

These fiber optic safety switches are intended to be used with PICO-GUARD series controllers in personnel safety and equipment-protection applications.



Refer to PICO-GUARD Controller Manual (p/n 69761) and PICO-GUARD Application and Design Guide (p/n 69763) for complete installation and operation information.



Warning ... Avoid Misapplication of this Product

PICO-GUARD optical elements must be properly installed and interfaced with a PICO-GUARD Fiber Optic Controller to be considered a safeguard.

See the PICO-GUARD Controller Instruction Manual (p/n 69761) and the PICO-GUARD Application and Design Guide (p/n 69763) for complete installation instructions, maintenance instructions, and application limitations.

Use of a Banner PICO-GUARD Fiber Optic Safety Interlock Switch is generally not allowed for:

- Establishing a beam for presence-sensing safeguarding (e.g., perimeter guarding),
- Linear (parallel) movement along the optical axis (see Figure 2 and the Application and Design Guide), or
- Machinery with long stopping time and without a guard-locking mechanism.

Follow all installation and maintenance instructions with extreme care. **The user is responsible for following all local, state, and national laws, rules, codes, and regulations relating to the use of this safeguarding system in any particular application.**

Features and Description

- Compact, non-contact, easy-to-install means of interlocking doors, guards, gates, and covers
- In-line lens housing
- Uses Banner 2.2 mm OD plastic fiber optic cable (1 mm core)
- Designed to meet Safety Category 4 applications with one switch pair per guard (per ISO13849-1)
- Impact- and chemically-resistant stainless steel and glass construction with PTFE-coated fiber
- Environmental rating of IEC IP67
- Attenuator available (see p/n 109910) for reducing excess gain in short-run applications
- Splice available for easy connection of two fiber sections (see p/n 109910)

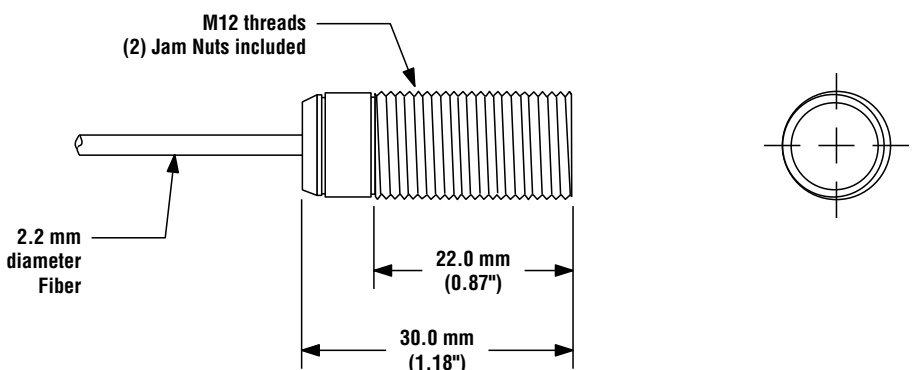
Models

Model	Fiber Length
SFI-M12SS06UXT	1.8 m (6')
SFI-M12SS15UXT	4.5 m (15')
SFI-M12SS30UXT	9.0 m (30')

Specifications

Operating Distance	1-50 mm (0.04" - 2") max.
Switching Distance	See Figure 3.
Mounting	2 M12 x 1.25 nuts (provided)
Construction	316 Stainless steel housing, glass window, PTFE sheathed plastic fiber.
Temperature Range	0° to +70° C (+32° to 158°F)
Max. Relative Humidity	95% (non-condensing)
Environmental Rating	IEC IP67

Dimensions



Mounting and Fiber Connection

The path of travel, or movement, of the Fiber Optic Safety Interlock Switch **must always be perpendicular** (at a right angle) to the optical axis to ensure proper switching. Perpendicular displacement along the optical centerline greater than the switching distance will result in a beam break and a stop condition.

Any opening in a guard must comply with the minimum safe opening requirements to prevent exposure to a hazard. See OSHA O-10 Table listed in 29CFR1910.217 or the relevant standard for further information.

With the guard closed, the maximum allowed distance from lens face to lens face is 50 mm (2"). Ensure that there is a minimum 1 mm (0.04") separation between switches and do not use the switches as an end-of-travel or mechanical stop.

Do not exceed the minimum bend radius of 25 mm (1") for the fiber optic cable. The excess gain is dependent on switch pair alignment, fiber length, fiber bend radius, and other loss factors, which may result in a weak signal or beam break condition (e.g., increased transitional area, see Figure 1). See Bannerengineering.com for an on-line gain estimator or the Application and Design Guide for more information.

Switching Specifications

The switching distance (D) is a "±" value; it is dependent on the distance between the optical switches (X) and their alignment along the optical axis. Perpendicular displacement greater than "D" will result in a stop condition. **(See Application and Design Guide for complete information.)**

The excess gain may fall below the threshold level before the switching distance dependent on alignment, fiber length, and other loss factors, which will result in a weak signal or beam break condition before distance D. This region is referred to as the **Transition Area**.

