

Fiber Selection

FT / FD / FR

Fiber Selection FT / FD / FR

A full line-up from general use fibers to special fibers.
You can select the most suitable fibers.

Fiber Selection Guide

Choose by model

Thru-beam type

Model No.	Page	
	Sensing range Specifications	Dimensions
FT-140	P.15	P.63
FT-30	P.14	
FT-31	P.15	
FT-31S	P.22	
FT-31W	P.15	
FT-32	P.15	
FT-40	P.14	
FT-42	P.15	
FT-42S	P.22	
FT-42W	P.15	
FT-43	P.15	P.64
FT-45X	P.15	
FT-A11	P.29	
FT-A11W	P.29	
FT-A32	P.29	
FT-A32W	P.29	
FT-AL05	P.29	
FT-E13	P.20 / P.22	
FT-E23	P.42	
FT-F93	P.42	
FT-H13-FM2	P.37	P.65
FT-H20-J20-S	P.37	
FT-H20-J30-S	P.37	
FT-H20-J50-S	P.37	
FT-H20-M1	P.37	
FT-H20-VJ50-S	P.37	
FT-H20-VJ80-S	P.37	
FT-H20W-M1	P.39	
FT-H30-M1V-S	P.39	
FT-H35-M2	P.37	
FT-H35-M2S6	P.37	P.66
FT-HL80Y	P.36	
FT-KS40	P.28	
FT-KV26	P.28	
FT-KV26H1	P.28	
FT-KV40	P.28	
FT-KV40W	P.28	
FT-L80Y	P.36	
FT-R31	P.18	
FT-R40	P.15	
FT-R41W	P.18	P.67
FT-R42W	P.18	
FT-R43	P.18	
FT-R44Y	P.18 / P.34	
FT-R60Y	P.18 / P.34	
FT-S11	P.20	
FT-S20	P.14	
FT-S21	P.20	
FT-S21W	P.20	
FT-S22	P.20	
FT-S30	P.14	P.68
FT-S31W	P.20	
FT-S32	P.20	
FT-V23	P.22	
FT-V24W	P.22	
FT-V25	P.22	
FT-V30	P.20	
FT-V40	P.20	

Retroreflective type

Model No.	Page	
	Sensing range Specifications	Dimensions
FR-KZ22E	P.28 / P.32	P.70
FR-KZ50E		
FR-KZ50H		
FR-Z50HW		

Model No.	Page	
	Sensing range Specifications	Dimensions
FT-V80Y	P.36	P.68
FT-Z20HBW	P.24	
FT-Z20W	P.24	
FT-Z30	P.24	
FT-Z30E	P.24	P.69
FT-Z30EW	P.24	
FT-Z30H	P.24	
FT-Z30HW	P.24	
FT-Z30W	P.24	
FT-Z40HBW	P.24	
FT-Z40W	P.24	
FT-Z802Y	P.24 / P.36	

Reflective type

Model No.	Page	
	Sensing range Specifications	Dimensions
FD-30	P.14	P.71
FD-31	P.16	
FD-31W	P.16	
FD-32G	P.16 / P.26 / P.27	
FD-32GX	P.27	
FD-34G	P.16	
FD-40	P.14	
FD-41	P.16	
FD-41S	P.22	
FD-41SW	P.22	
FD-41W	P.16	P.72
FD-42G	P.16 / P.26 / P.27	
FD-42GW	P.27	
FD-60	P.14	
FD-61	P.16	
FD-61G	P.16	
FD-61S	P.22	
FD-61W	P.22	
FD-62	P.16	
FD-64X	P.16	P.73
FD-A16	P.30	
FD-AL11	P.30	
FD-E13	P.20 / P.22	
FD-E23	P.20 / P.22	
FD-EG30	P.16 / P.26 / P.27	
FD-EG30S	P.22	
FD-EG31	P.16 / P.26 / P.27	
FD-F4	P.42	
FD-F41	P.42	P.74
FD-F41Y	P.42	
FD-F71	P.42	
FD-F8Y	P.42	
FD-FA93	P.42	
FD-H13-FM2	P.38	
FD-H18-L31	P.38	
FD-H20-21	P.38	
FD-H20-M1	P.38	
FD-H25-L43	P.38	
FD-H25-L45	P.38	P.75
FD-H30-KZ1V-S	P.39	

Model No.	Page	
	Sensing range Specifications	Dimensions
FD-H30-L32	P.38	P.76
FD-H30-L32V-S	P.39	
FD-H35-20S	P.38	
FD-H35-M2	P.38	
FD-H35-M2S6	P.42	P.77
FD-HF40Y	P.42	
FD-L10	P.31	
FD-L11	P.31	
FD-L12W	P.31	
FD-L20H	P.31	
FD-L21	P.31	
FD-L21W	P.31	
FD-L22A	P.31	
FD-L23	P.31	
FD-L30A	P.18 / P.26 / P.27	P.78
FD-L31A	P.18 / P.26 / P.27	
FD-L32H	P.18 / P.26 / P.27	
FD-R31G	P.18 / P.26 / P.27	
FD-R32EG	P.18 / P.26 / P.27	
FD-R33EG	P.18 / P.26 / P.27	
FD-R34EG	P.18 / P.26 / P.27	
FD-R41	P.18	
FD-R60	P.16	
FD-R61Y	P.18 / P.34	
FD-S21	P.20	P.79
FD-S30	P.14	
FD-S31	P.20	
FD-S32	P.20	
FD-S32W	P.20	
FD-S33GW	P.20	
FD-S34G	P.20	
FD-S60Y	P.36	
FD-V30	P.22	
FD-V30W	P.22	
FD-V50	P.22	P.80
FD-Z20HBW	P.24	
FD-Z20W	P.24	
FD-Z40HBW	P.24	
FD-Z40W	P.24	
FD-Z50HW	P.28	

Fiber Selection Guide

Choose by shape

Threaded Type

- Standard type which is mounted using nuts.



P.15

Square Head Type

- Installed cleanly on the side of a conveyor belt.



P.17

Cylindrical Type

- Has a slender shape that is mounted using set screws.



P.19

Sleeve

- Suitable for sensing in narrow locations and sensing minute objects.



P.21

Flat Type

- Thin and rectangular shape. Installed directly in narrow locations with screws.



P.23

Choose by beam shape

Small Spot

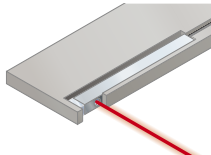
- Senses minute objects using a spot lens.



P.25

Narrow Beam

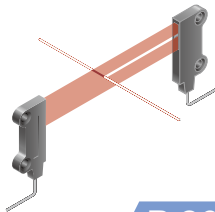
- Not easily affected by surrounding obstacles.



P.28

Wide Beam

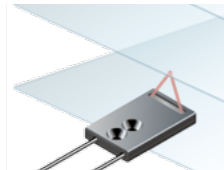
- Senses in the beam band without missing a work.



P.29

Convergent Reflective Type

- Senses in the limited range only.



P.31

Retroreflective Type

- Ideal for sensing transparent objects

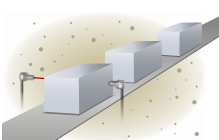


P.32

Choose by environment / performance

Oil-resistant

- Resist to oil by using fluorine resin.



P.33

Chemical-resistant

- Various kinds of liquids can be detected due to the fluorine contained resin case



P.35

Heat-resistant

- Withstands at -60 °C -76 °F to 350 °C 662 °F



P.37

Vacuum-resistant

- Usable in high-temperatures of 300 °C 572 °F and vacuum



P.39

Liquid Leak / Liquid Detection

- Corresponds to various liquid events.



P.41

Choose by quality

Super Quality

- The variance of beam intensity and beam axis is extremely small.

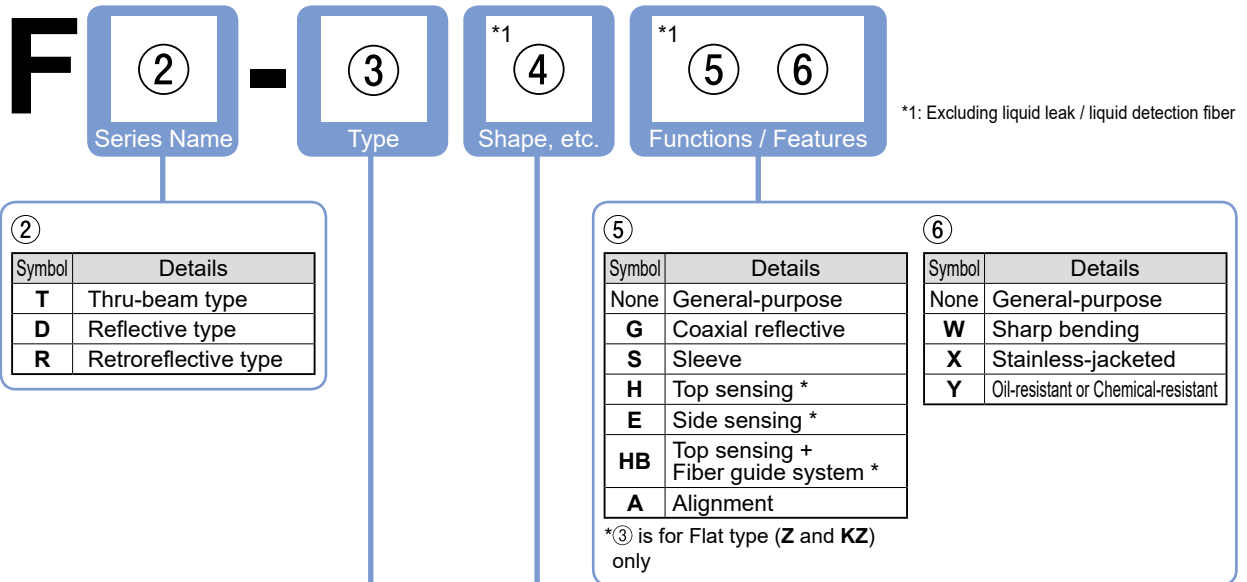


P.13

Fiber Selection Guide

How to read Model No.

Applies to the fiber in (p.13 to p.42)



③		④	
Symbol	Details	Lead No.	Details
None	Threaded type	3	M3
		4	M4
		6	M6
		14	M14
R	Elbow or square head	4	M4
		6	M6
S	Cylindrical type	1	ø1 mm
		2	ø1.5 mm
		3	ø2.5 or ø3 mm
KS	Narrow beam	4	ø3.7 mm
V	Side-view	2	ø2 mm
		3	ø2.5 or ø3 mm
		4	ø4 mm
		5	ø5 mm
KV	Narrow beam / Side-view	4	ø4 mm
		2	1.5 × 2 mm
E	Ultra small diameter	1	Fiber ø0.125 mm
		2	Fiber ø0.25 mm
EG	Coaxial	3	M3
Z	Flat type	2	Thickness 2 mm
		3	Thickness 3 mm
		4	Thickness 3.5 mm
		5	Thickness 5.2 mm
		KZ	Narrow beam
5	Thickness 5.2 mm		
A	Wide beam	3	Sensing width 32 mm
		1	Sensing width 10 to 19 mm
AL	Array	1	Sensing width 11.1 mm
		0	Sensing width 5.5 mm
L	Convergent reflective type	1	Sensing range 0 to 10 mm (STD)
		2	Sensing range 11 to 30 mm (STD)
		3	Sensing range 31mm or more (STD)
F	Liquid leak / Liquid detection	*1	

MEMO



Fiber Selection Guide

Earlier Models Comparison Table (The specification of new fiber may be changed from that of old one. Please confirm the specification before use.)

Thru-beam type

Old fiber Model No.	New fiber Model No.	Page	
		Sensing range Specifications	Dimensions
FT-A30	FT-A32	P.29	P.64
FT-A8	FT-A11		
FT-AFM2	FT-AL05		
FT-AFM2E			
FT-B8	FT-43	P.15	
FT-E12	FT-E13	P.20 / P.22	
FT-E22	FT-E23		
FT-F902	FT-F93	P.42	
FT-FM10L	FT-140	P.15	P.63
FT-FM2	FT-42		
FT-FM2S	FT-42S	P.22	
FT-FM2S4			
FT-K8	FT-KS40	P.28	P.66
FT-KV1	FT-KV26		
FT-KV8	FT-KV40		
FT-NFM2	FT-31	P.15	P.63
FT-NFM2S	FT-31S	P.22	
FT-NFM2S4			
FT-P2	FT-S21	P.20	P.67
FT-P40	FT-31	P.15	P.63
FT-P60	FT-42		
FT-P80			
FT-P81X	FT-45X		
FT-PS1	FT-S11	P.20	P.67
FT-R80	FT-R40	P.15	P.66
FT-SFM2	FT-S32	P.20	P.68
FT-SFM2L			
FT-SFM2SV2	FT-V30	P.22	
FT-SNFM2	FT-S21	P.20	P.67
FT-T80	FT-42	P.15	P.63
FT-V10	FT-V40	P.20	P.68
FT-V22	FT-V23	P.22	
FT-V41	FT-V25		
FT-W4	FT-31	P.15	P.63
	FT-31W		
FT-W8	FT-42		
	FT-42W		
FT-WA30	FT-A32	P.29	P.64
	FT-A32W		
FT-WA8	FT-A11		
	FT-A11W		

Old fiber Model No.	New fiber Model No.	Page		
		Sensing range Specifications	Dimensions	
FT-WKV8	FT-KV40	P.28	P.66	
	FT-KV40W			
FT-WR80	FT-R41W	P.18		
FT-WR80L	FT-R42W			
FT-WS3	FT-S31W	P.20	P.68	
FT-WS4	FT-S21		P.67	
	FT-S21W			
FT-WS8	FT-S31W		P.68	
FT-WS8L	FT-S32			
FT-WV42	FT-V25	P.22		P.68
	FT-V24W			
FT-WZ4	FT-Z20W	P.24	P.69	
FT-WZ4HB	FT-Z20HBW			
FT-WZ7	FT-Z40W			
FT-WZ7HB	FT-Z40HBW			
FT-WZ8	FT-Z30		P.68	
	FT-Z30W		P.69	
FT-WZ8E	FT-Z30E			
	FT-Z30EW			
FT-WZ8H	FT-Z30H			
	FT-Z30HW			
FT-Z8	FT-Z30		P.68	
FT-Z8E	FT-Z30E		P.69	
FT-Z8H	FT-Z30H			

Retroreflective type

Old fiber Model No.	New fiber Model No.	Page	
		Sensing range Specifications	Dimensions
FR-KV1	FR-KZ22E	P.28 / P.32	P.70
FR-KZ21	FR-KZ50H		
FR-KZ21E	FR-KZ50E		
FR-WKZ11	FR-Z50HW		

Fiber Selection Guide

Reflective type

Old fiber Model No.	New fiber Model No.	Page	
		Sensing range Specifications	Dimensions
FD-A15	FD-A16	P.30	P.73
FD-AFM2	FD-AL11		
FD-AFM2E			
FD-B8	FD-62	P.16	
FD-E12	FD-E13	P.20 / P.22	
FD-E22	FD-E23		
FD-EG1	FD-EG30	P.16 / P.26 / P.27	P.74
FD-EG2	FD-EG31		
FD-EG3			
FD-EN500S1	FD-EG30S	P.22	
FD-ENM1S1			
FD-F705	FD-F71	P.42	
FD-FA90	FD-FA93		
FD-FM2	FD-61	P.16	P.72
	FD-61G		
FD-FM2S	FD-61S	P.22	
FD-FM2S4			
FD-G4	FD-42G	P.16 / P.26 / P.27	P.71
FD-G6	FD-32G		
FD-G6X	FD-32GX		
FD-L4	FD-L20H	P.31	P.77
FD-L41	FD-L21		
FD-L43	FD-L22A		
FD-L44	FD-L11		
FD-L44S	FD-L10		
FD-L45	FD-L30A		
FD-L45A	FD-L31A		
FD-L46	FD-L32H		
FD-L47	FD-L23		
FD-L47	FD-L23		
FD-NFM2	FD-41	P.16	P.71
FD-NFM2S	FD-41S	P.22	
FD-NFM2S4			
FD-P2	FD-S21	P.20	P.78
FD-P40	FD-31	P.16	P.71
FD-P50	FD-S32	P.20	P.79

Old fiber Model No.	New fiber Model No.	Page	
		Sensing range Specifications	Dimensions
FD-P60	FD-41	P.16	P.71
FD-P80	FD-61		P.72
FD-P81X	FD-64X		P.73
FD-R80	FD-R60		P.78
FD-S80	FD-S32	P.20	P.79
FD-SFM2SV2	FD-V50	P.22	P.80
FD-SNFM2	FD-S31	P.20	P.79
FD-T40	FD-31	P.16	P.71
FD-T80	FD-61		P.72
	FD-41		P.71
FD-V41	FD-V30	P.22	P.79
FD-W44	FD-41S		P.71
	FD-41SW		
FD-W8	FD-61	P.16	P.72
	FD-61W		P.73
FD-WG4	FD-42G	P.16 / P.26 / P.27	P.72
	FD-42GW		
FD-WKZ1	FD-Z50HW	P.28	P.80
FD-WL41	FD-L21	P.31	P.77
	FD-L21W		
FD-WL48	FD-L12W	P.20	P.79
FD-WS8	FD-S32		
	FD-S32W		
FD-WSG4	FD-S33GW	P.16	P.71
FD-WT4	FD-31		
	FD-31W		
FD-WT8	FD-41	P.22	P.72
	FD-41W		P.79
FD-WV42	FD-V30	P.24	P.80
	FD-V30W		
FD-WZ4	FD-Z20W		
FD-WZ4HB	FD-Z20HBW		
FD-WZ7	FD-Z40W	P.24	P.80
FD-WZ7HB	FD-Z40HBW		

Tough Fiber

Unbreakable! More flexible! ECO!
Conventional 3 types rolled into 1!!

Bending-resistant fiber
Bending durability
1 million times

Sharp bending fiber
Bending radius
R2~R1 mm

General purpose fiber
Bending radius
R25 mm

in

Tough Fiber

Unbreakable

Bending durability **10** million times (Typical)
Bending conditions Bending radius: R10 mm
Reciprocating bending: 180°

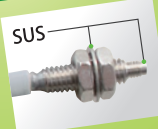


More flexible

Bending radius **R2~R4** mm



ECO

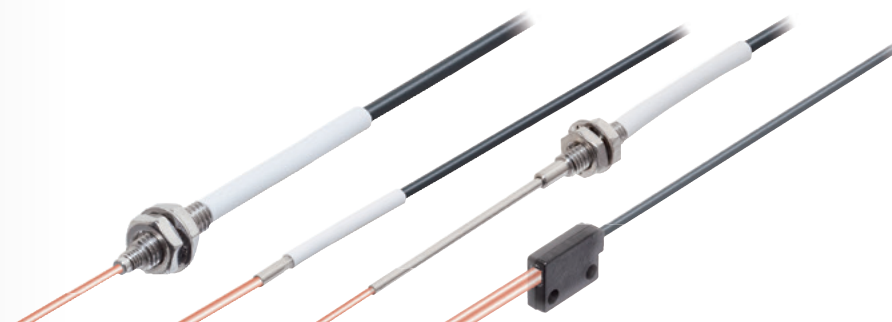


Stainless steel fittings are used for the fiber head of all models.

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

New tough fibers exceed normal optic fibers!

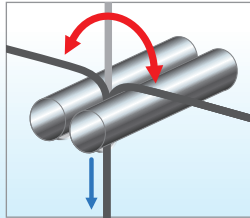
Tough fibers can be used on moving parts, can be bent with precision, and offer high quality for all purposes. They go beyond what was commonly thought to be possible.



Unbreakable

Bending conditions

Bending radius: R10 mm **R0.394 in**,
Reciprocating bending: 180°

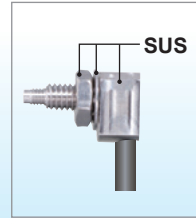


Bending durability

10 million times
(Typical)

ECO

Stainless steel fittings are used for the fiber head of all models.



- Clearly conforms to RoHS
- Can be used for secondary batteries
- Improved tightening torque

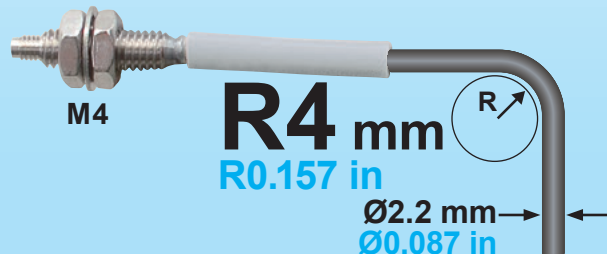
More flexible

R2 to R4 mm **R0.079 to R0.157 in**

Example: FT-31



Example: FT-42



Reduced the time in selecting fiber and in registering part numbers

For Designers

High-quality

- High-quality in whichever tough fiber you choose!
- Easy selection!
- Reduces risk of breaking and bending during installation!

For Buyers

Low Price

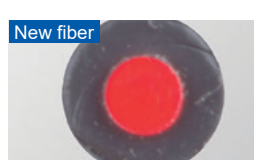
- Cost savings!
- Reduced registration of part numbers!
- Reduced maintenance time in keeping stocks and replacement!

Reduced variation in detection

Beams at the fiber aperture are uniform, leading to stable sensing.



Generally Bending-resistant fibers and sharp bending fibers are composed of multiple fiber cores, often resulting in large variations in light intensity.



Tough fiber is composed of a single fiber core, achieving uniform light intensity.

- Uniform and highly accurate sensing
- Stable sensing even if the fiber is bent

Super Quality

- It is a fiber with superior light intensity stability and simple digital management when combined with the **FX-500** series amplifier.
- It offers stable sensing with an extremely small beam axis curvature and gap.



Digital management is simple due to small differences in body.

When connected with the **FX-500** series amplifiers, it has up to 4 times improved stability of incident light intensity compared with traditional fibers. Management is simple even when replacing amplifiers because the digital display shows the approximate value.

Emitter intensity is also stable due to few curvatures and gaps in the beam axis.

Super quality fiber

FX-500 series

"Stabilized incident light intensities" even in multiple units



Stable emission amount within $\pm 10\%$

Variation in emission amount of the fiber core is controlled down to less than $\pm 10\%$, achieving a stable detection.

- Beam axis deviation: Thru-beam type within $\pm 2^\circ$, Reflective type within $\pm 3^\circ$
- Beam axis centering precision: within $\pm 150\ \mu\text{m}$

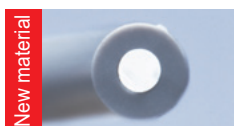
Expanded temperature range

Ambient temperature $[-40\text{ to }+70^\circ\text{C} \text{ } -40\text{ to }+158^\circ\text{F}$ in previous model]

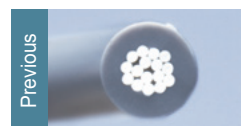
$-55\text{ to }+80^\circ\text{C}$
 $-67\text{ to }+176^\circ\text{F}$

1.2 times more than previous model

$\phi 2.2\text{ mm } \phi 0.087\text{ in}$ standard fiber



Single core standard fiber with high flexibility



In general, high-flexibility types adopt a multi-fiber core, which may result in large variation in light emission.

More flexible! **R4**

Bending radius [Previous model is $R25\text{ mm } R0.984\text{ in}$]

R4 mm
R0.157 in

1/6 of that of previous model



Integrated high-precision plug

The centering precision of the fiber core attached to the inserting plug is doubled. As the insertion precision is increased, the variation among units can be greatly suppressed.



- Centering precision: within $\pm 40\ \mu\text{m}$

More bendable!

Bending durability [Previous model is 1,000 times]

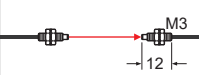
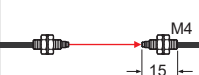
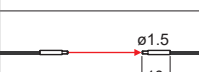
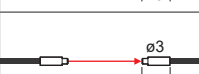
10 million times

10,000 times more than previous model

* Bending conditions
Bending radius: $R10\text{ mm } R0.394\text{ in}$,
Reciprocating bending 180°

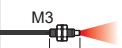
LIST OF FIBERS

Thru-beam type (one pair set)

Type		Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length	Sensing range (mm in)						Beam axis position / Inclination of beam axis	Optical transmission loss	Protection	Ambient temp.	Dimensions
						FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST					
Threaded	M3		Tough (Bending durability) FT-30	R2	2 m	STD 400 15.748 HYPR 1,350 53.150	810 31.890 650 25.591 210 8.268 75 2.953	STD 570 22.441 HYPR 1,860 73.228	1,240 48.819 830 32.677 340 13.386	135 5.315 400 15.748	ø0.5	150 μm / ±2°	±10 %	IP67	-55 to +80 °C	P.63
	M4		Tough (Bending durability) FT-40	R4		STD 1,200 47.244 HYPR (Note) 3,600 141.732	2,200 86.614 1,700 66.929 530 20.866 190 7.480	STD 1,570 61.811 HYPR 3,600 141.732 (Note)	3,100 122.047 2,200 86.614 960 37.795	320 12.598 870 34.252	ø1					
Cylindrical	ø1.5		Tough (Bending durability) FT-S20	R2		STD 400 15.748 HYPR 1,350 53.150	810 31.890 650 25.591 210 8.268 75 2.953	STD 550 21.654 HYPR 1,760 69.291	1,200 47.244 800 31.496 340 13.386	135 5.315 400 15.748	ø0.5					P.67
	ø3		Tough (Bending durability) FT-S30	R4		STD 1,200 47.244 HYPR (Note) 3,600 141.732	2,200 86.614 1,700 66.929 530 20.866 190 7.480	STD 1,650 64.961 HYPR 3,600 141.732 (Note)	3,100 122.047 2,250 88.583 1,000 39.370	320 12.598 870 34.252	ø1					

Note: The fiber cable length practically limits the sensing range.

Reflective type

Type		Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length	Sensing range (mm in) (Note)						Beam axis position / Inclination of beam axis	Optical transmission loss	Protection	Ambient temp.	Dimensions				
						FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series							Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	
Threaded	M3		Tough (Bending durability) FD-30	R2	2 m	STD 160 6.299	330 12.992 250 9.843 80 3.150 25 0.984		STD 210 8.268	460 18.110 330 12.992 140 5.512	45 1.772 155 6.102	150 μm / ±3°	±10 %	IP67	-55 to +80 °C	P.71				
	M4		Tough (Bending durability) FD-40																	
	M6		Tough (Bending durability) FD-60																	
Cylindrical	ø3		Tough (Bending durability) FD-S30	R4			STD 160 6.299 HYPR 600 23.622	330 12.992 250 9.843 80 3.150 25 0.984		STD 220 8.661 HYPR 800 31.496	500 19.685 330 12.992 140 5.512					45 1.772 155 6.102				P.79

Note: The sensing range is specified for white non-glossy paper.

Threaded Type

- It is a standard fiber which is mounted using nuts. It has reasonable pricing while drastically improving flexing performance.
- With the lens installable type, long distance sensing and microscopic object sensing is possible by installing a lens.
- A protective tube and a sturdy stainless jacket type that prevents disconnection are also prepared.

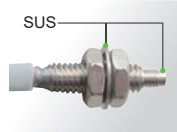
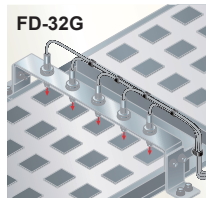
Stainless steel fittings are used for the fiber head of all models. 

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

* Except for **FT-140**

Application

Detecting a presence of a workpiece



FT-42

**<Thru-beam type> FT-31/31W/43/42/42W
FT-45X/R40**

<Reflective type> FD-31/41/62/61/R60

More user-friendly, high quality fiber

Improved centering accuracy

The beam axis deviation of each unit is kept within $\pm 3^\circ$ and the beam axis centering accuracy is kept within $\pm 150 \mu\text{m}$ **0.006 mil**.
(Within $\pm 5^\circ$ and $\pm 90 \mu\text{m}$ **0.004 mil** for ultra small diameter fibers)

- Makes beam axis adjustment easier
- Improves mounting hole machining accuracy
- Improves sensing accuracy



Improved specularity

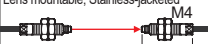
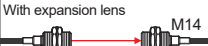
High precision polishing is accomplished by using the PCTC polishing technique.

The specularity of the end face of the fiber is 5 times greater.

- Light intensity is increased, enabling stable sensing.

LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length (m) Free-cut	Sensing range (mm in) (Note 1)						Beam axis position / Inclination of beam axis	Protection	Ambient temp.	Dimensions	
					FX-500 series	Other models	U-LG LONG FAST H-SP	FX-550 series	Other models	U-LG LONG FAST					FX-101 (Upper value) FX-102 (Lower value)
Threaded	M3	 Tough (Bending durability) FT-31	R2	2 m	STD 315 12.402 HYPR 1,350 53.150	770 30.315 550 21.654 210 8.268 70 2.756		STD 480 18.898 HYPR 1,580 62.205	1,000 39.370 700 27.559 290 11.417	130 5.118 340 13.386	ø0.5	150 μm / ±2°	IP67	-55 to +80 °C	P.63
		FT-31W	R1		STD 260 10.236 HYPR 990 38.976	590 23.228 440 17.323 150 5.906 53 2.087		STD 420 16.535 HYPR 1,300 51.181	890 35.039 580 22.835 250 9.843	80 3.150 240 9.449		150 μm / ±3°		-40 to +60 °C	
		 Tough (Bending durability) FT-32	R2		STD 3,000 118.110 HYPR 3,600 141.732	3,600 141.732 (Note 2) 1,600 62.992 580 22.835		STD 3,600 141.732 (Note 2) HYPR 2,900 114.173	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 2,900 114.173	1,300 51.181 3,600 141.732	ø1.6	—	IP40	-40 to +70 °C	
	M4	 (Bending durability) FT-43	R4	2 m	STD 1,400 55.118 HYPR 3,600 141.732	2,800 110.236 2,100 82.677 770 30.315 240 9.449		STD 2,200 86.614 HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,100 122.047 1,400 55.118	350 13.780 970 38.189	ø1.5	150 μm / ±2°	IP67	-55 to +80 °C	P.64
		Tough (Bending durability) FT-42	R4		STD 1,130 44.488 HYPR 3,600 141.732	2,050 80.709 1,600 62.992 530 20.866 190 7.480		STD 1,470 57.874 HYPR 3,600 141.732 (Note 2)	2,900 114.173 2,100 82.677 890 35.039	300 11.811 800 31.496		150 μm / ±3°		-40 to +60 °C	
		 FT-42W	R1		STD 800 31.496 HYPR 3,300 129.921	1,900 74.803 1,400 55.118 490 19.291 160 6.299		STD 1,200 47.244 HYPR 3,600 141.732 (Note 2)	2,600 102.362 1,780 70.079 710 27.953	260 10.236 720 28.346	ø1	150 μm / ±2°	IP67	-55 to +80 °C	P.64
 FT-45X		R4	STD 1,200 47.244 HYPR 1,600 62.992		1,600 62.992 (Note 2) 1,600 62.992 (Note 2) 630 24.803 200 7.874		STD 1,600 62.992 (Note 2) HYPR 1,600 62.992 (Note 2)	1,600 62.992 (Note 2) 1,600 62.992 (Note 2) 1,070 42.126	340 13.386 920 36.220	150 μm / ±2°		-40 to +70 °C			
Elbow	 Tough (Bending durability) FT-R40	R4	2 m	STD 930 36.614 HYPR 3,600 141.732	1,750 68.898 1,500 59.055 500 19.685 160 6.299		STD 1,400 55.118 HYPR 3,600 141.732 (Note 2)	2,900 114.173 1,950 76.772 860 33.858	270 10.630 740 29.134	ø10	—	—	-40 to +70 °C (Note 2)	P.63	
	 FT-140	R4	10 m	STD 19,600 771.654 HYPR 16,000 629.921	19,600 771.654 (Note 2) 19,600 771.654 (Note 2) 6,300 248.031		STD 19,600 771.654 (Note 2) HYPR 19,600 771.654 (Note 2)	19,600 771.654 (Note 2) 19,600 771.654 (Note 2)	14,000 551.181 19,600 771.654 (Note 2)		—				

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 fiber cable length practically limits the sensing range.

Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm **R0.394 in**, reciprocating bending: 180°) and more flexible (bending radius: R4 mm **R0.157 in** or less) features.
(Bending durability) : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm **R0.394 in**, reciprocating bending: 180°).

Coaxial type FD-□G□ in which high-precision positioning can be achieved.

It is a coaxial fiber that encloses the circumference of the emitter fiber at the center with the receiver fiber. This is suitable for high-precision positioning. It can perform sensing without affecting the approach direction of the work.



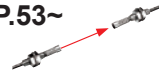
Supports spot lenses and zoom lenses!

FIBER OPTIONS

Lens

(For thru-beam type fiber)

► P.53~



Lens

(For reflective type fiber)

► P.55

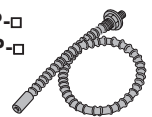


Protective tube

► P.57

•FTP-□

•FDP-□



LIST OF FIBERS

Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)						Beam axis position / Inclination of beam axis	Protection	Ambient temp.	Dimensions
					FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series					
M3		Tough FD-31		2 m	STD 125 4.921 HYPR 515 20.276	290 11.417 220 8.661 80 3.150 25 0.984	STD 200 7.874 HYPR 750 29.528	450 17.717 310 12.205 140 5.512	35 1.378 140 5.512	150 μm / ±3°	IP67	-55 to +80 °C	P.71	
		FD-31W			STD 80 3.150 HYPR 330 12.992	180 7.087 140 5.512 45 1.772 12 0.472	STD 130 5.118 HYPR 480 18.898	310 12.205 190 7.480 80 3.150	15 0.591 60 2.362	—				-40 to +60 °C
	Coaxial, Lens mountable 	Tough FD-32G			1 m (Note 3)	STD 200 7.874 HYPR 650 25.591	380 14.961 270 10.630 95 3.740 27 1.063	STD 320 12.598 HYPR 1,150 45.278	730 28.740 420 16.535 170 6.693	70 2.756 190 7.480	—	IP40		-55 to +80 °C
	Coaxial, Lens mountable, Stainless-jacketed 	FD-32GX				STD 200 7.874 HYPR 630 24.803	410 16.142 360 14.173 100 3.937 30 1.181	STD 320 12.598 HYPR 1,350 53.150	730 28.740 490 19.291 180 7.087	75 2.953 210 8.268	—			
	Coaxial, With lens 	Tough FD-34G			2 m	STD 90 3.543 HYPR 330 12.992	185 7.283 135 5.305 49 1.929 15 0.591	STD 130 5.118 HYPR 480 18.898	310 12.205 180 7.087 80 3.150	29 1.142 90 3.543	—	-40 to +70 °C		P.73
Ultra-small diameter	Coaxial, Lens mountable 	FD-EG30		500 mm	STD 48 1.890 HYPR 170 6.693	130 5.118 110 4.331 30 1.181 9 0.354	STD 90 3.543 HYPR 320 12.598	190 7.480 120 4.724 50 1.969	20 0.787 70 2.756	—	IP40	-20 to +60 °C	P.74	
	Coaxial, Lens mountable 				FD-EG31	STD 20 0.787 HYPR 85 3.346	45 1.772 35 1.378 12 0.472 3.5 0.138	STD 35 1.378 HYPR 120 4.724	70 2.756 45 1.772 20 0.787	7 0.276 25 0.984			—	
Threaded		Tough FD-41		2 m	STD 125 4.921 HYPR 515 20.276	290 11.417 220 8.661 80 3.150 25 0.984	STD 200 7.874 HYPR 750 29.528	450 17.717 310 12.205 140 5.512	35 1.378 140 5.512	150 μm / ±3°	IP67	-55 to +80 °C	P.71	
		FD-41W			STD 270 10.630 HYPR 900 35.433	630 24.803 430 16.929 150 5.906 45 1.772	STD 480 18.898 HYPR 1,400 55.118	1,000 39.370 680 26.772 270 10.630	80 3.150 230 9.055	—			-40 to +60 °C	P.72
	Coaxial, Lens mountable 	Tough FD-42G			STD 200 7.874 HYPR 650 25.591	380 14.961 270 10.630 95 3.740 27 1.063	STD 320 12.598 HYPR 1,150 45.278	730 28.740 420 16.535 170 6.693	70 2.756 190 7.480	—	IP40	-55 to +80 °C	P.72	
	Coaxial, Lens mountable 	FD-42GW			STD 150 5.906 HYPR 670 26.378	340 13.386 280 11.024 90 3.543 25 0.984	STD 210 8.268 HYPR 950 37.402	540 21.260 330 12.992 130 5.118	45 1.772 140 5.512	—			-40 to +60 °C	
M6		FD-62		2 m	STD 520 20.472 HYPR 1,500 59.055	1,000 39.370 940 37.008 340 13.386 110 4.331	STD 880 34.646 HYPR 1,950 76.772	1,450 57.087 1,140 44.882 550 21.654	170 6.693 450 17.717	150 μm / ±3°	IP67	-55 to +80 °C	P.73	
		Tough FD-61	STD 450 17.717 HYPR 1,400 55.118		840 33.071 670 26.378 200 7.874 70 2.756	STD 620 24.409 HYPR 1,630 64.173	1,180 46.457 870 34.252 380 14.961	120 4.724 410 16.142	P.72					
		FD-61W			STD 270 10.630 HYPR 900 35.433	630 24.803 430 16.929 150 5.906 45 1.772	STD 480 18.898 HYPR 1,400 55.118	1,000 39.370 680 26.772 270 10.630	80 3.150 230 9.055				-40 to +60 °C	P.73
	Coaxial 	Tough FD-61G			STD 420 16.535 HYPR 1,100 43.307	800 31.496 650 25.591 200 7.874 60 2.362	STD 600 23.622 HYPR 1,350 53.150	1,200 47.244 850 33.465 350 13.780	120 4.724 350 13.780				—	P.72
	Stainless-jacketed 	FD-64X			1 m	STD 280 11.024 HYPR 670 26.378	500 19.685 410 16.142 160 6.299 50 1.969	STD 410 16.142 HYPR 1,200 47.244	700 27.559 590 23.228 230 9.055				75 2.953 220 8.661	—
Elbow		Tough FD-R60		2 m	STD 290 11.417 HYPR 1,100 43.307	600 23.622 550 21.654 190 7.480 65 2.559	STD 500 19.685 HYPR 1,450 57.087	1,150 45.276 800 31.496 350 13.780	110 4.331 240 9.449	150 μm / ±3°	IP67	—	P.78	

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 is specified for white non-glossy paper.

3) The allowable cutting range is 700 mm 27.559 in from the end that the amplifier inserted.

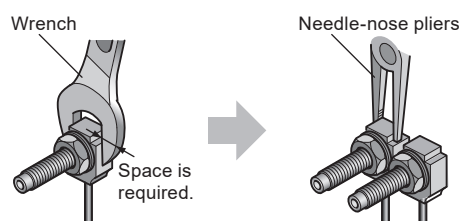
Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
 (Bending durability) : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Square Head Type

- Compact, space-saving design brings clean installation on the side of a conveyor belt. Fiber can be installed at a minimum pitch using needle-nose pliers.
- As for lens compatible type fiber head, sensing range becomes longer when a lens is attached to the thru-beam type fiber, spot detection is achieved in case of the reflective type.
- A lens equipped type fiber head is also available.

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.

FT-R□ / FD-R□



Standard fiber



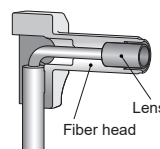
Introducing square R1 mm (R0.039 in) (sharp bending) fiber

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.

Three optional lenses for reflective type fiber are available. Perfect for chip component detection applications.

FX-MR7/MR8/MR9

Finest spot lens FX-MR7

About 3 times more light received (compared to conventional 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.



Typical FX-501 performance (STD mode)

	White	Black
FX-MR7 + FD-R33EG	3,200 digits	1,030 digits
FX-MR6 (conventional models) + FD-R33EG	1,000 digits	435 digits

Zoom lens FX-MR8

Variable spot diameter

Spot diameters ranging from $\phi 0.4$ to $\phi 3.5$ mm **$\phi 0.016$ to $\phi 0.138$ in** can be achieved by combining the lens with a variety of fibers.



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 $\phi 4$ mm **$\phi 0.157$ in** at a sensing range of 0 to 30 mm **0 to 1.181 in**.



All models

Tightening torque 5 times (compared to conventional models)

The standard aluminum body has been changed to stainless steel (SUS303) to reduce the likelihood of damage from over-tightening.

Standard lens outer diameter of $\phi 4.3$ mm **$\phi 0.169$ in**

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

LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)					Beam axis dia. (Fiber Core) (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Square head	M3	Tough (Bending durability) FT-R31	R2	2 m	STD 270 10.630 HYPR 1,000 39.370	580 22.835 440 17.323 160 6.299 55 2.165	510 20.079 HYPR 1,670 65.748	1,120 44.094 700 27.559 310 12.205	100 3.937 340 13.386	ø0.5	IP67	-55 to +80 °C	P.66
	Lens mountable	Tough (Bending durability) FT-R43	R4		STD 720 28.346 HYPR 3,000 118.110	1,600 62.992 1,100 43.307 430 16.929 130 5.118	1,250 49.213 HYPR 3,600 141.732 (Note 2)	2,650 104.331 1,750 68.898 750 29.528	210 8.268 640 25.197	ø1			P.67
	Lens mountable (FX-LE2)	FT-R41W			STD 800 31.496 HYPR 3,200 125.984	1,800 70.866 1,400 55.118 460 18.110 150 5.906	1,300 51.181 HYPR 3,600 141.732 (Note 2)	2,900 114.173 1,850 72.835 800 31.496	250 9.843 710 27.953	ø1	IP40	-40 to +60 °C	P.66
	With expansion lens	FT-R42W	R1		STD 2,200 86.614 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,500 137.795 1,300 51.181 460 18.110	STD 3,600 141.732 (Note 2) HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 2,800 110.236	510 20.079 2,000 78.740	ø2.2			
	Cable-protection type Lens mountable	Tough (Bending durability) FT-R44Y	R4		STD 720 28.346 HYPR 3,000 118.110	1,600 62.992 1,100 43.307 430 16.929 130 5.118	1,300 51.181 HYPR 3,600 141.732 (Note 2)	2,900 114.173 1,800 70.866 800 31.496	210 8.268 640 25.197	ø1	IP67 (Note 3)	-55 to +80 °C	P.67
	Full-protection type	Tough (Bending durability) FT-R60Y	R4		STD 2,100 82.677 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 1,260 48.606 400 15.748	STD 3,600 141.732 (Note 2) HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 1,900 74.803	690 27.165 1,890 74.409	ø3.5	IP68G		

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 fiber cable length practically limits the sensing range.
3) The fiber part is oil-resistant.

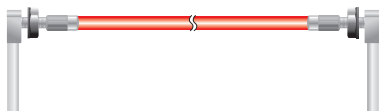
Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)					Beam axis dia. (Fiber Core) (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Square head	Coaxial, Lens mountable	Tough (Bending durability) FD-R31G	R2	2 m	STD 170 6.693 HYPR 530 20.866	310 12.205 260 10.236 85 3.346 27 1.063	290 11.417 HYPR 900 35.433	600 23.622 400 15.748 160 6.299	45 1.772 150 5.906	Emitter ø0.5		-55 to +80 °C	
	Coaxial, Lens mountable	FD-R32EG			STD 145 1.772 HYPR 170 6.693	110 4.331 92 3.622 30 1.181 9 0.354	STD 80 3.150 HYPR 290 11.417	180 7.087 110 4.331 45 1.772	20 0.787 68 2.677	Emitter ø0.25	IP40	-40 to +70 °C	
	Coaxial, Lens mountable	FD-R34EG	R4		STD 138 1.496 HYPR 130 5.118	90 3.543 70 2.756 23 0.906 7 0.276	STD 70 2.756 HYPR 250 9.843	140 5.512 90 3.543 40 1.575	17 0.669 60 2.362	Emitter ø0.175		-20 to +60 °C	P.78
	Coaxial, Lens mountable	FD-R33EG			STD 119 0.748 HYPR 84 3.307	44 1.732 33 1.299 11 0.433 3 0.118	STD 30 1.181 HYPR 110 4.331	65 2.559 40 1.575 18 0.709	7 0.276 22 0.866	Emitter ø0.125			
	M4	Tough (Bending durability) FD-R41	R2		STD 210 8.268 HYPR 710 27.953	430 16.929 320 12.598 100 3.937 34 1.339	STD 340 13.386 HYPR 1,150 45.276	750 29.528 450 17.716 190 7.480	60 2.362 170 6.693	ø0.75	IP67	-55 to +80 °C	
	Cable-protection type	Tough (Bending durability) FD-R61Y	R4		STD 280 11.024 HYPR 990 38.976	610 24.016 435 17.126 160 6.299 50 1.969	STD 450 17.717 HYPR 1,350 53.150	1,000 39.370 650 25.591 250 9.843	85 3.346 185 7.283	—	IP67 (Note 3)		

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 is specified for white non-glossy paper.
3) The fiber part is oil-resistant.

FIBER OPTIONS

Lens (For thru-beam type fiber) ▶ P.53~



Lens (For reflective type fiber) ▶ P.55



Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
Bending durability : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Cylindrical Type

- Has a slender shape which can be mounted in narrow locations using set screws.
- Line up that includes ultra-thin fibers with $\varnothing 0.25$ mm $\varnothing 0.010$ in tips.



<Thru-beam type> FT-S21/S21W/S31W <Reflective type> FD-S32/S31

- User-friendly, high quality fiber
- Improved centering accuracy and specularity

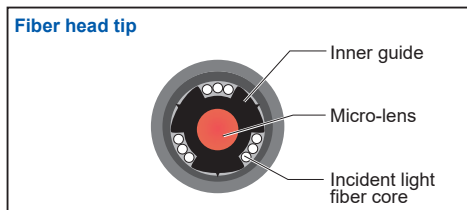
Stainless steel fittings are used for the fiber head of all models.

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

FT-S22 / FD-S34G Tough fiber with built-in lens

Micro-lens and inner guide structure

The built-in micro-lens has achieved the small head size. The compact head with the built-in lens measures only 1.5 mm $\varnothing 0.059$ in in diameter. Furthermore, the reflective type has an inner guide for a uniform layout of fiber cores to reduce the variation in the amount of light received.

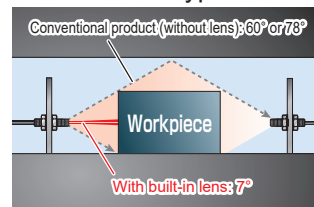


Aperture angle of 7°!

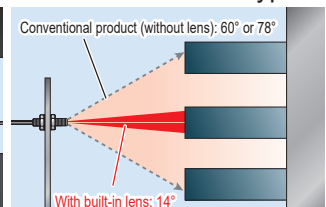
Narrow aperture angle reduces scattered light!

The narrow aperture angle of 7° (coaxial reflective type: 14°) minimizes the scattering of light and ensures stable detection even when installed in a narrow space.

▶ Thru-beam type



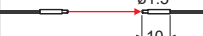
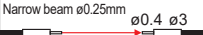
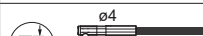
▶ Coaxial reflective type



Refer to p.15~ for threaded type tough fibers with built-in lens **FT-32** and **FD-34G**.

LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length  Free-cut	Sensing range (mm in) (Note 1)						Beam axis position / Inclination of beam axis (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST				
Cylindrical	ø1	 Tough  FT-S11	R2	500 mm	STD 190 3.543 HYPR 350 13.780	210 8.268 160 6.299 60 2.362 19 0.748	STD 130 5.118 HYPR 400 15.748	280 11.024 180 7.867 80 3.145	40 1.575 90 3.543	ø0.25	—	-55 to +80 °C	P.67	
	ø1.5	 Tough  FT-S21			STD 315 12.402 HYPR 1,350 53.150	770 30.315 550 21.654 210 8.268 70 2.756	STD 450 17.717 HYPR 1,600 62.992	1,000 39.370 670 26.378 280 11.024	130 5.118 340 13.386	150 μm / ±2°				
	ø1.5	 FT-S21W	R1	2 m	STD 260 10.236 HYPR 990 38.976	590 23.228 440 17.323 150 5.906 53 2.087	STD 400 15.748 HYPR 1,650 64.961	850 33.465 580 22.835 240 9.449	80 3.150 240 9.449	150 μm / ±3°	—	-40 to +60 °C		
	With lens	 Tough  FT-S22			STD 450 17.717 HYPR 1,500 59.055	920 36.220 730 28.740 250 9.843 90 3.543	STD 870 34.252 HYPR 2,900 114.173	1,900 74.803 1,200 47.244 530 20.866	230 9.055 560 22.047	ø0.7				
	ø2.5	 FT-S32		R10	STD 3,100 122.047 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 1,800 70.866 600 23.622	STD 3,600 141.732 (Note 2) HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 3,000 118.110	1,100 43.307 3,000 118.110	ø2	—	-40 to +70 °C	P.68	
ø3	 FT-S31W	R1	1 m	STD 800 31.496 HYPR 3,300 129.921	1,900 74.803 1,400 55.118 490 19.291 160 6.299	STD 1,100 43.307 HYPR 3,600 141.732 (Note 2)	2,450 96.457 1,600 62.992 650 25.591	260 10.236 720 28.346	ø1	150 μm / ±3°	-40 to +60 °C	P.64		
Ultra-small diameter	ø3	 Narrow beam ø0.125mm Sleeve part cannot be bent. Tough  FT-E13	R2	1 m	STD 15 0.591 HYPR 52 2.047	30 1.181 24 0.945 8 0.315 2 0.079	STD 21 0.827 HYPR 68 2.677	45 1.772 30 1.181 12 0.472	6 0.236 19 0.748	ø0.125	—	IP67	-40 to +70 °C	P.64
	ø3	 Narrow beam ø0.25mm Sleeve part cannot be bent. Tough  FT-E23			STD 75 2.953 HYPR 270 10.630	160 6.299 125 4.921 42 1.654 13 0.512	STD 120 4.724 HYPR 355 13.976	250 9.843 165 6.496 70 2.756	22 0.866 80 3.150	ø0.25	—	IP50	-40 to +60 °C	P.68
Side-view	ø4	 Tough  FT-V40	R4	2 m	STD 3,500 137.795 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 2,400 94.488 850 33.465	STD 3,600 141.732 (Note 2) HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	1,000 39.370 3,100 122.047	ø2.5	—	IP50	-40 to +60 °C	P.68

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 fiber cable length practically limits the sensing range.

Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)						Beam axis position / Inclination of beam axis	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)			
Cylindrical	ø1.5	Tough (Bending durability) FD-S21	R2	1 m	STD 80 3.150 HYPR 190 7.480	130 5.118 110 4.331 37 1.457 11 0.433		STD 85 3.346 HYPR 175 6.890	130 5.118 110 4.331 50 1.969	25 0.984 70 2.756	—	IP40	-55 to +80 °C	P.78
	ø3	Tough (Bending durability) FD-S32	R4		STD 420 16.535 HYPR 1,200 47.244	790 31.102 660 25.984 220 8.661 75 2.953		STD 600 23.622 HYPR 1,600 62.992	1,200 42.244 900 35.433 350 13.780	120 4.724 345 13.583	150 μm / ±3°			
	ø3	FD-S32W	R1	2 m	STD 270 10.630 HYPR 900 35.433	630 24.803 430 16.929 150 5.906 45 1.772		STD 450 17.717 HYPR 1,400 55.118	1,000 39.370 650 25.591 250 9.843	80 3.150 230 9.055	—	IP67	-40 to +60 °C	P.79
	ø3	Tough (Bending durability) FD-S31	R2		STD 125 4.921 HYPR 515 20.276	290 11.417 220 8.661 80 3.150 25 0.984		STD 200 7.874 HYPR 700 27.559	450 17.717 300 11.811 130 5.118	35 1.378 140 5.512	150 μm / ±3°			
	Coaxial ø3	FD-S33GW	R1	2 m	STD 150 5.906 HYPR 670 26.378	340 13.386 280 11.024 90 3.543 25 0.984		STD 240 9.449 HYPR 880 34.646	550 21.654 370 14.567 150 5.906	45 1.772 140 5.512	—	—	-40 to +60 °C	P.73
	Coaxial, With lens ø3	Tough (Bending durability) FD-S34G	R2		STD 90 3.543 HYPR 330 12.992	185 7.283 135 5.305 49 1.929 15 0.591		STD 130 5.118 HYPR 480 18.898	310 12.205 180 7.187 80 3.150	29 1.142 90 3.543	—			
Ultra-small diameter	ø1.5	FD-E13	R4	1 m	STD 12 0.472 HYPR 150 1.969	29 1.142 25 0.984 7 0.276 2 0.079		STD 23 0.906 HYPR 75 2.953	50 1.969 30 1.181 12 0.472	5 0.197 15 0.591	—	IP40	-40 to +60 °C	P.73
	ø3	FD-E23			STD 55 2.165 HYPR 170 6.693	120 4.724 80 3.150 30 1.181 9 0.354		STD 80 3.150 HYPR 290 11.417	170 6.693 105 4.134 45 1.772	20 0.787 70 2.756	—			

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 is specified for white non-glossy paper.

Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
(Bending durability) : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Sleeve

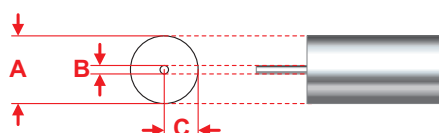
- It is suitable for sensing in narrow locations and sensing minute objects because the fiber tip is a thin sleeve.
- The 40 mm 1.575 in sleeve type can be bent in any direction.



<Thru-beam type> FT-E13 / FT-E23 Ultra-small diameter fiber

Centering accuracy of 1/10 mm or less

Ultra-small diameter fibers with a compact head ensure precision centering accuracy* to stably detect minute parts.



* Tolerance of A + Tolerance of B + Tolerance of C = $\pm 0.09 \text{ mm}$ $\pm 0.004 \text{ in}$

Dimensions UNCLEAR

Previous general fiber

Extra clearance needs to be added when designing and machining the mounting hole due to unclear dimensions. As a result, mounting variation increases and the beam axis deviates, resulting in a decrease in sensing accuracy or causing the sleeve to bend or break.

Dimensions CLEAR

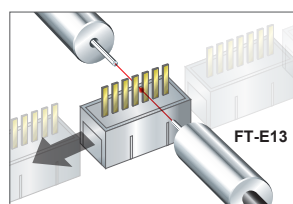
Example: FT-E13

New standard fiber

Highly accurate design and machining are possible due to clear mounting hole dimensions. As a result, mounting variation is minimal, improving sensing accuracy. In addition to this, as the beam axis alignment is not affected when the fiber is changed, readjustment is not necessary.

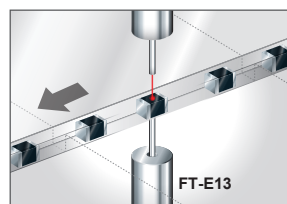
Minute sensing only possible with ultra small fiber

Detection of fine-pitch connector pins



Ultra-small diameter fiber with $\phi 0.125 \text{ mm}$ $\phi 0.005 \text{ in}$ beam axis is able to detect the insertion or bending of fine-pitch connector pins.

Detection of tiny chips

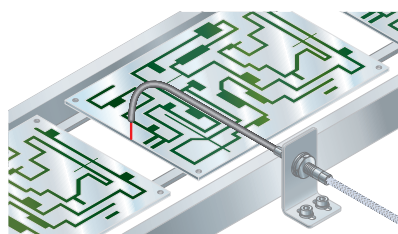


Fiber can be installed with only the $\phi 0.25 \text{ mm}$ $\phi 0.010 \text{ in}$ sleeve close to the minute section.

Stainless steel fittings are used for the fiber head of all models.

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

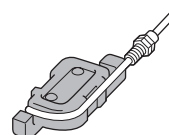
Application



FIBER OPTION

Fiber bender

·FB-1



The fiber bender bends the sleeve part of the fiber head at the proper radius.

Note: Do not bend the sleeve part of any side-view type fiber or ultra-small diameter head type fiber.

LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)						Beam axis dia. (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)			
Threaded	M3 Sleeve 40mm ø0.88 10	Tough (Bending durability) FT-31S	R2 (Note 2)	2 m	STD 315 12.402 HYPR 1,220 48.031	740 29.134 550 21.654 195 7.677 63 2.480		STD 480 18.898 HYPR 1,580 62.205	1,000 39.370 700 27.559 290 11.417	130 5.118 340 13.386	ø0.5	IP67	-55 to +80 °C	P.63
	M4 Sleeve 40mm ø1.48 12	Tough (Bending durability) FT-42S	R4 (Note 2)	2 m	STD 1,130 44.488 HYPR 3,600 141.732	2,050 80.709 1,600 62.992 530 20.866 190 7.480		STD 1,470 57.874 HYPR 3,600 141.732 (Note 3)	2,900 114.173 2,100 82.677 890 35.039	300 11.811 800 31.496	ø1			
Cylindrical	Ultra-small diameter ø3 Narrow beam ø0.125mm Sleeve part cannot be bent.	Tough (Bending durability) FT-E13	R2	1 m	STD 15 0.591 HYPR 52 2.047	30 1.181 24 0.945 8 0.315 2 0.079		STD 21 0.827 HYPR 68 2.677	45 1.772 30 1.181 12 0.472	6 0.236 19 0.748	ø0.125	IP67	-40 to +70 °C	P.64
	ø3 Narrow beam ø0.25mm Sleeve part cannot be bent.	Tough (Bending durability) FT-E23	R2	1 m	STD 175 2.953 HYPR 270 10.630	160 6.299 125 4.921 42 1.654 13 0.512		STD 120 4.724 HYPR 355 13.976	250 9.843 165 6.496 70 2.756	22 0.866 80 3.150	ø0.25			
	Side-view ø2 Sleeve part cannot be bent.	Tough (Bending durability) FT-V23	R4	2 m	STD 450 17.717 HYPR 1,800 70.866	1,000 39.370 880 34.646 280 11.024 90 3.543		STD 750 29.528 HYPR 2,400 94.488	1,600 62.992 1,050 41.339 450 17.717	160 6.299 400 15.748	ø0.75	IP30	-55 to +80 °C	P.68
		Tough (Bending durability) FT-V25	R2		STD 240 9.449 HYPR 900 35.433	550 21.654 480 18.898 140 5.512 45 1.772		STD 450 17.717 HYPR 1,400 55.118	950 37.402 630 24.803 280 11.024	95 3.740 260 10.236	ø0.5			
		Tough (Bending durability) FT-V24W	R1		STD 110 4.331 HYPR 380 14.961	230 9.055 200 7.874 60 2.362 20 0.787		STD 160 6.299 HYPR 500 19.685	350 13.780 220 8.661 95 3.740	35 1.378 90 3.543	ø0.5			
		Tough (Bending durability) FT-V30	R4		STD 680 26.772 HYPR 2,200 86.614	1,200 47.244 1,000 39.370 340 13.386 100 3.937		STD 950 37.402 HYPR 3,600 141.732 (Note 2)	1,950 76.772 1,300 51.181 550 21.654	180 7.087 480 18.898	ø1.0			
	ø2.5 Sleeve part cannot be bent.													
	ø2.5 Sleeve part cannot be bent.													
	ø2.5 Sleeve part cannot be bent.													
	ø2.5 Sleeve part cannot be bent.													
	ø2.5 Sleeve part cannot be bent.													

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) Bending radius of sleeve part is R10 mm R0.394 in or more. 3) The fiber cable length practically limits the sensing range.

Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)						Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Threaded	Ultra-small diameter M3 Sleeve 15mm ø0.8 15 Sleeve part cannot be bent.	FD-EG30S	R4	1 m	STD 50 1.969 HYPR 170 6.693	110 4.331 80 3.150 30 1.181 9 0.354		STD 90 3.543 HYPR 320 12.598	190 7.480 120 4.724 50 1.969	20 0.787 70 2.756	IP40	-40 to +70 °C	P.74
	M4 Sleeve 40mm ø1.48 12	Tough (Bending durability) FD-41S	R2 (Note 3)	2 m	STD 125 4.921 HYPR 515 20.276	290 11.417 220 8.661 80 3.150 25 0.984		STD 200 7.874 HYPR 750 29.528	450 17.717 310 12.205 140 5.512	35 1.378 140 5.512	IP67	-55 to +80 °C	P.71
	M4 Sleeve 40mm ø1.48 12	FD-41SW	R1 (Note 3)		STD 80 3.150 HYPR 330 12.992	180 7.087 140 5.512 45 1.772 12 0.472		STD 130 5.118 HYPR 480 18.898	310 12.205 190 7.480 80 3.150	15 0.591 60 2.362			
	M6 Sleeve 40mm ø2.5 15	Tough (Bending durability) FD-61S	R4 (Note 3)		STD 420 16.535 HYPR 1,200 47.244	790 31.102 660 25.984 220 8.661 75 2.953		STD 650 25.591 HYPR 1,900 74.803	1,300 51.181 900 35.433 400 15.748	130 5.118 360 14.173		-55 to +80 °C	P.72
Cylindrical	Ultra-small diameter ø1.5 Sleeve part cannot be bent.	FD-E13	R4	1 m	STD 12 0.472 HYPR 50 1.969	29 1.142 25 0.984 7 0.276 2 0.079		STD 23 0.906 HYPR 75 2.953	50 1.969 30 1.181 12 0.472	5 0.197 15 0.591	IP40	-40 to +60 °C	P.73
	ø3 Coaxial Sleeve part cannot be bent.	FD-E23	R4	1 m	STD 55 2.165 HYPR 170 6.693	120 4.724 80 3.150 30 1.181 9 0.354		STD 80 3.150 HYPR 290 11.417	170 6.693 105 4.134 45 1.772	20 0.787 70 2.756		-40 to +70 °C	P.73
	Side-view ø3 Sleeve part cannot be bent.	Tough (Bending durability) FD-V30	R2	2 m	STD 65 2.559 HYPR 240 9.449	130 5.118 120 4.724 35 1.378 14 0.551		STD 90 3.243 HYPR 430 16.929	210 8.268 145 5.709 65 2.559	25 0.984 75 2.953	IP30	-55 to +80 °C	P.79
	ø3 Sleeve part cannot be bent.	FD-V30W	R1		STD 20 0.787 HYPR 80 3.150	40 1.575 30 1.181 10 0.394 2 0.079		STD 30 1.181 HYPR 120 4.724	65 2.559 37 1.457 16 0.630	6 0.236 20 0.787			
	ø5 Sleeve part cannot be bent.	Tough (Bending durability) FD-V50	R4		STD 120 4.724 HYPR 370 14.567	220 8.661 210 8.268 75 2.953 25 0.984		STD 180 7.087 HYPR 530 20.866	400 15.748 240 9.449 110 4.331	40 1.575 100 3.937			

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.

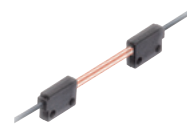
2) The sensing range is specified for white non-glossy paper. 3) Bending radius of sleeve part is R10 mm R0.394 in or more.

Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.

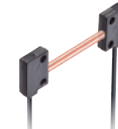
(Bending durability) : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Flat Type

■ Since it has a thin, rectangular shape, it can be installed in narrow locations. It is also a fiber with good workability and can be mounted directly with screws.



FT-Z30H



FT-Z30E



FT-Z30

Supplied with a boss that allows for a single mount point

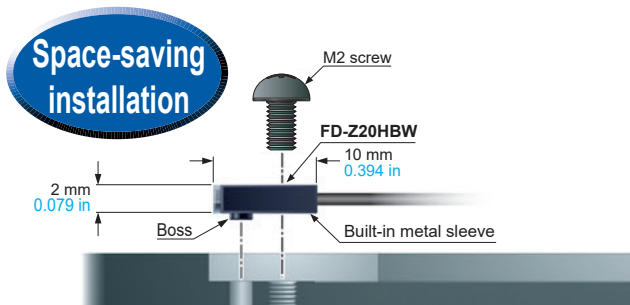
The fiber can be fastened with either a single M2 or M3 screw, and all mounting holes are reinforced with a metal sleeve for durability against excess tightening torque.

- Models that use a M2 screw

FT-Z20W, FT-Z20HBW, FD-Z20W, FD-Z20HBW

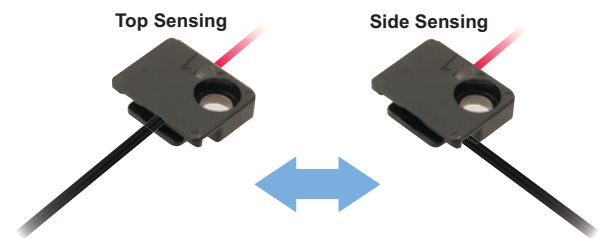
- Models that use a M3 screw

FT-Z40W, FT-Z40HBW, FD-Z40W, FD-Z40HBW



Fiber guide provides additional space savings

FT-Z□HBW and **FD-Z□HBW** are equipped with a fiber guide feature. Top sensing and side sensing can be selected with one head.



LIST OF FIBERS

Thru-beam type (one pair set)

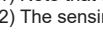
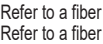
Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)					Beam axis dia. (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Flat	Top sensing W3 × H8 × D12	Tough FT-Z30H	R2	2 m	STD 3,500 137.795	3,600 141.732 (Note 2)		STD 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	1,400 55.118	2 × 3	IP40	P.69
	Top sensing W3 × H8 × D12	FT-Z30HW	R1		HYPR (Note 2) 3,600 141.732	2,600 102.362 810 31.890		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,200 125.984			
	Side sensing W3 × H12 × D8	Tough FT-Z30E	R2		STD 3,500 137.795	3,600 141.732 (Note 2)		STD 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	1,200 47.244			
	Side sensing W3 × H12 × D8	FT-Z30EW	R1		HYPR (Note 2) 3,600 141.732	2,400 94.488 740 29.134		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,200 125.984			
	Front sensing W8.5 × H12 × D3	Tough FT-Z30	R2		STD 2,100 82.677	3,600 141.732 (Note 2)		STD 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	710 27.953			
	Front sensing W8.5 × H12 × D3	FT-Z30W			HYPR (Note 2) 3,600 141.732	1,200 47.244 410 16.142		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	2,300 90.551			
	Front sensing W10 × H7 × D2	FT-Z20W	R1	1 m	STD 620 24.409	3,300 129.921 1,100 43.307		STD 1,100 43.307	1,600 62.992 (Note 2)	280 11.024	ø2	-40 to +60 °C	P.68
	Fiber guide type W2 × H10 × D10	FT-Z20HBW			HYPR (Note 2) 1,600 62.992	3,200 125.984 1,000 39.370 280 11.024		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	540 21.260			
	Front sensing W14 × H7 × D3.5	FT-Z40W			STD 1,500 59.055	2,300 90.551 900 35.433		STD 2,000 78.740	2,800 110.236	410 16.142			
	Fiber guide type W3.5 × H14 × D11	FT-Z40HBW			HYPR (Note 2) 3,600 141.732	290 11.417		HYPR 3,600 141.732 (Note 2)	1,200 47.244	1,200 47.244			
	Easy mounting, Rectangular head SEMI S2 compliant (Note 3) Metal-free W7 × H15 × D13	Tough FT-Z802Y	R4		STD 3,100 122.047	3,600 141.732 (Note 2)		STD 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	520 20.472			
					HYPR (Note 2) 3,600 141.732	1,900 74.803 470 18.504		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,100 122.047			
With boss	Front sensing W10 × H7 × D2	FT-Z20W	R1	1 m	STD 620 24.409	3,300 129.921 1,100 43.307		STD 1,100 43.307	1,600 62.992 (Note 2)	280 11.024	ø1.5	IP67	P.68
	Fiber guide type W2 × H10 × D10	FT-Z20HBW			HYPR (Note 2) 1,600 62.992	3,200 125.984 1,000 39.370 280 11.024		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	540 21.260			
	Front sensing W14 × H7 × D3.5	FT-Z40W			STD 1,500 59.055	2,300 90.551 900 35.433		STD 2,000 78.740	2,800 110.236	410 16.142			
	Fiber guide type W3.5 × H14 × D11	FT-Z40HBW			HYPR (Note 2) 3,600 141.732	290 11.417		HYPR 3,600 141.732 (Note 2)	1,200 47.244	1,200 47.244			
Chemical-resistant	Easy mounting, Rectangular head SEMI S2 compliant (Note 3) Metal-free W7 × H15 × D13	Tough FT-Z802Y	R4	2 m	STD 3,100 122.047	3,600 141.732 (Note 2)		STD 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	520 20.472	ø3.7	IP68G	0 to +60 °C
					HYPR (Note 2) 3,600 141.732	1,900 74.803 470 18.504		HYPR 3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,100 122.047			

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 fiber cable length practically limits the sensing range.

3) The design takes into account the environmental testing required by SEMI S2. To ensure that the final system complies with the standards, you must design and use it in accordance with relevant standards, regulations, and regulations.

Reflective type

Type		Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length ✂️ : Free-cut	Sensing range (mm in) (Note 1, 2)						Protection	Ambient temp.	Dimensions
						FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series				
Flat	With boss	Front sensing  W10 × H7 × D2	FD-Z20W	R1	✂️ 1 m	STD 1 to 65 0.039 to 2.559 HYPR 260 10.236	150 5.906 130 5.118 2 to 45 0.079 to 1.772 5 to 13 0.197 to 0.512		STD 130 5.118 HYPR 450 17.717	290 11.417 190 7.480 80 3.150	2 to 32 0.079 to 1.260 1 to 80 0.039 to 3.150	IP40	-40 to +60 °C	P.80
		Fiber guide type  W2 × H10 × D10	FD-Z20HBW			STD 2 to 85 0.079 to 3.346 HYPR 1 to 340 0.039 to 13.386	1 to 210 0.039 to 8.268 1 to 180 0.039 to 7.087 2 to 55 0.079 to 2.165 3 to 15 0.118 to 0.591		STD 170 6.693 HYPR 550 21.254	370 14.567 240 9.449 100 3.937	2 to 30 0.079 to 1.181 1 to 90 0.039 to 3.543	IP67		
		Front sensing  W14 × H7 × D3.5	FD-Z40W											
		Fiber guide type  W3.5 × H14 × D11	FD-Z40HBW											
	Without boss	Front sensing  W10 × H7 × D2	FD-Z20W	R2	✂️ 2 m	STD 190 7.480 HYPR 790 31.102	440 17.323 390 15.354 1 to 120 0.039 to 4.724 2 to 35 0.079 to 1.378		STD 390 15.254 HYPR 1,500 59.155	950 37.402 510 20.079 230 9.055	1 to 74 0.039 to 2.913 200 7.874	IP40		
		Fiber guide type  W2 × H10 × D10	FD-Z20HBW			STD 260 10.236 HYPR 760 29.921	540 21.260 470 18.504 1 to 160 0.039 to 6.299 2 to 50 0.079 to 1.989		STD 480 18.898 HYPR 1,350 53.150	1,000 39.370 680 26.772 270 10.630	1 to 90 0.039 to 3.543 0.5 to 240 0.020 to 9.449	IP67		
		Front sensing  W14 × H7 × D3.5	FD-Z40W											
		Fiber guide type  W3.5 × H14 × D11	FD-Z40HBW											

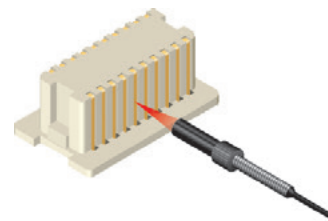
Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.

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

Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
Bending durability : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

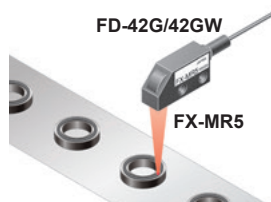
Small Spot

■ Sensing of minute objects can be performed by combining the fiber and spot lens. The spot diameter can also be changed.



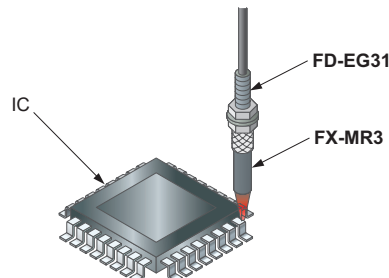
Applications

Packing detection

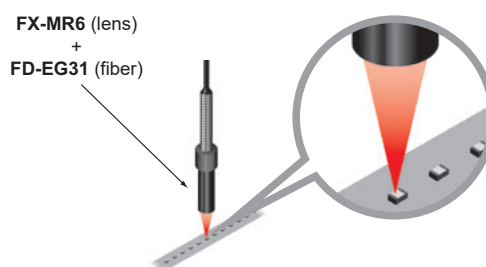


Because it's a side-view type, it can be mounted even in narrow spaces.

Number of IC pins checking



Discrimination of 0603 chip direction



Three optional lenses for reflective type fiber are available.
Perfect for chip component detection applications.

FX-MR7/MR8/MR9

Finest spot lens FX-MR7

About 3 times more light received (compared to conventional 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 $\varnothing 4$ mm $\varnothing 0.157$ in at a sensing range of 0 to 30 mm 0 to 1.181 in.



Typical FX-501 performance (STD mode)

	White	Black
FX-MR7 + FD-R33EG	3,200 digits	1,030 digits
FX-MR6 (conventional models) + FD-R33EG	1,000 digits	435 digits

Zoom lens FX-MR8

Variable spot diameter

Spot diameters ranging from $\varnothing 0.4$ to $\varnothing 3.5$ mm $\varnothing 0.016$ to $\varnothing 0.138$ in can be achieved by combining the lens with a variety of fibers.



All models

Tightening torque 5 times (compared to conventional models)

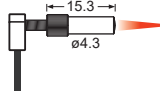
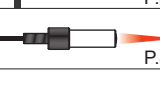
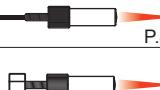
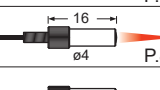
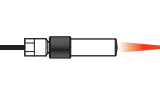
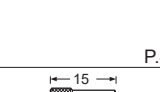
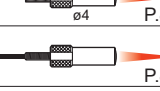
The standard aluminum body has been changed to stainless steel (SUS303) to reduce the likelihood of damage from over-tightening.

Standard lens outer diameter of $\varnothing 4.3$ mm $\varnothing 0.169$ in

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

LIST OF FIBERS

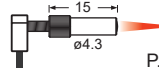
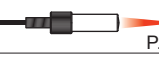
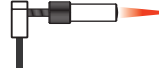
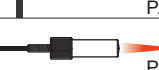
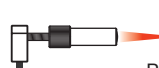
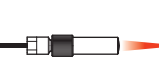
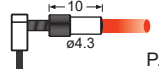
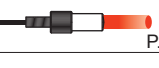
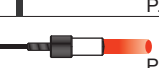
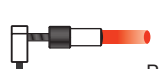
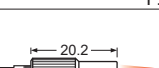
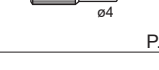
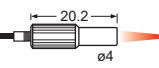
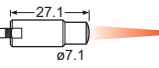
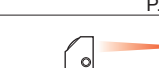
High precision fiber & spot lens

Designation	Shape of head (mm) / Dimensions of lens	Spot diameter (mm in) (Note 1)	Distance to focal point (mm in) (Note 1)	Lens		Applicable fibers					
				Model No.	Ambient temp.	Model No.	Fiber cable length ✂: Free-cut (Note 2)	Bending radius (mm)	Protection	Ambient temp.	Dimensions
Finest spot lens		ø0.1 ø0.004 approx. P.83	7±0.5 0.276 ±0.020	FX-MR7	-55 to +70 °C	FD-R33EG	500 mm	R4	IP40	-20 to +60 °C	P.78
						FD-EG31					P.74
		FD-R34EG				P.78					
		FD-R32EG				-40 to +70 °C				P.73	
		FD-EG30								P.73	
		ø0.4 ø0.016 approx. P.83				Tough (Bending durability) FD-R31G	2 m	R2		-55 to +80 °C	P.78
						Tough (Bending durability) FD-42G		R1			-40 to +60 °C
						FD-42GW				R2	
						FD-32G		✂ 1 m (Note 3)			
		ø0.1 ø0.004 P.83				7±0.5 0.276 ±0.020	FX-MR6 (Note 4)	-20 to +60 °C		FD-EG31	500 mm
		ø0.2 ø0.008 P.83	FD-EG30	-40 to +70 °C	P.73						
		ø0.4 ø0.016 P.83	Tough (Bending durability) FD-42G	2 m	R2				-55 to +80 °C	P.72	
			FD-42GW		R1				-40 to +60 °C		
			FD-32G	✂ 1 m (Note 3)	R2				-55 to +80 °C	P.71	
			FD-32GX								
		ø0.15 ø0.006 P.83	7.5±0.5 0.295 ±0.020	FX-MR3 (Note 4)	-40 to +70 °C	FD-EG31	500 mm	R4	-20 to +60 °C	P.74	
		ø0.3 ø0.012 P.83				FD-EG30			-40 to +70 °C	P.73	
		ø0.5 ø0.020 P.83				Tough (Bending durability) FD-42G	2 m	R2	-55 to +80 °C	P.72	
						FD-42GW		R1	-40 to +60 °C		
						FD-32G	✂ 1 m (Note 3)	R2	-55 to +80 °C	P.71	
		FD-32GX									

- Notes: 1) Spot diameter, distance to focal point and sensing range are specified for **FX-500 / FX-550 / FX-100** series.
 2) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
 3) The allowable cutting range is 700 mm **27.559 in** from the end that the amplifier inserted.
 4) Finest spot lenses **FX-MR6 / FX-MR3** are used with **FD-R33EG / FD-R34EG / FD-R32EG / FD-R31G** as well. Please refer to our website for more details.

LIST OF FIBERS

High precision fiber & spot lens

Designation	Shape of head (mm) / Dimensions of lens	Spot diameter (mm in) (Note 1)	Distance to focal point (mm in) (Note 1)	Lens		Applicable fibers												
				Model No.	Ambient temp.	Model No.	Fiber cable length ✂ : Free-cut (Note 2)	Bending radius (mm)	Protection	Ambient temp.	Dimensions							
Zoom lens		P.83	10 to 30 0.394 to 1.181	FX-MR8	-55 to +70 °C	FD-R33EG	500 mm	R4	IP40	-20 to +60 °C	P.78							
		P.83				FD-EG31					P.74							
		P.83				FD-R34EG					P.78							
		P.83				FD-R32EG				-40 to +70 °C	P.73							
		P.83				FD-EG30					P.78							
		P.83				Tough (Bending durability) FD-R31G	2 m	R2		-55 to +80 °C	P.71							
		P.83				Tough (Bending durability) FD-32G												
		P.83				Tough (Bending durability) FD-32GX						✂ 1 m (Note 3)						
	Parallel light lens					P.83	0 to 30 0 to 1.181	FX-MR9				-55 to +70 °C	FD-R33EG	500 mm	R4	IP40	-20 to +60 °C	P.78
						P.83							FD-EG31					P.74
		P.83	FD-R34EG	P.78														
		P.83	FD-R32EG	-40 to +70 °C	P.73													
		P.83	FD-EG30		P.78													
		P.83	Tough (Bending durability) FD-R31G	2 m	R2	-55 to +80 °C			P.72									
		P.83	Tough (Bending durability) FD-42G		R1	-40 to +60 °C			P.71									
		P.83	Tough (Bending durability) FD-42GW		R2				P.78									
		P.83	Tough (Bending durability) FD-32G	✂ 1 m (Note 3)		-55 to +80 °C			P.72									
		P.83	Tough (Bending durability) FD-32GX						P.71									
Pinpoint spot lens		P.82	Distance to focal point 6±1 0.236 ±0.039	FX-MR1	-40 to +70 °C	Tough (Bending durability) FD-42G	2 m	R2		-55 to +80 °C	P.72							
Zoom lens		P.82	Distance to focal point 18.5 to 43 0.728 to 1.693 approx.	FX-MR2	-40 to +70 °C	FD-42GW		R1		-40 to +60 °C								
		P.82	Distance to focal point 13 to 30 0.512 to 1.181 approx.			Tough (Bending durability) FD-42G		R2		-55 to +80 °C								
Zoom lens (Side-view type)		P.83	Distance to focal point 13 to 30 0.512 to 1.181 approx.	FX-MR5	-40 to +60 °C	FD-42GW		R1		-40 to +60 °C								

Notes: 1) Spot diameter, distance to focal point and sensing range are specified for FX-500 / FX-550 / FX-100 series.

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

3) The allowable cutting range is 700 mm 27.559 in from the end that the amplifier inserted.

Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
(Bending durability) : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Narrow Beam

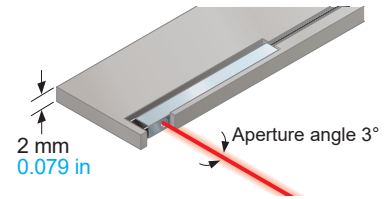
Since the beam is narrow, it has a feature by which it is not easily affected by surrounding obstacles even in long distances.

Applications

Detection of a transparent tube



Mapping of a wafer

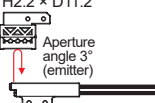
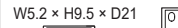
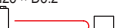


LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)						Beam axis dia. (mm)	Inclination of beam axis	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)				
Narrow beam Side-view	Aperture angle 2° ø3.5 ø3.7 20	Tough (Bending durability) FT-KS40	R2	2 m	STD (Note 2) 3,600 141.732 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 1,200 47.244	3,600 141.732 (Note 2)	STD (Note 2) 3,600 141.732 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,200 86.614 3,600 141.732 (Note 2)	ø2.2	—	IP40	-40 to +80 °C	P.66
	Aperture angle 2° ø4 25	Tough (Bending durability) FT-KV40			STD (Note 2) 3,600 141.732 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 1,200 47.244	3,600 141.732 (Note 2)	STD (Note 2) 3,600 141.732 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,200 86.614 3,600 141.732 (Note 2)	ø2.5	±0.8°	IP30	-40 to +60 °C	
	Aperture angle 2° ø4 25	FT-KV40W	R1		STD (Note 2) 3,600 141.732 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 3,100 122.047	3,600 141.732 (Note 2)	STD (Note 2) 3,600 141.732 HYPR (Note 2) 3,600 141.732	3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,200 86.614 3,600 141.732 (Note 2)	ø2.5	±0.8°	IP30	-40 to +60 °C	
	Aperture angle 3° 1.5 × 2 20	Tough (Bending durability) FT-KV26	R2		STD (Note 2) 1,600 62.992 HYPR (Note 2) 1,200 47.244	1,600 62.992 1,200 47.244 440 17.323	1,600 62.992 (Note 2)	STD (Note 2) 1,100 43.307 HYPR (Note 2) 1,100 43.307	1,100 43.307 (Note 2) 1,100 43.307 (Note 2) 1,100 43.307 (Note 2)	135 5.315 560 22.047	ø1	X ±1° Z ±0.5°	IP30	-40 to +80 °C	
	Aperture angle 3° 1.5 × 2 20	FT-KV26H1	R10		STD (Note 2) 1,430 56.299 HYPR (Note 2) 1,070 42.126	1,430 56.299 1,070 42.126 390 15.354	1,430 56.299 (Note 2)	STD (Note 2) 1,000 39.370 HYPR (Note 2) 1,000 39.370	1,000 39.370 (Note 2) 1,000 39.370 (Note 2) 1,000 39.370 (Note 2)	160 6.299 500 19.685	ø1	X ±1° Z ±0.5°	IP30	-40 to +105 °C	

Retroreflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length  Free-cut	Sensing range (mm in) (Note 1, 3)						Protection	Ambient temp.	Dimensions
					FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series				
With polarizing filter	 W30 × H30 × D0.5	FR-Z50HW		 2 m	STD  100 to 990 3.937 to 38.976	100 to 1,400 3.937 to 55.118 100 to 1,200 3.937 to 47.244 100 to 780 3.937 to 30.709 100 to 490 3.937 to 19.291	STD 100 to 1,150 3.937 to 45.278	100 to 1,800 3.937 to 70.866 100 to 1,400 3.937 to 55.118 100 to 950 3.937 to 37.402	100 to 550 3.937 to 21.654 100 to 830 3.937 to 32.677	IP40	-25 to +55 °C	P.70	
Ultra-narrow beam	 W4 × H2 × D21.5	 (Bending durability) FR-KZ22E	STD  15 to 310 0.591 to 12.205 HYPR  15 to 570 0.591 to 22.441		15 to 460 0.591 to 18.110 15 to 410 0.591 to 16.142 15 to 220 0.591 to 8.661 15 to 100 0.591 to 3.937	STD 15 to 540 0.591 to 21.260 HYPR 15 to 800 0.591 to 31.496	15 to 700 0.591 to 27.559 15 to 600 0.591 to 23.622 15 to 400 0.591 to 15.748	15 to 200 0.591 to 7.874 15 to 360 0.591 to 14.173					
Narrow beam	 W10.6 × H28 × D10.1	 (Bending durability) FR-KZ50H			STD  20 to 300 0.787 to 11.811 HYPR  20 to 1,000 0.787 to 39.370	20 to 800 0.787 to 31.496 20 to 400 0.787 to 15.748 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874	STD 20 to 400 0.787 to 15.748 HYPR 20 to 1,600 0.787 to 62.992	20 to 1,300 0.787 to 51.181 20 to 500 0.787 to 19.685 20 to 350 0.787 to 13.780	20 to 200 0.787 to 7.874 20 to 350 0.787 to 13.780				
	Side sensing	 W28 × H10.6 × D10.1			 (Bending durability) FR-KZ50E								

Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 4)						Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Long range	W5.2 × H9.5 × D16	FD-Z50HW	R1	2 m	STD (Note 2) 10 to 650 0.394 to 25.591 HYPR (Note 2) 10 to 2,500 0.394 to 98.425	10 to 1,100 0.394 to 43.307 10 to 1,000 0.394 to 39.370 10 to 410 0.394 to 16.142 10 to 130 0.591 to 5.118	10 to 950 0.394 to 37.402	STD (Note 2) 10 to 950 0.394 to 37.402 HYPR (Note 2) 10 to 3,700 0.394 to 154.669	10 to 2,100 0.394 to 82.677 10 to 1,300 0.394 to 51.181 10 to 590 0.394 to 23.228	10 to 200 0.394 to 7.874 10 to 330 0.394 to 13.780	IP40	-40 to +60 °C	P.80

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 fiber cable length practically limits the sensing range.

3) The sensing range is the possible setting range for the attached reflector. The fiber can detect an object less than setting range for the reflector.

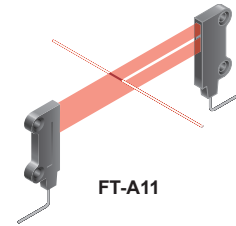
Refer to p.32 or p.47 for the sensing range when FR-Z50HW is used in combination with a reflector (optional).

4) The sensing range is specified for white non-glossy paper.

Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
 (Bending durability) : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Wide Beam

■ Senses a workpiece with indefinite shape or position in the wide beam without missing. It can also be used to discriminate shape.



FT-A11

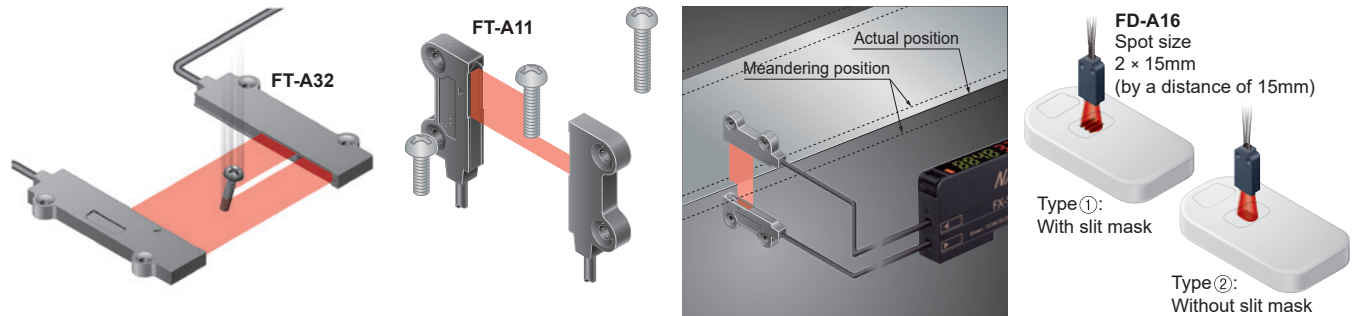
Applications

Sensing tiny moving objects

Inspecting screw height

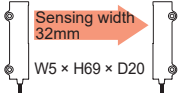
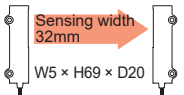
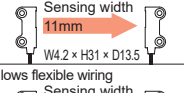
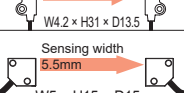
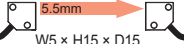
Control the amount of meandering

Confirming presence of slit mask



LIST OF FIBERS

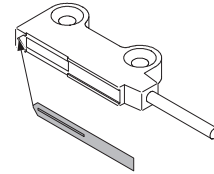
Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)						Beam axis dia. (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series					
Wide beam	 Sensing width 32mm W5 × H69 × D20	Tough (Bending durability) FT-A32 (Note 2)	R2	 2 m	STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)		STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3.2 × 32	IP40	-40 to +60 °C	P.64
	HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)			HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)								
	Allows flexible wiring  Sensing width 32mm W5 × H69 × D20	FT-A32W (Note 2)	R1		STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)		STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)				
	HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)			HYPR (Note 3) 3,600 141.732	3,000 118.110		HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)					
Wide beam	 Sensing width 11mm W4.2 × H31 × D13.5	Tough (Bending durability) FT-A11 (Note 2)	R2	STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)		STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)	1,900 74.803 3,600 141.732 (Note 3)	2.2 × 11	IP40	-40 to +70 °C	P.64	
	HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)		HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)									
	Allows flexible wiring  Sensing width 11mm W4.2 × H31 × D13.5	FT-A11W (Note 2)	R1	STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)		STD (Note 3) 3,600 141.732	3,600 141.732 (Note 3)	1,700 66.929 3,400 133.858					
	HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)		HYPR (Note 3) 3,600 141.732	1,300 51.181		HYPR (Note 3) 3,600 141.732	3,600 141.732 (Note 3)						
Array	 Sensing width 5.5mm W5 × H15 × D15	Tough (Bending durability) FT-AL05	R2	STD 860 33.858	1,550 61.024 1,500 59.055 500 19.685 170 6.693		STD 1,150 45.276 HYPR 2,350 92.520	1,600 62.992 660 25.984	250 9.843 660 25.984	0.25 × 5.5		-55 to +80 °C		

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 slit mask (accessory) is sold separately. Refer to the next page.
3) The fiber cable length practically limits the sensing range.

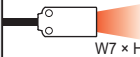
Accessories

- **FX-SL1** (one pair set) Slit mask for **FT-A11 / FT-A11W**, slit size: 0.5 × 12 mm **0.020 × 0.472 in**
- **FX-SL2** (one pair set) Slit mask for **FT-A11 / FT-A11W**, slit size: 1 × 12 mm **0.039 × 0.472 in**
- **FX-SL3** (one pair set) Slit mask for **FT-A32 / FT-A32W**, slit size: 0.5 × 33 mm **0.020 × 1.299 in**



LIST OF FIBERS

Reflective type

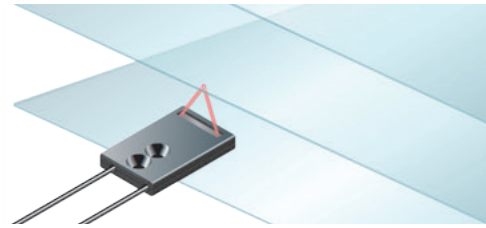
Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)					Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	
Wide beam	 W7 × H15 × D30	Tough (Bending durability) FD-A16	R4	 2 m	STD 200 7.874 HYPR Cannot use	200 7.874 200 7.874 140 5.512 75 2.953	STD 350 13.780 HYPR —	350 13.780 250 9.843	120 4.724 240 9.449	IP40	-40 to +60 °C	P.73
Array	 W5 × H20 × D20	Tough (Bending durability) FD-AL11	R2	 2 m	STD 320 12.598 HYPR 670 26.378	530 20.866 510 20.079 180 7.087 50 1.969	STD 450 17.717 HYPR 1,300 51.181	1,000 39.370 700 27.559 320 12.598	100 3.937 285 11.220	IP40	-55 to +80 °C	P.73

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 is specified for white non-glossy paper.

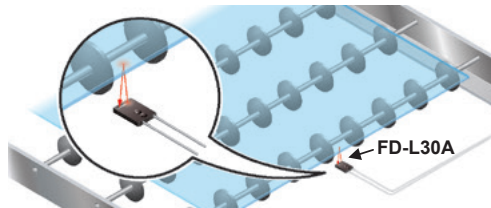
Convergent Reflective Type

It is a fiber in which the sensing distance is limited to a specific range so it is not easily affected by the background. It is effective when a workpiece is accumulated or when the background is near.

