SENSTAR® FiberPatrol® FP1150 for Pipeline Protection Applications

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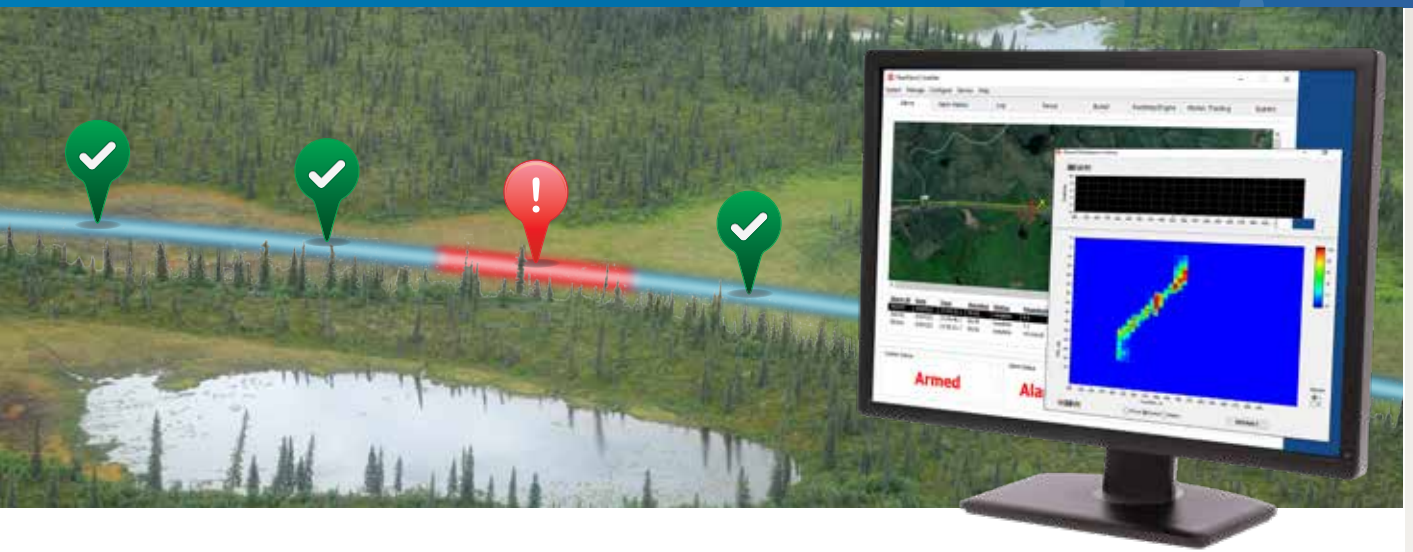


Fiber optic third-party interference (TPI) detection

Third-party interference (TPI), including unauthorized excavation in a pipeline's right-of-way, is a leading cause of pipeline accidents and loss. A single pipeline incident can have devastating effects, causing property destruction, service interruptions, environmental damage and risks to human life – all of which can cost pipeline operators millions of dollars in financial losses. Further, incidents involving oil theft can have a significant economic impact by going unnoticed for long periods of time.

The FiberPatrol FP1150 uses fiber optic cable buried along the pipeline to detect and locate ground vibrations and acoustic signatures associated with TPI activity.

No powered or conductive items are required in the field. The sensor cable is intrinsically safe within explosive atmospheres and completely immune to all forms of electromagnetic energy from radio communications, radar, electrical power transmission equipment and lightning.

EARLY WARNING OF THREATS TO PIPELINES

The FP1150 is designed specifically to detect and classify activities that threaten pipelines: machine or manual digging, heavy machinery operating in the nearby vicinity–even people walking within the protected area if so configured.

PIPELINE TPI DETECTION

When TPI events such as manual digging, machine digging, or vehicle movements occur in the vicinity of a pipeline, characteristic vibrations are created. The FP1150 is able to detect these minute vibrations and using its advanced algorithms distinguish them from background vibrations and declare an alarm.

Features and Benefits

- Detect and locate pipeline third-party interference (TPI) events over a distance of up to 100 km (62.1 mi) per sensor unit (50 km per sensing channel)
- Combine fence detection with TPI for distances up to 80 km (49.7 mi) per sensor unit
- Pinpoint interference locations with a ±4 m (±13 ft) accuracy, even with multiple simultaneous intrusions
- Classification algorithms for foot-steps, manual digging, machine digging, engine noise, and vehicle motion
- Sensor cable continues to operate up to the point of a cut and remains 100% operational after a cable cut when in cut-immune configuration
- High Probability of Detection (PD) and low Nuisance Alarm Rate (NAR)
- Up to 1,440 software-configurable detection zones
- No outdoor power, grounding or communication infrastructure required
- EMI and lightning immune
- 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
- Sensor Unit can host Senstar Network Manager to minimize cyber vulnerabilities

