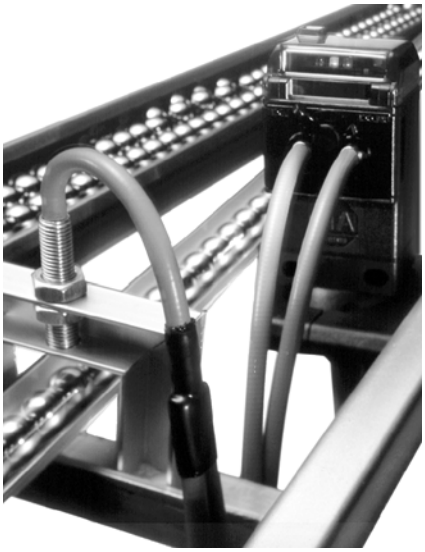
Glass Fiber Optic Cables

Introduction



Application Recommendations

1. Many glass fiber optic cables are available with different glass fiber bundle diameters.

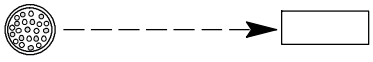
   Larger diameter bundles contain more fibers to carry light between the sensor and application. These cables will generally offer **longer sensing ranges**.

   Smaller diameter bundles provide greater resolution and the ability to detect smaller targets.
2. Glass fiber optic cables can be applied in high shock and vibration applications, but secure the cables to prevent excess flexing. Do not use glass cables in applications where they are constantly flexing. ***They will break***. Plastic fiber optic cables provide better performance in these applications.
3. Avoid sharp bends. The individual glass fibers in the cable can be broken. Don't exceed the following bend tolerances with PVC sheathed cables:

Minimum Cable Bend Radius

Bundle Diameter [mm (in.)]	Minimum Bend Radius [mm (in.)]
0.68 (0.027)	12.7 (0.50)
1.16 (0.046)	12.7 (0.50)
1.6 (0.063)	15.8 (0.625)
2.28 (0.090)	15.8 (0.625)
3.17 (0.125)	19.0 (0.75)
3.96 (0.156)	25.4 (1.0)
4.57 (0.180)	31.7 (1.25)

4. Glass fiber optic cables cannot be cut, spliced or repaired.
5. Glass fiber optic cables tip cannot be bent. Only special plastic fiber optic cable sensing end tips can be bent as specified in the Selection Guide. When using bendable end tips, bend should not be attempted closer than 19 mm (0.75 in.) to the sensing end of the cable.
6. Some applications call for glass fiber optic cables to be used to isolate the sensor from **high voltage**. Custom cables with special nonconductive components must be ordered for these applications.
7. X-RAY or GAMMA radiation will cause glass fibers to eventually become opaque. Custom cables constructed with special optical quartz fibers must be ordered for use in areas with **high radiation**.
8. Use Transmitted Beam sensing in **submerged applications** when possible. Spiral-wound stainless steel sheathing is generally not suitable for wet applications. Fiber optic cables with PVC sheathing should be used for these applications.
9. A glass fiber optic sensor with a **bifurcated** cable can provide **retroreflective** or **diffuse sensing** depending upon the distance to the target and the sensitivity adjustment on the sensor. If the sensor and cable are to be used for retroreflective sensing, the sensitivity of the sensor must be adjusted low enough to avoid unwanted diffuse response from the targets to be sensed.
10. Glass fiber optic cables have a wide **field of view**, typically 82°. A smaller field of view can be achieved by attaching an Extended Range Lens Assembly to the sensing end of the fiber. These lens assemblies will also increase the available sensing distance. Refer to the Accessories section for more information.
11. Most glass fiber optic cables have round sensing tips with the glass fibers arranged in a circular configuration. Other cables such as 43GT-FIS40SL offer sensing tips with a **rectangular shaped opening** for the glass fibers, referred to as "slotted" cables (see illustration below).



Control Interface End Tip — Sensing End Tip

Use these equivalent diameters to determine the approximate performance of slotted cables.