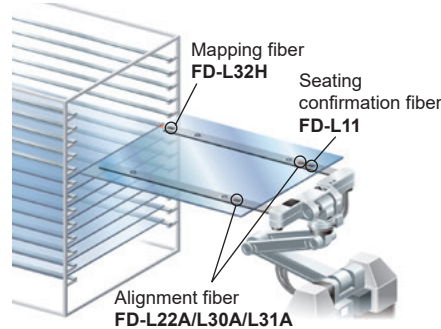


Applications

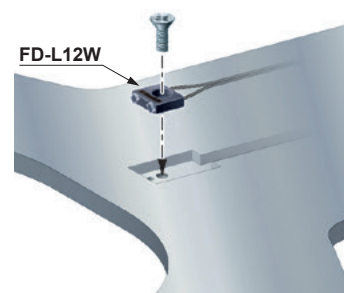
Detecting a passing glass



LCD transportation



Mounting in handling arms



LIST OF FIBERS

Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length (m)	Sensing range (mm in) (Note 1, 2)						Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST-H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Glass substrate detection	Mapping W25 × H7.3 × D30	FD-L32H	R4	4 m	STD 0 to 56 0 to 2.205 HYPR 0 to 110 0 to 4.331	0 to 87 0 to 3.425 0 to 74 0 to 2.913 1 to 38 0.039 to 1.496 Cannot use		STD 0 to 65 0 to 2.559 HYPR 0 to 100 0 to 3.397	0 to 90 0 to 3.543 0 to 75 0 to 2.953 0 to 50 0 to 1.969	16 to 30 0.630 to 1.181 0 to 50 0 to 1.969		-40 to +60 °C	P.78
	Alignment W20 × H29 × D3.8	FD-L30A	R2	3 m	STD 0 to 43 0 to 1.693 HYPR 0 to 43 0 to 1.693	0 to 43 0 to 1.693 0 to 43 0 to 1.693 0 to 42 0 to 1.654 0 to 29 0 to 1.142		STD 0 to 52 0 to 2.047 HYPR 0 to 72 0 to 2.835	0 to 68 0 to 2.677 0 to 62 0 to 2.441 0 to 46 0 to 1.811	0 to 40 0 to 1.575 0 to 50 0 to 1.969		0 to +70 °C	
	Alignment W23.5 × H29 × D4.5	FD-L31A	R4	3 m	STD 4 to 33 0.157 to 1.299 HYPR 3 to 35 0.118 to 1.378	4 to 33 0.157 to 1.299 4 to 33 0.157 to 1.299 4 to 32 0.157 to 1.260 5 to 25 0.197 to 0.984		STD 3 to 42 0.118 to 1.654 HYPR 0 to 50 0 to 1.967	2 to 43 0.079 to 1.693 3 to 42 0.118 to 1.654 3 to 40 0.118 to 1.575	5 to 30 0.197 to 1.181 4 to 33 0.157 to 1.299		0 to +70 °C	
	Alignment W17 × H29 × D3.8	FD-L22A	R2	2 m	STD 0 to 24 0 to 0.945 HYPR 0 to 31 0 to 1.220	0 to 28 0 to 1.102 0 to 27 0 to 1.063 0 to 24 0 to 0.945 0 to 18 0 to 0.709		STD 0 to 34 0 to 1.339 HYPR 0 to 35 0 to 1.378	0 to 35 0 to 1.378 0 to 35 0 to 1.378 0 to 32 0 to 1.260	0 to 19 0 to 0.748 0 to 25 0 to 0.984		-20 to +70 °C	
	Seating confirmation W18 × H29 × D3.8	FD-L23	R2	3 m	STD 0 to 29 0 to 1.142 HYPR 0 to 30 0 to 1.181	0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 28 0 to 1.102 1.5 to 24 0.059 to 0.945		STD 0 to 34 0 to 1.339 HYPR 0 to 34 0 to 1.339	0 to 34 0 to 1.339 0 to 34 0 to 1.339 0 to 32 0 to 1.260	0 to 28 0 to 1.102 0 to 30 0 to 1.181		-20 to +70 °C	
	Seating confirmation W12 × H19 × D3	FD-L11	R4	2 m	STD 0 to 9.5 0 to 0.374 HYPR 0 to 11.5 0 to 0.453	0 to 10.5 0 to 0.413 0 to 10 0 to 0.394 0 to 9 0 to 0.354 0 to 8 0 to 0.315		STD 0 to 13 0 to 0.512 HYPR 0 to 14 0 to 0.551	0 to 13 0 to 0.512 0 to 13 0 to 0.512 0 to 12 0 to 0.472	0 to 8 0 to 0.315 0 to 9 0 to 0.354		-40 to +60 °C	P.77
	Seating confirmation W12 × H19 × D3	FD-L10	R4	2 m	STD 0 to 5 0 to 0.197 HYPR 0 to 6 0 to 0.236	0 to 5.5 0 to 0.217 0 to 5.5 0 to 0.217 0 to 4.5 0 to 0.177 0 to 4 0 to 0.157		STD 0 to 5 0 to 0.197 HYPR 0 to 6 0 to 0.236	0 to 5.5 0 to 0.217 0 to 5.5 0 to 0.217 0 to 5 0 to 0.197	0 to 4.5 0 to 0.177 0 to 5.5 0 to 0.217		-40 to +60 °C	
	Seating confirmation W24 × H21 × D4	FD-L21	R2	2 m	STD 1.5 to 16 0.059 to 0.630 HYPR 1 to 19 0.039 to 0.748	1 to 18 0.039 to 0.709 1 to 18 0.039 to 0.709 2 to 15 0.079 to 0.591 3 to 12 0.118 to 0.472		STD 1 to 19 0.039 to 0.748 HYPR 1 to 20 0.039 to 0.787	1 to 20 0.039 to 0.787 1 to 19 0.039 to 0.748 2 to 18 0.079 to 0.709	3 to 15 0.118 to 0.591 1.5 to 16 0.059 to 0.630		-40 to +60 °C	
	Seating confirmation W24 × H21 × D4	FD-L21W	R1	2 m	STD 3 to 14 0.118 to 0.551 HYPR 1.5 to 15 0.059 to 0.591	2 to 15 0.079 to 0.591 2 to 15 0.079 to 0.591 4 to 14 0.157 to 0.551 6.5 to 10 0.256 to 0.394		STD 2 to 18 0.079 to 0.709 HYPR 1 to 19 0.039 to 0.748	1 to 19 0.039 to 0.748 2 to 18 0.079 to 0.709 3 to 17 0.118 to 0.669	7 to 12 0.276 to 0.472 3 to 14 0.118 to 0.551		-40 to +60 °C	
	General purpose W6 × H18 × D14	FD-L20H	R2	2 m	STD 23 0.906 HYPR 45 1.772	0 to 35 0 to 1.378 0 to 32 0 to 1.260 2 to 15 0.079 to 0.591 5 to 9 0.197 to 0.354		STD 0 to 33 0 to 1.229 HYPR 0 to 65 0 to 2.559	0 to 50 0 to 1.969 0 to 40 0 to 1.575 0 to 25 0 to 0.984	5 to 15 0.197 to 0.591 1 to 30 0.039 to 1.181		-40 to +60 °C	
Ultra-small	W7.2 × H7.5 × D2	FD-L12W	R1	1 m	STD 8 0.315 HYPR 14 0.551	0 to 12.5 0 to 0.492 0 to 12 0 to 0.472 0.5 to 7 0.020 to 0.276 0.5 to 4 0.020 to 0.157		STD 0 to 12 0 to 0.472 HYPR 0 to 17 0 to 0.669	0 to 16 0 to 0.630 0 to 15 0 to 0.591 0 to 10 0 to 0.394	1 to 4.5 0.039 to 0.177 0.5 to 7 0.020 to 0.276		-40 to +60 °C	IP30

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 is specified for transparent glass 100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in (FD-L32H: R edge, FD-L21 and FD-L21W: t2 mm 0.079 in) (FD-L20H: white non-glossy paper, FD-L10: silicon wafers 100 × 100 mm 3.937 × 3.937 in).

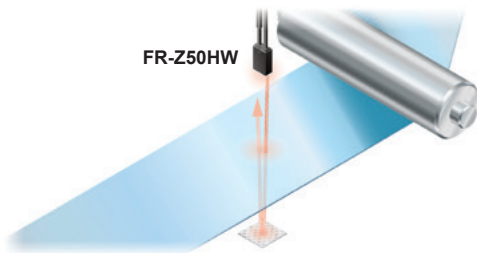
Tough: Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
(Bending durability): Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Retroreflective Type

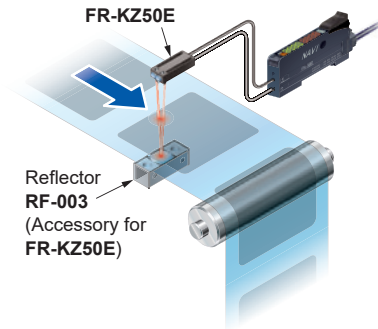
Compared with the thru-beam type, it is easier to arrange the fibers since one side is a reflector. Sensing transparent objects is also its advantage.

Applications

Detecting transparent film



Detecting transparent seals on transparent sheet



LIST OF FIBERS

Retroreflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)					Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	
With polarizing filters	W5.2 × H9.5 × D16 W30 × H30 × D0.5	FR-Z50HW	R1	2 m	STD 100 to 980 3.937 to 38.976 HYPR 100 to 1,900 3.937 to 74.803	100 to 1,400 3.937 to 55.118 100 to 1,200 3.937 to 47.244 100 to 780 3.937 to 30.709 100 to 490 3.937 to 19.291		STD 100 to 1,150 3.937 to 45.278 HYPR 100 to 2,250 3.937 to 88.583	100 to 1,800 3.937 to 70.866 100 to 1,400 3.937 to 55.118 100 to 950 3.937 to 37.402	100 to 550 3.937 to 21.654 100 to 830 3.937 to 32.677	IP40	-25 to +55 °C
Ultra-narrow beam	W7.5 × H2.2 × D11.2 Aperture angle 3° (emitter) W4 × H2 × D21.5	Tough FR-KZ22E			STD 15 to 310 0.591 to 12.205 HYPR 15 to 570 0.591 to 22.441	15 to 460 0.591 to 18.110 15 to 410 0.591 to 16.142 15 to 220 0.591 to 8.661 15 to 100 0.591 to 3.937		STD 15 to 540 0.591 to 21.260 HYPR 15 to 800 0.591 to 31.496	15 to 700 0.591 to 27.559 15 to 600 0.591 to 23.622 15 to 400 0.591 to 15.748	15 to 200 0.591 to 7.874 15 to 360 0.591 to 14.173	IP30	-40 to +60 °C
Narrow beam	W5.2 × H9.5 × D21 W10.6 × H28 × D10.1	Tough FR-KZ50H	R2		STD 20 to 300 0.787 to 11.811 HYPR 20 to 1,000 0.787 to 39.370	20 to 800 0.787 to 31.496 20 to 400 0.787 to 15.748 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874		STD 20 to 400 0.787 to 15.748 HYPR 20 to 1,600 0.787 to 62.982	20 to 1,300 0.787 to 51.181 20 to 500 0.787 to 19.685 20 to 350 0.787 to 13.780	20 to 200 0.787 to 7.874 20 to 350 0.787 to 13.780		
Side sensing	W9.5 × H25 × D5.2 W28 × H10.6 × D10.1	Tough FR-KZ50E										

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 is the possible setting range for the attached reflector. The fiber can detect an object less than setting range for the reflector.

Sensing range when FR-Z50HW is used in combination with a reflector (optional)

Reflector model No.	Sensing range (mm in)											
	FX-500 series						FX-550 series					
	HYPR	U-LG	LONG	STD	FAST	H-SP	HYPR	U-LG	LONG	STD	FAST	FX-101
RF-230	100 to 19,000 3.937 to 748.030	100 to 8,000 3.937 to 314.960	100 to 5,000 3.937 to 196.850	100 to 3,600 3.937 to 141.732	100 to 2,900 3.937 to 114.173	100 to 1,400 3.937 to 55.118	100 to 20,000 3.937 to 78.402	100 to 11,000 3.937 to 433.071	100 to 7,000 3.937 to 275.591	100 to 5,000 3.937 to 196.850	100 to 3,500 3.937 to 137.795	100 to 2,400 3.937 to 94.488
RF-220	100 to 8,000 3.937 to 314.960	100 to 4,700 3.937 to 185.039	100 to 3,500 3.937 to 137.795	100 to 3,000 3.937 to 118.110	100 to 1,800 3.937 to 70.866	100 to 830 3.937 to 32.677	100 to 10,000 3.937 to 393.701	100 to 6,500 3.937 to 255.906	100 to 4,500 3.937 to 177.165	100 to 3,500 3.937 to 137.795	100 to 2,500 3.937 to 98.425	100 to 1,300 3.937 to 51.181
RF-210	100 to 5,500 3.937 to 216.535	100 to 2,700 3.937 to 106.299	100 to 2,400 3.937 to 94.488	100 to 1,500 3.937 to 59.055	100 to 1,200 3.937 to 47.244	100 to 530 3.937 to 20.866	100 to 7,000 3.937 to 275.591	100 to 4,000 3.937 to 157.480	100 to 3,600 3.937 to 141.732	100 to 2,800 3.937 to 110.236	100 to 2,100 3.937 to 82.677	100 to 980 3.937 to 38.583

Note: The sensing range is the possible setting range for the reflector. The fiber can detect an object less than 100 mm 3.937 in. However, note that if there are any white or highly-reflective surfaces near the fiber head, reflected incident light may affect the fiber head. If this occurs, adjust the threshold value of the amplifier unit before use.

FIBER OPTION

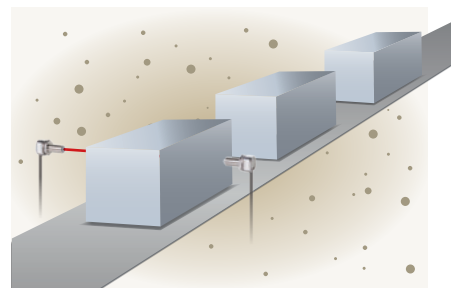
Reflectors (for FR-Z50HW) ▶ P.57



Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
Bending durability : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

Oil-resistant

- The fiber core will not harden or break, even in environments where oil is present.
- Resist to oil by using fluorine resin.

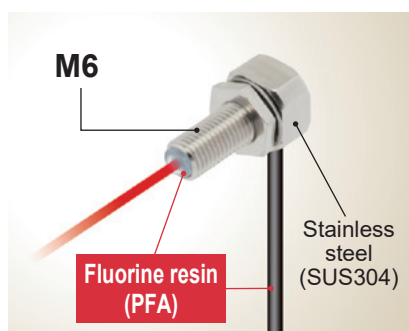


<Thru-beam type> Full-protection type IP68G rating

FT-R60Y

High environmental resistance

The head, nut, and washer are made from rust-resistant stainless steel (SUS304). The unbreakable tough fiber with high durability is covered in a fluorine resin tube. The fiber head is also covered with a fluorine resin component, achieving a high level of environmental resistance.



Less susceptibility to oil adhesion thanks to fluorine resin

Fibers deliver stable detection, since the sensing part is sealed with fluorine resin, which does not allow oil penetration. Additionally, the detection part features a convex design made of fluorine resin, achieving lower friction than glass.

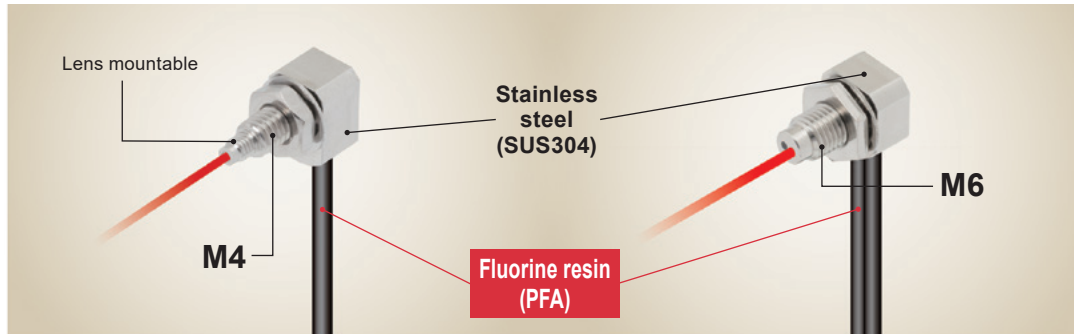


Resistant to oil and coolant

The fiber head and fiber cable are connected by the "fastening and caulking" method without using adhesives. This method eliminates concerns that adhesives will absorb moisture in high-humidity environments and damage the fiber. The enclosure achieves IP68G protection, so the fiber can be installed around metal processing machines shrouded in the oil mist.

Test oil	Product
Lubricating oil	Velocite Oil No. 3
Non-water-soluble cutting oil	Yushiron Cut Abas KZ201
	Yushiron Cut UH75
Water-soluble cutting oil	Syntilo 9954 (10% diluted)
	Yushiroken S50N (2% diluted)
Alcohol-based neutral detergent	Super Teepol

* Yushiron and Yushiroken are registered trademarks of Yushiro Chemical Industry Co., Ltd.

Cable-protection type IP67 rating**FT-R44Y / FD-R61Y****FT-R44Y** (Square head type M4 / thru-beam type)**FD-R61Y** (Square head type M6 / reflective type)**Even stronger than tough fiber**

The tough fiber has been reinforced by covering it with a fluorine resin tube so that it can be used even in harsh environments where oils and solvents are used. The fiber cable will not harden or break, even if it is splashed with oil.

IP67 rating

The head, nut, and washer are made from rust-resistant stainless steel (SUS304).

**LIST OF FIBERS****Thru-beam type (one pair set)**

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)					Beam axis dia. (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Oil-resistant Square head type	M6 Full-protection type W10 × H11 × D21.2	Tough (Bending durability) FT-R60Y	R4	2 m	STD 2,100 82.677 HYPR 3,600 141.732 (Note 3)	3,600 141.732 (Note 3) 1,260 49.606 400 15.748		STD 3,600 141.732 (Note 3) HYPR 3,600 141.732 (Note 3)	3,600 141.732 (Note 3) 1,900 74.803	680 27.165 1,890 74.409	ø3.5	IP68G	-55 to +80 °C P.67
	M4 Cable-protection type Lens mountable W7 × H9.5 × D15.5	Tough (Bending durability) FT-R44Y			STD 720 28.346 HYPR 3,000 118.110	1,600 62.992 1,100 43.307 430 16.929 130 5.118		STD 1,300 51.181 HYPR 1,350 53.150	2,900 114.173 1,800 70.866 800 31.496	210 8.268 640 25.197	ø1	IP67 (Note 4)	

Reflective type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)					Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	
Oil-resistant Square head type	M6 Cable-protection type W10 × H11 × D15.5	Tough (Bending durability) FD-R61Y	R4	2 m	STD 280 11.024 HYPR 990 38.976	610 24.016 435 17.126 160 6.299 50 1.969		STD 450 17.717 HYPR 1,350 53.150	1,000 39.370 650 25.591 250 9.843	85 3.346 185 7.283	IP67 (Note 4)	-55 to +80 °C P.78

- 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 is specified for white non-glossy paper.
 3) The fiber cable length practically limits the sensing range.
 4) The fiber part is oil-resistant.

Chemical-resistant

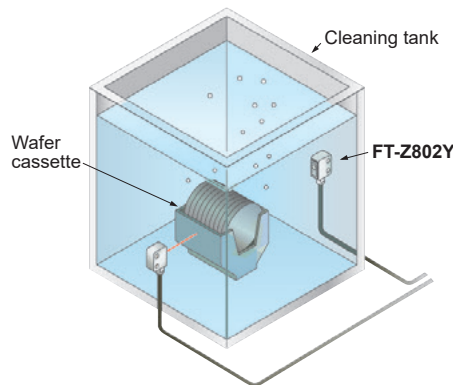
- Metal-free design
- With the case and fiber sheath made of PFA, the fiber can be used with various types of chemical liquids.



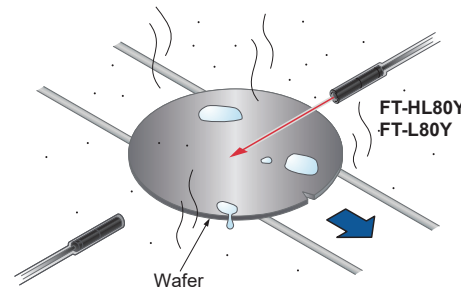
<Thru-beam type> Full-protection type Metal-free IP68G rating FT-HL80Y / FT-L80Y / FT-V80Y / FT-Z802Y

Applications

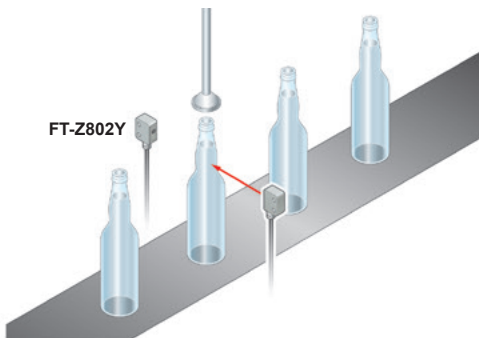
Detecting wafer cassette in cleaning tank



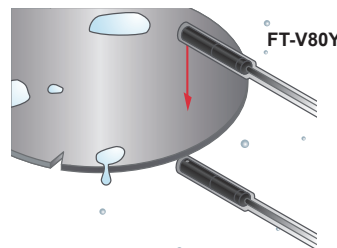
Sensing a wafer in corrosive environment



Detecting a container at a chemical piller



Sensing a wafer in corrosive environment



<Reflective type> Full-protection type Metal-free IP68G rating

FD-S60Y

Metal-free design

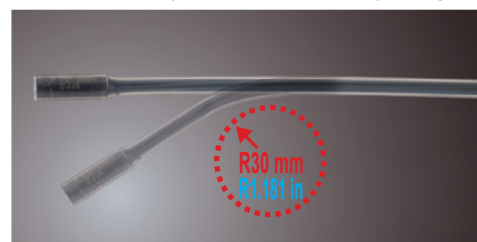
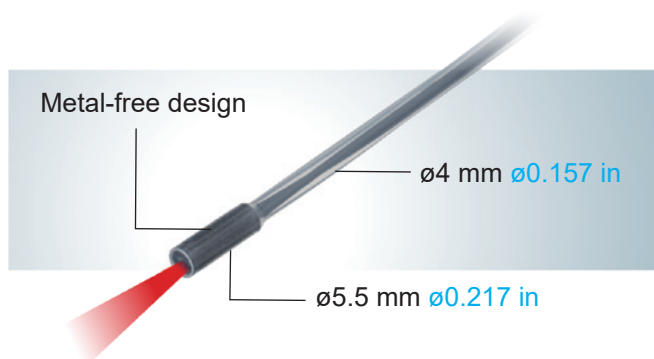
Since no metal components are used, there is no need to worry about metal contamination, even if the protective tube is damaged. It is ideal for use in applications such as semiconductor front-end equipment where a clean environment is required.

Detection in long range and narrow view

A built-in lens achieves narrow-view detection with an aperture angle of 30 degrees.

Improved tip flexibility

The protective tube features a bending radius of R30 mm $R1.181$ in, which improved the cable arrangement compared to previous (R40 mm $R1.575$ in) designs.



LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)					Beam axis dia. (mm)	Protection	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)		
Chemical-resistant	Flat type Easy mounting • Rectangular head SEMI S2 compliant (Note 5) Metal-free W7 × H15 × D13	Tough (Bending durability) FT-Z802Y	R4	2 m	STD 3,100 122.047 HYPR (Notes 3) 3,600 141.732	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 1,900 74.803 470 18.504		STD 3,600 141.732 (Note 3) HYPR 3,600 141.732 (Note 3)	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 3,600 141.732 (Note 3)	520 20.472 3,100 122.047	IP68G	0 to +60 °C	P.69
	Cylindrical type Heat-resistant 115 °C Metal-free ø5.5 (25)	FT-HL80Y	R30	2 m (Note 4)	STD (Note 3) 3,600 141.732 HYPR (Notes 3) 3,600 141.732	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 2,300 90.551 740 29.134		STD 3,600 141.732 (Note 3) HYPR 3,600 141.732 (Note 3)	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 3,600 141.732 (Note 3)	990 38.976 2,340 92.126		-40 to +115 °C	P.66
	Metal-free ø5.5 (25)	FT-L80Y			STD (Note 3) 3,600 141.732 HYPR (Notes 3) 3,600 141.732	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 2,800 110.236 920 36.220		STD 3,600 141.732 (Note 3) HYPR 3,600 141.732 (Note 3)	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 3,600 141.732 (Note 3)	1,100 43.307 2,600 102.362		-40 to +70 °C	P.68
	Side-view Metal-free ø5.5 (25)	FT-V80Y			STD 1,300 51.181 HYPR (Notes 3) 3,600 141.732	2,800 110.236 2,200 86.614 800 31.496 240 9.449		STD 2,200 86.614 HYPR 3,600 141.732 (Note 3)	3,600 141.732 (Note 3) 3,600 141.732 (Note 3) 1,400 55.118	340 13.386 800 31.496	ø2.8		

Reflective type

Type		Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1, 2)						Protection	Ambient temp.	Dimensions
						FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series				
Chemical-resistant	Cylindrical type	Metal-free 	Tough  Bending durability FD-S60Y	Protective tube R30 mm Fiber R4	 2 m (Note 4)	STD 320 12.598		590 23.228	STD 450 17.717	700 27.559	140 5.512	IP68G	-40 to +70 °C	P.79
						HYPR 600 23.622		420 16.535						

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 is specified for white non-glossy paper.

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

4) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

5) The design takes into account the environmental testing required by SEMI S2. To ensure that the final system complies with the standards, you must design and use it in accordance with relevant standards, regulations, and regulations.

Heat-resistant

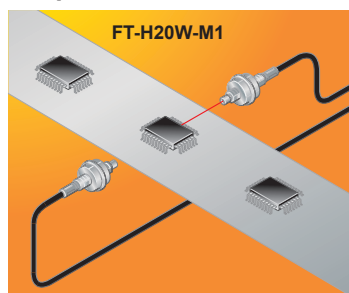
■ It can be used under environments of -60 to +350 °C
-76 to +662 °F.

■ A joint type for wider workability is also available.

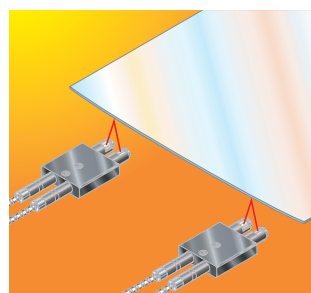
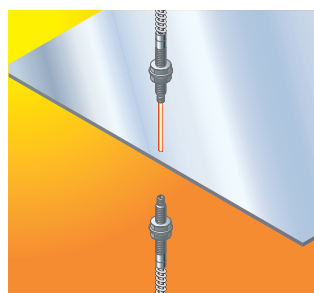


Applications

IC detection within a high temperature handler

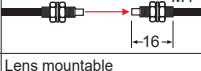
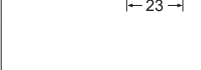


Detecting glass substrates



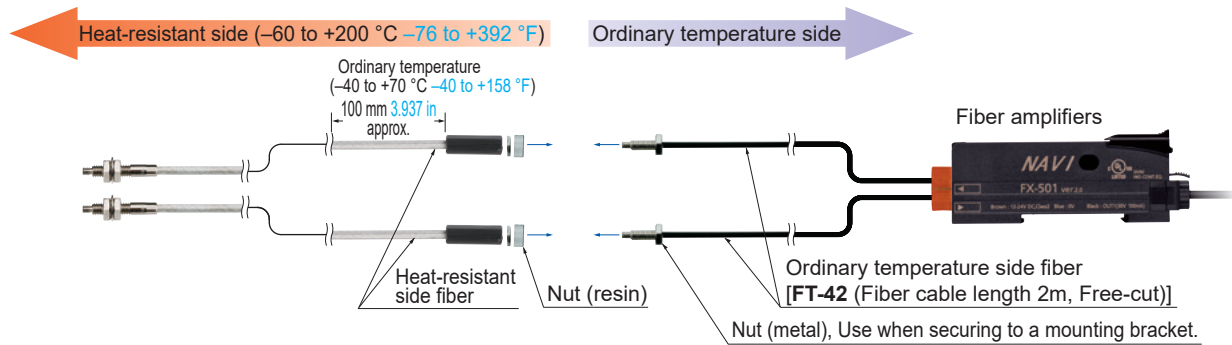
LIST OF FIBERS

Thru-beam type (one pair set)

Type	Heat-resistant temp.	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length Free-cut	Sensing range (mm in) (Note 1)						Beam axis dia. (mm)	Ambient temp.	Dimension
						FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST			
Heat-resistant	350 °C	Lens mountable (FX-LE1/LE2/SV1) 	FT-H35-M2	R25	2 m	STD 430 16.929 HYPR 1,200 47.244	880 34.646 670 26.378 250 9.843 80 3.150	STD 1,050 41.339 HYPR 3,600 141.732 (Note 2)	2,300 90.551 1,500 59.055 650 25.591	170 6.693 490 19.291	ø1.2	-60 to +350 °C	P.65	
		Sleeve 60 mm 	FT-H35-M2S6	Fiber R25 Sleeve R10										
	200 °C	Allows flexible wiring Lens mountable (FX-LE1/LE2/SV1) 	FT-H20W-M1	R10	1 m	STD 470 18.504 HYPR 1,600 62.992 (Note 2)	1,000 39.370 840 33.071 300 11.811 90 3.543	STD 730 28.740 HYPR 1,600 62.992 (Note 2)	1,600 62.992 (Note 2) 1,050 41.339 440 17.323	100 3.937 300 11.811	ø0.8	-60 to +200 °C		
		Lens mountable (FX-LE1/LE2/SV1) 	FT-H20-M1	R25		STD 540 21.260 HYPR 1,600 62.992 (Note 2)	1,300 51.181 960 37.795 330 12.992 110 4.331	STD 1,000 39.370 HYPR 1,600 62.992 (Note 2)	1,600 62.992 (Note 2) 1,600 62.992 (Note 2) 600 23.622	210 8.268 540 21.260				ø1.2
130 °C	Lens mountable (FX-LE2 only) 	FT-H13-FM2			2 m	STD 700 27.559 HYPR 3,300 129.921	1,900 74.803 1,300 51.181 410 16.142 140 5.512	STD 1,150 45.276 HYPR 3,600 141.732 (Note 2)	2,700 106.299 1,690 66.535 750 29.528	250 9.843 700 27.559	ø1.5	-60 to +130 °C		
Heat-resistant (joint)	200 °C	Lens mountable (FX-LE1/LE2/SV1) 	FT-H20-J20-S (Note 5)	Heat-resistant side R18 (Note 4)	200 mm (Note 3)						ø1.2	-60 to +200 °C		
			FT-H20-J30-S (Note 5)		300 mm (Note 3)	STD 470 18.504 HYPR 1,600 62.992	1,000 39.370 790 31.102 300 11.811 90 3.543	STD 860 33.858 HYPR 2,600 102.362	1,800 70.866 1,200 47.244 530 20.866	135 5.315 420 16.535				
		FT-H20-J50-S (Note 5)												
		Side-view 	FT-H20-VJ50-S (Note 5)		500 mm (Note 3)	STD 600 23.622 HYPR 2,100 82.677	1,300 51.181 980 38.583 390 15.354 120 4.724	STD 1,000 39.370 HYPR 3,600 141.732 (Note 2)	2,200 86.614 1,400 55.118 620 24.409	150 5.906 500 19.685				
		FT-H20-VJ80-S (Note 5)	800 mm (Note 3)											

- 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 fiber cable length practically limits the sensing range.
3) Fiber length (fixed-length) for heat-resistant fiber side. Fiber length for ordinary temperature side is 2 m 6.562 ft (free-cut).
4) Bending-resistant fiber R4 mm R0.157 in or more for ordinary temperature side.
5) Heat-resistant joint fibers and ordinary-temperature fibers (FT-42) are sold as a set.

Heat-resistant joint fiber set contents

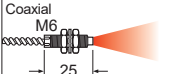
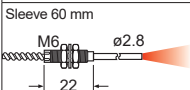
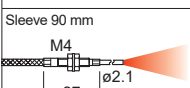
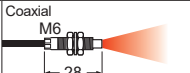
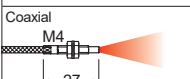
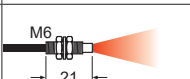
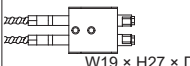
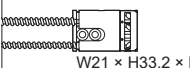
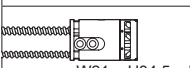
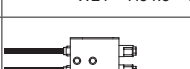


Model No. when ordering individually as spare parts

- Heat-resistant side fiber **one pair set**
FT-H20-J20, FT-H20-J30, FT-H20-J50, FT-H20-VJ50, FT-H20-VJ80
- Ordinary temperature side fiber **one pair set**
FT-42

LIST OF FIBERS

Reflective type

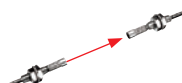
Type	Heat-resistant temp.	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length  Free-cut	Sensing range (mm in) (Note 1, 2)					Ambient temp.	Dimensions	
						FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes			U-LG LONG FAST
Heat-resistant	Threaded		FD-H35-M2	R25	2 m	STD 260 10.236 HYPR 720 28.346	540 21.260 460 18.110 150 5.906 45 1.772	STD 400 15.748 HYPR 750 29.528	600 23.662 500 19.685 220 8.661	75 2.953 280 11.024	-60 to +350 °C	P.76	
			FD-H35-M2S6	Fiber R25									
			FD-H35-20S	Sleeve R10		STD 260 10.236 HYPR 840 33.071	550 21.654 440 17.323 140 5.512 45 1.772	STD 410 16.142 HYPR 850 33.465	750 29.528 550 21.654 230 9.055	85 3.346 200 7.874			
		200 °C		FD-H20-M1	1 m	STD 330 12.992 HYPR 840 33.071	550 21.654 500 19.685 200 7.874 55 2.165	STD 450 17.717 HYPR 1,350 53.150	1,000 39.370 650 25.591 300 11.811	120 4.724 300 11.811	-60 to +200 °C	P.75	
			FD-H20-21	STD 230 9.055 HYPR 770 30.315		500 19.685 380 14.961 130 5.118 45 1.772	STD 450 17.717 HYPR 1,250 49.213	850 33.465 650 25.591 250 9.843	90 3.543 280 11.024				
		130 °C		FD-H13-FM2		 2 m	STD 350 13.780 HYPR 880 34.646	640 25.197 600 23.622 200 7.874 65 2.559	STD 670 26.378 HYPR 1,650 64.961	1,300 51.181 940 37.008 390 15.354			100 3.937 280 11.024
	Glass substrate detection convergent reflective	300 °C		FD-H30-L32	R25	2 m	STD 0 to 17 0 to 0.669 HYPR 0 to 40 0 to 1.575	0 to 30 0 to 1.181 0 to 25 0 to 0.984 0 to 12 0 to 0.472 1.5 to 6 0.059 to 0.236	STD 0 to 21 0 to 0.827 HYPR 0 to 60 0 to 2.362	0 to 42 0 to 1.654 0 to 25 0 to 0.984 0 to 16 0 to 0.630	2 to 9 0.079 to 0.354 0 to 17 0 to 0.669	-60 to +300 °C	P.76
		250 °C		FD-H25-L43	3 m		STD 1.5 to 26 0.059 to 1.024 HYPR 1 to 31 0.039 to 1.220	1 to 30 0.039 to 1.181 1 to 28 0.039 to 1.102 1.5 to 24 0.059 to 0.945 2 to 18 0.079 to 0.709	STD 1 to 28 0.039 to 1.102 HYPR 1 to 31 0.039 to 1.220	1 to 30 0.039 to 1.181 1 to 28 0.039 to 1.142 1 to 26 0.039 to 1.024	4 to 16 0.157 to 0.630 4 to 23 0.157 to 0.906		
			FD-H25-L45	STD 5 to 42 0.197 to 1.654 HYPR 4 to 43.5 0.157 to 1.713		4 to 43 0.157 to 1.693 4.5 to 43 0.177 to 1.693 5 to 40 0.197 to 1.575 6.5 to 34 0.256 to 1.339	STD 4 to 48 0.157 to 1.890 HYPR 4 to 51 0.157 to 2.008	4 to 50 0.157 to 1.969 4 to 49 0.157 to 1.929 4 to 44 0.157 to 1.732	7 to 35 0.276 to 1.378 7 to 38 0.276 to 1.496				
		180 °C		FD-H18-L31	 2 m	STD 0 to 16 0 to 0.630 HYPR 0 to 60 0 to 2.362	0 to 32 0 to 1.260 0 to 24 0 to 0.945 0 to 13 0 to 0.512 2 to 6.5 0.079 to 0.256	STD 0 to 45 0 to 1.772 HYPR 0 to 130 0 to 5.118	0 to 85 0 to 3.346 0 to 60 0 to 2.362 0 to 30 0 to 1.181	0 to 10 0 to 0.394 0 to 25 0 to 0.984	-60 to +180 °C		

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 the value for white non-glossy paper (50 × 50 mm 1.969 × 1.969 in glass substrate for FD-H30-L32 and FD-H18-L31, transparent glass 100 × 100 × 0.7 mm 3.937 × 3.937 × 0.028 in for FD-H25-L43 and FD-H25-L45).

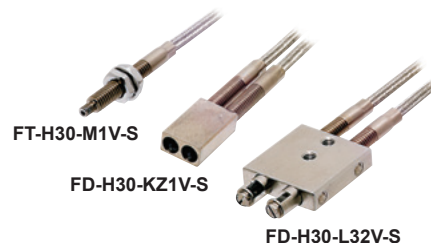
FIBER OPTION

Lens (For thru-beam type fiber) ▶ P.53~



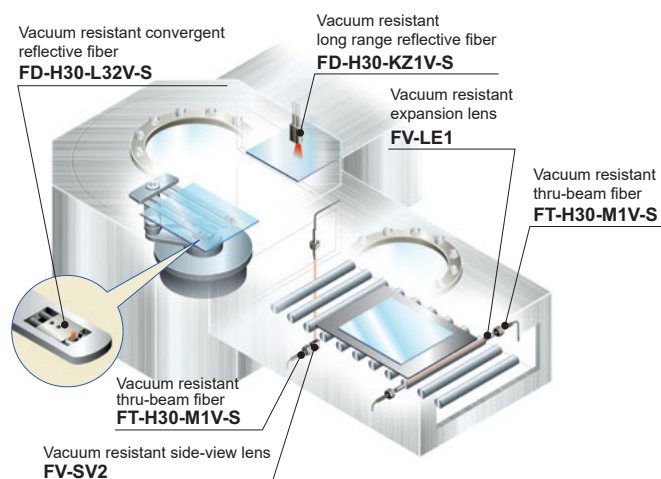
Vacuum-resistant

- Usable in high-temperatures of 300 °C 572 °F vacuum
- The leakage of **FV-BR1** is still less than a very slight 1.33×10^{-10} Pa · m³/s [He], so that it can be used in vacuums with confidence.



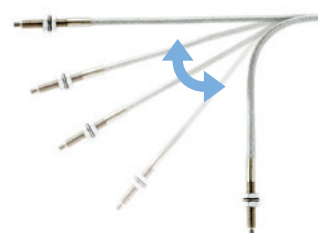
Applications

Detecting an FPD in vacuum chamber



Highly resistant to repeated bending

Because it has a bending durability of over 100,000 times (R20 mm [R0.787 in](#)), it is highly resistant to repeated bending and is optimal for mounting on moving robot hand.



LIST OF FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length	Sensing range (mm in)					Beam axis dia. (mm)	Ambient temp.	Dimensions
					FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	
Vacuum-resistant Thru-beam	300 °C Lens mountable (FV-LE1/SV2) M4 W9.5 × H5.2 × D15	FT-H30-M1V-S (Note)	R18	1 m	STD 270 10.630 HYPR 160 6.299 1,000 39.370	590 23.228 470 18.504 160 6.299 55 2.165		STD 400 15.748 HYPR 250 9.843 1,400 55.118	950 37.402 620 24.409 250 9.843	110 4.331 280 11.024	ø1.2 -30 to +300 °C	P.65

Note: Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**).

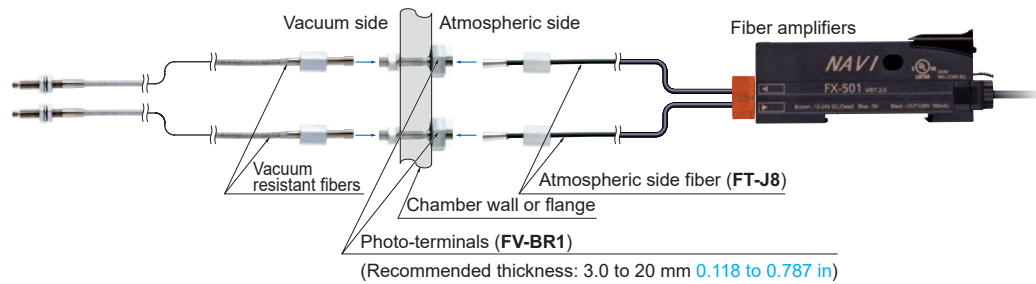
Reflective type

Type		Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length	Sensing range (mm in)(Note 2)						Ambient temp.	Dimensions
						FX-500 series		Other modes	U-LG LONG FAST H-SP	FX-550 series			
Vacuum-resistant	Reflective	300 °C, Rectangular head  W9.5 × H5.2 × D15	FD-H30-KZ1V-S (Note 1)	R18	1 m	STD 20 to 200 0.787 to 7.874 HYPR 5 to 500 0.197 to 19.685	10 to 340 0.394 to 13.386 15 to 270 0.591 to 10.630 20 to 120 0.787 to 4.724 20 to 45 0.787 to 1.772	STD 20 to 450 0.787 to 17.717 HYPR 5 to 1,500 0.197 to 59.055	10 to 1,000 0.394 to 39.370 15 to 650 0.591 to 25.591 20 to 300 0.787 to 11.811	25 to 80 0.984 to 3.150 10 to 220 0.394 to 8.661	-30 to +300 °C	P.76	
	Convergent reflective	300 °C, Glass substrate detection  W19 × H5 × D27	FD-H30-L32V-S (Note 1)		3 m	STD 0 to 8 0 to 0.315 HYPR 0 to 18 0 to 0.709	0 to 12 0 to 0.472 0 to 10 0 to 0.394 0 to 5.5 0 to 0.217 1.5 to 3 0.059 to 0.118	STD 0 to 11 0 to 0.433 HYPR 0 to 27 0 to 1.063	0 to 19 0 to 0.748 0 to 13 0 to 0.512 0 to 7.5 0 to 0.295	2.5 to 6.5 0.098 to 0.256 0 to 11 0 to 0.433			

Notes: 1) Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**).

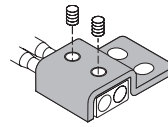
2) The sensing range is the value for transparent glass 100 × 100 × 10.7 mm [3.937 × 3.937 × 10.028 in](#).

Vacuum-resistant fiber set contents



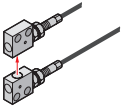
Model No. when ordering individually as spare parts

- Vacuum resistant fiber
FT-H30-M1V (one pair set)
FD-H30-KZ1V
FD-H30-L32V
- Photo-terminal
FV-BR1 (one pair set)
- Atmospheric side fiber
FT-J8 (one pair set)
- Mounting bracket for **FD-H30-KZ1V(-S)**
MS-FD-2



FIBER OPTIONS

Lens (For thru-beam type fiber)

Designation		Model No.	Description																																															
For thru-beam type fiber	Vacuum resistant expansion lens (Note 1)	FV-LE1		Increases the sensing range 4 times or more. • Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 3) • Beam axis dia: ø3.6 mm ø0.142 in Sensing range (mm in) [Lens on both sides] (Note 4) <table><thead><tr><th rowspan="2">Fiber</th><th rowspan="2">Mode</th><th colspan="6">Amplifier</th><th colspan="2">FX-100 series</th></tr><tr><th colspan="6">FX-500 series (Upper value) FX-550 series (Lower value)</th><th>FX-101</th><th>FX-102</th></tr></thead><tbody><tr><td rowspan="2">FT-H30-M1V-S</td><td></td><td>3,600 141.732 (Note 2)</td><td>3,600 141.732 (Note 2)</td><td>3,400 133.858 (Note 2)</td><td>1,500 59.055 (Note 2)</td><td>900 35.433 (Note 2)</td><td>370 14.567 (Note 2)</td><td>450 17.717 (Note 2)</td><td>1,600 62.992 (Note 2)</td></tr><tr><td></td><td>3,600 141.732 (Note 2)</td><td>3,600 141.732 (Note 2)</td><td>3,600 141.732 (Note 2)</td><td>2,500 98.425 (Note 2)</td><td>1,650 64.961 (Note 2)</td><td>—</td><td></td><td></td></tr></tbody></table>										Fiber	Mode	Amplifier						FX-100 series		FX-500 series (Upper value) FX-550 series (Lower value)						FX-101	FX-102	FT-H30-M1V-S		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,400 133.858 (Note 2)	1,500 59.055 (Note 2)	900 35.433 (Note 2)	370 14.567 (Note 2)	450 17.717 (Note 2)	1,600 62.992 (Note 2)		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	2,500 98.425 (Note 2)	1,650 64.961 (Note 2)	—		
	Fiber	Mode	Amplifier						FX-100 series																																									
FX-500 series (Upper value) FX-550 series (Lower value)						FX-101	FX-102																																											
FT-H30-M1V-S		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,400 133.858 (Note 2)	1,500 59.055 (Note 2)	900 35.433 (Note 2)	370 14.567 (Note 2)	450 17.717 (Note 2)	1,600 62.992 (Note 2)																																									
		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	2,500 98.425 (Note 2)	1,650 64.961 (Note 2)	—																																											
Vacuum resistant side-view lens (Note 1)	FV-SV2		Beam axis is bent by 90°. • Ambient temperature: -60 to +300 °C -76 to +572 °F (Note 3) • Beam axis dia: ø3.7 mm ø0.146 in Sensing range (mm in) [Lens on both sides] (Note 4) <table><thead><tr><th rowspan="2">Fiber</th><th rowspan="2">Mode</th><th colspan="6">Amplifier</th><th colspan="2">FX-100 series</th></tr><tr><th colspan="6">FX-500 series (Upper value) FX-550 series (Lower value)</th><th>FX-101</th><th>FX-102</th></tr></thead><tbody><tr><td rowspan="2">FT-H30-M1V-S</td><td></td><td>3,600 141.732 (Note 2)</td><td>3,600 141.732 (Note 2)</td><td>3,400 133.858 (Note 2)</td><td>1,500 59.055 (Note 2)</td><td>900 35.433 (Note 2)</td><td>370 14.567 (Note 2)</td><td>450 17.717 (Note 2)</td><td>1,600 62.992 (Note 2)</td></tr><tr><td></td><td>3,600 141.732 (Note 2)</td><td>3,600 141.732 (Note 2)</td><td>3,600 141.732 (Note 2)</td><td>1,800 70.866 (Note 2)</td><td>1,100 43.307 (Note 2)</td><td>—</td><td></td><td></td></tr></tbody></table>										Fiber	Mode	Amplifier						FX-100 series		FX-500 series (Upper value) FX-550 series (Lower value)						FX-101	FX-102	FT-H30-M1V-S		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,400 133.858 (Note 2)	1,500 59.055 (Note 2)	900 35.433 (Note 2)	370 14.567 (Note 2)	450 17.717 (Note 2)	1,600 62.992 (Note 2)		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	1,800 70.866 (Note 2)	1,100 43.307 (Note 2)	—			
Fiber	Mode	Amplifier						FX-100 series																																										
		FX-500 series (Upper value) FX-550 series (Lower value)						FX-101	FX-102																																									
FT-H30-M1V-S		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,400 133.858 (Note 2)	1,500 59.055 (Note 2)	900 35.433 (Note 2)	370 14.567 (Note 2)	450 17.717 (Note 2)	1,600 62.992 (Note 2)																																									
		3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	1,800 70.866 (Note 2)	1,100 43.307 (Note 2)	—																																											

Notes: 1) Be careful when installing the thru-beam type fiber equipped with the lens, as the beam envelope becomes narrow and alignment is difficult.

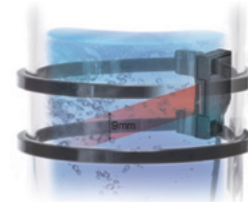
2) The fiber cable length practically limits the sensing range.

3) Refer to previous page for the ambient temperature of fibers to be used in combination.

4) The fiber cable length for the **FT-H30-M1V-S** is 1 m **3.281 ft**. The sensing ranges in HYPR, U-LG and LONG of **FX-500 / FX-550** series, in **FX-102** take into account the length of the **FT-J8** atmospheric side fiber.

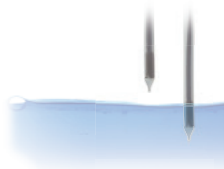
Liquid Leak / Liquid Detection

It corresponds to various liquid events, from the contact (wetted) type to the pipe mounting type, and up to leak detection.



Applications

Detecting liquid level in a tank



Leak detection for use in semiconductor device manufacturing



<Contact type liquid level sensing> Full-protection type

Metal-free

IP68G rating

Small diameter type (ø4 mm ø0.157 in)

Bends easily with its small bending radius, protective tube is cuttable and extendable.