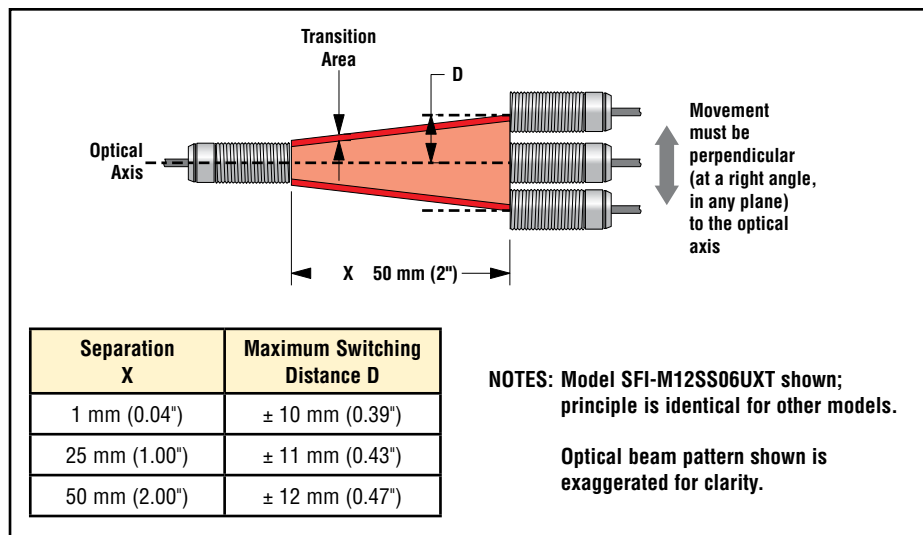



Figure 2. Switch alignment




Warning ... Explosive Environments

When used in a potentially explosive environment, and if there is a possibility of a significant static accumulation that could cause an electrical spark, **SFI series Fiber Optic Safety Interlock Switches must be mounted on an electrically grounded surface.**

Accessory Brackets

See Banner Safety Products catalog or website for dimensions.

SMB12MM	<ul style="list-style-type: none"> • 12-gauge, 303 stainless steel, right-angle mounting bracket for barrel-style sensors with 12 mm threads • Curved mounting slot allows the bracket ±10° of lateral movement • Mounting holes accommodate M4 (#8) hardware 	
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Switching Specifications

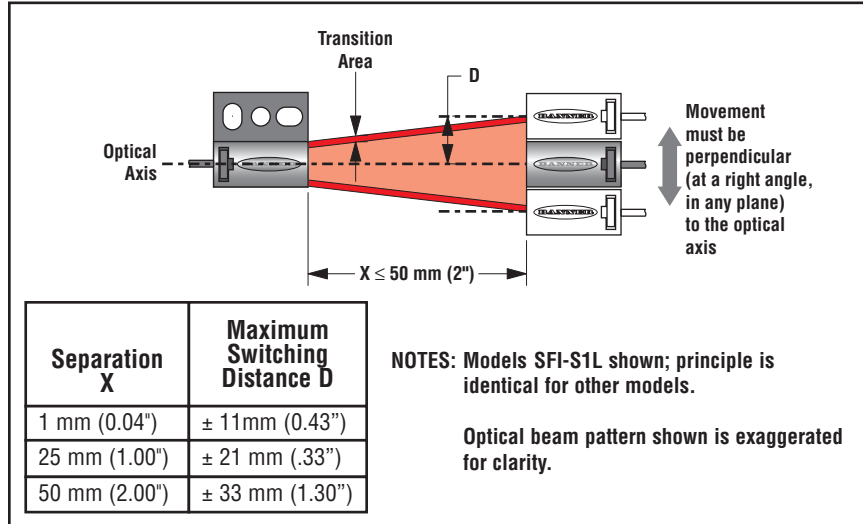


Figure 2. Switch alignment

The switching distance (D) is a “±” value; it is dependent on the distance between the optical switches (X) and their alignment along the optical axis. Perpendicular displacement greater than “D” will result in a stop condition. (See Application and Design Guide for complete information.)

The excess gain may fall below the threshold level before the switching distance dependent on alignment, fiber length, and other loss factors, which will result in a weak signal or beam break condition before distance D. This region is referred to as the **Transition Area**.



