for continuity in Chapter 7).

Check that all sensor wires are isolated with respect to ground.
If there is any connection between a sensor wire and ground, the connection must be traced and eliminated.

Check all insulators for dirt or contamination. Ensure that the sensor wires are properly tensioned.

Terminators

Measure the capacitance of the upper pair terminator (coaxial cable center conductor to coaxial cable center conductor).
The measurement should be 150 pF (+/- 10%) plus an additional 18 pF per foot of coaxial cable. Otherwise, replace the terminator.

Repeat this procedure for the lower pair terminator.

Coaxial cable, sensor wire, splice-connection test

Test all coaxial cables and sensor wires with a megger (high voltage Ohm-meter, e.g. Fluke 1500).

All Intelli-FIELD electronics MUST be disconnected BEFORE megger testing to prevent serious damage.

Test setup:

1. Disconnect all BNCs and coaxial cables from the Processor and Isolation Transformers.
2. Set the megger at the 500 V maximum range to protect the zone terminators.
3. Measure the insulation resistance (center conductor to shield) of each of the coaxial cables between the Processor and the Isolation Transformer.
   Make the measurement at the processor between the coaxial cable center conductor and either the BNC shell or the coaxial cable shield.

All readings must be 2000 M Ohms, or greater.

If any reading is less than 2000 M Ohms, there is either a defective coaxial cable, or water in the conduit. Replace the coaxial cable OR if water is present, replace and reseal the conduit.

4. Measure the insulation resistance (center conductor to shield) of each of the coaxial cables between the Isolation Transformer and the sensor wires.
   This also tests for any serious degradation or contamination of the splice-connections.
   Make the measurement at the Isolation Transformer between the coaxial cable center conductor and the coaxial cable shield.

All readings must be 2000 M Ohms, or greater.

Replace the coaxial cable and the splice-connection to the sensor wire if any readings are less than 2000 M Ohms.

5. At the Isolation Transformer, on the sensor wire side, measure the resistance between each coaxial cable center conductor and the common ground strap. This will check the integrity of the terminators and terminator splice-connections.

All readings must be 2000 M Ohms, or greater.

Replace the terminator and terminator splice-connectors if any readings are less than 2000 M Ohms.

Insulator ground test

Use a multi-meter to test the resistance between each insulator housing and the common ground strap.

There should be little to no resistance (maximum 1 Ω).

If more than 1 Ω is measured at any insulator, you must find and eliminate the cause of the resistance, e.g., remove paint from mounting post, replace corroded components, tighten loose hardware, etc.

Tamper switch

With the processor set to Local Aux Control (default setting) open the enclosure door. If LED 6 Door turns ON and relay K5 activates, the tamper switch is okay. If not, check the wiring connections or replace the tamper switch.

Processor error codes

If the processor detects any system problems during a system self-test, the ERR CODE LED turns ON and the error code is indicated on the digital display. The following table includes processor error codes, error code definitions and possible solutions:

Error code	Definition	Solution
05	Internal processor problem with sample counter	Power-down and restart the processor. If the problem persists, replace the processor.
44	Internal processor problem with digital converter	
100	Zone A sense signal is low	Power-down the processor. Check all coaxial cable connections, splice connections and ground connections in the indicated zone. Restart the processor. If the problem persists, replace the processor.
101	Zone B sense signal is low	
128	Processor cannot null Zone A top signal	Power-down the processor. Check all coaxial cable connections, splice connections and ground connections in the indicated zone. Restart the processor. If the problem persists, replace the processor.
129	Processor cannot null Zone A bottom signal	
130	Processor cannot null Zone B top signal	
131	Processor cannot null Zone B bottom signal	
204	Internal processor problem with loop counter	Power-down and restart the processor. If the problem persists, replace the processor.
209	Internal processor problem with firmware - Zone A top signal phase-shift null subroutine	Power-down the processor. Check all coaxial cable connections, splice connections and ground connections in the indicated zone. Restart the processor. If the problem persists, replace the processor.
210	Internal processor problem with firmware - Zone A bottom signal phase-shift null subroutine	
211	Internal processor problem with firmware - Zone B top signal phase-shift null subroutine	
212	Internal processor problem with firmware - Zone B bottom signal phase-shift null subroutine	

Error code	Definition	Solution
224	Internal processor problem with Zone A field generator power amp line select	Power-down and restart the processor. If the problem persists, replace the processor.
225	Internal processor problem with Zone A top sense line in select	
226	Internal processor problem with Zone A bottom sense line in select	
227	Internal processor problem with Zone A top null generator line select	
228	Internal processor problem with Zone A bottom null generator line select	
229	Internal processor problem with Zone A top null signal line select	
230	Internal processor problem with Zone A bottom null signal line select	
231	Internal processor problem with Zone B field generator power amp line select	Power-down and restart the processor. If the problem persists, replace the processor. For a single-zone processor, check the loop-back cable on Zone B.
232	Internal processor problem with Zone B top sense line in select	
233	Internal processor problem with Zone B bottom sense line in select	
234	Internal processor problem with Zone B top null generator line select	
235	Internal processor problem with Zone B bottom null generator line select	
236	Internal processor problem with Zone B top null signal line select	
237	Internal processor problem with Zone B bottom null signal line select	

Sensor wire repair

If the insulation on a sensor wire is damaged, cover the damaged section completely with non-corrosive RTV compound. If a sensor wire is damaged or cut the entire damaged section should be replaced. Field or sense wires can be splice-connected as a temporary solution. However, to maintain the operational effectiveness of the system, replacement is required. For example, if additional sensor wire must be ordered to replace a section of damaged wire, a splice will serve as a short-term solution. As soon as the replacement wire is available, the whole section should be replaced. Repair damaged or broken sensor wires as follows:

1. Disconnect power from the processor.
2. Remove the damaged section of sensor wire from between the two tension points.
3. Install a new section of sensor wire between the two tension points.
4. Insert and lock the wire into the interim insulators.
5. Adjust the wire to the proper tension.
6. Replace the splice-connections.
7. Apply power to the processor and test the zone.
8. Recalibrate the processor, if required.

If field testing cannot determine where a problem exists on a processor board, shop testing can help identify the problem. However, it is helpful to pinpoint a problem with the system in the normal operational setting.

When troubleshooting procedures have been followed and the problem has been identified, it is a good idea to verify the diagnosis by replacing suspect equipment with equipment that is known to be working well. Any defective connections or sensor wires should be repaired or replaced.

Senstar-Stellar recommends that Intelli-FIELD sites maintain a 10% hardware backup. Sites with less than 10 zones (5 processors) should stock at least one exchangeable unit for each major assembly. Extra sensor wire, tension insulators, interim insulators and mounting hardware should also be kept in reserve.

a Spare components

Intelli-FIELD component list

Component	Model Number	Part Number	Description
Intelli-FIELD processor kits - Industrial version			
processor	IFD-101	C7EM0101	dual zone relay output processor, mounting plate, mounted in a NEMA-4 rated painted aluminum enclosure
single zone retro-fit processor kit	IFD-301	C7KT0311	single zone relay output processor, isolation transformer, two zone terminators, loop back cable, hardware and tamper harness for retrofit into existing E-Field enclosures
dual zone retro-fit processor kit	IFD-302	C7KT0301	dual zone relay output processor, two isolation transformers, four zone terminators, hardware and tamper harness for retrofit into existing E-Field enclosure
Intelli-FIELD processor kits - Nuclear industry high-reliability version			
processor	IFD-101A	C7EM0111	Hi-Rel dual zone relay output processor, mounting plate, mounted in a NEMA-4 rated painted aluminum enclosure
single zone retro-fit processor kit	IFD-301A	C7KT0312	Hi-Rel single zone relay output processor, isolation transformer, two zone terminators, one loop back cable, hardware and tamper harness for retrofit into existing E-Field enclosures
dual zone retro-fit processor kit	IFD-302A	C7KT0302	Hi-Rel dual zone relay output processor, two isolation transformers, four zone terminators, hardware and tamper harness for retrofit into existing E-Field enclosures

Component	Model Number	Part Number	Description
Intelli-FIELD frequency generating crystals			
crystal frequency A	IFD-XTLA	C7AD0401	9.190 MHz crystal - frequency A - 1 crystal per processor
crystal frequency B	IFD-XTLB	C7AD0402	8.883 MHz crystal - frequency B - 1 crystal per processor
crystal frequency C	IFD-XTLC	C7AD0403	8.576 MHz crystal - frequency C - 1 crystal per processor
crystal frequency D	IFD-XTLD	C7AD0404	8.269 MHz crystal - frequency D - 1 crystal per processor
Intelli-FIELD accessories and spare components			
dual zone processor PCB Industrial	IFD-DP	C7BA0101	replacement dual zone standard processor PCB with mounting plate
dual zone processor board High-reliability	IFD-DPA	C7BA0102	replacement Hi-Rel dual zone processor PCB with mounting plate
configuration module	IFD-CFG	C7EM0300	Configuration Module
sensor wire	2361-2	11535-2	sensor wire, coated 305 stainless steel 300 m (1,000 ft.) roll
isolation transformer	IFD-IT1	C7EM0201	single zone isolation transformer assembly mounted in a painted aluminum NEMA-4 rated enclosure
enclosure mounting clamp	EMC-1	C7SP0500	enclosure mounting clamp for mounting on 5 - 9.5 cm (2 - 3.75 in.) OD post - 2 per enclosure
zone terminator	IFD-ZT1	C7CA0301	zone terminator - 1 per sensor wire pair
loop-back cable	IFD-LBC	C7CA0400	loop-back cable for unused zone - 1 per single zone processor
RG-59 mini coaxial cable crimp tool	CT-174	X0259	crimp tool for RG-59 mini Amphenol RFX series BNC connectors
RG-59 mini BNC connectors	RG59-CMN	T0812	RG-59 mini crimp-on BNC connectors - 3 per zone; 6 per dual zone processor
RG-59 mini coaxial cable	RG59-MN	W0296	RG-59 mini coaxial cable with polyethylene jacket - 150 m (500 ft.) roll
NOTE: Use only zinc or zinc plated hardware to attach the ground strap and mounting post ground clamps to the mounting posts. Zinc hardware is available at most hardware retail outlets.			
Ground strap	IFD-GS	C7SP0600	Zinc strap for mounting post grounding - 67 m (220 ft.) app.

Component	Model Number	Part Number	Description
Mounting post ground clamp	IFD-GC2	H0947-2	Mounting post ground clamp fits post OD range 2.95 to 3.35 cm (1.16 to 1.32 in.)
Mounting post ground clamp	IFD-GC3	H0947-3	Mounting post ground clamp fits post OD range 4.22 to 4.57 cm (1.66 to 1.8 in.)
Mounting post ground clamp	IFD-GC5	H0947-5	Mounting post ground clamp fits post OD range 5.59 to 6.35 cm (2.2 to 2.5 in.)
Mounting post ground clamp	IFD-GC6	H0947-6	Mounting post ground clamp fits post OD range 7.32 to 7.62 cm (2.88 to 3 in.)
Mounting post ground clamp	IFD-GC7	H0947-7	Mounting post ground clamp fits post OD range 8.38 to 8.89 cm (3.3 to 3.5 in.)
Mounting post ground clamp	IFD-GC8	H0947-8	Mounting post ground clamp fits post OD range 10.16 to 11.43 cm (4 to 4.5 in.)
Mounting post ground clamp	IFD-GC9	H0947-9	Mounting post ground clamp fits post OD range 11.43 to 12.7 cm (4.5 to 5 in.)
Intelli-FIELD power supplies and power cords			
24 VDC network power supply	IFL-NPS	C6AD0300	24 VDC network power supply - 85-245 VAC, 50/60 Hz I/P, 24 VDC @ 1.25 A output, indoor, requires power cord,
48 VDC network power supply	FPM-48	A3EM0305	48 VDC network power supply - 115/230 VAC, 50/60 Hz I/P, 48 VDC 350 W output, indoor, requires power cord, includes mounting hardware
power supply enclosure	WE1-4	M0706	enclosure for FPM-48 power supply NEMA-3R/IP32 rated, includes mounting hardware
power cord - UK	PC-UK	E0321	power cord - UK, 250 VAC 10 A, 2.5 m
power cord - EC	PC-EC	E0322	power cord - European, 250 VAC 10 A, 2.5 m
power cord - AS	PC-AS	E0323	power cord - Australian, 250 VAC 10 A, 2.5 m
power cord - IT	PC-IT	E0324	power cord - Italian, 250 VAC 10 A, 2.5 m
power cord - NA	PC-XX	E0245	power cord - North American, 125 VAC, 10 A, 2.3 m
power cord - XT	PC-XT	E0325	power cord - extension, IEC 320, jumper, 2.5 m
Intelli-FIELD spare hardware components			
high tension spring	2350	10455	spring - high tension
UV resistant cable ties	2366A	H0915	UV resistant cable ties for outdoor installation (Qty. 100)
post clamp	2365-2	10450-2	clamp, 5 cm (2 in.) OD pipe, nominal

Component	Model Number	Part Number	Description
post clamp	2365-3	H0838	clamp, 7.5 cm (3 in.) OD pipe, nominal
post clamp	2365-4	H0839	clamp, 10 cm (4 in.) OD pipe, nominal
plastic insert for interim insulator	5002	00668	plastic insert for interim insulator
connecting link	5013	12705	connects spring to tension insulator
winder	5014	80076-1	applies tension to sensor wires at tension insulator
free-standing adjacent zone mounting bracket 1-wire	5015-1	00687-01	mounting bracket - adjacent free-standing dual hardware start/end points, 1-wire
fence-mounted adjacent zone mounting bracket 1-wire	5016-1	00688-01	mounting bracket - adjacent fence-mounted dual hardware start/ end points, 1-wire
corner point extender	5017	08154	corner point extender - fence-mounted hardware
7.5 cm (3 in.) wire guide	5021	C7MD0600	7.5 cm (3 in.) wire guide for tension insulators - vertical wall mount and vertical corner point configurations
connecting bar	5031	C7MD0600	connecting bar for vertical corner points
pulley	5032	H0905	pulley for vertical corner points
S-hook		H0935	S-hook for vertical corner points
A1-5 insulator	5034	H0909	A1-5 insulator
vertical wall mount bracket	5040	12844	vertical wall mount bracket, 3-wire/4-wire
wall/fence-mounting hardware kit, 90º	5101-1	08144	wall or round post fence-mounting hardware kit, opposite side, 90º, 50 cm (20 in.) off fence
wall/fence-mounting hardware kit, 45º	5101-2	08145	wall or round post fence-mounting hardware kit, opposite side, 45º, 50 cm (20 in.) off fence
wall/fence-mounting hardware kit, 90º	5102-1	08146	wall or round post fence-mounting hardware kit, same side, 90º, 50 cm (20 in.) off fence
wall/fence-mounting hardware kit, 45º	5102-2	08147	wall or round post fence-mounting hardware kit, same side, 45º, 50 cm (20 in.) off fence