FP1150 processor

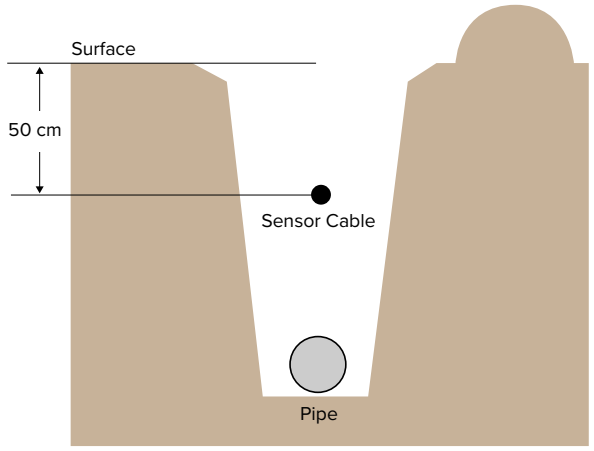
VEHICLE DETECTION AND OPTIONAL REJECTION

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.

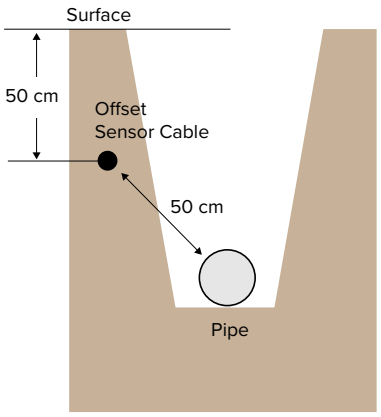
CABLE INSTALLATION RECOMMENDATIONS

To provide equal protection to the pipeline from either side, the ideal location for the sensor cable is directly above the pipeline and buried at least 50 cm below the surface to protect the cable from incidental digging and surface erosion. It is also recommended to keep the sensor cable at least 50 cm from the pipeline itself to minimize pickup of vibrations from the flow of fluid within the pipeline. Laterally offsetting the sensor cable from the pipeline is possible, keeping in mind that the sensitive zone will be centered around the sensor cable, not the pipeline itself.

Due to the potential for nuisance alarms from incidental vibrations, the best TPI detection performance 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.



Central Location



Alternate Location

Cable installation recommendations

TPI 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.

TRANSITIONING BETWEEN PIPELINE TPI AND FENCE DETECTION SECTIONS

At the transition point between pipeline TPI sections and fence detection sections a 30-meter (100 ft) buffer coil of sensor cable is recommended.

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)**
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)
Machine digging (backhoe)	10 to 30 m (33 to 100 ft)

* At the maximum sensor length of 50 km the typical lateral detection distances are halved

** Requires quiet background environment

CLASSIFICATION ALGORITHMS

To provide optimum Probability of Detection vs. Nuisance Alarm Rate performance and situational awareness FiberPatrol FP1150 provides an extensive set of classification algorithms:

- For buried applications – footstep, manual digging, machine digging, vehicle engine, and vehicle motion
- When fence-mounted to protect above-ground infrastructure - separate fence-climb and fence-cut detection algorithms enable the detection of stealthy fence cutting attempts without compromising NAR performance

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 Senstar 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.

