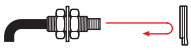
LIST OF FIBERS

Red LED type sensing range

Retroreflective type



Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Sharp bending	With polarizing filters	W9.5 × H5.2 × D15 W0.374 × H0.205 × D0.591 W30 × H30 × D0.5 W1.181 × H1.181 × D0.020	**FR-WKZ11** (Note 3)	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 990 3.937 to 38.976 100 to 780 3.937 to 30.709 100 to 490 3.937 to 19.291	100 to 550 3.937 to 21.654 100 to 830 3.937 to 32.677
Narrow beam	Top sending	W9.5 × H5.2 × D21 W0.374 × H0.205 × D0.827 W10.6 × H28 × D10.1 W0.417 × H1.102 × D0.398	**FR-KZ21** (Note 3)	20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874	20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874
	Side sending	W9.5 × H25× D5.2 W0.374 × H0.984× D0.205 W10.6 × H28 × D10.1 W0.417 × H1.102 × D0.398	**FR-KZ21E** (Note 3)		
Wafer mapping		W7.5 × H2.2 × D11.2 W0.295 × H0.087 × D0.441 W4 × H2 × D21.5 W0.157 × H0.079 × D0.846	**FR-KV1** (Note 3)	20 to 530 0.787 to 20.866 20 to 460 0.787 to 18.110 20 to 410 0.787 to 16.142 20 to 310 0.787 to 12.205 20 to 220 0.787 to 8.661 20 to 100 0.787 to 3.937	15 to 200 0.591 to 7.874 15 to 360 0.591 to 14.173

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-WKZ11** is specified for the **RF-13**. The sensing range of **FR-KZ21**, **FR-KZ21E** is specified for the attached reflector **RF-003**.
The sensing range of **FR-KV1** is specified for the attached reflector.
2) The sensing range of retro reflective 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.
3) Refer to p.18~ for details.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂: Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	100 to 730 3.937 to 28.740 100 to 520 3.937 to 20.472 100 to 460 3.937 to 18.110 Cannot use Cannot use	100 to 910 3.937 to 35.827 100 to 730 3.937 to 28.740 100 to 600 3.937 to 23.622 100 to 520 3.937 to 20.472 100 to 460 3.937 to 18.110 Cannot use	100 to 910 3.937 to 35.827 100 to 520 3.937 to 20.472 100 to 460 3.937 to 18.110	✂ 2 m 6.562 ft	R1 mm R0.039 in	-25 to +55 °C -13 to +131 °F
	20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 (**FX-301-HS**: Cannot use) 20 to 200 0.787 to 7.874	20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874	20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874 20 to 200 0.787 to 7.874		R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F
	15 to 330 0.591 to 12.992 15 to 210 0.591 to 8.268 15 to 170 0.591 to 6.693 15 to 80 0.591 to 3.150 (**FX-301-HS**: 15 to 24 0.591 to 0.945) 15 to 90 0.591 to 3.543	15 to 370 0.591 to 14.567 15 to 330 0.591 to 12.992 15 to 240 0.591 to 9.449 15 to 210 0.591 to 8.268 15 to 170 0.591 to 6.693 15 to 80 0.591 to 3.150	15 to 350 0.591 to 13.780 15 to 140 0.591 to 5.512 15 to 100 0.591 to 3.937			

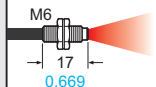
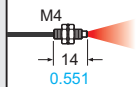
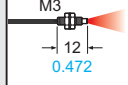
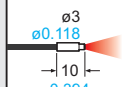
●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

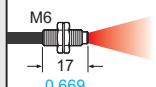
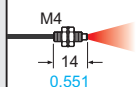
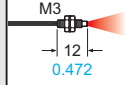
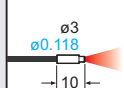
LIST OF FIBERS

Red LED type sensing range

Super quality fiber reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Threaded type	M6		**FD-60**	1,550 61.024 900 35.433 740 29.134 520 20.472 260 10.236 90 3.543	140 5.512 420 16.535
	M4		**FD-40**		
	M3		**FD-30**	600 23.622 330 12.992 250 9.843 160 6.299 80 3.150 25 0.984	45 1.772 155 6.102
Cylindrical type	ø3 ø0.118		**FD-S30**		

New standard fiber reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Threaded type	M6		**FD-61**	1,400 55.118 840 33.071 670 26.378 450 17.717 200 7.874 70 2.756	120 4.724 410 16.142
	M4		**FD-41**		
	M3		**FD-31**	515 20.276 290 11.417 220 8.661 125 4.921 80 3.150 25 0.984	35 1.378 140 5.512
Cylindrical type	ø3 ø0.118		**FD-S31**		

Notes: 1) The sensing range is specified for white non-glossy paper (400 × 400 mm 15.748 × 15.748 in) as the object.
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) Please contact our office about the sensing range for the **FX-301-HS**.