Component	Model Number	Part Number	Description
fence bracket standoff 90º	5109-1	12861	wall or fence bracket standoff 90º, 23 cm (9 in.)
3-wire wall top mounting bracket	5115	C7AD0201	3-wire wall topper 45º mounting bracket
90º outside corner bracket (20 in. offset)	C7KT1900		90º outside corner bracket for corner installation on walls and buildings (20 in.)
installer's spares kit	IFD-JSK	C7KT1400	installer's spares kit
E-Field tensioning hardware upgrade kit		C7KT1700	kit to upgrade E-Field tension point and splice-connection hardware to Intelli-FIELD tension point and splice-connection hardware (for sensor wire to sensor wire splice-connections order an additional splice-connection kit for each upgrade kit)
splice-connection kit	IFD-SCK	C7KT1600	splice-connection kit for coaxial cable to sensor wire splices
Intelli-FIELD RTV sealant			
RTV sealant 3 oz	RTV3	40011	RTV sealant, non-corrosive, 3 ounce tube
RTV sealant 10 oz	RTV10	X0251	RTV sealant, non-corrosive, 10.3 ounce tube
Intelli-FIELD insulator kits (regular)			
start/tension point	5020IF	C7KT0401	start point/tension point, regular insulator kit
end point	5020IFE	C7KT0701	end point, regular insulator kit
corner point	5020IFC	C7KT0601	corner point, regular insulator kit
interim point	5001IF	00650	interim point, regular insulator
vertical corner point	5001IFV	C7KT1201	vertical corner point, regular insulator kit
Intelli-FIELD insulator kits (powder coated)			
start/tension point	5020BIF	C7KT0801	start point/tension point, powder coated insulator kit
end point	5020BIFE	C7KT1101	end point, powder coated insulator kit
corner point	5020BIFC	C7KT1001	corner point, powder coated insulator kit
interim point	5001BIF	00650-02	interim point, powder coated insulator

Component	Model Number	Part Number	Description
vertical corner point	5001BIFV	C7KT1301	vertical corner point, powder coated insulator kit

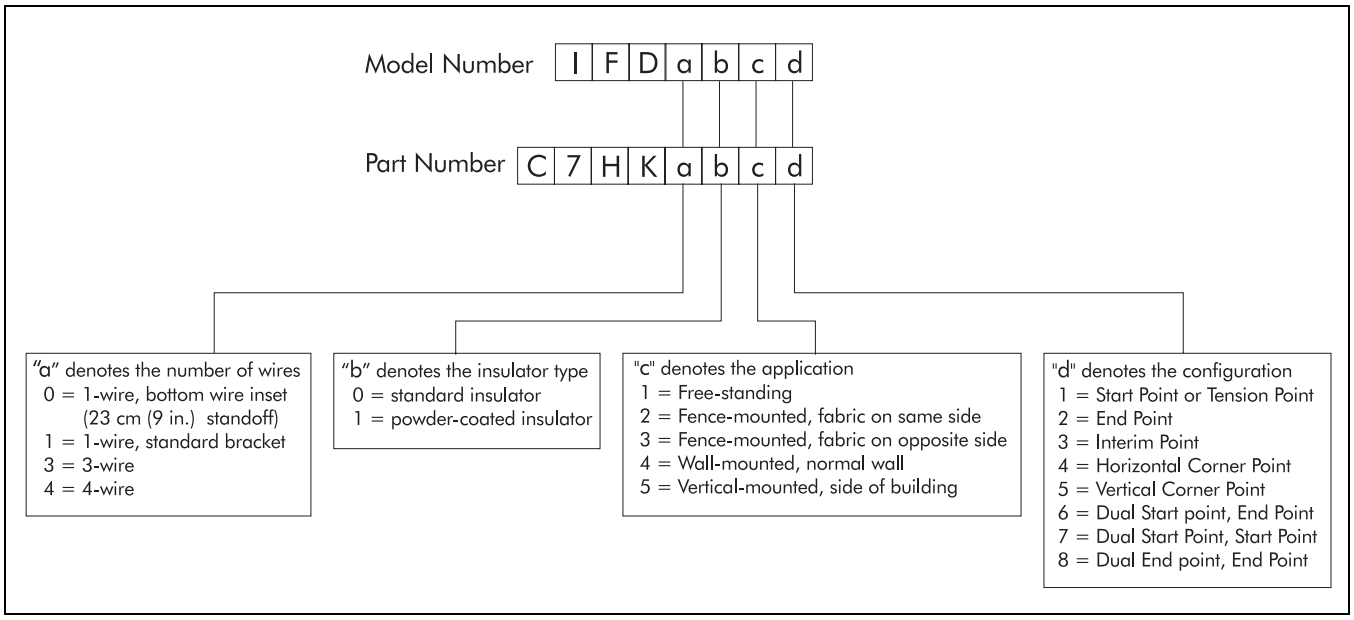
Suppliers information

Geotextile fabric	Terrafix Geosynthetics 178 Bethridge Rd., Toronto, ON., Canada, M9W 1N3 Tel. (416) 674-0363 Fax (416) 674-1159
	Reemay Inc. 70 Old Hickory Boulevard, P.O. Box 511 Old Hickory, Tennessee, U.S.A. 37138-3651 Tel. (615) 847-7000 Fax (615) 847-7068
Zinc strapping (for post grounding) 0.033 gauge, 0.4330 width, alloy 750	Zinc Products Company P.O. Box 1890, Greeneville, TN, U.S.A. 37744-1890 Tel. (423) 639-8111 Fax (423) 639-3125
Zinc or zinc plated conduit hangers (to attach zinc strapping to mounting posts) NOTE: Conduit hangers that are specified for a 6.4 cm (2.5 in.) EMT conduit will fit a 7.6 cm (3 in.) OD post. Before ordering conduit hangers, make sure that they will fit tightly on the mounting posts in your Intelli-FIELD installation.	Minerallac Fastening Systems 466 Vista Ave., Addison, IL 60101 Tel. (630) 543-7080 Toll free fax (800) 824-8942 Toll free tel. 1-877-285-2200
	McMaster-Carr Supply Company P.O. Box 94930, Cleveland OH, 44101-4930 Tel. (330) 995-5500 Fax (330) 995-9600
Hole punch (for punching the holes in the zinc strapping) P.N. 135010050	Roper Whitney of Rockford Inc. 2833 Hoffman Blvd. Rockford, Illinois, 61103 Tel. (815) 962-3011 Fax (815) 962-2227
Corrugated cable loom (for covering and protecting coaxial cables at start and end points)	Hosa Technology Inc. 6920 Hermosa Circle, Buena Park, CA, 90620 Tel. (714) 736-9270 Fax (714) 522-4540

b Hardware kits

Intelli-FIELD hardware kits

The following conventions are used in the Intelli-FIELD kit model and part numbering system. The Model Number uses the form IFDabcd, and the Part Number uses the form C7HKabcd:



Model Number	Part Number	Description
Intelli-FIELD Hardware Kits, Free-Standing 1-Wire		
IFD1011	C7HK1011	Start Point Kit
IFD1012	C7HK1012	End Point Kit
IFD1013	C7HK1013	Interim Point Kit
IFD1014	C7HK1014	Horizontal Corner Point Kit
IFD1015	C7HK1015	Vertical Corner Point Kit
IFD1016	C7HK1016	Adjacent Start-End Point Kit
IFD1017	C7HK1017	Adjacent Dual Start Point Kit
IFD1018	C7HK1018	Adjacent Dual End Point Kit
IFD1111	C7HK1111	Start Point Kit, Powder-Coated
IFD1112	C7HK1112	End Point Kit, Powder-Coated
IFD1113	C7HK1113	Interim Point Kit, Powder-Coated
IFD1114	C7HK1114	Horizontal Corner Point Kit, Powder-Coated
IFD1115	C7HK1115	Vertical Corner Point Kit, Powder-Coated
IFD1116	C7HK1116	Adjacent Start-End Point Kit, Powder-Coated
IFD1117	C7HK1117	Adjacent Dual Start Point Kit, Powder-Coated
IFD1118	C7HK1118	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Free-Standing 3-Wire		
IFD3011	C7HK3011	Start Point Kit
IFD3012	C7HK3012	End Point Kit
IFD3013	C7HK3013	Interim Point Kit
IFD3014	C7HK3014	Horizontal Corner Point Kit
IFD3015	C7HK3015	Vertical Corner Point Kit
IFD3016	C7HK3016	Adjacent Start-End Point Kit
IFD3017	C7HK3017	Adjacent Dual Start Point Kit
IFD3018	C7HK3018	Adjacent Dual End Point Kit
IFD3111	C7HK3111	Start Point Kit, Powder-Coated
IFD3112	C7HK3112	End Point Kit, Powder-Coated
IFD3113	C7HK3113	Interim Point Kit, Powder-Coated
IFD3114	C7HK3114	Horizontal Corner Point Kit, Powder-Coated
IFD3115	C7HK3115	Vertical Corner Point Kit, Powder-Coated

Model Number	Part Number	Description
IFD3116	C7HK3116	Adjacent Start-End Point Kit, Powder-Coated
IFD3117	C7HK3117	Adjacent Dual Start Point Kit, Powder-Coated
IFD3118	C7HK3118	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Free-Standing 4-Wire		
IFD4011	C7HK4011	Start Point Kit
IFD4012	C7HK4012	End Point Kit
IFD4013	C7HK4013	Interim Point Kit
IFD4014	C7HK4014	Horizontal Corner Point Kit
IFD4015	C7HK4015	Vertical Corner Point Kit
IFD4016	C7HK4016	Adjacent Start-End Point Kit
IFD4017	C7HK4017	Adjacent Dual Start Point Kit
IFD4018	C7HK4018	Adjacent Dual End Point Kit
IFD4111	C7HK4111	Start Point Kit, Powder-Coated
IFD4112	C7HK4112	End Point Kit, Powder-Coated
IFD4113	C7HK4113	Interim Point Kit, Powder-Coated
IFD4114	C7HK4114	Horizontal Corner Point Kit, Powder-Coated
IFD4115	C7HK4115	Vertical Corner Point Kit, Powder-Coated
IFD4116	C7HK4116	Adjacent Start-End Point Kit, Powder-Coated
IFD4117	C7HK4117	Adjacent Dual Start Point Kit, Powder-Coated
IFD4118	C7HK4118	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Same Side, 1-Wire		
IFD1021	C7HK1021	Start Point Kit
IFD1022	C7HK1022	End Point Kit
IFD1023	C7HK1023	Interim Point Kit
IFD1024	C7HK1024	Horizontal Corner Point Kit
IFD1025	C7HK1025	Vertical Corner Point Kit
IFD1026	C7HK1026	Adjacent Start-End Point Kit
IFD1027	C7HK1027	Adjacent Dual Start Point Kit
IFD1028	C7HK1028	Adjacent Dual End Point Kit
IFD1121	C7HK1121	Start Point Kit, Powder-Coated
IFD1122	C7HK1122	End Point Kit, Powder-Coated

Model Number	Part Number	Description
IFD1123	C7HK1123	Interim Point Kit, Powder-Coated
IFD1124	C7HK1124	Horizontal Corner Point Kit, Powder-Coated
IFD1125	C7HK1125	Vertical Corner Point Kit, Powder-Coated
IFD1126	C7HK1126	Adjacent Start-End Point Kit, Powder-Coated
IFD1127	C7HK1127	Adjacent Dual Start Point Kit, Powder-Coated
IFD1128	C7HK1128	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Same Side, 3-Wire		
IFD3021	C7HK3021	Start Point Kit
IFD3022	C7HK3022	End Point Kit
IFD3023	C7HK3023	Interim Point Kit
IFD3024	C7HK3024	Horizontal Corner Point Kit
IFD3025	C7HK3025	Vertical Corner Point Kit
IFD3026	C7HK3026	Adjacent Start-End Point Kit
IFD3027	C7HK3027	Adjacent Dual Start Point Kit
IFD3028	C7HK3028	Adjacent Dual End Point Kit
IFD3121	C7HK3121	Start Point Kit, Powder-Coated
IFD3122	C7HK3122	End Point Kit, Powder-Coated
IFD3123	C7HK3123	Interim Point Kit, Powder-Coated
IFD3124	C7HK3124	Horizontal Corner Point Kit, Powder-Coated
IFD3125	C7HK3125	Vertical Corner Point Kit, Powder-Coated
IFD3126	C7HK3126	Adjacent Start-End Point Kit, Powder-Coated
IFD3127	C7HK3127	Adjacent Dual Start Point Kit, Powder-Coated
IFD3128	C7HK3128	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Same Side, 4-Wire		
IFD4021	C7HK4021	Start Point Kit
IFD4022	C7HK4022	End Point Kit
IFD4023	C7HK4023	Interim Point Kit
IFD4024	C7HK4024	Horizontal Corner Point Kit
IFD4025	C7HK4025	Vertical Corner Point Kit
IFD4026	C7HK4026	Adjacent Start-End Point Kit
IFD4027	C7HK4027	Adjacent Dual Start Point Kit

Model Number	Part Number	Description
IFD4028	C7HK4028	Adjacent Dual End Point Kit
IFD4121	C7HK4121	Start Point Kit, Powder-Coated
IFD4122	C7HK4122	End Point Kit, Powder-Coated
IFD4123	C7HK4123	Interim Point Kit, Powder-Coated
IFD4124	C7HK4124	Horizontal Corner Point Kit, Powder-Coated
IFD4125	C7HK4125	Vertical Corner Point Kit, Powder-Coated
IFD4126	C7HK4126	Adjacent Start-End Point Kit, Powder-Coated
IFD4127	C7HK4127	Adjacent Dual Start Point Kit, Powder-Coated
IFD4128	C7HK4128	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Same Side, Bottom Wire Inset		
IFD0021	C7HK0021	Start Point Kit
IFD0022	C7HK0022	End Point Kit
IFD0023	C7HK0023	Interim Point Kit
IFD0024	C7HK0024	Horizontal Corner Point Kit
IFD0025	C7HK0025	Vertical Corner Point Kit
IFD0026	C7HK0026	Adjacent Start-End Point Kit
IFD0027	C7HK0027	Adjacent Dual Start Point Kit
IFD0028	C7HK0028	Adjacent Dual End Point Kit
IFD0121	C7HK0121	Start Point Kit, Powder-Coated
IFD0122	C7HK0122	End Point Kit, Powder-Coated
IFD0123	C7HK0123	Interim Point Kit, Powder-Coated
IFD0124	C7HK0124	Horizontal Corner Point Kit, Powder-Coated
IFD0125	C7HK0125	Vertical Corner Point Kit, Powder-Coated
IFD0126	C7HK0126	Adjacent Start-End Point Kit, Powder-Coated
IFD0127	C7HK0127	Adjacent Dual Start Point Kit, Powder-Coated
IFD0128	C7HK0128	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Opposite Side, 1-Wire		
IFD1031	C7HK1031	Start Point Kit
IFD1032	C7HK1032	End Point Kit
IFD1033	C7HK1033	Interim Point Kit
IFD1034	C7HK1034	Horizontal Corner Point Kit

