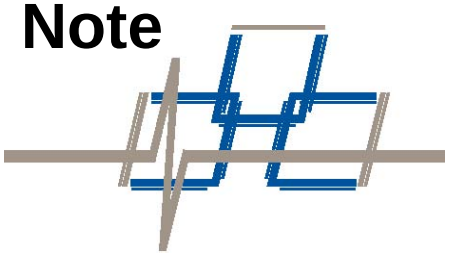
Fiber SenSys
PERIMETER SECURITY

Gate Protection

Application Note



Fiber SenSys, Inc. (FSI)
2925 NE Aloclek Dr.
Suite 120
Hillsboro, OR 97124
USA

Tel: 1-503-692-4430
Fax: 1-503-692-4410
info@fibersensys.com
www.fibersensys.com

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Introduction

The successful installation and operation of Fiber SenSys® fiber optic intrusion detection systems are achieved by a thorough understanding of the security needs of the site to be protected as well as proper deployment of the sensor cable. Gates are a point of easy access to intruders and as such must be considered for protection. This application note will discuss typical installation of the fiber optic intrusion detection systems on gates as well as give guidelines and tips to help ensure that the correct deployment is achieved.

Prior to installing the Fiber Defender® Alarm Processing Unit (APU) and deploying the sensor cable, the site must be assessed so that all the security needs are met, and all potential threats are accounted for. The entire perimeter needs to be secured, and the selected zone size defined.

Fiber SenSys® recommends the following procedure for planning the installation of our fiber optic intrusion detection systems.

1. **Assess:** Survey the site to be protected including all accessible gates and record site details needed for the design phase.

2. **Design:** Create a strategy for protecting the site. Planning location and number of zones should include all gates and the strategy for each gate.

3. **Install:** Proper deployment of the fiber optic sensor and correct installation of the Fiber SenSys® fiber optic intrusion detection systems ensure better performance. For installing 300 Series units, see application note Site Design and Installation for FD300 Series (AN-ENG-027)**.** For installing 500 Series units, see application note FD500 Series - Standard Installation Instructions (AN-SM-035).

4. **Tuning:** Once the sensor is properly installed, intrusion simulations should be performed and the system tuned to catch intrusions. For a comprehensive guide to tuning, see application note Setting the Tuning Parameters (AN-SM-008).

Site assessment

A site assessment is used to evaluate the security needs of a site and to gather important information used for site design. This process will assist in identifying the requirements for gate protection. This process involves the following:

- Collect the system requirements:
  - Level of security (high, medium, etc.)
  - Develop potential intruder profile
  - Types of security threats
  - Additional layers of security (cameras, lights, additional sensors, etc.)

- Survey the gates and record:
  - Location of all gates
  - Type of gate movement (swing, slide, roll, etc.)
  - Length and height of the gate
  - Gate traffic (vehicles, human, permanently closed, etc.)
  - Gate surroundings (fence, roads, wildlife, etc.)

Intrusion types

As gates vary in structure, use, and design, it is imperative that the gate is assessed for intrusion pathways. Possible intrusion attempts through gates include the following:

1. Destroying or bending the gate
2. Cutting the gate fabric
3. Climbing over the gate
4. Trenching or crawling under the gate

A properly installed and tuned Fiber Defender® APU is capable of detecting the above types of intrusions.

Nuisance alarms

As part of the site assessment, consider possible non-threatening activity that could trigger an alarm. Wind, rain, and animals are potential sources of nuisance alarms. Encroaching vegetation may dampen or increase the vibrations on the gate due to heavy wind. Heavily trafficked areas can increase the Nuisance Alarm Rate (NAR) if sensor cable is near these areas and is not properly protected. Some gate type are more prone to vibrations, such as sliding gates, and are susceptible to causing nuisance alarms during normal operation.

In general, the gate should be constructed properly and in good repair. A poorly constructed gate may be subject to excessive nuisance alarms and will present an easier access point for intruders.

