

## Plastic Fiber Optic Cables



## Glass Fiber Optic Cables



### 9.1 Plastic Fiber Optic Cables

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Unless otherwise noted, the products contained in this section should not be used for functional safety applications. These products were not designed or tested to IEC 60947-5-3 or recommended for functional safety.



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in Canada call 1-800-268-3578.  
For Application Assistance in the U.S. and Canada  
call 1-800-426-9184.

# Revision notes

## Volume 8—Sensing Solutions, CA08100010E

### Tab 9—Fiber Optic Cable

Revision date	Section	Change page(s)	Description
09/08/2017	All	All	Revision date changed to September 2017



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# 9.1

## Fiber Optic Cables

### Plastic Fiber Optic Cables

#### Plastic Fiber Optic Cables



### Plastic Fiber Optic Cables

#### Product Description

Plastic Fiber Optic Cables from Eaton's electrical sector offer a lower-cost alternative to glass fibers. They are available as bulk cable or pre-assembled with sensing tips.

**Bulk fiber optic cable** is ordered by the foot and can be cut to length by the user with a special cutter accessory. It can be used with lenses, adapters and terminations. Single fiber is normally used for thru-beam sensing and duplex fiber (two isolated cables running in parallel) for diffuse reflective. Order single fiber cable for both source and detector cable runs. Order duplex fiber cable equal to the length of run—separate source and detector cable not required.

**Pre-assembled fiber optic cables** are special purpose cables to solve a variety of fiber optic sensing applications. A fiber optic cable cutter is included only for 1 mm bundle models. The cables are available in 1 mm and 0.5 mm diameters (0.5 mm cables cannot be cut to length). Single cable is used for thru-beam sensing, duplex for diffuse reflective sensing.

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#### Features

- Fiber optic cables allow remote sensing in areas where space is restricted or tight viewing angles are required
- The economical plastic cable is easy to cut to length during installation for a perfect fit (see cutter accessory, 0.5 mm cable cannot be cut)
- Single cable styles are ideal for thru-beam sensing
- Duplex cable styles are typically used for diffuse reflective sensing
- Pre-assembled cables are available in 0.5 mm for sensing extremely small targets



#### DANGER

**THIS SENSOR IS NOT A SAFETY DEVICE AND IS NOT INTENDED TO BE USED AS A SAFETY DEVICE. This sensor is designed only to detect and read certain data in an electronic manner and perform no use apart from that, specifically no safety-related use. This sensor product does not include self-checking redundant circuitry, and the failure of this sensor product could cause either an energized or de-energized output condition, which could result in death, serious bodily injury, or property damage.**


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### Product Selection

#### Bulk Fiber Optic Cable


##### Bulk Fiber Optic Cable

	Fiber Diameter	Cable Style	Catalog Number <sup>①</sup>
	0.039 in (1 mm)	Duplex cable (for diffuse reflective sensing)	6324A-XXX
		Single cable (for thru-beam sensing)	6323A-XXX

Accessories, see Page V8-T9-4.

#### Pre-Assembled Fiber Optic Cables

##### Pre-Assembled Duplex Fiber Optic Cables (for Diffuse Reflective Sensing)





	Fiber Diameter	Catalog Number <sup>②</sup>
	<b>Large Diameter, Threaded Tip</b>	
	0.039 in (1.0 mm)	6324A-6501
	0.059 in (1.5 mm)	6324E-6501 <sup>③</sup>
	<b>Small Diameter, Threaded Tip</b>	
	0.020 in (0.5 mm)	6324A-6511
	<b>Large Diameter, Threaded Tip with Bendable Probe</b>	
	0.039 in (1.0 mm)	6324A-6502
	<b>Small Diameter, Threaded Tip with Bendable Probe</b>	
	0.020 in (0.5) mm	6324A-6512

Dimensions, see Page V8-T9-5.

##### Notes

- ① Quantity ordered indicates length, for example, a quantity of 5 equals five feet of fiber.
- ② One cable.
- ③ Larger diameter (1.5 mm) fibers provide approximately 50% longer sensing range than small diameter (1 mm).
- ④ Set of two.