Model Number	Part Number	Description
IFD1035	C7HK1035	Vertical Corner Point Kit
IFD1036	C7HK1036	Adjacent Start-End Point Kit
IFD1037	C7HK1037	Adjacent Dual Start Point Kit
IFD1038	C7HK1038	Adjacent Dual End Point Kit
IFD1131	C7HK1131	Start Point Kit, Powder-Coated
IFD1132	C7HK1132	End Point Kit, Powder-Coated
IFD1133	C7HK1133	Interim Point Kit, Powder-Coated
IFD1134	C7HK1134	Horizontal Corner Point Kit, Powder-Coated
IFD1135	C7HK1135	Vertical Corner Point Kit, Powder-Coated
IFD1136	C7HK1136	Adjacent Start-End Point Kit, Powder-Coated
IFD1137	C7HK1137	Adjacent Dual Start Point Kit, Powder-Coated
IFD1138	C7HK1138	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Opposite Side, 3-Wire		
IFD3031	C7HK3031	Start Point Kit
IFD3032	C7HK3032	End Point Kit
IFD3033	C7HK3033	Interim Point Kit
IFD3034	C7HK3034	Horizontal Corner Point Kit
IFD3035	C7HK3035	Vertical Corner Point Kit
IFD3036	C7HK3036	Adjacent Start-End Point Kit
IFD3037	C7HK3037	Adjacent Dual Start Point Kit
IFD3038	C7HK3038	Adjacent Dual End Point Kit
IFD3131	C7HK3131	Start Point Kit, Powder-Coated
IFD3132	C7HK3132	End Point Kit, Powder-Coated
IFD3133	C7HK3133	Interim Point Kit, Powder-Coated
IFD3134	C7HK3134	Horizontal Corner Point Kit, Powder-Coated
IFD3135	C7HK3135	Vertical Corner Point Kit, Powder-Coated
IFD3136	C7HK3136	Adjacent Start-End Point Kit, Powder-Coated
IFD3137	C7HK3137	Adjacent Dual Start Point Kit, Powder-Coated
IFD3138	C7HK3138	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Opposite Side, 4-Wire		
IFD4031	C7HK4031	Start Point Kit

Model Number	Part Number	Description
IFD4032	C7HK4032	End Point Kit
IFD4033	C7HK4033	Interim Point Kit
IFD4034	C7HK4034	Horizontal Corner Point Kit
IFD4035	C7HK4035	Vertical Corner Point Kit
IFD4036	C7HK4036	Adjacent Start-End Point Kit
IFD4037	C7HK4037	Adjacent Dual Start Point Kit
IFD4038	C7HK4038	Adjacent Dual End Point Kit
IFD4131	C7HK4131	Start Point Kit, Powder-Coated
IFD4132	C7HK4132	End Point Kit, Powder-Coated
IFD4133	C7HK4133	Interim Point Kit, Powder-Coated
IFD4134	C7HK4134	Horizontal Corner Point Kit, Powder-Coated
IFD4135	C7HK4135	Vertical Corner Point Kit, Powder-Coated
IFD4136	C7HK4136	Adjacent Start-End Point Kit, Powder-Coated
IFD4137	C7HK4137	Adjacent Dual Start Point Kit, Powder-Coated
IFD4138	C7HK4138	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Fence-Mounted, Fabric on Opposite Side, Bottom Wire Inset		
IFD0031	C7HK0031	Start Point Kit
IFD0032	C7HK0032	End Point Kit
IFD0033	C7HK0033	Interim Point Kit
IFD0034	C7HK0034	Horizontal Corner Point Kit
IFD0035	C7HK0035	Vertical Corner Point Kit
IFD0036	C7HK0036	Adjacent Start-End Point Kit
IFD0037	C7HK0037	Adjacent Dual Start Point Kit
IFD0038	C7HK0038	Adjacent Dual End Point Kit
IFD0131	C7HK0131	Start Point Kit, Powder-Coated
IFD0132	C7HK0132	End Point Kit, Powder-Coated
IFD0133	C7HK0133	Interim Point Kit, Powder-Coated
IFD0134	C7HK0134	Horizontal Corner Point Kit, Powder-Coated
IFD0135	C7HK0135	Vertical Corner Point Kit, Powder-Coated
IFD0136	C7HK0136	Adjacent Start-End Point Kit, Powder-Coated
IFD0137	C7HK0137	Adjacent Dual Start Point Kit, Powder-Coated

Model Number	Part Number	Description
IFD0138	C7HK0138	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Wall-Mounted, 1-Wire		
IFD1041	C7HK1041	Start Point Kit
IFD1042	C7HK1042	End Point Kit
IFD1043	C7HK1043	Interim Point Kit
IFD1044	C7HK1044	Horizontal Corner Point Kit
IFD1045	C7HK1045	Vertical Corner Point Kit
IFD1046	C7HK1046	Adjacent Start-End Point Kit
IFD1047	C7HK1047	Adjacent Dual Start Point Kit
IFD1048	C7HK1048	Adjacent Dual End Point Kit
IFD1141	C7HK1141	Start Point Kit, Powder-Coated
IFD1142	C7HK1142	End Point Kit, Powder-Coated
IFD1143	C7HK1143	Interim Point Kit, Powder-Coated
IFD1144	C7HK1144	Horizontal Corner Point Kit, Powder-Coated
IFD1145	C7HK1145	Vertical Corner Point Kit, Powder-Coated
IFD1146	C7HK1146	Adjacent Start-End Point Kit, Powder-Coated
IFD1147	C7HK1147	Adjacent Dual Start Point Kit, Powder-Coated
IFD1148	C7HK1148	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Wall-Mounted, 3-Wire		
IFD3041	C7HK3041	Start Point Kit
IFD3042	C7HK3042	End Point Kit
IFD3043	C7HK3043	Interim Point Kit
IFD3044	C7HK3044	Horizontal Corner Point Kit
IFD3045	C7HK3045	Vertical Corner Point Kit
IFD3046	C7HK3046	Adjacent Start-End Point Kit
IFD3047	C7HK3047	Adjacent Dual Start Point Kit
IFD3048	C7HK3048	Adjacent Dual End Point Kit
IFD3141	C7HK3141	Start Point Kit, Powder-Coated
IFD3142	C7HK3142	End Point Kit, Powder-Coated
IFD3143	C7HK3143	Interim Point Kit, Powder-Coated
IFD3144	C7HK3144	Horizontal Corner Point Kit, Powder-Coated

Model Number	Part Number	Description
IFD3145	C7HK3145	Vertical Corner Point Kit, Powder-Coated
IFD3146	C7HK3146	Adjacent Start-End Point Kit, Powder-Coated
IFD3147	C7HK3147	Adjacent Dual Start Point Kit, Powder-Coated
IFD3148	C7HK3148	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Wall-Mounted, Bottom Wire Inset		
IFD0041	C7HK0041	Start Point Kit
IFD0042	C7HK0042	End Point Kit
IFD0043	C7HK0043	Interim Point Kit
IFD0044	C7HK0044	Horizontal Corner Point Kit
IFD0045	C7HK0045	Vertical Corner Point Kit
IFD0046	C7HK0046	Adjacent Start-End Point Kit
IFD0047	C7HK0047	Adjacent Dual Start Point Kit
IFD0048	C7HK0048	Adjacent Dual End Point Kit
IFD0141	C7HK0141	Start Point Kit, Powder-Coated
IFD0142	C7HK0142	End Point Kit, Powder-Coated
IFD0143	C7HK0143	Interim Point Kit, Powder-Coated
IFD0144	C7HK0144	Horizontal Corner Point Kit, Powder-Coated
IFD0145	C7HK0145	Vertical Corner Point Kit, Powder-Coated
IFD0146	C7HK0146	Adjacent Start-End Point Kit, Powder-Coated
IFD0147	C7HK0147	Adjacent Dual Start Point Kit, Powder-Coated
IFD0148	C7HK0148	Adjacent Dual End Point Kit, Powder-Coated
Intelli-FIELD Hardware Kits, Vertical-Mounted, Side of Building, 4-Wire		
IFD4051	C7HK4051	Start Point Kit
IFD4052	C7HK4052	End Point Kit
IFD4055	C7HK4055	Vertical Corner Point Kit
IFD4151	C7HK4151	Start Point Kit, Powder-Coated
IFD4150	C7HK4150	End Point Kit, Powder-Coated
IFD4155	C7HK4155	Vertical Corner Point Kit, Powder-Coated

C Specifications

Processor	Model	• IFD-101 (processor card, mounting plate and painted aluminum enclosure) • IFD-101A (high-reliability processor for nuclear power industry, mounting plate and painted aluminum enclosure) • IFD-DP dual zone standard processor with mounting plate • IFD-DPA dual zone high-reliability processor with mounting plate
	PCB Dimensions (LxW)	• 30.5 x 23 cm (12 x 9 in.)
	Quantity	• one per 2 sensor zones
	Probability of detection	• greater than 95% for a walking intruder weighing more than 35 kg at speeds between 5 cm (2 in.) and 8 m (26 ft.) per second
	Individual Zone length	• up to 150 m (500 ft.)
	Maximum perimeter length	• unlimited using multiple processors
	Power consumption	• 12.2 W maximum (without auxiliary power output)
	Power input (network)	• 18 to 56 VDC
	Power input (local)	• 10.5 to 15 VDC @ 1 A (minimum)
	Power output (available only on processors receiving network power)	• 12 VDC @ 300 mA maximum
	Connectors	• board-mounted BNC connectors for coaxial cable connections • removable terminal block for power input/output • removable terminal blocks for relay output connections • removable terminal block for remote self-test inputs • modular 8-pin socket for configuration module connection

Processor	Controls	• adjustable detection gain for each sensor zone (sensitivity)
		• adjustable field excitation voltage for each sensor zone (field strength)
		• adjustable zone configuration
		  • four independent 2-wire alarm zones
		  • one 8-wire alarm zone
		  • two independent 4-wire alarm zones
		• adjustable sensor alarm threshold for each zone (alarm trigger signal setting)
		• adjustable time constant - environmental noise filter
		• adjustable transition - environmental noise filter
		• adjustable slope threshold - environmental noise filter
		• jumper-selectable relay contact configuration as normally open or normally closed, independent for each relay
		• remote self-test - independent for each sensor zone
		• configuration module self-test - independent for each sense wire

	Outputs	• 6 form A/B relay outputs 30 VDC, 1.0 A maximum
		  • one sensor alarm relay, and one supervision relay for each zone
		  • one enclosure tamper relay, and one power fail relay per processor

	LED indicators	• one each per output relay, plus one for VCC
	Tamper circuit	• Hall-effect tamper circuit • connection for a mechanical tamper switch
	Lightning protection	• transorbs and gas discharge pellets on relay outputs, communication lines, and power inputs
	Grounding requirements	• 10 Ω maximum earth ground
	Temperature	• -40° to +70°C (-40° to +158° F)
	Relative humidity	• 0 to 95%, non-condensing
	Enclosure options	• NEMA-4 rated painted aluminum weatherproof outdoor enclosure, lockable, with tamper switch
	Operating frequency	• 9 KHz (VLF)
	Crystal Frequency	• A - 9.19 MHz • B - 8.883 MHz • C - 8.576 MHz • D - 8.269 MHz

Isolation Transformer	Model	• IFD-IT1
	PCB Dimensions (LxW)	• 17 x 12 cm ($6^{3/4}$ x $4^{7/8}$ in.)
	Quantity	• one for each sensor zone (2 isolation transformers for a dual zone processor)
	Connectors	• screw-terminal blocks for coaxial cable connections
	Power consumption	• nil
	Grounding requirements	• 10 Ω maximum earth ground
	Lightning protection	• transorbs and gas discharge pellets on sensor zone connections
	Temperature	• -40° to +70°C
	Relative humidity	• 0 to 95%, non-condensing
	Enclosure options	• NEMA-4 rated weatherproof outdoor enclosure, lockable

Sensor Wire	Description	• solid stainless steel #305, Tefzel coated, insulated (green)
	Dimensions (Length)	• 305 m (1,000 ft.)
	Operational Temperature	• -40° to +70°C (-40° to +158°F)
	Storage Temperature	• -50° to +85°C (-58° to +185°F)

Terminator	Model	• IFD-ZT1
	Dimensions (LxWxD)	• 7.6 x 3.8 x 1.4 cm (3 x 1.5 x 9/16 in.)
	Coaxial cables	• 2 per terminator 1.5 m (5 ft.)
	Quantity	• one terminator required for each pair of sensor wires (field and sense) per sensor zone (2 terminators for each 4-wire sensor zone)
	Grounding requirements	• maximum 10 Ω earth ground (ground wire provided)

Processor enclosure	Model	• included with IFD-101, IFD-101A (painted aluminum enclosure)
	Dimensions (LxWxD)	• 35.5 x 30.5 x 17 cm (14 x 12 x 6.75 in.)
	Quantity	• one per processor
	Features	• lockable (lock not included), magnetic contact on enclosure door for Hall-effect tamper circuit
	Rating	• NEMA-4, weatherproof

Isolation Transformer enclosure	Model	• included with IFD-IT1 (painted aluminum enclosure)
	Dimensions (LxWxD)	• 20 x 15 x 12 cm (8 x 6 x 4.75 in.)
	Quantity	• one per sensor zone (2 required for a dual zone processor)
	Features	• lockable (lock not included)
	Rating	• NEMA-4, weatherproof

Power supply enclosure	Model	• WE1-4
	Dimensions (LxWxD)	• 51 x 51 x 15 cm (20 x 20 x 6 in.)
	Weight	• 15 kg (33 lbs.)
	Quantity	• one per FPM-48
	Rating	• IP32 / NEMA-3R

Configuration Module	Model	• IFD-CFG
	Quantity	• one per site
	Dimensions (LxWxD)	• 19 x 11.5 x 2 cm (7.5 x 4.5 x 0.75 in.)
	Connection	• modular 8-pin cable interconnection (cable included)
	Connector	• modular 8-pin connector
	Power requirements	• receives power directly from processor (when connected)
	LED indicators	• 24 individual LEDs
	Bar scale	• 24 segment LED bar scale
	Digital display	• three digit digital display
	Function keys	• seven function keys
	Temperature	• -30º to +40º C (-22º to +104º F)
	Relative humidity	• 0 to 95%, non-condensing

48 VDC Network power supply	Model	• FPM-48
	Weight	• 2.3 kg (5 lbs.)
	Quantity	• the number of processors that can be powered by each power supply varies with the total length of the power cable run
	Power input	• 115/230 VAC, 60/50 Hz
	Power output	• 48 VDC, 3A maximum, 350 W

