



Precision locating fiber sensor for fence, wall-top, and buried perimeter intrusion detection applications

FiberPatrol FP1150 provides up to 80 km (49.7 mi) of protection per processor. It accurately locates intrusions even when there are multiple simultaneous intrusions or in the presence of non-localized environmental noise that would overwhelm the location capability of other long-range fiber optic sensors. The full length of the cable is continuously analyzed and disturbances at different locations are reported independently.

The FP1150's fiber optic sensor technology requires no powered or conductive items in the field, making the sensor completely immune to EMI and lightning and intrinsically safe in the presence of explosive atmospheres.

Its resilient reflectometry-based design using coherent Rayleigh scattering allows detection to continue right up to the point of a cut in the sensor cable.

DETECTION SETTINGS

The FP1150 uses sophisticated algorithms to discriminate between real threats and vibrations from incidental sources. Detection algorithms incorporate disturbance magnitude thresholds, spatial parameters, and timing parameters. Its advanced software allows detection settings to be independently optimized for fence, wall-top, and buried sections of a perimeter. Algorithms are easy to configure, enabling facility personnel to optimize the system for site-specific conditions.

Features and Benefits

- Detect and locate perimeter intrusions over a distance of up to 80 km (49.7 mi)
- Pinpoint intrusions with a ± 4 m (13 ft) accuracy
- Accurate locating of multiple simultaneous intrusions
- Sensor cable continues to operate up to the point of a cut
- Dual sensor channels
- 100% operational after a cable cut in cut-immune configuration; maximum perimeter 40 km (24.8 mi)
- High Probability of detection (Pd) and low Nuisance Alarm Rate (NAR)
- Software-configurable detection zones
- No outdoor power or communication infrastructure required
- EMI and lightning immune
- No electronics or grounding points required in the field
- Accurate locating for directing surveillance cameras and/or response forces
- Field components intrinsically safe
- Alarms reported by zone number, cable distance and/or GPS coordinates
- Multiple options for integration with SMS, VMS and PSIM platforms
- Easy to install and maintain
- Per-meter licensing
- Possible to use sensor cable with fire ratings such as LSZH, fire retardant, and fire resistant

CUT IMMUNITY

When the sensor cable is cut, either accidentally or in an attempt to defeat the sensor, the FP1150 immediately reports the incident, including its exact location. Moreover, the sensor retains the ability to detect and localize intrusions up to the point of the cut. When installed in the cut-immune configuration, the sensor continues to provide detection on the full perimeter even after a cable cut. The maximum perimeter length in the cut-immune configuration is 40 km (24.8 mi).

POINT DISTURBANCE DISCRIMINATION

FP1150 differentiates between point disturbances caused by real intrusions and spatially distributed environmental disturbances like wind, heavy rain, and hail. Unlike a block sensor, where all events are aggregated together along the entire zone length (including ones caused by distributed environmental conditions), FP1150 divides the perimeter protected into logical cells and intrusion signals are evaluated independently for each cell.

ENVIRONMENTAL COMPENSATION ALGORITHM

FP1150's Environmental Compensation algorithm further mitigates the effects of wind, heavy rain, and hail. Using its precision locating capability, FiberPatrol accounts for the background environmental noise level in the vicinity of a disturbance before declaring an alarm.

SENSOR CABLES

The FP1150 uses single-mode fiber within standard telecommunications-grade cable. The sensing function requires one fiber—additional fibers within the cable can be used for other communications purposes like Ethernet and/or Senstar's proprietary Silver Network protocol (for communication with other Senstar sensors like the Senstar LM100™ hybrid perimeter intrusion detection and intelligent lighting system, OmniTrax® buried cable sensor, UltraWave™ microwave, or XField® electrostatic sensors).

For standard fence-detection applications non-armored cable is recommended. For buried perimeter application or for installation on concertina coils single-armor double-jacket cable construction is recommended.