FD-HF40Y

R10 mm R0.394 in

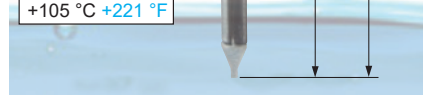
Sheath: Polyethylene

2,000 mm
78.740 in

R20 mm R0.787 in
ø4 mm ø0.157 in protective tube (fluorine resin)

500 mm
19.685 in
(Cuttable*)

Heat-resistant
+105 °C +221 °F



FD-F41Y

R10 mm R0.394 in

Primary sheath: Polyethylene
Secondary sheath: Fluorine resin

2,000 mm
78.740 in

R20 mm R0.787 in
ø4 mm ø0.157 in protective tube (fluorine resin)

500 mm
19.685 in
(Cuttable*)

Heat-resistant
+70 °C +158 °F



* The range of 50 mm 1.969 in from the fiber tip cannot be cut. Also, fiber length can be extended using MS-FX-02Y (optional).

For detecting the upper limit of liquid surface level, sensor that receives beam when "liquid is absent" is recommended.

The sensor will turn OFF during abnormal conditions (excess fluid, fiber disconnection, etc.)!

Liquid absent: Beam received (Output ON)

Liquid present / fiber is cutoff: Beam not received (Output OFF)

FD-FA93 Strong against air bubbles

Applicable pipe: Transparent pipe, Outer diameter ø8 mm ø0.315 in or more

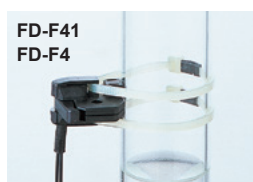
(When used with the tying bands: ø8 to ø80 mm ø0.315 to ø3.150 in)

FD-F41

Standard type

FD-F4

For 1 mm 0.039 in thick pipes manufactured by PFA



For detecting the lower limit of liquid surface level, sensor that receives beam when "liquid is present" is recommended.

The sensor will turn OFF during abnormal conditions (insufficient liquid, fiber disconnection, etc.) !

Liquid present: Beam received (Output ON)

Liquid absent / fiber is cutoff: Beam not received (Output OFF)

FT-F93 Thru-beam



LIST OF FIBERS

Reflective type / Thru-beam type

Type	Shape of fiber head (mm)	Model No.	Bending radius (mm)	Fiber cable length ✂: Free-cut	Description			Protection	Ambient temp.	Dimensions
					FX-500 series (STD mode)	FX-550 series (STD mode)	FX-101 FX-102			
Contact type	Reflective type	Liquid level sensing	Heat resistant 125 °C Fluorine resin coating ø6	FD-F8Y	Protective tube R40 Fiber R15	✂ 2 m (Note 1)	ø6 mm ø0.236 in Protective tube: Fluorine resin, length 1,000 mm 39.370 in (not cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received	IP68	-40 to +125 °C	P.74
	Liquid leak detection	SEMI S2 compliant (Note 3) W20 × H30 × D10	FD-F71	Tough (Bending durability)	R4	✂ 5 m	Liquid leak detection Leak absent: Beam received, Leak present: Beam not received Compatible amplifier: FX-500 / FX-550 series only	IP67	-20 to +60 °C	P.74
Pipe-mountable type	Reflective type	Liquid level sensing	Standard W25 × H13 × D20	FD-F41	R10	✂ 2 m	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe [PVC (vinyl chloride), fluorine resin, polycarbonate, acrylic, glass, wall thickness 1 to 3 mm 0.039 to 0.118 in] Liquid absent: Beam received, Liquid present: Beam not received	—	-40 to +100 °C	P.74
	Liquid sensing	Array fiber W6.5 × H28.3 × D17	FD-FA93	Tough (Bending durability)	R4	✂ 2 m	Applicable pipe diameter: Outer dia. ø8 mm ø0.315 in or more transparent pipe (When used with the tying bands: ø8 to ø80 mm ø0.315 to ø3.150 in) [PFA (fluorine resin), including translucent] Liquid absent: Beam received, Liquid present: Beam not received	IP40	-40 to +70 °C	P.64
Thru-beam type	Liquid sensing	SEMI S2 compliant (Note 3) W23 × H20 × D17	FT-F93	Tough (Bending durability)	Protective tube R20 Fiber R2	✂ 2 m	Applicable pipe diameter: Outer dia. ø3 to ø10 mm ø0.118 to ø0.394 in transparent pipe [PFA (fluorine resin) or equivalently transparent pipe, wall thickness 0.3 to 1 mm 0.012 to 0.039 in] Liquid absent: Beam not received, Liquid present: Beam received Compatible amplifier: FX-500 / FX-550 series only	IP40	-40 to +60 °C	P.64

Notes: 1) The allowable cutting range is 1,000 mm **39.370 in** from the end that the amplifier inserted.

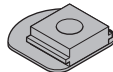
2) Liquid inflow prevention joint, protective tube extension joint, fiber mounting joint is available.

3) The design takes into account the environmental testing required by SEMI S2. To ensure that the final system complies with the standards, you must design and use it in accordance with relevant standards, regulations, and regulations.

Accessories

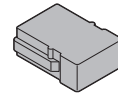
• MS-FD-F7-1

(SUS mounting bracket for FD-F71)



• MS-FD-F7-2

(PVC mounting bracket for FD-F71)



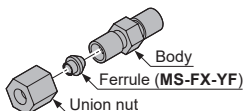
FIBER OPTIONS

Designation	Model No.	Description	
Liquid inflow prevention joint (Note)	MS-FX-01Y	Applicable fibers FD-HF40Y FD-F41Y	This joint suppresses false operations due to liquid slip-in from the top of the protective tube.
Protective tube extension joint (Note)	MS-FX-02Y		The protective tube can be extended.
Fiber mounting joint (Note)	MS-FX-03Y		The joint is used for mounting fibers on a tank.

Note: The joint internal ferrule (MS-FX-YF) is available as a spare part. A distorted ferrule may result in leakage.

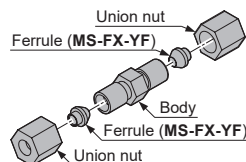
Liquid inflow prevention joint

• MS-FX-01Y



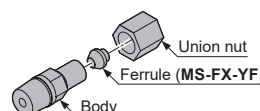
Protective tube extension joint

• MS-FX-02Y



Fiber mounting joint

• MS-FX-03Y



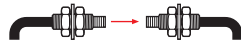
Tough : Refer to a fiber which possesses both unbreakable (bending radius: R10 mm **R0.394 in**, reciprocating bending: 180°) and more flexible (bending radius: R4 mm **R0.157 in** or less) features.

Bending durability : Refer to a fiber which possesses unbreakable bending-resistant feature (bending radius: R10 mm **R0.394 in**, reciprocating bending: 180°).

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Thru-beam type (one pair set)



Model No.	Sensing range (mm in) (Note 1) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPER	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FT-140	19,600 771.654 (Note 2) 19,600 771.654 (Note 2)	19,600 771.654 (Note 2) 19,600 771.654 (Note 2)	19,600 771.654 (Note 2) 19,600 771.654 (Note 2)	19,600 771.654 (Note 2) 19,600 771.654 (Note 2)	16,000 629.921 19,600 771.654 (Note 2)	6,300 248.031 —	14,000 551.181	19,600 771.654 (Note 2)	P.63
FT-30	1,350 53.150 1,860 73.228	810 31.890 1,240 48.819	650 25.591 830 32.677	400 15.748 570 22.441	210 8.268 340 13.386	75 2.953 —	135 5.315	400 15.748	P.63
FT-31	1,350 53.150 1,580 62.205	770 30.315 1,000 39.370	550 21.654 700 27.559	315 12.402 480 18.898	210 8.268 290 11.417	70 2.756 —	130 5.118	340 13.386	P.63
FT-31S	1,220 48.031 1,580 62.205	740 29.134 1,000 39.370	550 21.654 700 27.559	315 12.402 480 18.898	195 7.677 290 11.417	63 2.480 —	130 5.118	340 13.386	P.63
FT-31W	990 38.976 1,300 51.181	590 23.228 890 35.039	440 17.323 580 22.835	260 10.236 420 16.535	150 5.906 250 9.843	53 2.087 —	80 3.150	240 9.449	P.63
FT-32	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,000 118.110 3,600 141.732 (Note 2)	1,600 62.992 2,900 114.173	580 22.835 —	1,300 51.181	3,600 141.732 (Note 2)	P.63
FT-40	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,200 86.614 3,100 122.047	1,700 66.929 2,200 86.614	1,200 47.244 1,570 61.811	530 20.866 960 37.795	190 7.480 —	320 12.598	870 34.252	P.63
FT-42	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,050 80.709 2,900 114.173	1,600 62.992 2,100 82.677	1,130 44.488 1,470 57.874	530 20.866 890 35.039	190 7.480 —	300 11.811	800 31.496	P.63
FT-42S	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,050 80.709 2,900 114.173	1,600 62.992 2,100 82.677	1,130 44.488 1,470 57.874	530 20.866 890 35.039	190 7.480 —	300 11.811	800 31.496	P.63
FT-42W	3,300 129.921 3,600 141.732 (Note 2)	1,900 74.803 2,600 102.362	1,400 55.118 1,780 70.079	800 31.496 1,200 47.244	490 19.291 710 27.953	160 6.299 —	260 10.236	720 28.346	P.63
FT-43	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,800 110.236 3,600 141.732 (Note 2)	2,100 82.677 3,100 122.047	1,400 55.118 2,200 86.614	770 30.315 1,400 55.118	240 9.449 —	350 13.780	970 38.189	P.64
FT-45X	1,600 62.992 (Note 2) 1,600 62.992 (Note 2)	1,600 62.992 (Note 2) 1,600 62.992 (Note 2)	1,600 62.992 (Note 2) 1,600 62.992 (Note 2)	1,200 47.244 1,600 62.992 (Note 2)	630 24.803 1,070 42.126	200 7.874 —	340 13.386	920 36.220	P.64
FT-A11	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	1,100 43.307 —	1,900 74.803	3,600 141.732 (Note 2)	P.64
FT-A11W	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	1,300 51.181 —	1,700 66.929	3,400 133.858	P.64
FT-A32	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,100 82.677 —	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	P.64
FT-A32W	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,000 118.110 —	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	P.64
FT-AL05	2,300 90.551 3,600 141.732 (Note 2)	1,550 61.024 2,350 92.520	1,500 59.055 1,600 62.992	860 33.858 1,150 45.276	500 19.685 660 25.984	170 6.693 —	250 9.843	660 25.984	P.64
FT-E13	52 2.047 68 2.677	30 1.181 45 1.772	24 0.945 30 1.181	15 0.591 21 0.827	8 0.315 12 0.472	2 0.079 —	6 0.236	19 0.748	P.64
FT-E23	270 10.630 355 13.976	160 6.299 250 9.843	125 4.921 165 6.496	75 2.953 120 4.724	42 1.654 70 2.756	13 0.512 —	22 0.866	80 3.150	P.64
FT-F93	Applicable pipe diameter: Outer dia. ø3 to ø10 mm ø0.118 to ø0.394 in transparent pipe [PFA (fluorine resin) or equivalently transparent pipe, wall thickness 0.3 to 1 mm 0.012 to 0.039 in] Liquid absent: Beam not received, Liquid present: Beam received Compatible amplifier: FX-500 / FX-550 series only								P.64

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 fiber cable length practically limits the sensing range.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Thru-beam type (one pair set)



Model No.	Sensing range (mm in) (Note 1) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPER	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FT-H13-FM2	3,300 129.921 3,600 141.732 (Note 2)	1,900 74.803 2,700 106.299	1,300 51.181 1,690 66.535	700 27.559 1,150 45.276	410 16.142 750 29.528	140 5.512 —	250 9.843	700 27.559	P.65
FT-H20-J20-S (Note 3)	1,600 62.992 2,600 102.362	1,000 39.370 1,800 70.866	790 31.102 1,200 47.244	470 18.504 860 33.858	300 11.811 530 20.866	90 3.543 —	135 5.315	420 16.535	P.65
FT-H20-J30-S (Note 3)	1,600 62.992 2,600 102.362	1,000 39.370 1,800 70.866	790 31.102 1,200 47.244	470 18.504 860 33.858	300 11.811 530 20.866	90 3.543 —	135 5.315	420 16.535	P.65
FT-H20-J50-S (Note 3)	1,600 62.992 2,600 102.362	1,000 39.370 1,800 70.866	790 31.102 1,200 47.244	470 18.504 860 33.858	300 11.811 530 20.866	90 3.543 —	135 5.315	420 16.535	P.65
FT-H20-M1	1,600 62.992 (Note 2) 1,600 62.992 (Note 2)	1,300 51.181 1,600 62.992 (Note 2)	960 37.795 1,600 62.992 (Note 2)	540 21.260 1,000 39.370	330 12.992 600 23.622	110 4.331 —	210 8.268	540 21.260	P.65
FT-H20-VJ50-S (Note 3)	2,100 82.677 3,600 141.732 (Note 2)	1,300 51.181 2,200 86.614	980 38.583 1,400 55.118	600 23.622 1,000 39.370	390 15.354 620 24.409	120 4.724 —	150 5.906	500 19.685	P.65
FT-H20-VJ80-S (Note 3)	2,100 82.677 3,600 141.732 (Note 2)	1,300 51.181 2,200 86.614	980 38.583 1,400 55.118	600 23.622 1,000 39.370	390 15.354 620 24.409	120 4.724 —	150 5.906	500 19.685	P.65
FT-H20W-M1	1,600 62.992 (Note 2) 1,600 62.992 (Note 2)	1,000 39.370 1,600 62.992 (Note 2)	840 33.071 1,050 41.339	470 18.504 730 28.740	300 11.811 440 17.323	90 3.543 —	100 3.937	300 11.811	P.65
FT-H30-M1V-S (Note 4)	1,000 39.370 1,400 55.118	590 23.228 950 37.402	470 18.504 620 24.409	270 10.630 400 15.748	160 6.299 250 9.843	55 2.165 —	110 4.331	280 11.024	P.65
FT-H35-M2	1,200 47.244 3,600 141.732 (Note 2)	880 34.646 2,300 90.551	670 26.378 1,500 59.055	430 16.929 1,050 41.339	250 9.843 650 25.591	80 3.150 —	170 6.693	490 19.291	P.65
FT-H35-M2S6	1,200 47.244 3,600 141.732 (Note 2)	880 34.646 2,300 90.551	670 26.378 1,500 59.055	430 16.929 1,050 41.339	250 9.843 650 25.591	80 3.150 —	170 6.693	490 19.291	P.65
FT-HL80Y	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,300 90.551 3,600 141.732 (Note 2)	740 29.134 —	990 38.976	2,340 92.126	P.66
FT-KS40	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	1,200 47.244 —	2,200 86.614	3,600 141.732 (Note 2)	P.66
FT-KV26	2,500 98.425 3,600 141.732 (Note 2)	1,600 62.992 2,300 90.551	1,200 47.244 1,600 62.992	710 27.953 1,100 43.307	440 17.323 650 25.591	160 6.299 —	135 5.315	560 22.047	P.66
FT-KV26H1	2,200 86.614 3,600 141.732 (Note 2)	1,430 56.299 1,900 74.803	1,070 42.126 1,400 55.118	630 24.803 1,000 39.370	390 15.354 650 25.591	135 5.315 —	160 6.299	500 19.685	P.66
FT-KV40	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	1,200 47.244 —	2,200 86.614	3,600 141.732 (Note 2)	P.66
FT-KV40W	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,100 122.047 3,600 141.732 (Note 2)	940 37.008 —	2,200 86.614	3,600 141.732 (Note 2)	P.66
FT-L80Y	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,800 110.236 3,600 141.732 (Note 2)	920 36.220 —	1,100 43.307	2,600 102.362	P.66
FT-R31	1,000 39.370 1,670 65.748	580 22.835 1,120 44.094	440 17.323 700 27.559	270 10.630 510 20.079	160 6.299 310 12.205	55 2.165 —	100 3.937	340 13.386	P.66
FT-R40	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	1,750 68.898 2,900 114.173	1,500 59.055 1,950 76.772	930 36.614 1,400 55.118	500 19.685 860 33.858	160 6.299 —	270 10.630	740 29.134	P.66

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 fiber cable length practically limits the sensing range.
 3) Heat-resistant joint fibers and ordinary-temperature fibers (FT-42) are sold as a set.
 4) Sold as a set comprising vacuum type fiber + photo-terminal (FV-BR1) + fiber at atmospheric side (FT-J8).

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Thru-beam type (one pair set)



Model No.	Sensing range (mm in) (Note 1) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPER	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FT-R41W	3,200 125.984 3,600 141.732 (Note 2)	1,800 70.866 2,900 114.173	1,400 55.118 1,850 72.835	800 31.496 1,300 51.181	460 18.110 800 31.496	150 5.906 —	250 9.843	710 27.953	P.66
FT-R42W	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,500 137.795 3,600 141.732 (Note 2)	2,200 86.614 3,600 141.732 (Note 2)	1,300 51.181 2,800 110.236	460 18.110 —	510 20.079	2,000 78.740	P.66
FT-R43	3,000 118.110 3,600 141.732 (Note 2)	1,600 62.992 2,650 104.331	1,100 43.307 1,750 68.898	720 28.346 1,250 49.213	430 16.929 750 29.528	130 5.118 —	210 8.268	640 25.197	P.67
FT-R44Y	3,000 118.110 3,600 141.732 (Note 2)	1,600 62.992 2,900 114.173	1,100 43.307 1,800 70.866	720 28.346 1,300 51.181	430 16.929 800 31.496	130 5.118 —	210 8.268	640 25.197	P.67
FT-R60Y	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,100 82.677 3,600 141.732 (Note 2)	1,260 49.606 1,900 74.803	400 15.748 —	690 27.165	1,890 74.409	P.67
FT-S11	350 13.780 400 15.748	210 8.268 280 11.024	160 6.299 180 7.087	90 3.543 130 5.118	60 2.362 80 3.150	19 0.748 —	40 1.575	90 3.543	P.67
FT-S20	1,350 53.150 1,760 69.291	810 31.890 1,200 47.244	650 25.591 800 31.496	400 15.748 550 21.654	210 8.268 340 13.386	75 2.953 —	135 5.315	400 15.748	P.67
FT-S21	1,350 53.150 1,600 62.992	770 30.315 1,000 39.370	550 21.654 670 26.378	315 12.402 450 17.717	210 8.268 280 11.024	70 2.756 —	130 5.118	340 13.386	P.67
FT-S21W	990 38.976 1,650 64.961	590 23.228 850 33.465	440 17.323 580 22.835	260 10.236 400 15.748	150 5.906 240 9.449	53 2.087 —	80 3.150	240 9.449	P.67
FT-S22	1,500 59.055 2,900 114.173	920 36.220 1,900 74.803	730 28.740 1,200 47.244	450 17.717 870 34.252	250 9.843 530 20.866	90 3.543 —	230 9.055	560 22.047	P.67
FT-S30	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,200 86.614 3,100 122.047	1,700 66.929 2,250 88.583	1,200 47.244 1,650 64.961	530 20.866 1,000 39.370	190 7.480 —	320 12.598	870 34.252	P.67
FT-S31W	3,300 129.921 3,600 141.732 (Note 2)	1,900 74.803 2,450 96.457	1,400 55.118 1,600 62.992	800 31.496 1,100 43.307	490 19.291 650 25.591	160 6.299 —	260 10.236	720 28.346	P.68
FT-S32	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,100 122.047 3,600 141.732 (Note 2)	1,800 70.866 3,000 118.110	600 23.622 —	1,100 43.307	3,000 118.110	P.68
FT-V23	1,800 70.866 2,400 94.488	1,000 39.370 1,600 62.992	880 34.646 1,050 41.339	450 17.717 750 29.528	280 11.024 450 17.717	90 3.543 —	160 6.299	400 15.748	P.68
FT-V24W	380 14.961 500 19.685	230 9.055 350 13.780	200 7.874 220 8.661	110 4.331 160 6.299	60 2.362 95 3.740	20 0.787 —	35 1.378	90 3.543	P.68
FT-V25	900 35.433 1,400 55.118	550 21.654 950 37.402	480 18.898 630 24.803	240 9.449 450 17.717	140 5.512 280 11.024	45 1.772 —	95 3.740	260 10.236	P.68
FT-V30	2,200 86.614 3,600 141.732 (Note 2)	1,200 47.244 1,950 76.772	1,000 39.370 1,300 51.181	680 26.772 950 37.402	340 13.386 550 21.654	100 3.937 —	180 7.087	480 18.898	P.68
FT-V40	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,500 137.795 3,600 141.732 (Note 2)	2,400 94.488 3,600 141.732 (Note 2)	850 33.465 —	1,000 39.370	3,100 122.047	P.68
FT-V80Y	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,800 110.236 3,600 141.732 (Note 2)	2,200 86.614 3,600 141.732 (Note 2)	1,300 51.181 2,200 86.614	800 31.496 1,400 55.118	240 9.449 —	340 13.386	800 31.496	P.68
FT-Z20HBW	1,100 43.307 1,600 62.992 (Note 2)	670 26.378 1,000 39.370	570 22.441 650 25.591	260 10.236 450 17.717	180 7.087 280 11.024	55 2.165 —	100 3.937	320 12.598	P.68

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 fiber cable length practically limits the sensing range.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Thru-beam type (one pair set)



Model No.	Sensing range (mm in) (Note 1) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPER	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FT-Z20W	1,600 62.992 (Note 2) 1,600 62.992 (Note 2)	1,500 59.055 1,600 62.992 (Note 2)	1,100 43.307 1,600 62.992 (Note 2)	620 24.409 1,100 43.307	420 16.535 650 25.591	130 5.118 —	280 11.024	730 28.740	P.68
FT-Z30	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	2,100 82.677 3,600 141.732 (Note 2)	1,200 47.244 2,200 86.614	410 16.142 —	710 27.953	2,300 90.551	P.68
FT-Z30E	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,500 137.795 3,600 141.732 (Note 2)	2,400 94.488 3,600 141.732 (Note 2)	740 29.134 —	1,200 47.244	3,200 125.984	P.69
FT-Z30EW	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,400 133.858 3,600 141.732 (Note 2)	2,000 78.740 3,600 141.732 (Note 2)	630 24.803 —	1,400 55.118	2,600 102.362	P.69
FT-Z30H	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,500 137.795 3,600 141.732 (Note 2)	2,600 102.362 3,600 141.732 (Note 2)	810 31.890 —	1,400 55.118	3,200 125.984	P.69
FT-Z30HW	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,500 137.795 3,600 141.732 (Note 2)	2,600 102.362 3,600 141.732 (Note 2)	810 31.890 —	1,400 55.118	3,200 125.984	P.69
FT-Z30W	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,300 129.921 3,600 141.732 (Note 2)	3,200 125.984 3,600 141.732 (Note 2)	1,500 59.055 2,800 110.236	1,000 39.370 1,700 66.929	280 11.024 —	540 21.260	1,800 70.866	P.69
FT-Z40HBW	3,300 129.921 3,600 141.732 (Note 2)	1,900 74.803 2,700 106.299	1,400 55.118 1,850 72.835	800 31.496 1,300 51.181	490 19.291 750 29.528	160 6.299 —	260 10.236	720 28.346	P.69
FT-Z40W	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,300 129.921 3,600 141.732 (Note 2)	2,300 90.551 2,800 110.236	1,500 59.055 2,000 78.740	900 35.433 1,200 47.244	290 11.417 —	410 16.142	1,200 47.244	P.69
FT-Z802Y	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,600 141.732 (Note 2) 3,600 141.732 (Note 2)	3,100 122.047 3,600 141.732 (Note 2)	1,900 74.803 3,600 141.732 (Note 2)	470 18.504 —	520 20.472	3,100 122.047	P.69

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 fiber cable length practically limits the sensing range.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Retroreflective type



Model No.	Sensing range (mm in) (Note 1, 2)								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPER	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FR-KZ22E	15 to 570	15 to 460	15 to 410	15 to 310	15 to 220	15 to 100	15 to 200	15 to 360	P.70
	0.591 to 22.441	0.591 to 18.110	0.591 to 16.142	0.591 to 12.205	0.591 to 8.661	0.591 to 3.937	0.591 to 7.874	0.591 to 14.173	
	15 to 800	15 to 700	15 to 600	15 to 540	15 to 400	—	—	—	
FR-KZ50E	20 to 1,000	20 to 800	20 to 400	20 to 300	20 to 200	20 to 200	20 to 200	20 to 350	P.70
	0.787 to 39.370	0.787 to 31.496	0.787 to 15.748	0.787 to 11.811	0.787 to 7.874	0.787 to 7.874	0.787 to 7.874	0.787 to 13.780	
	20 to 1,600	20 to 1,300	20 to 500	20 to 400	20 to 350	—	—	—	
FR-KZ50H	20 to 1,000	20 to 800	20 to 400	20 to 300	20 to 200	20 to 200	20 to 200	20 to 350	P.70
	0.787 to 39.370	0.787 to 31.496	0.787 to 15.748	0.787 to 11.811	0.787 to 7.874	0.787 to 7.874	0.787 to 7.874	0.787 to 13.780	
	20 to 1,600	20 to 1,300	20 to 500	20 to 400	20 to 350	—	—	—	
FR-Z50HW	100 to 1,900	100 to 1,400	100 to 1,200	100 to 990	100 to 780	100 to 490	100 to 550	100 to 830	P.70
	3.937 to 74.803	3.937 to 55.118	3.937 to 47.244	3.937 to 38.976	3.937 to 30.709	3.937 to 19.291	3.937 to 21.654	3.937 to 32.677	
	100 to 2,250	100 to 1,800	100 to 1,400	100 to 1,150	100 to 950	—	—	—	

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.

The sensing range of **FR-KZ22E** is specified for the attached reflector. The sensing range of **FR-KZ50E** and **FR-KZ50H** is specified for the attached reflector **RF-003**. The sensing range of **FR-Z50HW** is specified for the attached reflective tape **RF-13**.

2) The sensing range of retroreflective type is the possible setting range for the attached reflector. The fiber can detect an object less than setting range for the reflector. However, note that if there are any white or highly-reflective surfaces near the fiber head, reflected incident light may affect the fiber head. If this occurs, adjust the threshold value of the amplifier unit before use.

Sensing range when FR-Z50HW is used in combination with a reflector (optional)

Reflector Model No.	Sensing range (mm in)							
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series	
	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102
RF-230	100 to 19,000	100 to 8,000	100 to 5,000	100 to 3,600	100 to 2,900	100 to 1,400	100 to 2,400	100 to 5,000
	3.937 to 748.03	3.937 to 314.960	3.937 to 196.850	3.937 to 141.732	3.937 to 114.173	3.937 to 55.118	3.937 to 94.488	3.937 to 196.850
	100 to 20,000	100 to 11,000	100 to 7,000	100 to 5,000	100 to 3,500	—	—	—
RF-220	100 to 8,000	100 to 4,700	100 to 3,500	100 to 3,000	100 to 1,800	100 to 830	100 to 1,300	100 to 2,600
	3.937 to 314.960	3.937 to 185.039	3.937 to 137.795	3.937 to 118.110	3.937 to 70.866	3.937 to 32.677	3.937 to 51.181	3.937 to 102.362
	100 to 10,000	100 to 6,500	100 to 4,500	100 to 3,500	100 to 2,500	—	—	—
RF-210	100 to 5,500	100 to 2,700	100 to 2,400	100 to 1,500	100 to 1,200	100 to 530	100 to 980	100 to 1,300
	3.937 to 216.535	3.937 to 106.299	3.937 to 94.488	3.937 to 59.055	3.937 to 47.244	3.937 to 20.866	3.937 to 38.583	3.937 to 51.181
	100 to 7,000	100 to 4,000	100 to 3,600	100 to 2,800	100 to 2,100	—	—	—

Note: The sensing range is the possible setting range for the reflector. The fiber can detect an object less than 100 mm 3.937 in. However, note that if there are any white or highly-reflective surfaces near the fiber head, reflected incident light may affect the fiber head. If this occurs, adjust the threshold value of the amplifier unit before use.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Reflective type

Model No.	Sensing range (mm in) (Note 1, 2) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPH	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FD-30	600	330	250	160	80	25			
	23.622	12.992	9.843	6.299	3.150	0.984	45	155	P.71
	800	460	330	210	140	—	1.772	6.102	
FD-31	515	290	220	125	80	25			
	20.276	11.417	8.661	4.921	3.150	0.984	35	140	P.71
	750	450	310	200	140	—	1.378	5.512	
FD-31W	330	180	140	80	45	12			
	12.992	7.087	5.512	3.150	1.772	0.472	15	60	P.71
	480	310	190	130	80	—	0.591	2.362	
FD-32G	650	380	270	200	95	27			
	25.591	14.961	10.630	7.874	3.740	1.063	70	190	P.71
	1,150	730	420	320	170	—	2.756	7.480	
FD-32GX	630	410	360	200	100	30			
	24.803	16.142	14.173	7.874	3.937	1.181	75	210	P.71
	1,350	730	490	320	180	—	2.953	8.268	
FD-34G	330	185	135	90	49	15			
	12.992	7.283	5.305	3.543	1.929	0.591	29	90	P.71
	480	310	180	130	80	—	1.142	3.543	
FD-40	600	330	250	160	80	25			
	23.622	12.992	9.843	6.299	3.150	0.984	45	155	P.71
	800	460	330	210	140	—	1.772	6.102	
FD-41	515	290	220	125	80	25			
	20.276	11.417	8.661	4.921	3.150	0.984	35	140	P.71
	750	450	310	200	140	—	1.378	5.512	
FD-41S	515	290	220	125	80	25			
	20.276	11.417	8.661	4.921	3.150	0.984	35	140	P.71
	750	450	310	200	140	—	1.378	5.512	
FD-41SW	330	180	140	80	45	12			
	12.992	7.087	5.512	3.150	1.772	0.472	15	60	P.71
	480	310	190	130	80	—	0.591	2.362	
FD-41W	900	630	430	270	150	45			
	35.433	24.803	16.929	10.630	5.906	1.772	80	230	P.72
	1,400	1,000	680	480	270	—	3.150	9.055	
FD-42G	650	380	270	200	95	27			
	25.591	14.961	10.630	7.874	3.740	1.063	70	190	P.72
	1,150	730	420	320	170	—	2.756	7.480	
FD-42GW	670	340	280	150	90	25			
	26.378	13.386	11.024	5.906	3.543	0.984	45	140	P.72
	950	540	330	210	130	—	1.772	5.512	
FD-60	1,550	900	740	520	260	90			
	61.024	35.433	29.134	20.472	10.236	3.543	140	420	P.72
	1,750	1,300	970	750	420	—	5.512	16.535	
FD-61	1,400	840	670	450	200	70			
	55.118	33.071	26.378	17.717	7.874	2.756	120	410	P.72
	1,630	1,180	870	620	380	—	4.724	16.142	
FD-61G	1,100	800	650	420	200	60			
	43.307	31.496	25.591	16.535	7.874	2.362	120	350	P.72
	1,350	1,200	850	600	350	—	4.724	13.780	
FD-61S	1,200	790	660	420	220	75			
	47.244	31.102	25.984	16.535	8.661	2.953	130	360	P.72
	1,900	1,300	900	650	400	—	5.118	14.173	
FD-61W	900	630	430	270	150	45			
	35.433	24.803	16.929	10.630	5.906	1.772	80	230	P.73
	1,400	1,000	680	480	270	—	3.150	9.055	

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 is specified for white non-glossy paper.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Reflective type



Model No.	Sensing range (mm in) (Note 1, 2) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FD-62	1,500 59.055 1,950 76.772	1,000 39.370 1,450 57.087	940 37.008 1,140 44.882	520 20.472 880 34.646	340 13.386 550 21.654	110 4.331 —	170 6.693	450 17.717	P.73
FD-64X	670 26.378 1,200 47.244	500 19.685 700 27.559	410 16.142 590 23.228	280 11.024 410 16.142	160 6.299 230 9.055	50 1.969 —	75 2.953	220 8.661	P.73
FD-A16	— —	200 7.874 —	200 7.874 350 13.780	200 7.874 350 13.780	140 5.512 250 9.843	75 2.953 —	120 4.724	240 9.449	P.73
FD-AL11	670 26.378 1,300 51.181	530 20.866 1,000 39.370	510 20.079 700 27.560	320 12.598 450 17.717	180 7.087 320 12.598	50 1.969 —	100 3.937	285 11.220	P.73
FD-E13	50 1.969 75 2.953	29 1.142 50 1.969	25 0.984 30 1.181	12 0.472 23 0.906	7 0.276 12 0.472	2 0.079 —	5 0.197	15 0.591	P.73
FD-E23	170 6.693 290 11.417	120 4.724 170 6.693	80 3.150 105 4.134	55 2.165 80 3.150	30 1.181 45 1.772	9 0.354 —	20 0.787	70 2.756	P.73
FD-EG30	170 6.693 320 12.598	130 5.118 190 7.480	110 4.331 120 4.724	48 1.890 90 3.543	30 1.181 50 1.969	9 0.354 —	20 0.787	70 2.756	P.73
FD-EG30S	170 6.693 320 12.598	110 4.331 190 7.480	80 3.150 120 4.724	50 1.969 90 3.543	30 1.181 50 1.969	9 0.354 —	20 0.787	70 2.756	P.74
FD-EG31	85 3.346 120 4.724	45 1.772 70 2.756	35 1.378 45 1.772	20 0.787 35 1.378	12 0.472 20 0.787	3.5 0.138 —	7 0.276	25 0.984	P.74
FD-F4	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe [PFA (fluorine resin) or equivalently transparent pipe, wall thickness 1 mm 0.039 in] Liquid absent: Beam received, Liquid present: Beam not received								P.74
FD-F41	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe [PVC (vinyl chloride), fluorine resin, polycarbonate, acrylic, glass, wall thickness 1 to 3 mm 0.039 to 0.118 in] Liquid absent: Beam received, Liquid present: Beam not received								P.74
FD-F41Y (Note 3)	ø4 mm ø0.157 in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received								P.74
FD-F71	Liquid leak detection Leak absent: Beam received, Leak present: Beam not received Compatible amplifier: FX-500 / FX-550 series only								P.74
FD-F8Y	ø6 mm ø0.236 in Protective tube: Fluorine resin, length 1,000 mm 39.370 in (not cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received								P.74
FD-FA93	Applicable pipe diameter: Outer dia. ø8 mm ø0.315 in or more transparent pipe (When used with the tying bands: ø8 to ø80 mm ø0.315 to ø3.150 in) [PFA (fluorine resin), including translucent] Liquid absent: Beam received, Liquid present: Beam not received								P.74
FD-H13-FM2	880 34.646 1,650 64.961	640 25.197 1,300 51.181	600 23.622 940 37.008	350 13.780 670 26.378	200 7.874 390 15.354	65 2.559 —	100 3.937	280 11.024	P.75
FD-H18-L31	0 to 60 0 to 2.362 0 to 130 0 to 5.118	0 to 32 0 to 1.260 0 to 85 0 to 3.346	0 to 24 0 to 0.945 0 to 60 0 to 2.362	0 to 16 0 to 0.630 0 to 45 0 to 1.772	0 to 13 0 to 0.512 0 to 30 0 to 1.181	2 to 6.5 0.079 to 0.256 —	0 to 10 0 to 0.394	0 to 25 0 to 0.984	P.75
FD-H20-21	770 30.315 1,250 49.213	500 19.685 850 33.465	380 14.961 650 25.591	230 9.055 450 17.717	130 5.118 250 9.843	45 1.772 —	90 3.543	280 11.024	P.75

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 is specified for white non-glossy paper (as for FD-H18-L31 50 × 50 mm 1.969 × 1.969 in glass substrate).

3) Liquid inflow prevention joint, protective tube extension joint, fiber mounting joint are available. Please refer to p.42 for details.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Reflective type



Model No.	Sensing range (mm in) (Note 1, 2) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FD-H20-M1	840 33.071 1,350 53.150	550 21.654 1,000 39.370	500 19.685 650 25.591	330 12.992 450 17.717	200 7.874 300 11.811	55 2.165 —	120 4.724	300 11.811	P.75
FD-H25-L43 (Note 3)	1 to 31 0.039 to 1.220 1 to 31 0.039 to 1.220	1 to 30 0.039 to 1.181 1 to 30 0.039 to 1.181	1 to 28 0.039 to 1.102 1 to 29 0.039 to 1.142	1.5 to 26 0.059 to 1.024 1 to 28 0.039 to 1.102	1.5 to 24 0.059 to 0.945 1 to 26 0.039 to 1.024	2 to 18 0.079 to 0.709 —	4 to 16 0.157 to 0.630	4 to 23 0.157 to 0.906	P.75
FD-H25-L45 (Note 3)	4 to 43.5 0.157 to 1.713 4 to 51 0.157 to 2.008	4 to 43 0.157 to 1.693 4 to 50 0.157 to 1.969	4.5 to 43 0.177 to 1.693 4 to 49 0.157 to 1.929	5 to 42 0.197 to 1.654 4 to 48 0.157 to 1.890	5 to 40 0.197 to 1.575 4 to 44 0.157 to 1.732	6.5 to 34 0.256 to 1.339 —	7 to 35 0.276 to 1.378	7 to 38 0.276 to 1.496	P.75
FD-H30-KZ1V-S (Note 3, 4)	5 to 500 0.197 to 19.685 5 to 1,500 0.197 to 59.055	10 to 340 0.394 to 13.386 10 to 1,000 0.394 to 39.370	15 to 270 0.591 to 10.630 15 to 650 0.591 to 25.591	20 to 200 0.787 to 7.874 20 to 450 0.787 to 17.717	20 to 120 0.787 to 4.724 20 to 300 0.787 to 11.811	20 to 45 0.787 to 1.772 —	25 to 80 0.984 to 3.150	10 to 220 0.394 to 8.661	P.76
FD-H30-L32	0 to 40 0 to 1.575 0 to 60 0 to 2.362	0 to 30 0 to 1.181 0 to 42 0 to 1.654	0 to 25 0 to 0.984 0 to 25 0 to 0.984	0 to 17 0 to 0.669 0 to 21 0 to 0.827	0 to 12 0 to 0.472 0 to 16 0 to 0.630	1.5 to 6 0.059 to 0.236 —	2 to 9 0.079 to 0.354	0 to 17 0 to 0.669	P.76
FD-H30-L32V-S (Note 3, 4)	0 to 18 0 to 0.709 0 to 27 0 to 1.063	0 to 12 0 to 0.472 0 to 19 0 to 0.748	0 to 10 0 to 0.394 0 to 13 0 to 0.512	0 to 8 0 to 0.315 0 to 11 0 to 0.433	0 to 5.5 0 to 0.217 0 to 7.5 0 to 0.295	1.5 to 3 0.059 to 0.118 —	2.5 to 6.5 0.098 to 0.256	0 to 11 0 to 0.433	P.76
FD-H35-20S	840 33.071 850 33.465	550 21.654 750 29.528	440 17.323 550 21.654	260 10.236 410 16.142	140 5.512 230 9.055	45 1.772 —	85 3.346	200 7.874	P.76
FD-H35-M2	720 28.346 750 29.528	540 21.260 600 23.622	460 18.110 500 19.685	260 10.236 400 15.748	150 5.906 220 8.661	45 1.772 —	75 2.953	280 11.024	P.76
FD-H35-M2S6	720 28.346 750 29.528	540 21.260 600 23.622	460 18.110 500 19.685	260 10.236 400 15.748	150 5.906 220 8.661	45 1.772 —	75 2.953	280 11.024	P.76
FD-HF40Y (Note 5)	ø4 mm ø0.157 in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received								P.76
FD-L10 (Note 3)	0 to 6 0 to 0.236 0 to 6 0 to 0.236	0 to 5.5 0 to 0.217 0 to 5.5 0 to 0.217	0 to 5.5 0 to 0.217 0 to 5.5 0 to 0.217	0 to 5 0 to 0.197 0 to 5 0 to 0.197	0 to 4.5 0 to 0.177 0 to 5 0 to 0.197	0 to 4 0 to 0.157 —	0 to 4.5 0 to 0.177	0 to 5.5 0 to 0.217	P.77
FD-L11 (Note 3)	0 to 11.5 0 to 0.453 0 to 14 0 to 0.551	0 to 10.5 0 to 0.413 0 to 13 0 to 0.512	0 to 10 0 to 0.394 0 to 13 0 to 0.512	0 to 9.5 0 to 0.374 0 to 13 0 to 0.512	0 to 9 0 to 0.354 0 to 12 0 to 0.472	0 to 8 0 to 0.315 —	0 to 8 0 to 0.315	0 to 9 0 to 0.354	P.77
FD-L12W (Note 3)	0 to 14 0 to 0.551 0 to 17 0 to 0.669	0 to 12.5 0 to 0.492 0 to 16 0 to 0.630	0 to 12 0 to 0.472 0 to 15 0 to 0.591	0 to 8 0 to 0.315 0 to 12 0 to 0.472	0.5 to 7 0.020 to 0.276 0 to 10 0 to 0.394	0.5 to 4 0.020 to 0.157 —	1 to 4.5 0.039 to 0.177	0.5 to 7 0.020 to 0.276	P.77
FD-L20H	0 to 45 0 to 1.772 0 to 65 0 to 2.559	0 to 35 0 to 1.378 0 to 50 0 to 1.969	0 to 32 0 to 1.260 0 to 40 0 to 1.575	0 to 23 0 to 0.906 0 to 33 0 to 1.299	2 to 15 0.079 to 0.591 0 to 25 0 to 0.984	5 to 9 0.197 to 0.354 —	5 to 15 0.197 to 0.591	1 to 30 0.039 to 1.181	P.77
FD-L21 (Note 3)	1 to 19 0.039 to 0.748 1 to 20 0.039 to 0.787	1 to 18 0.039 to 0.709 1 to 20 0.039 to 0.787	1 to 18 0.039 to 0.709 1 to 19 0.039 to 0.748	1.5 to 16 0.059 to 0.630 1 to 19 0.039 to 0.748	2 to 15 0.079 to 0.591 2 to 18 0.079 to 0.709	3 to 12 0.118 to 0.472 —	3 to 15 0.118 to 0.591	1.5 to 16 0.059 to 0.630	P.77
FD-L21W (Note 3)	1.5 to 15 0.059 to 0.591 1 to 19 0.039 to 0.748	2 to 15 0.079 to 0.591 1 to 19 0.039 to 0.748	2 to 15 0.079 to 0.591 2 to 18 0.079 to 0.709	3 to 14 0.118 to 0.551 2 to 18 0.079 to 0.709	4 to 14 0.158 to 0.551 3 to 17 0.118 to 0.669	6.5 to 10 0.256 to 0.394 —	7 to 12 0.276 to 0.472	3 to 14 0.118 to 0.551	P.77
FD-L22A (Note 3)	0 to 31 0 to 1.220 0 to 35 0 to 1.378	0 to 28 0 to 1.102 0 to 35 0 to 1.378	0 to 27 0 to 1.063 0 to 35 0 to 1.378	0 to 24 0 to 0.945 0 to 34 0 to 1.339	0 to 24 0 to 0.945 0 to 32 0 to 1.260	0 to 18 0 to 0.709 —	0 to 19 0 to 0.748	0 to 25 0 to 0.984	P.77

- 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 is the value for white non-glossy paper (as for FD-H30-L32 50 × 50 mm 1.969 × 1.969 in glass substrate).
 3) The sensing range is specified for transparent glass 100 × 100 × 0.7 mm 3.937 × 3.937 × 0.028 in (FD-L21 and FD-L21W: t2 mm 0.079 in) [FD-L10: silicon wafers 100 × 100 mm 3.937 × 3.937 in].
 4) Sold as a set comprising vacuum type fiber + photo-terminal (FV-BR1) + fiber at atmospheric side (FT-J8).
 5) Liquid inflow prevention joint, protective tube extension joint, fiber mounting joint are available. Please refer to p.42 for details.

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Reflective type



Model No.	Sensing range (mm in) (Note 1, 2) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FD-L23 (Note 3)	0 to 30 0 to 1.181 0 to 34 0 to 1.339	0 to 30 0 to 1.181 0 to 34 0 to 1.339	0 to 30 0 to 1.181 0 to 34 0 to 1.339	0 to 29 0 to 1.142 0 to 34 0 to 1.339	0 to 28 0 to 1.102 0 to 32 0 to 1.260	1.5 to 24 0.059 to 0.945 —	0 to 28 0 to 1.102	0 to 30 0 to 1.181	P.77
FD-L30A (Note 3)	0 to 43 0 to 1.693 0 to 72 0 to 2.835	0 to 43 0 to 1.693 0 to 68 0 to 2.677	0 to 43 0 to 1.693 0 to 62 0 to 2.441	0 to 43 0 to 1.693 0 to 52 0 to 2.047	0 to 42 0 to 1.654 0 to 46 0 to 1.811	0 to 29 0 to 1.142 —	0 to 40 0 to 1.575	0 to 50 0 to 1.969	P.77
FD-L31A (Note 3)	3 to 35 0.118 to 1.378 0 to 50 0 to 1.969	4 to 33 0.157 to 1.299 2 to 43 0.079 to 1.693	4 to 33 0.157 to 1.299 3 to 42 0.118 to 1.654	4 to 33 0.157 to 1.299 3 to 42 0.118 to 1.654	4 to 32 0.157 to 1.260 3 to 40 0.118 to 1.575	5 to 25 0.197 to 0.984 —	5 to 30 0.197 to 1.181	4 to 33 0.157 to 1.299	P.77
FD-L32H (Note 3)	0 to 110 0 to 4.331 0 to 100 0 to 3.937	0 to 87 0 to 3.425 0 to 90 0 to 3.543	0 to 74 0 to 2.913 0 to 75 0 to 2.953	0 to 56 0 to 2.205 0 to 65 0 to 2.559	1 to 38 0.039 to 1.496 0 to 50 0 to 1.969	— — —	16 to 30 0.630 to 1.181	0 to 50 0 to 1.969	P.78
FD-R31G	530 20.866 900 35.433	310 12.205 600 23.622	260 10.236 400 15.748	170 6.693 290 11.417	85 3.346 160 6.299	27 1.063 —	45 1.772	150 5.906	P.78
FD-R32EG	170 6.693 290 11.417	110 4.331 180 7.087	92 3.622 110 4.331	45 1.772 80 3.150	30 1.181 45 1.772	9 0.354 —	20 0.787	68 2.677	P.78
FD-R33EG	84 3.307 110 4.331	44 1.732 65 2.559	33 1.299 40 1.575	19 0.748 30 1.181	11 0.433 18 0.709	3 0.118 —	7 0.276	22 0.866	P.78
FD-R34EG	130 5.118 250 9.843	90 3.543 140 5.512	70 2.756 90 3.543	38 1.496 70 2.756	23 0.906 40 1.575	7 0.276 —	17 0.669	60 2.362	P.78
FD-R41	710 27.953 1,150 45.276	430 16.929 750 29.528	320 12.598 450 17.717	210 8.268 340 13.386	100 3.937 190 7.480	34 1.339 —	60 2.362	170 6.693	P.78
FD-R60	1,100 43.307 1,450 57.087	600 23.622 1,150 45.276	550 21.654 800 31.496	290 11.417 500 19.685	190 7.480 350 13.780	65 2.559 —	110 4.331	240 9.449	P.78
FD-R61Y	990 38.976 1,350 53.150	610 24.016 1,000 39.370	435 17.126 650 25.591	280 11.024 450 17.717	160 6.299 250 9.843	50 1.969 —	85 3.346	185 7.283	P.78
FD-S21	190 7.480 175 6.890	130 5.118 130 5.118	110 4.331 110 4.331	80 3.150 85 3.346	37 1.457 50 1.969	11 0.433 —	25 0.984	70 2.756	P.78
FD-S30	600 23.622 800 31.496	330 12.992 500 19.685	250 9.843 330 12.992	160 6.299 220 8.661	80 3.150 140 5.512	25 0.984 —	45 1.772	155 6.102	P.79
FD-S31	515 20.276 700 27.559	290 11.417 450 17.717	220 8.661 300 11.811	125 4.921 200 7.874	80 3.150 130 5.118	25 0.984 —	35 1.378	140 5.512	P.79
FD-S32	1,200 47.244 1,600 62.992	790 31.102 1,200 47.244	660 25.984 900 35.433	420 16.535 600 23.622	220 8.661 350 13.780	75 2.953 —	120 4.724	345 13.583	P.79
FD-S32W	900 35.433 1,400 55.118	630 24.803 1,000 39.370	430 16.929 650 25.591	270 10.630 450 17.717	150 5.906 250 9.843	45 1.772 —	80 3.150	230 9.055	P.79
FD-S33GW	670 26.378 880 34.646	340 13.386 550 22.047	280 11.024 370 14.567	150 5.906 240 9.449	90 3.543 150 5.906	25 0.984 —	45 1.772	140 5.512	P.79
FD-S34G	330 12.992 480 18.898	185 7.283 310 12.205	135 5.305 180 7.087	90 3.543 130 5.118	49 1.929 80 3.150	15 0.591 —	29 1.142	90 3.543	P.79
FD-S60Y	600 23.622 —	590 23.228 700 27.559	420 16.535 550 21.654	320 12.598 450 17.717	200 7.874 380 14.961	75 2.953 —	140 5.512	300 11.811	P.79

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 is specified for white non-glossy paper.