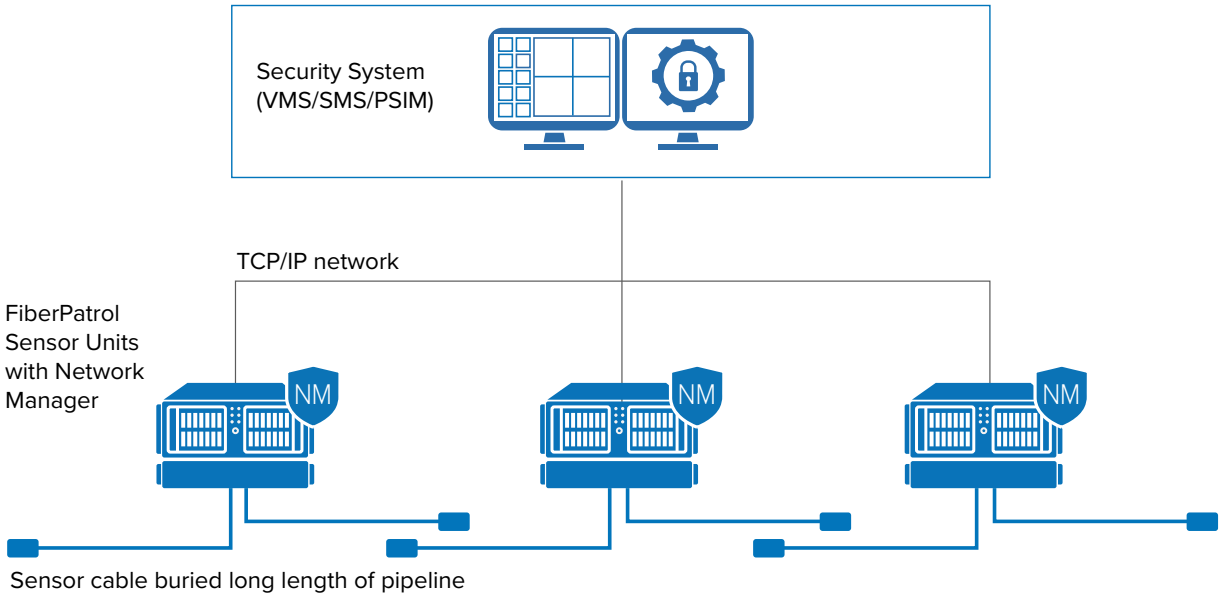
THIRD-PARTY INTEGRATION

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 intrusion detection and deterrence system, XField® electrostatic sensor, UltraWave™ microwave, F400 fiber-optic sensor, 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.

CYBERSECURITY PROVISIONS

The FP1150 Sensor Unit has been cyber penetration tested to ensure that exposure to malware and cyber attacks is minimized. In addition, running Senstar's Network Manager software on the Sensor Unit further minimizes cyber hazards. The Network Manager allows the network attack surface to be reduced to the single IP port required for communication to the customer's VMS/SMS/PSIM. This network connection is further protected by the use of TLS 1.2 to provide an authenticated and encrypted connection and by the use of an IP Allow list whereby Network Manager will only accept TCP/IP connections from authorized IP addresses.



FiberPatrol FP1150 for pipelines network

KEY SPECIFICATIONS

- FP115040x
  - Up to 50 km (31.06 mi.) of TPI detection processing per sensor channel, 100 km (62.1 mi) total
  - Maximum allowable cable loss (installed): 12.0 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): 4.8 dB @1550 nm per sensor channel
- Detection accuracy: ±4 m (13 ft) typical
- Up to 1,440 software-definable detection zones
- Detection peformance: 95% typical Pd, less than 1/km/month typical FAR, NAR site dependent
- 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
- System integrity features:
  - Sensor Unit MTBF: 87,000 hours
  - dual 1 GbE Ethernet ports
  - redundant hot-swappable power supplies
  - optional redundant Sensor Unit configuration

PART	DESCRIPTION
FP115005U	FP1150 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. Price includes a baseline 1000 m of activation license. The detection capabilities of the Sensor Unit can be extended with additional, separately purchased, activation licenses.
FP115040U	FP1150 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 and up to 100 km total for pipeline or conduit TPI applications. Price includes a baseline 5000 m of activation license. The detection capabilities of the Sensor Unit can be extended with additional separately-purchased activation licenses.
FP-PML-05(B)	Add-on 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. “B” licenses are required for buried applications.
FP-PML-40(B)	Add-on 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. “B” licenses are required for buried applications.
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.
FPMA0922-001	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).
FPKT0400-001	8-port KVM switch with 2 sets of cables.
FPMA0222-001	Dual End module for FiberPatrol FP1150.
FPKT0201-001	Field splice enclosure, 4 cable ports, in-line. Includes grommet kit and splicing supplies for 24 splices.
FPKT0211-001	Optional low-profile splice tray for use with field splice enclosure FPKT0201-001, 24-splice capacity.
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.
FPKT0500-001	Buried vault for buried cable splices and service loops, 100 x 75 x 45 cm.
FPSP0424-001	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.
FPSP1624-001	Unarmored fiber optic sensor/lead cable, 24 fibers, recommended for fence or wall-top applications.
00FG0220-XXY	Single-armor, double-jacket fiber optic sensor/lead cable, 24 fibers, recommended for buried applications.
00SW0240-XXY	Network Manager (Windows service version) on USB drive.
00SW0261-XXY	NMS-GSC Gateway. Gateway software integrating Senstar Network Manager (NM) to Genetec Security Center.
00SW0280-XXY	NMS-XProtect Gateway. Gateway software integrating Senstar Network Manager to Milestone XProtect.
00CD0100-001	Universal documentation package on USB (includes Universal Configuration Manager (UCM) software).
GB0390	Replacement power supply module for FiberPatrol FP1150 Sensor Unit.
FPFG0201-001	Replacement blank solid-state drive for FP1150 processor unit. Provided in hot-swap tray.
FPFG0202-001	Pair of replacement blank 250 GB solid-state disk drives. Software installation and setup sold separately.