FENCE APPLICATIONS

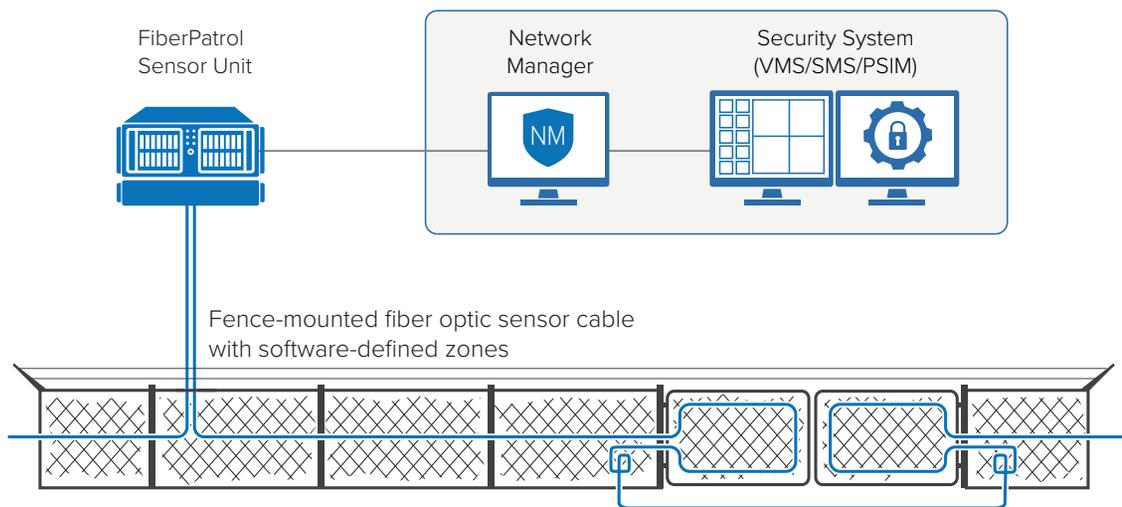
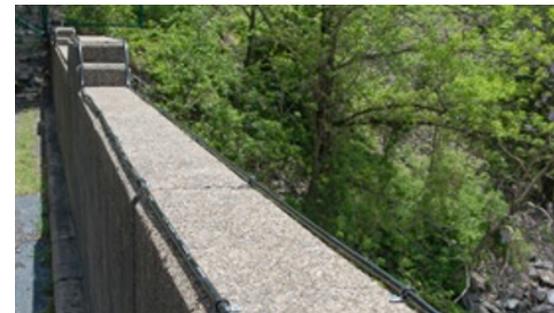
The FiberPatrol FP1150 can be used on most types of metallic fences including chain-link, welded mesh and expanded metal. A single pass of sensor cable provides effective protection for fences up to 4.3 m (14 ft) in height. The sensor may also be used on palisade-style fences depending on the specific characteristics of the fence. The sensor cable can be mounted on swinging gates to provide gate protection.

The FP1150 provides separate detection settings for fence climb and fence cut.

For planning purposes, it is recommended to budget 20% sensor cable over the fence length for use in service loops, extra coverage at brace and corner posts, gate areas, and zone isolation loops.

WALL-TOP APPLICATIONS

For walled perimeters the FP1150 sensor cable is mounted at the top corners of the wall using Senstar's custom extended P-clip fastener. Any impact to the sensor cable by an intruder's hands, feet, or climbing aid will be detected by the system. For highest security the sensor cable can be installed on both the inner and outer sides of the wall.



Fence protection site configuration

BURIED APPLICATIONS

When an intruder moves across the ground above a buried fiber optic sensor cable, whether walking, running, or crawling, characteristic vibrations are created. The system distinguishes these from background vibrations, and the FP1150 declares an alarm.

The FP1150 not only detects soil compression and displacement in the vicinity of the buried sensor cable but also the minute seismic waves induced by human footsteps. The high sensitivity of the FP1150 provides flexibility in the burial depth of the sensor cable, enabling the system to not only detect footsteps directly above the sensor cable, but also those up to several meters away.

VEHICLE DETECTION AND OPTIONAL REJECTION

The FP1150 is capable of detecting vehicles in the vicinity of the sensor cable due to the vibrations created by their motion or by the engine. In the case of a road parallel to the protected asset the FP1150 can be configured to reject normal vehicle traffic and only raise an alarm if a vehicle drops below a configurable speed setting or stops altogether.

DIGGING AND TUNNELING DETECTION

The FP1150 detects hand and machine digging and tunneling at distances of up to 20 m (66 ft) from the sensor cable in any direction. The sensor cable can be positioned several meters underground if necessary to extend coverage down to the required depth. Activities inside an existing tunnel such as movement of people, equipment, and vehicles can also be detected.



BURIED DETECTION - INSTALLATION RECOMMENDATIONS

For detection of above ground activity the sensor cable is recommended to be direct-buried at a depth between 15 to 70 cm (6 to 28 in). For detection of tunneling a burial depth of at least 2 m (6.5 ft) is recommended to minimize the response to incidental sources of vibration. Due to the potential for nuisance alarms from incidental vibrations, the best performance for buried applications is achieved when the sensor cable is installed 6 m (20 ft) or more away from trees, fences, and posts, and 30 m (100 ft) or more from roadways.