Deployment design

General rules

Gates vary in design and application, so some general rules to consider are the following:

- The most common method for cable to bypass a gate is to bury or route it through conduit above the gate. These two methods protect the cable as well as reduce nuisance alarm potential.
- If any fiber needs to be buried, it should be in conduit and must be buried at a minimum depth of 18 inches. In cold climates, where the ground freezes and thaws, the conduit should be buried below the “frost line.”
- Pinch points and excessive slack can create problems when the gate is in motion. On swing gates that open away from the protected zone, it is best to restrict the gate leaf to a maximum opening of 90 degrees. This keeps the slack minimal to reduce nuisance alarm potential.
- Wire ties should be applied at least every 12 inches. This helps keep tension in the cable or conduit which reduces slack. Less slack helps to reduce nuisance alarms.
- The only exception to wire tie placement is on swinging gates where the fiber crosses from fixed fence to gate leaf, at which the fiber should be secured to the nearest mesh diamond so that the gate can swing open without applying excessive strain on the cable.
- Trunk cable designs may vary and are not used on all systems.
- Fiber SenSys® Fiber Defender® systems are not designed to detect gates being opened, therefore, if this is of concern to the sites security, the best course of action is to utilize an alternative sensor such as the Microwave Defender™, IR beams, or magnetic contacts, as examples.
- On gates where excessive nuisance alarms occur due to normal operation, such as a sliding gate being used to let authorized traffic in, the system can be shunted. Shunting is a process by which the system temporarily ceases all alarm communications from an APU by utilizing an authorization pass. This can increase efficiency of the system where protection is desired.
- The following figures are meant to be an example of common types of cable runs. None of them are all inclusive.
- If there are any further questions, please contact Fiber SenSys® technical support.

Design examples:

Zone continuation

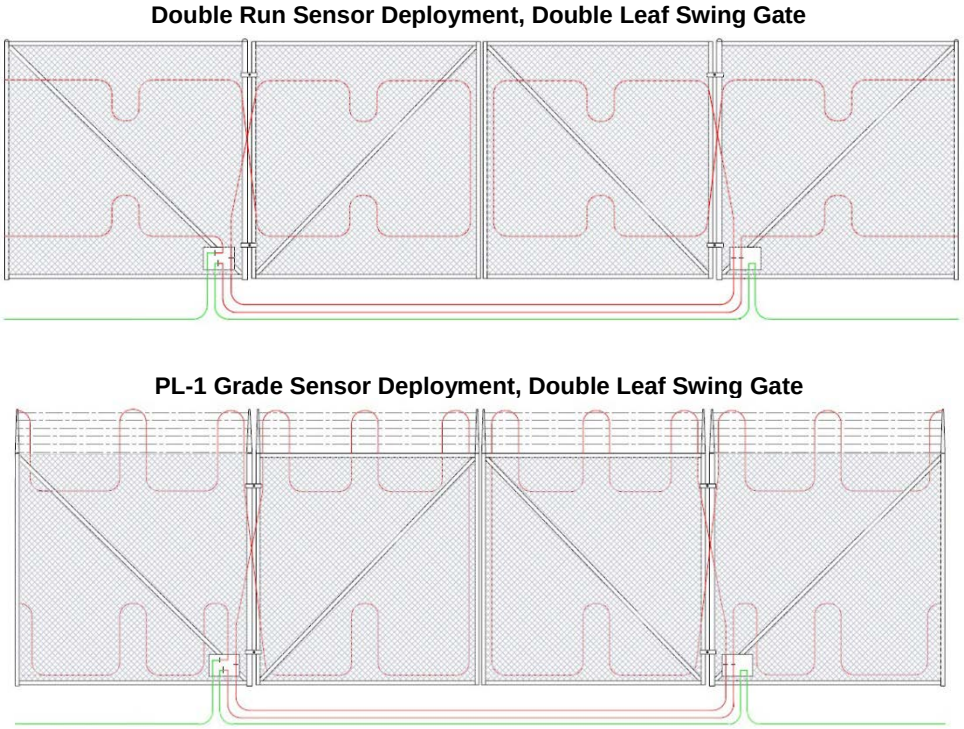


Figure 1. Double run sensor deployment on a double leaf swing gate showing a continuation of the zone across the gate. The upper diagram shows double run sensor deployment whereas the bottom diagram shows PL-1 sensor deployment. Green lines show trunk cable, red is the sensing fiber. Note that both the trunk and the sensing cable are buried underground.

