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FIBER OPTIC LIGHT GUIDES

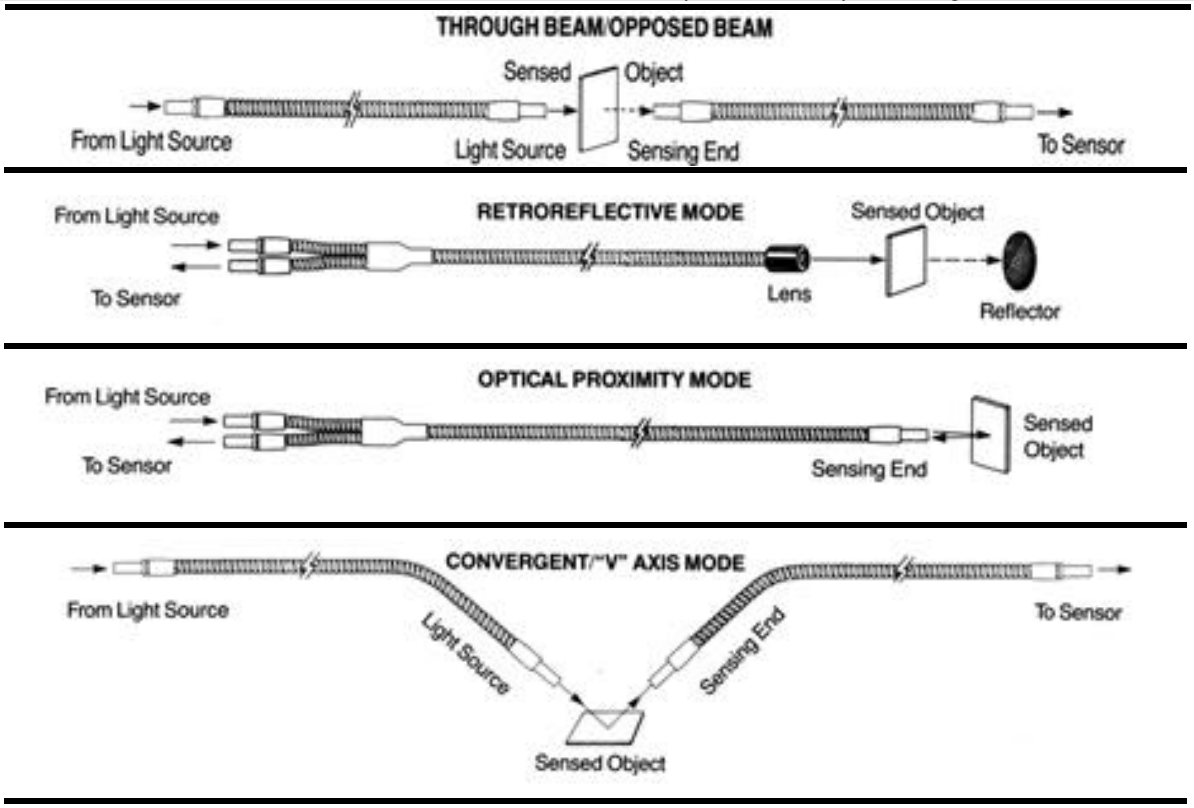
SECTION 3

Shine a flashlight into one end of either a flexible plastic or glass fiber optic light guide, and you will see light coming out of the other end. This ability to guide light from one place to another provides many advantages when applied to industrial photoelectric sensing.

The light guides are flexible and small enough to fit into difficult sensing sites.They are resistant to high temperatures, vibration, condensation and corrosion. They allow the sensor to be located at a remote, convenient location...out of harm's way.

One of the main advantages of glass fiber optic light guides is that they can be sized and shaped to provide optical advantages. When fiber optic light guides are utilized, they become the optics of the sensing system.

At the sensing site, the size and shape of the fiber optic bundle carrying the light controls the size and shape of the transmitted light beam. The size and shape of the fiber optic bundle receiving the light beam controls the effective viewing area of the sensing system. Optional lenses are available to provide additional control of the transmitted and received light beams. All modes of both beam make and beam break sensing are adaptable to fiber optic sensing.



Application Hints and Tips

1. **EXPLOSIVE ENVIRONMENTS:** While fiber optics are considered to be intrinsically safe, the sheathing is a hollow tube that could conceivably provide a flame path. The electronic sensor is not safe, and must be placed into the proper enclosure.