48 VDC Network power supply (Hi-rel option)	Model	• FPM-48R
	Weight	• 2.3 kg (5 lbs.)
	Quantity	• the number of processors that can be powered by each power supply varies with the total length of the power cable run
	Power input	• 115/230 VAC, 60/50 Hz
	Power output	• 48 VDC, 3A maximum, 150W

24 VDC Network power supply	Part Number	• P0092
	Quantity	• one per processor
	Power input	• 85-245 VAC, 60/50 Hz
	Power output	• 24 VDC, 1.25 A maximum, 30 W

d StarNeT 1000 setup

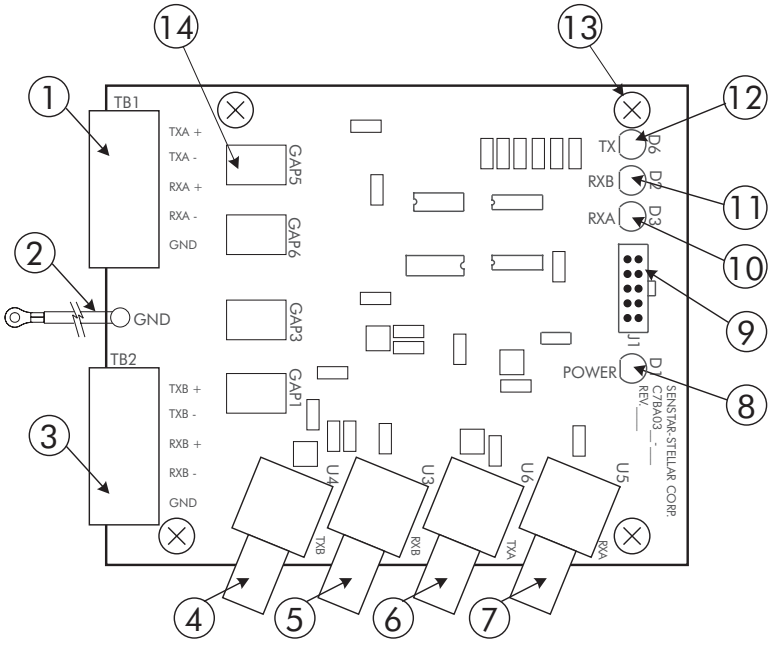
StarNeT 1000 installation & setup

This section details the procedures for installing and setting up an Intelli-FIELD system as part of a StarNeT 1000 network.

Refer to Chapters 9 and 10 and the Control Program Maintenance Guide (J4DA0402-002) for information about configuring the Intelli-FIELD system's operating parameters to meet your site-specific detection requirements. Refer to the SIMPL Site Creation Guide (J4DA0202-002) for information about configuring a StarNeT 1000 site database.

To communicate with the StarNeT 1000 alarm display and control system, the Intelli-FIELD processor requires version 2.0 or later firmware and the StarNeT 1000 communication interface card (see figure d-1). To communicate with Intelli-FIELD, the StarNeT 1000 requires version 2.66 or later software. If you purchased a StarNeT 1000 compatible Intelli-FIELD system, the firmware and communication interface card are included. If you are upgrading an Intelli-FIELD system as a part of a StarNeT 1000 network, you must verify the firmware, and install the interface card.

Interface card features



NOTE: For illustration purposes, both EIA-422 terminal blocks and fiber optic connectors are shown. The StarNeT 1000 communication interface card provides EITHER EIA-422 OR fiber optic communications, not both.

Figure d-1 StarNeT 1000 interface card

Item	Description	Item	Description
1	TB1 - EIA-422 Crossfire channel A	8	D1 - Power LED (LED ON = Power ON)
2	Ground strap - connect to ground stud on enclosure	9	J1 - 10-pin header - connect to J10 on processor card
3	TB2 - EIA-422 Crossfire channel B	10	D3 - RxA communication LED *
4	U4 - fiber optic TxB ST connector	11	D2 - RxB communication LED *
5	U3 - fiber optic RxB ST connector	12	D6 - Tx communication LED *
6	U6 - fiber optic TxA ST connector	13	Mounting hole (qty. 4)
7	U5 - fiber optic RxA ST connector	14	Lightning protection device (qty. 4)
* LED flashing indicates active network communication			

Installing the interface card

The Intelli-FIELD processor and StarNeT 1000 communication interface card include static sensitive components. Follow proper ESD procedures when handling the cards.

Disconnect power to the Intelli-FIELD processor BEFORE installing the interface card.

1. Verify the firmware by visually checking U76. If the firmware is C7SW0200-200 or higher, the firmware is StarNeT 1000 compatible.

2. Using the supplied metal standoffs and mounting hardware, mount the interface module as indicated in Figure d-2 (you may have to remove the processor from the mounting plate).

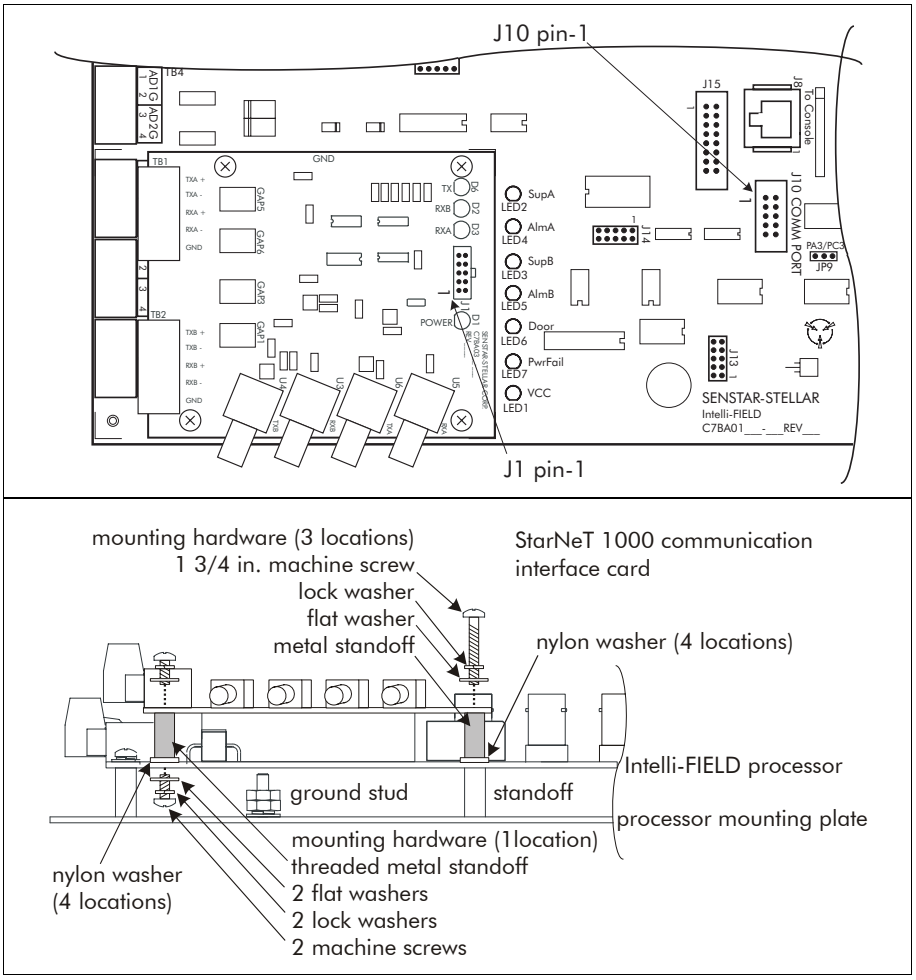


Figure d-2 Installing the com card

3. Connect the ground strap on the interface card to the ground stud on the mounting plate.

4. Make the StarNeT 1000 network communication wiring connections as indicated in figure d-8 (EIA-422) or figure d-9 (fiber optic).

5. Connect the 10-pin ribbon cable assembly to J10 COMM PORT on the Intelli-FIELD processor and J1 (the 10-pin header) on the communication interface card. Ensure that pin 1 on the ribbon cable (indicated by a red stripe) is installed correctly at both connectors (see figure d-2).

Configuring the StarNeT 1000 database

The StarNeT 1000 database must be configured using the SIMPL site creation application, to control and report the status of the Intelli-FIELD processor. Refer to the SIMPL Site Creation Guide (J4DA0202-002) for additional information.

When used with the StarNeT 1000 system, the Intelli-FIELD processor counts as a StarNeT 1000 transponder. If no inputs or outputs are used on a StarNeT 1000 transponder, the transponder is not included in the StarNeT runtime database for the Control Program.

1. Define each Intelli-FIELD processor in your StarNeT 1000 network - Select Tools > Transponder Type...
2. Select the Station number of the StarNeT 1000 workstation, which will poll the Intelli-FIELD processor.
3. Select the Transponder number (network device address) for this Intelli-FIELD processor.
   (The Transponder number must also be entered into the Intelli-FIELD processor via the configuration module.)
4. Select the I-Field radio button to define this transponder as an Intelli-FIELD processor.
5. Repeat this for each Intelli-FIELD processor.

StarNeT 1000 input/output points

The following StarNeT 1000 I/O points are available on each Intelli-FIELD processor that is under control of the StarNeT 1000 host computer.

Processors using the Local Aux Control default setting cannot use the two analog inputs (AD1G & AD2G) as auxiliary device inputs (input points 10, 11, 26, 27). In addition, they cannot control the output points.

Follow the directions in the SIMPL Site Creation Guide (J4DA0202) to define and assign the Intelli-FIELD I/O points.

Inputs:

Point	Description
0	Zone A top alarm
1	Zone A bottom alarm
4	Zone A combined top & bottom alarm
16	Zone A top tamper
17	Zone A bottom tamper
2	Zone B top alarm
3	Zone B bottom alarm
5	Zone B combined top & bottom alarm
18	Zone B top tamper
19	Zone B bottom tamper
6	All wires combined alarm
10 *	Supervised input point - alarm (AD1G)
11 *	Supervised input point - alarm (AD2G)
26 *	Supervised input point - tamper (AD1G)
27 *	Supervised input point - tamper (AD2G)
8	Enclosure tamper

Outputs:

Point	Description
2 *	Zone A supervision relay (Sup A)
3 *	Zone A alarm relay (Alm A)
4 *	Zone B supervision relay (Sup B)
5 *	Zone B alarm relay (Alm B)
6 *	Enclosure door tamper relay (Door)
7 *	Power fail relay (Pwr Fail)
0	Zone A self-test
1	Zone B self-test

** point not available in Local Aux Control mode*

Setting the processor address

The valid range of addresses is from 0 to 127, and the address assigned to the processor via the configuration module MUST match the Transponder number assigned in the site database.

1. With the Intelli-FIELD processor installed and powered-up, connect the configuration module to J8.
2. Press the MODE SEL key to select configure mode.
   The CONFIGURE LED is ON, the MONITOR LED is OFF.
3. Press the FUNC SEL key repeatedly, until the ADDRESS LED is ON.
4. Use the INCREASE or DECREASE key to enter the address (Transponder number assigned in SIMPL) for this processor.
   The address appears on the digital display (default address = 3).
5. Press the LD/ST function key to save the address.

Setting the baud rate

All devices on a Crossfire network must communicate at the same baud rate.

1. With the Intelli-FIELD processor installed and powered-up, connect the configuration module to J8.
2. Press the FUNC SEL key repeatedly, until the BAUD RT LED is ON.
   The baud rate setting appears on the digital display, e.g., 19.2 (default baud rate = 19200).
3. Use the INCREASE or DECREASE key to enter the correct baud rate for the Crossfire network.
4. Press the LD/ST function key to save the baud rate.

Setting the operating parameters

The operating parameters for a StarNeT 1000 connected Intelli-FIELD system can be set using the configuration module or via the Control Program.

The Intelli-FIELD processor must be powered-up, have the processor address and baud rate set and be connected to the StarNeT 1000 system BEFORE making any operating parameter adjustments via the Control Program.

To adjust the basic operating parameters in the Control Program, you require a level 252 or higher password.

If a field in a dialog box is grayed-out, you do NOT have access to that feature. The feature is either unavailable due to other configuration settings, or is a restricted advanced parameter setting.

To adjust the grayed-out advanced operating parameters, you require the factory level password. Contact Senstar-Stellar Customer Service BEFORE adjusting the advanced operating parameters.

From the diagnostic mode toolbar in the Control Program:

1. Select Tools > Configure Devices > Configure IntelliField...
   The Intelli-FIELD configuration dialog displays.
2. Use Chapter 10 and the following descriptions to calibrate the Intelli-FIELD system.

Basic configuration parameters:

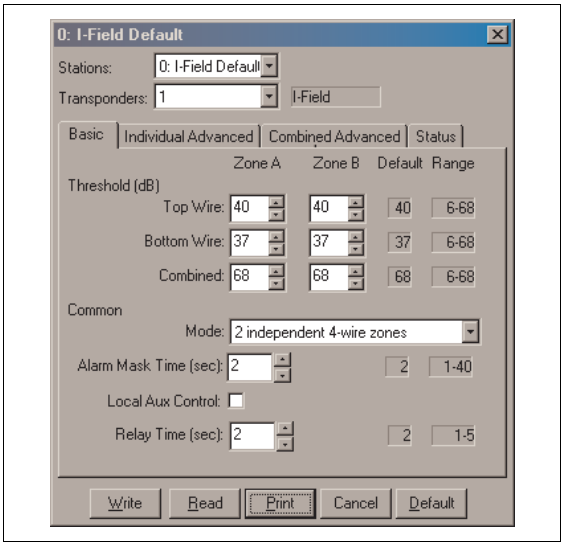


Figure d-3 Intelli-FIELD basic parameters

Stations - select the StarNeT 1000 station that will poll the processor being configured

Transponders - select the transponder number (assigned in SIMPL) for the processor being configured

Mode - select the sensor zone configuration:

- 2 independent 4-wire zones
- 4 independent 2-wire zones
- 1 8-wire zone

> *The number of alarm thresholds that can be set depends on the zone configuration selected in the Mode field.*

Threshold (dB) - set the detection alarm threshold, in decibels, for Zone A and Zone B:

- Top Wire
- Bottom Wire
- Combined

Alarm Mask Time - set the time, in seconds, that further alarms from the associated sense wire will be masked, following the initial alarm

Local Aux Control

Local Aux Control is the default setting for the Intelli-FIELD processor. If you are using the Local Aux Control feature, follow the directions in Chapter 8 to connect the output relays and the self-test inputs.

