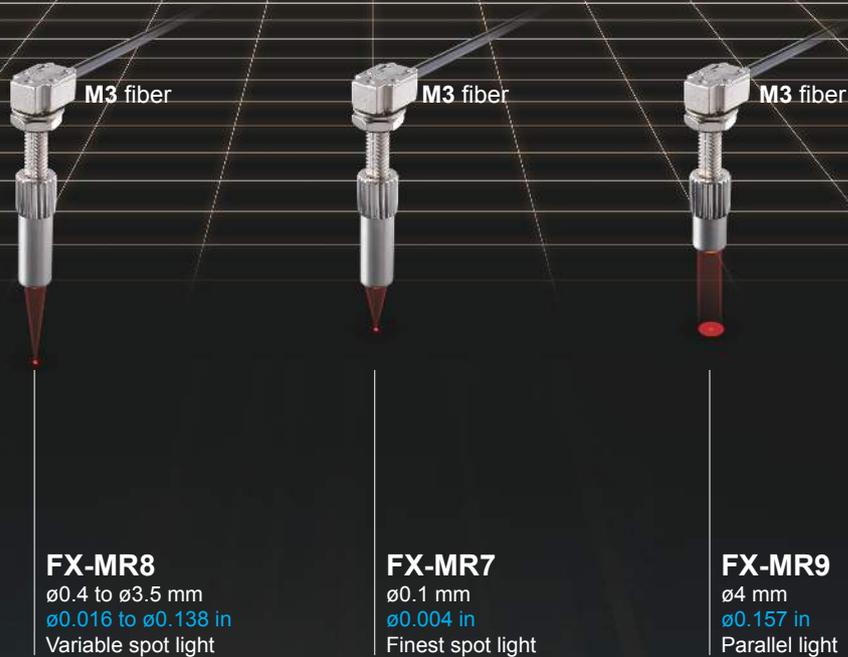


Delivering super-high-precision detection  
with 3 times more light received and  
1.3 times the S/N ratio! (compared to previous models)

#### Finest spot lens FX-MR7



The product line includes three lenses for chip component detection applications: a finest spot lens, a zoom lens, and a parallel light lens.

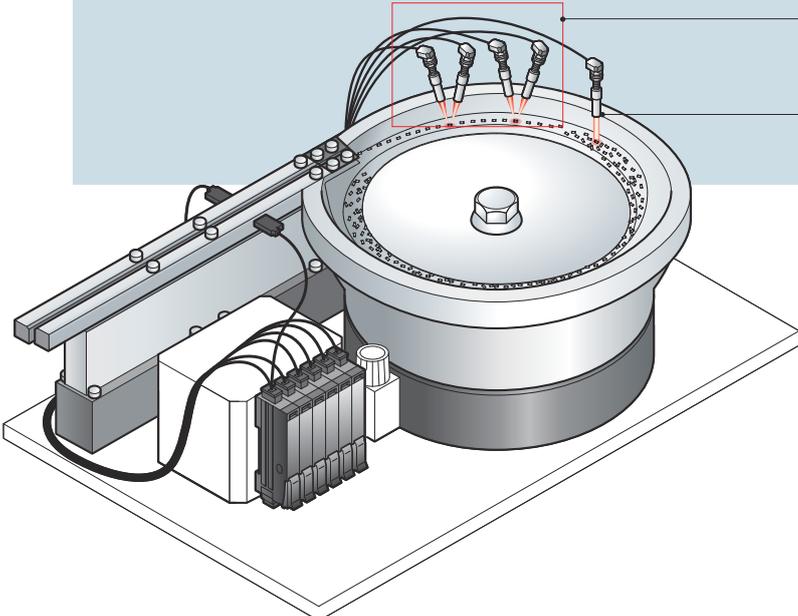
**Featuring an extensive selection of spot diameters and the ability to save space when used with square head fiber**

Products accommodate a variety of target objects with different shapes, colors, and surface characteristics.