##### Pre-Assembled Single Fiber Optic Cables (for Thru-Beam Sensing)

	Fiber Diameter	Catalog Number <sup>④</sup>
	<b>Large Diameter, Threaded Tip</b>	
	0.039 in (1.0 mm)	6323A-6501
	0.059 in (1.5 mm)	6323E-6501 <sup>③</sup>
	<b>Small Diameter, Threaded Tip</b>	
	0.020 in (0.5 mm)	6323A-6511
	<b>Large Diameter, Threaded Tip with Bendable Probe</b>	
	0.039 in (1.0 mm)	6323A-6502
	<b>Small Diameter, Threaded Tip with Bendable Probe</b>	
	0.020 in (0.5) mm	6323A-6512

Dimensions, see Page V8-T9-5.

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## Fiber Optic Cables

### Plastic Fiber Optic Cables

#### Accessories

##### Cable Accessories

##### Bulk Fiber Optic Cable Accessories

Description	Range Increase	Catalog Number
<b>Fiber Optic Cable Cutter</b>		
For 1 mm diameter fiber, good for six cuts	—	8909A-6501
<b>Fiber Optic Termination</b>		
For mounting of 1 mm diameter bulk fiber. Sensing distance is the same as for bare fibers without lenses	—	6230A-6503



Dimensions, see Page V8-T9-6.

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#### Lenses

For 1 mm diameter bulk cable only. Lenses extend the range of thru-beam sensors. Sold individually—two required for thru-beam sensing.

##### Lenses

Description	Range Increase	Catalog Number
<b>Thru-Beam Lenses</b>		
<b>0.25 In Diameter Thru-Beam Lens</b>	10X	6230A-6505
0.25 in diameter thru-beam lens		
<b>0.5 In Diameter Thru-Beam Lens</b>	100X	6230A-6509
0.5 in diameter thru-beam lens		
<b>1.0 In Diameter Thru-Beam Lens</b>	200X	6230A-6508
1.0 in diameter thru-beam lens		



Dimensions, see Page V8-T9-6.

#### Technical Data and Specifications

##### Plastic Fiber Optic Cables

Description	Specification
Storage and operating temperature	-22° to 158°F (-30° to 70°C)
Length, pre-assembled cables	6.6 ft (2m)
Sheathing	Polyethylene
Bend radius <sup>①</sup>	1 mm fiber: 2 in; 0.5 mm fiber: 1 in with no loss of optical signal. Tighter bends will result in some signal loss.

##### Note

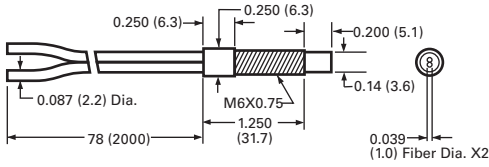
<sup>①</sup> **IMPORTANT:** Do not bend fibers within 0.5 in of either end.

### Dimensions

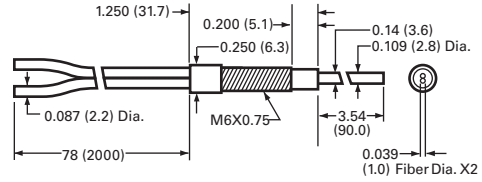
Approximate Dimensions in Inches (mm)

#### Pre-Assembled Duplex Fiber Optic Cables (for Diffuse Reflective Sensing)

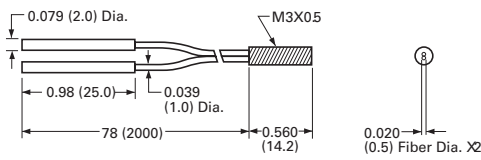
##### Large Diameter, Threaded Tip



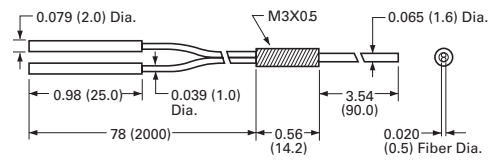
##### Large Diameter, Threaded Tip with Bendable Probe



