


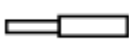
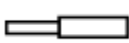




## Diffuse-Reflective Fiber Optics

The FD series of diffuse-reflective fiber optics is a wide-ranging family of sensing heads that are suitable for use in all SUNX fiber amplifiers. Fiber types include standard, high flexibility, special use, and environmentally resistant. Each type is broken down further to include various configurations such as side-view, fixed-focus, ultra-small diameter, high precision, and wide beam.

Model Name	Model Pic	Type	Fiber Length (mm)	Bending Radius (mm)	Sensing Range (mm)
Sort ▲ ▼		Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼
FD-B8		M6 Threaded Type	2000	25	600
FD-FM2		Coaxial M6 Threaded Type	2000	25	410
FD-G4		Coaxial M4 Threaded Type Lens Mountable	2000	25	150
FD-S80		3mm Cylindrical Type	2000	25	370
FD-SNFM2		2.5mm Cylindrical Type	2000	25	140



LIST OF FIBERS

FX-305 / FX-301 (Red LED type) sensing range (Note 1)

Reflective type



The FX-305 and FX-301(-HS) have different sensing modes.  
 FX-305: H-SP, FAST, STD, STDF, LONG, U-LG (no S-D mode)  
 FX-301(-HS): S-D, H-SP, FAST, STD, LONG (no STDF or U-LG mode)

