

New product introduction
Tough Fiber

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Choose by shape/application
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Square Head Type
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Small Spot
Narrow Beam
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Retroreflective Type
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Cylindrical Type

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

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)	Beam axis position/Inclination of beam axis	Protection	Ambient temp.	Dimensions	
					FX-500 series	U-LG LONG FAST H-SP	FX-101 (Upper value) FX-102 (Lower value)						
Cylindrical	$\phi 1$		Tough FT-S11	R2	500 mm	STD 90 3.543	210 8.268	40 1.575	$\phi 0.25$	—	—	—	
						HYPH 350 13.780	160 6.299	90 3.543					
	$\phi 1.5$		Tough FT-S21	R2	Bending durability	500 mm	STD 315 12.402	770 30.315	130 5.118	$\phi 0.5$	150 μ m $\pm 2^\circ$	IP67	-55 to +80 °C
							HYPH 1,350 53.150	550 21.654	340 13.386				
	$\phi 1.5$		FT-S21W	R1	Bending durability	2 m	STD 260 10.236	590 23.228	80 3.150	$\phi 0.5$	150 μ m $\pm 3^\circ$	IP67	-40 to +60 °C
							HYPH 990 38.976	440 17.323	240 9.449				
	$\phi 2.5$	With lens, Long sensing range $\phi 2.5$ 	FT-S32	R10	Bending durability	2 m	STD 3,100 122.047	3,600 141.732 (Note 2)	1,100 43.307	$\phi 2$	—	IP40	-40 to +70 °C
							HYPH (Note 2) 3,600 141.732	3,600 141.732 (Note 2)	3,000 118.110				
	$\phi 3$		FT-S31W	R1	Bending durability	2 m	STD 800 31.496	1,900 74.803	260 10.236	$\phi 1$	150 μ m $\pm 3^\circ$	IP67	-40 to +60 °C
							HYPH 3,300 129.921	1,400 55.118	720 28.346				
Side-view Ultra-small diameter	$\phi 0.3$ Narrow beam $\phi 0.125$ mm 	Tough FT-E13	R2	Bending durability	1 m	STD 15 0.591	30 1.181	6 0.236	$\phi 0.125$	—	IP67	-40 to +70 °C	
						HYPH 52 2.047	24 0.945	19 0.748					
	$\phi 0.3$ Narrow beam $\phi 0.25$ mm 	Tough FT-E23	R2	Bending durability	1 m	STD 75 2.953	160 6.299	22 0.866	$\phi 0.25$	—	IP67	-40 to +70 °C	
						HYPH 270 10.630	125 4.921	80 3.150					
$\phi 4$ 	Tough FT-V40	R4	Bending durability	2 m	STD 3,500 137.795	3,600 141.732 (Note 2)	1,000 39.370	$\phi 2.5$	—	IP50	-40 to +60 °C		
					HYPH (Note 2) 3,600 141.732	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.

Tough : Refers 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.

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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	U-LG LONG FAST H-SP	FX-101 (Upper value) FX-102 (Lower value)				
Cylindrical		Tough FD-S21	R2 Bending durability	1 m	STD 80 3.150 HYPR 190 7.480	130 5.118 110 4.331 37 1.457 11 0.433	25 0.984 70 2.756	—	IP40	-55 to +80 °C	P.63
		Tough FD-S32	R4 Bending durability		STD 420 16.535 HYPR 1,200 47.244	790 31.102 660 25.984 220 8.661 75 2.953	120 4.724 345 13.583	150 μm /±3°			
		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	80 3.150 230 9.055	—	IP67	-40 to +60 °C	P.64
		Tough FD-S31	R2 Bending durability		STD 125 4.921 HYPR 515 20.276	290 11.417 220 8.661 80 3.150 25 0.984	35 1.378 140 5.512	150 μm /±3°			
		FD-S33GW	R1	STD 150 5.906 HYPR 670 26.378	340 13.386 280 11.024 90 3.543 25 0.984	45 1.772 140 5.512	—				
Ultra-small diameter	<p>Sleeve part cannot be bent.</p>	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	5 0.197 15 0.591	—	IP40	-40 to +60 °C	P.58
	<p>Sleeve part cannot be bent.</p>	FD-E23			STD 55 2.165 HYPR 170 6.693	120 4.724 80 3.150 30 1.181 9 0.354	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 : Refers 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.