- when selected, the 6 output relays are controlled by the Intelli-FIELD processor, and the two analog inputs (AD1G & AD2G) are self-test inputs
- when NOT selected, the 6 output relays are controlled by the host computer, and the two analog inputs (AD1G & AD2G) become auxiliary device inputs to the StarNeT 1000 system

Relay Time - set the time, in seconds, that a relay remains activated after an event (applicable only with Local Aux Control)

Individual advanced configuration parameters:

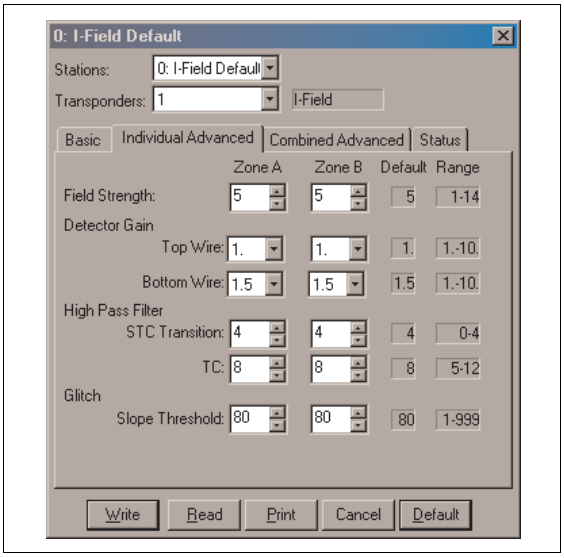


Figure d-4 Intelli-FIELD individual advanced parameters

The STC Transition, TC and Slope Threshold for both individual and combined advanced settings are environmental noise filters.

Senstar-Stellar strongly recommends leaving these filters at the default settings. Adjust these filters only if environmental factors are causing an unacceptable nuisance alarm rate. Contact Senstar-Stellar Customer Service for additional information.

The individual advanced parameters apply to the individual sense wire signals (top sense, bottom sense) and the field wires.

Field Strength - set the field strength for the Zone A/B field generators

Detector Gain - set the detection gain for the Zone A/B:

- Top Wire
- Bottom Wire

STC Transition - set the time constant transition between the secure state and the alarm threshold state

TC (Time Constant) - set the time constant for Zones A/B, which affects the system's sensitivity to slow moving intruders (increasing the time constant increases the sensitivity)

Slope Threshold - set the slope threshold, which filters rapidly changing detection signals (e.g., the signals caused by the onset of rain)

Combined advanced configuration parameters:

The combined advanced parameters apply to the combined sense wire signals.

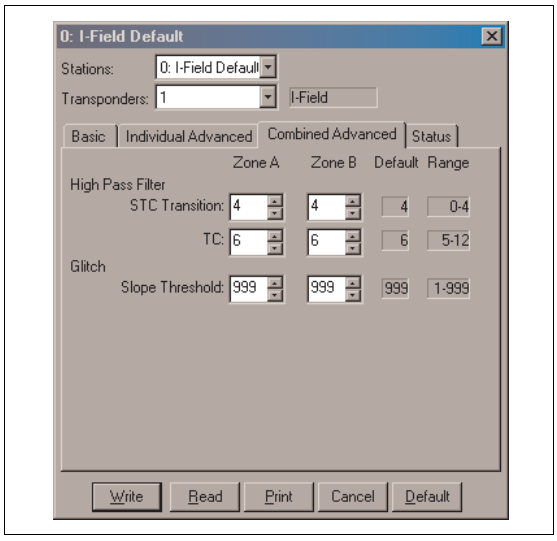


Figure d-5 Intelli-FIELD combined advanced parameters

STC Transition - set the time constant transition between the secure state and the alarm threshold state

TC (Time Constant) - set the time constant for Zones A/B, which affects the system's sensitivity to slow moving intruders (increasing the time constant increases the sensitivity)

Slope Threshold - set the slope threshold, which filters rapidly changing detection signals (e.g., the signals caused by the onset of rain)

Intelli-FIELD processor operating status:

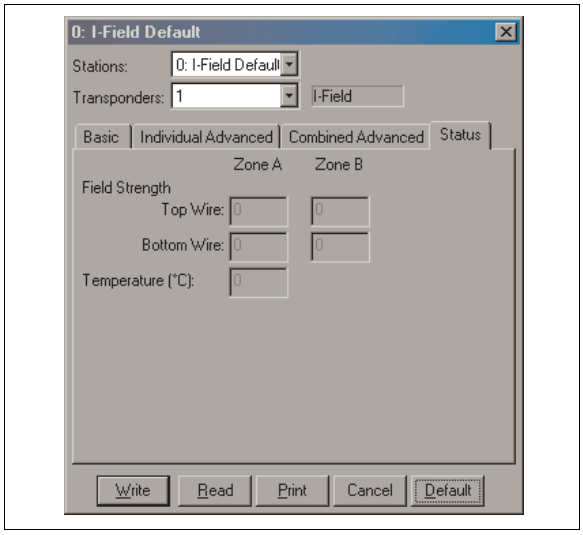


Figure d-6 Intelli-FIELD processor status

The processor status dialog box provides the returned Field Strength level readings from the sense wires, plus the temperature as measured inside the processor enclosure.

Intelli-FIELD plot mode

The StarNeT 1000 Control Program includes diagnostic tools, which can be used to examine the following Intelli-FIELD sensor signal data:

- Zone A top wire; Zone B top wire
- Zone A bottom wire; Zone B bottom wire
- Zone A top and bottom wires combined;
  Zone B top and bottom wires combined
- Zone A and Zone B all wires combined

Setting up a new plot

1. Select Tools > Configure Devices > IntelliField Plot...
   A blank Intelli-FIELD plot is displayed.
2. Select the StarNeT 1000 station, which polls the Intelli-FIELD processor(s).
3. Select the channel(s) that you want to display.
   (All channels are monitored while recording, but only selected channels are displayed. You can make channel selection changes while recording.)
4. Select Record.
   The Select Plot Parameters dialog appears.

5. Set the duration of the plot and the sampling frequency.
6. Select OK.
7. Select the file name for the current plot. The default plot name is IFLDyyyymmdd.plt.
   The Intelli-FIELD Plot recording begins.

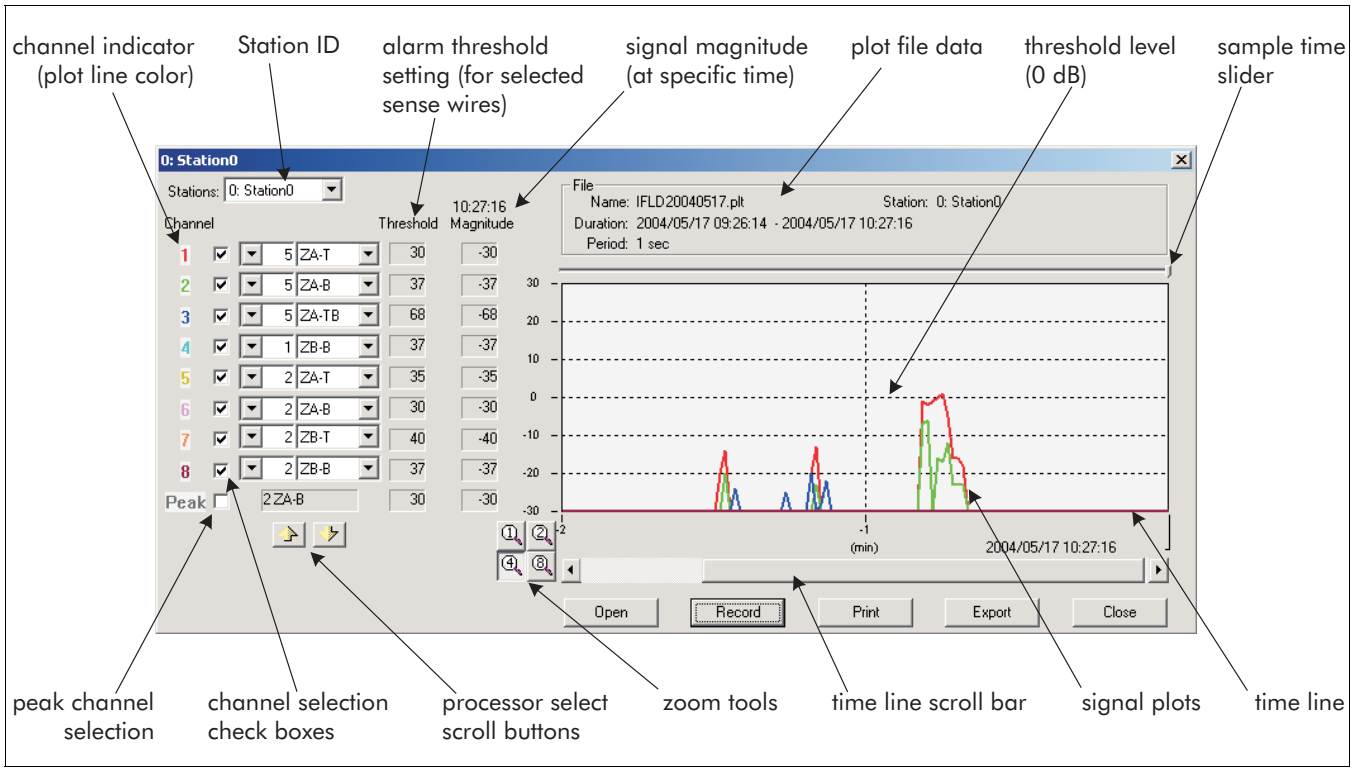


Figure d-7 Intelli-FIELD processor plot display

The Intelli-FIELD plot includes the following features:

Stations: - select the StarNeT 1000 station that polls the processor(s) being plotted

File - includes information about the current plot file

Channel - indicates the color of the trace, the processor address, and the specific sense signal

Channel select check box - deselect if you do NOT want to view data from this sense signal

Threshold field - indicates the alarm threshold setting for this sense signal

Magnitude - indicates the sense signal magnitude at the indicated sample time

Peak check box - select to plot in black, the maximum received sense signal from all processors, for each sample time

Processor select scroll buttons - select to move through the available range of Intelli-FIELD processors

Zoom tools - select a zoom tool to increase or decrease the plot display window

Time line scroll bar - use to select the time window that is displayed in the plot dialog (not active while recording)

Sample time slider - use to select and view a particular time in the recorded plot; the signal magnitudes for the selected time are displayed in the signal magnitude column

Signal plots - indicate the received signals from the various sense wires (in different colors)

Open button - use to open an existing plot file (not valid while recording)

Record button - use to begin recording a plot file
once recording begins, this becomes the **Stop** button

Print - select to print the plot data (not valid while recording)

Export - select to export the plot data as a .csv file, which can be read by other applications (such as MS Excel) (not valid while recording)

The **Y axis** of the plot display is the received signal strength in decibels
(0 db = alarm threshold)