Type	Shape of fiber head (mm in)	Sensing range (mm in)(Note 2, 3)	Min. sensing object (Note 4)	Fiber cable length Free-cut	Bending radius	Model No.			
Cylindrical type	φ3 φ0.118	370 14.567 (FAST) 270 10.630 (H-SP) 170 6.693 (S-D) 110 4.331 (STD)	85 3.346 (FAST) 45 1.772 (H-SP) 39 1.535 (S-D)	φ0.02 mm φ0.0008 in gold wire	2 m 6.562 ft	R25 mm R0.984 in	FD-S80		
		250 9.843 (FAST) 190 7.480 (H-SP) 110 4.331 (S-D) 90 3.543 (STD)	60 2.362 (FAST) 25 0.984 (H-SP) 32 1.260 (S-D)			R1 mm R0.039 in	FD-WS8		
		85 3.346 (FAST) 65 2.559 (H-SP) 37 1.457 (S-D) 32 1.260 (STD)	25 0.984 (FAST) 10 0.394 (H-SP) 11 0.433 (S-D)			R2 mm R0.079 in	FD-WSG4		
		130 5.118 (FAST) 90 3.543 (H-SP) 55 2.165 (S-D) 45 1.772 (STD)	30 1.181 (FAST) 13 0.512 (H-SP) 16 0.630 (S-D)			R4 mm R0.157 in	FD-P50		
		Flexible							
	φ2.5 φ0.098	140 5.512 (FAST) 90 3.543 (H-SP) 60 2.362 (S-D) 45 1.772 (STD)	35 1.378 (FAST) 16 0.630 (H-SP) 16 0.630 (S-D)	φ0.02 mm φ0.0008 in gold wire	2 m 6.562 ft	R25 mm R0.984 in	FD-SNFM2		
	φ1.5 φ0.059	80 3.150 (FAST) 50 1.969 (H-SP) 30 1.181 (S-D) 25 0.984 (STD)	19 0.748 (FAST) 7.5 0.295 (H-SP) 9 0.354 (S-D)	φ0.02 mm φ0.0008 in gold wire	1 m 3.281 ft	R4 mm R0.157 in	FD-P2		
	Ultra-small diameter	φ1.5 φ0.5 φ0.059 φ0.020	15 0.591 (FAST) 11 0.433 (H-SP) 8 0.315 (S-D) 6 0.236 (STD)	4 0.157 (FAST) 2 0.079 (H-SP) 1 0.039 (S-D)	φ0.02 mm φ0.0008 in gold wire	1 m 3.281 ft	R10 mm R0.394 in	FD-E12	
		Sleeve part cannot be bent.							
		Coaxial φ3 φ0.118	65 2.559 (FAST) 45 1.772 (H-SP) 28 1.102 (S-D) 23 0.906 (STD)	17 0.669 (FAST) 8 0.315 (H-SP) 7 0.276 (S-D)			φ0.02 mm φ0.0008 in gold wire		R25 mm R0.984 in
Sleeve part cannot be bent.									
Side-view	Small diameter φ1.5 φ0.059 φ0.7 φ0.028	80 3.150 (FAST) 55 2.165 (H-SP) 30 1.181 (S-D) 25 0.984 (STD)	17 0.669 (FAST) 8 0.315 (H-SP) 9 0.354 (S-D)	φ0.02 mm φ0.0008 in gold wire	2 m 6.562 ft	R25 mm R0.984 in	FD-V41		
	φ3 φ0.118 φ2 φ0.079 φ0.039	20 0.787 (FAST) 15 0.591 (H-SP) 8.5 0.335 (S-D) 7 0.276 (STD)	5 0.197 (FAST) Cannot use (H-SP) Cannot use (S-D)			R1 mm R0.039 in	FD-WV42		
	Sleeve part cannot be bent.								
	φ5 φ0.197 φ0.079 φ3 φ0.118 φ2 φ0.031	170 6.693 (FAST) 100 3.937 (H-SP) 55 2.165 (S-D) 45 1.772 (STD)	32 1.260 (FAST) 15 0.591 (H-SP) 16 0.630 (S-D)					R25 mm R0.984 in	FD-SFM2SV2
Rectangular	Glass substrate detection · Mapping W25 × H7.3 × D30 W0.984 × H0.287 × D1.181	12 to 50 0.472 to 1.969 (FAST) 12.5 to 37.5 0.492 to 1.476 (H-SP) 15 to 36 0.591 to 1.417 (S-D) 15 to 35 0.591 to 1.378 (STD)	16 to 29 0.630 to 1.142 (FAST) Cannot use (H-SP) Cannot use (S-D)	φ0.3 mm φ0.012 in gold wire	4 m 13.123 ft	R25 mm R0.984 in	FD-L46		
		0 to 50 0 to 1.969 (FAST) 0 to 36 0 to 1.417 (H-SP) 0 to 33 0 to 1.299 (S-D) 0 to 30 0 to 1.181 (STD)	0 to 30 0 to 1.181 (FAST) 0 to 15 0 to 0.591 (H-SP) 0 to 21 0 to 0.827 (S-D)			(LCD glass)			
	Glass substrate detection · Alignment W20 × H29 × D3.8 W0.787 × H1.142 × D0.157	0 to 50 0 to 1.969 (FAST) 0 to 36 0 to 1.417 (H-SP) 0 to 33 0 to 1.299 (S-D) 0 to 30 0 to 1.181 (STD)	0 to 30 0 to 1.181 (FAST) 0 to 15 0 to 0.591 (H-SP) 0 to 21 0 to 0.827 (S-D)		φ0.03 mm φ0.0012 in gold wire	3 m 9.843 ft	R4 mm R0.157 in	FD-L45	
		0 to 23 0 to 0.906 (FAST) 0 to 8.2 0 to 0.323 (H-SP) 0 to 7 0 to 0.276 (S-D) 0 to 6.5 0 to 0.256 (STD) 0 to 6 0 to 0.236 (STD)	0 to 5.7 0 to 0.224 (FAST) 0 to 5 0 to 0.197 (H-SP) 0 to 5.2 0 to 0.205 (S-D)						
	Glass substrate detection · Seating W12 × H19 × D3 W0.472 × H0.748 × D0.118	0 to 4.7 0 to 0.185 (FAST) 0 to 4.5 0 to 0.177 (H-SP) 0 to 4 0 to 0.157 (S-D) 0 to 4 0 to 0.157 (STD)	0 to 3.8 0 to 0.150 (FAST) 0 to 3 0 to 0.118 (H-SP) 0 to 3.5 0 to 0.138 (S-D)		φ0.03 mm φ0.0012 in gold wire	2 m 6.562 ft	R10 mm R0.394 in	FD-L44	
		0 to 4.7 0 to 0.185 (FAST) 0 to 4.5 0 to 0.177 (H-SP) 0 to 4 0 to 0.157 (S-D) 0 to 4 0 to 0.157 (STD)	0 to 3.8 0 to 0.150 (FAST) 0 to 3 0 to 0.118 (H-SP) 0 to 3.5 0 to 0.138 (S-D)						
	Convergent reflective type	Glass substrate detection W24 × H21 × D4 W0.945 × H0.827 × D0.157	6.5 to 14.5 0.256 to 0.571 (Convergent point 8 0.315) 6.5 to 14 0.256 to 0.551 (Convergent point 8 0.315) 7 to 14 0.276 to 0.551 (Convergent point 8 0.315) 7 to 12 0.276 to 0.472 (Convergent point 8 0.315)	7.5 to 12 0.295 to 0.472 (Convergent point 8 0.315) Cannot use (H-SP) Cannot use (S-D)	φ1.9 mm φ0.075 in metal pipe (gray)	2 m 6.562 ft	R1 mm R0.039 in	FD-WL41	
			2 to 19 0.079 to 0.748 (Convergent point 8 0.315) 2.5 to 18 0.098 to 0.709 (Convergent point 8 0.315) 3 to 16 0.118 to 0.630 (Convergent point 8 0.315) 3 to 16 0.118 to 0.630 (Convergent point 8 0.315)	3.5 to 15 0.138 to 0.591 (Convergent point 8 0.315) Cannot use (H-SP) Cannot use (S-D)			φ0.06 mm φ0.024 in gold wire		
		W6 × H18 × D14 W0.236 × H0.709 × D0.551	2 to 20 0.079 to 0.787 (Convergent point 6 0.236) 2.5 to 18 0.098 to 0.709 (Convergent point 6 0.236) 4 to 12 0.157 to 0.472 (Convergent point 6 0.236) 4 to 12 0.157 to 0.472 (Convergent point 6 0.236)	4.5 to 11 0.177 to 0.433 (Convergent point 6 0.236) 1.5 to 8.5 0.197 to 0.335 (Convergent point 6 0.236) 1.8 to 9.5 0.189 to 0.374 (Convergent point 6 0.236)		φ0.02 mm φ0.0008 in gold wire	2 m 6.562 ft	R10 mm R0.394 in	FD-L4
			0.5 to 8.5 0.020 to 0.335 (FAST) 0.5 to 7.5 0.020 to 0.295 (H-SP) 1 to 6.5 0.039 to 0.256 (S-D) 1 to 5.5 0.039 to 0.217 (STD)	1 to 5 0.039 to 0.197 (FAST) Cannot use (H-SP) Cannot use (S-D)	φ0.3 mm φ0.012 in copper wire				
W7.2 × H7.5 × D2 W0.283 × H0.295 × D0.079	0.5 to 8.5 0.020 to 0.335 (FAST) 0.5 to 7.5 0.020 to 0.295 (H-SP) 1 to 6.5 0.039 to 0.256 (S-D) 1 to 5.5 0.039 to 0.217 (STD)	1 to 5 0.039 to 0.197 (FAST) Cannot use (H-SP) Cannot use (S-D)		φ0.3 mm φ0.012 in copper wire	1 m 3.281 ft	R1 mm R0.039 in	FD-WL48		