Slot Dimensions [mm (in.)]	Round Sensing Tip Equivalent Diameter [mm (in.)]
2.5 x 0.5 (0.1 x 0.02)	1.2 (0.046)
0.5 x 2.5 (0.02 x 0.1)	1.2 (0.046)
5.1 x 0.25 (2.0 x 0.01)	1.2 (0.046)
9.7 x 0.8 (0.382 x 0.032)	3.1 (0.125)

Formula:
Approximate diameter = $1.128 \times \sqrt{\text{Length x Width}}$

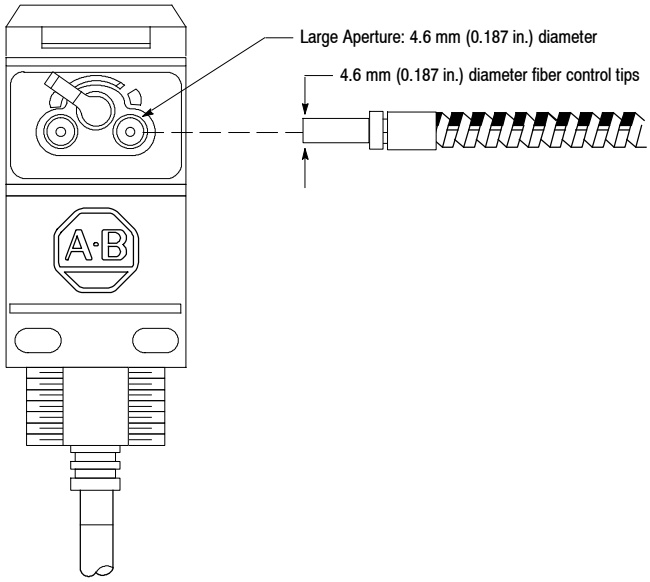
ATTENTION

Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Glass Fiber Optic Cables for use with Large Aperture Sensors

The fiber optic cables on pages 1-236…1-250 are for use with the large aperture sensors shown below.

42GxF-900x



Large Aperture Sensors:

42SRF-60xx
42SRF-65xx

42GTGF-100x0
42GTGF-103x0

42xRx-5x00FO

42GxF-900x

42EF-G1xxA

42KL-G1xxx

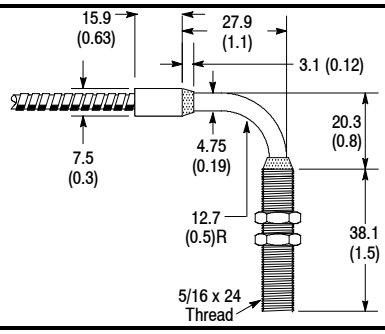
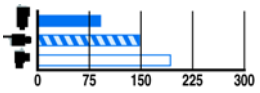
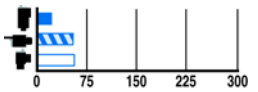
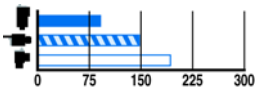
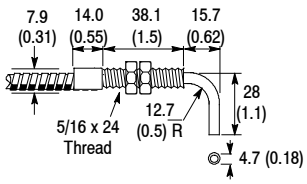
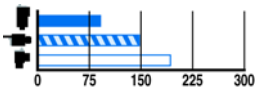
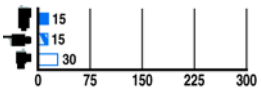
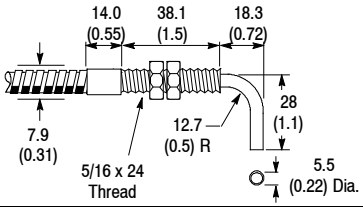
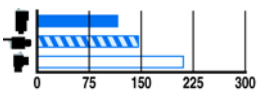
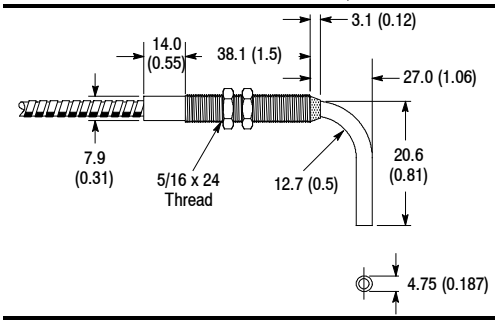
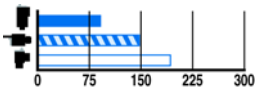
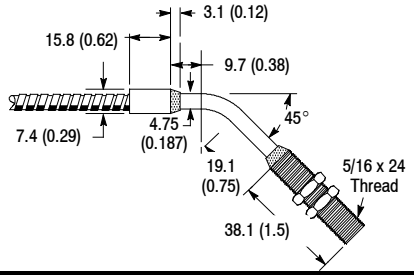
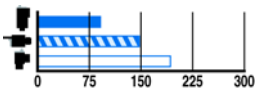
Note: Nominal Sensing Distance

- Due to the variation between fiber optic cables, sensing distance can vary widely
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The published numbers are based on extensive testing and are conservative
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
  - Sensor selected
  - Reflectivity of target
  - Environment
  - Accessories such as range extending lenses
  - Length of the cable
- Consult with product support for additional information.