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Features and Description



- Compact, non-contact, easy-to-install means of interlocking doors, guards, gates, and covers
- Right-angle lens housing
- Simple, quick means of connecting and disconnecting the fiber
- For use with Banner 2.2 mm OD plastic fiber optic cable (1 mm core)
- Designed to meet Safety Category 4 applications with one switch pair per guard (per ISO13849-1)
- Impact-resistant polycarbonate plastic construction
- Environmental rating of IEC IP65 (NEMA 4, 13)
- Attenuator available (see p/n 109910) for reducing excess gain in short-run applications
- Splice available for easy connection of two fiber sections (see p/n 109910)

Refer to PICO-GUARD Controller Manual (p/n 69761) and PICO-GUARD Application and Design Guide (p/n 69763) for complete installation and operation information.



Important ... Read this Section!

Information for use is found within each PICO-GUARD Fiber Optic Safety Interlock Switch data sheet, the Controller installation manual, and the Application and Design Guide. Please direct questions regarding the use or installation of this system to the factory applications department at the telephone numbers or address on page 4.



Caution ... Appropriate Applications

- In addition to the limitations listed in the documents mentioned above (page 2), **use of Banner PICO-GUARD Fiber Optic Safety Interlock Switches is generally not allowed for:**
- Individual beam(s) in an optical grid for presence-sensing safeguarding (e.g., perimeter guarding).
 - Linear (parallel) movement along the optical axis (see the Application and Design Guide).
 - Machinery with long stopping time, without guard-locking mechanism.



WARNING . . . Fiber Optic Safety Interlock Switches, by themselves, are not a stand-alone guarding device.

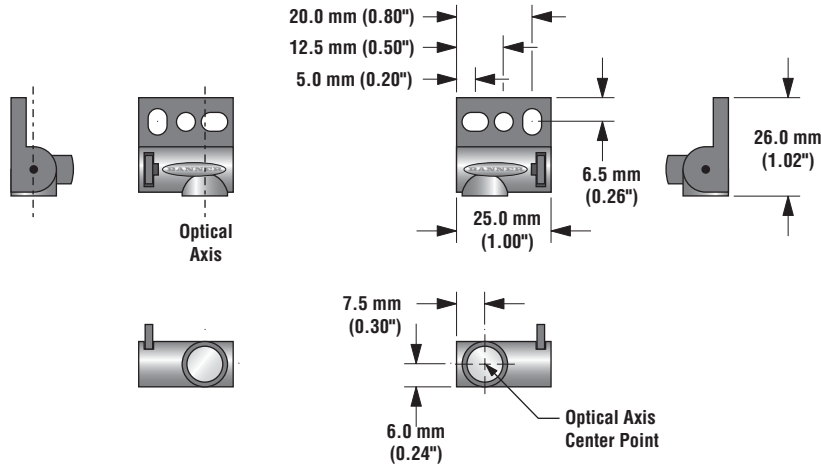
They must be appropriately installed and interfaced with a PICO-GUARD Fiber Optic Safety System controller to be an effective safeguard. See the PICO-GUARD Controller Installation Manual, and the PICO-GUARD Application and Design Guide for **complete installation instructions**. Extreme care is urged to ensure that all installation and maintenance instructions contained in all manuals are followed. **The user is responsible for ensuring that all local, state, and national laws, rules, codes, and regulations relating to the use of this safeguarding system in any particular application are satisfied.**

Specifications

Operating Distance	1-50 mm (0.04" - 2") max.
Switching Distance	See Figure 3
Mounting	Holes for M4 (#10) screw (not included)
Construction	Polycarbonate plastic housing and window; acrylic lens
Temperature range	0° to +70°C (+32° to 158°F)
Max. relative humidity	95% (non-condensing)
Environmental Rating	IEC IP65, NEMA 4, 13

SFI-R1L

SFI-R1R



Mounting and Fiber Connection

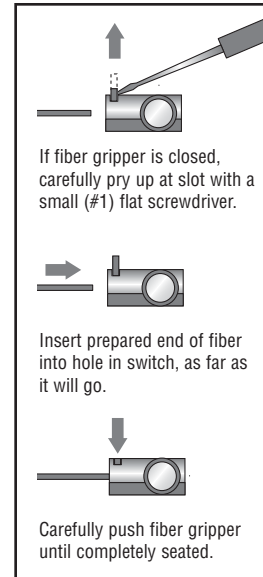


Figure 1. Fiber connections

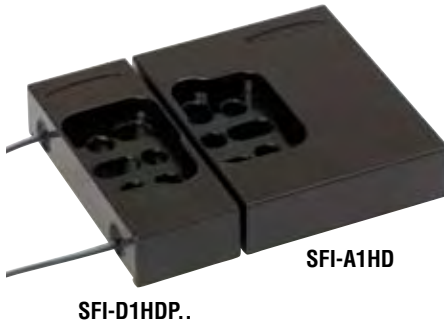
The path of travel, or movement, of the Fiber Optic Safety Interlock Switch **must always be perpendicular** (at a right angle) to the optical axis to ensure proper switching. Perpendicular displacement along the optical centerline greater than the switching distance will result in a beam break and a stop condition.