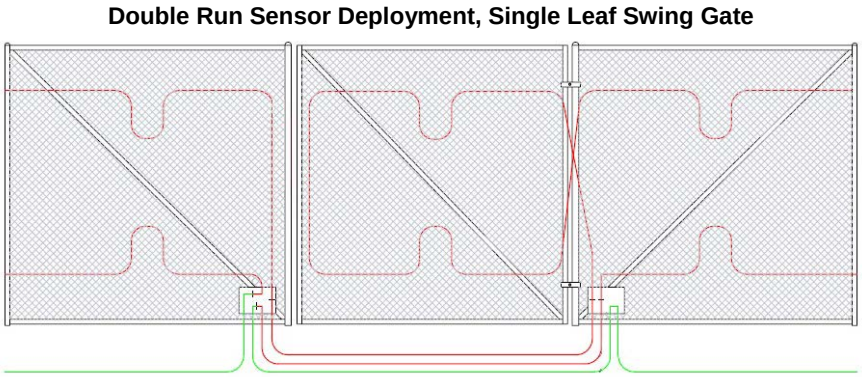


Figure 2. Double run sensor deployment on a single leaf swing gate showing a continuation of the zone across the gate.

Figure 1 and 2 display a zone continued across a gate for double run or PL-1 sensor deployments. This works for any system but especially well for those that have low zone capacities. In this type of setup, the APU considers both fence and gate to be one zone and therefore must be calibrated as such.

Zone isolation

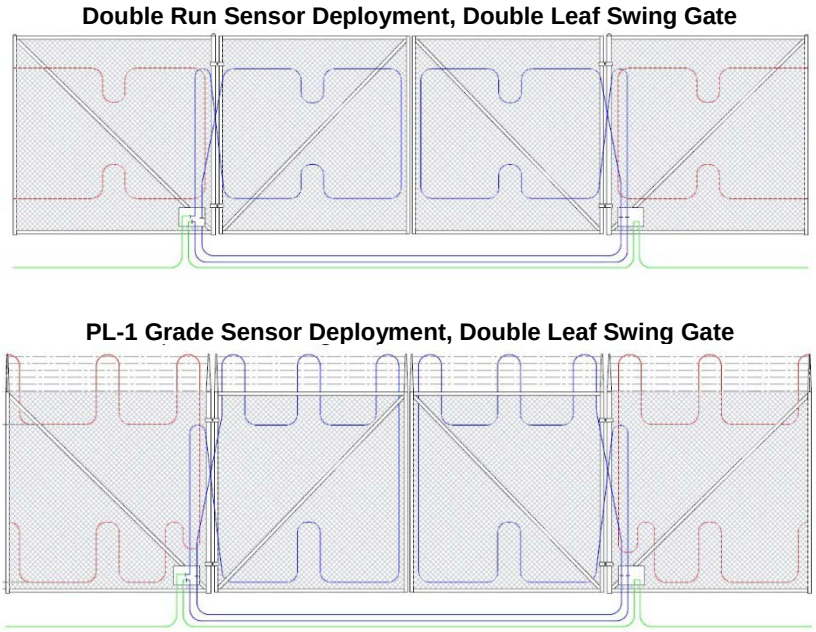


Figure 3. Typical double run sensor deployment on a double leaf swing gate showing an isolated zone. The upper diagram is of double run sensor deployment and the lower diagram is of a PL-1 sensor deployment. Green is trunk cable. Red shows separate zone sensing fibers. Blue is gate specific sensing fiber.

Figure 3 displays a zone isolated by itself to cover the gate in both double run and PL-1 sensor deployments. This setup works with any system but especially well with high zone capabilities. In this type of setup, the gate is sectioned off from the fence utilizing its own zone. This helps optimize the system allowing for higher probability of detection (PD) and lower nuisance alarm rate (NAR).

Zone split

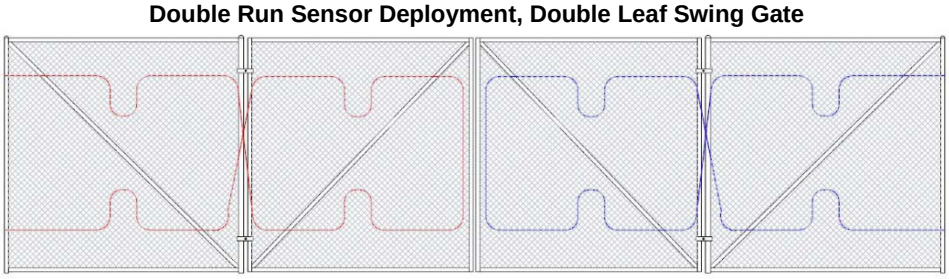


Figure 4. Typical double run sensor deployment on a double leaf swing gate with the zones ending at the center of the gate. Cable on the left is one zone while cable on the right is a second zone.