All dimensions indicated are typical. The fiber optic cables on pages 1-236…1-250 are for use with large aperture sensors as seen on the following pages:

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

Approximate Dimensions [mm (in.)]	Sensing Tip Material	Fiber Bundle Diameter [mm (in.)]	Sheathing Material	Sensing Distance [mm]	Cat. No.
	Brass/ Stainless Steel	3.2 (0.125)	Stainless Steel		**43GR-TMC25SL**
			PVC		43GR-TMC25ML
		1.6 (0.062)	Stainless Steel		43GR-TMC15SL
			PVC		43GR-TMC15ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-TMS25SL
			PVC		43GR-TMS25ML
	Brass/ Stainless Steel	3.2 (0.125)	Stainless Steel		**43GR-TQC25SL**
			PVC		43GR-TQC25ML
		2.5 x 0.5 (0.1 x 0.02) E-W Slot	Stainless Steel		43GR-TQC40SL
			PVC		43GR-TQC40ML
	Stainless Steel	4.0 (0.156)	Stainless Steel		43GR-TRC30SL
			PVC		43GR-TRC30ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-TXC25SL
			PVC		43GR-TXC25ML
	Stainless Steel	3.2 (0.125)	Stainless Steel		43GR-THC25SL
			PVC		43GR-THC25ML

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Fiber Optic Cable Cross Reference

Cat. No.	Cat. No.
99-1000-1	43GR-TAS20ML
99-1003-1	43GR-XDB25SL
99-108	43PT-PLS52FS
99-109	43PT-PLS52GS
99-110	43PR-PJS53ZS
99-116-1	43GT-MIS15SL
99-161-1	43GR-TAB20SS
99-181-1	43GT-TWC25SL
99-184-1	43GT-2FAS20SL
99-201-1	43GR-FOS20ML
99-206-1	43GR-FPS20SL
99-214-1	43GR-FJS30SL
99-222-1	43GR-TMC25SL
99-224-1	43GR-TMC15SL
99-238-1	43GR-FGS25SL
99-275-1	43GR-TFS10ML
99-279-1	43GR-MUS10ML
99-283-1	43GR-MSC10ML
99-290-1	43GR-MHS15SL
99-291-1	43GR-MHS15ML
99-294-1	43GR-BCA73SL
99-300-1	43GR-TBS25SL
99-30-1	43GR-FAS25SL
99-301-1	43GR-TBS25ML
99-302-1	43GR-TBB30SL
99-304-1	43GR-TQC25SL
99-308-1	43GR-TRC30SL
99-31-1	43GR-FAS25ML
99-315-1	43GR-TKC25ML
99-32-1	43GR-TBB25SL
99-330-1	43GR-TTS20SL
99-33-1	43GR-TBB25ML
99-34-1	43GR-FIS25SL
99-350-1	43GR-FRS40SL
99-35-1	43GR-FIS25ML
99-36-1	43GR-BAA72SL
99-37-1	43GR-BAA72ML
99-39-1	43GR-MKS00ML
99-400-1	43GT-FOS20SL
99-408-1	43GT-FPS10SL
99-424-1	43GT-TMC15SL
99-426-1	43GT-TOC30SL
99-436-1	43GT-FAS30SL
99-453-1	43GT-TJC30ML
99-458-1	43GT-MBS10SL
99-46-1	43GR-TXC25SL

Cat. No.	Cat. No.
99-461-1	43GT-MMS10ML
99-477-1	43GT-TFS00ML
99-479-1	43GT-MUS10ML
99-487-1	43GT-MRS10ML
99-490-1	43GT-MHS15SL
99-491-1	43GT-MHS15ML
99-494-1	43GT-BCA73SL
99-495-1	43GT-BCA73ML
99-500-1	43GT-TBS25SL
99-50-1	43GT-FAS25SL
99-501-1	43GT-TBS25ML
99-502-1	43GT-TBB30SL
99-504-1	43GT-TQC25SL
99-505-1	43GT-TQC25ML
99-508-1	43GT-TRC30SL
99-51-1	43GT-FAS25ML
99-52-1	43GT-TBB25SL
99-530-1	43GT-TTC20SL
99-53-1	43GT-TBB25ML
99-54-1	43GT-FIS25SL
99-55-1	43GT-FIS25ML
99-56-1	43GT-BAA72SL
99-57-1	43GT-BAA72ML
99-58-1	43GT-MKS00SL
99-59-1	43GT-MKS00ML
99-614-1	43GR-MQS15SL
99-623-1	43GR-2FAS25SL
99-626-1	43GT-6TBB15SL
99-643-1	43GR-4TBB22SL
99-68-1	43GR-MVS00ML
99-69-1	43GT-TMC25SL
99-700-1	43GR-TBS20MS
99-701-1	43GR-TBS15ML
99-702-1	43GR-TAS20MS
99-704-1	43GR-TAS20SS
99-705-1	43GR-TMS25ML
99-706-1	43GR-TMS20MS
99-708-1	43GR-TQS20MS
99-710-1	43GT-TBS15MS
99-714-1	43GT-TAS15SS
99-714-1	43GT-TAS15SS
99-715-1	43GT-TFS10ML
99-716-1	43GT-TOS30ML
99-717-1	43GT-TQS25ML
99-718-1	43GT-TQS15MS
99-720-1	43GT-TRS30ML