##### Small Diameter, Threaded Tip

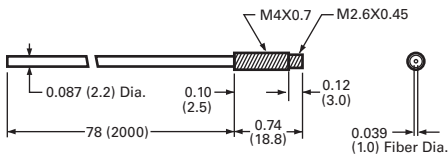


##### Small Diameter, Threaded Tip with Bendable Probe

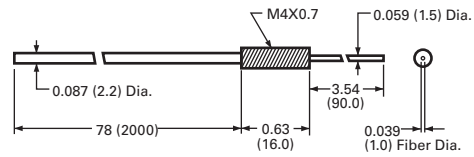


#### Pre-Assembled Single Fiber Optic Cables (for Thru-Beam Sensing)

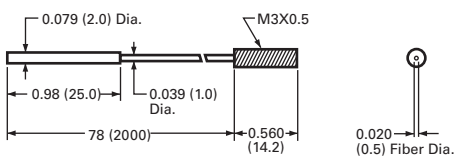
##### Large Diameter, Threaded Tip



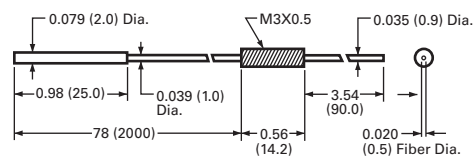
##### Large Diameter, Threaded Tip with Bendable Probe



##### Small Diameter, Threaded Tip



##### Small Diameter, Threaded Tip with Bendable Probe



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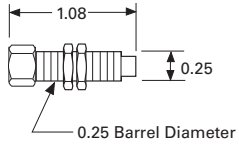
## Fiber Optic Cables

### Plastic Fiber Optic Cables

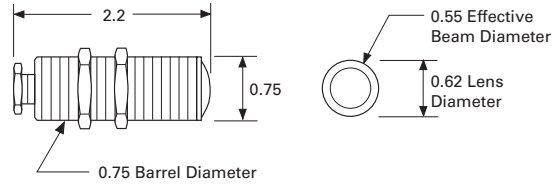
Approximate Dimensions in Inches

#### Accessories

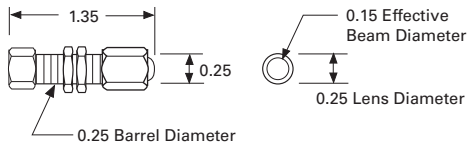
##### Fiber Optic Termination



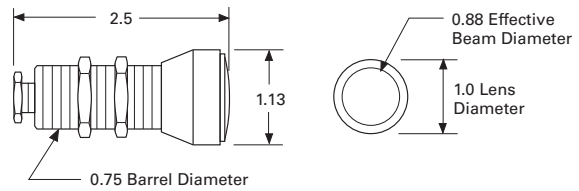
##### 0.5 In Diameter Thru-Beam Lens



##### 0.25 In Diameter Thru-Beam Lens



##### 1.0 In Diameter Thru-Beam Lens



### Glass Fiber Optic Cables



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## Glass Fiber Optic Cables

### Product Description

Glass Fiber Optic Cables from Eaton's electrical sector transmit light through a cable containing a bundle of tiny glass fibers. The cable can curve back and forth through equipment to the target and still transmit light with very little signal loss.

Two cable types are available:

**Duplex fibers** contain both source and detector fibers intermixed at the cable end for diffuse reflective sensing. One cable is required for sensing. (It is also possible to use this style of cable and a retroreflector for reflex sensing.)

### Diffuse Reflective Sensing with a Single Duplex Fiber



**Single fibers** are used for thru-beam sensing. Separate cables are needed to carry the source light and the detector light, respectively. Two cables are required for sensing.

