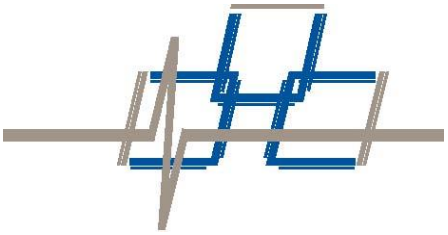
Fiber SenSys
PERIMETER SECURITY

Using the FD322 as a Cable Break Sensor

Application Note



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The Fiber Defender® product line offers a diverse range of solutions for a wide scope of security applications. Our products are trusted to protect military, nuclear, industrial, commercial, and residential applications. The FD322 combines Fiber SenSys' legacy of high-security and high-reliability with simple configuration requirements at a very competitive price.

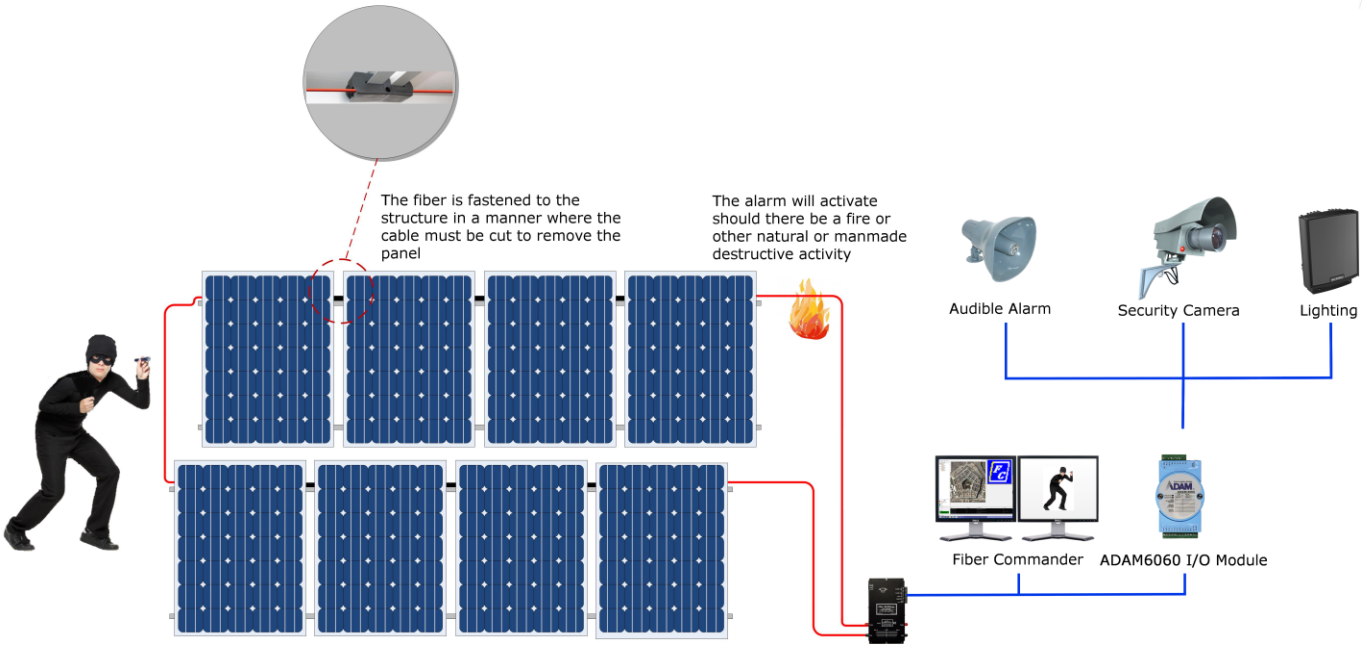
Typically applications with Fiber SenSys perimeter security products involve detection of intruders that are trying to climb, cut, or crawl through the fence. In these applications, a fiber-optic cable is attached to the fence, and an alarm processing unit (APU) is connected to the fiber. The APU launches laser light into the fiber, and by measuring the transmitted and reflected light, the APU can tell when the fiber is disturbed by an intruder trying to breach the fence.