The **X axis** represents the time period for the plot

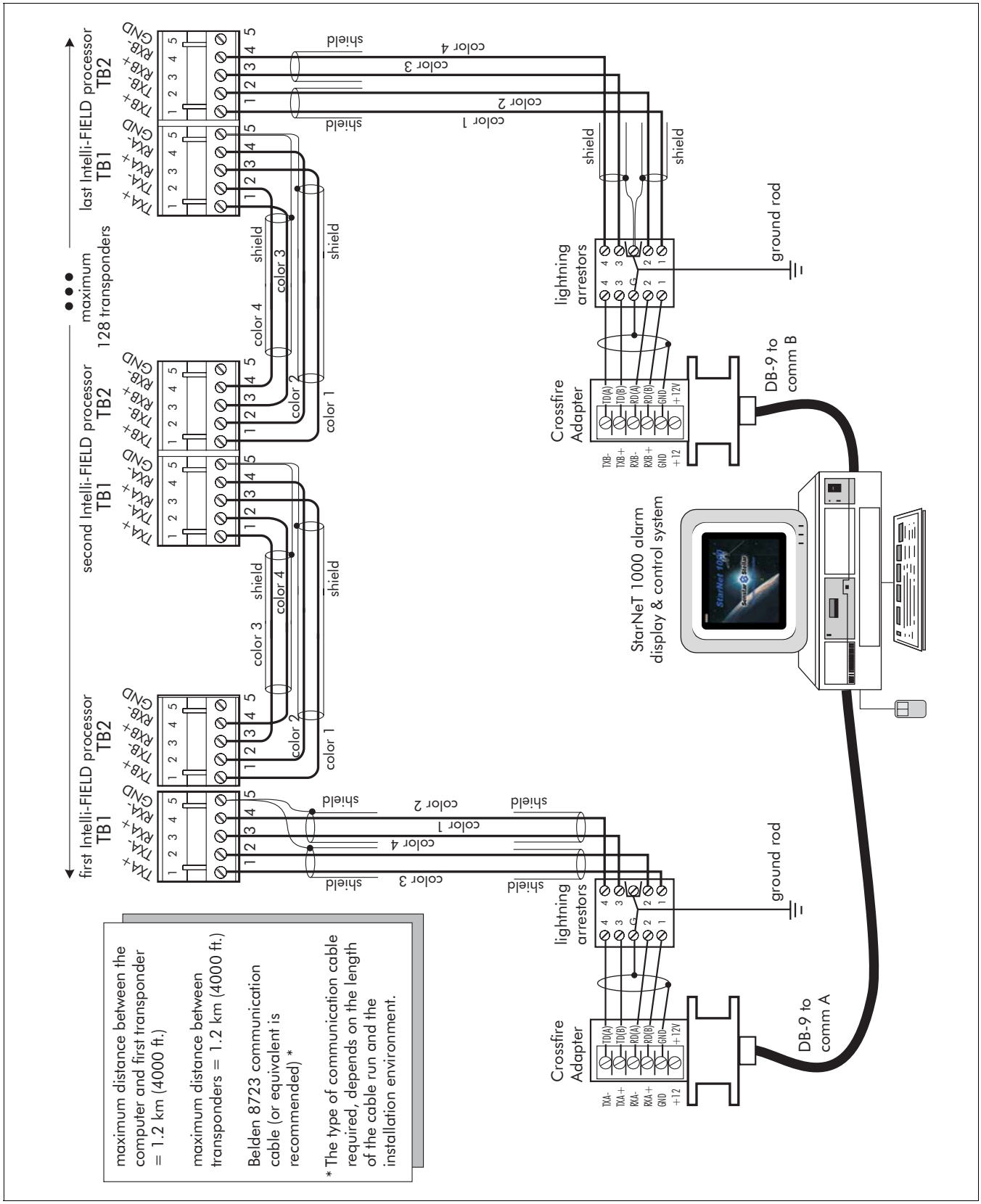


Figure d-8 Intelli-FIELD EIA-422 Crossfire network wiring diagram

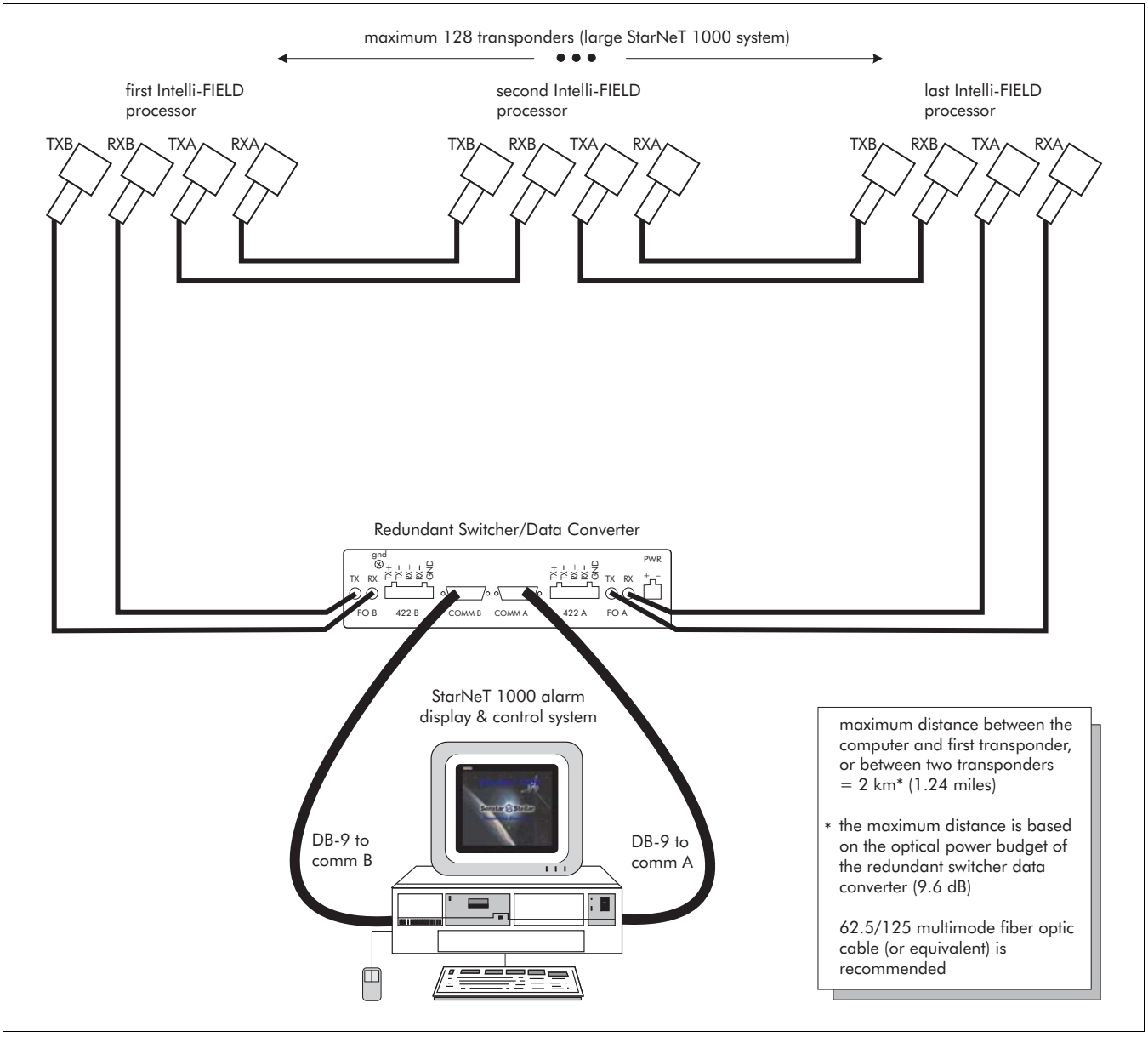


Figure d-9 Intelli-FIELD fiber optic network wiring diagram

e Next generation hardware

Introduction

This appendix details the procedures for installing Intelli-FIELD mounting hardware, the mounting post ground strap and sensor wire. A 4-wire Intelli-FIELD system uses four mounting points per post, an 8-wire system uses eight. Each mounting point requires a post clamp/insulator assembly to support the sensor wire. Figure e-1 illustrates an Intelli-FIELD post clamp/insulator assembly.

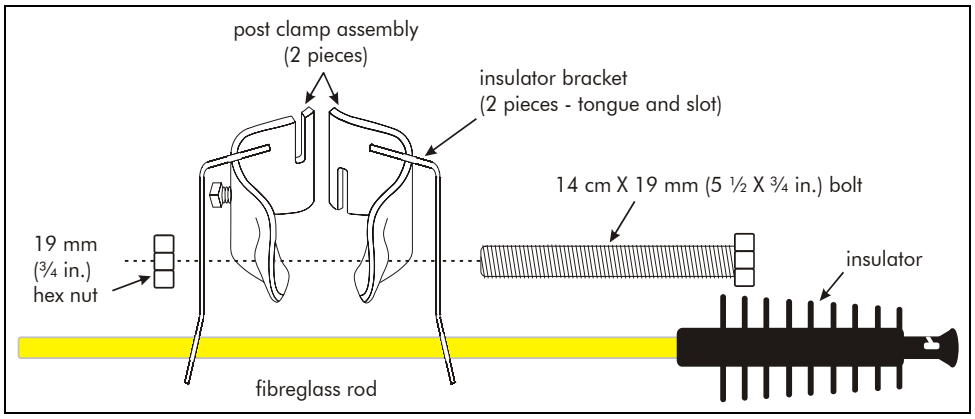


Figure e-1 Post clamp/insulator hardware assembly

The maximum length for an Intelli-FIELD zone is 150 m (500 ft.).

There are four Intelli-FIELD mounting hardware kits available (see Table e-1). Each kit includes four sets of the components shown in Figure e-1. Each kit fits a specific outside diameter (O.D.) post size:

kit #	post O.D.	kit #	post O.D.
C9HK4362	6 cm (2 $^{3}/_{8}$ in.)	C9HK4382	8.9 cm (3 $^{1}/_{2}$ in.)
C9HK4372	7.3 cm (2 $^{7}/_{8}$ in.)	C9HK4392	11.4 cm (4 $^{1}/_{2}$ in.)

Table e-1 Hardware kits

Tools and equipment

- one 28 mm (1 $^{1}/_{8}$ in.) wrench and one cordless drill with a 28 mm socket (recommended)
  OR
  two 28 mm wrenches
- one 28 mm torque wrench (recommended)
- one 1 cm ($^{3}/_{8}$ in.) open ended wrench
- linesman's pliers
- two 2.5 m (8 ft.) step ladders
- one 2.5 m measuring tape and a permanent marker
- one 2.5 m length of lumber (recommended)
- zinc strap for mounting post grounding (C7SP0600)
- ground rod for mounting post grounding

Select suitable ladders, measuring tapes and lumber for 8-wire installations, e.g., 7.6 m (25 ft.).

Preparation

1. Use a permanent marker to mark each fibreglass rod 19 cm (7.5 in.) from the end of the rod. This mark will facilitate the positioning of the rods in the insulator brackets during installation.

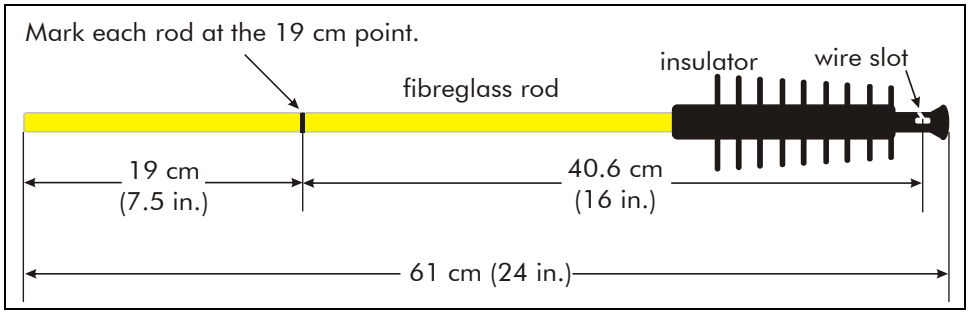


Figure e-2 Insulator assembly

2. On the start point post, mark the installation heights for the post clamps according to Figure e-3 (4-wire systems).

Follow the wire spacing guidelines in Chapter 3 for 6-wire and 8-wire installations.

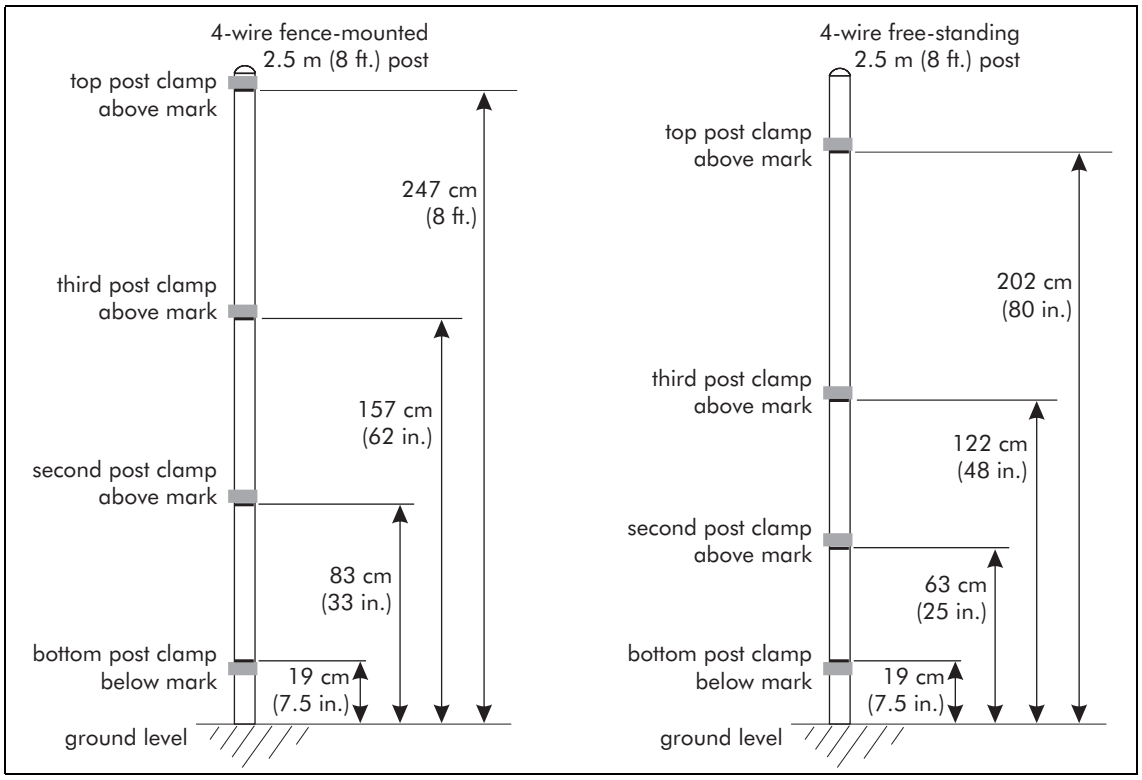


Figure e-3 Post clamp positions (4-wire)

The post clamp locations in Figure e-3 provide approximate positions for the mounting hardware installation. You may have to adjust the mounting hardware to ensure that the sensor wires are the proper height above ground level.

Mounting hardware installation (upper wires)

Although one person can install the Intelli-FIELD mounting hardware, the job is far easier and much quicker for two.

Install the mounting hardware so that:

- the fibreglass rod/insulator assemblies are perpendicular to the protected perimeter
- the wire slot opening in each insulator assembly is oriented directly upward, away from the ground
- each wire slot opening is 40.5 cm (16 in.) away from the insulator bracket

Free-standing installations

For free-standing installations, install each post clamp/ insulator assembly loosely at a comfortable working level, slide the assembly to its correct position on the post, and then tighten the bolt.

Fence-mounted installations

For fence-mounted installations, it may be necessary to cut the wire ties that attach the fence fabric to the fence post in the area where the mounting hardware is being installed. If this is the case, cut only the ties that are close to the point that you are installing. When you have finished installing this point, replace the cut wire ties before proceeding to the next point on the post.

Upper wire installation procedure

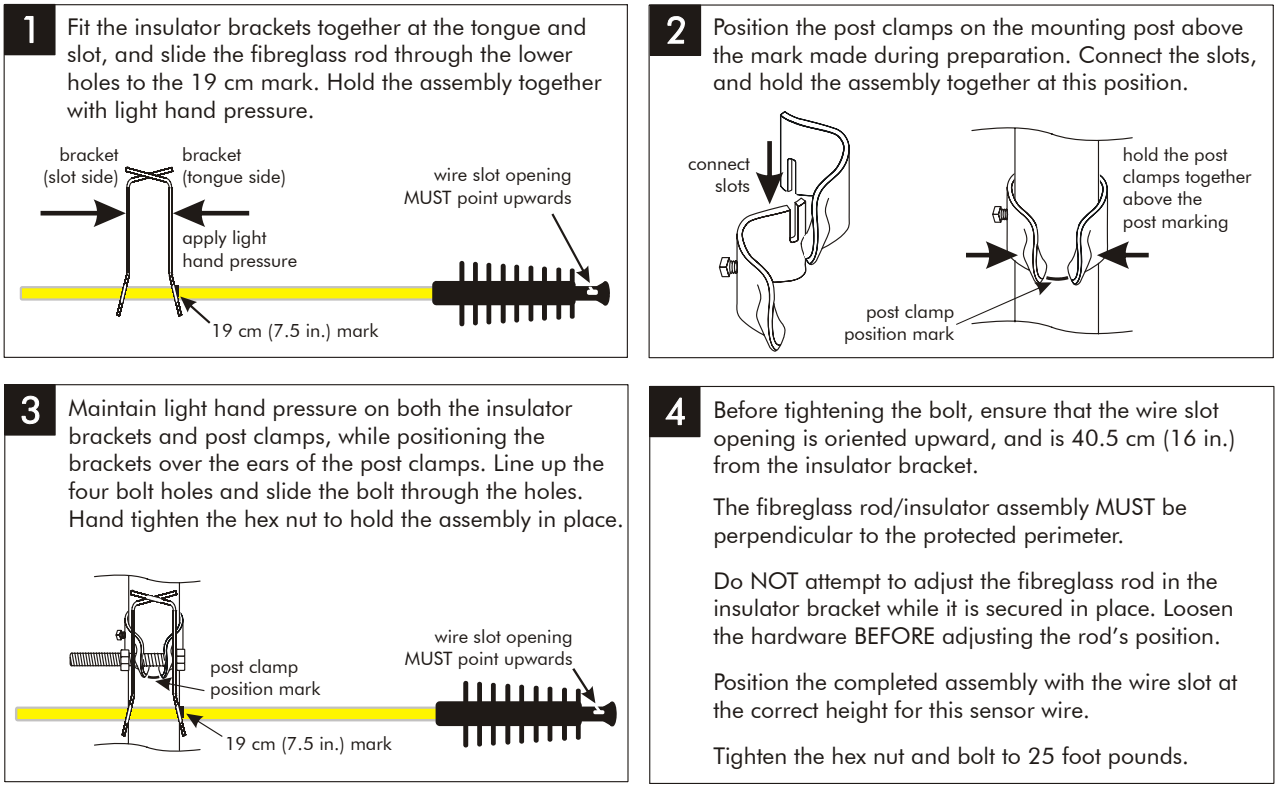


Figure e-4 Mounting hardware installation (upper wires)

Mounting hardware installation (bottom wire)

The bottom sensor wire must be installed at a consistent height of 20 cm (8 in.) above ground, throughout the installation.