Any opening in a guard must comply with the minimum safe opening requirements to prevent exposure to a hazard. See OSHA O-10 Table listed in 29CFR1910.217 or the relevant standard for further information.

The use of tamper-resistant fasteners, such as one-way screws, is recommended. Insert the fasteners, but before tightening, verify alignment between the two switch housings using a straightedge or the alignment guide (SFA-IAG) shipped with the PICO-GUARD controller. Do not over-tighten or mount the fiber switch on an uneven surface such that the switch is deformed or bows, affecting the optical performance.

With the guard closed, the maximum allowed distance from lens face to lens face is 50 mm (2"). Ensure that there is a minimum 1 mm (0.04") separation between switches and do not use the switches as an end-of-travel or mechanical stop.

Do not exceed the minimum bend radius for the fiber optic cable to be used. The excess gain is dependent on switch pair alignment, fiber length, fiber bend radius, and other loss factors, which may result in a weak signal or beam break condition (e.g., increased transitional area, see Figure 2). See Bannerengineering.com for an on-line gain estimator or the Application and Design Guide for more information.



These fiber optic safety switches are intended to be used with PICO-GUARD series controllers in personnel safety and equipment-protection applications.

Features

- Compact, non-contact, easy-to-install means of interlocking doors, guards, gates, and covers
- Uses Banner 2.2 mm OD plastic fiber optic cable (1 mm core); choose PE or PTFE-coated fiber models
- Designed to meet Safety Category 4 applications with one switch pair per guard (per ISO13849-1)
- Impact- and chemically-resistant zinc and glass construction
- Environmental rating of IEC IP67
- Attenuator available (see p/n 109910) for reducing excess gain in short-run applications
- Splice available for easy connection of two fiber sections (see p/n 109910)

Fiber Guide model SFA-FGD1HD available for routing fibers (refer to p/n 123560).

Refer to PICO-GUARD Controller Manual (p/n 69761) and PICO-GUARD Application and Design Guide (p/n 69763) for complete installation and operation information.

Models

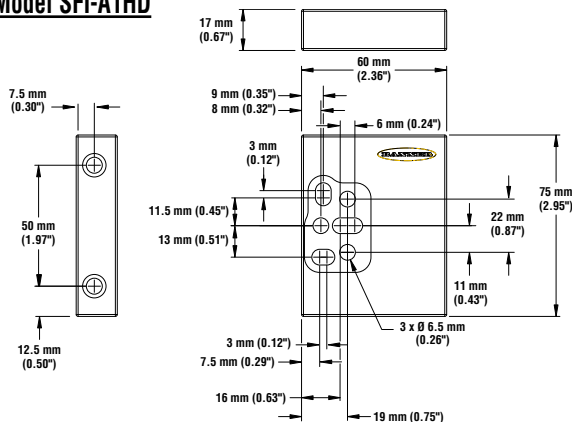
Model		Fiber Length
PE Fiber	PTFE-Coated Fiber	
SFI-D1HDPS6	SFI-D1HDPXT6	1.8 m (6')
SFI-D1HDPS15	SFI-D1HDPXT15	4.5 m (15')
SFI-D1HDPS30	SFI-D1HDPXT30	9.0 m (30')
SFI-D1HDPS50	SFI-D1HDPXT50	15.3 m (50')
SFI-A1HD		-

Specifications

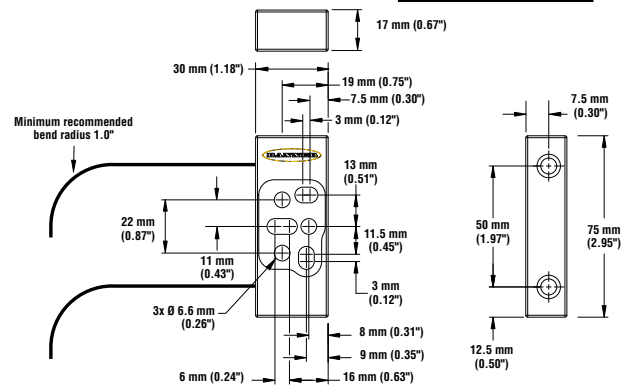
Operating Distance	1-50 mm (0.04" - 2") max.
Switching Distance	See Figure 1.
Mounting	Holes for M6 screws (mounting hardware not included)
Construction	Cast zinc housing, glass window, PTFE-sheathed or PE plastic fiber
Temperature Range	0° to +70° C (+32° to 158°F)
Max. Relative Humidity	95% (non-condensing)
Environmental Rating	IEC IP67

Dimensions

Model SFI-A1HD



SFI-D1HDP.. Models



PICO-GUARD™ Fiber Optic Safety Interlock Switches – Zinc Housing

Models SFI-A1HD and SFI-D1HDP.