2. **REPAIRS:** Fiber optics must ***never be cut or broken. Never*** pull on a fiber optic's protective jacket. They cannot be repaired or spliced. The tips cannot be bent unless specifically noted. They are filled with epoxy, and will break. Abrasion can scratch the face of the fiber optic bundle and lower its performance.

3. **ROUTING:** Avoid sharp bends when routing light guides around machines. A good minimum bend radius is about 10 times the jacket diameter.

4. **WATERPROOF:** Liquid inside the fiber's protective jacket will lower transmission. Use PVC monocoil jackets in wet loctions. The stainless steel interlock jacket is not waterproof.

5. **LONG FIBERS:** Glass fiber absorb 10% of the remaining light for each foot of glass the light travels. 15-foot fibers have brighter beams than 20-foot fibers, etc.

6. **CLEANING:** Avoid dirt build-up on the bundle face. Clean with soap and water, glass cleaners, toothbrushes, etc.Avoid abrasives. Spray cans of video tape recorder head cleaner work well.

7. **HEAT:** Excess heat above the rated temperature damages the epoxy in the tips, or melts the PVC monocoil jacket.

8. **RATINGS:** FOR GLASS FIBER OPTIC LIGHT GUIDES
   • Flexible Stainless Steel Jacketing: Operating temperatures from -50°F to 525°F (-45°C to 275°C)

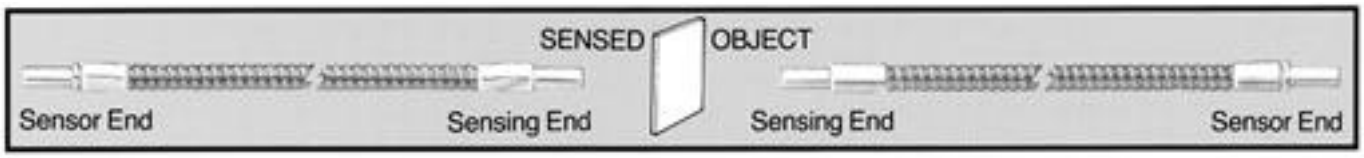
   • PVC Monocoil Jacketing: Operating temperatures from -40°F to 220°F (-40°C to 105°C)

FIBER OPTIC LIGHT GUIDES

SECTION 3

This Section lists only the most popular fiber optic light guides. Many more configurations are also available directly from stock. In addition, **Custom Fiber Optics are a TRI-TRONICS specialty!** We can meet your "special requirements" for customized tip configurations, fiber bundle sizes and cable lengths ... with faster delivery times. Consult your local sales representative or the factory with your requirements.

Straight Light Guides for Beam Break Sensing Modes



Straight light guides are used in pairs. One light guide is used to transmit the light from the sensor's light source to the sensing site. Here the light beam is pointed, focused, or directed across the area the target is to be passing the receiving light guide is located on the opposite side, aligned in position to receive the light beam. Then this light guide transmits the received light back to the sensor's photo detector. When a target or object passes through the light beam, the sensor responds to the absence of light and switches its output accordingly. This is called beam-break, or through-beam sensing.

Bifurcated Light Guides for Beam Make Sensing Modes



Bifurcated light guides start out as one bundle of glass fibers. This single bundle is then split into two separate bundles of fibers at the sensor end, and left as one randomly mixed bundle at the sensing end. One half of the fiber transmits the light to the sensing site. The other half transmits the reflecting or diffusing light off the surface of the target back to the sensor's photodetector. This "proximity mode" sensing is used to sense nearby objects.

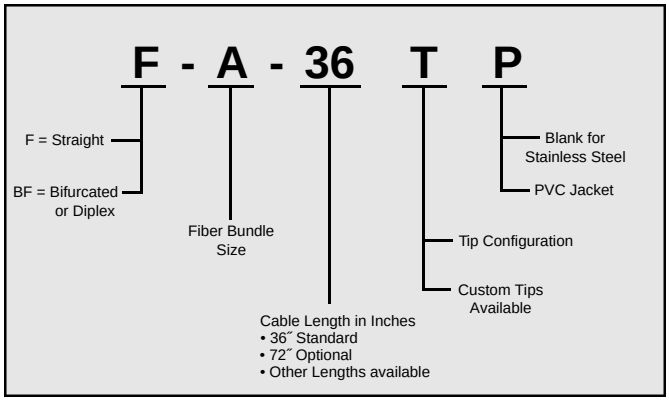
Jacketing for Glass Fibers

Flexible Stainless Steel Armored Cables (as shown above)
• Operating temperatures from-50°F to 525°F (-45°C to 275°C)
Stainless steel armored cables (Type 302 Stainless) provide maximum protection against shock and abrasion. The interlocked metal hose is both flexible and strong. However, it is not waterproof, oil tight; or vapor proof.