The bottom sensor wire mounting hardware must be installed with the insulator brackets and fibreglass rod above the post clamps, UNLESS the ground strap is CAD welded to the posts, or connected to the posts with conduit clamps.

All of the square-head bolts on the bottom sensor wire mounting hardware MUST be on the same side of the posts.

The mounting procedure for the bottom sensor wire is the same as for the other sensor wires, except that the insulator bracket/insulator assembly is installed above the post clamp, rather than below. This facilitates the ground strap installation.

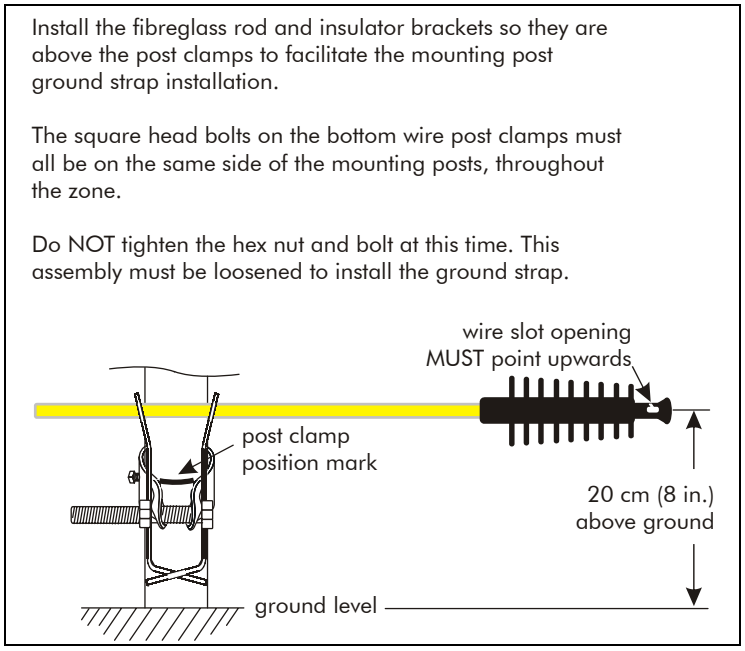


Figure e-5 Mounting hardware installation (bottom wire)

Completing the start point hardware installation

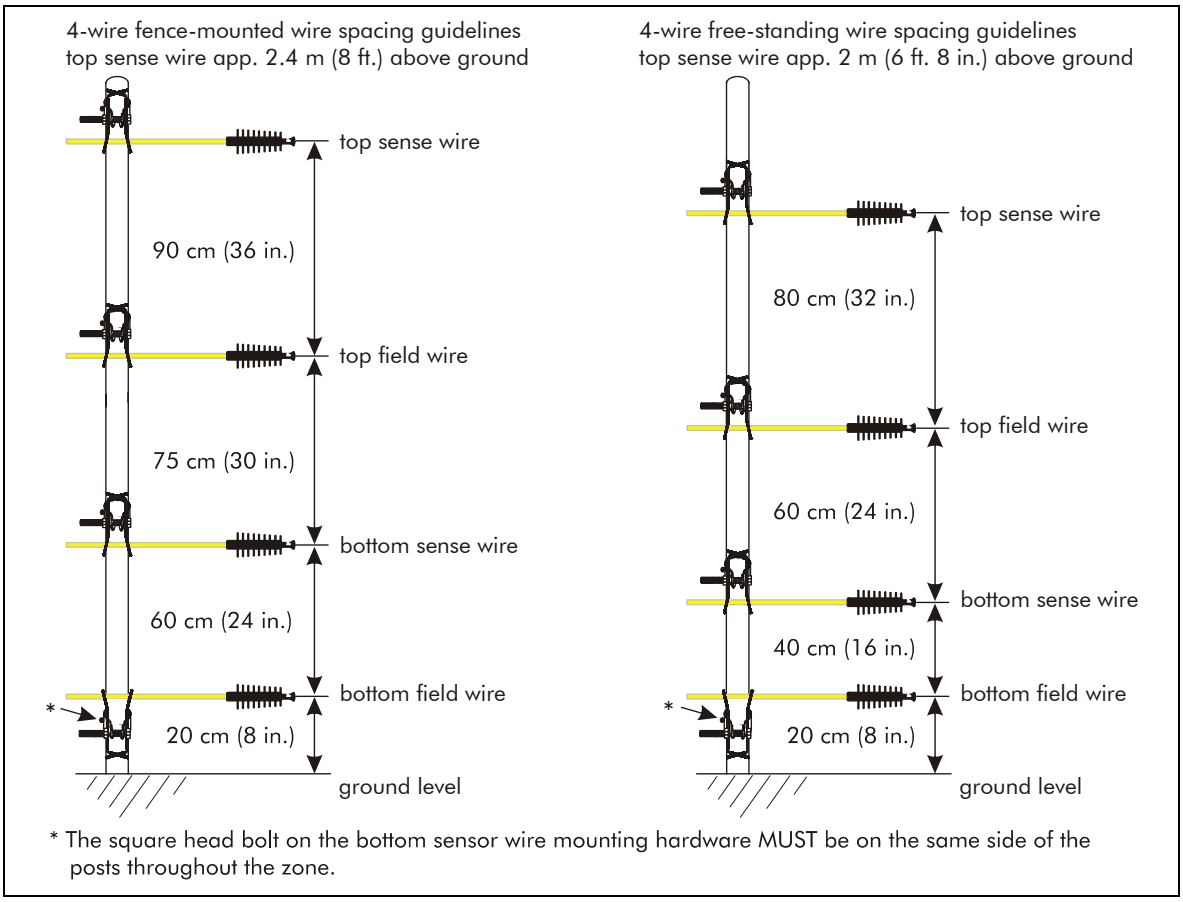


Figure e-6: Hardware installation (4-wire)

1. Adjust the mounting hardware on the start point post as follows:
   - each wire slot opens directly upward, away from the ground
   - each wire slot opening is 40.5 cm (16 in.) away from the nearest insulator bracket
   - each wire slot is at the correct height for the particular sensor wire (see Figure e-6:)
   - each fibreglass rod/insulator assembly is perpendicular to the perimeter line or fence
2. Mark the positions of the start point post clamps on a piece of lumber.
3. Use the lumber as a template for marking the clamp positions on the remaining posts.
4. Install the mounting hardware on the remaining posts in the zone.

Corner point hardware installation at outside corners

To install sensor wire around outside corners where the direction changes by 20° or less, install a single mounting bracket at approximately ½ of the turn angle. Adjust the length of the fibreglass rods in the insulator brackets to maintain consistent sensor wire to perimeter line spacing around the turn.

> *It may be necessary to adjust the positions of the fibreglass rods in the insulator clamps at corners to maintain consistent sensor wire spacing (from the fence, or perimeter line).*

To install Intelli-FIELD wire around outside corners where the direction changes by more than 20°, you must install two sets of mounting hardware on one post. The wire spacing (from the fence or perimeter line) must remain consistent for both sets of mounting hardware. To accomplish this, install the first set according to the standard directions. Install the second set with the insulator assemblies inverted (see Figure e-7). Both sides of the corner remain perpendicular to the perimeter line, with respect to the straight section of sensor wire of which they are a part. For example, at a 90° turn, the first set of hardware is installed exactly the same as the hardware on the mounting posts leading up to the corner. The second set of hardware is inverted and installed at a 90° angle to the first set, so that it is perpendicular to the section of sensor wire leading away from the corner. Both fibreglass rods should be in physical contact to minimize the sensor wire height deviation. Figure e-7 illustrates the recommended installation for a 90° outside corner.

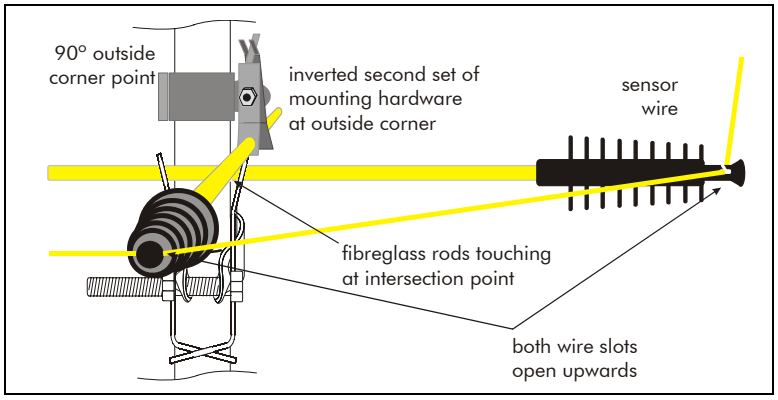


Figure e-7 Outside corner mounting hardware

Corner point hardware installation at inside corners

At inside corners a single set of mounting hardware is installed at approximately ½ of the turn angle. For example, at a 90° angle the mounting hardware is installed at a turn angle of 45°. Figure e-8 illustrates the recommended installation procedure for an inside corner.

The positions of the fibreglass rods in the insulator brackets must be adjusted to maintain consistent sensor wire to perimeter line spacing at inside corners.

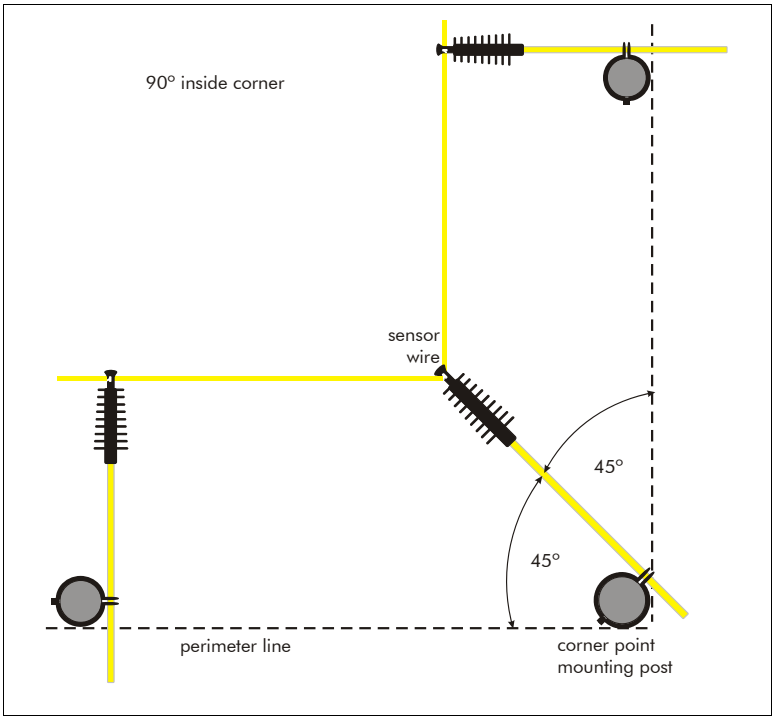


Figure e-8 Inside corner mounting hardware

Installing the common ground strap

Each mounting post in an Intelli-FIELD installation MUST be connected to a common ground strap.

The square head bolts on the bottom wire post clamps must all be on the same side of the mounting posts.

1. Connect the zinc ground strap (C7SP0600) to a properly installed ground rod adjacent to the start point post.
2. Pull the ground strap tight beyond the start point post and mark it directly below the outside edge of the square head bolt.
3. Mark the position of the bottom clamp on the post.

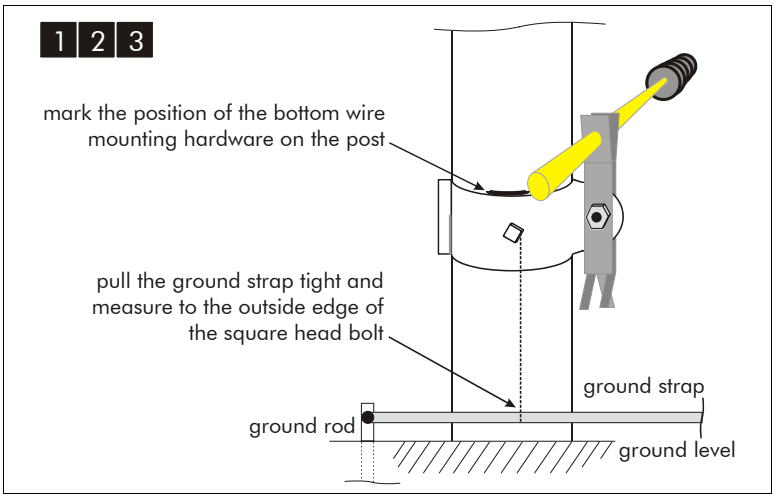


Figure e-9 Mark the ground strap and post

4. Loosen the hex nut and bolt enough so that you can slide the bottom wire mounting hardware 5 to 10 cm up the post. Make sure that the fastening hardware is tight enough to hold the mounting hardware in place at this position.
5. At the mark on the ground strap, fold the ground strap perpendicular to the ground so that it runs straight up the post, past the original position of the square head bolt. Pinch the fold flat with linesman's pliers.

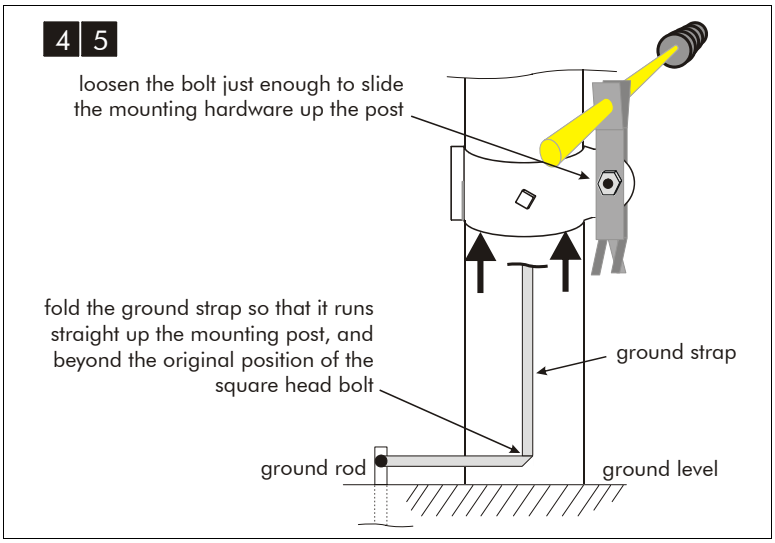


Figure e-10 Fold ground strap up post

6. Measure the ground strap 10 cm (4 in.) above the first fold, and fold it over double so that it runs back down the post. Pinch the fold flat at the 10 cm point with linesman's pliers.