Mounting and Fiber Connection

The path of travel, or movement, of the Fiber Optic Safety Interlock Switch **must always be perpendicular** (at a right angle) to the optical axis to ensure proper switching. Perpendicular displacement along the optical centerline greater than the switching distance will result in a beam break and a stop condition.

Any opening in a guard must comply with the minimum safe opening requirements to prevent exposure to a hazard. See OSHA O-10 Table listed in 29CFR1910.217 or the relevant standard for further information.

With the guard closed, the maximum allowed distance from lens face to lens face is 50 mm (2"). Ensure that there is a minimum 1 mm (0.04") separation between switches and do not use the switches as an end-of-travel or mechanical stop.

Do not exceed the minimum bend radius of 25 mm (1") for the fiber optic cable. The excess gain is dependent on switch pair alignment, fiber length, fiber bend radius, and other loss factors, which may result in a weak signal or beam break condition (e.g., increased transitional area, see Figure 1). See Bannerengineering.com for an on-line gain estimator or the Application and Design Guide for more information.

Switching Specifications

The switching distance (D) is a "±" value; it is dependent on the distance between the optical switches (X) and their alignment along the optical axis. Perpendicular displacement greater than "D" will result in a stop condition. **(See Application and Design Guide for complete information.)**

The excess gain may fall below the threshold level before the switching distance dependent on alignment, fiber length, and other loss factors, which will result in a weak signal or beam break condition before distance D. This region is referred to as the **Transition Area**.

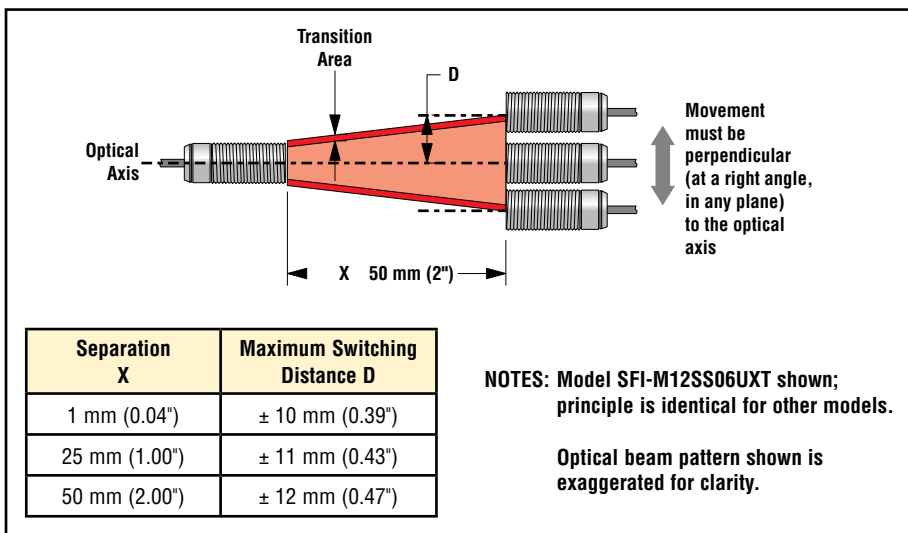


Figure 1. Switch alignment



Warning ... Avoid Misapplication of this Product

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Use of a Banner PICO-GUARD Fiber Optic Safety Interlock Switch is generally not allowed for:

- Establishing a beam for presence-sensing safeguarding (e.g., perimeter guarding),
- Linear (parallel) movement along the optical axis (see Figure 2 and the Application and Design Guide), or
- Machinery with long stopping time and without a guard-locking mechanism.

Follow all installation and maintenance instructions with extreme care. **The user is responsible for following all local, state, and national laws, rules, codes, and regulations relating to the use of this safeguarding system in any particular application.**



Warning ... Explosive Environments

When used in a potentially explosive environment, and if there is a possibility of a significant static accumulation that could cause an electrical spark, **SFI series Fiber Optic Safety Interlock Switches must be mounted on an electrically grounded surface.**



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PICO-GUARD™ Fiber Optic Safety Interlock Switches

Models SFI-A1ED and SFI-D1EDPXT.. with Extreme-Duty Stainless Steel Housing

These fiber optic safety switches are intended to be used with PICO-GUARD series controllers in personnel safety and equipment-protection applications.



Refer to PICO-GUARD Controller Manual (p/n 69761) and PICO-GUARD Application and Design Guide (p/n 69763) for complete installation and operation information.



Warning ... Avoid Misapplication of this Product

PICO-GUARD optical elements must be properly installed and interfaced with a PICO-GUARD Fiber Optic Controller to be considered a safeguard. See the PICO-GUARD Controller Instruction Manual (p/n 69761) and the PICO-GUARD Application and Design Guide (p/n 69763) for complete installation instructions, maintenance instructions, and application limitations.