PVC Jacketed Monocoil (as shown above)
• Operating temperatures from -40°F to 220°F (-40°C to 105°C)
PVC jacketed monocoil provides ample protection for most industrial applications. It is a flat-wound steel spring, forming a crush-proof flexible tube around the glass, PVC monocoil is waterproof, oil tight, crush resistant, and very flexible.
PVC Jacketed Monocoil (Add Suffix "P" to Model Numbers)

Model Number Identification



How To Order

A) Select mode of sensing best suited to your application; e.g., “straight light guide” for beam break sensing, or “bifurcated light guide” for beam make/proximity sensing.
B) Select “ stainless steel armored cable” for high temperature applications, or “PVC jacketed monocoil” for normal or wet applications.
C) Select fiber bundle size and shape that optimize the viewing area and provide the greatest amount of contrast deviation as displayed on the CONTRAST INDICATOR.
D) Select the tip configuration that best fits the job sensing site; e.g., right angle, straight, threaded, etc.
E) Find the model number that matches your selected sensing mode, jacketing, fiber bundle and size, and tip configuration in the table shown.

Selection Guidelines

Straight Light Guides, Glass Fibers

Stainless	PVC Monocoil	Fiber Bundle Size	Sensing Tip Configuration*	Page No.
F-A-36	F-A-36P	.125” Diameter	Straight Barrel	3-5
F-A-36R	F-A-36RP	.125” Diameter	Right Angle	3-5
F-A-36RT	F-A-36RTP	.125” Diameter	Right Angle Tip, then Threaded	3-5
F-A-36T	F-A-36TP	.125” Diameter	Threaded	3-6
F-A-36TR	F-A-36TRP	.125” Diameter	Threaded Tip, then Right Angle	3-6
F-A-36RS	F-A-36RSP	.093” Diameter	Side View, Right Angle	3-6
F-B-36	F-B-36P	.062” Diameter	Straight Needle	3-7
F-B-36A	F-B-36AP	.062” Diameter	Straight Barrel	3-5
F-B-36AR	F-B-36ARP	.062” Diameter	Right Angle	3-5
F-B-36R	F-B-36RP	.062” Diameter	Right Angle Needle	3-7
F-B-36RT	F-B-36RTP	.062” Diameter	Right Angle Tip, then Threaded	3-5
F-B-36T	F-B-36TP	.062” Diameter	Threaded	3-6
F-B-36TR	F-B-36TRP	.062” Diameter	Threaded Tip, then Right Angle	3-6
F-C-36	F-C-36P	.032” x.382” Rectangle	Rectangular, Flat Housing	3-9
F-E-36	F-E-36P	.046” Diameter	Straight Needle	3-7
F-E-36A	F-E-36AP	.046” Diameter	Straight Barrel	3-5
F-E-36AR	F-E-36ARP	.046” Diameter	Right Angle	3-5
F-E-36R	F-E-36RP	.046” Diameter	Right Angle Needle	3-8
F-E-36RT	F-E-36RTP	.046” Diameter	Right Angle Tip, then Threaded	3-5
F-E-36T	F-E-36TP	.046” Diameter	Threaded	3-6
F-E-36TR	F-E-36TRP	.046” Diameter	Threaded Tip, then Right Angle	3-6
F-H-36	F-H-36P	.015” Diameter	Straight Needle	3-8
F-H-36R	F-H-36RP	.015” Diameter	Right Angle Needle	3-8
F-J-36	F-J-36P	.027” Diameter	Straight Needle	3-9
F-J-36R	F-J-36RP	.027” Diameter	Right Angle Needle	3-9
F-K-36	F-K-36P	.020” x .150” Rectangle	1/2” Long Straight Tip	3-10
F-L-36B	F-L-36BP	.057” Diameter	3” Long Bendable	3-10
F-P-36	F-P-36P	.010” x 1.50” Rectangle	Rectangular Bundle, 1” Flat Housing	3-10

*Custom tips available.