### Thru-Beam Sensing with Two Single Fibers



### Features

- Fiber optic cables allow remote sensing in areas where space is restricted or tight viewing angles are required
- Ideal for high temperature applications up to 480°F (249°C)
- Choose from many styles and lengths to exactly suit your needs
- Use PVC jacket models for most applications, stainless steel for high temperature and harsh environments
- Larger fiber bundle size offers higher excess gain for longer ranges. Small size is useful for sensing extremely small targets

### DANGER

**THIS SENSOR IS NOT A SAFETY DEVICE AND IS NOT INTENDED TO BE USED AS A SAFETY DEVICE. This sensor is designed only to detect and read certain data in an electronic manner and perform no use apart from that, specifically no safety-related use. This sensor product does not include self-checking redundant circuitry, and the failure of this sensor product could cause either an energized or de-energized output condition, which could result in death, serious bodily injury, or property damage.**

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#### Product Overview

#### Ordering Information

#### Mounting End Compatibility

Two mounting end styles are available; standard and collar. Collar mounting cables and standard mounting cables are not interchangeable and must be coupled to the correct sensor.

#### Mounting Ends


	Description	Compatible Fiber Optic Sensors	Catalog Number
<b>Standard Mounting End</b> 	Standard mounting end	Prism™ Series, Comet® Series, 50 Series, 55 Series, 80 Series, 70 Series and E51 Sensor Heads—Catalog Numbers E51DF1 and E51DF11	<b>Starts with: E51KF_</b>
<b>Collar Mounting End</b> 	Collar mounting end	E51 Sensor Heads—Catalog Numbers E51DF3, E51DF4 and E51DF33	<b>Starts with: E51KT_</b>

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#### Non-Standard Cable Lengths

To order fiber optic cable in a non-standard length, replace last digit of listed catalog number with code suffix from table below. Example: For E51KF113 with a 10 ft cable, order E51KF11**10**. Built-to-order. May require minimum order quantity.

#### Non-Standard Cable Lengths

	Length of Fiber Optic Cable	Code Suffix
<b>Glass Fiber Optic Cables</b> 	18 in (1.5 ft)	<b>15</b>
	24 in (2.0 ft)	<b>2</b>
	48 in (4.0 ft)	<b>4</b>
	72 in (6.0 ft)	<b>6</b>
	120 in (10.0 ft)	<b>10</b>

**Product Selection**

**Duplex Cables (for Diffuse Reflective Sensing)**

**Duplex Cables**

	Fiber Bundle Size A	Mounting End Style ①	Stainless Steel Jacket Catalog Number	PVC/Monocoil Jacket Catalog Number
	<b>Forward Viewing, Unthreaded</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF713</b>	<b>E51KF313</b>
Collar		<b>E51KT713</b>	<b>E51KT313</b>	
	<b>Right-Angle Viewing, Unthreaded</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF733</b>	<b>E51KF333</b>
Collar		<b>E51KT733</b>	<b>E51KT333</b>	
	<b>Forward Viewing, Threaded Cable End</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF723</b>	<b>E51KF323</b>
Collar		<b>E51KT723</b>	<b>E51KT323</b>	
	<b>Forward Viewing, Rectangular Fiber Bundle, Threaded Cable End</b>			
	0.020 x 0.154 in (0.5 x 3.9 mm)	Standard	<b>E51KF593</b>	<b>E51KF193</b>
Collar		<b>E51KT593</b>	<b>E51KT193</b>	
	<b>Right-Angle Viewing, Threaded Cable Shaft</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF7A3</b>	<b>E51KF3A3</b>
	<b>Right-Angle Viewing, Threaded Cable End</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF7B3</b>	<b>E51KF3B3</b>
	<b>Right-Angle Viewing, Tight Viewing Angle, Unthreaded</b>			
	0.094 in (2.4 mm)	Standard	<b>E51KF563</b>	<b>E51KF163</b>
Collar		<b>E51KT563</b>	<b>E51KT163</b>	
	<b>Forward Viewing, Miniature Probe, Unthreaded</b>			
	0.0625 in (1.6 mm)	Standard	<b>E51KF583</b>	<b>E51KF183</b>
Collar		<b>E51KT583</b>	<b>E51KT183</b>	
	<b>Right-Angle Viewing, Miniature Probe, Unthreaded</b>			
	0.0625 in (1.6 mm)	Standard	<b>E51KF573</b>	<b>E51KF173</b>
Collar		<b>E51KT573</b>	<b>E51KT173</b>	
	<b>Forward Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting</b>			
	0.032 x 0.382 in (0.8 x 9.7 mm)	Standard	<b>E51KF743</b>	<b>E51KF343</b>
		Collar	—	<b>E51KT343</b>
	0.020 x 0.154 in (0.5 x 3.9 mm)	Standard	<b>E51KF543</b>	<b>E51KF143</b>
Collar		—	—	
	<b>Right-Angle Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting</b>			
	0.020 x 0.154 in (0.5 x 3.9 mm)	Standard	<b>E51KF553</b>	<b>E51KF153</b>
Collar		—	<b>E51KT153</b>	