Notes: 1) Refer to p.27 for the sensing ranges for the FX-301-HS in H-SP mode and for the FX-301B/G/H.  
 2) The sensing range is specified for white non-glossy paper (FD-S80, FD-WS8: 400 × 400 mm 15.748 × 15.748 in, FD-WSG4, FD-P50, FD-SNFM2, FD-V41, FD-SFM2SV2: 200 × 200 mm 7.874 × 7.874 in, FD-P2, FD-E12, FD-E22, FD-WV42, FD-L4, FD-WL48: 100 × 100 mm 3.937 × 3.937 in, FD-L46: 100 × 100 × t 0.7 mm 3.937 × 3.937 × t 0.028 in R edge of LCD glass substrates, FD-L43, FD-L44 and FD-L45: 100 × 100 × t 0.7 mm 3.937 × 3.937 × t 0.028 in LCD glass substrates, FD-L44S: silicon wafers polished surface, FD-WL41, FD-L41: 100 × 100 × t 2 mm 3.937 × 3.937 × t 0.079 in glass substrates).  
 3) Please take care that the sensing range of the free-cut type fiber may be reduced by 20% max. depending upon how the fiber is cut.  
 4) The minimum sensing object size is the value for red LED type at maximum sensitivity. Note that the corresponding setting distance is different from the rated sensing distance. However, with the convergent reflective type, when the sensitivity is at MAX., it is only possible to detect the minimum size of the sensing object at a distance corresponding to the convergent point.