Figure 4 displays the method of ending the zones at the ends of the gate leaves (for dual-leaf gates) or the end of the gate (for single-leaf gates). Unlike the prior techniques this method requires no trenching or burying cables and can allow for alternative routing on systems requiring trunk cable; it keeps each leaf on two separate zones.

Speed-E-Chain for sliding gates

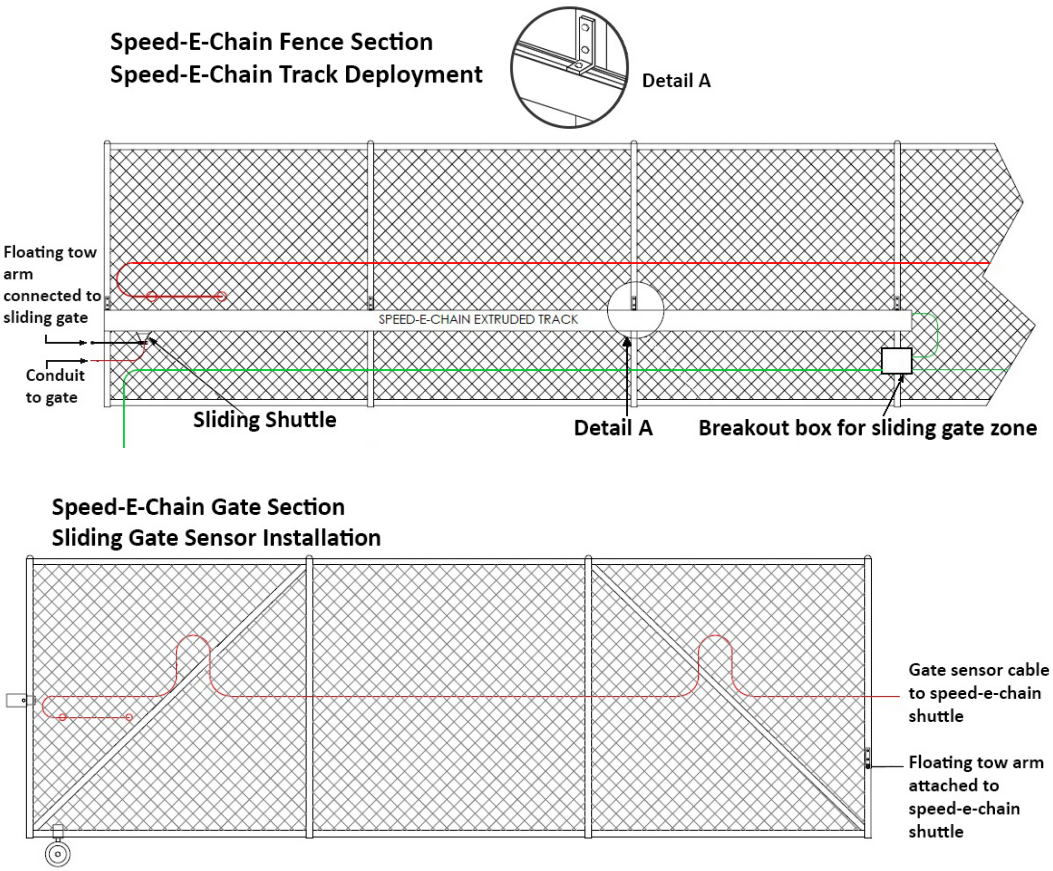
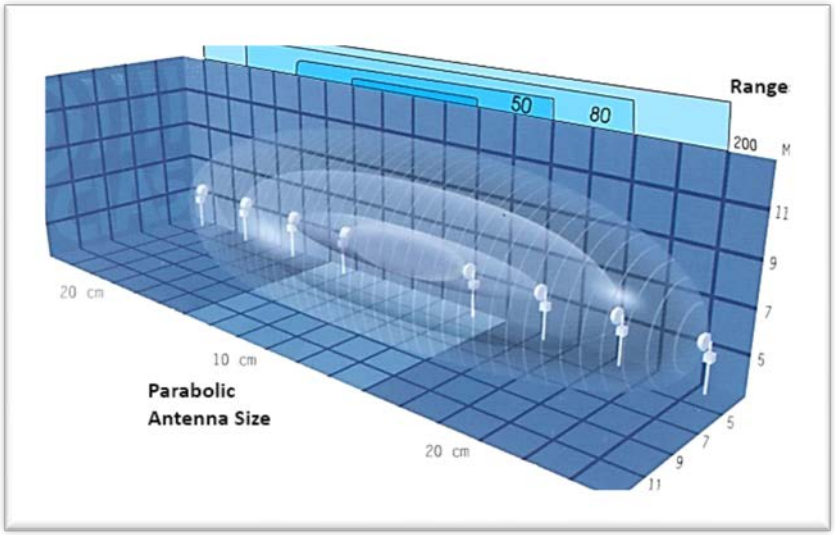