Dimensions, see Page V8-T9-12.

**Note**

① Collar mounting cables and standard mounting cables are not interchangeable and must be coupled to the correct sensor. See compatibility chart on Page V8-T9-8.

#### Single Cables (for Thru-Beam Sensing)

#### Single Cables

	Fiber Bundle Size A	Mounting End Style <sup>①</sup>	Stainless Steel Jacket Catalog Number	PVC/Monocoil Jacket Catalog Number
 <b>Forward Viewing, Unthreaded</b>	<b>Forward Viewing, Unthreaded</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF813</b>	<b>E51KF413</b>
		Collar	<b>E51KT813</b>	<b>E51KT413</b>
 <b>Right-Angle Viewing, Unthreaded</b>	<b>Right-Angle Viewing, Unthreaded</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF833</b>	<b>E51KF433</b>
		Collar	<b>E51KT833</b>	<b>E51KT433</b>
 <b>Forward Viewing, Threaded</b>	<b>Forward Viewing, Threaded Cable End</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF823</b>	<b>E51KF423</b>
		Collar	<b>E51KT823</b>	<b>E51KT423</b>
 <b>Forward Viewing, Rectangular</b>	<b>Forward Viewing, Rectangular Fiber Bundle, Threaded Cable End</b>			
	0.020 x 0.154 in (0.5 x 3.9 mm)	Standard	<b>E51KF693</b>	<b>E51KF293</b>
		Collar	<b>E51KT693</b>	<b>E51KT293</b>
 <b>Right-Angle Viewing, Threaded Cable Shaft</b>	<b>Right-Angle Viewing, Threaded Cable Shaft</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF8A3</b>	<b>E51KF4A3</b>
		Collar	<b>E51KT8A3</b>	—
 <b>Right-Angle Viewing, Threaded Cable End</b>	<b>Right-Angle Viewing, Threaded Cable End</b>			
	0.125 in (3.2 mm)	Standard	<b>E51KF8B3</b>	<b>E51KF4B3</b>
		Collar	<b>E51KT8B3</b>	—
 <b>Right-Angle Viewing, Tight Viewing Angle</b>	<b>Right-Angle Viewing, Tight Viewing Angle, Unthreaded</b>			
	0.094 in (2.4 mm)	Standard	<b>E51KF663</b>	<b>E51KF263</b>
		Collar	<b>E51KT663</b>	<b>E51KT263</b>
 <b>Forward Viewing, Miniature Probe</b>	<b>Forward Viewing, Miniature Probe, Unthreaded</b>			
	0.0625 in (1.6 mm)	Standard	<b>E51KF683</b>	<b>E51KF283</b>
		Collar	<b>E51KT683</b>	<b>E51KT283</b>
 <b>Right-Angle Viewing, Miniature Probe</b>	<b>Right-Angle Viewing, Miniature Probe, Unthreaded</b>			
	0.0625 in (1.6 mm)	Standard	<b>E51KF673</b>	<b>E51KF273</b>
		Collar	<b>E51KT673</b>	<b>E51KT273</b>
 <b>Forward Viewing, Fiber Bundle</b>	<b>Forward Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting</b>			
	0.032 x 0.382 in (0.8 x 9.7 mm)	Standard	<b>E51KF843</b>	<b>E51KF443</b>
		Collar	—	<b>E51KT443</b>
	0.020 x 0.154 in (0.5 x 3.9 mm)	Standard	<b>E51KF643</b>	<b>E51KF243</b>
 <b>Right-Angle Viewing, Fiber Bundle</b>	<b>Right-Angle Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting</b>			
	0.020 x 0.154 in (0.5 x 3.9 mm)	Standard	<b>E51KF653</b>	<b>E51KF253</b>
		Collar	—	<b>E51KT253</b>

**Dimensions**, see **Page V8-T9-13**.

**Note**






<sup>①</sup> Collar mounting cables and standard mounting cables are not interchangeable and must be coupled to the correct sensor. See compatibility chart on **Page V8-T9-8**.