	FX-301 / FX-301-HS (Note 3) / **FX-311** (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Specifications
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation	
	350 13.780 160 6.299 130 5.118 70 2.756 70 2.756	500 19.685 350 13.780 240 9.449 160 6.299 130 5.118 70 2.756	600 23.622 150 5.906 100 3.937	2 m 6.562 ft R4 mm R0.157 in 10 million Times -55 to +80 °C -67 to +176 °F ±10 % 150 µm/ ±3 °
	110 4.331 50 1.969 40 1.575 20 0.787 18 0.709	170 6.693 110 4.331 70 2.756 50 1.969 40 1.575 20 0.787	200 7.874 48 1.890 35 1.378	

	FX-301 / FX-301-HS (Note 3) / **FX-311** (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Specifications	
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation		
	320 12.598 145 5.709 105 4.134 65 2.559 60 2.362	440 17.323 320 12.598 205 8.071 145 5.709 105 4.134 65 2.559	510 20.079 140 5.512 90 3.543	R4 mm R0.157 in	2 m 6.562 ft 10 million Times -55 to +80 °C -67 to +176 °F 150 µm/ ±3 ° IP67
	95 3.740 45 1.772 35 1.378 17 0.669 16 0.630	150 5.906 95 3.740 63 2.480 45 1.772 35 1.378 17 0.669	175 6.890 45 1.772 34 1.339	R2 mm R0.079 in	

●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250µs / 2.5ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

2 m 6.562 ft Fiber cable length/ Free cut
R4 mm R0.157 in Allowable bending radius
10 million Times Bending durability
-55 to +80 °C -67 to +176 °F Ambient temperature
±10 % Optical transmission loss
150 µm/ ±3 ° Beam axis position/ Inclination of beam axis
IP67 Protective structure

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Threaded type	M6	M6, 15 0.591	**FD-B8**	1,450 57.087 960 37.795 860 33.858 490 19.291 330 12.992 100 3.937	170 6.693 440 17.323
		Metal-free · Coaxial, M6	**FD-G60**	1,400 55.118 800 31.496 650 25.591 420 16.535 200 7.874 60 2.362	100 3.937 410 16.142
		Coaxial, M6, 20 0.787	**FD-FM2**		
		Sleeve 90 mm 3.543 in, M6, 20 0.787, ø2.5 ø0.098	**FD-FM2S**	1,100 43.307 700 27.559 540 21.260 380 14.961 220 8.661 70 2.756	100 3.937 345 13.583
		Sleeve 40 mm 1.575 in, M6, 20 0.787, ø2.5 ø0.098	**FD-FM2S4**		
		M6, 15 0.591	**FD-W8**	870 34.252 560 22.047 420 16.535 250 9.843 140 5.512 45 1.772	80 3.150 230 9.055
		M6, 15 0.591	**FD-P80**	820 32.283 610 24.016 480 18.898 280 11.024 160 6.299 55 2.165	90 3.543 200 7.874
		Tough flexible, M6, 15 0.591	**FD-P81X**	450 17.717 370 14.567 330 12.992 270 10.630 160 6.299 50 1.969	70 2.756 220 8.661
	Elbow	15 0.591, M6	**FD-R80**	890 35.039 500 19.685 370 14.567 220 8.661 130 5.118 40 1.575	70 2.756 180 7.087

Notes: 1) The sensing range is specified for white non-glossy paper as the object.
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.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂ : Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	480 18.898 220 8.661 160 6.299 85 3.346 (**FX-301-HS**: 50 1.969) 75 2.953	600 23.622 480 18.898 280 11.024 220 8.661 160 6.299 85 3.346	650 25.591 180 7.087 120 4.724			
	310 12.205 140 5.512 100 3.937 55 2.165 (**FX-301-HS**: 33 1.299) 47 1.850	410 16.142 310 12.205 200 7.874 140 5.512 100 3.937 55 2.165	460 18.110 110 4.331 80 3.150		R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	270 10.630 110 4.331 85 3.346 45 1.772 (**FX-301-HS**: 27 1.063) 39 1.535	370 14.567 270 10.630 170 6.693 110 4.331 85 3.346 45 1.772	400 15.748 90 3.543 70 2.756	✂ 2 m 6.562 ft	Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	
	190 7.480 90 3.543 60 2.362 25 0.984 (**FX-301-HS**: 20 0.787) 32 1.260	250 9.843 190 7.480 110 4.331 90 3.543 60 2.362 25 0.984	300 11.811 70 2.756 50 1.969		R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F
	220 8.661 100 3.937 70 2.756 30 1.181 (**FX-301-HS**: 17 0.669) 35 1.378	300 11.811 220 8.661 130 5.118 100 3.937 70 2.756 30 1.181	350 13.780 88 3.465 65 2.559		R4 mm R0.157 in Flexible	
	185 7.283 80 3.150 60 2.362 30 1.181 (**FX-301-HS**: 17 0.669) 35 1.378	270 10.630 185 7.283 100 3.937 80 3.150 60 2.362 30 1.181	280 11.024 80 3.150 55 2.165	1 m 3.281 ft	R10 mm R0.394 in	-40 to +70 °C
	185 7.283 85 3.346 60 2.362 25 0.984 (**FX-301-HS**: 15 0.591) 30 1.181	240 9.449 185 7.283 110 4.331 85 3.346 60 2.362 25 0.984	260 10.236 60 2.362 40 1.575	✂ 2 m 6.526 ft	R25 mm R0.984 in	-40 to +158 °F