Cat. No.	Cat. No.
99-721-1	43GT-MIS15ML
99-722-1	43GT-TMS25ML
99-723-1	43GT-TMS15MS
99-751-1	43GR-XAS10SS
99-752-1	43GR-TIS10SS
99-753-1	43GR-FTS10SS
99-755-1	43GR-TDS10SS
99-794-1	43GR-BRA79SL
99-800	43PR-NDS59FS
99-801	43PR-NDS57ZS
99-802	43PR-NAS57ZM
99-803	43PR-NAS60FM
99-804	43PR-NKS57ZS
99-805	43PR-NKS61FS
99-806	43PR-NFS53FM
99-808Z	43PR-NGS53ZM
99-809Z	43PR-NGS55ZM
99-810	43PR-PES53FS
99-811	43PR-PFS53FS
99-814	43PR-CBS53ZM
99-816	43PR-AAS53ZM
99-818	43PR-VBS53ZM
99-819	43PT-NAS58FS
99-820	43PT-NBS56FM
99-821	43PT-NBS54FM
99-822	43PT-NBS52FM
99-823	43PT-PAS52FS
99-825	43PT-PCS52FM
99-827	43PT-CBS56FS
99-828	43PT-SAS56FS
99-833	43PR-SCS57ZS
99-838	43PR-SBS57ZS
99-85-1	43GR-TGB33SL
99-90	43PT-NJS56FS
99-900	43PR-RAS57ZS
99-91	43PT-NJS56GS
99-92	43PT-PKS56FS
99-93	43PT-PKS56GS
99-94	43PR-NES57ZS
99-95	43PR-NES57VS
99-951-1	43GT-XAS10SS
99-952-1	43GT-TIS10SS
99-953-1	43GT-FTS10SS
99-955-1	43GT-TDS10SS
99-96	43PR-PIS57ZS
99-97	43PR-PIS57VS

Visit our website: *www.ab.com/catalogs*.
Preferred availability cat. nos. are printed in **bold**.

Glass Fiber Optic Cables

Additional Cables for Large Aperture Sensors [4.6 mm (0.187 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic for a Large Aperture Sensor:

43 — L

Fiber Optic Cable

Fiber Material
G = Glass
Q = Quartz

Sensing Mode
R = Reflective (Bifurcated)
T = Transmitted Beam (Individual)

Sensing End Tip Style (see pages 1-260…1-267)
Threaded
- Axial
- Angled
- Side view

Ferruled
- Axial
- Angled
- Side view

Block
- Axial
- Side view

Sensing End Tip and Nut Material
A = Aluminum (block tips only)
B = Brass
C = Combination Brass/Stainless Steel
S = Stainless Steel

Fiber Bundles
See page 1-268 for dimensions.

Overall Length (in.)
Standard lengths are 36 inches and do not require these spaces to be filled in. If a special length is required, complete the above with the number of total inches, i.e. 024 for a two foot cable.

Lengths typically ordered:

24 inches	=	024
48 inches	=	048
60 inches	=	060
72 inches	=	072
96 inches	=	096
108 inches	=	108
120 inches	=	120

Any length over 120 inches, please contact product support.