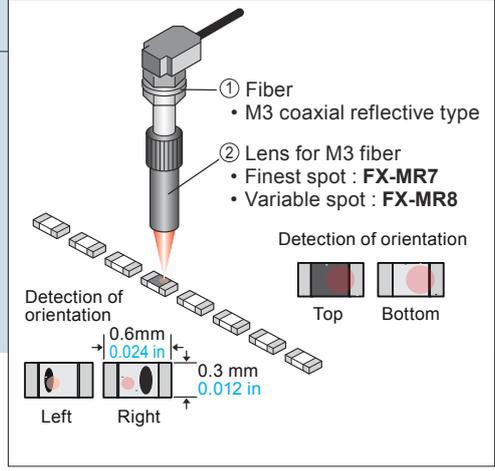
**<Spot diameter>**

Combination with **FX-MR7**

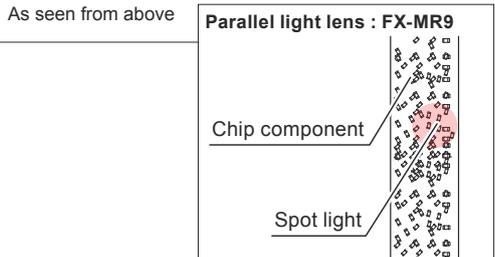
- ø0.1 mm ø0.004 in : **FD-R33EG**
- ø0.15 mm ø0.006 in : **FD-R34EG**
- ø0.2 mm ø0.008 in : **FD-R32EG**
- ø0.4 mm ø0.016 in : **FD-R31G**



**Application: Detection of chip component orientation and direction**



**Application: Verification of chip component supply quantity**



**Finest spot lens FX-MR7**

About 3 times more light received (compared to previous models)

Since there is a large difference in the amount of light received in applications such as direction detection, it is easy to set a threshold that will allow stable detection. Additionally, these products offer an S/N ratio that is 1.3 times better than previous models.



**Parallel light lens FX-MR9**

**Long-range parallel light**

Depending on the fiber with which it is used, this lens creates parallel light with a spot diameter of approximately ø4 mm ø0.157 in at a sensing range of 0 to 30 mm 0 to 1.181 in.



**Typical FX-501 performance (STD mode)**

	White	Black
<b>FX-MR7 + FD-R33EG</b>	3,200 digits	1,030 digits
<b>FX-MR6 (compared to previous models) + FD-R33EG</b>	1,000 digits	435 digits

**Zoom lens FX-MR8**

**Variable spot diameter**

Spot diameters ranging from ø0.4 to ø3.5 mm ø0.016 to ø0.138 in can be achieved by combining the lens with a variety of fibers.



**All models**

**Tightening torque 5 times** (compared to previous models)

The standard aluminum body has been changed to stainless steel (SUS 303) to reduce the likelihood of damage from over-tightening.

**All models**

**Standard lens outer diameter of ø4.3 mm (ø0.169 in)**

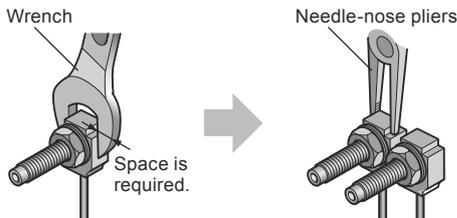
Use of the same mounting hardware across the product line means less inventory and lower costs.

## New square head fiber models for the Tough Series (break-free and bendable\*)

\* These fibers provide a combination of break-free (10 million times bending durability [typical value, when bent back and forth at 180° with a bending radius of R10 mm R0.394 in]) and bendable (bending radius of R2 to R4 mm R0.079 to R0.157 in) characteristics.

### Compact, space-saving

Fiber can be installed at a minimum pitch of M3: 6.5 mm 0.256 in or M4: 8.5 mm 0.335 in using needle-nose pliers.