## Accessories

### Lenses

Provide increased sensing range in thru-beam mode for use with fiber optic cables with threaded tip.

#### Lenses

	Description	Range Increase <sup>①</sup>	Catalog Number
	0.5 in diameter, threaded	15X	6230A-6501
	1.0 in diameter, threaded	30X	6230A-6502
	0.5 in diameter, smooth	7X	E51KFH1
	0.75 in diameter, smooth	18X	E51KFH2
	1.0 in diameter, smooth	35X	E51KFH3

Dimensions, see [Page V8-T9-14](#).

## Technical Data and Specifications

### Glass Fiber Optic Cables

Description	PVC/Monocoil Specification	Stainless Steel Specification
Temperature range	-40° to 221°F (-40° to 105°C)	-50° to 480°F (-45° to 249°C)
Bend radius	2.5X sheathing O.D. minimum	2.5X sheathing O.D. minimum
Cable length	3 ft (0.9m) standard; other lengths available, see <a href="#">Page V8-T9-8</a> .	3 ft (0.9m) standard; other lengths available, see <a href="#">Page V8-T9-8</a> .

#### Note

<sup>①</sup> Theoretical range increase with lens on both source and detector fiber optic cable.

# 9.2

## Fiber Optic Cables

### Glass Fiber Optic Cables

#### Dimensions

Approximate Dimensions in Inches (mm)

#### Mounting Ends ①

##### Standard Mounting End

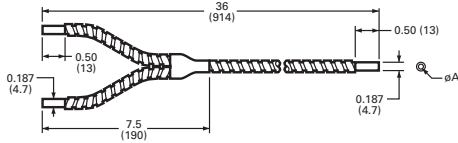


##### Collar Mounting End

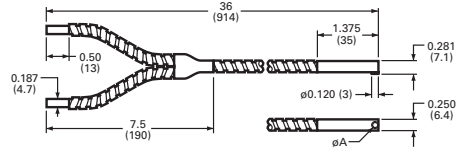


#### Duplex Cables (for Diffuse Reflective Sensing)

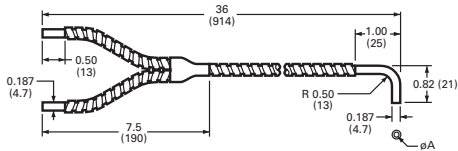
##### Forward Viewing, Unthreaded



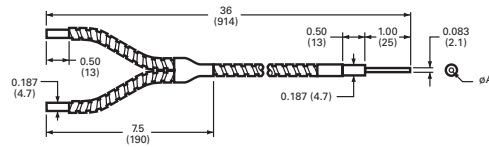
##### Right-Angle Viewing, Tight Viewing Angle, Unthreaded



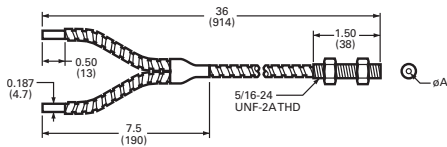
##### Right-Angle Viewing, Unthreaded



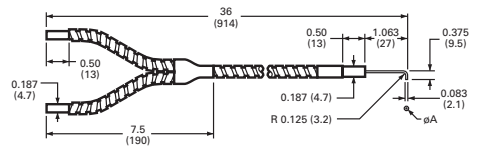
##### Forward Viewing, Miniature Probe, Unthreaded