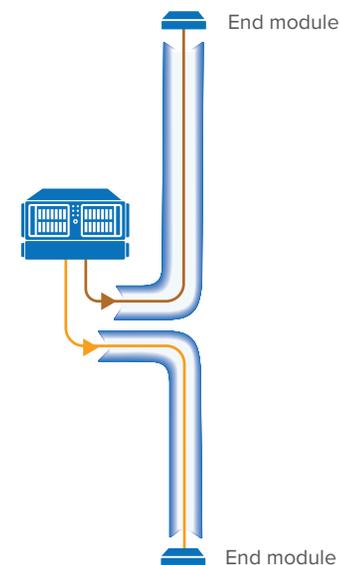
BURIED DETECTION - TYPICAL DETECTION RANGES

Typical detection ranges are shown in the table below. It is important to note that actual performance will depend on specific site conditions and can increase or decrease considerably from these typical values. Factors that can affect achievable detection ranges include:

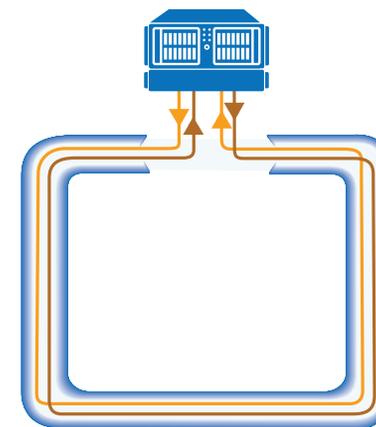
- Nearby incidental sources of vibration
- Burial medium type (clay, gravel, sand, etc.), moisture content, and compaction level
- Presence of distinct layers within the burial medium
- Amount of vegetation

Typical detection ranges can vary from location to location at a given site and can vary over time depending on the moisture content and the depth of frost penetration.

INTRUSION TYPE	TYPICAL DISTANCE FROM CABLE FOR DETECTION
Human - Normal Walking	1 to 5 m (3 to 16 ft)
Human - Running	5 to 10 m (16 to 33 ft)
Human - Crawling Slowly	1 m (3 ft)
Light Vehicle - Moving	3 to 10 m (10 to 33 ft)
Heavy Vehicle - Moving	10 to 20 m (33 to 66 ft)
Heavy Vehicle - Engine Running	5 to 10 m (16 to 33 ft)
Manual Digging (pickaxe)	10 to 20 m (33 to 66 ft)
Tunnel Digging	20 m (66 ft)



Independent sensor configuration



Cut-immune configuration

TRANSITIONING BETWEEN INSTALLATION TYPES (FENCE, WALL, BURIED)

At the transition point between different installation types – fence, wall-top, buried - a 30 m (100 ft) buffer coil of sensor cable is recommended.

ALARM DISPLAY OPTIONS

Several options are available for alarm display and integration with third-party devices. Customers requiring a single display dedicated to FP1150 perimeter monitoring can use the processor's built-in alarm display. Senstar's StarNet™ 2 and Symphony™ systems provide enhanced capabilities for those requiring multiple workstations and maps as well as the management of additional security equipment. The FP1150 can report alarm locations by zone number, cable distance and/or GPS coordinates.

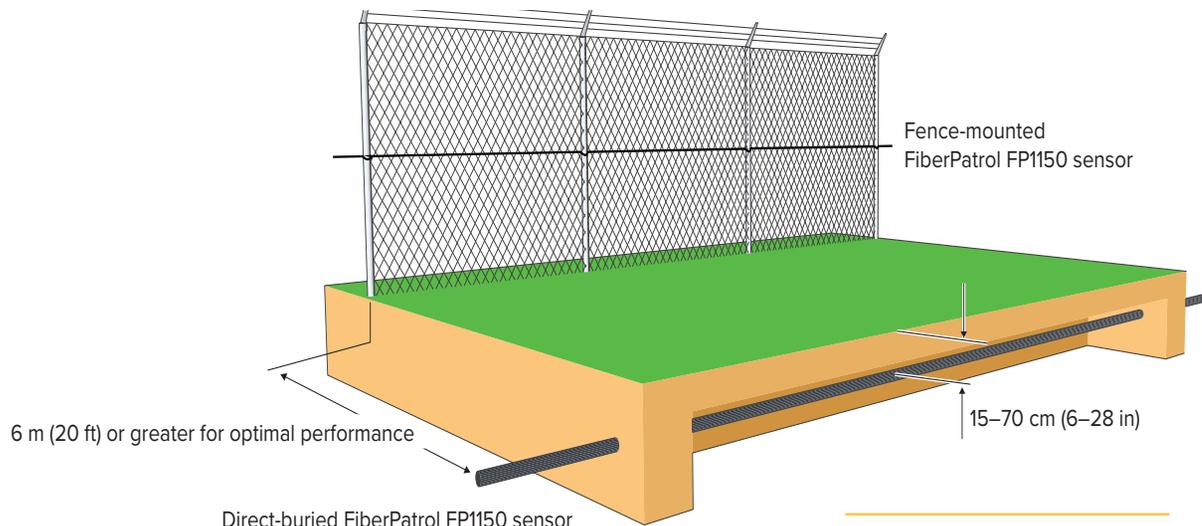
THIRD-PARTY INTEGRATION

Senstar's Network Manager software is used to integrate the FP1150 with security management systems and video management systems. The Network Manager software provides an IP-based interface to the FP1150 that is common to Senstar's other industry-leading sensors, including the OmniTrax® buried RF cable sensor, Senstar LM100 hybrid perimeter intrusion detection and intelligent lighting system, XField® electrostatic sensor, UltraWave™ microwave, and the FlexZone® cable-based fence sensor.