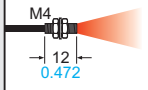
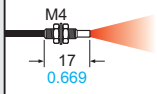
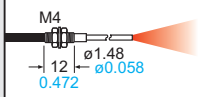
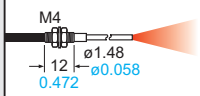
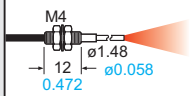
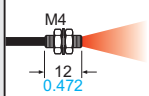
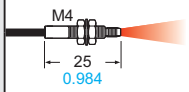
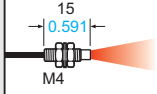
●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / **FX-102** (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / **FX-301-HS**	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / **FX-412**	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Threaded type	M4		**FD-T80**	1,100 43.307 700 27.559 540 21.260 380 14.961 220 8.661 70 2.756	100 3.937 345 13.583
			**FD-NFM2**		
		Sleeve 90 mm 3.543 in 	**FD-NFM2S**	510 20.079 280 11.024 215 8.465 120 4.724 70 2.756 22 0.866	35 1.378 100 3.937
		Sleeve 40 mm 1.575 in 	**FD-NFM2S4**		
		Sleeve 40 mm 1.575 in 	**FD-W44**	330 12.992 180 7.087 140 5.512 80 3.150 45 1.772 12 0.472	15 0.591 40 1.575
			**FD-WT8**	870 34.252 560 22.047 420 16.535 250 9.843 140 5.512 45 1.772	80 3.150 230 9.055
		Minute objects can be detected due to the small spot beam. Coaxial • Lens mountable (**FX-MR1/MR2/MR3/MR5/MR6**) 	**FD-WG4**	590 23.228 340 13.386 280 11.024 150 5.906 90 3.543 25 0.984	28 1.102 75 2.953
			FD-G4	550 21.654 330 12.992 270 10.630 140 5.512 80 3.150 27 1.063	50 1.969 120 4.724
		Metal-free · Coaxial 	**FD-G40**		
			**FD-P60**	490 19.291 250 9.843 190 7.480 120 4.724 75 2.953 22 0.866	45 1.772 150 5.906

Notes: 1) The sensing range is specified for white non-glossy paper as the object.
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.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂ : Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	270 10.630 110 4.331 85 3.346 45 1.772 (**FX-301-HS**: 27 1.063) 39 1.535	370 14.567 270 10.630 170 6.693 110 4.331 85 3.346 45 1.772	400 15.748 90 3.543 70 2.756	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	90 3.543 45 1.772 35 1.378 16 0.630 (**FX-301-HS**: 9 0.354) 16 0.630	140 5.512 90 3.543 60 2.362 45 1.772 35 1.378 16 0.630	170 6.693 40 1.575 30 1.181		Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	
	30 1.181 15 0.591 12 0.472 4.5 0.177 (**FX-301-HS**: 2.5 0.098) 5 0.197	40 1.575 30 1.181 18 0.709 15 0.591 12 0.472 4.5 0.177	60 2.362 15 0.591 11 0.433		Fiber R1 mm R0.039 in Sleeve R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F
	190 7.480 90 3.543 60 2.362 25 0.984 (**FX-301-HS**: 20 0.787) 32 1.260	250 9.843 190 7.480 110 4.331 90 3.543 60 2.362 25 0.984	300 11.811 70 2.756 50 1.969		R1 mm R0.039 in	
	65 2.559 32 1.260 25 0.984 10 0.394 (**FX-301-HS**: 6 0.236) 11 0.433	85 3.346 65 2.559 37 1.457 32 1.260 25 0.984 10 0.394	150 5.906 32 1.260 25 0.984		R2 mm R0.079 in	
	110 4.331 55 2.165 42 1.654 15 0.591 (**FX-301-HS**: 9 0.354) 19 0.748	150 5.906 110 4.331 65 2.559 55 2.165 42 1.654 15 0.591	220 8.661 52 2.047 38 1.496		R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	90 3.543 45 1.772 30 1.181 13 0.512 (**FX-301-HS**: 7 0.276) 16 0.630	130 5.118 90 3.543 55 2.165 45 1.772 30 1.181 13 0.512	165 6.496 45 1.772 30 1.181		R4 mm R0.157 in Flexible	-40 to +60 °C -40 to +140 °F