In some applications, the APU is tuned to detect when the optical fiber is broken. These applications arise when the environment has lots of vibration and noise, and valuable hardware cannot be accessed without breaking the fiber. An example of this is the security of medical devices (see Figure 1). Multi-mode optical cable such as SC-4 is recommended for cable break detection applications.

Figure 1
Medical equipment utilizing radioactive material may be secured within its area using a cable break detector.

Another possible application for the FD322 as a cable break detector is to protect solar panels at a solar farm. Deploying the break detection design involves weaving the fiber loop through the solar panels. The cable is looped through the panels in a manner that the cable cannot be removed without being cut. In this type of application, the APU can be tuned so that it will not alarm when the optical fiber is shaken but will alarm when the fiber is broken.

Figure 2



To configure the FD322 to detect breaks only, first verify that the maximum loss in the fiber is less than 5dB.[1]

The FD322 APU has a built-in loss calculator that functions as part of the unit's calibration process. Using the FD322's custom **Tuning Software** to check the loss using the APU, execute the "CALIB" command within the software's "Terminal Mode" as follows:

1. Enter Terminal mode and type "CALIB" in all caps, then [Enter]
2. Type "ML" and [Enter]
3. Verify that you are prepared to calibrate the processor
4. Shake the fiber for ten seconds and press the test button located under the LEDs on the corresponding channel of the unit
5. View and record the measured loss value and ensure it is below 5dB

A more detailed description of the calibration process can be found on the *FD322 Field Calibration Video*. Please visit http://www.fibersensys.com/products/product-videos. Note: Product and training videos are available to registered users. Register at http://fibersensys.com/login-or-register.

1. Typically installations <5km have less than 5dB loss.

If the optical loss is less than 5dB, connect the two ends of the optical cable to the APU and use the tuning software to disable both processors. When configured in this manner, the APU will not alarm when the fiber is shaken. The alarm relay will change states if the fiber is broken, cut, or unplugged. If the IP port is being used, the processor will output a fault indicator via XML messaging when the cable is disconnected or cut. Figure 3 below displays a screenshot from the FD322 Tuning Software reflecting the proper parameters for cable break detector applications; observe that all the detection related settings are disabled.

Figure 3

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FD322		
APU Info		
Serial #		
Manufactured Date		
FirmWare #		
Climb		**Default**
Enabled? (Yes or No)	No	Yes
Climb Sensitivity (0 to 50)	24	24
Event Count (1 to 10)	3	3
Lowest Frequency (10 to 600 Hz)	200	200
Cut		**Default**
Enabled? (Yes or No)	No	Yes
Cut Sensitivity (0 to 50)	24	24
Event Count (1 to 10)	5	5
Lowest Frequency (10 to 600 Hz)	300	300
Wind		**Default**
Enable Wind Rejection Software?	No	Yes
Wind Rejection (20 to 80)	50	50
Misc		**Default**
Enable Tamper Switch?	No	No
Alarm Relay Time (1 to 10 sec)	1	1

The cut and climb settings are disabled, so movement of the cable does not cause an alarm; only cuts, breaks, or unplugging the connector will cause an alarm with these settings.

The cable break detector can be implemented utilizing one or both of the APU channels. If only one channel is used, the other channel is typically “jumpered-out,” which means that a short single-mode or multi-mode jumper would be used to close the loop of the unused channel; that way, either the *Fault* indicator or the *Alarm* indicator can be used with the functioning channel. Both channels share a common *Fault* relay so if one of the two channels was not connected, the *Fault* relay would permanently be in a fault state, and a red light would signal a fault on the unused channel. The primary purpose of “jumpering-out” the unused channel is to satisfy the unused channel and prevent the red LED from illuminating.

Figure 4

Connect one end of the cable being used to detect breaks to the output port on FD322; connect the other end to the input port (on the same side).

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