Alarms and status can also be presented on relays or open-collector outputs using UltraLink I/O modules.



FP1150 processor



Sample installation in which buried FP1150 sensor works in conjunction with a fence-mounted sensor

KEY SPECIFICATIONS

- FP115040x
 - up to 40 km (24.8 mi.) of detection processing per sensor channel, 80 km (49.7 mi) total
 - maximum allowable cable loss, installed, of 9.6 dB @1550 nm per sensor channel
- FP115005x
 - up to 5 km (3.1 mi.) of detection processing per sensor channel, 10 km (6.2 mi) total
 - maximum allowable cable loss, installed, of 4.8 dB @1550 nm per sensor channel
- Sensor Unit MTBF: greater than 87,000 hours
- Detection accuracy: ±4 m (13 ft) typical
- Up to 1,440 software-definable detection zones
- Simple integration with SMS/VMS systems
- Detection resolution (minimum separation for two disturbances to be reported separately):
 - 15 m (50 ft) in non cut-immune configuration
 - 30 m (100 ft) in cut-immune configuration
- Cut cable response
 - Cable cut detected and location reported to +/- 30 m (100 ft)
 - Operation continues up to the point of the cut
- Pd: 95% typical
- FAR: less than 1/km/month typical
- NAR: site dependent

For further information on individual system components refer to the respective Technical Specification.

PART	DESCRIPTION
FP115005U	FP1150 unlicensed Sensor Unit capable of providing up to 5 km (3.10 mi) of detection processing on each of its two sensor channels, up to 10 km (6.21 mi) in total. Requires separately-purchased per-meter activation licenses, FP-PML-05, to enable detection processing
FP115040U	FP1150 unlicensed Sensor Unit capable of providing up to 40 km (24.8 mi) of detection processing on each of its two sensor channels, up to 80 km (49.7 mi) in total for perimeter protection applications. Up to 100 km total for pipeline or conduit TPI applications. Requires separately-purchased per-meter activation licenses, FP-PML-40, to enable detection processing
FP-PML-05	Per-meter activation license applicable to FP115005U Sensor Unit. The number of meters licensed needs to cover all cable beyond the initial lead-in section (max 500 m) including all service loops, isolation loops, gate bypasses, etc. Initial lead-in in excess of 500 m needs to be added to the licensed section. Each meter licensed activates both sensor channels
FP-PML-40	Per-meter activation license applicable to FP115040U Sensor Unit. The number of meters licensed needs to cover all cable beyond the initial lead-in section (max 500 m) including all service loops, isolation loops, gate bypasses, etc. Initial lead-in in excess of 500 m needs to be added to the licensed section. Each meter licensed activates both sensor channels
FP115005H	Equivalent to FP115005U but with fiber connections compatible with FP1100X/FP1400/FP6100X systems
FP115040H	Equivalent to FP115040U but with fiber connections compatible with FP1100X/FP1400/FP6100X systems
FPMA0922	FiberPatrol fiber connection module for FP1150 systems. Includes two patch cords, two end modules, associated splice trays, and 1U rack-mount splice enclosure
GB0296-17	17 in 1U rack mount KVM (KB/LCD/Mouse)
FPKT0400	8 port KVM switch with 2 sets of cables
FPMA0222	Dual End module for FiberPatrol FP1150
GM0749-24	Field splice enclosure (24 splice capacity, 3 cable ports)
FPKT0200	Splice consumables kit
GH1080-08	3/16" x 08" (0.48 x 20.3 cm) stainless steel cable ties (100 each)
GX0310	Tool – manual tension and cut-off tool for stainless steel cable ties
GM0748	Buried vault for buried cable splices and service loops, 100 x 75 x 45 cm
GM0749-48	Field splice enclosure (48 splice capacity, 3 cable ports)
FPKT0500	Sensor cable management kit for swinging gates. One (1) section of 5 cm (2 in) diameter split conduit 1 m (3 ft) long and two (2) hose clamps
FPSP0424	Unarmored fiber optic sensor/lead cable, 24 fibers, recommended for fence or wall-top applications
FPSP0624	Single-armor, double-jacket fiber optic sensor/lead cable, 24 fibers, recommended for buried applications
O0FG0220	Network Manager service version on USB drive

For further information on individual system components refer to the respective Technical Specification.