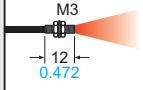
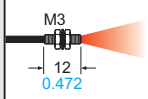
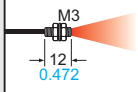
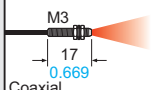
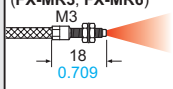
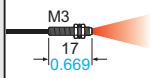
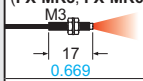
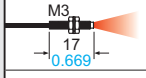
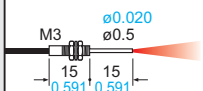
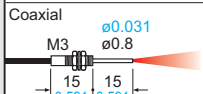
●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Threaded type	M3	Small diameter 	**FD-T40**	510 20.079 280 11.024 215 8.465 120 4.724 70 2.756 22 0.866	35 1.378 100 3.937
			**FD-WT4**	330 12.992 180 7.087 140 5.512 80 3.150 45 1.772 12 0.472	15 0.591 40 1.575
			**FD-P40**	190 7.480 100 3.937 85 3.346 45 1.772 20 0.787 7 0.276	8 0.315 30 1.181
		Lens mountable (**FX-MR3**, **FX-MR6**)  Coaxial	**FD-G6**	550 21.654 330 12.992 270 10.630 140 5.512 80 3.150 27 1.063	50 1.969 120 4.724
		Tough flexible • Coaxial • Lens mountable (**FX-MR3**, **FX-MR6**) 	**FD-G6X**	630 24.803 370 14.567 310 12.205 170 6.693 95 3.740 27 1.063	45 1.772 160 6.299
		High precision • Coaxial • Lens mountable (**FX-MR3**, **FX-MR6**) 	**FD-EG1**	170 6.693 100 3.937 80 3.150 40 1.575 24 0.945 7.5 0.295	18 0.709 50 1.969
		High precision • Light emitting fiber element ø0.175 ø0.007 Coaxial • Lens mountable (**FX-MR3**, **FX-MR6**) 	**FD-EG2**	130 5.118 100 3.937 80 3.150 24 0.945 19 0.748 3 0.118	10 0.394 30 1.181
		High precision • Light emitting fiber element ø0.125 ø0.005 Coaxial • Lens mountable (**FX-MR3**, **FX-MR6**) 	**FD-EG3**	85 3.346 45 1.772 35 1.378 20 0.787 12 0.472 3.5 0.138	7 0.276 22 0.866
		 Sleeve part cannot be bent.	**FD-EN500S1**	—	1 0.039 4 0.157
		Coaxial  Sleeve part cannot be bent.	**FD-ENM1S1**	190 7.480 110 4.331 90 3.543 50 1.969 28 1.102 9 0.354	15 0.591 48 1.890

Notes: 1) The sensing range is specified for white non-glossy paper as the object.
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.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂ : Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	90 3.543 45 1.772 35 1.378 16 0.630 (**FX-301-HS**: 9 0.354) 16 0.630	140 5.512 90 3.543 60 2.362 45 1.772 35 1.378 16 0.630	170 6.693 40 1.575 30 1.181	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	30 1.181 15 0.591 12 0.472 4.5 0.177 (**FX-301-HS**: 2.5 0.098) 5 0.197	40 1.575 30 1.181 18 0.709 15 0.591 12 0.472 4.5 0.177	60 2.362 15 0.591 11 0.433		R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F
	36 1.417 18 0.709 14 0.551 5.5 0.217 (**FX-301-HS**: 3 0.118) 6 0.236	50 1.969 36 1.417 20 0.787 18 0.709 14 0.551 5.5 0.217	50 1.969 12 0.472 9 0.354		R4 mm R0.157 in Flexible	-40 to +70 °C -40 to +158 °F
	110 4.331 55 2.165 42 1.654 15 0.591 (**FX-301-HS**: 9 0.354) 19 0.748	150 5.906 110 4.331 65 2.559 55 2.165 42 1.654 15 0.591	220 8.661 52 2.047 38 1.496		R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F
	90 3.543 45 1.772 35 1.378 12 0.472 (**FX-301-HS**: 7 0.276) 20 0.787	150 5.906 90 3.543 48 1.890 45 1.772 35 1.378 12 0.472	200 7.874 45 1.772 35 1.378	1 m (Note 3) 3.281 ft	R10 mm R0.394 in	
	38 1.496 18 0.709 14 0.551 5 0.197 (**FX-301-HS**: 3 0.118) 6 0.236	50 1.969 38 1.496 25 0.984 18 0.709 14 0.551 5 0.197	50 1.969 13 0.512 10 0.394	500 mm 19.685 in	R25 mm R0.984 in	-20 to +60 °C -4 to +140 °F
	25 0.984 12 0.472 9 0.354 3 0.118 (**FX-301-HS**: 1.5 0.059) 5 0.197	40 1.575 25 0.984 14 0.551 12 0.472 9 0.354 3 0.118	45 1.772 7 0.276 5 0.197		R10 mm R0.394 in	
	15 0.591 8 0.315 5 0.197 2.5 0.098 (**FX-301-HS**: 1.2 0.047) 3 0.118	20 0.787 15 0.591 9 0.354 8 0.315 5 0.197 2.5 0.098	23 0.906 5 0.197 4 0.157			
	5 0.197 3 0.118 2 0.079 Cannot use Cannot use	6.5 0.256 5 0.197 3 0.118 3 0.118 2 0.079 Cannot use	4.5 0.177 1.2 0.047 1 0.039		R25 mm R0.984 in	
	38 1.496 18 0.709 14 0.551 5 0.197 (**FX-301-HS**: 3 0.118) 6 0.236	50 1.969 38 1.496 20 0.787 18 0.709 14 0.551 5 0.197	48 1.890 12 0.472 9 0.354	1 m 3.281 ft		