Straight Light Guides, Plastic Fibers

Model No.	Fiber Bundle Size	Sensing Tip Configuration	Page No.
F-S-72R	.375” Dia. Lens	Right Angle	3-11
F-Z-72TT	.040” Diameter	Threaded Tip	3-11
LF-G-36	.040” Diameter	1/4” x 1” Slip-on Barrel Lens	3-11
LF-G-72	.040” Diameter	1/4” x 1” Slip-on Barrel Lens	3-11
LF-H-36	.040” Diameter	3/8” x 1” Threaded Slip-on Lens	3-11
LF-H-72	.040” Diameter	3/8” x 1” Threaded Slip-on Lens	3-11

Selection Guidelines

Bifurcated Light Guides, Glass Fibers

Stainless	PVC Monocoil	Fiber Bundle Size	Sensing Tip Configuration*	Page No.
BF-A-36	BF-A-36P	.125” Diameter	Straight Barrel	3-12
BF-A-36R	BF-A-36RP	.125” Diameter	Right Angle	3-12
BF-A-36RT	BF-A-36RTP	.125” Diameter	Right Angle Tip, then Threaded	3-12
BF-A-36T	BF-A-36TP	.125” Diameter	Threaded	3-13
BF-A-36TR	BF-A-36TRP	.125” Diameter	Threaded Tip, then Right Angle	3-13
BF-A-36RS	BF-A-36RSP	.093” Diameter	Side View, Right Angle	3-13
BF-B-36	BF-B-36P	.062” Diameter	Straight Needle	3-14
BF-B-36A	BF-B-36AP	.062” Diameter	Straight Barrel	3-12
BF-B-36AR	BF-B-36ARP	.062” Diameter	Right Angle	3-12
BF-B-36R	BF-B-36RP	.062” Diameter	Right Angle Needle	3-14
BF-B-36RT	BF-B-36RTP	.062” Diameter	Right Angle Tip, then Threaded	3-12
BF-B-36T	BF-B-36TP	.062” Diameter	Threaded	3-13
BF-B-36TR	BF-B-36TRP	.062” Diameter	Threaded Tip, then Right Angle	3-13
BF-C-36	BF-C-36P	.032” x.382” Rectangle	Rectangular, Flat Housing	3-16
BF-E-36	BF-E-36P	.046” Diameter	Straight Needle	3-14
BF-E-36A	BF-E-36AP	.046” Diameter	Straight Barrel	3-12
BF-E-36AR	BF-E-36ARP	.046” Diameter	Right Angle	3-12
BF-E-36R	BF-E-36RP	.046” Diameter	Right Angle Needle	3-15
BF-E-36RT	BF-E-36RTP	.046” Diameter	Right Angle Tip, then Threaded	3-12
BF-E-36T	BF-E-36TP	.046” Diameter	Threaded	3-13
BF-E-36TR	BF-E-36TRP	.046” Diameter	Threaded Tip, then Right Angle	3-13
BF-J-36	BF-J-36P	.027” Diameter	Straight Needle	3-15
BF-J-36A	BF-J-36AP	.027” Diameter	Straight Barrel	3-12
BF-J-36R	BF-J-36RP	.027” Diameter	Right Angle Needle	3-15
BF-J-36T	BF-J-36TP	.027” Diameter	Threaded	3-13
BF-K-36	BF-K-36P	.020” x .150” Rectangle	1/2” Long Straight Tip	3-16
BF-L-3B		.057” Diameter	Sensor Adaptor, 3” Bendable Tip	3-17
BF-L-36B	BF-L-36BP	.057” Diameter	3” Long Bendable	3-17
BF-P-36	BF-P-36P	.010” x 1.50” Rectangle	Rectangular Bundle, 2” Flat Housing	3-16

*Custom tips avilable.

Diplex Light Guides, Plastic Fibers

Model No.	Fiber Bundle Size	Sensing Tip Configuration	Page No.
BF-W-24PP	.040” Diameter	Straight Needle Tip	3-18
BF-Y-72PPC	.040” Diameter	Straight Needle Tip	3-18
BF-Z-72T	.040” Diameter	Threaded Tip	3-18

Accessories (See Page 5-5)

Application Hints and Tips (See Page 3-1)

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