Figure 5. Single run sliding gate application of Speed-E-Chain. The top diagram shows the fixed fence where the hardware is mounted. The bottom diagram shows the cable run across the actual gate. Green shows trunk cable. Red shows sensing fiber.

Figure 5 displays the application of Speed-E-Chain which is a system designed to accommodate sliding gates. The device is mounted on the fixed fence and utilizes links to manage cable movement as the sliding gate opens and closes. The typical design of sliding gates may induce vibrations which can cause nuisance alarms. To help combat this, it is recommended to separate the gate into its own zone and utilize insensitive lead-in cable inside the housing of the Speed-E-Chain device and sensing fiber on the rest of the gate.

Microwave Defender™ for volumetric zone detection



Microwave Defender™ System Deployment, Double Leaf Swing Gate

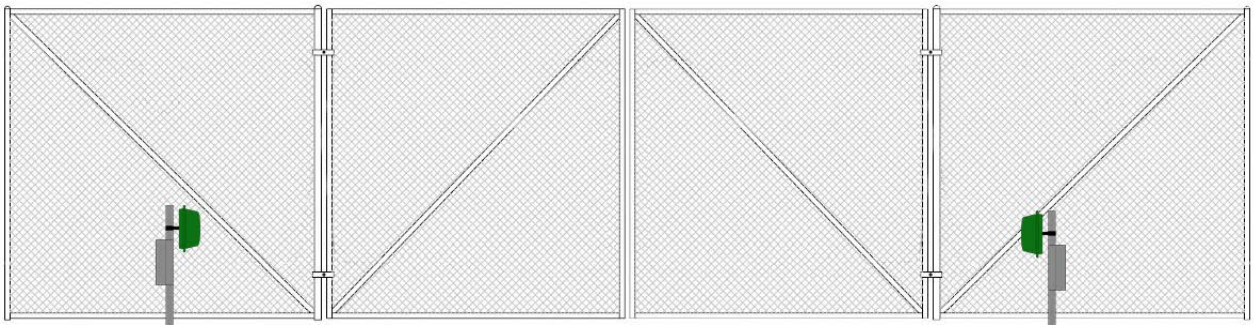


Figure 6. Microwave Defender™™ system. The top diagram shows the transmitter and receiver with all ranges that are available as well as the antenna size. The bottom diagram shows deployment of the microwave system on a dual-leaf gate.

Figure 6 displays the application of the Microwave Defender™ at different ranges. The benefit of this system is that it can be used on any type of gate, it has no pinch points to watch for in the sensing area, and it uses a volumetric system of detection. The Microwave Defender™ system utilizes a transmitter and a receiver, that together create a field of detection. If an animal, individual, or vehicle cross into this field, the system will alarm. For more information, please see Microwave Perimeter Security Application Note (AN-SM-011).

Turnstiles

Figure 7. Turnstile personnel gate. The fiber runs up and over the gate and the gate is isolated from the fence system so that the vibrations do not cause unnecessary nuisance alarms from use.

Figure 7 displays a turnstile application. Turnstiles provide a lot of complexity and the fiber system is not optimal for securing them as they cause excessive amounts of vibrations from general use. When installing a fiber system near a turnstile it is best to ensure that the turnstile has no direct contact with the fence or the detection system. The fiber needs to be buried underneath or, as pictured above, routed over top.

For more information, please contact us at:
info@fibersensys.com
Tel: +1(503) 692-4430
Toll free (US) +1(800) 641-8150
www.fibersensys.com