●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type	Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
			FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
			Dual display digital standard type	Dual display digital
Cylindrical type — ø3 ø0.118	ø3 ø0.118, 15 0.591	**FD-S80**	1,100 43.307 700 27.559 540 21.260 380 14.961 220 8.661 70 2.756	100 3.937 345 13.583
	ø3 ø0.118, 15 0.591	**FD-WS8**	960 37.795 550 21.654 410 16.142 250 9.843 140 5.512 45 1.772	80 3.150 230 9.055
	Coaxial ø3 ø0.118, 15 0.591	**FD-WSG4**	590 23.228 340 13.386 280 11.024 150 5.906 90 3.543 25 0.984	28 1.102 75 2.953
	ø3 ø0.118, 15 0.591	**FD-P50**	490 19.291 250 9.843 190 7.480 120 4.724 75 2.953 22 0.866	45 1.772 150 5.906
ø2.5 ø0.098	ø2.5 ø0.098, 8 0.315	**FD-SNFM2**	510 20.079 280 11.024 215 8.465 120 4.724 70 2.756 22 0.866	35 1.378 100 3.937
ø1.5 ø0.059	ø1.5 ø0.059, 15 0.591	**FD-P2**	260 10.236 170 6.693 140 5.512 80 3.150 55 2.165 20 0.787	25 0.984 65 2.559
Ultra-small diameter	ø1.5 ø0.059 ø0.5 ø0.020, 15 0.591 3 0.118, Sleeve part cannot be bent.	**FD-E12**	45 1.772 25 0.984 22 0.866 12 0.472 7 0.276 2 0.079	3.5 0.138 13 0.512
	Coaxial ø3 ø0.118 ø0.65 ø0.026, 15 0.591 5 0.197, Sleeve part cannot be bent.	**FD-E22**	210 8.268 130 5.118 110 4.331 55 2.165 32 1.260 11 0.433	16 0.630 45 1.772
Side-view	Small diameter 0.591 0.394, 15 10, ø3 ø0.118 ø1.5 ø0.059, 0.7 0.028, Sleeve part cannot be bent.	**FD-V41**	260 10.236 140 5.512 110 4.331 65 2.559 35 1.378 14 0.551	25 0.984 70 2.756
	0.591 0.591, 15 15, ø3 ø0.118 ø2 ø0.079, 1 0.039, Sleeve part cannot be bent.	**FD-WV42**	60 2.362 35 1.378 25 0.984 16 0.630 8 0.315 2 0.079	6 0.236 20 0.787
	0.591 0.787, 15 20, ø5 ø0.197 ø2 ø0.079, 0.8 0.031, Sleeve part cannot be bent.	**FD-SFM2SV2**	370 14.567 250 9.843 210 8.268 120 4.724 75 2.953 25 0.984	30 1.181 90 3.543

Notes: 1) The sensing range is specified for white non-glossy paper as the object.
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.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂ : Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	270 10.630 110 4.331 85 3.346 45 1.772 (**FX-301-HS**: 27 1.063) 39 1.535	370 14.567 270 10.630 170 6.693 110 4.331 85 3.346 45 1.772	400 15.748 90 3.543 70 2.756	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	190 7.480 90 3.543 60 2.362 25 0.984 (**FX-301-HS**: 20 0.787) 32 1.260	250 9.843 190 7.480 110 4.331 90 3.543 60 2.362 25 0.984	300 11.811 70 2.756 50 1.969		R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F
	65 2.559 32 1.260 25 0.984 10 0.394 (**FX-301-HS**: 6 0.236) 11 0.433	85 3.346 65 2.559 37 1.457 32 1.260 25 0.984 10 0.394	150 5.906 32 1.260 25 0.984		R2 mm R0.079 in	
	90 3.543 45 1.772 30 1.181 13 0.512 (**FX-301-HS**: 7 0.276) 16 0.630	130 5.118 90 3.543 55 2.165 45 1.772 30 1.181 13 0.512	165 6.496 45 1.772 30 1.181		R4 mm R0.157 in Flexible	
	90 3.543 45 1.772 35 1.378 16 0.630 (**FX-301-HS**: 9 0.354) 16 0.630	140 5.512 90 3.543 60 2.362 45 1.772 35 1.378 16 0.630	170 6.693 40 1.575 30 1.181		R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	50 1.969 25 0.984 19 0.748 7.5 0.295 (**FX-301-HS**: 4 0.157) 9 0.354	80 3.150 50 1.969 30 1.181 25 0.984 19 0.748 7.5 0.295	80 3.150 18 0.709 13 0.512	1 m 3.281 ft	R4 mm R0.157 in Flexible	
	11 0.433 6 0.236 4 0.157 2 0.079 (**FX-301-HS**: 1 0.039) 1 0.039	15 0.591 11 0.433 8 0.315 6 0.236 4 0.157 2 0.079	13 0.512 3.5 0.138 2.5 0.098		R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F
	45 1.772 23 0.906 17 0.669 8 0.315 (**FX-301-HS**: 4.5 0.177) 7 0.276	65 2.559 45 1.772 28 1.102 23 0.906 17 0.669 8 0.315	54 2.126 13 0.512 10 0.394		R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F
	55 2.165 25 0.984 17 0.669 8 0.315 (**FX-301-HS**: 4.5 0.177) 9 0.354	80 3.150 55 2.165 30 1.181 25 0.984 17 0.669 8 0.315	80 3.150 19 0.748 14 0.551			-40 to +60 °C -40 to +140 °F
	15 0.591 7 0.276 5 0.197 Cannot use Cannot use	20 0.787 15 0.591 8.5 0.335 7 0.276 5 0.197 Cannot use	20 0.787 5 0.197 3 0.118	2 m 6.562 ft	R1 mm R0.039 in	
	100 3.937 45 1.772 32 1.260 15 0.591 (**FX-301-HS**: 9 0.354) 16 0.630	170 6.693 100 3.937 55 2.165 45 1.772 32 1.260 15 0.591	140 5.512 35 1.378 25 0.984		R25 mm R0.984 in	-20 to +60 °C -4 to +140 °F