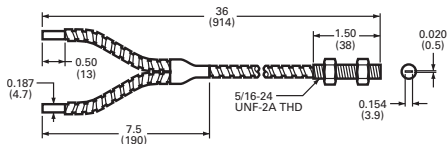
##### Forward Viewing, Threaded Cable End



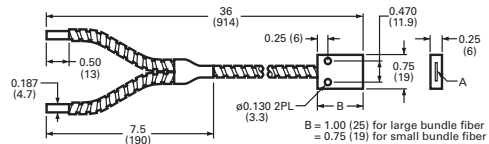
##### Right-Angle Viewing, Miniature Probe, Unthreaded



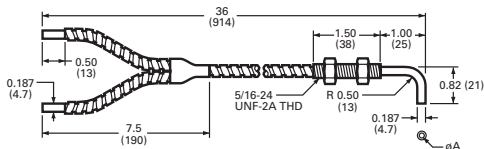
##### Forward Viewing, Rectangular Fiber Bundle, Threaded Cable End



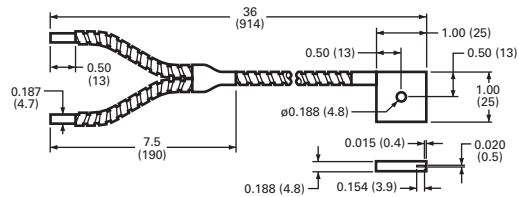
##### Forward Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting



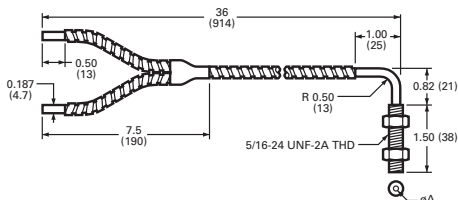
##### Right-Angle Viewing, Threaded Cable Shaft



##### Right-Angle Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting



##### Right-Angle Viewing, Threaded Cable End



#### Note

- ① Collar mounting cables and standard mounting cables are not interchangeable and must be coupled to the correct sensor. See compatibility chart on **Page V8-T9-8**.

Approximate Dimensions in Inches (mm)

### Mounting Ends ①

#### Standard Mounting End

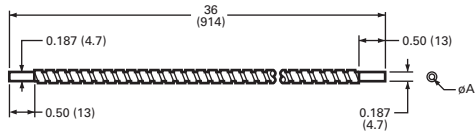


#### Collar Mounting End

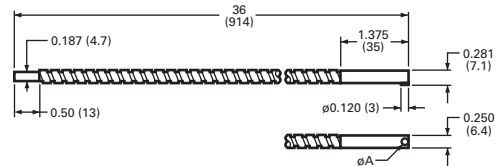


### Single Cables (for Thru-Beam Sensing)

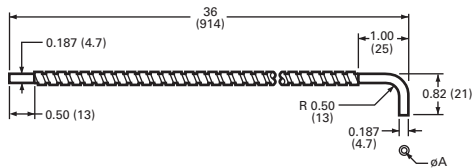
#### Forward Viewing, Unthreaded



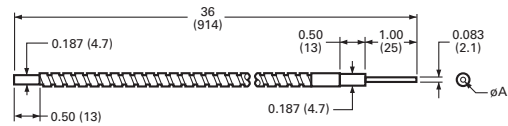
#### Right-Angle Viewing, Tight Viewing Angle, Unthreaded



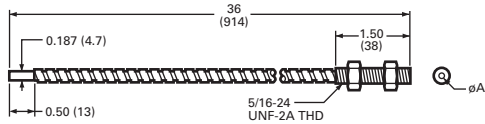
#### Right-Angle Viewing, Unthreaded



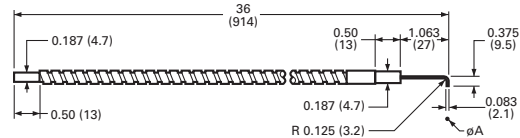
#### Forward Viewing, Miniature Probe, Unthreaded



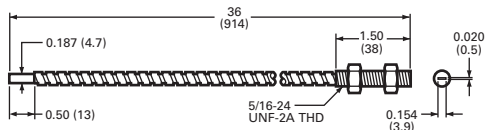
#### Forward Viewing, Threaded Cable End