### Compact installation

Square head fiber heads can be installed cleanly on the side of a conveyor belt. The design makes it less likely for tools and other objects to catch on the fiber cable during installation.



### Extensive selection of product variants

We offer an extensive selection of variants representing a total of seven models. The FD-□EG features higher coaxial precision for increased precision when used with lenses.

Thru-beam type: 2 models

Reflective type: 5 models



M4 : FT-R43  
M3 : FT-R31



M4 : FD-R41  
M3 : FD-R31G (Fiber core :  $\varnothing 0.5$  mm  $\varnothing 0.020$  in)  
FD-R32EG (Fiber core :  $\varnothing 0.25$  mm  $\varnothing 0.010$  in)  
FD-R34EG (Fiber core :  $\varnothing 0.175$  mm  $\varnothing 0.007$  in)  
FD-R33EG (Fiber core :  $\varnothing 0.125$  mm  $\varnothing 0.005$  in)

### Use for long-range sensing or spot detection by attaching a lens

Thru-beam type fibers



Lens (For thru-beam type fiber)

Sensing range (mm in) (Note 1) [Lens on both sides]	Beam axis dia. (mm in)	Lens		Applicable fiber
		Designation	Model No.	
3,600 141.732 (Note 2)	$\varnothing 3.6$ $\varnothing 0.142$	Expansion lens	FX-LE1	FT-R43
	$\varnothing 9.8$ $\varnothing 0.386$	Super-expansion lens	FX-LE2	
950 37.402	$\varnothing 2.8$ $\varnothing 0.110$	Side-view lens	FX-SV1	

Notes: 1) The sensing ranges are the values when used in combination with an FX-500 series amplifier (in STD mode).

2) The fiber cable length practically limits the sensing range.

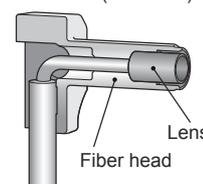
## Introducing square R1 mm (R0.039 in) (sharp bending) fiber

We now offer a sharp bending fiber featuring a low level of light fluctuations, even when bent at R1 mm R0.039 in. It is also available with a lens capable of long-range sensing.

FT-R41W FT-R42W



FT-R42W (With lens)



- Resistant to dust and particulate matter.
- Tip dimensions can be shortened.

## Semi-custom fibers that flexibly meet diverse needs

Custom-ordered products are available with different fiber lengths and sleeve lengths in order to respond quickly to different requirements. Contact your nearest our office for details on model numbers, standard prices and delivery periods.

# ORDER GUIDE

## Square head fiber

Type	Shape of fiber head (mm in)	Model No.	Bending radius	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)			Beam axis (Fiber core) dia. (mm in)	Protection	Ambient temp.
					FX-500 series	U-LG LONG FAST H-SP	FX-101 (Upper value) FX-102 (Lower value)			
Thru-beam	M3 	<b>Tough</b> <b>NEW</b> FT-R31	R2 mm R0.079 in Bending durability	2 m 6.562 ft	STD 270 10.630 HYPR 1,000 39.370	580 22.835 440 17.323 160 6.299 55 2.165	100 3.937 340 13.386	ø0.5 ø0.020	IP67	-55 to +80 °C -67 to +176 °F
		<b>Tough</b> <b>NEW</b> FT-R43	R4 mm R0.157 in Bending durability		STD 720 28.346 HYPR 3,000 118.110	1,600 62.992 1,100 43.307 430 16.929 130 5.118	210 8.268 640 25.197			
	M4 	FT-R41W	R1 mm R0.039 in		STD 800 31.496 HYPR 3,200 125.984	1,800 70.866 1,400 55.118 460 18.110 150 5.906	250 9.843 710 27.953	ø1 ø0.039	IP40	-40 to +60 °C -40 to +140 °F
		FT-R42W			With expansion lens 	STD 2,200 86.614 HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3) 1,400 55.118 460 18.110			
Square head	Reflective M3 	<b>Tough</b> <b>NEW</b> FD-R31G	R2 mm R0.079 in Bending durability	500 mm 1.640 ft	STD 170 6.693 HYPR 530 20.866	310 12.205 260 10.236 85 3.346 27 1.063	45 1.772 150 5.906	Emitter ø0.5 ø0.020	IP40	-55 to +80 °C -67 to +176 °F
		<b>NEW</b> FD-R32EG	R4 mm R0.157 in		STD 45 1.772 HYPR 170 6.693	110 4.331 92 3.622 30 1.181 9 0.354	20 0.787 68 2.677			
		<b>NEW</b> FD-R34EG	R4 mm R0.157 in		STD 38 1.496 HYPR 130 5.118	90 3.543 70 2.756 23 0.906 7 0.276	17 0.669 60 2.362	Emitter ø0.175 ø0.007		
		<b>NEW</b> FD-R33EG	R4 mm R0.157 in		STD 19 0.748 HYPR 84 3.307	44 1.732 33 1.299 11 0.433 3 0.118	7 0.276 22 0.866		Emitter ø0.125 ø0.005	
	M4 	<b>Tough</b> <b>NEW</b> FD-R41	R2 mm R0.079 in Bending durability		STD 210 8.268 HYPR 710 27.953	430 16.929 320 12.598 100 3.937 34 1.339	60 2.362 170 6.693	ø0.75 ø0.030		IP67