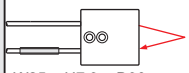
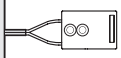
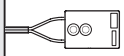
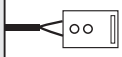
●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type	Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
			FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
			Dual display digital standard type	Dual display digital
Rectangular — Convergent reflective type	Glass substrate detection • Mapping  W25 × H7.3 × D30 W0.984 × H0.287 × D1.181	**FD-L46** (Note 3)	1 to 110 0.039 to 4.331 1 to 87 0.039 to 3.425 1 to 74 0.039 to 2.913 1 to 56 0.039 to 2.205 1 to 38 0.039 to 1.496 Cannot use	16 to 30 0.630 to 1.181 12 to 50 0.472 to 1.969
	Glass substrate detection • Alignment  W20 × H29 × D3.8 W0.787 × H1.142 × D0.150	**FD-L45** (Note 3)	0 to 43 0 to 1.693 0 to 43 0 to 1.693 0 to 43 0 to 1.693 0 to 40 0 to 1.575 0 to 40 0 to 1.575 0 to 24 0 to 0.945	0 to 40 0 to 1.575 0 to 50 0 to 1.969
	Glass substrate detection • Alignment  W23.5 × H29 × D4.5 W0.925 × H1.142 × D0.177	**FD-L45A** (Note 3)	3 to 51 0.118 to 2.008 4 to 47 0.157 to 1.850 4 to 46 0.157 to 1.811 4 to 44 0.157 to 1.732 4 to 42 0.157 to 1.654 5 to 38 0.197 to 1.496	Cannot use 10 to 33 0.394 to 1.299 (Note 4)
	Glass substrate detection • Alignment  W17 × H29 × D3.8 W0.669 × H1.142 × D0.150	**FD-L43** (Note 3)	0 to 31 0 to 1.220 0 to 25 0 to 0.984 0 to 24 0 to 0.945 0 to 24 0 to 0.945 0 to 24 0 to 0.945 0 to 18 0 to 0.709	0 to 19 0 to 0.748 0 to 25 0 to 0.984
	Glass substrate detection • Alignment  W18 × H29 × D3.8 W0.709 × H1.142 × D0.150	**FD-L47**	0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 29 0 to 1.142 0 to 28 0 to 1.102 1.5 to 24 0.059 to 0.945	0 to 28 0 to 1.102 0 to 30 0 to 1.181
	Glass substrate detection • Seating confirmation  W12 × H19 × D3 W0.472 × H0.748 × D0.118	**FD-L44** (Note 3)	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 9.5 0 to 0.374 0 to 9 0 to 0.354 0 to 8 0 to 0.315	0 to 6 0 to 0.236 0 to 8 0 to 0.315
		FD-L44S (Note 3)	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 4 0 to 0.157	0 to 4.5 0 to 0.177 0 to 5.5 0 to 0.217
	Glass substrate detection  W24 × H21 × D4 W0.945 × H0.827 × D0.157	**FD-WL41**	1.5 to 15 0.059 to 0.591 2 to 14.5 0.079 to 0.571 2 to 14.5 0.079 to 0.571 2.5 to 14 0.098 to 0.551 5.5 to 13.5 0.217 to 0.531 6.5 to 10 0.256 to 0.394	7 to 12 0.276 to 0.472 (Convergent point 8 0.315) 6 to 13.5 0.236 to 0.531 (Convergent point 8 0.315)
		FD-L41	1 to 19 0.039 to 0.748 1 to 18 0.039 to 0.709 1.5 to 16 0.059 to 0.630 1.5 to 16 0.059 to 0.630 3 to 15 0.118 to 0.591 8 to 11 0.315 to 0.433	3 to 14 0.118 to 0.551 (Convergent point 8 0.315) 1.5 to 16 0.059 to 0.630 (Convergent point 8 0.315)

Notes: 1) These are the sensing range values for the **FD-L46** LCD 100 × 100 × t 0.7 mm 3.937 × 3.937 × t 0.028 in glass board R-edge, the **FD-L43**, **FD-L44**, **FD-L45**, **FD-L45A**, **FD-L47** LCD 100 × 100 × t 0.7 mm 3.937 × 3.937 × t 0.028 in glass board, the **FD-L44S** silicon wafer (polished surface), and the **FD-WL41**, **FD-L41** 100 × 100 × t 2 mm 3.937 × 3.937 × t 0.079 in glass board.

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.