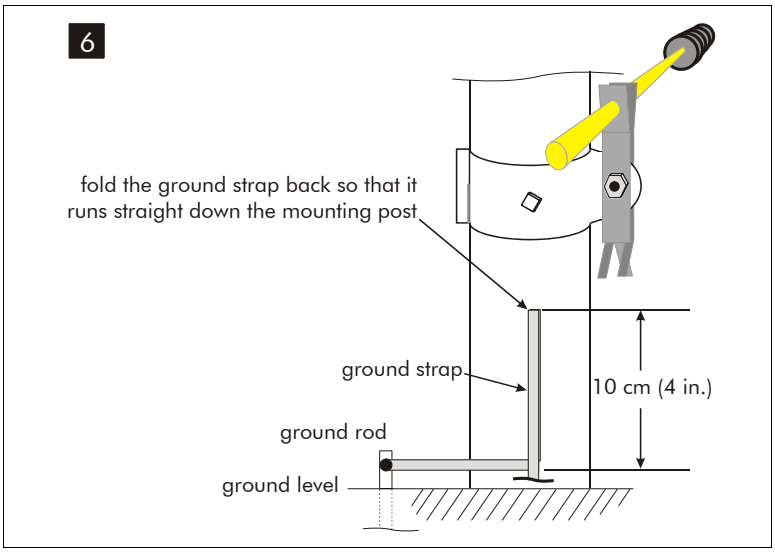


Figure e-11 Fold ground strap back down post

7. Fold the ground strap one more time so that it continues to run parallel to the ground at its original level. Pinch the fold flat with linesman's pliers.

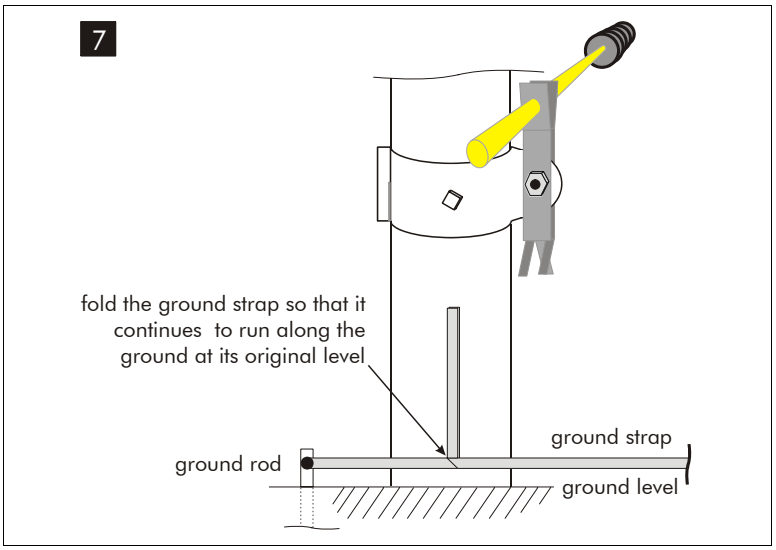


Figure e-12 Fold ground strap along original route

8. Slide the bottom wire mounting hardware back down the post, over the doubled section of ground strap, to its original position. Ensure the ground strap is directly beneath the square head bolt.

9. Tighten the hex nut and bolt to 25 foot pounds. Tighten the square head bolt to 25 foot pounds.

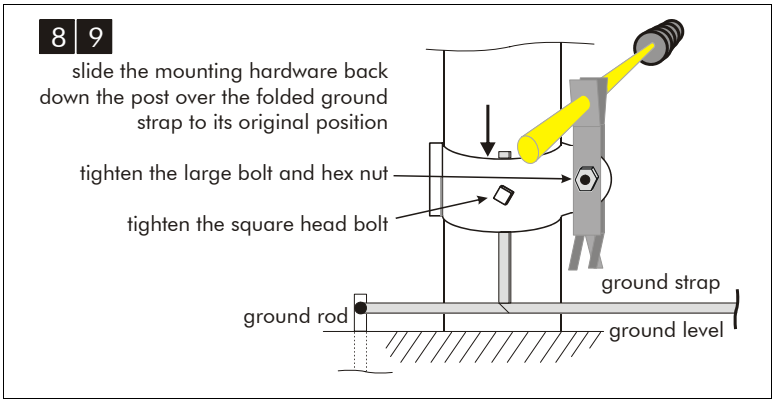


Figure e-13 Reposition and tighten the bottom wire hardware

10. Repeat this procedure for each mounting post in the zone.

For long sensor zones it may be necessary to splice two sections of zinc ground strap together. Accomplish this by using one square head bolt to fasten two ground straps to one post.

Installing the sensor wire

After installing the mounting hardware and ground strap, you can begin installing the sensor wire. You can dispense one, or more, spools of sensor wire simultaneously. The following tables include the sensor wire spacing guidelines for 4-wire and 8-wire Intelli-FIELD installations.

4-wire fence-mounted - top wire 2.4 m (8 ft.)		4-wire free-standing - top wire 2 m (6.5 ft.)	
wire	**wire height**	**wire**	**wire height**
top sense	90 cm (36 in.) above top field	top sense	80 cm (32 in.) above upper field
upper field	75 cm (30 in.) above bottom sense	upper field	60 cm (24 in.) above bottom sense
bottom sense	60 cm (24 in.) above bottom field	bottom sense	40 cm (16 in.) above lower field
lower field	20 cm (8 in.) above ground level	lower field	20 cm (8 in.) above ground level

Table e-2 Sensor wire spacing (4-wire)

8-wire dual stacked zone - top wire 4.2 m (14 ft.)		8-wire dual stacked zone - top wire 6 m (20 ft.)	
fence-mounted		free-standing	
wire	**wire height**	**wire**	**wire height**
B-side top sense	90 cm (36 in.) above top sense	B-side top sense	60 cm (24 in.) above B-side top field
B-side top field	90 cm (36 in.) above top field	B-side top field	60 cm above B-side bottom sense
B-side bottom sense	90 cm (36 in.) above top field	B-side bottom sense	60 cm above B-side bottom field
B-side bottom field	90 cm (36 in.) above bottom sense	B-side bottom field	60 cm above A-side top sense
A-side top sense	90 cm (36 in.) above bottom sense	A-side top sense	60 cm above A-side top field
A-side top field	75 cm (30 in.) above bottom field	A-side top field	60 cm above A-side bottom sense
A-side bottom sense	60 cm (24 in.) above bottom field	A-side bottom sense	40 cm (16 in.) above A-side bottom field
A-side bottom field	20 cm (8 in.) above ground level	A-side bottom field	20 cm (8 in.) above ground level

Table e-3 Sensor wire spacing (8-wire)

Each spool of Intelli-FIELD sensor wire holds 305 m (1000 ft.). If you are dispensing multiple spools of sensor wire, install all of the wires (one wire per spool) at each mounting post before proceeding to the next mounting post. Otherwise, repeat this procedure for each sensor wire.

1. At the start point, place one or more cable spools on a rod. One person unspools the sensor wire, while the second installs it in the insulators.
2. Measure a 50 cm (20 in.) piece of sensor wire and fit the loose wire (at the 50 cm point) through the wire slot opening on the start point insulator. Ensure that the sensor wire on the spool leads toward the sensor zone, and the cut end extends away from the zone.
3. Wrap the loose end of sensor wire completely around the insulator and fit it into the wire slot opening a second time.
4. Wrap the sensor wire around the insulator one more time and feed the loose end down through the hole in the insulator.
5. Hold both ends of the sensor wire close to the insulator, and pull it in opposite directions until the wire fits tightly on the start point insulator.

   Do NOT trim the loose end of sensor wire.

6. At the first interim point fit the sensor wire into the wire slot opening, and pull it toward the end of the insulator.
7. Continue until you reach the end point of the sensor zone. At the end point pull the sensor wire hand tight and fit it into the wire slot opening on the end point insulator.
8. Cut the sensor wire approximately 50 cm (20 in.) beyond the end point insulator.
9. Pull the sensor wire tight while pushing lightly on the fibreglass rod, until the rod bends toward the sensor zone.
10. Wrap the sensor wire completely around the insulator and fit it into the wire slot opening a second time.

11. Wrap the sensor wire around the insulator one more time and feed the loose end down through the hole in the insulator. Pull the sensor wire so it fits tightly on the insulator.

    Do NOT trim the loose end of sensor wire.

    Both the end point and the start point fibreglass rods must bend toward the sensor zone to ensure adequate wire tension throughout the zone.

Increasing the sensor wire tension

Intelli-FIELD sensor wire requires from 13.5 to 16 kg (30 to 35 lb) of wire tension, depending on environmental factors.

If the sensor wire tension is not adequate after the sensor wire is installed, there is a tension-wheel assembly available to increase the wire tension. The tension-wheel (H0967) works in conjunction with a tensioning bar (H0968) to increase the tension on a sensor wire without having to adjust the wire in its insulators.

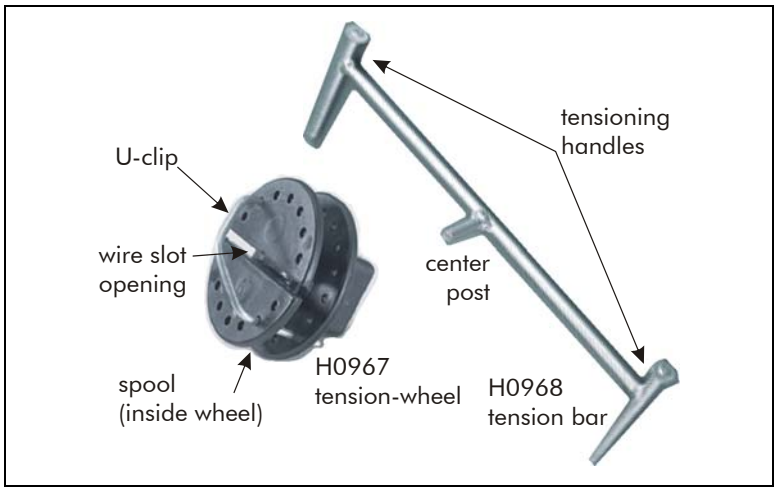


Figure e-14 Tension-wheel and tensioning bar

WARNING	*Use caution when working with tensioned sensor wire and when applying tension to sensor wire.*

Approximately 40 cm (16 in.) from either the start or end point insulator:

1. Remove the wire locking U-clip from the tension-wheel (see Figure e-15).
2. Fit the wire slot opening on the tension-wheel over the sensor wire at the 40 cm point.
3. Fit the center post on the tensioning bar through the hole on the backside of the tension-wheel.

4. Grasp the two handles on the tensioning bar and turn the tension-wheel to achieve 13.5 to 16 kg (30 to 35 lb) wire tension. The sensor wire wraps around the spool inside the tension-wheel.
5. Hold the tensioning bar to maintain the wire tension, and insert the U-clip to lock the sensor wire in place. One side of the U-clip goes above the sensor wire and the second side goes below.
6. Ensure that the U-clip is pushed all the way into the tension-wheel.
7. Repeat this procedure for any other sensor wires, which require additional tension.

Adjacent sensor zones

When two Intelli-FIELD zones physically meet, two sets of mounting hardware are installed on one mounting post:

- The first set is installed according to the standard directions. The second set is inverted, with respect to the first (see Figure e-16).
- The zinc ground strap is installed in the usual manner, with the first set of hardware, and provides the grounding for the mounting post.
- The two sets of hardware are installed with slight offsets (5 to 10 º) from perpendicular. The offset angle is straightened when tension is applied to the sensor wires (see Figure e-15).
- The fibreglass rods are adjusted in the insulator brackets to maintain consistent sensor wire to perimeter spacing.
- The fibreglass rods physically touch to limit the wire height deviation.
- The sensor wires from the adjacent zones DO NOT make contact.
- The sensor zones overlap to prevent an area of reduced detection sensitivity between the zones.

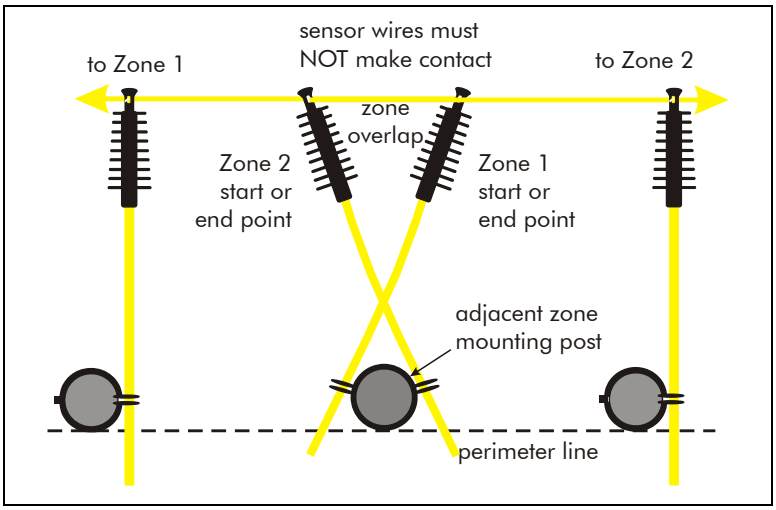


Figure e-15 Adjacent zone hardware (top view)

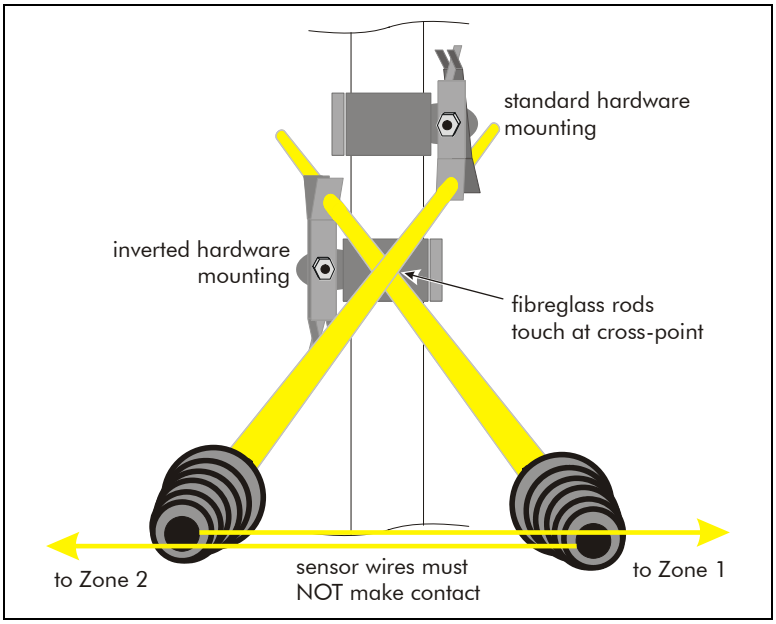


Figure e-16 Adjacent zone hardware (front view)