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.

2) The sensing range of reflective type is specified for white non-glossy paper.

**Tough** : These fibers provide a combination of break-free (when bent back and forth at 180° with a bending radius of R10 mm R0.394 in) and bendable (bending radius of R4 mm R0.157 in or less) characteristics.

## Lens (For M3 Fiber)

Type	Spot diameter (mm in)	Distance to focal point (mm in)	Lens		Fiber		
			Shape (mm in)	Model No.	Shape	Emitting fiber core (mm in)	Model No.
Finest spot lens	ø0.1 ø0.004 approx.	7 ± 0.5 0.276 ± 0.020		FX-MR7		ø0.125 ø0.005	FD-R33EG
	ø0.15 ø0.006 approx.					ø0.125 ø0.005	FD-EG31
	ø0.2 ø0.008 approx.					ø0.175 ø0.007	FD-R34EG
	ø0.4 ø0.016 approx.					ø0.25 ø0.010	FD-R32EG
						ø0.25 ø0.010	FD-EG30
						ø0.5 ø0.020	FD-R31G
						ø0.5 ø0.020	FD-32G
						ø0.5 ø0.020	FD-32GX
						ø0.5 ø0.020	FD-42G
						ø0.5 ø0.020	FD-42GW

Type	Spot diameter (mm in)	Sensing range (mm in)	Lens		Applicable fibers	
			Shape (mm in)	Model No.	Emitting fiber core (mm in)	Model No.
Zoom lens	ø0.4 to ø2.0 ø0.016 to ø0.079 approx.	10 to 30 0.394 to 1.181		FX-MR8	ø0.125 ø0.005	FD-R33EG, FD-EG31
	ø0.4 to ø2.2 ø0.016 to ø0.087 approx.				ø0.175 ø0.007	FD-R34EG
	ø0.5 to ø2.5 ø0.020 to ø0.098 approx.				ø0.25 ø0.010	FD-R32EG, FD-EG30
	ø0.8 to ø3.5 ø0.031 to ø0.138 approx.				ø0.5 ø0.020	FD-R31G, FD-32G, FD-32GX, FD-42G, FD-42GW
Parallel light lens	ø4.0 ø0.157 approx.	0 to 30 0 to 1.181		FX-MR9	ø0.125 ø0.005	FD-R33EG, FD-EG31
					ø0.175 ø0.007	FD-R34EG
					ø0.25 ø0.010	FD-R32EG, FD-EG30
					ø0.5 ø0.020	FD-R31G, FD-32G, FD-32GX, FD-42G, FD-42GW