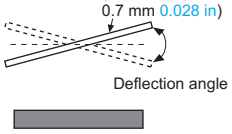
3) Refer to p.19 ~ for details for the **FD-L□**.

4) Value when sensing object is inclined (θ, ω) = (±2°, ±2°)

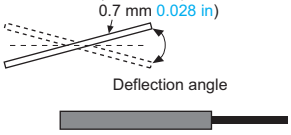
5) Please contact our office about the sensing range for the **FX-301-HS**.

Definition of direction (θ, ω)

① θ direction



② ω direction



Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂: Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	12.5 to 37.5 0.492 to 1.476 15 to 35 0.591 to 1.378 16 to 29 0.630 to 1.142 Cannot use Cannot use	12 to 50 0.472 to 1.969 12.5 to 37.5 0.492 to 1.476 15 to 36 0.591 to 1.417 15 to 35 0.591 to 1.378 16 to 29 0.630 to 1.142 Cannot use	12 to 50 0.472 to 1.969 15 to 30 0.591 to 1.181 20 to 25 0.787 to 0.984	✂ 4 m 13.123 ft	R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F
	0 to 36 0 to 1.417 0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 15 0 to 0.591 (**FX-301-HS**: 2 to 15 0.079 to 0.591) 0 to 21 0 to 0.827	0 to 50 0 to 1.969 0 to 36 0 to 1.417 0 to 33 0 to 1.299 0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 15 0 to 0.591	0 to 50 0 to 1.969 0 to 30 0 to 1.181 0 to 30 0 to 1.181	✂ 3 m 9.843 ft	R4 mm R0.157 in	0 to +70 °C 32 to +158 °F
	10 to 33 0.394 to 1.299 10 to 32 0.394 to 1.260 10 to 32 0.394 to 1.260 13 to 18 0.512 to 0.709 (Note 4) (**FX-301-HS**: Cannot use) 13 to 18 0.512 to 0.709	10 to 33 0.394 to 1.299 10 to 33 0.394 to 1.299 10 to 32 0.394 to 1.260 10 to 32 0.394 to 1.260 (Note 4) 10 to 32 0.394 to 1.260 13 to 18 0.512 to 0.709	10 to 33 0.394 to 1.299 10 to 32 0.394 to 1.260 (Note 4) 10 to 27 0.394 to 1.063	✂ 3 m 9.843 ft	R25 mm R0.984 in	
	0 to 23 0 to 0.906	0 to 23 0 to 0.906	0 to 23 0 to 0.906	✂ 2 m 6.562 ft	R4 mm R0.157 in	
	0 to 30 0 to 1.181 (Note 5) 0 to 30 0 to 1.181 (Note 5) 1 to 28 0.039 to 1.102 (Note 5) 2 to 27 0.079 to 1.063 (Note 5) 2 to 27 0.079 to 1.063 (Note 5)	0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 30 0 to 1.181 1 to 28 0.039 to 1.102 2 to 27 0.079 to 1.063	0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 28 0 to 1.102	✂ 3 m 9.843 ft		-20 to +70 °C -4 to +158 °F
	0 to 7 0 to 0.276 0 to 6 0 to 0.236 0 to 5.7 0 to 0.224 0 to 5 0 to 0.197 0 to 5.2 0 to 0.205	0 to 8.2 0 to 0.323 0 to 7 0 to 0.276 0 to 6.5 0 to 0.256 0 to 6 0 to 0.236 0 to 5.7 0 to 0.224 0 to 5 0 to 0.197	0 to 8.2 0 to 0.323 0 to 6 0 to 0.236 0 to 5.7 0 to 0.224	✂ 2 m 6.562 ft	R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F
	0 to 4.5 0 to 0.177 0 to 4 0 to 0.157 0 to 3.8 0 to 0.150 0 to 3 0 to 0.118 0 to 3.5 0 to 0.138	0 to 4.7 0 to 0.185 0 to 4.5 0 to 0.177 0 to 4 0 to 0.157 0 to 4 0 to 0.157 0 to 3.8 0 to 0.150 0 to 3 0 to 0.118	0 to 4.4 0 to 0.173 0 to 4 0 to 0.157 0 to 3.8 0 to 0.150			
	6.5 to 14 0.256 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 Cannot use	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	6.5 to 12 0.256 to 0.472 (Convergent point 8 0.315) 7 to 11 0.276 to 0.433 (Convergent point 8 0.315) 7.5 to 10 0.295 to 0.394 (Convergent point 8 0.315)		R1 mm R0.039 in	
	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) 3.5 to 15 0.138 to 0.591 (Convergent point 8 0.315) Cannot use Cannot use	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	1 to 14 0.039 to 0.551 (Convergent point 8 0.315) 3 to 12 0.118 to 0.472 (Convergent point 8 0.315) 2.5 to 10 0.098 to 0.394 (Convergent point 8 0.315)		R10 mm R0.394 in	