3) The sensing range is specified for transparent glass 100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in (FD-L32H: R edge)

SENSING RANGE

Fibers are listed in alphabetic order.
Refer to p.5~ for details of each fiber.

Reflective type



Model No.	Sensing range (mm in) (Note 1, 2) / Description								Dimensions
	FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
FD-V30	240 9.449 430 16.929	130 5.118 210 8.268	120 4.724 145 5.709	65 2.559 90 3.543	35 1.378 65 2.559	14 0.551 —	25 0.984	75 2.953	P.79
FD-V30W	80 3.150 120 4.724	40 1.575 65 2.559	30 1.181 37 1.457	20 0.787 30 1.181	10 0.394 16 0.630	2 0.079 —	6 0.236	20 0.787	P.80
FD-V50	370 14.567 530 20.866	220 8.661 400 15.748	210 8.268 240 9.449	120 4.724 180 7.087	75 2.953 110 4.331	25 0.984 —	40 1.575	100 3.937	P.80
FD-Z20HBW	1 to 340 0.039 to 13.386 550 21.654	1 to 210 0.039 to 8.268 370 14.567	1 to 180 0.039 to 7.087 240 9.449	2 to 85 0.079 to 3.346 170 6.693	2 to 55 0.079 to 2.165 100 3.937	3 to 15 0.118 to 0.591 —	2 to 30 0.079 to 1.181	1 to 90 0.039 to 3.543	P.80
FD-Z20W	260 10.236 450 17.717	150 5.906 290 11.417	130 5.118 190 7.480	1 to 65 0.039 to 2.559 130 5.118	2 to 45 0.079 to 1.772 80 3.150	5 to 13 0.197 to 0.512 —	2 to 32 0.079 to 1.260	1 to 80 0.039 to 3.150	P.80
FD-Z40HBW	760 29.921 1,350 53.150	540 21.260 1,000 39.370	470 18.504 680 26.772	260 10.236 480 18.898	1 to 160 0.039 to 6.299 270 10.630	2 to 50 0.079 to 1.969 —	1 to 90 0.039 to 3.543	0.5 to 240 0.020 to 9.449	P.80
FD-Z40W	790 31.102 1,500 59.055	440 17.323 950 37.402	390 15.354 510 20.079	190 7.480 390 15.354	1 to 120 0.039 to 4.724 230 9.055	2 to 35 0.079 to 1.378 —	1 to 74 0.039 to 2.913	200 7.874	P.80
FD-Z50HW	10 to 2,500 0.394 to 98.425 10 to 3,700 0.394 to 145.669	10 to 1,100 0.394 to 43.307 10 to 2,100 0.394 to 82.677	10 to 1,000 0.394 to 39.370 10 to 1,300 0.394 to 51.181	10 to 650 0.394 to 25.591 10 to 950 0.394 to 37.402	10 to 410 0.394 to 16.142 10 to 590 0.394 to 23.228	15 to 130 0.591 to 5.118 —	10 to 200 0.394 to 7.874	10 to 530 0.394 to 20.866	P.80

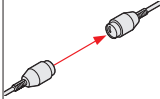
Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.

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

FIBER OPTIONS

Refer to p.81~ for details of lens dimensions.

Lens (For thru-beam type fiber)

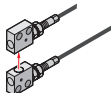
Designation	Model No.	Description										
Expansion lens (Note 1)	FX-LE1		Increases the sensing range by 5 times or more. • Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 3) • Beam dia: ø3.6 mm ø0.142 in Sensing range (mm in) [Lens on both sides]									
			Amplifier		FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series	
			Fiber	Mode	HYPH	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102
			FT-43		3,600	3,600	3,600	3,600	3,600	1,600		
					141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	62.992	2,400	3,600
					3,600	3,600	3,600	3,600	3,600	—	94.488	141.732 (Note 2)
			FT-42 FT-42W		3,600	3,600	3,600	3,600	3,600	2,200		
					141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	86.614	3,400	3,600
					3,600	3,600	3,600	3,600	3,600	—	133.858	141.732 (Note 2)
			FT-45X		1,600	1,600	1,600	1,600	1,600	1,500		
	62.992 (Note 2)	62.992 (Note 2)		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	59.055	1,600	1,600			
	1,600	1,600		1,600	1,600	1,600	—	62.992 (Note 2)	62.992 (Note 2)			
FT-R40		3,600	3,600	3,600	3,600	3,600	1,900					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	74.803	3,100	3,600			
		3,600	3,600	3,600	3,600	3,600	—	122.047	141.732 (Note 2)			
FT-R43 FT-R44Y		3,600	3,600	3,600	3,600	1,900	670					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	74.803	26.378	1,300	3,600			
		3,600	3,600	3,600	3,600	3,600	—	51.181	141.732 (Note 2)			
FT-H35-M2		3,600	3,600	3,600	3,600	3,300	1,400					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	129.921	55.118	2,000	3,500			
		3,600	3,600	3,600	3,600	3,600	—	78.740	137.795 (Note 2)			
FT-H20W-M1		1,600	1,600	1,600	1,600	1,600	850					
		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	33.465	1,300	1,600			
		1,600	1,600	1,600	1,600	1,600	—	51.181	62.992 (Note 2)			
FT-H20-M1		1,600	1,600	1,600	1,600	1,600	1,200					
		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	47.244	1,600	1,600			
		1,600	1,600	1,600	1,600	1,600	—	62.992 (Note 2)	62.992 (Note 2)			
FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S		3,600	3,600	3,500	2,000	1,600	500					
		141.732 (Note 2)	141.732 (Note 2)	137.795	78.740	62.992	19.685	1,000	3,500			
		3,600	3,600	3,600	3,600	3,600	—	39.370	137.795 (Note 2)			
Super-expansion lens (Note 1)	FX-LE2		Tremendously increases the sensing range with large diameter lenses. • Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 3) • Beam dia: ø9.8 mm ø0.386 in Sensing range (mm in) [Lens on both sides]									
			Amplifier		FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series	
			Fiber	Mode	HYPH	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102
			FT-43 FT-42 FT-42W		3,600	3,600	3,600	3,600	3,600	3,600		
					141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	3,600	3,600
					3,600	3,600	3,600	3,600	3,600	—	141.732 (Note 2)	141.732 (Note 2)
			FT-45X		1,600	1,600	1,600	1,600	1,600	1,600		
					62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	1,600	1,600
					1,600	1,600	1,600	1,600	1,600	—	62.992 (Note 2)	62.992 (Note 2)
			FT-R40		3,600	3,600	3,600	3,600	3,600	3,600		
	141.732 (Note 2)	141.732 (Note 2)		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	3,600	3,600			
	3,600	3,600		3,600	3,600	3,600	—	141.732 (Note 2)	141.732 (Note 2)			
FT-R41W FT-R43 FT-R44Y		3,600	3,600	3,600	3,600	3,600	3,600					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	3,600	3,600			
		3,600	3,600	3,600	3,600	3,600	—	141.732 (Note 2)	141.732 (Note 2)			
FT-H35-M2		3,600	3,600	3,600	3,600	3,600	3,600					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	3,500	3,500			
		3,600	3,600	3,600	3,600	3,600	—	137.795 (Note 2)	137.795 (Note 2)			
FT-H20W-M1 FT-H20-M1		1,600	1,600	1,600	1,600	1,600	1,600					
		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	1,600	1,600			
		1,600	1,600	1,600	1,600	1,600	—	62.992 (Note 2)	62.992 (Note 2)			
FT-H13-FM2		3,600	3,600	3,600	3,600	3,600	3,600					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	3,500	3,500			
		3,600	3,600	3,600	3,600	3,600	—	137.795 (Note 2)	137.795 (Note 2)			
FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S		3,600	3,600	3,600	3,600	3,600	3,600					
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	3,500	3,500			
		3,600	3,600	3,600	3,600	3,600	—	137.795 (Note 2)	137.795 (Note 2)			

- Notes: 1) Be careful sure to use it only after you have adjusted it sufficiently when installing the thru-beam type fiber equipped with the expansion lens, as the beam envelope becomes narrow and alignment is difficult.
- 2) The fiber cable length practically limits the sensing range.
- 3) Refer to p.15, p.18, p.34, and p.37 for the ambient temperature of fibers to be used in combination.

FIBER OPTIONS

Refer to p.81~ for details of lens dimensions.

Lens (For thru-beam type fiber)

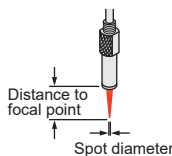
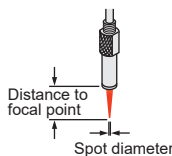
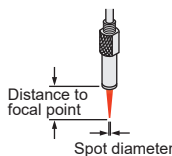
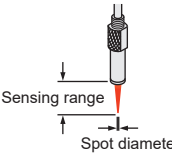
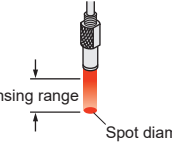
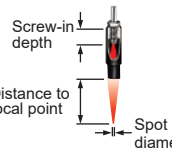
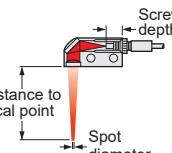
Designation	Model No.	Description											
Side-view lens	FX-SV1		Beam axis is bent by 90°. • Ambient temperature: -60 to +300 °C -76 to +572 °F (Note 4) • Beam dia: ø2.8 mm ø0.110 in Sensing range (mm in) [Lens on both sides]										
			Amplifier		FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
			Fiber	Mode	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
			FT-43		3,600	3,400	2,600	1,700	970	310			
					141.732 (Note 2)	133.858	102.362	66.929	38.189	12.205	510	1,400	
					3,600	3,600	3,600	2,300	1,400	—	20.079	55.118	
					141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	90.551	55.118				
				FT-42		3,600	3,600	3,600	2,100	1,150	370		
						141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	82.677	45.276	14.567	500	1,700
					3,600	3,600	3,600	2,800	1,700	—	19.685	66.929	
					141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	110.236	66.929				
				FT-42W		3,600	3,500	2,700	1,800	990	320		
						141.732 (Note 2)	137.795	106.299	70.866	38.976	12.598	480	1,300
	3,600	3,600	3,600		2,300	1,400	—	18.898	51.181				
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	90.551	55.118							
	FT-45X		1,600	1,600	1,600	1,400	800	210					
			62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	55.118	31.496	8.268	540	1,600			
		1,600	1,600	1,600	1,600	1,600	—	21.260	62.992 (Note 2)				
		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)							
	FT-R43		3,200	1,800	1,300	950	510	160					
			125.984	70.866	51.181	37.402	20.079	6.299	310	930			
		3,600	3,600	2,700	1,900	1,200	—	12.205	36.614				
		141.732 (Note 2)	141.732 (Note 2)	106.299	74.803	47.244							
	FT-R44Y		3,200	1,800	1,300	950	510	160					
			125.984	70.866	51.181	37.402	20.079	6.299	310	930			
		3,600	3,600	3,200	2,200	1,400	—	12.205	36.614				
		141.732 (Note 2)	141.732 (Note 2)	125.984	86.614	55.118							
	FT-H35-M2		3,500	1,600	1,200	780	500	150					
			137.795	62.992	47.244	30.709	19.685	5.906	280	800			
		3,600	2,800	1,800	1,300	750	—	11.024	31.496				
		141.732 (Note 2)	110.236	70.866	51.181	29.528							
	FT-H20W-M1		1,600	1,600	1,500	950	560	190					
			62.992 (Note 2)	62.992 (Note 2)	59.055	37.402	22.047	7.480	140	400			
		1,600	1,600	1,600	1,250	690	—	5.512	15.748				
		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	49.213	27.165							
	FT-H20-M1		1,600	1,600	1,300	780	500	150					
			62.992 (Note 2)	62.992 (Note 2)	51.181	30.709	19.685	5.906	280	840			
		1,600	1,600	1,600	1,600	800	—	11.024	33.071				
		62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	62.992 (Note 2)	31.496							
	FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S		1,600	960	740	450	290	80					
			62.992 (Note 2)	37.795	29.134	17.717	11.417	3.150	150	410			
		3,600	2,400	1,500	1,100	680	—	5.906	16.142				
		141.732 (Note 2)	94.488	59.055	43.307	26.771							
Expansion lens for vacuum fiber (Note 1)	FV-LE1		Sensing range increases by 4 times or more. • Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 4) • Beam dia: ø3.6 mm ø0.142 in Sensing range (mm in) [Lens on both sides] (Note 3)										
			Amplifier		FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
			Fiber	Mode	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
			FT-H30-M1V-S		3,600	3,600	3,400	1,500	900	370			
	141.732 (Note 2)	141.732 (Note 2)		133.858	59.055	35.433	14.567	450	1,600				
	3,600	3,600		3,600	2,500	1,650	—	17.717	62.992				
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	98.425	64.961							
Vacuum-resistant side-view lens (Note 1)	FV-SV2		Beam axis is bent by 90°. • Ambient temperature: -60 to +300 °C -76 to +572 °F (Note 4) • Beam dia: ø3.7 mm ø0.146 in Sensing range (mm in) [Lens on both sides] (Note 3)										
			Amplifier		FX-500 series (Upper value) FX-550 series (Lower value)						FX-100 series		
			Fiber	Mode	HYPR	U-LG	LONG	STD	FAST	H-SP	FX-101	FX-102	
			FT-H30-M1V-S		3,600	3,600	3,400	1,500	900	370			
	141.732 (Note 2)	141.732 (Note 2)		133.858	59.055	35.433	14.567	450	1,600				
	3,600	3,600		3,600	1,800	1,100	—	17.717	62.992				
		141.732 (Note 2)	141.732 (Note 2)	141.732 (Note 2)	70.866	43.307							

- Notes: 1) Be careful sure to use it only after you have adjusted it sufficiently when installing the thru-beam type fiber equipped with the expansion lens, as the beam envelope becomes narrow and alignment is difficult.
- 2) The fiber cable length practically limits the sensing range.
- 3) The fiber cable length for the **FT-H30-M1V-S** is 1 m **3.281 ft**. The sensing ranges in HYPR, U-LG and LONG of **FX-500 / FX-550** series and in **FX-102** are specified considering the length of the **FT-J8** atmospheric side fiber.
- 4) Refer to p.15, p.18, p.34, p.37 and p.39 for the ambient temperature of fibers to be used in combination.

FIBER OPTIONS

Refer to p.81~ for details of lens dimensions.

Lens (For reflective type fiber)

Designation	Model No.	Description																																
Finest spot lens	FX-MR7		Extremely fine spot of $\varnothing 0.1$ mm $\varnothing 0.004$ in approx. achieved. • Applicable fibers: FD-R33EG, FD-EG31, FD-R34EG, FD-R32EG, FD-EG30, FD-R31G, FD-42G, FD-42GW, FD-32G, FD-32GX • Ambient temperature: -55 to +70 °C +67 to +158 °F (Note 1)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Fiber model No.</th><th>Distance to focal point</th><th>Spot diameter</th></tr><tr><td>FD-R33EG</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.1$ mm approx.</td></tr><tr><td>FD-EG31</td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.004$ in approx.</td></tr><tr><td>FD-R34EG</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.15$ mm approx.</td></tr><tr><td></td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.006$ in approx.</td></tr><tr><td>FD-R32EG</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.2$ mm approx.</td></tr><tr><td>FD-EG30</td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.008$ in approx.</td></tr><tr><td>FD-R31G</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.4$ mm approx.</td></tr><tr><td>FD-42G/42GW</td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.016$ in approx.</td></tr><tr><td>FD-32G/32GX</td><td></td><td></td></tr></table>	Fiber model No.	Distance to focal point	Spot diameter	FD-R33EG	7 $\pm$ 0.5 mm	$\varnothing 0.1$ mm approx.	FD-EG31	0.276 $\pm$ 0.020 in	$\varnothing 0.004$ in approx.	FD-R34EG	7 $\pm$ 0.5 mm	$\varnothing 0.15$ mm approx.		0.276 $\pm$ 0.020 in	$\varnothing 0.006$ in approx.	FD-R32EG	7 $\pm$ 0.5 mm	$\varnothing 0.2$ mm approx.	FD-EG30	0.276 $\pm$ 0.020 in	$\varnothing 0.008$ in approx.	FD-R31G	7 $\pm$ 0.5 mm	$\varnothing 0.4$ mm approx.	FD-42G/42GW	0.276 $\pm$ 0.020 in	$\varnothing 0.016$ in approx.	FD-32G/32GX		
	Fiber model No.	Distance to focal point	Spot diameter																															
	FD-R33EG	7 $\pm$ 0.5 mm	$\varnothing 0.1$ mm approx.																															
FD-EG31	0.276 $\pm$ 0.020 in	$\varnothing 0.004$ in approx.																																
FD-R34EG	7 $\pm$ 0.5 mm	$\varnothing 0.15$ mm approx.																																
	0.276 $\pm$ 0.020 in	$\varnothing 0.006$ in approx.																																
FD-R32EG	7 $\pm$ 0.5 mm	$\varnothing 0.2$ mm approx.																																
FD-EG30	0.276 $\pm$ 0.020 in	$\varnothing 0.008$ in approx.																																
FD-R31G	7 $\pm$ 0.5 mm	$\varnothing 0.4$ mm approx.																																
FD-42G/42GW	0.276 $\pm$ 0.020 in	$\varnothing 0.016$ in approx.																																
FD-32G/32GX																																		
FX-MR6 (Note 2)		Extremely fine spot of $\varnothing 0.1$ mm $\varnothing 0.004$ in approx. achieved. • Applicable fibers: FD-EG31, FD-EG30, FD-42G, FD-42GW, FD-32G, FD-32GX • Ambient temperature: -20 to +60 °C -4 to +140 °F (Note 1)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Fiber model No.</th><th>Distance to focal point</th><th>Spot diameter</th></tr><tr><td>FD-EG31</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.1$ mm approx.</td></tr><tr><td></td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.004$ in approx.</td></tr><tr><td>FD-EG30</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.2$ mm approx.</td></tr><tr><td></td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.008$ in approx.</td></tr><tr><td>FD-42G/42GW</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.4$ mm approx.</td></tr><tr><td>FD-32G/32GX</td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.016$ in approx.</td></tr></table>	Fiber model No.	Distance to focal point	Spot diameter	FD-EG31	7 $\pm$ 0.5 mm	$\varnothing 0.1$ mm approx.		0.276 $\pm$ 0.020 in	$\varnothing 0.004$ in approx.	FD-EG30	7 $\pm$ 0.5 mm	$\varnothing 0.2$ mm approx.		0.276 $\pm$ 0.020 in	$\varnothing 0.008$ in approx.	FD-42G/42GW	7 $\pm$ 0.5 mm	$\varnothing 0.4$ mm approx.	FD-32G/32GX	0.276 $\pm$ 0.020 in	$\varnothing 0.016$ in approx.										
Fiber model No.	Distance to focal point	Spot diameter																																
FD-EG31	7 $\pm$ 0.5 mm	$\varnothing 0.1$ mm approx.																																
	0.276 $\pm$ 0.020 in	$\varnothing 0.004$ in approx.																																
FD-EG30	7 $\pm$ 0.5 mm	$\varnothing 0.2$ mm approx.																																
	0.276 $\pm$ 0.020 in	$\varnothing 0.008$ in approx.																																
FD-42G/42GW	7 $\pm$ 0.5 mm	$\varnothing 0.4$ mm approx.																																
FD-32G/32GX	0.276 $\pm$ 0.020 in	$\varnothing 0.016$ in approx.																																
FX-MR3 (Note 2)		Extremely fine spot of $\varnothing 0.15$ mm $\varnothing 0.006$ in approx. achieved. • Applicable fibers: FD-EG31, FD-EG30, FD-42G, FD-42GW, FD-32G, FD-32GX • Ambient temperature: -40 to +70 °C -40 to +158 °F (Note 1)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Fiber model No.</th><th>Distance to focal point</th><th>Spot diameter</th></tr><tr><td>FD-EG31</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.15$ mm approx.</td></tr><tr><td></td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.006$ in approx.</td></tr><tr><td>FD-EG30</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.3$ mm approx.</td></tr><tr><td></td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.012$ in approx.</td></tr><tr><td>FD-42G/42GW</td><td>7 $\pm$ 0.5 mm</td><td>$\varnothing 0.5$ mm approx.</td></tr><tr><td>FD-32G/32GX</td><td>0.276 $\pm$ 0.020 in</td><td>$\varnothing 0.020$ in approx.</td></tr></table>	Fiber model No.	Distance to focal point	Spot diameter	FD-EG31	7 $\pm$ 0.5 mm	$\varnothing 0.15$ mm approx.		0.276 $\pm$ 0.020 in	$\varnothing 0.006$ in approx.	FD-EG30	7 $\pm$ 0.5 mm	$\varnothing 0.3$ mm approx.		0.276 $\pm$ 0.020 in	$\varnothing 0.012$ in approx.	FD-42G/42GW	7 $\pm$ 0.5 mm	$\varnothing 0.5$ mm approx.	FD-32G/32GX	0.276 $\pm$ 0.020 in	$\varnothing 0.020$ in approx.										
Fiber model No.	Distance to focal point	Spot diameter																																
FD-EG31	7 $\pm$ 0.5 mm	$\varnothing 0.15$ mm approx.																																
	0.276 $\pm$ 0.020 in	$\varnothing 0.006$ in approx.																																
FD-EG30	7 $\pm$ 0.5 mm	$\varnothing 0.3$ mm approx.																																
	0.276 $\pm$ 0.020 in	$\varnothing 0.012$ in approx.																																
FD-42G/42GW	7 $\pm$ 0.5 mm	$\varnothing 0.5$ mm approx.																																
FD-32G/32GX	0.276 $\pm$ 0.020 in	$\varnothing 0.020$ in approx.																																
Zoom lens	FX-MR8		The spot diameter is adjustable according to how much the fiber is screwed in. • Applicable fibers: FD-R33EG, FD-EG31, FD-R34EG, FD-R32EG, FD-EG30, FD-R31G, FD-32G, FD-32GX • Ambient temperature: -55 to +70 °C +67 to +158 °F (Note 1)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Fiber model No.</th><th>Sensing range</th><th>Spot diameter</th></tr><tr><td>FD-R33EG</td><td>10 to 30 mm</td><td>$\varnothing 0.4$ to $\varnothing 2.0$ mm approx.</td></tr><tr><td>FD-EG31</td><td>0.394 to 1.181 in</td><td>$\varnothing 0.016$ to $\varnothing 0.079$ in approx.</td></tr><tr><td>FD-R34EG</td><td>10 to 30 mm</td><td>$\varnothing 0.4$ to $\varnothing 2.2$ mm approx.</td></tr><tr><td></td><td>0.394 to 1.181 in</td><td>$\varnothing 0.016$ to $\varnothing 0.087$ in approx.</td></tr><tr><td>FD-R32EG</td><td>10 to 30 mm</td><td>$\varnothing 0.5$ to $\varnothing 2.5$ mm approx.</td></tr><tr><td>FD-EG30</td><td>0.394 to 1.181 in</td><td>$\varnothing 0.020$ to $\varnothing 0.098$ in approx.</td></tr><tr><td>FD-R31G</td><td>10 to 30 mm</td><td>$\varnothing 0.8$ to $\varnothing 3.5$ mm approx.</td></tr><tr><td>FD-32G/32GX</td><td>0.394 to 1.181 in</td><td>$\varnothing 0.031$ to $\varnothing 0.138$ in approx.</td></tr></table>	Fiber model No.	Sensing range	Spot diameter	FD-R33EG	10 to 30 mm	$\varnothing 0.4$ to $\varnothing 2.0$ mm approx.	FD-EG31	0.394 to 1.181 in	$\varnothing 0.016$ to $\varnothing 0.079$ in approx.	FD-R34EG	10 to 30 mm	$\varnothing 0.4$ to $\varnothing 2.2$ mm approx.		0.394 to 1.181 in	$\varnothing 0.016$ to $\varnothing 0.087$ in approx.	FD-R32EG	10 to 30 mm	$\varnothing 0.5$ to $\varnothing 2.5$ mm approx.	FD-EG30	0.394 to 1.181 in	$\varnothing 0.020$ to $\varnothing 0.098$ in approx.	FD-R31G	10 to 30 mm	$\varnothing 0.8$ to $\varnothing 3.5$ mm approx.	FD-32G/32GX	0.394 to 1.181 in	$\varnothing 0.031$ to $\varnothing 0.138$ in approx.			
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Parallel light lens	FX-MR9		Long-range parallel light • Applicable fibers: FD-R33EG, FD-EG31, FD-R34EG, FD-R32EG, FD-EG30, FD-R31G, FD-42G, FD-42GW, FD-32G, FD-32GX • Ambient temperature: -55 to +70 °C +67 to +158 °F (Note 1)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Fiber model No.</th><th>Sensing range</th><th>Spot diameter</th></tr><tr><td>FD-R33EG</td><td>0 to 30 mm</td><td>$\varnothing 4.0$ mm approx.</td></tr><tr><td>FD-EG31</td><td>0.394 to 1.181 in</td><td>$\varnothing 0.157$ in approx.</td></tr><tr><td>FD-R34EG</td><td>0 to 30 mm</td><td>$\varnothing 4.0$ mm approx.</td></tr><tr><td></td><td>0.394 to 1.181 in</td><td>$\varnothing 0.157$ in approx.</td></tr><tr><td>FD-R32EG</td><td>0 to 30 mm</td><td>$\varnothing 4.0$ mm approx.</td></tr><tr><td>FD-EG30</td><td>0.394 to 1.181 in</td><td>$\varnothing 0.157$ in approx.</td></tr><tr><td>FD-R31G</td><td>0 to 30 mm</td><td>$\varnothing 4.0$ mm approx.</td></tr><tr><td>FD-42G/42GW</td><td>0.394 to 1.181 in</td><td>$\varnothing 0.157$ in approx.</td></tr><tr><td>FD-32G/32GX</td><td></td><td></td></tr></table>	Fiber model No.	Sensing range	Spot diameter	FD-R33EG	0 to 30 mm	$\varnothing 4.0$ mm approx.	FD-EG31	0.394 to 1.181 in	$\varnothing 0.157$ in approx.	FD-R34EG	0 to 30 mm	$\varnothing 4.0$ mm approx.		0.394 to 1.181 in	$\varnothing 0.157$ in approx.	FD-R32EG	0 to 30 mm	$\varnothing 4.0$ mm approx.	FD-EG30	0.394 to 1.181 in	$\varnothing 0.157$ in approx.	FD-R31G	0 to 30 mm	$\varnothing 4.0$ mm approx.	FD-42G/42GW	0.394 to 1.181 in	$\varnothing 0.157$ in approx.	FD-32G/32GX		
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FD-42G/42GW	0.394 to 1.181 in	$\varnothing 0.157$ in approx.																																
FD-32G/32GX																																		
Pinpoint spot lens	FX-MR1		Pinpoint spot of $\varnothing 0.5$ mm $\varnothing 0.020$ in. Enables detection of minute objects or small marks. • Distance to focal point: 6 $\pm$ 1 mm 0.236 ± 0.039 in • Applicable fibers: FD-42G, FD-42GW • Ambient temperature: -40 to +70 °C -40 to +158 °F (Note 1)																															
Zoom lens	FX-MR2		The spot diameter is adjustable from $\varnothing 0.7$ to $\varnothing 2$ mm $\varnothing 0.028$ to $\varnothing 0.079$ in according to how much the fiber is screwed in. • Applicable fibers: FD-42G, FD-42GW • Ambient temperature: -40 to +70 °C -40 to +158 °F (Note 1) • Accessory: MS-EX3 (mounting bracket)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Screw-in depth</th><th>Distance to focal point</th><th>Spot diameter</th></tr><tr><td>7 mm 0.276 in</td><td>18.5 mm approx.</td><td>$\varnothing 0.7$ mm</td></tr><tr><td></td><td>0.728 in approx.</td><td>$\varnothing 0.028$ in</td></tr><tr><td>12 mm 0.472 in</td><td>27 mm approx.</td><td>$\varnothing 1.2$ mm</td></tr><tr><td></td><td>1.063 in approx.</td><td>$\varnothing 0.047$ in</td></tr><tr><td>14 mm 0.551 in</td><td>43 mm approx.</td><td>$\varnothing 2.0$ mm</td></tr><tr><td></td><td>1.693 in approx.</td><td>$\varnothing 0.079$ in</td></tr></table>	Screw-in depth	Distance to focal point	Spot diameter	7 mm 0.276 in	18.5 mm approx.	$\varnothing 0.7$ mm		0.728 in approx.	$\varnothing 0.028$ in	12 mm 0.472 in	27 mm approx.	$\varnothing 1.2$ mm		1.063 in approx.	$\varnothing 0.047$ in	14 mm 0.551 in	43 mm approx.	$\varnothing 2.0$ mm		1.693 in approx.	$\varnothing 0.079$ in									
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Zoom lens (side-view type)	FX-MR5		FX-MR2 is converted into a side-view type and can be mounted in a very small space. • Applicable fibers: FD-42G, FD-42GW • Ambient temperature: -40 to +60 °C -40 to +140 °F (Note 1)	Sensing range for FX-500 / FX-550 / FX-100 series <table><tr><th>Screw-in depth</th><th>Distance to focal point</th><th>Spot diameter</th></tr><tr><td>8 mm 0.315 in</td><td>13 mm approx.</td><td>$\varnothing 0.5$ mm</td></tr><tr><td></td><td>0.512 in approx.</td><td>$\varnothing 0.020$ in</td></tr><tr><td>10 mm 0.394 in</td><td>15 mm approx.</td><td>$\varnothing 0.8$ mm</td></tr><tr><td></td><td>0.591 in approx.</td><td>$\varnothing 0.031$ in</td></tr><tr><td>14 mm 0.551 in</td><td>30 mm approx.</td><td>$\varnothing 3.0$ mm</td></tr><tr><td></td><td>1.181 in approx.</td><td>$\varnothing 0.118$ in</td></tr></table>	Screw-in depth	Distance to focal point	Spot diameter	8 mm 0.315 in	13 mm approx.	$\varnothing 0.5$ mm		0.512 in approx.	$\varnothing 0.020$ in	10 mm 0.394 in	15 mm approx.	$\varnothing 0.8$ mm		0.591 in approx.	$\varnothing 0.031$ in	14 mm 0.551 in	30 mm approx.	$\varnothing 3.0$ mm		1.181 in approx.	$\varnothing 0.118$ in									
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Notes: 1) Refer to p.16, p.18, p.26 and p.27 for the ambient temperature of fibers to be used in combination.

2) Finest spot lenses **FX-MR6** / **FX-MR3** are used with **FD-R33EG** / **FD-R34EG** / **FD-R32EG** / **FD-R31G** as well. Please refer to our website for more details.

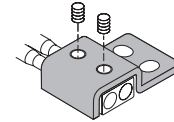
FIBER OPTIONS

Model No. when ordering heat-resistant fibers individually as spare parts

- Heat-resistant side fiber
FT-H20-J20 (one pair set)
FT-H20-J30 (one pair set)
FT-H20-J50 (one pair set)
FT-H20-VJ50 (one pair set)
FT-H20-VJ80 (one pair set)
- Ordinary temperature side fiber
FT-42 (one pair set)

Model No. when ordering vacuum-resistant fibers individually as spare parts

- Vacuum-resistant fiber
FT-H30-M1V (one pair set)
FD-H30-KZ1V
FD-H30-L32V
- Photo-terminal
FV-BR1 (one pair set)
- Fiber at atmospheric side
FT-J8 (one pair set)
- Mounting bracket for **FD-H30-KZ1V(-S)**
MS-FD-2



Model No. when ordering accessories additionally

- **RF-003** (Reflector for **FR-KZ50E/KZ50H**)
- **RF-13** (Reflective tape for **FR-Z50HW**)
- **FX-CT2** (Fiber cutter)
- **FX-CT3** (Fiber cutter for $\phi 1\text{mm}$ $\phi 0.039\text{ in}$ / $\phi 1.3\text{mm}$ $\phi 0.051\text{ in}$ fiber cable / $\phi 4\text{mm}$ $\phi 0.157\text{ in}$ protective tube)
- **FX-CT4** (Fiber cutter for $\phi 2\text{mm}$ $\phi 0.079\text{ in}$ fiber cable / $\phi 4\text{mm}$ $\phi 0.157\text{ in}$ protective tube)
- **FX-AT2** (Attachment for fixed-length fiber, Orange)
- **FX-AT3** (Attachment for $\phi 2.2\text{ mm}$ $\phi 0.087\text{ in}$ fiber, Clear orange)
- **FX-AT4** (Attachment for $\phi 1\text{ mm}$ $\phi 0.039\text{ in}$ fiber, Black)
- **FX-AT5** (Attachment for $\phi 1.3\text{ mm}$ $\phi 0.051\text{ in}$ fiber, Gray)
- **FX-AT6** (Attachment for $\phi 1\text{ mm}$ $\phi 0.039\text{ in}$ / $\phi 1.3\text{ mm}$ $\phi 0.051\text{ in}$ mixed fiber, Black / Gray)
- **FX-AT4G1** (Gland single for $\phi 1\text{ mm}$ $\phi 0.039\text{ in}$ fiber, Black)
- **FX-AT5G1** (Gland single for $\phi 1.3\text{ mm}$ $\phi 0.051\text{ in}$ fiber, Gray)
- **FX-AT6G1** (Gland single for $\phi 1\text{ mm}$ $\phi 0.039\text{ in}$ / $\phi 1.3\text{ mm}$ $\phi 0.051\text{ in}$ mixed fiber, Black / Gray)
- **FX-SL1** (Slit mask for **FT-A11** / **FT-A11W** (one pair set), slit size: $0.5 \times 12\text{ mm}$ $0.020 \times 0.472\text{ in}$)
- **FX-SL2** (Slit mask for **FT-A11** / **FT-A11W** (one pair set), slit size: $1 \times 12\text{ mm}$ $0.039 \times 0.472\text{ in}$)
- **FX-SL3** (Slit mask for **FT-A11** / **FT-A11W** (one pair set), slit size: $0.5 \times 33\text{ mm}$ $0.020 \times 1.299\text{ in}$)
- **MS-FD-2** (Fiber mounting bracket)
- **MS-FD-F7-1** (SUS mounting bracket for **FD-F71**)
- **MS-FD-F7-2** (PVC mounting bracket for **FD-F71**)

• RF-003



• RF-13



• FX-CT2



• FX-CT3



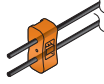
• FX-CT4



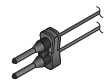
• FX-AT2



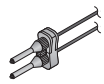
• FX-AT3



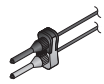
• FX-AT4



• FX-AT5



• FX-AT6



• FX-AT4G1



• FX-AT5G1



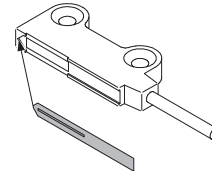
• FX-AT6G1



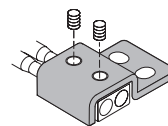
• FX-SL1

• FX-SL2

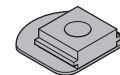
• FX-SL3



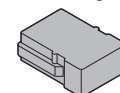
• MS-FD-2



• MS-FD-F7-1

(SUS mounting bracket for **FD-F71**)

• MS-FD-F7-2

(PVC mounting bracket for **FD-F71**)

FIBER OPTIONS

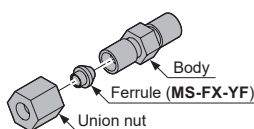
Others

Designation	Model No.	Description				
Protective tube for thru-beam type fiber	FTP-500 (0.5 m 1.640 ft)	For M4 thread	Applicable fibers	FT-42 FT-42S FT-42W	FT-43 FT-H13-FM2	The protective tube, made of non-corrosive stainless steel, protects the inner fiber cable from any external forces.
	FTP-1000 (1 m 3.281 ft)					
	FTP-1500 (1.5 m 4.921 ft)					
	FTP-N500 (0.5 m 1.640 ft)	For M3 thread		FT-31 FT-31S FT-31W	FD-31 FD-31W	
	FTP-N1000 (1 m 3.281 ft)					
	FTP-N1500 (1.5 m 4.921 ft)					
Protective tube for reflective type fiber	FDP-500 (0.5 m 1.640 ft)	For M6 thread		FD-61 FD-61G FD-61S FD-61W	FD-62 FD-H13-FM2	
	FDP-1000 (1 m 3.281 ft)					
	FDP-1500 (1.5 m 4.921 ft)					
	FDP-N500 (0.5 m 1.640 ft)	For M4 thread		FD-41 FD-41W	FD-41S FD-41SW	
	FDP-N1000 (1 m 3.281 ft)					
	FDP-N1500 (1.5 m 4.921 ft)					
Fiber bender	FB-1	The fiber bender bends the sleeve part of the fiber head at the proper radius. (Note 1)				
Universal sensor mounting stand	MS-AJ1-F	Horizontal mounting type		Mounting stand assembly for fiber (For M3, M4 or M6 threaded head fiber)		
	MS-AJ2-F	Vertical mounting type				
Liquid inflow prevention joint (Note 2)	MS-FX-01Y	Applicable fibers	FD-HF40Y FD-F41Y	This joint suppresses false operations due to liquid slip-in from the top of the protective tube.		
Protective tube extension joint (Note 2)	MS-FX-02Y			The protective tube can be extended.		
Fiber mounting joint (Note 2)	MS-FX-03Y			The joint is used for mounting fibers on a tank.		
Single core holder	FX-AT15A	The incident light intensity may vary when using a multi-core fiber or a thin type sharp bending fiber. This holder suppresses the variation in the incident light intensity. (Brown)				
Reflector	RF-210	Used with FR-Z50HW. Refer to p.32 or p.47 for the sensing range of FR-Z50HW to be used in combination.				
	RF-220					
	RF-230					

Notes: 1) Do not bend the sleeve part of any side-view type fiber or ultra-small diameter head type fiber.
2) The joint internal ferrule (MS-FX-YF) is available as a spare part. A distorted ferrule may result in leakage.

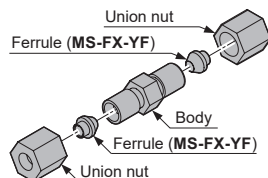
Liquid inflow prevention joint

• MS-FX-01Y



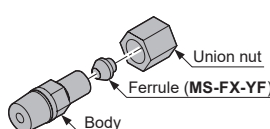
Protective tube extension joint

• MS-FX-02Y



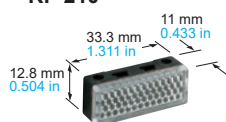
Fiber mounting joint

• MS-FX-03Y



Reflector

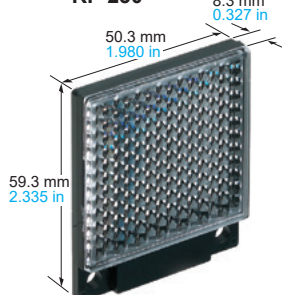
• RF-210



• RF-220



• RF-230



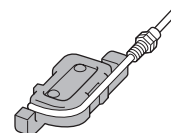
Protective tube

- FTP-□
- FDP-□



Fiber bender

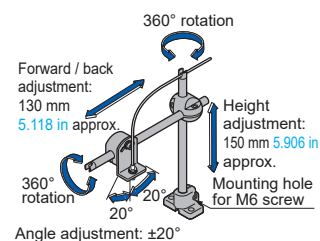
- FB-1



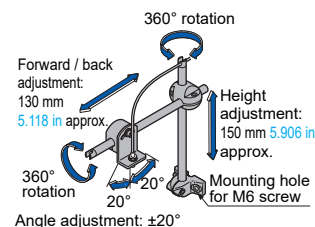
Universal sensor mounting stand

Using the arm which enables adjustment in the horizontal direction, sensing can also be done from above an assembly line.

- MS-AJ1-F



- MS-AJ2-F



Single core holder

- FX-AT15A



Semi-custom fibers that flexibly meet diverse needs

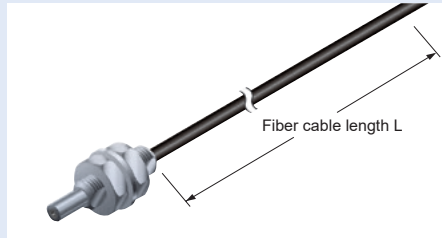
Guide to interchanging fiber length and sleeve length

Custom-ordered products are available with different fiber lengths and sleeve lengths in order to respond quickly to different requirements.

Contact us more information.

Fiber length change

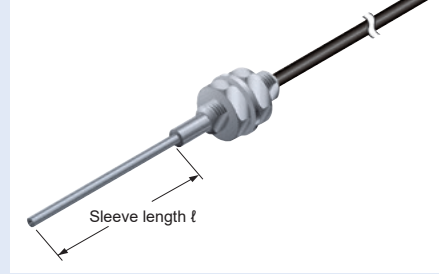
It is possible to extend up to 30 m **98.425 ft** in units of 1 m **3.281 ft**, varying depending on the model. Refer to the table on the next page for applicable models.



Note : Note that the model number differs from previous models with changed lengths.

Sleeve length change

Extension is possible up to 120 mm **4.724 in** in units of 10 mm **0.394 in**. Applicable models are sleeve extension-type models indicated by ▲ in the table on the next page.

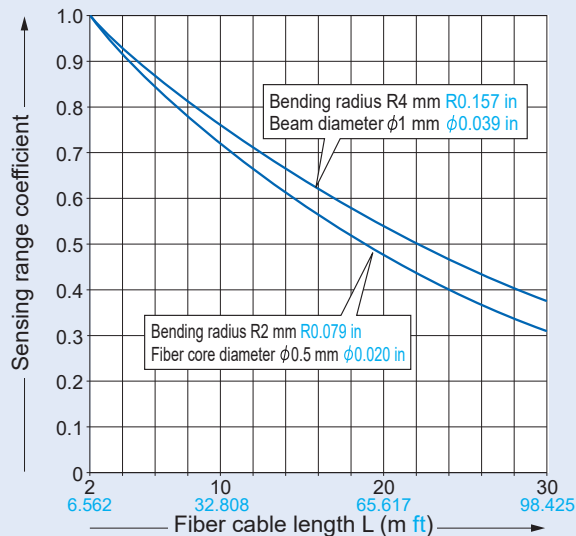


Note : Note that the model number differs from previous models with changed lengths.

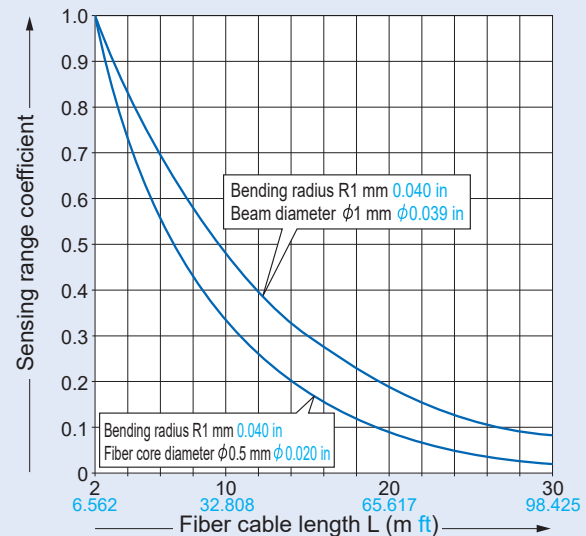
• Attenuation ratio characteristics for fiber cable length and sensing range

Note that the longer the fiber cable length, the shorter the sensing range.

Typical example: Bending radius R4 mm **R0.157 in** / R2 mm **R0.079 in** (Tough fiber)



Typical example: Bending radius R1 mm **R0.040 in** (Sharp bending fiber FT-□W / FD-□W)



Note: Because infrared types are easily affected by humidity, please ask assistance when using them in a humid environment or in an environment with varying humidity.

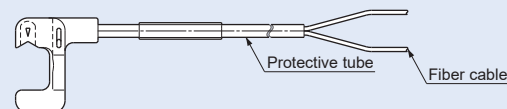
Extended protective tube

The chemical-resistant cover and stainless jacket can be extended in accordance with the fiber cable length.

Applicable models are indicated in the table as follows.