Fits large aperture (4.6 mm/ 0.187 in. OD) sensors which include:
- 42EF-G1xxA
- 42EF-KL-G1xxx
- 42GxF-900x
- 42GTGF-100x0
- 42GTGF-103x0
- 42SRF-60xx
- 42SRF-65xx
- 42xRx-5x00FO

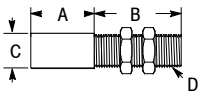
Sheathing
E = Stainless Steel Flexible Conduit 600°F
F = Stainless Steel Flexible Conduit 900°F
M = PVC 200°F
S = Stainless Steel Flexible Conduit 500°F

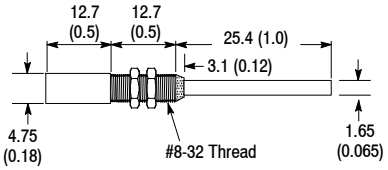
PVC

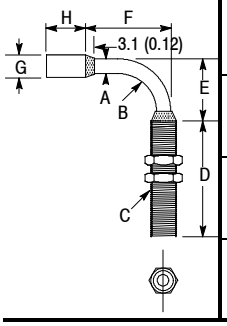
Stainless Steel Flexible Conduit

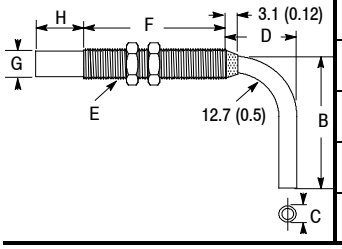
Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

Approximate Dimensions [mm (in.)]	Code	[mm (in.)]	Approximate Dimensions [mm (in.)]			
			A	B	C	D
	TA	2.29 (0.09)	10.16 (0.40)	11.18 (0.44)	5.84 (0.23)	M6 x 1 class 6g
	TB	3.2 (0.125)	13.46 (0.53)	38.1 (1.5)	7.92 (0.312)	5/16 x 24 UNF
	TF	3.2 (0.125)	13.46 (0.53)	12.7 (0.5)	4.45 (0.175)	#8-32
	TG	1.2 (0.046)	13.46 (0.53)	38.1 (1.5)	9.53 (0.375)	3/8 x 24 UNF
	TV	4.0 (0.156)	13.46 (0.53)	139.7 (5.5)	7.92 (0.312)	5/16 x 24 UNF
	TY	3.2 (0.125)	13.46 (0.53)	101.6 (4.0)	7.62 (0.3)	5/16 x 24 UNF
	XA	1.2 (0.046)	10.16 (0.40)	12.7 (0.5)	4.75 (0.187)	M4 x 0.7
	XB	1.2 (0.046)	10.16 (0.40)	12.7 (0.5)	4.75 (0.187)	M6 x 0.75
	XD	3.2 (0.125)	13.46 (0.53)	15.24 (0.6)	7.92 (0.312)	5/16 x 24 UNF

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]
	MR	1.2 (0.046)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Approximate Dimensions [mm (in.)]							
			A	B	C	D	E	F	G	H
	TM	3.2 (0.125)	4.75 (0.187)	12.7 (0.5)	5/16 x 24	38.1 (1.5)	20.3 (0.8)	27.9 (1.1)	7.49 (0.295)	15.8 (0.625)
	TO	4.0 (0.156)	5.54 (0.218)	12.7 (0.5)	5/16 x 24	38.1 (1.5)	20.3 (0.8)	27.9 (1.1)	7.49 (0.295)	15.8 (0.625)
	TC	1.2 (0.046)	2.36 (0.093)	6.35 (0.25)	8 - 32	12.7 (0.5)	9.65 (0.38)	15.2 (0.6)	4.45 (0.175)	15.8 (0.625)
	TI	1.2 (0.046)	2.36 (0.093)	3.81 (0.15)	M6 x 0.75	15.2 (0.6)	8.89 (0.35)	12.7 (0.5)	4.75 (0.187)	10.1 (0.40)

Approximate Dimensions [mm (in.)]	Code	Standard Bundle [mm (in.)]	Approximate Dimensions [mm (in.)]						
			B	C	D	E	F	G	H
	TQ	3.2 (0.125)	27.9 (1.1)	4.75 (0.187)	15.75 (0.62)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)
	TR	3.98 (0.156)	27.9 (1.1)	5.54 (0.218)	18.29 (0.72)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)
	TW	3.2 (0.125)	40.6 (1.6)	4.75 (0.187)	15.75 (0.62)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)
	TX	3.2 (0.125)	20.6 (0.81)	4.75 (0.187)	26.9 (1.06)	5/16 x 24	38.1 (1.5)	7.92 (0.312)	13.97 (0.55)
	TD	1.2 (0.046)	12.7 (0.5)	2.36 (0.093)	8.89 (0.35)	M4 x 0.7	12.7 (0.5)	4.75 (0.187)	10.16 (0.40)