Use of a Banner PICO-GUARD Fiber Optic Safety Interlock Switch is generally not allowed for:

- Establishing a beam for presence-sensing safeguarding (e.g., perimeter guarding),
- Linear (parallel) movement along the optical axis (see Figure 2 and the Application and Design Guide), or
- Machinery with long stopping time and without a guard-locking mechanism.

Follow all installation and maintenance instructions with extreme care. **The user is responsible for following all local, state, and national laws, rules, codes, and regulations relating to the use of this safeguarding system in any particular application.**

Features and Description

- Compact, non-contact, easy-to-install means of interlocking doors, guards, gates, and covers
- Uses Banner 2.2 mm OD plastic fiber optic cable (1 mm core)
- Designed to meet Safety Category 4 applications with one switch pair per guard (per ISO13849-1)
- Impact- and chemically-resistant stainless steel and glass construction with PTFE-coated fiber
- Environmental rating of IEC IP67
- Attenuator available (see p/n 109910) for reducing excess gain in short-run applications
- Splice available for easy connection of two fiber sections (see p/n 109910)

Models

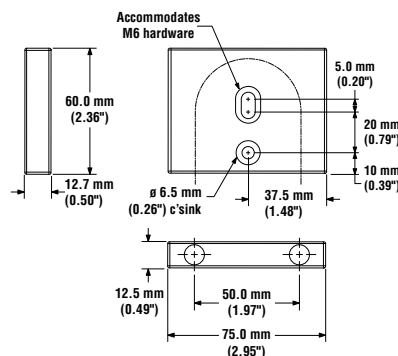
Model	Fiber Length
SFI-D1EDPXT6	1.8 m (6')
SFI-D1EDPXT15	4.5 m (15')
SFI-D1EDPXT30	9.0 m (30')
SFI-D1EDPXT50	15.3 m (50')
SFI-A1ED	-

Specifications

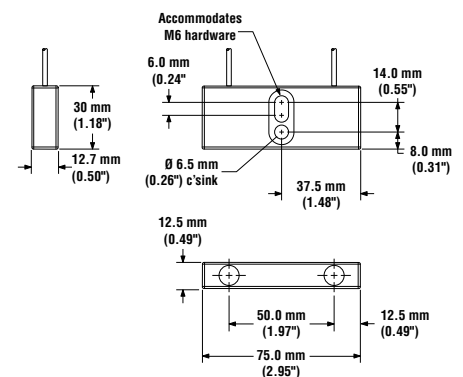
Operating Distance	1-50 mm (0.04" - 2") max.
Switching Distance	See Figure 1.
Mounting	Holes for M6 screws (mounting hardware not included)
Construction	316 Stainless steel housing, glass window, PTFE sheathed plastic fiber
Temperature Range	0° to +70° C (+32° to 158°F)
Max. Relative Humidity	95% (non-condensing)
Environmental Rating	IEC IP67

Dimensions

Model SFI-A1ED



SFI-D1EDPXT.. Models



PICO-GUARD™ Fiber Optic Safety Interlock Switches – Stainless Steel Housing

Models SFI-A1ED and SFI-D1EDPXT..

Mounting and Fiber Connection

The path of travel, or movement, of the Fiber Optic Safety Interlock Switch **must always be perpendicular** (at a right angle) to the optical axis to ensure proper switching. Perpendicular displacement along the optical centerline greater than the switching distance will result in a beam break and a stop condition.

Any opening in a guard must comply with the minimum safe opening requirements to prevent exposure to a hazard. See OSHA O-10 Table listed in 29CFR1910.217 or the relevant standard for further information.

With the guard closed, the maximum allowed distance from lens face to lens face is 50 mm (2"). Ensure that there is a minimum 1 mm (0.04") separation between switches and do not use the switches as an end-of-travel or mechanical stop.

Do not exceed the minimum bend radius of 25 mm (1") for the fiber optic cable. The excess gain is dependent on switch pair alignment, fiber length, fiber bend radius, and other loss factors, which may result in a weak signal or beam break condition (e.g., increased transitional area, see Figure 1). See Bannerengineering.com for an on-line gain estimator or the Application and Design Guide for more information.



Warning ... Explosive Environments

When used in a potentially explosive environment, and if there is a possibility of a significant static accumulation that could cause an electrical spark, **SFI series Fiber Optic Safety Interlock Switches must be mounted on an electrically grounded surface.**

Switching Specifications

The switching distance (D) is a "±" value; it is dependent on the distance between the optical switches (X) and their alignment along the optical axis. Perpendicular displacement greater than "D" will result in a stop condition. **(See Application and Design Guide for complete information.)**

The excess gain may fall below the threshold level before the switching distance dependent on alignment, fiber length, and other loss factors, which will result in a weak signal or beam break condition before distance D. This region is referred to as the **Transition Area**.