★: Models which can have extended protective tube (fluorine resin)

☆: Models which can have extended stainless jacket sheath



Applicable models

■ Retroreflective type

Model No.	Fiber cable length ☒ : Free-cut	Protective tube length	Sleeve length (mm in)	Basic specifications		Applicable fiber length	
				Sensing range (mm in) FX-500 series (STD) (Note)	Sensing range (mm in) FX-550 series (STD) (Note)	Max. (m ft)	Unit (m ft)
FR-KZ22E	2 m 6.562 ft ☒	—	—	15 to 310 0.591 to 12.205	15 to 540 0.591 to 21.260	10 32.808	1 3.281
FR-KZ50E	2 m 6.562 ft ☒	—	—	20 to 300 0.787 to 11.811	20 to 400 0.787 to 15.748	10 32.808	1 3.281
FR-KZ50H	2 m 6.562 ft ☒	—	—	20 to 300 0.787 to 11.811	20 to 400 0.787 to 15.748	10 32.808	1 3.281
FR-Z50HW	2 m 6.562 ft ☒	—	—	100 to 990 3.937 to 38.976	100 to 1,150 3.937 to 45.276	30 98.425	1 3.281

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

Semi-custom fibers that flexibly meet diverse needs

Guide to interchanging fiber length and sleeve length

Applicable models

Thru-beam type

Basic specifications						Applicable fiber length	
Model No.	Fiber cable length [] : Free-cut	Protective tube length	Sleeve length (mm in)	Sensing range (mm in) FX-500 series (STD) (Note 1)	Sensing range (mm in) FX-550 series (STD) (Note 1)	Max. (m ft)	Unit (m ft)
FT-140	10 m 32.808 ft []	—	—	19,600 771.654 (Note2)	19,600 771.654 (Note2)	30 98.425	1 3.281
FT-30	2 m 6.562 ft	—	—	400 15.748	570 22.441	10 32.808	0.1 0.328
FT-31	2 m 6.562 ft []	—	—	315 12.402	480 18.898	30 98.425	1 3.281
▲FT-31S	2 m 6.562 ft []	—	40 1.575 (Note 3)	315 12.402	480 18.898	30 98.425	1 3.281
FT-31W	2 m 6.562 ft []	—	—	260 11.024	420 16.535	20 65.617	1 3.281
FT-32	2 m 6.562 ft []	—	—	3,000 118.110	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-40	2 m 6.562 ft	—	—	1,200 47.244	1,570 61.811	10 32.808	0.1 0.328
FT-42	2 m 6.562 ft []	—	—	1,130 44.488	1,470 57.874	30 98.425	1 3.281
▲FT-42S	2 m 6.562 ft []	—	40 1.575 (Note 3)	1,130 44.488	1,470 57.874	30 98.425	1 3.281
FT-42W	2 m 6.562 ft []	—	—	800 31.496	1,200 47.244	20 65.617	1 3.281
FT-43	2 m 6.562 ft []	—	—	1,400 55.118	2,200 86.614	30 98.425	1 3.281
FT-45X	1 m 3.281 ft	—	—	1,200 47.244	1,600 62.992 (Note2)	10 32.808	0.5 1.640
FT-A11	2 m 6.562 ft []	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281
FT-A11W	2 m 6.562 ft []	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281
FT-A32	2 m 6.562 ft []	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281
FT-A32W	2 m 6.562 ft []	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281
FT-AL05	2 m 6.562 ft []	—	—	860 33.858	1,150 45.276	20 65.617	1 3.281
FT-E13	1 m 3.281 ft []	—	5 0.197	15 0.591	21 0.827	10 32.808	0.5 1.640
FT-E23	1 m 3.281 ft []	—	5 0.197	75 2.953	120 4.724	10 32.808	0.5 1.640
★FT-F93	2 m 6.562 ft []	1 m 3.281 ft (Note 4)	—	—	—	25 82.021	1 3.281
FT-H13-FM2	2 m 6.562 ft []	—	—	700 27.559	1,150 45.276	20 65.617	1 3.281
FT-H20-J50-S	500 mm 19.685 in [] (Note 5)	—	—	470 18.504	860 33.858	6.5 21.325	0.1 0.328
FT-H20-M1	1 m 3.281 ft	—	—	540 21.260	1,000 39.370	6.5 21.325	0.1 0.328
FT-H20-VJ80-S	800 mm 31.496 in [] (Note 5)	—	—	600 23.622	1,000 39.370	6.5 21.325	0.1 0.328
FT-H20W-M1	1 m 3.281 ft	—	—	470 18.504	730 28.740	6.5 21.325	0.1 0.328
FT-H30-M1V-S	1 m 3.281 ft	—	—	270 10.630	400 15.748	6.5 21.325	0.1 0.328
FT-H35-M2	2 m 6.562 ft	—	—	430 16.929	1,050 41.339	6.5 21.325	0.1 0.328
FT-H35-M2S6	2 m 6.562 ft	—	55 2.165	430 16.929	1,050 41.339	6.5 21.325	0.1 0.328
★FT-HL80Y	2 m 6.562 ft [] (Note 6)	1.5 m 4.921 ft (Note 4)	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-J8	2 m 6.562 ft []	—	—	—	—	30 98.425	1 3.281
FT-KS40	2 m 6.562 ft []	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281
FT-KV26	2 m 6.562 ft []	—	—	710 27.953	1,100 43.307	10 32.808	1 3.281
FT-KV26H1	2 m 6.562 ft []	—	—	630 24.803	1,000 39.370	10 32.808	1 3.281
FT-KV40	2 m 6.562 ft []	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281

▲: Models which can have extended sleeve

★: Models which can have extended protective tube (fluorine resin)

☆: Models which can have extended stainless jacket sheath

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 fiber cable length practically limits the sensing range.

3) Applicable sleeve length is from 10 to 120 mm 0.394 to 4.724 in and in units of 10 mm 0.394 in.

4) Applicable protective tube length is up to 10 m 32.808 ft and in units of 0.5 m 1.640 ft.

5) Fiber length (fixed-length) for heat-resistant fiber side. Fiber length for ordinary temperature side is 2 m 6.562 ft (free-cut).

6) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

Basic specifications						Applicable fiber length	
Model No.	Fiber cable length ☒ : Free-cut	Protective tube length	Sleeve length (mm in)	Sensing range (mm in) FX-500 series (STD) (Note 1)	Sensing range (mm in) FX-550 series (STD) (Note 1)	Max. (m ft)	Unit (m ft)
FT-KV40W	2 m 6.562 ft ☒	—	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	10 32.808	1 3.281
★FT-L80Y	2 m 6.562 ft ☒ (Note 4)	1.5 m 4.921 ft (Note 3)	—	3,600 141.732 (Note2)	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-R31	2 m 6.562 ft ☒	—	—	270 10.630	510 20.079	30 98.425	1 3.281
FT-R40	2 m 6.562 ft ☒	—	—	930 36.614	1,400 55.118	30 98.425	1 3.281
FT-R41W	2 m 6.562 ft ☒	—	—	800 31.496	1,300 51.181	20 65.617	1 3.281
FT-R42W	2 m 6.562 ft ☒	—	—	2,200 86.614	3,600 141.732 (Note2)	20 65.617	1 3.281
FT-R43	2 m 6.562 ft ☒	—	—	720 28.346	1,250 49.213	30 98.425	1 3.281
FT-R44Y	2 m 6.562 ft ☒	—	—	720 28.346	1,300 51.181	30 98.425	1 3.281
FT-R60Y	2 m 6.562 ft ☒	—	—	2,100 82.677	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-S11	500 mm 19.685 in	—	—	90 3.543	130 5.118	30 98.425	1 3.281
FT-S20	2 m 6.562 ft	—	—	400 15.748	550 21.654	10 32.808	0.1 0.328
FT-S21	2 m 6.562 ft ☒	—	—	315 12.402	450 17.717	30 98.425	1 3.281
FT-S21W	2 m 6.562 ft ☒	—	—	260 10.236	400 15.748	20 65.617	1 3.281
FT-S22	2 m 6.562 ft ☒	—	—	450 17.717	870 34.252	30 98.425	1 3.281
FT-S30	2 m 6.562 ft	—	—	1,200 47.244	1,650 64.961	10 32.808	0.1 0.328
FT-S31W	2 m 6.562 ft ☒	—	—	800 31.496	1,100 43.307	20 65.617	1 3.281
FT-S32	2 m 6.562 ft ☒	—	—	3,100 122.047	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-V23	2 m 6.562 ft ☒	—	20 0.787	450 17.717	750 29.528	30 98.425	1 3.281
FT-V24W	2 m 6.562 ft ☒	—	15 0.591	110 4.331	160 6.299	10 32.808	1 3.281
FT-V25	2 m 6.562 ft ☒	—	15 0.591	240 9.449	450 17.717	30 98.425	1 3.281
FT-V30	2 m 6.562 ft ☒	—	20 0.787	680 26.772	950 37.402	30 98.425	1 3.281
FT-V40	2 m 6.562 ft ☒	—	—	3,500 137.795	3,600 141.732 (Note2)	30 98.425	1 3.281
★FT-V80Y	2 m 6.562 ft ☒ (Note 4)	1.5 m 4.921 ft (Note 3)	—	1,300 51.181	2,200 86.614	30 98.425	1 3.281
FT-Z20HBW	1 m 3.281 ft ☒	—	—	260 10.236	450 17.717	20 65.617	1 3.281
FT-Z20W	1 m 3.281 ft ☒	—	—	620 24.236	1,100 43.307	20 65.617	1 3.281
FT-Z30	2 m 6.562 ft ☒	—	—	2,100 82.677	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-Z30E	2 m 6.562 ft ☒	—	—	3,500 137.795	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-Z30EW	2 m 6.562 ft ☒	—	—	3,400 133.858	3,600 141.732 (Note2)	20 65.617	1 3.281
FT-Z30H	2 m 6.562 ft ☒	—	—	3,500 137.795	3,600 141.732 (Note2)	30 98.425	1 3.281
FT-Z30HW	2 m 6.562 ft ☒	—	—	3,500 137.795	3,600 141.732 (Note2)	20 65.617	1 3.281
FT-Z30W	2 m 6.562 ft ☒	—	—	1,500 59.055	2,800 110.236	20 65.617	1 3.281
FT-Z40HBW	2 m 6.562 ft ☒	—	—	800 31.496	1,300 51.181	20 65.617	1 3.281
FT-Z40W	2 m 6.562 ft ☒	—	—	1,500 59.055	2,000 78.740	20 65.617	1 3.281
FT-Z802Y	2 m 6.562 ft ☒	—	—	3,100 122.047	3,600 141.732 (Note2)	30 98.425	1 3.281

▲: Models which can have extended sleeve

★: Models which can have extended protective tube (fluorine resin)

☆: Models which can have extended stainless jacket sheath

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 fiber cable length practically limits the sensing range.

3) Applicable protective tube length is up to 10 m 32.808 ft and in units of 0.5 m 1.640 ft.

4) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

Semi-custom fibers that flexibly meet diverse needs

Guide to interchanging fiber length and sleeve length

Applicable models

■ Reflective type

Basic specifications						Applicable fiber length	
Model No.	Fiber cable length ☒ : Free-cut	Protective tube length	Sleeve length (mm in)	Sensing range (mm in) FX-500 series (STD) (Note 1)	Sensing range (mm in) FX-550 series (STD) (Note 1)	Max. (m ft)	Unit (m ft)
FD-30	2 m 6.562 ft	—	—	160 6.299	210 8.268	10 32.808	0.1 0.328
FD-31	2 m 6.562 ft ☒	—	—	125 4.922	200 7.874	30 98.425	1 3.281
FD-31W	2 m 6.562 ft ☒	—	—	80 3.150	130 5.118	20 65.617	1 3.281
FD-32G	2 m 6.562 ft ☒	—	—	200 7.874	320 12.598	30 98.425	1 3.281
☆FD-32GX	1 m 3.281 ft ☒	300 mm 11.811 in (Note 3)	—	200 7.874	320 12.598	30 98.425	1 3.281
FD-34G	2 m 6.562 ft ☒	—	—	90 3.543	130 5.118	30 98.425	1 3.281
FD-40	2 m 6.562 ft	—	—	160 6.299	210 8.268	10 32.808	0.1 0.328
FD-41	2 m 6.562 ft ☒	—	—	125 4.921	200 7.874	30 98.425	1 3.281
▲FD-41S	2 m 6.562 ft ☒	—	40 1.575 (Note 2)	125 4.921	200 7.874	30 98.425	1 3.281
▲FD-41SW	2 m 6.562 ft ☒	—	40 1.575 (Note 2)	80 3.150	130 5.118	20 65.617	1 3.281
FD-41W	2 m 6.562 ft ☒	—	—	270 10.630	480 18.898	20 65.617	1 3.281
FD-42G	2 m 6.562 ft ☒	—	—	200 7.874	320 12.598	30 98.425	1 3.281
FD-42GW	2 m 6.562 ft ☒	—	—	150 5.906	210 8.268	20 65.617	1 3.281
FD-60	2 m 6.562 ft ☒	—	—	520 20.472	750 29.528	10 32.808	0.1 0.328
FD-61	2 m 6.562 ft ☒	—	—	450 17.717	620 24.409	30 98.425	1 3.281
FD-61G	2 m 6.562 ft ☒	—	—	420 16.535	600 23.622	30 98.425	1 3.281
▲FD-61S	2 m 6.562 ft ☒	—	40 1.575 (Note 2)	420 16.535	650 25.591	30 98.425	1 3.281
FD-61W	2 m 6.562 ft ☒	—	—	270 10.630	480 18.898	20 65.617	1 3.281
FD-62	2 m 6.562 ft ☒	—	—	520 20.472	880 34.646	30 98.425	1 3.281
FD-64X	1 m 3.281 ft	—	—	280 11.024	410 16.142	10 32.808	0.5 1.640
FD-A16	2 m 6.562 ft ☒	—	—	200 7.874	350 13.780	30 98.425	1 3.281
FD-AL11	2 m 6.562 ft ☒	—	—	320 12.598	450 17.717	20 65.617	1 3.281
FD-E13	1 m 3.281 ft	—	3 0.118	12 0.472	23 0.906	3 9.843	0.1 0.328
FD-E23	1 m 3.281 ft	—	5 0.197	55 2.165	80 3.150	3 9.843	0.1 0.328
FD-EG30	500 mm 19.685 in	—	—	48 1.890	90 3.543	3 9.843	0.1 0.328
FD-EG30S	1 m 3.281 ft	—	15 0.591	50 1.969	90 3.543	3 9.843	0.1 0.328
FD-EG31	500 mm 19.685 in	—	—	20 0.787	35 1.378	3 9.843	0.1 0.328
FD-F4	2 m 6.562 ft ☒	—	—	—	—	10 32.808	1 3.281
FD-F41	2 m 6.562 ft ☒	—	—	—	—	10 32.808	1 3.281
FD-F41Y	2 m 6.562 ft ☒	500 mm 19.685 in	—	—	—	5 16.404	1 3.281
★FD-F71	5 m 16.404 ft ☒	3 m 9.843 ft (Note 3)	—	—	—	25 82.021	1 3.281
FD-FA93	2 m 6.562 ft ☒	—	—	—	—	10 32.808	1 3.281
FD-H13-FM2	2 m 6.562 ft ☒	—	—	350 13.780	670 26.378	20 65.617	1 3.281
FD-H18-L31	2 m 6.562 ft ☒	—	—	0 to 16 0 to 0.630	0 to 45 0 to 1.772	5 16.404	1 3.281
FD-H20-21	1 m 3.281 ft	—	—	230 9.055	450 17.717	6.5 21.325	0.1 0.328
FD-H20-M1	1 m 3.281 ft	—	—	330 12.992	450 17.717	6.5 21.325	0.1 0.328
FD-H25-L43	3 m 9.843 ft	—	—	1.5 to 26 0.059 to 1.024	1 to 28 0.039 to 1.102	5 16.404	0.1 0.328
FD-H25-L45	3 m 9.843 ft	—	—	5 to 42 0.197 to 1.654	4 to 48 0.517 to 1.890	5 16.404	0.1 0.328
FD-H30-KZ1V-S	1 m 3.281 ft	—	—	20 to 200 0.787 to 7.874	20 to 450 0.787 to 17.717	6.5 21.325	0.1 0.328
FD-H30-L32	2 m 6.562 ft	—	—	0 to 17 0 to 0.670	0 to 21 0 to 0.827	5 16.404	1 3.281

▲: Models which can have extended sleeve

★: Models which can have extended protective tube (fluorine resin)

☆: Models which can have extended stainless jacket sheath

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) Applicable sleeve length is from 10 to 120 mm 0.394 to 4.724 in and in units of 10 mm 0.394 in.

3) Applicable protective tube length is up to 10 m 32.808 ft and in units of 0.5 m 1.640 ft. (however, FD-32GX is in units of 0.1 m 0.328 ft.)

4) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

Basic specifications						Applicable fiber length	
Model No.	Fiber cable length ✂ : Free-cut	Protective tube length	Sleeve length (mm in)	Sensing range (mm in) FX-500 series (STD) (Note 1)	Sensing range (mm in) FX-550 series (STD) (Note 1)	Max. (m ft)	Unit (m ft)
FD-H30-L32V-S	3 m 9.843 ft	—	—	0 to 8 0 to 0.315	0 to 11 0 to 0.433	5 16.404	0.1 0.328
FD-H35-20S	1 m 3.281 ft	—	90 3.543	260 10.236	410 16.142	6.5 21.325	0.1 0.328
FD-H35-M2	2 m 6.562 ft	—	—	260 10.236	400 15.748	6.5 21.325	0.1 0.328
FD-H35-M2S6	2 m 6.562 ft	—	55 2.165	260 10.236	400 15.748	6.5 21.325	0.1 0.328
FD-HF40Y	2 m 6.562 ft ✂	500 mm 19.685 in	—	—	—	5 16.404	1 3.281
FD-L10	2 m 6.562 ft ✂	—	—	0 to 5 0 to 0.197	0 to 5 0 to 0.197	5 16.404	1 3.281
FD-L11	2 m 6.562 ft ✂	—	—	0 to 9.5 0 to 0.374	0 to 13 0 to 0.512	5 16.404	1 3.281
FD-L12W	1 m 3.281 ft ✂	—	—	0 to 8 0 to 0.315	0 to 12 0 to 0.472	5 16.404	1 3.281
FD-L20H	2 m 6.562 ft ✂	—	—	0 to 23 0 to 0.906	0 to 33 0 to 1.299	5 16.404	1 3.281
FD-L21	2 m 6.562 ft ✂	—	—	1.5 to 16 0.059 to 0.630	1 to 19 0.039 to 0.748	5 16.404	1 3.281
FD-L21W	2 m 6.562 ft ✂	—	—	3 to 14 0.118 to 0.551	2 to 18 0.079 to 0.709	5 16.404	1 3.281
FD-L22A	2 m 6.562 ft ✂	—	—	0 to 24 0 to 0.945	0 to 34 0 to 1.339	5 16.404	1 3.281
FD-L23	3 m 9.843 ft ✂	—	—	0 to 29 0 to 1.142	0 to 34 0 to 1.339	5 16.404	1 3.281
FD-L30A	3 m 9.843 ft ✂	—	—	0 to 43 0 to 1.693	0 to 52 0 to 2.047	5 16.404	1 3.281
FD-L31A	3 m 9.843 ft ✂	—	—	4 to 33 0.157 to 0.299	3 to 42 0.118 to 1.654	5 16.404	1 3.281
FD-L32H	4 m 13.123 ft ✂	—	—	0 to 56 0 to 2.205	0 to 65 0 to 2.559	5 16.404	1 3.281
FD-R31G	2 m 6.562 ft ✂	—	—	170 6.693	290 11.417	30 98.425	1 3.281
FD-R32EG	500 mm 19.685 in	—	—	45 1.772	80 3.150	3 9.843	0.1 0.328
FD-R33EG	500 mm 19.685 in	—	—	19 0.748	30 1.181	3 9.843	0.1 0.328
FD-R34EG	500 mm 19.685 in	—	—	38 1.496	70 2.756	3 9.843	0.1 0.328
FD-R41	2 m 6.562 ft ✂	—	—	210 8.268	340 13.386	30 98.425	1 3.281
FD-R60	2 m 6.562 ft ✂	—	—	290 11.417	500 19.685	30 98.425	1 3.281
FD-R61Y	2 m 6.562 ft ✂	—	—	280 11.124	450 17.717	30 98.425	1 3.281
FD-S21	1 m 3.281 ft	—	—	80 3.150	85 3.346	20 65.617	1 3.281
FD-S30	2 m 6.562 ft	—	—	160 6.299	220 8.661	10 32.808	0.1 0.328
FD-S31	2 m 6.562 ft ✂	—	—	125 4.921	200 7.874	30 98.425	1 3.281
FD-S32	2 m 6.562 ft ✂	—	—	420 16.535	600 23.622	30 98.425	1 3.281
FD-S32W	2 m 6.562 ft ✂	—	—	270 10.630	450 17.717	20 65.617	1 3.281
FD-S33GW	2 m 6.562 ft ✂	—	—	150 5.906	240 9.449	20 65.617	1 3.281
FD-S34G	2 m 6.562 ft ✂	—	—	90 3.543	130 5.118	30 98.425	1 3.281
FD-S60Y	2 m 6.562 ft ✂ (Note 3)	1.5 m 4.921 ft (Note 2)	—	320 12.598	450 17.717	30 98.425	1 3.281
FD-V30	2 m 6.562 ft ✂	—	15 0.591	65 2.559	90 3.543	30 98.425	1 3.281
FD-V30W	2 m 6.562 ft ✂	—	15 0.591	20 0.787	30 1.181	10 32.808	1 3.281
FD-V50	2 m 6.562 ft ✂	—	20 0.787	120 4.724	180 7.087	30 98.425	1 3.281
FD-Z20HBW	1 m 3.281 ft ✂	—	—	2 to 85 0.079 to 3.346	170 6.693	20 65.617	1 3.281
FD-Z20W	1 m 3.281 ft ✂	—	—	1 to 65 0.039 to 2.559	130 5.118	20 65.617	1 3.281
FD-Z40HBW	2 m 6.562 ft ✂	—	—	260 10.236	480 18.898	20 65.617	1 3.281
FD-Z40W	2 m 6.562 ft ✂	—	—	190 7.480	390 15.354	20 65.617	1 3.281
FD-Z50HW	2 m 6.562 ft ✂	—	—	10 to 650 0.394 to 25.591	10 to 950 0.394 to 37.402	20 65.617	1 3.281

▲: Models which can have extended sleeve

★: Models which can have extended protective tube (fluorine resin)

☆: Models which can have extended stainless jacket sheath

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) Applicable protective tube length is up to 10 m 32.808 ft and in units of 0.5 m 1.640 ft.

3) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Thru-beam type fibers

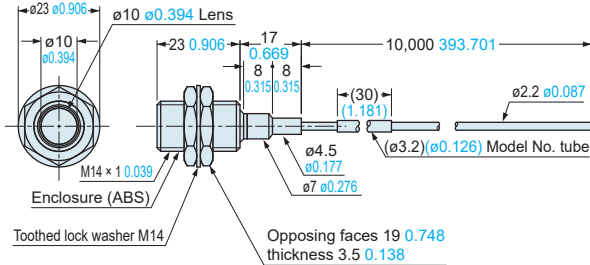


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FT-140

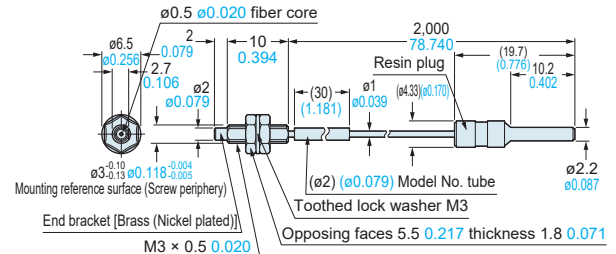
Free-cut

<with FX-AT3>



FT-30

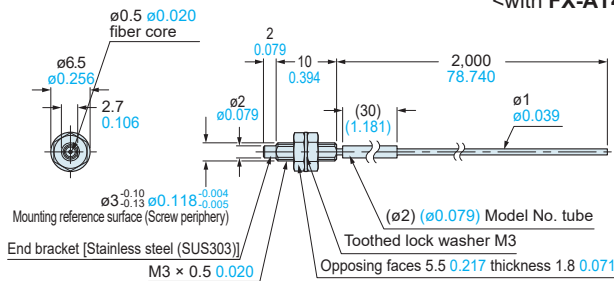
<with FX-AT2>



FT-31

Free-cut

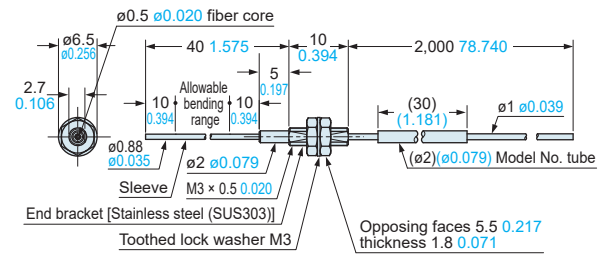
<with FX-AT4>



FT-31S

Free-cut

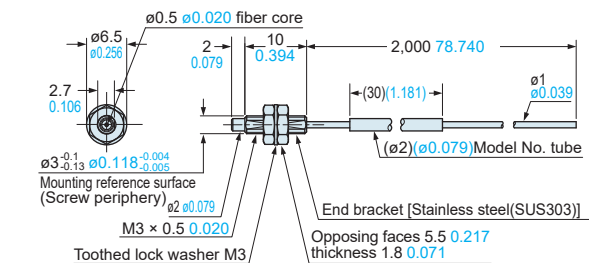
<with FX-AT4>



FT-31W

Free-cut

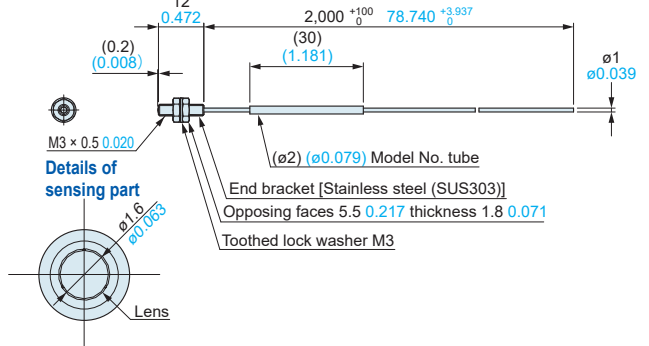
<with FX-AT4>



FT-32

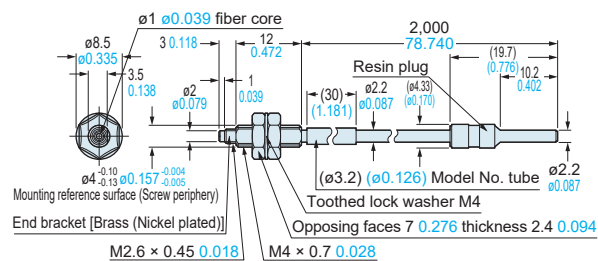
Free-cut

<with FX-AT4>



FT-40

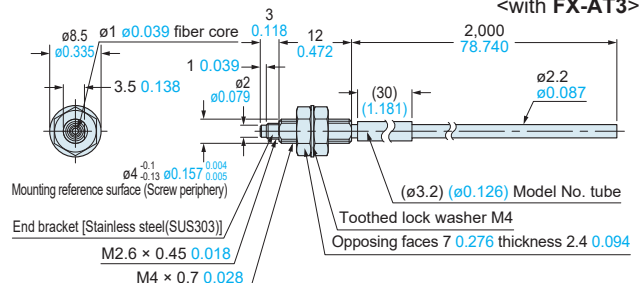
<with FX-AT2>



FT-42

Free-cut

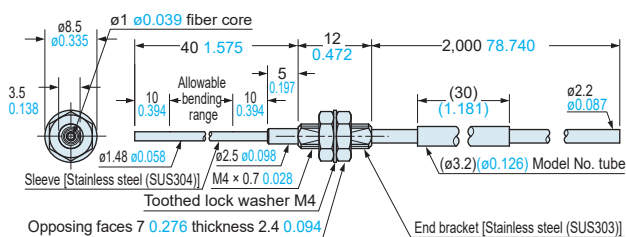
<with FX-AT3>



FT-42S

Free-cut

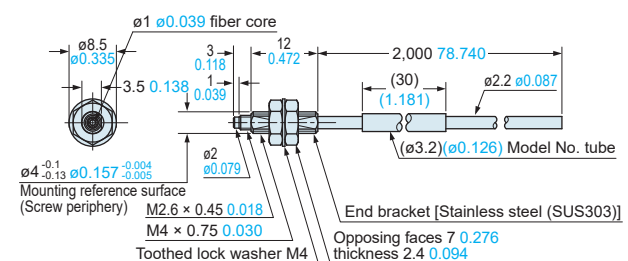
<with FX-AT3>



FT-42W

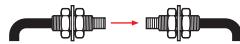
Free-cut

<with FX-AT3>



The CAD data can be downloaded from our website.

Thru-beam type fibers



FT-43



Technical drawing of the Model No. tube assembly. The drawing includes a cross-sectional view of the tube on the left and a side view of the assembly on the right. Key dimensions and components are labeled:

- Tube Dimensions:**
 - Outer diameter: $\phi 8.5$ ± 0.335
 - Inner diameter: $\phi 6.5$ ± 0.138
 - Wall thickness: 1.5 ± 0.059 fiber core
 - Mounting reference surface (Screw periphery): $\phi 4$ $^{+0.1}_{-0.13}$ $\phi 0.157$ $^{+0.004}_{-0.005}$
- Assembly Dimensions:**
 - Distance from tube end to lock washer: 3 ± 0.118
 - Lock washer thickness: 1 ± 0.039
 - Distance from lock washer to end bracket: 12 ± 0.472
 - End bracket length: $2,000$ ± 78.740
 - End bracket inner diameter: $\phi 2.2$ ± 0.087
 - End bracket outer diameter: $\phi 3.2$ ± 0.126
 - End bracket hole diameter: $\phi 2.0$ ± 0.087
 - End bracket hole position: (30) (1.181)
- Components:**
 - Toothed lock washer M4: $M2.6 \times 0.45$ ± 0.018
 - End bracket [Stainless steel (SUS303)]: $M4 \times 0.7$ ± 0.028
 - Opposing faces: 7 ± 0.276
 - Thickness: 2.4 ± 0.094

 Free-cut

Top View Dimensions:

- Center of beam axis
- Lens sensing face (2.2×11) (0.087×0.433)
- Beam axis
- Enclosure (PC)
- Countersinking: $2-\phi 3.2 \pm 0.126$, $\phi 6.0 \pm 0.236$ countersinking (on both sides)

Side View Dimensions:

- Center of beam axis
- (8) (0.315)
- 9.5 (0.374)
- 4.2 (0.165)
- (13.5) (0.531)
- 2-R4 R0.151
- 4 (0.157)
- 19 (0.748)
- 2- $\phi 3.2 \pm 0.126$, $\phi 6.0 \pm 0.236$ countersinking (on both sides)
- Enclosure (PC)

 Free-cut

[illegible] Free-cut

Details of sensing part

5 0.197

15 0.591

10 0.394

8 0.315

2.5 0.098

15 0.591

2,000 78.740

2-M3 x 0.5 0.020

4.5 0.177

2.5 0.098

4.5 0.177

1 0.039

5.25 0.207

Enclosure (PPS)

Sensing part (ø0.25 fiber core ø0.010 x 16)

2.2 0.087

 Free-cut

Details of sensing part

Technical drawing showing the details of the sensing part of the probe. The drawing includes a side view and a top view.

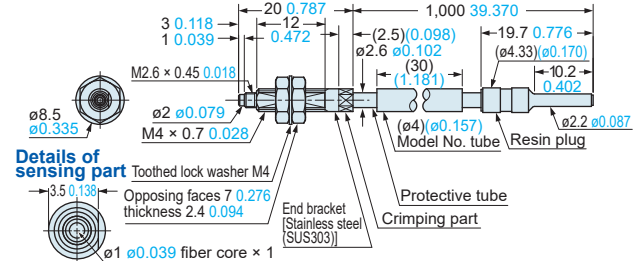
Side View Dimensions:

- Overall length: 1,000
- Distance from end bracket to sleeve: 15 (0.591)
- Distance from sleeve to mounting reference surface: 39.370 (30) (1.181)
- End bracket (Stainless steel (SUS303))
- Sleeve
- Mounting reference surface (Periphery)
- Model No. tube: (ø2) (ø0.079)
- Inner diameter of tube: ø0.039
- Outer diameter of sleeve: 5±0.5
- Dimension of sleeve: 0.197±0.020

Top View Dimensions:

- Outer diameter: ø3.0^{0.1}_{-0.1}
- Inner diameter: ø0.118^{0.004}_{-0.004}
- Fiber core diameter: ø0.25 ø0.010 fiber core ×1
- Outer diameter of mounting reference surface: ø4.0^{0.1}_{-0.1}
- Inner diameter of mounting reference surface: ø0.016^{0.004}_{-0.004}

<with **FX-AT2**>

 Free-cut

 Free-cut

Technical drawing of the front view of the enclosure (PC). The drawing shows a light blue rectangular enclosure with a dashed center line. Key dimensions and labels include:

- Top Section:**
 - Center of beam axis (indicated by a dashed line).
 - Sensing face (3.2 × 32) Lens (indicated by a dashed line).
 - Dimensions: 19 (0.748), 65 2.559, 4 0.157, 2,000 78.740.
- Bottom Section:**
 - Beam axis (indicated by a dashed line).
 - Enclosure (PC) label.
 - Dimensions: 5 0.197, 16 (20) 0.630 (0.787), 12 0.472, 45 1.772, 2-ø3.2 ø0.126 ø6 ø0.236 countersinking (on both sides), 7.3 0.287, 5.2 0.205, ø1.3 ø0.051.
- Left Section:**
 - Dimensions: 2-R4 R0.157, 12 0.472.

 Free-cut

Technical drawing of the end bracket and details of the sensing part of the fiber optic probe.

End bracket [Stainless steel (SUS303)]

Dimensions and tolerances for the end bracket:

- Overall length: 1,000
- Distance from mounting reference surface to center of fiber core: 39.370
- Distance from mounting reference surface to end of sleeve: 15
- Distance from mounting reference surface to end of sleeve (with tolerance): 0.197 ± 0.020
- Distance from mounting reference surface to end of sleeve (with tolerance): 5 ± 0.5
- Distance from mounting reference surface to end of sleeve (with tolerance): 0.591
- Distance from mounting reference surface to end of sleeve (with tolerance): $(30) (1.181)$
- Distance from mounting reference surface to end of sleeve (with tolerance): $\phi 0.039$
- Distance from mounting reference surface to end of sleeve (with tolerance): $\phi 0.079$
- Distance from mounting reference surface to end of sleeve (with tolerance): $\phi 0.118 \pm 0.004$
- Distance from mounting reference surface to end of sleeve (with tolerance): $\phi 0.125 \pm 0.005$
- Distance from mounting reference surface to end of sleeve (with tolerance): $\phi 0.25 \pm 0.01$
- Distance from mounting reference surface to end of sleeve (with tolerance): $\phi 0.010 \pm 0.004$

Details of sensing part

Mounting reference surface (Periphery)

Model No. tube

Fiber core dimensions:

- Fiber core diameter: $\phi 0.125 \pm 0.005$
- Fiber core diameter: $\phi 0.25 \pm 0.01$
- Fiber core diameter: $\phi 0.010 \pm 0.004$

 Free-cut

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

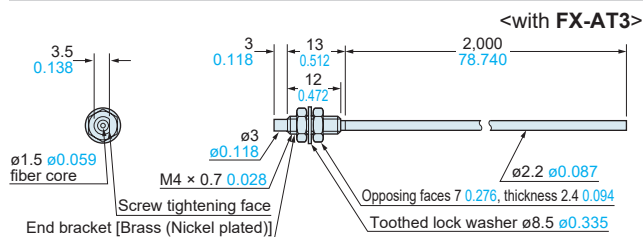
DIMENSIONS (Unit: mm in)

Thru-beam type fibers



Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FT-H13-FM2

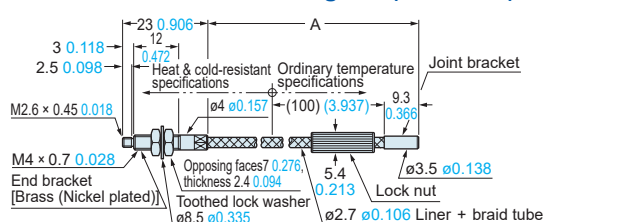


FT-H20-J20-S FT-H20-J30-S FT-H20-J50-S

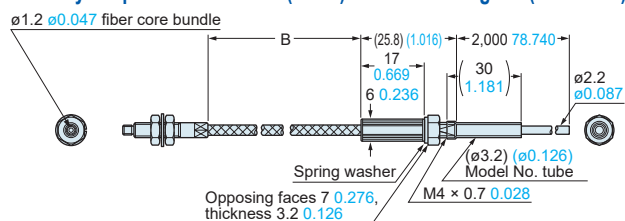


<with **FX-AT3**>

Heat-resistant side unit diagram (side view)



Ordinary temperature side fiber (FT-42) connection diagram (front view)

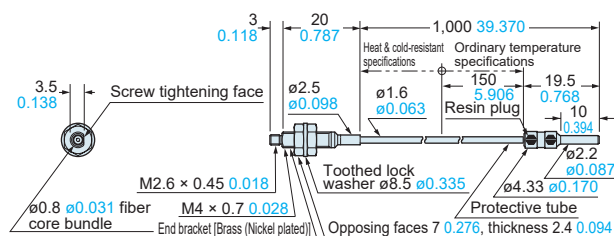
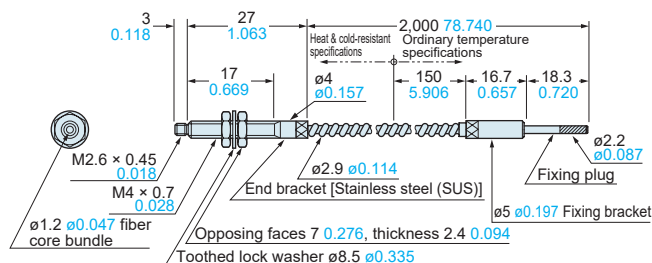


Model No.	A		B	
FT-H20-J20-S	200 $\begin{smallmatrix} +25 \\ 0 \end{smallmatrix}$	7.874 $\begin{smallmatrix} +0.984 \\ 0 \end{smallmatrix}$	185 $\begin{smallmatrix} +30 \\ 0 \end{smallmatrix}$	7.284 $\begin{smallmatrix} +1.181 \\ 0 \end{smallmatrix}$
FT-H20-J30-S	300 $\begin{smallmatrix} +25 \\ 0 \end{smallmatrix}$	11.811 $\begin{smallmatrix} +0.984 \\ 0 \end{smallmatrix}$	285 $\begin{smallmatrix} +30 \\ 0 \end{smallmatrix}$	11.221 $\begin{smallmatrix} +1.181 \\ 0 \end{smallmatrix}$
FT-H20-J50-S	500 $\begin{smallmatrix} +25 \\ 0 \end{smallmatrix}$	19.685 $\begin{smallmatrix} +0.984 \\ 0 \end{smallmatrix}$	485 $\begin{smallmatrix} +30 \\ 0 \end{smallmatrix}$	19.095 $\begin{smallmatrix} +1.181 \\ 0 \end{smallmatrix}$

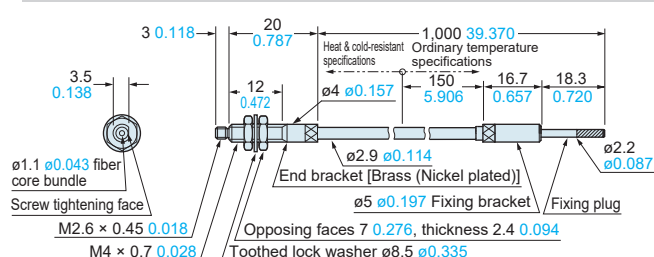
Note: Ordinary temperature side fiber (**FT-42**) only.

FT-H20W-M1

<with **FX-AT2**>

**FT-H35-M2**

FT-H20-M1

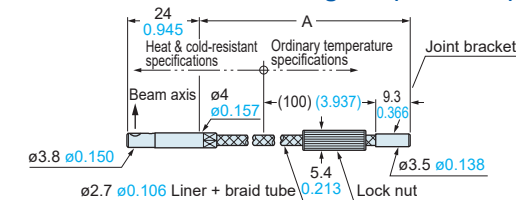


FT-H20-VJ50-S FT-H20-VJ80-S

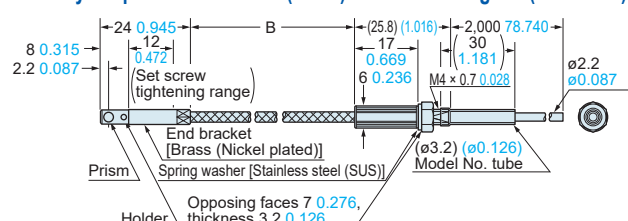


<with **FX-AT3**>

Heat-resistant side unit diagram (side view)

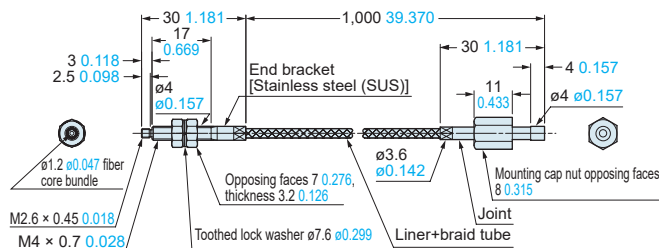


Ordinary temperature side fiber (FT-42) connection diagram (front view)

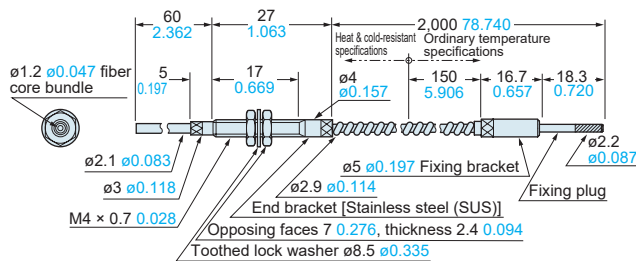


Model No.	A	B
FT-H20-VJ50-S	500 $\begin{smallmatrix} +25 \\ 0 \end{smallmatrix}$ 19.685 $\begin{smallmatrix} +0.984 \\ 0 \end{smallmatrix}$	485 $\begin{smallmatrix} +30 \\ 0 \end{smallmatrix}$ 19.095 $\begin{smallmatrix} +1.181 \\ 0 \end{smallmatrix}$
FT-H20-VJ80-S	800 $\begin{smallmatrix} +50 \\ 0 \end{smallmatrix}$ 31.496 $\begin{smallmatrix} +1.969 \\ 0 \end{smallmatrix}$	785 $\begin{smallmatrix} +55 \\ 0 \end{smallmatrix}$ 30.906 $\begin{smallmatrix} +2.165 \\ 0 \end{smallmatrix}$

Note: Ordinary temperature side fiber (FT-42) only.

FT-H30-M1V-S

Note: The **FT-H30-M1V-S** is a set with the **FT-H30-M1V**, photo-terminal, and atmospheric side fiber. Refer to p.81 for dimensions of the atmospheric side fiber and photo-terminals.