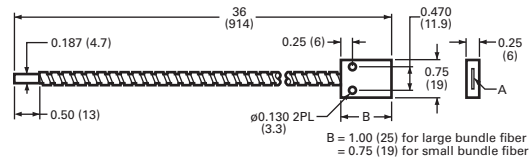
#### Right-Angle Viewing, Miniature Probe, Unthreaded



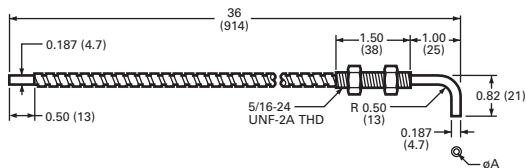
#### Forward Viewing, Rectangular Fiber Bundle, Threaded Cable End



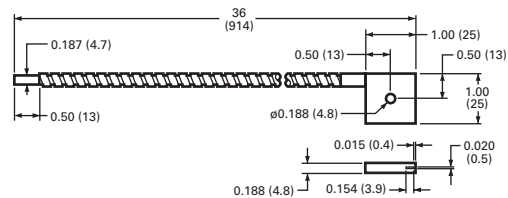
#### Forward Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting



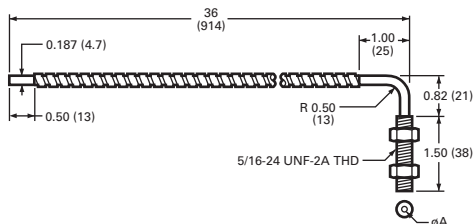
#### Right-Angle Viewing, Threaded Cable Shaft



#### Right-Angle Viewing, Rectangular Fiber Bundle, Thru-Hole Mounting



#### Right-Angle Viewing, Threaded Cable End



### Note

① Collar mounting cables and standard mounting cables are not interchangeable and must be coupled to the correct sensor. See compatibility chart on **Page V8-T9-8**.

# 9.2

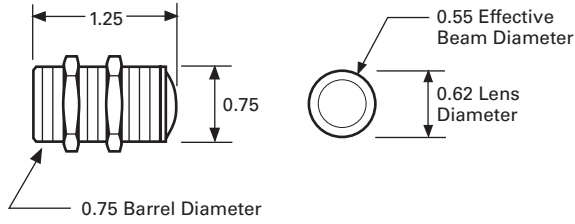
## Fiber Optic Cables

### Glass Fiber Optic Cables

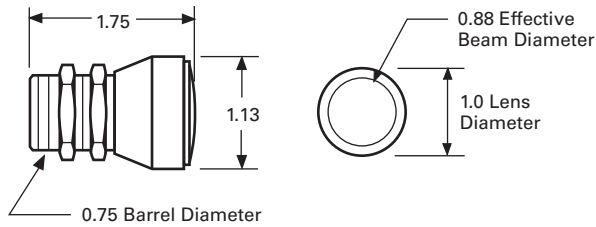
#### Accessories—Lenses

Approximate Dimensions in Inches

##### 0.5 In Diameter, Threaded

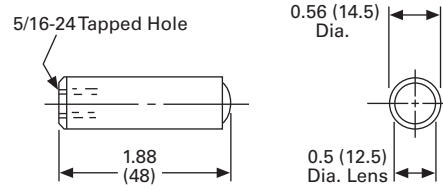


##### 1 In Diameter, Threaded

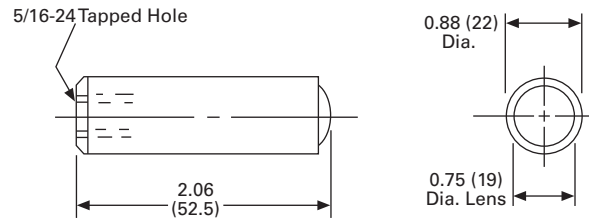


Approximate Dimensions in Inches (mm)

##### 0.5 In Diameter, Smooth



##### 0.75 In Diameter, Smooth



##### 1.0 In Diameter, Smooth