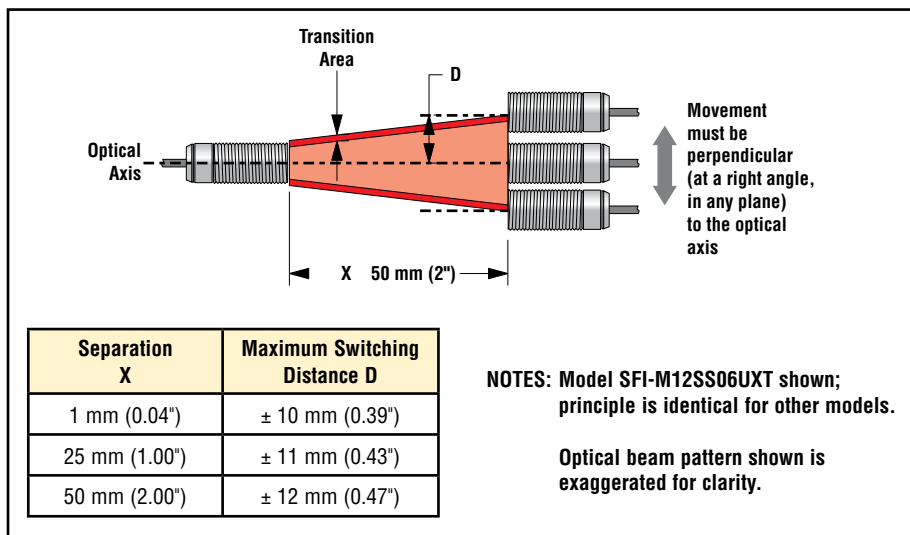


Figure 1. Switch alignment



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PICO-GUARD Fiber Optic Safety Interlock Switches

Models SFI-S1R and SFI-S1L

These fiber optic safety switches are intended to be used with PICO-GUARD series controllers in personnel-safety and equipment-protection applications.



Features and Description

- Compact, non-contact, easy-to-install means of interlocking doors, guards, gates, and covers
- In-line lens housing
- Simple, quick means of connecting and disconnecting the fiber
- For use with Banner 2.2 mm OD plastic fiber optic cable (1 mm core)
- Designed to meet Safety Category 4 applications with one switch pair per guard (per ISO13849-1)
- Impact-resistant polycarbonate plastic construction
- Environmental rating of IEC IP65 (NEMA 4, 13)
- Attenuator available (see p/n 109910) for reducing excess gain in short-run applications
- Splice available for easy connection of two fiber sections (see p/n 109910)

Refer to PICO-GUARD Controller Manual (p/n 69761) and PICO-GUARD Application and Design Guide (p/n 69763) for complete installation and operation information.



Important ... Read this Section!

Information for use is found within each PICO-GUARD Fiber Optic Safety Interlock Switch data sheet, the Controller installation manual, and the Application and Design Guide. Please direct questions regarding the use or installation of this system to the factory applications department at the telephone numbers or address on page 4.



Caution ... Appropriate Applications

In addition to the limitations listed in the documents mentioned above (page 2), **use of Banner PICO-GUARD Fiber Optic Safety Interlock Switches is generally not allowed for:**

- Individual beam(s) in an optical grid for presence-sensing safeguarding (e.g., perimeter guarding).
- Linear (parallel) movement along the optical axis (see the Application and Design Guide).
- Machinery with long stopping time, without guard-locking mechanism.



WARNING . . . Fiber Optic Safety Interlock Switches, by themselves, are not a stand-alone guarding device.

They must be appropriately installed and interfaced with a PICO-GUARD Fiber Optic Safety System controller to be an effective safeguard. See the PICO-GUARD Controller Installation Manual, and the PICO-GUARD Application and Design Guide for **complete installation instructions**. Extreme care is urged to ensure that all installation and maintenance instructions contained in all manuals are followed. **The user is responsible for ensuring that all local, state, and national laws, rules, codes, and regulations relating to the use of this safeguarding system in any particular application are satisfied.**