FT-H35-M2S6

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Thru-beam type fibers

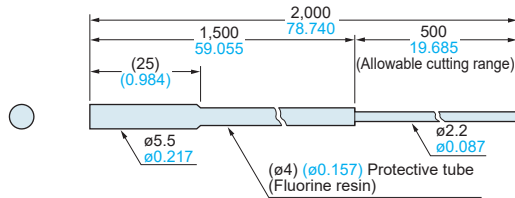


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FT-HL80Y

Free-cut

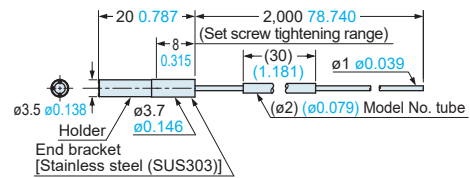
<with FX-AT3>



FT-KS40

Free-cut

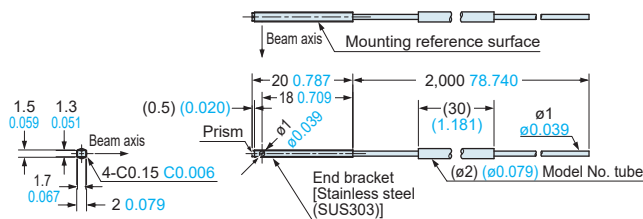
<with FX-AT4>



FT-KV26 FT-KV26H1

Free-cut

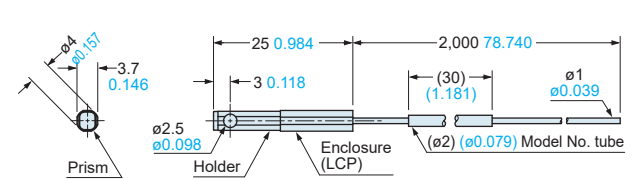
<with FX-AT4>



FT-KV40 FT-KV40W

Free-cut

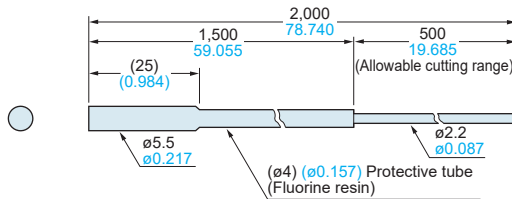
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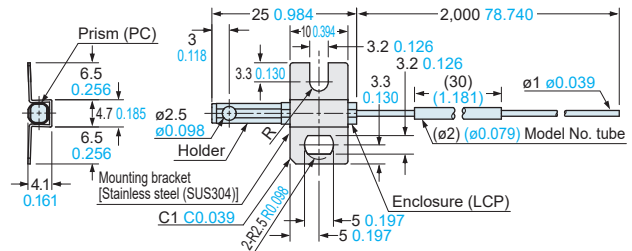
FT-L80Y

Free-cut

<with FX-AT3>



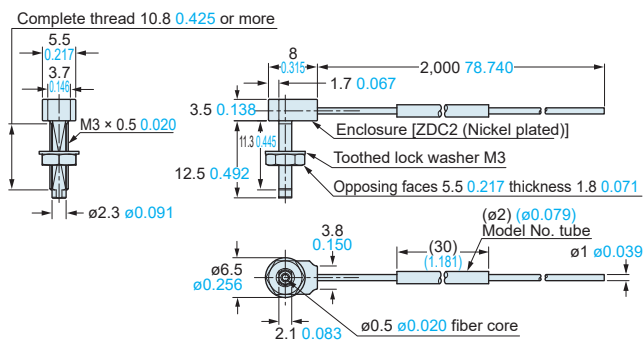
Assembly dimensions with MS-FD-3 (attached mounting bracket)



FT-R31

Free-cut

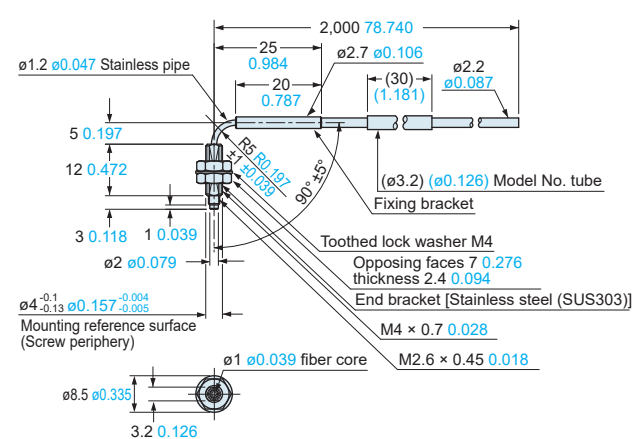
<with FX-AT4>



FT-R40

Free-cut

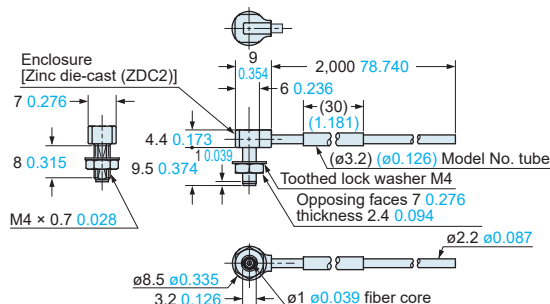
<with FX-AT3>



FT-R41W

Free-cut

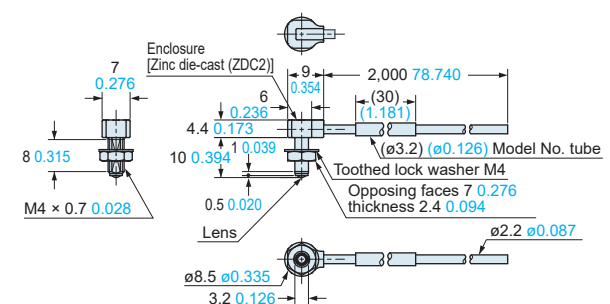
<with FX-AT3>



FT-R42W

Free-cut

<with FX-AT3>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Thru-beam type fibers

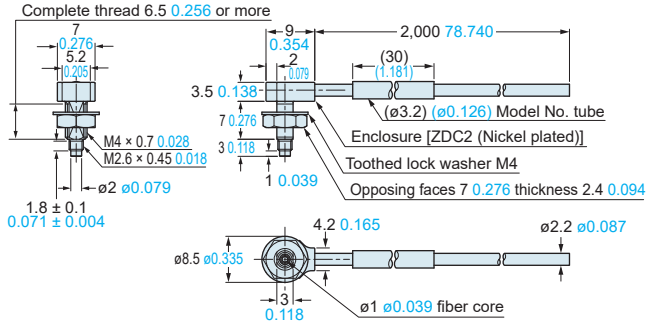


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FT-R43

Free-cut

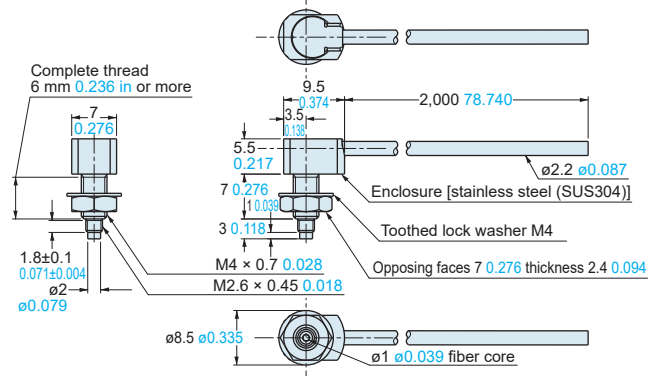
<with FX-AT3>



FT-R44Y

Free-cut

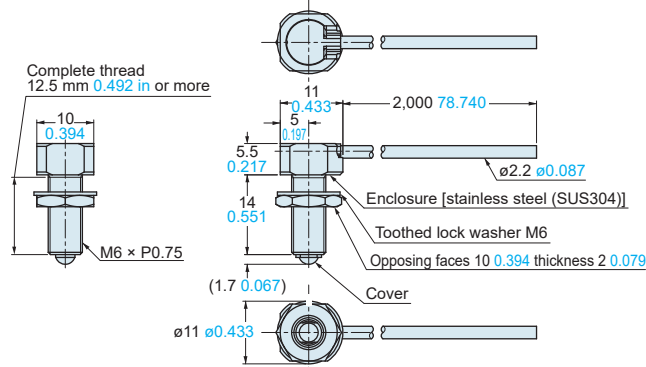
<with FX-AT3>



FT-R60Y

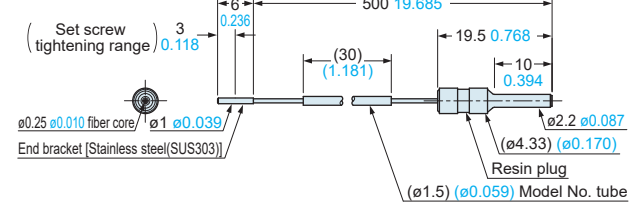
Free-cut

<with FX-AT3>



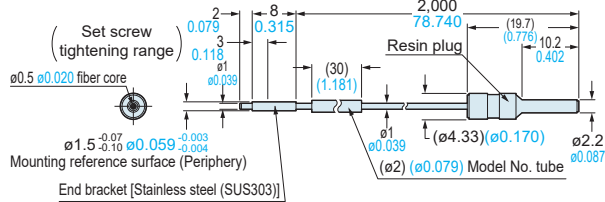
FT-S11

<with FX-AT2>



FT-S20

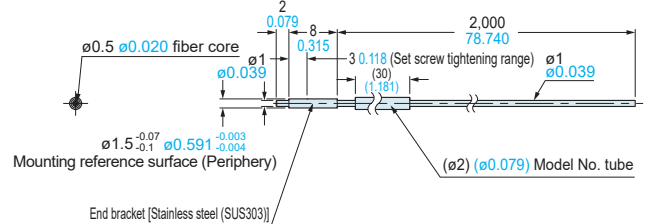
<with FX-AT2>



FT-S21

Free-cut

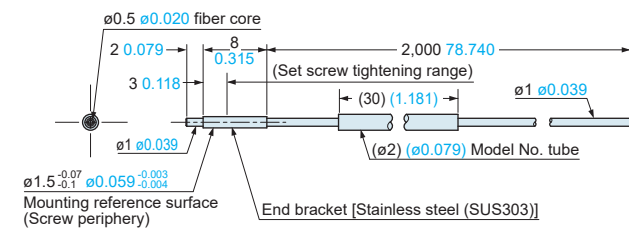
<with FX-AT4>



FT-S21W

Free-cut

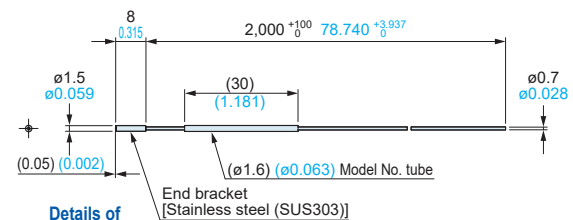
<with FX-AT4>



FT-S22

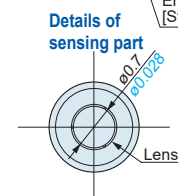
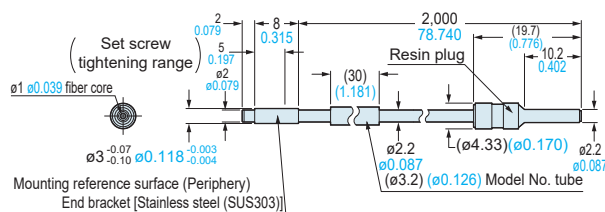
Free-cut

<with FX-AT7>



FT-S30

<with FX-AT2>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Thru-beam type fibers

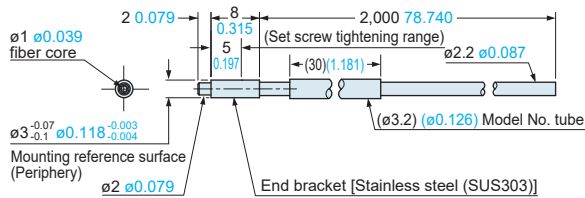


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FT-S31W

Free-cut

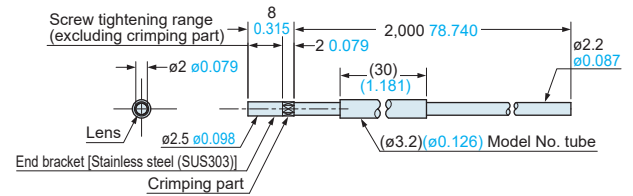
<with FX-AT3>



FT-S32

Free-cut

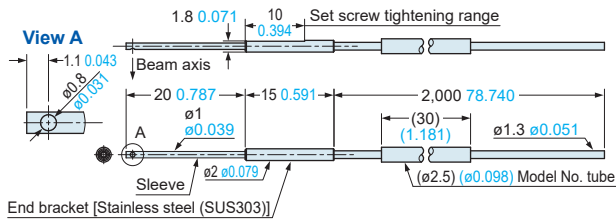
<with FX-AT3>



FT-V23

Free-cut

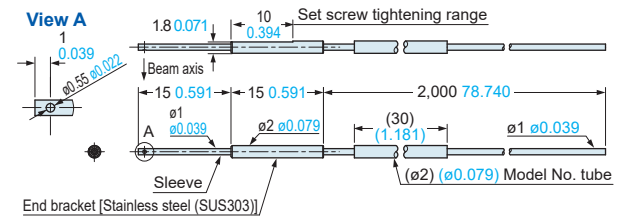
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FT-V24W

Free-cut

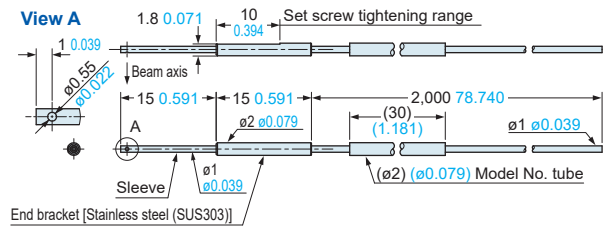
<with FX-AT4>



FT-V25

Free-cut

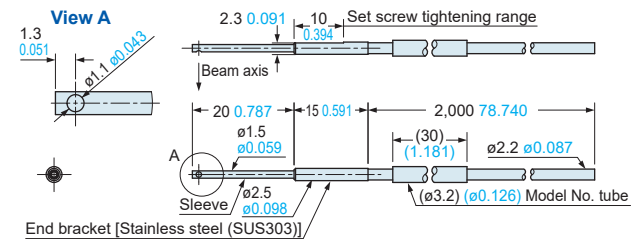
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FT-V30

Free-cut

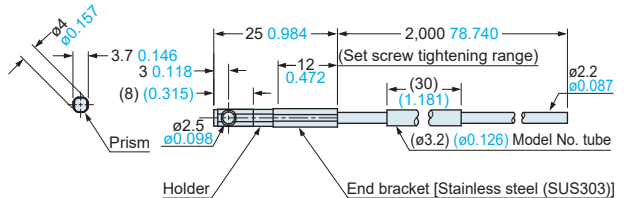
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FT-V40

Free-cut

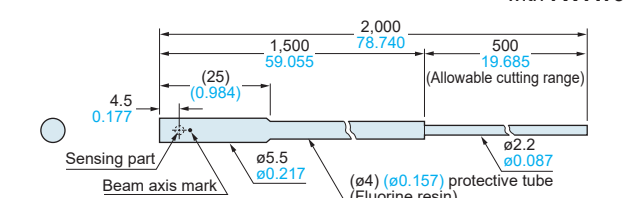
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FT-V80Y

Free-cut

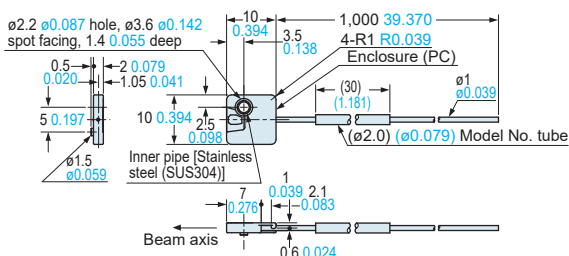
<with FX-AT3>



FT-Z20HBW

Free-cut

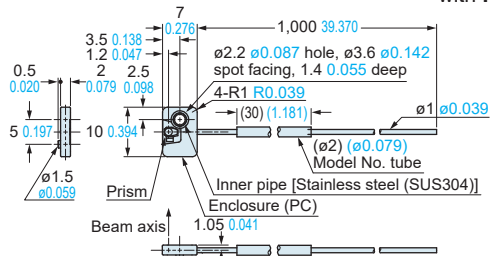
<with FX-AT4>



FT-Z20W

Free-cut

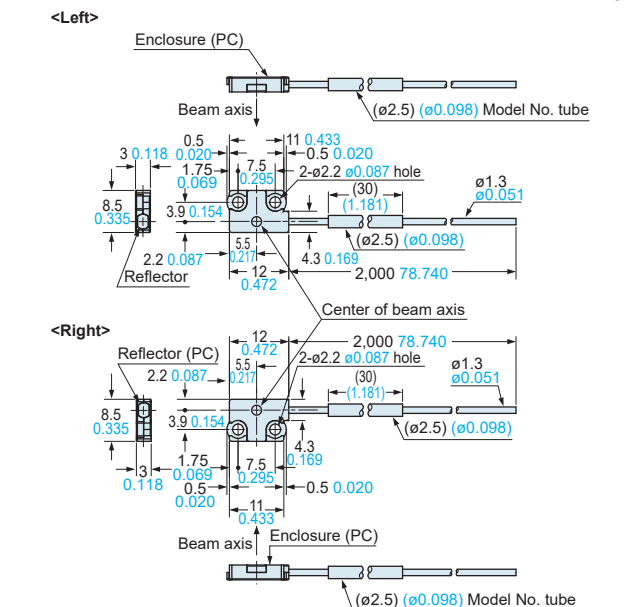
<with FX-AT4>



FT-Z30

Free-cut

<with FX-AT5>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Thru-beam type fibers

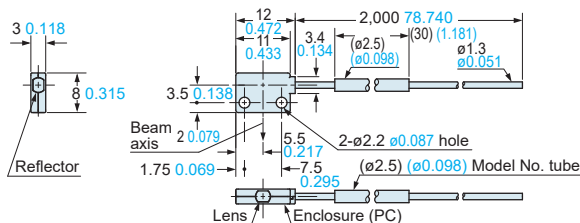


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FT-Z30E

Free-cut

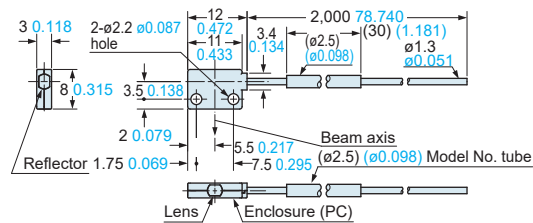
<with FX-AT5>



FT-Z30EW

Free-cut

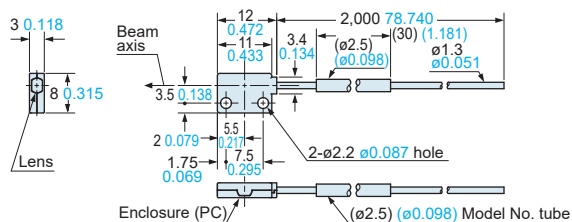
<with FX-AT5>



FT-Z30H

Free-cut

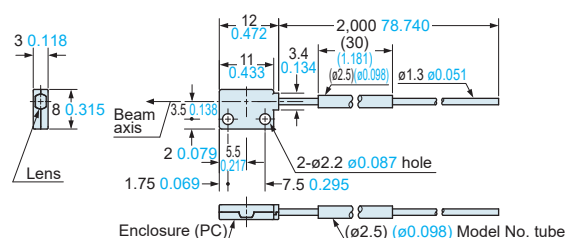
<with FX-AT5>



FT-Z30HW

Free-cut

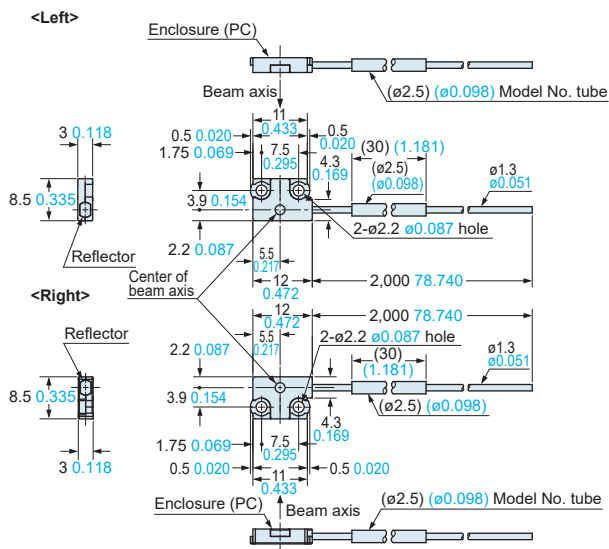
<with FX-AT5>



FT-Z30W

Free-cut

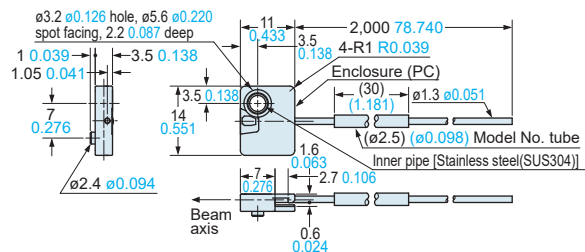
<with FX-AT5>



FT-Z40HBW

Free-cut

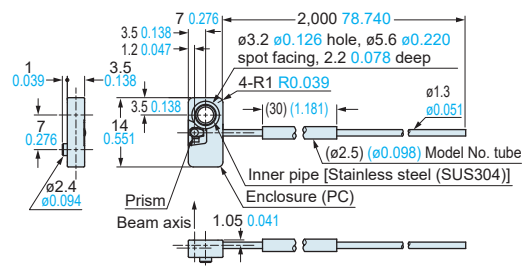
<with FX-AT5>



FT-Z40W

Free-cut

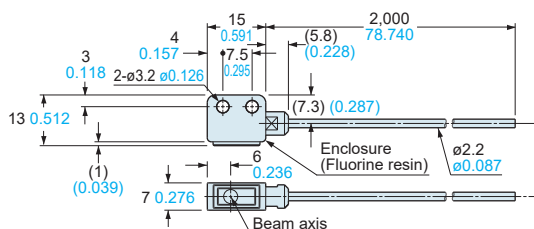
<with FX-AT5>



FT-Z802Y

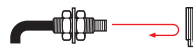
Free-cut

<with FX-AT3>



DIMENSIONS (Unit: mm in)

Retroreflective type fibers



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

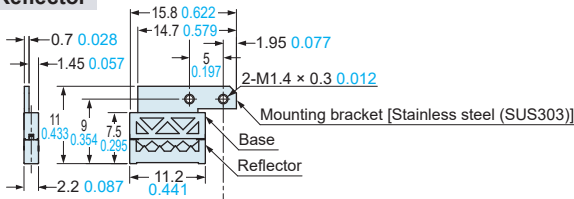
Dimensions are listed in the order of thru-beam type, retroreflective type, and in alphabetic order of the Model No.

FR-KZ22E

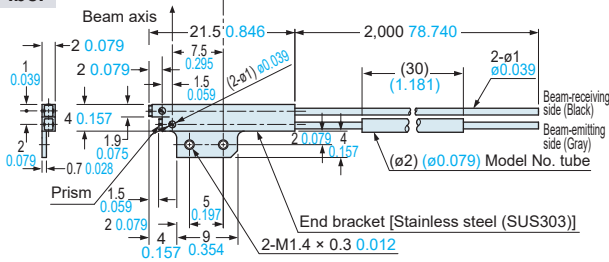
Free-cut

<with FX-AT4>

Reflector



Fiber

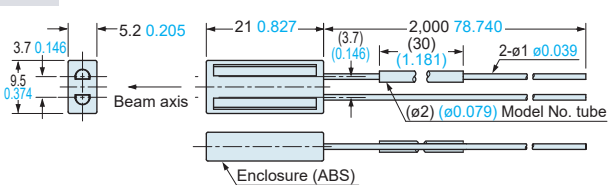


FR-KZ50H

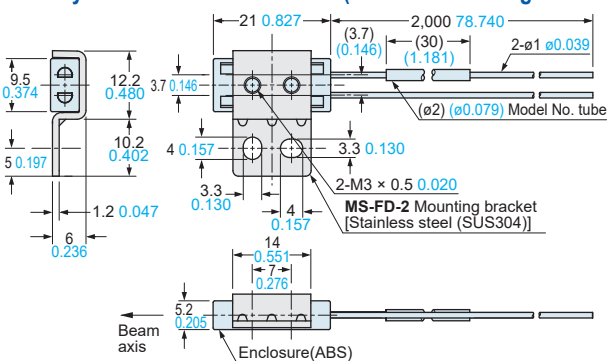
Free-cut

<with FX-AT4>

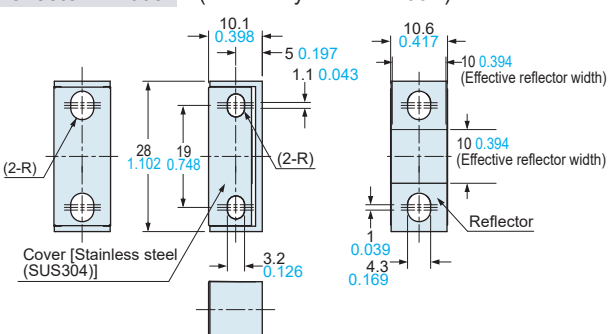
Fiber



Assembly dimensions with MS-FD-2 (attached mounting bracket)



Reflector RF-003 (Accessory for FR-KZ50H)

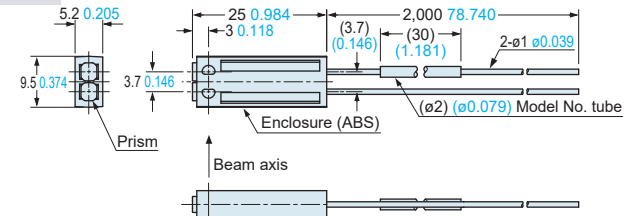


FR-KZ50E

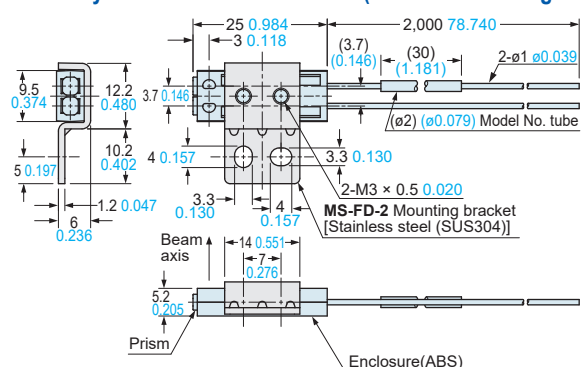
Free-cut

<with FX-AT4>

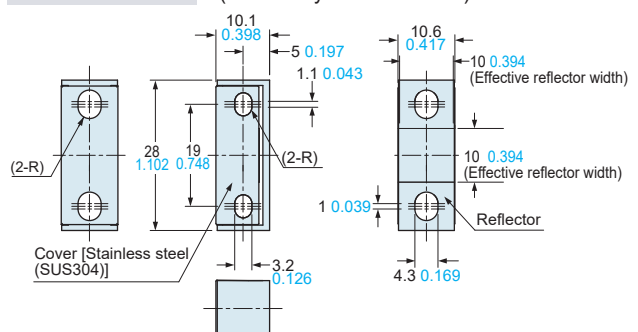
Fiber



Assembly dimensions with MS-FD-2 (attached mounting bracket)



Reflector RF-003 (Accessory for FR-KZ50E)

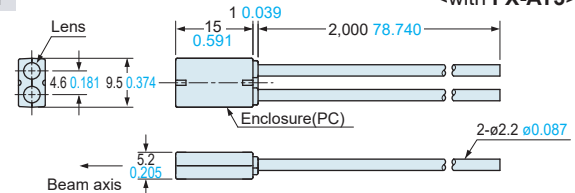


FR-Z50HW

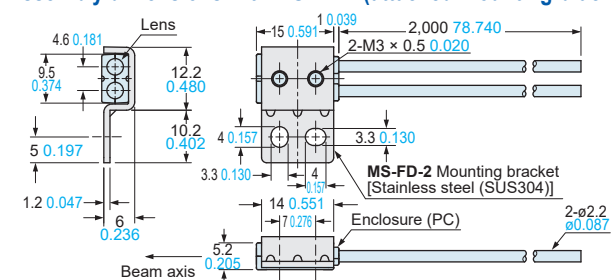
Free-cut

Fiber

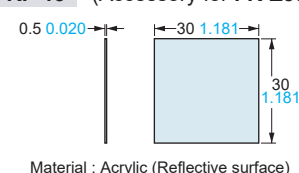
<with FX-AT3>



Assembly dimensions with MS-FD-2 (attached mounting bracket)



Reflective tape RF-13 (Accessory for FR-Z50HW)



Material : Acrylic (Reflective surface)

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

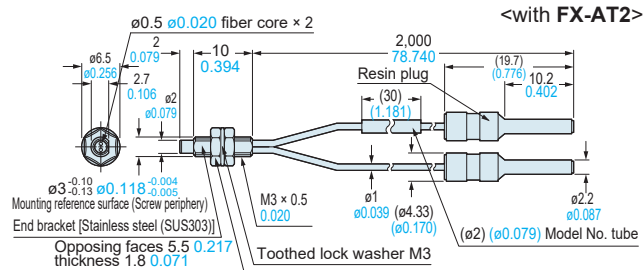
DIMENSIONS (Unit: mm in)

Reflective type fibers



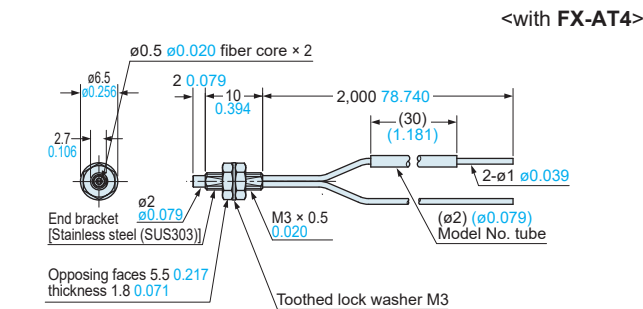
Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FD-30



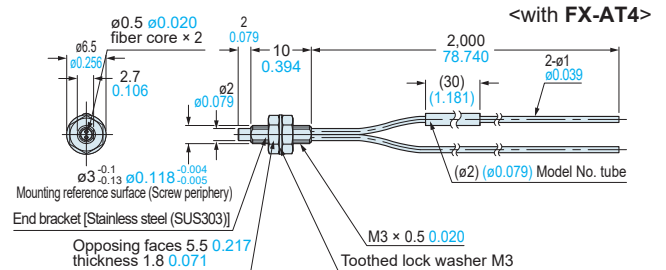
FD-31W

Free-cut



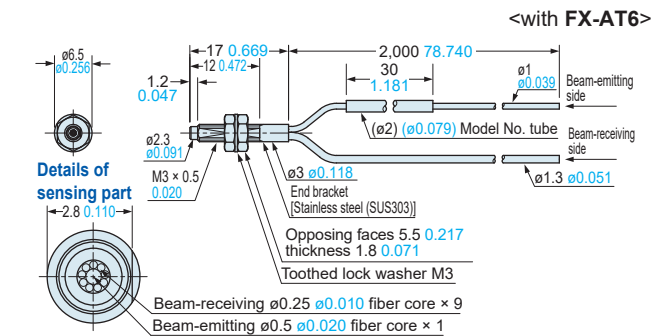
FD-31

Free-cut



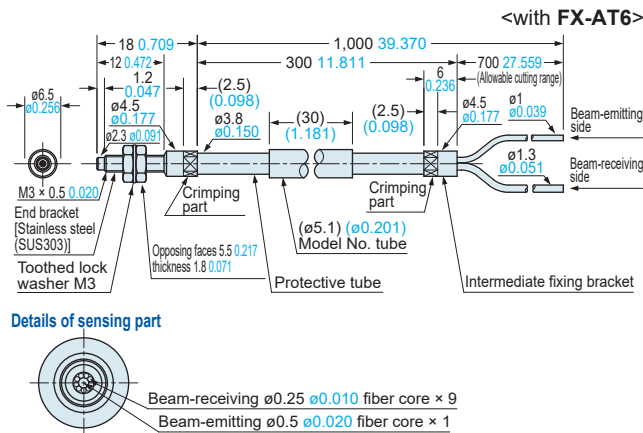
FD-32G

Free-cut



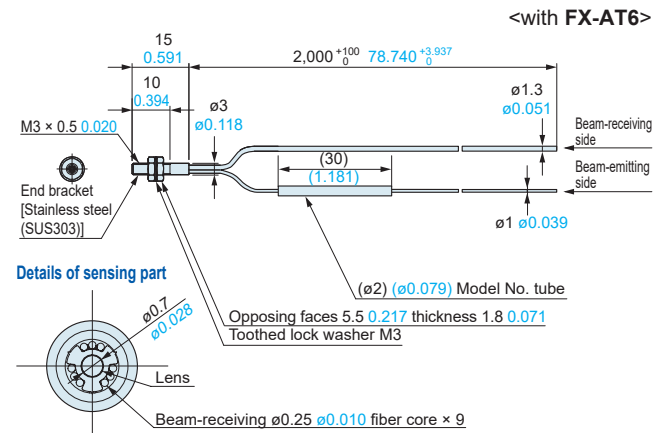
FD-32GX

Free-cut

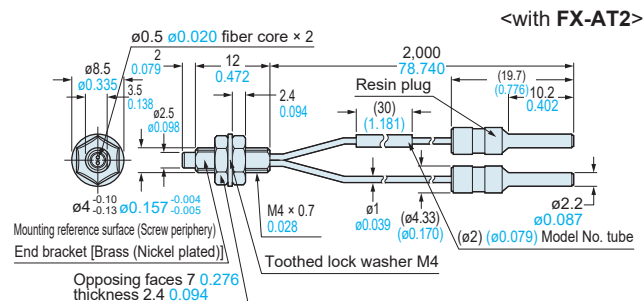


FD-34G

Free-cut

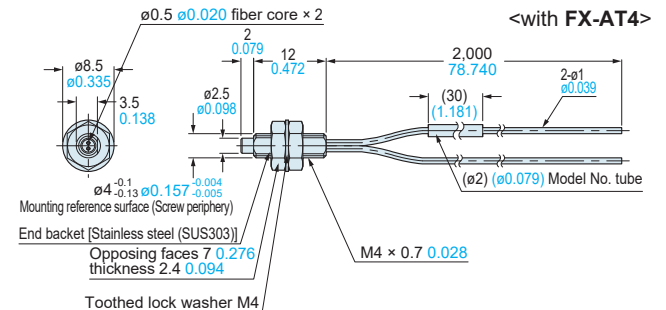


FD-40



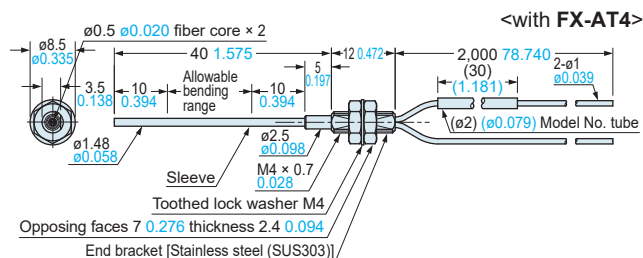
FD-41

Free-cut



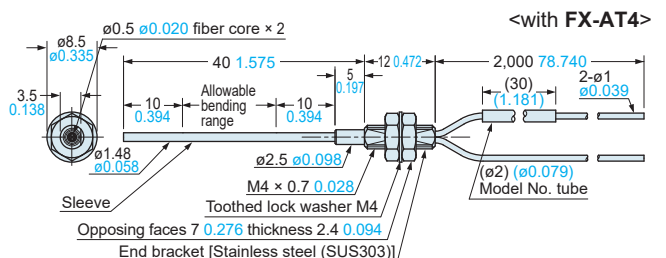
FD-41S

Free-cut



FD-41SW

Free-cut



DIMENSIONS (Unit: mm in)

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

Reflective type fibers

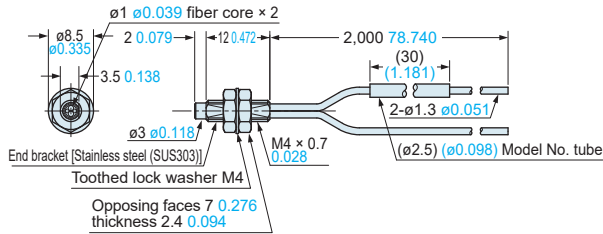


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FD-41W

Free-cut

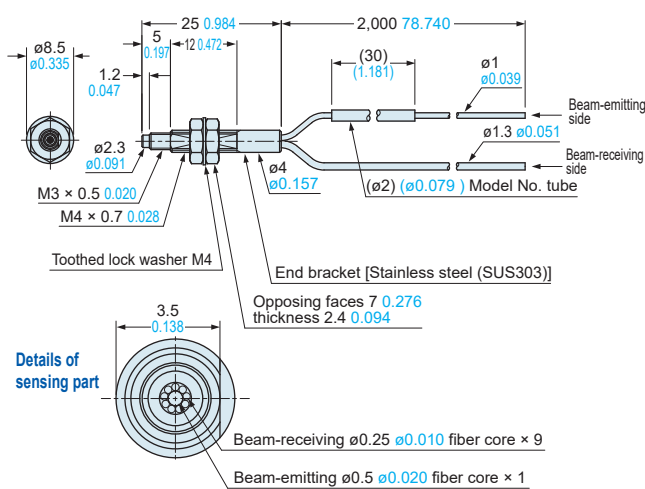
<with FX-AT5>



FD-42G

Free-cut

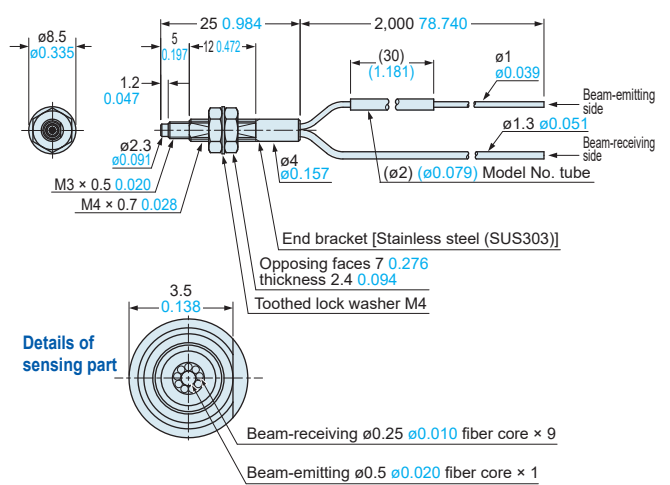
<with FX-AT6>



FD-42GW

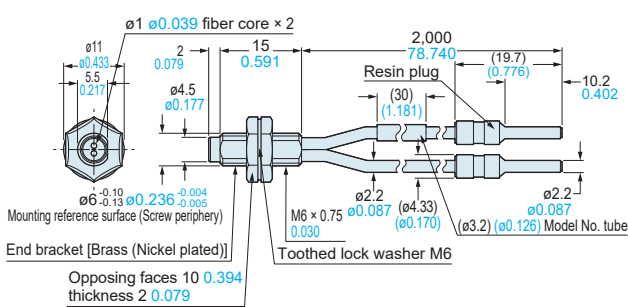
Free-cut

<with FX-AT6>



FD-60

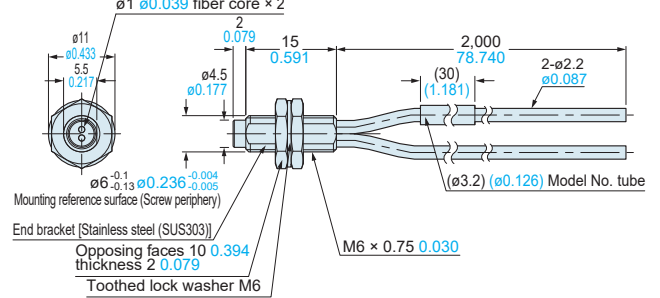
<with FX-AT2>



FD-61

Free-cut

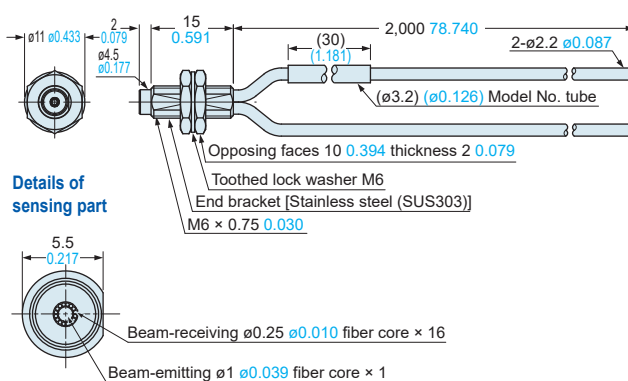
<with FX-AT3>



FD-61G

Free-cut

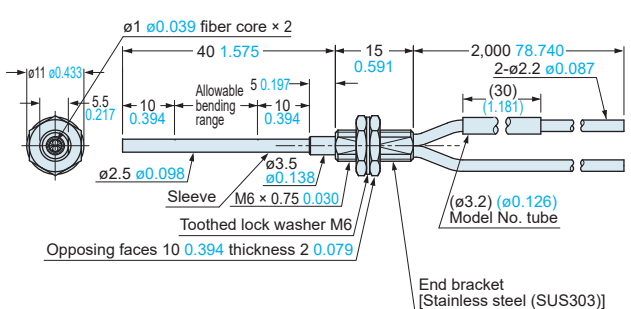
<with FX-AT3>



FD-61S

Free-cut

<with FX-AT3>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Reflective type fibers

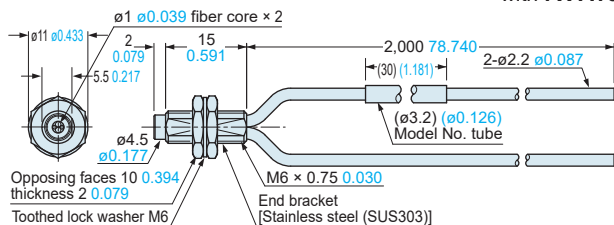


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

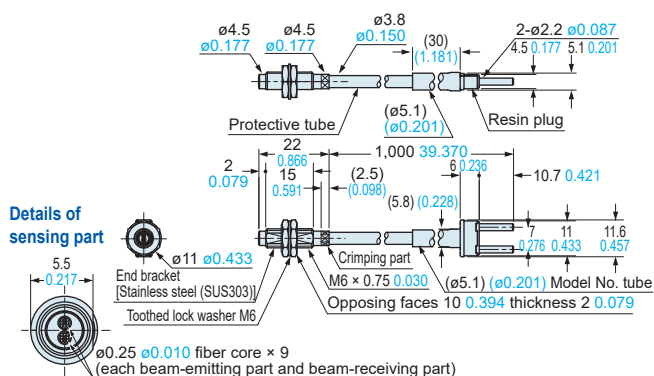
FD-61W



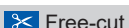
<with **FX-AT3**>



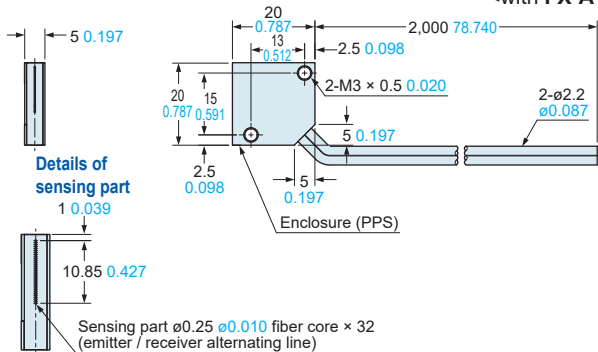
FD-64X



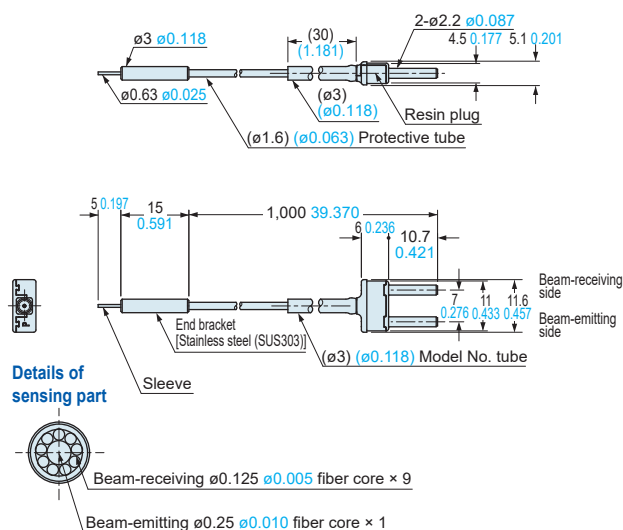
FD-AL11



<with **FX-AT3**>



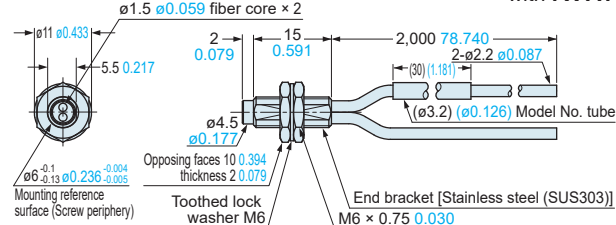
FD-E23



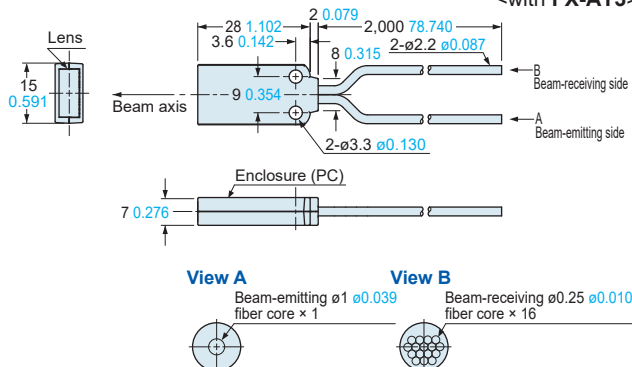
FD-62



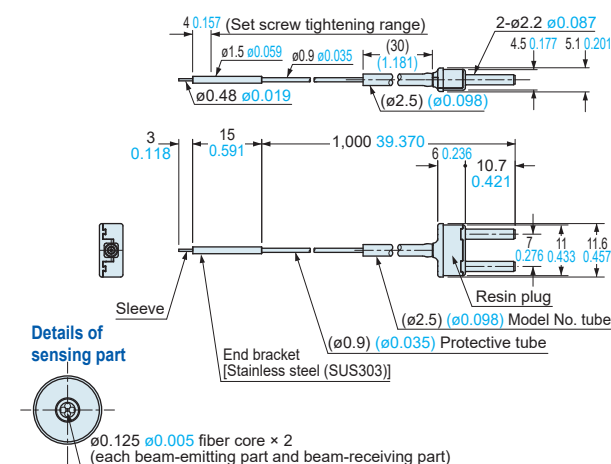
<with **FX-AT3**>



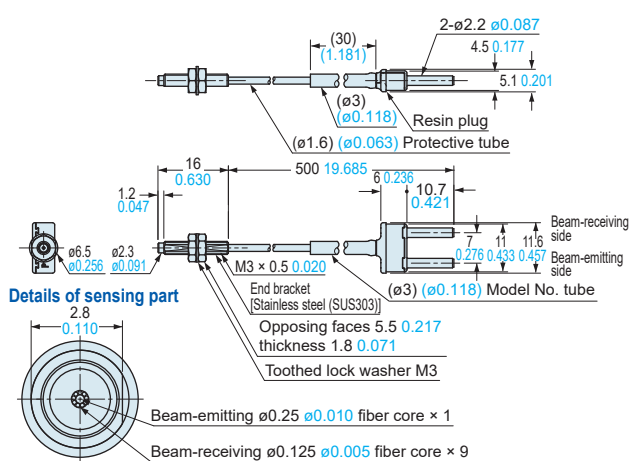
FD-A16

<with **FX-AT3**>

FD-E13



FD-EG30



DIMENSIONS (Unit: mm in)

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

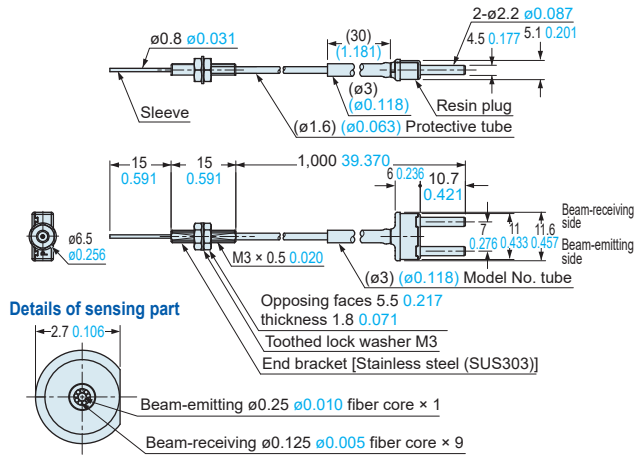
The CAD data can be downloaded from our website.

Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

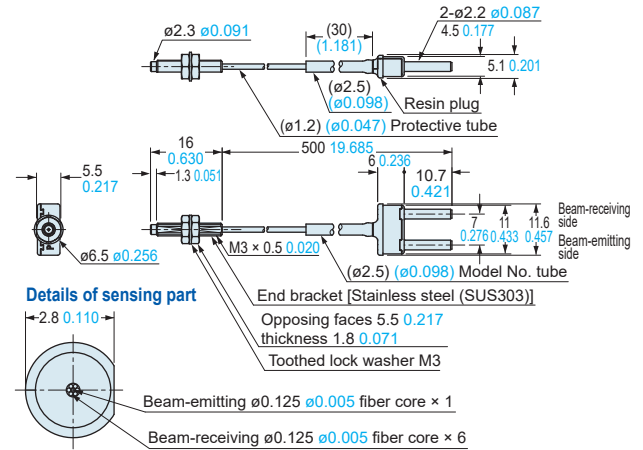
Reflective type fibers



FD-EG30S



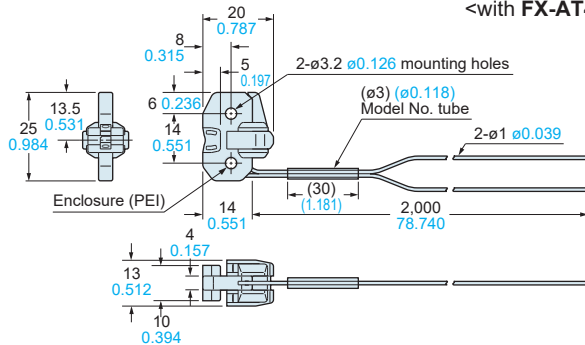
FD-EG31



FD-F4 FD-F41

Free-cut

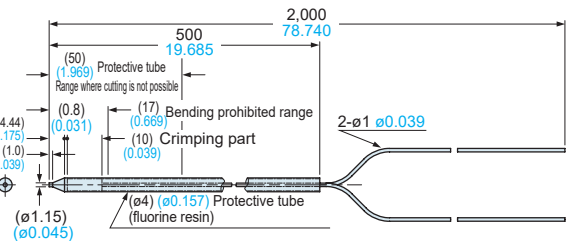
<with FX-AT4>



FD-F41Y

Free-cut

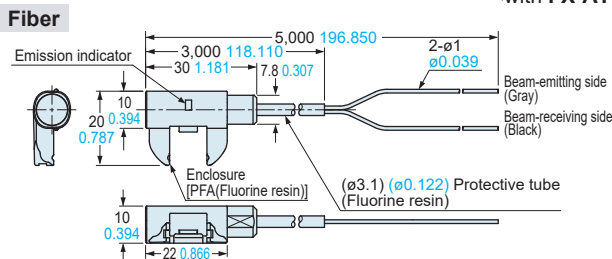
<with FX-AT4>



FD-F71

Free-cut

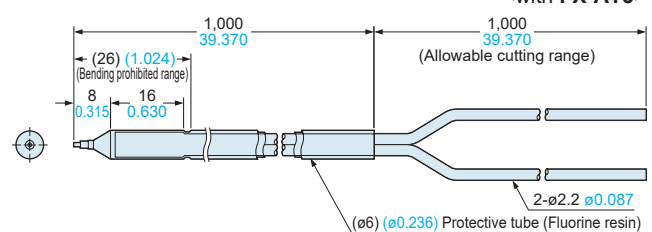
<with FX-AT4>



FD-F8Y

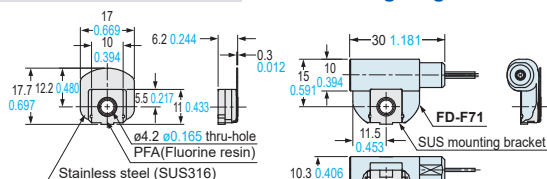
Free-cut

<with FX-AT3>



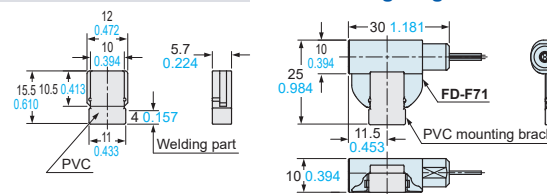
SUS mounting bracket (MS-FD-F7-1)

SUS mounting bracket mounting diagram



PVC mounting bracket (MS-FD-F7-2)

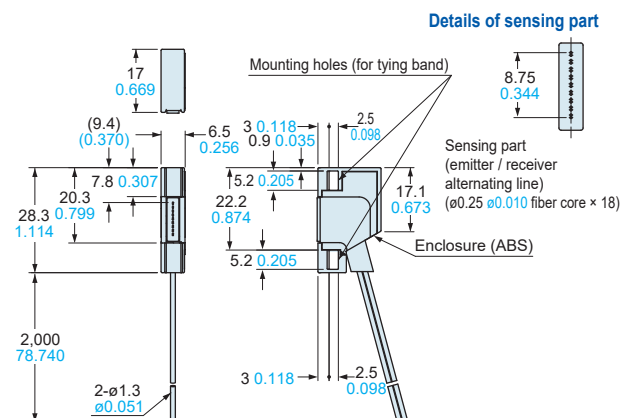
PVC mounting bracket mounting diagram



FD-FA93

Free-cut

<with fiber attachment>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Reflective type fibers



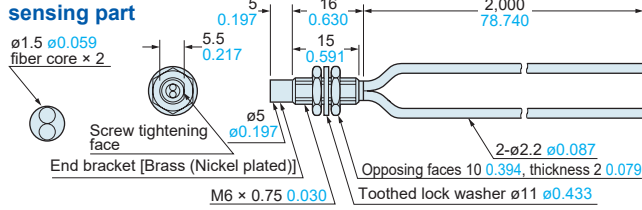
Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FD-H13-FM2



<with **FX-AT3**>

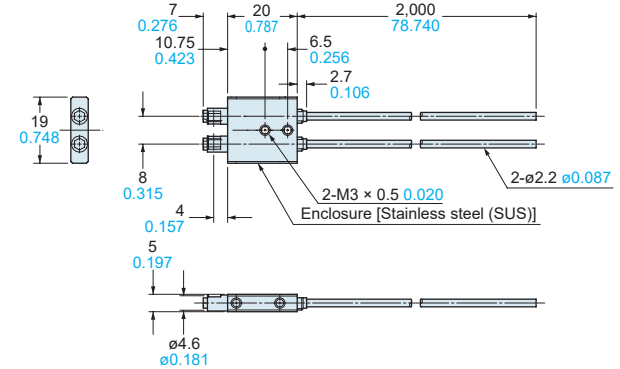
Details of sensing part



FD-H18-L31

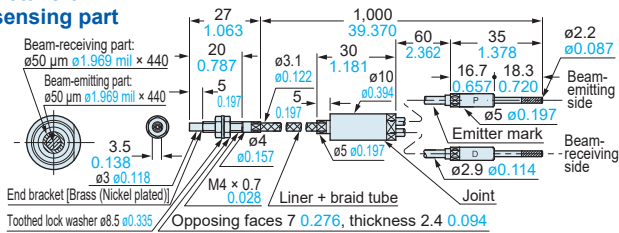


<with **FX-AT3**>



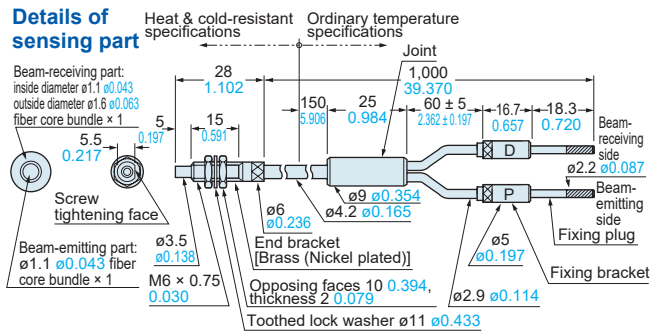
FD-H20-21

Details of sensing part



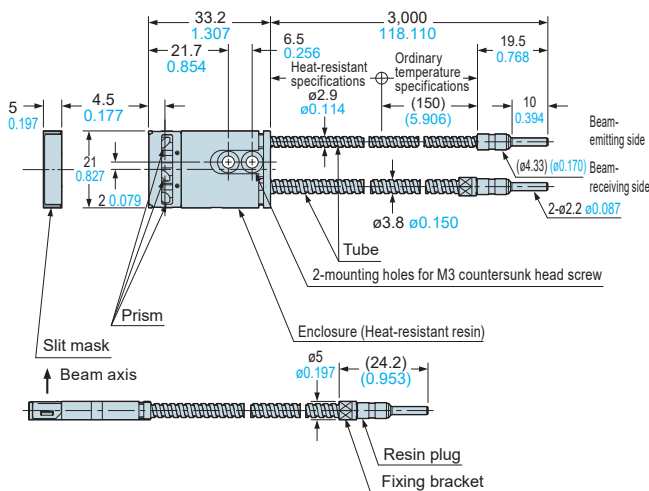
FD-H20-M1

Details of sensing part



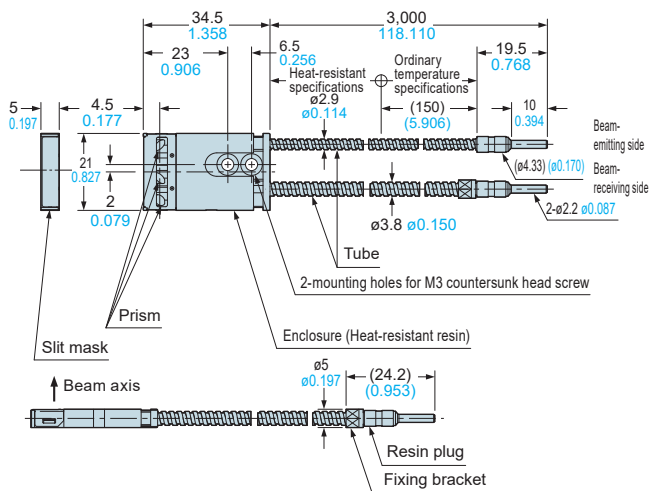
FD-H25-L43

<with **FX-AT2**>



FD-H25-L45

<with **FX-AT2**>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

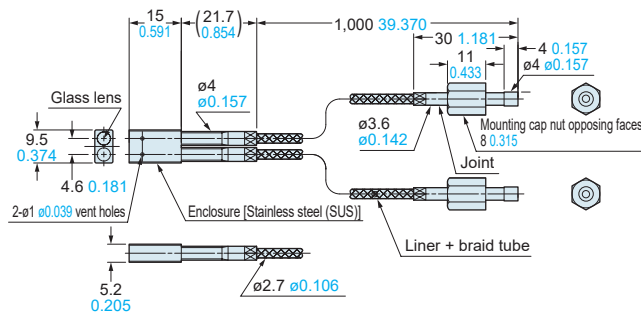
DIMENSIONS (Unit: mm in)

Reflective type fibers

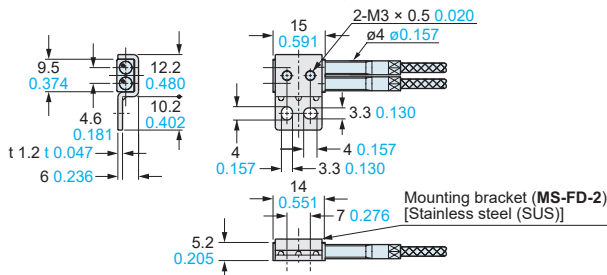


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FD-H30-KZ1V-S

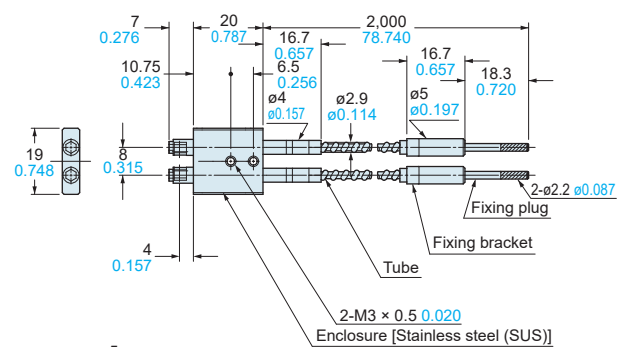


Assembly dimensions with MS-FD-2 (attached mounting bracket)

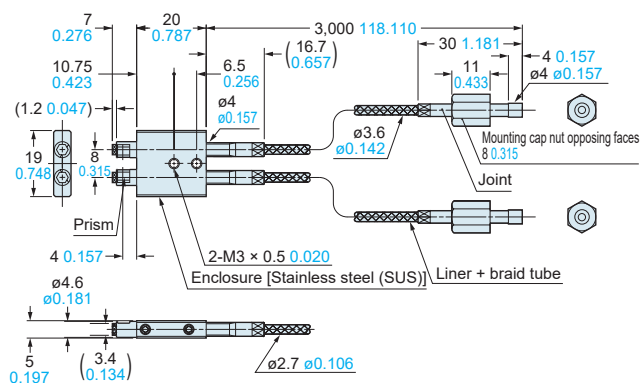


Note: The **FD-H30-KZ1V-S** is a set with the **FD-H30-KZ1V**, photo-terminal, and atmospheric side fiber. Refer to p.81 for dimensions of the atmospheric side fiber and photo-terminals.

FD-H30-L32

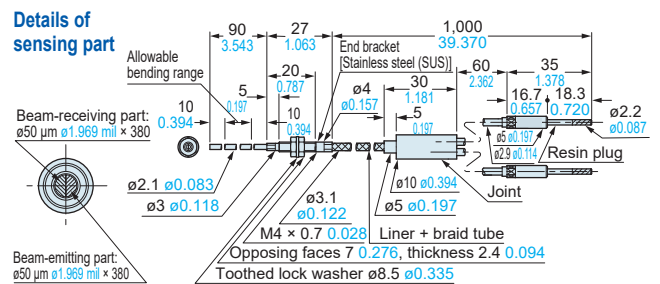


FD-H30-L32V-S

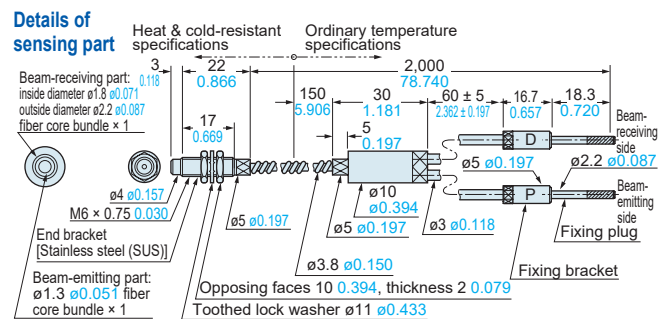


Note: The **FD-H30-L32V-S** is a set with the **FD-H30-L32V**, photo-terminal, and atmospheric side fiber. Refer to P.81 for dimensions of the atmospheric side fiber and photo-terminals.

FD-H35-20S

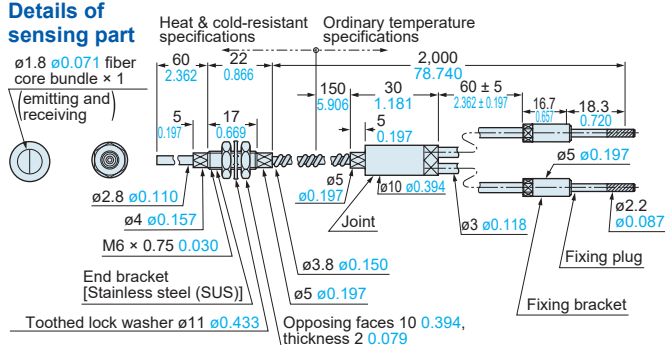


FD-H35-M2



FD-H35-M2S6

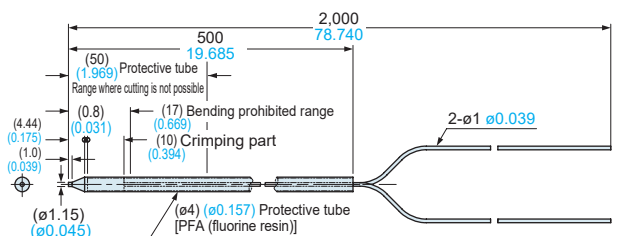
Details of sensing part



FD-HF40Y

Free-cut

<with FX-AT4>



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

Reflective type fibers

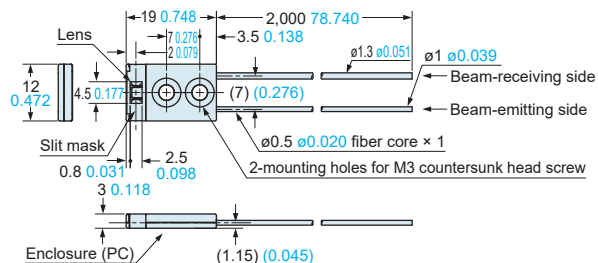


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FD-L10



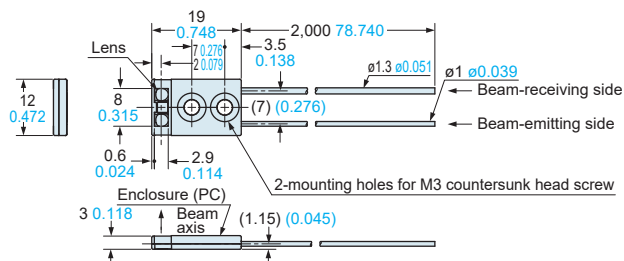
<with **FX-AT6**>



FD-L11



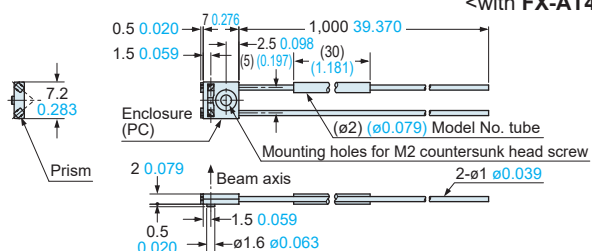
<with **FX-AT6**>



FD-L12W



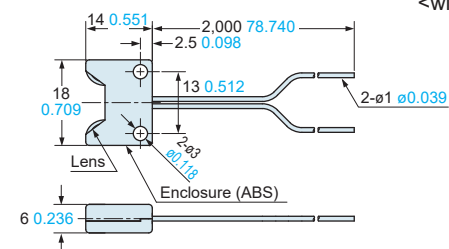
<with **FX-AT4**>



FD-L20H



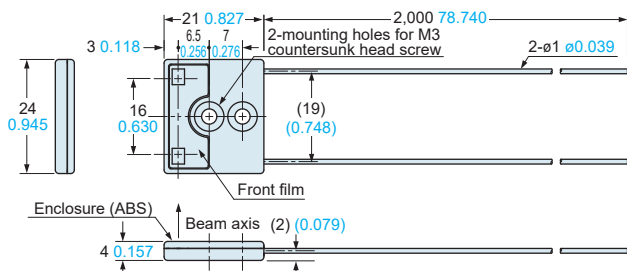
<with **FX-AT4**>



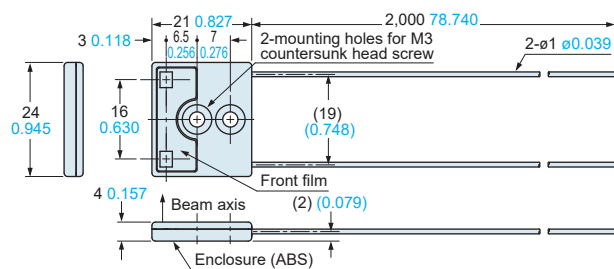
FD-L21



<with **FX-AT4**>



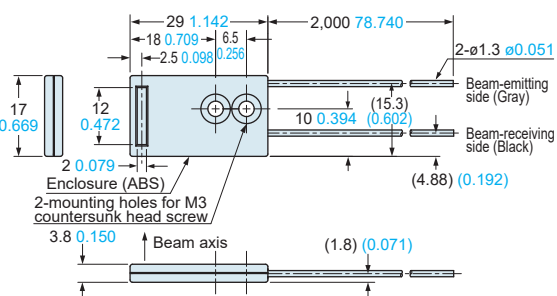
FD-L21W

<with **FX-AT4**>

FD-L22A



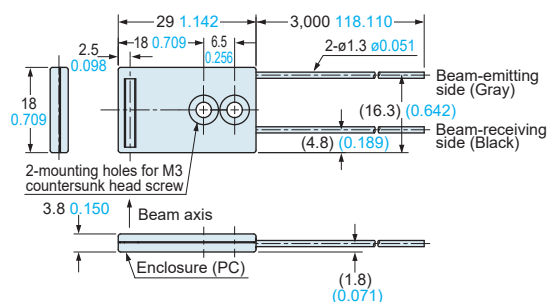
<with **FX-AT5**>



FD-L23



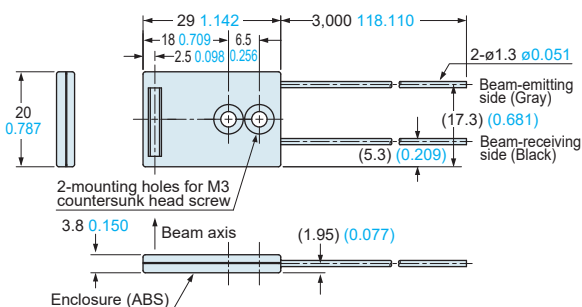
<with **FX-AT5**>



FD-L30A



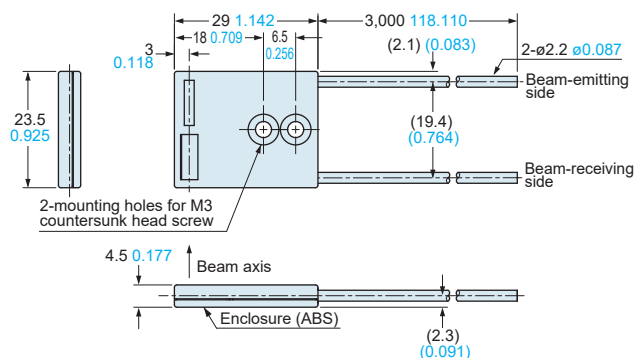
<with **FX-AT5**>



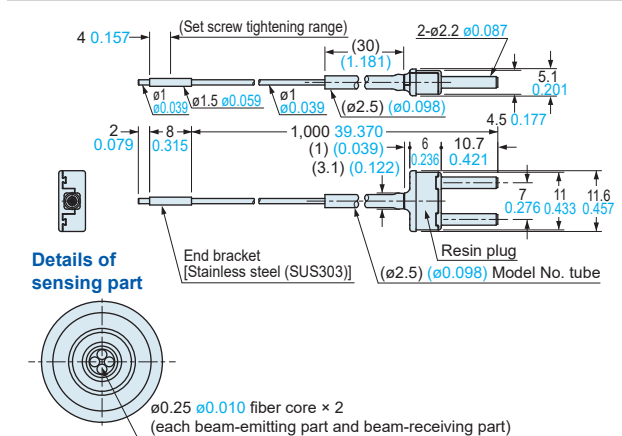
FD-L31A



<with **FX-AT3**>



The CAD data can be downloaded from our website.

 Free-cut

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

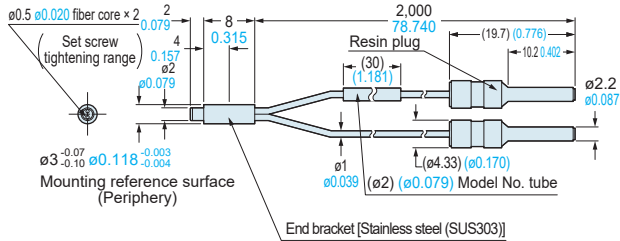
Reflective type fibers



Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the Model No.

FD-S30

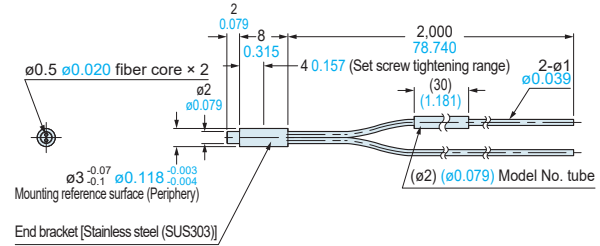
<with FX-AT2>



FD-S31

Free-cut

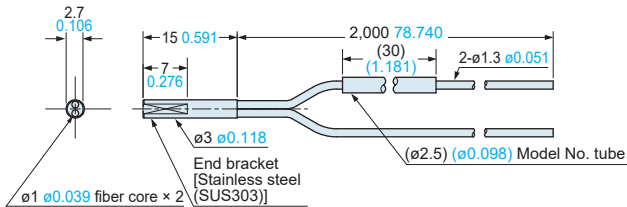
<with FX-AT4>



FD-S32

Free-cut

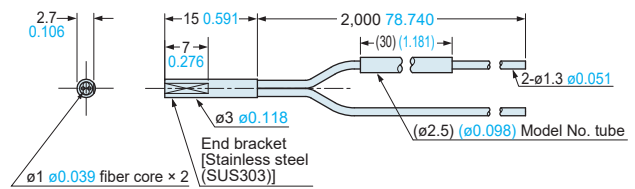
<with FX-AT5>



FD-S32W

Free-cut

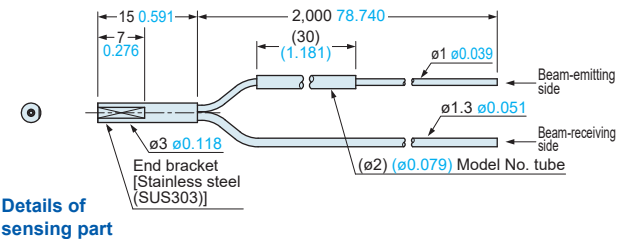
<with FX-AT5>



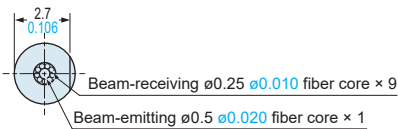
FD-S33GW

Free-cut

<with FX-AT6>



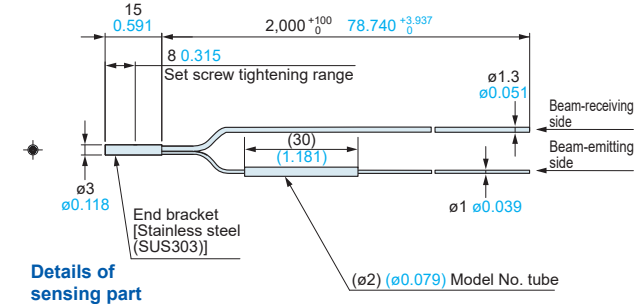
Details of sensing part



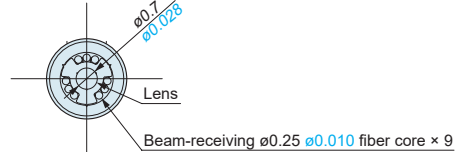
FD-S34G

Free-cut

<with FX-AT6>



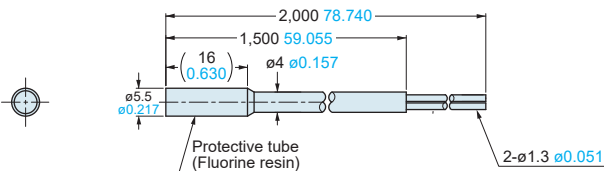
Details of sensing part



FD-S60Y

Free-cut

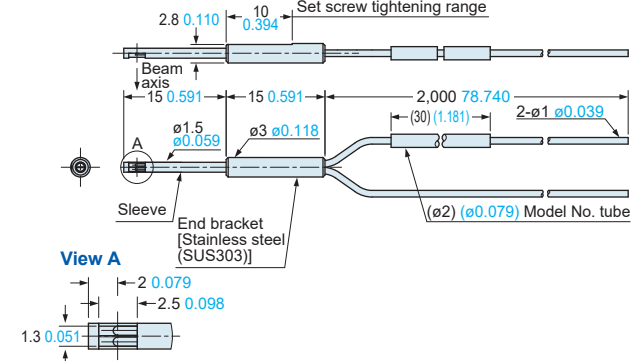
<with FX-AT5>



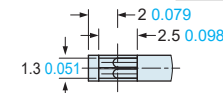
FD-V30

Free-cut

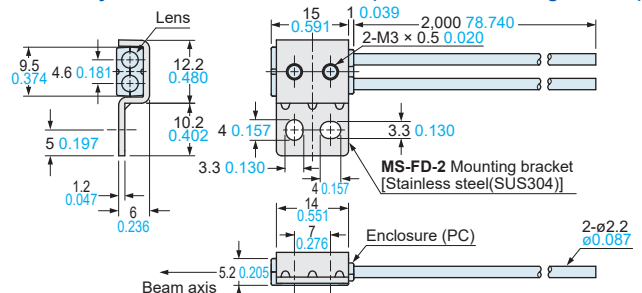
<with FX-AT4>



View A



The CAD data can be downloaded from our website.



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

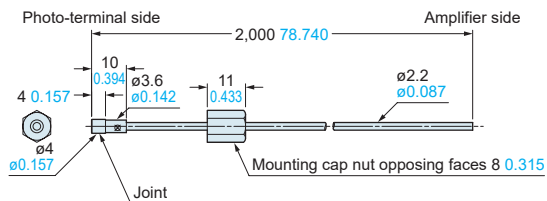
DIMENSIONS (Unit: mm in)

Vacuum-resistant atmospheric side fiber

FT-J8

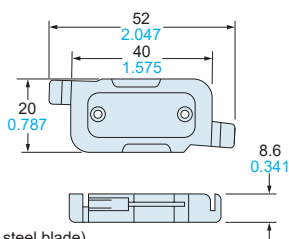
Free-cut

(Accessory for vacuum-resistant fiber) <with FX-AT3>



FB-1

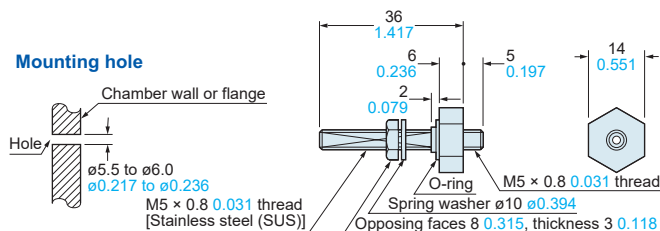
Fiber bender (Optional)



Material: PP (Containing steel blade)

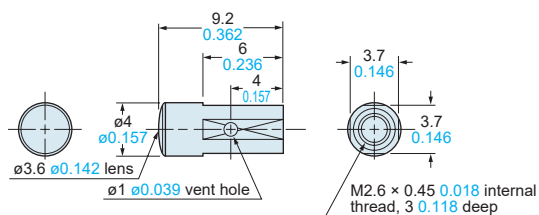
FV-BR1

Photo-terminal (for vacuum-resistant) (with vacuum-resistant fiber)



FV-LE1

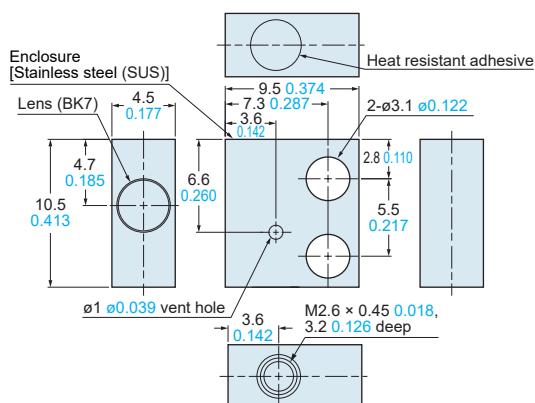
Vacuum-resistant expansion lens (Optional)



Material: Enclosure...Aluminum alloy (A6061-T6)
Lens.....BK-7

FV-SV2

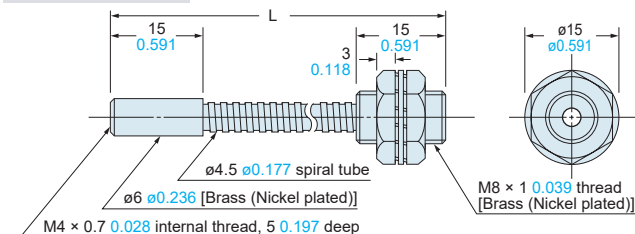
Vacuum-resistant side-view lens (Optional)



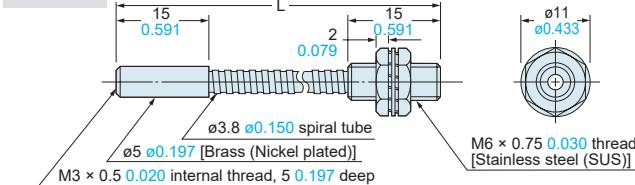
FTP-□ FDP-□

Protective tube (Optional)

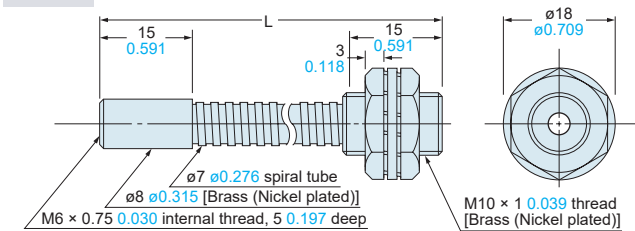
FTP-□ FDP-N□



FTP-N□



FDP-□



• Length L

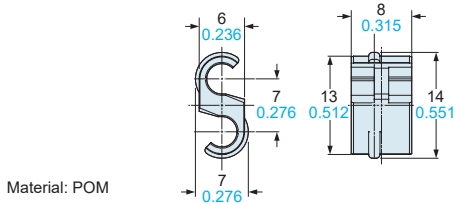
Model No.	Length L
FTP-500, FTP-N500, FDP-N500, FDP-500	500 ⁺¹⁰ ₀ 19.685 ^{+0.394} ₀
FTP-1000, FTP-N1000, FDP-N1000, FDP-1000	1,000 ⁺¹⁰ ₀ 39.370 ^{+0.394} ₀
FTP-1500, FTP-N1500, FDP-N1500, FDP-1500	1,500 ⁺¹⁰ ₀ 59.055 ^{+0.394} ₀

Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

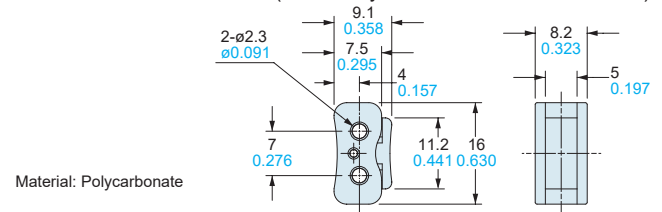
DIMENSIONS (Unit: mm in)

FX-AT2 Attachment for fixed-length fiber (Accessory for fixed-length fiber)



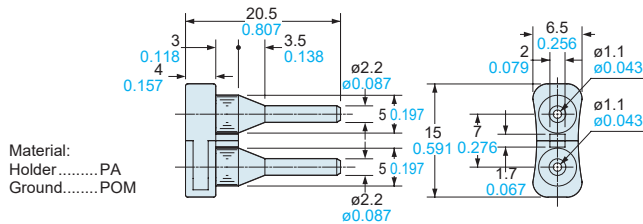
FX-AT3 Attachment for $\varnothing 2.2$ mm $\varnothing 0.087$ in fiber

(Accessory for $\varnothing 2.2$ mm $\varnothing 0.087$ in fiber)



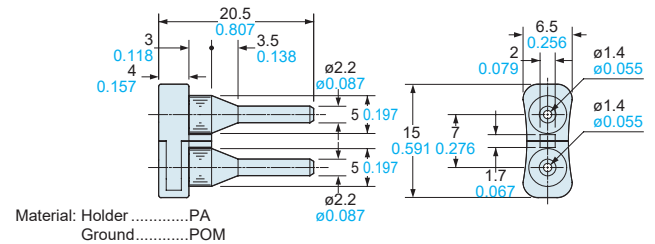
FX-AT4 Attachment for $\varnothing 1$ mm $\varnothing 0.039$ in fiber

(Accessory for $\varnothing 1$ mm $\varnothing 0.039$ in fiber)



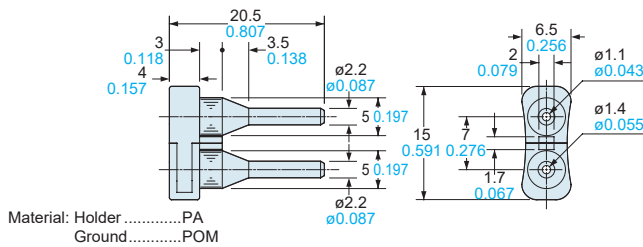
FX-AT5 Attachment for $\varnothing 1.3$ mm $\varnothing 0.051$ in fiber

(Accessory for $\varnothing 1.3$ mm $\varnothing 0.051$ in fiber)

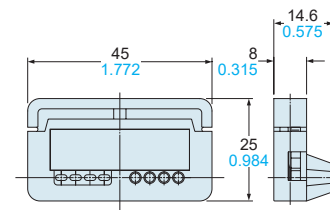


FX-AT6 Attachment for $\varnothing 1$ mm $\varnothing 0.039$ in / $\varnothing 1.3$ mm $\varnothing 0.051$ in mixed fiber

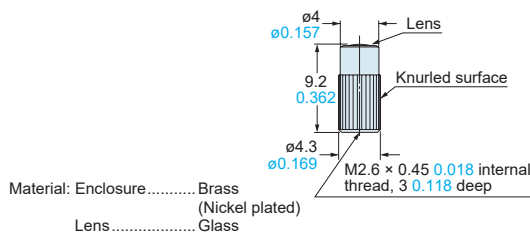
(Accessory for $\varnothing 1$ mm $\varnothing 0.039$ in / $\varnothing 1.3$ mm $\varnothing 0.051$ in mixed fiber)



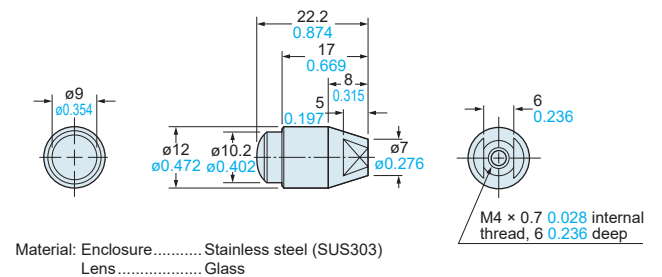
FX-CT2 Fiber cutter (Accessory for free-cut type fiber)



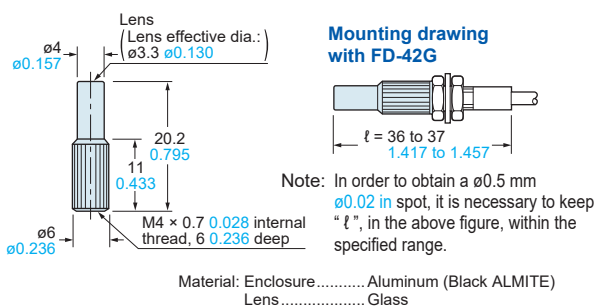
FX-LE1 Expansion lens (Optional)



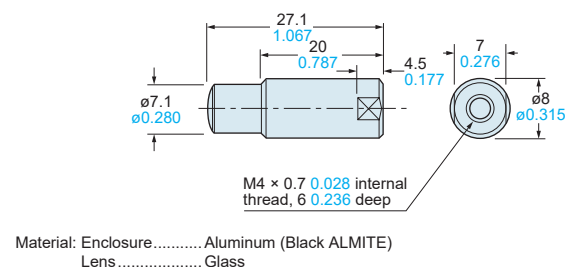
FX-LE2 Super-expansion lens (Optional)



FX-MR1 Pinpoint spot lens (Optional)



FX-MR2 Zoom lens (Optional)



Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

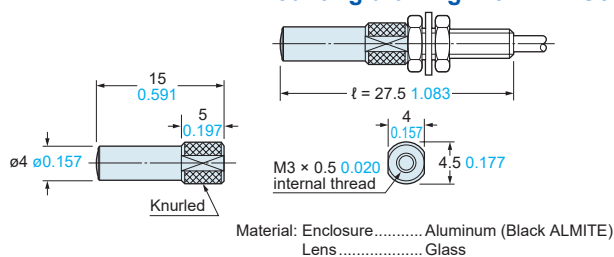
The CAD data can be downloaded from our website.

DIMENSIONS (Unit: mm in)

FX-MR3

Finest spot lens (Optional)

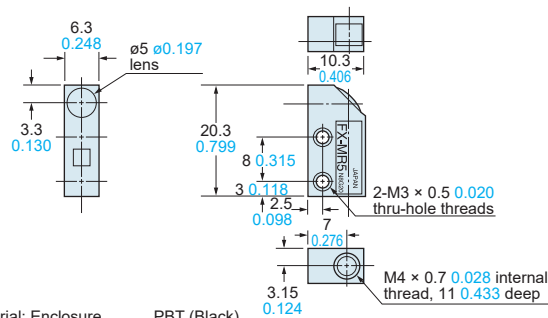
Mounting drawing with FD-EG30



Note: When inserting the fiber, insert fully till it stops.

FX-MR5

Zoom lens (Optional)

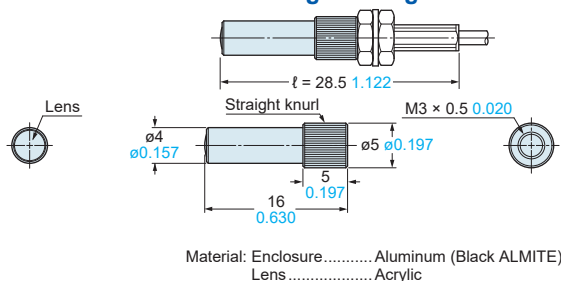


NT-FX-MR5 (exclusive nut) is attached.

FX-MR6

Finest spot lens (Optional)

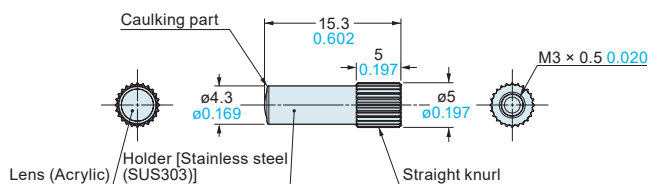
Mounting drawing with FD-EG31



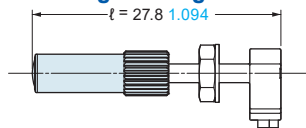
Note: When inserting the fiber, insert fully till it stops.

FX-MR7

Finest spot lens (Optional)

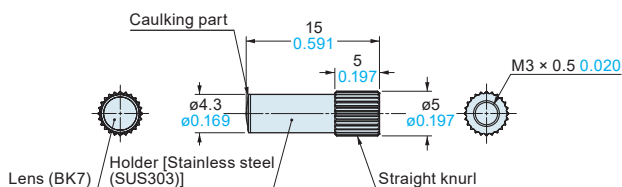


Mounting drawing with FD-R31G/R32EG/R33EG/R34EG

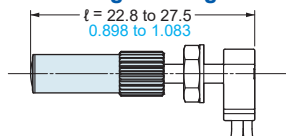


FX-MR8

Zoom lens (Optional)

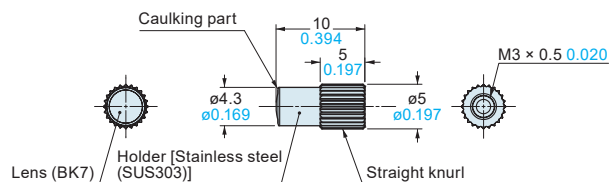


Mounting drawing with FD-R31G/R32EG/R33EG/R34EG

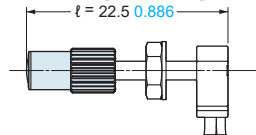


FX-MR9

Parallel light lens (Optional)



Mounting drawing with FD-R31G/R32EG/R33EG/R34EG

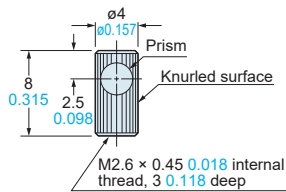


Refer to the **FX-500** series (p.109), **FX-550** series (p.118), **FX-100** series (p.131) for dimensions of the amplifiers.

The CAD data can be downloaded from our website.

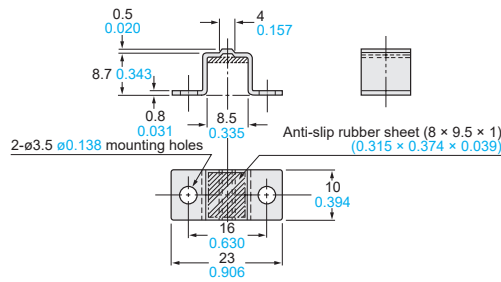
DIMENSIONS (Unit: mm in)

FX-SV1 Side-view lens (Optional)



Material: Enclosure.....Brass (Nickel plated)
Lens.....Glass

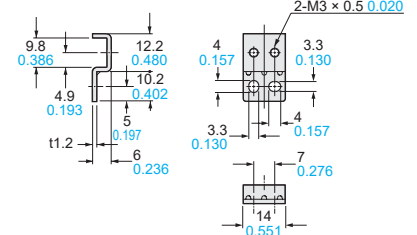
MS-EX3 Mounting bracket for FX-MR2 (Accessory for FX-MR2)



Material: Brass (Nickel plated)

MS-FD-2 Fiber mounting bracket

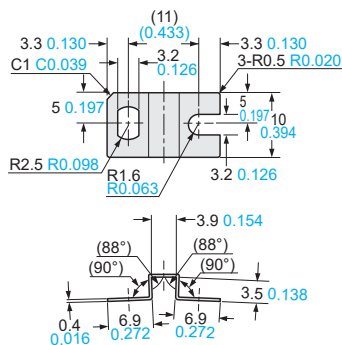
Accessory for FD-Z50HW, FR-KZ50E/KZ50H/Z50HW, FD-H30-KZ1V-S



Material: Stainless steel (SUS304)

MS-FD-3 Fiber mounting bracket

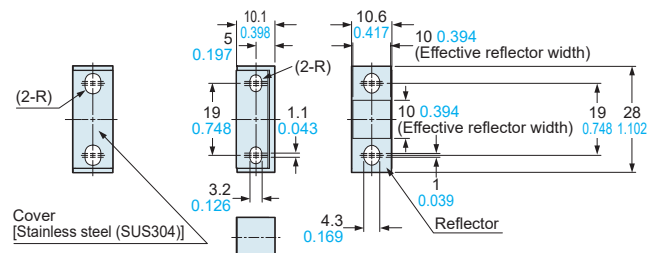
Accessory for FT-KV40/KV40W



Material: Stainless steel (SUS304)

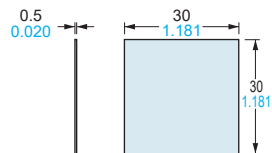
RF-003 Reflector for FR-KZ50E/KZ50H

Accessory for FR-KZ50E/KZ50H



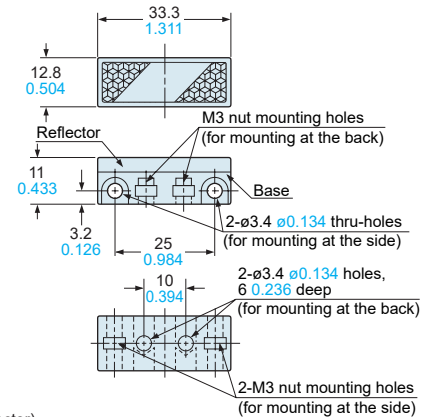
RF-13 Reflective tape for FR-Z50HW

Accessory for FR-Z50HW



Material : Acrylic (Reflective surface)

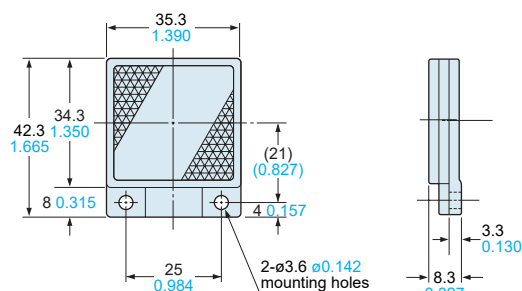
RF-210 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

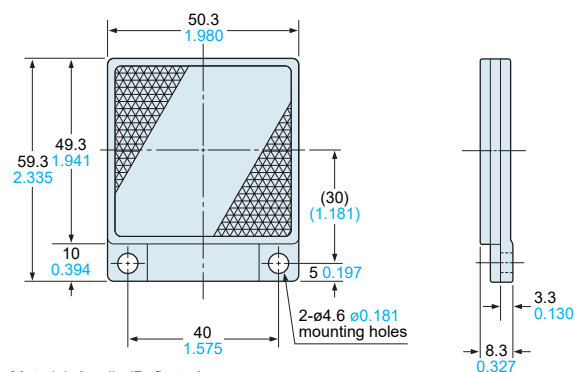
Two M3 (length 8 mm 0.315 in) screws with washers and two nuts are attached.

RF-220 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

RF-230 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

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[FD-42G](#) [FD-Z50HW](#) [FT-140](#) [FT-A32](#) [FT-S20](#) [FD-F4-M7T](#) [FDP-1500](#) [FR-Z50HW](#) [FT-45X-2T](#) [FT-H20-J50](#) [FT-H20-M1](#) [FT-J8](#) [FT-KV26](#) [FT-V30](#) [FD-40](#) [FD-E13](#) [FD-F41-M5T](#) [FD-G500](#) [FD-H30-L32V-S](#) [FD-R61Y](#) [FT-31](#) [FT-42-3T](#) [FT-HL80Y-54T](#) [RF-220](#) [FD-34G](#) [FD-L20H](#) [FT-R41W](#) [FT-Z8Y-M5T](#) [RF-210](#) [FD-61-5T](#) [FD-H18-L31](#) [FD-H20-21](#)
[FD-R33EG](#) [FD-V50](#) [FT-H13-FM10T](#) [FT-H30-M1V-S](#) [FT-S30-4T](#) [FT-S31W](#) [FX-CT2](#) [FX-SV1](#) [FD-42GW-4T](#) [FD-FA93](#) [FD-H25-L45](#) [FDP-500](#) [FD-R60-20T](#) [FD-S21](#) [FT-H20-VJ50-S](#) [FT-S21](#) [FT-V23](#) [FT-V25](#) [FD-A16](#) [FD-H35-M2S6](#) [FD-L53](#) [FDP-1000](#) [FD-S32W](#) [FR-KZ50H](#) [FST-038](#) [FT-H20-J50-S](#) [FT-KS40](#) [FT-R42W](#) [FT-V40](#) [FT-V80Y-M76T](#) [FV-LE1](#) [FD-HF10Y](#) [FD-32G](#) [FD-L30A](#) [FD-S33GW](#) [FT-H20-J20](#) [FT-H20-J30](#) [FT-Z30EW](#) [FX-MR7](#) [FX-MR9](#)
[FD-30](#) [FD-61G](#) [FT-31W](#) [FT-E13](#) [FT-E23](#) [FT-H30-M1V](#) [FTP-N1000](#)