PICO-GUARD Fiber Optic Safety Interlock Switches

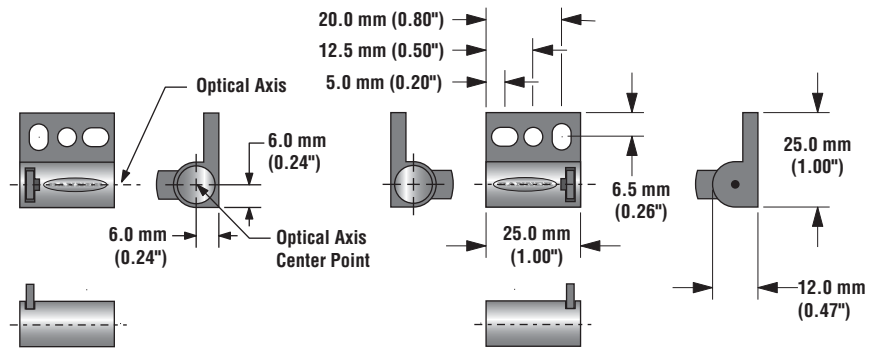
Models SFI-S1R and SFI-S1L

Specifications

Operating Distance	1-50 mm (0.04" - 2") max.
Switching Distance	See Figure 3
Mounting	Holes for M4 (#10) screw (not included)
Construction	Polycarbonate plastic housing and window; acrylic lens
Temperature range	0° to +70°C (+32° to 158°F)
Max. relative humidity	95% (non-condensing)
Environmental Rating	IEC IP65, NEMA 4, 13

SFI-S1L

SFI-S1R



Models SFI-S1R and SFI-S1L

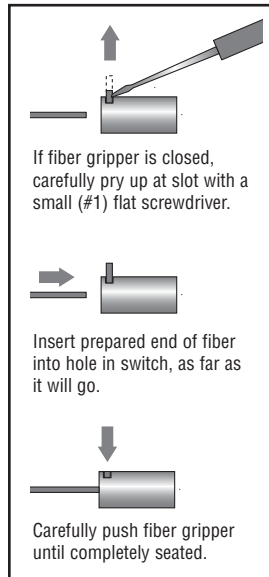


Figure 1. Fiber connections

Mounting and Fiber Connection

The path of travel, or movement, of the Fiber Optic Safety Interlock Switch **must always be perpendicular** (at a right angle) to the optical axis to ensure proper switching. Perpendicular displacement along the optical centerline greater than the switching distance will result in a beam break and a stop condition.

Any opening in a guard must comply with the minimum safe opening requirements to prevent exposure to a hazard. See OSHA O-10 Table listed in 29CFR1910.217 or the relevant standard for further information.

The use of tamper-resistant fasteners, such as one-way screws, is recommended. Insert the fasteners, but before tightening, verify alignment between the two switch housings using a straightedge or the alignment guide (SFA-IAG) shipped with the PICO-GUARD controller. Do not over-tighten or mount the fiber switch on an uneven surface such that the switch is deformed or bows, affecting the optical performance.

With the guard closed, the maximum allowed distance from lens face to lens face is 50 mm (2"). Ensure that there is a minimum 1 mm (0.04") separation between switches and do not use the switches as an end-of-travel or mechanical stop.

Do not exceed the minimum bend radius for the fiber optic cable to be used. The excess gain is dependent on switch pair alignment, fiber length, fiber bend radius, and other loss factors, which may result in a weak signal or beam break condition (e.g., increased transitional area, see Figure 2). See Bannerengineering.com for an on-line gain estimator or the Application and Design Guide for more information.

Switching Specifications

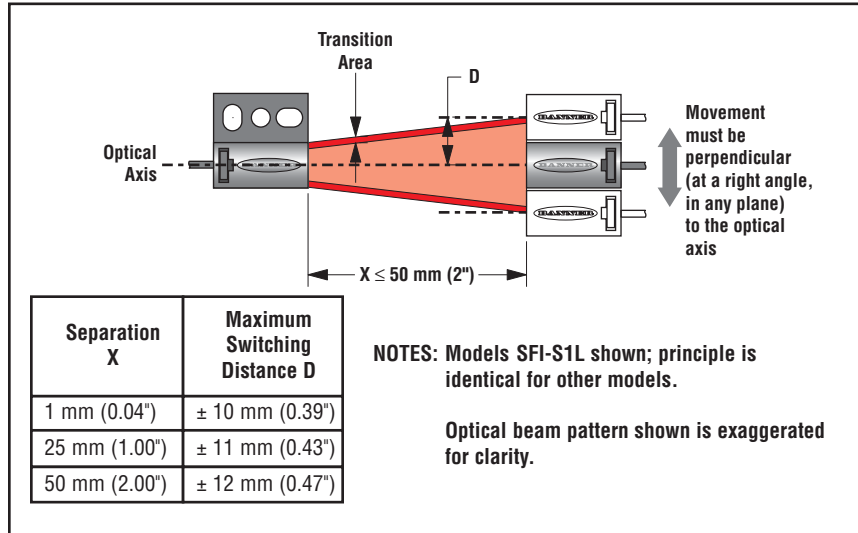


Figure 2. Switch alignment

The switching distance (D) is a “±” value; it is dependent on the distance between the optical switches (X) and their alignment along the optical axis. Perpendicular displacement greater than “D” will result in a stop condition. (See Application and Design Guide for complete information.)

The excess gain may fall below the threshold level before the switching distance dependent on alignment, fiber length, and other loss factors, which will result in a weak signal or beam break condition before distance D. This region is referred to as the **Transition Area**.



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