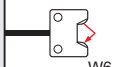
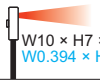
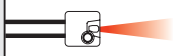
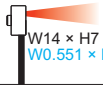
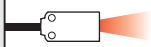
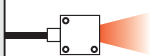
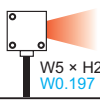
●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Rectangular	Convergent reflective type	 W6 × H18 × D14 W0.236 × H0.709 × D0.551	**FD-L4**	21.5 0.846 19.5 0.768 18.5 0.728 15.5 0.610 3 to 13 0.118 to 0.512 5 to 7.5 0.197 to 0.295	5 to 8 0.197 to 0.315 (Convergent point 6 0.236) 1 to 17 0.039 to 0.669 (Convergent point 6 0.236)
		 W7.2 × H7.5 × D2 W0.283 × H0.295 × D0.079	**FD-WL48**	16 0.630 12.5 0.492 11.5 0.453 7.5 0.295 0.5 to 6 0.020 to 0.236 0.5 to 4 0.020 to 0.157	1 to 4.5 0.039 to 0.177 0.5 to 6.5 0.020 to 0.256
	Small	Front sensing  W10 × H7 × D2 W0.394 × H0.276 × D0.079	**FD-WZ4** (Note 3)	1 to 230 0.039 to 9.055 1 to 110 0.039 to 4.331 1 to 85 0.039 to 3.346 2 to 65 0.079 to 2.559 3 to 35 0.118 to 1.378 5 to 13 0.197 to 0.512	2 to 20 0.079 to 0.787 1 to 70 0.039 to 2.756
		Fiber bending type  W2 × H10 × D10 W0.079 × H0.394 × D0.394	**FD-WZ4HB** (Note 3)	1 to 190 0.039 to 7.480 1 to 130 0.039 to 5.118 1 to 90 0.039 to 3.543 2.5 to 65 0.098 to 2.559 2.5 to 40 0.098 to 1.575 3 to 11 0.118 to 0.433	2 to 20 0.079 to 0.787 1 to 70 0.039 to 2.756
		Front sensing  W14 × H7 × D3.5 W0.551 × H0.276 × D0.138	**FD-WZ7** (Note 3)	430 16.929 230 9.055 180 7.087 110 4.331 1.5 to 65 0.059 to 2.559 3 to 25 0.118 to 0.984	1 to 55 0.039 to 2.165 160 6.299
		Fiber bending type  W3.5 × H14 × D11 W0.138 × H0.551 × D0.433	**FD-WZ7HB** (Note 3)	0.5 to 560 0.020 to 22.047 0.5 to 320 0.020 to 12.598 0.5 to 270 0.020 to 10.630 1 to 150 0.039 to 5.906 1 to 90 0.039 to 3.543 2.5 to 30 0.098 to 1.181	1 to 60 0.039 to 2.362 0.5 to 180 0.020 to 7.087
Special	Long sensing range	Long sensing range • Rectangular head  W5.2 × H9.5 × D15 W0.205 × H0.374 × D0.591	**FD-WKZ1**	20 to 1,700 0.787 to 66.929 20 to 1,000 0.787 to 39.370 20 to 820 0.787 to 32.283 20 to 490 0.787 to 19.291 20 to 310 0.787 to 12.205 20 to 100 0.787 to 3.937	20 to 180 0.787 to 7.087 20 to 480 0.787 to 18.898
	Wide beam	 W7 × H15 × D30 W0.276 × H0.591 × D1.181	**FD-A15**	200 7.874 200 7.874 200 7.874 200 7.874 140 5.512 75 2.953	125 4.921 250 9.843
	Array	Top sensing  W5 × H20 × D20 W0.197 × H0.787 × D0.787	**FD-AFM2**	660 25.984 510 20.079 430 16.929	105 4.134 285 11.220
		Side sensing  W5 × H20 × D20 W0.197 × H0.787 × D0.787	**FD-AFM2E**	280 11.024 160 6.299 50 1.969	85 3.346 245 9.646

Notes: 1) The sensing range is specified for white non-glossy paper as the object.
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) Refer to p.13 ~ for details for the **FD-WZ□**.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂: Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	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) 4.5 to 11 0.177 to 0.433 (Convergent point 6 0.236) 5 to 8.5 0.197 to 0.335 (Convergent point 6 0.236) [**FX-301-HS**: 5 to 7.5 0.197 to 0.295 (Convergent point 6 0.236)] 4.8 to 9.5 0.189 to 0.374 (Convergent point 6 0.236)	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) 5 to 8.5 0.197 to 0.335 (Convergent point 6 0.236)	2 to 20 0.079 to 0.787 (Convergent point 6 0.236) 4 to 10 0.157 to 0.394 (Convergent point 6 0.236) 4.5 to 9 0.177 to 0.354 (Convergent point 6 0.236)	✂ 2 m 6.562 ft	R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F
	0.5 to 7.5 0.020 to 0.295 1 to 5.5 0.039 to 0.217 1 to 5 0.039 to 0.197 Cannot use Cannot use	0.5 to 8.5 0.020 to 0.335 0.5 to 7.5 0.020 to 0.295 1 to 6.5 0.039 to 0.256 1 to 5.5 0.039 to 0.217 1 to 5 0.039 to 0.197 Cannot use	0.5 to 7.5 0.020 to 0.295 1 to 4.5 0.039 to 0.177 1 to 3.5 0.039 to 0.138			-20 to +60 °C -4 to +140 °F
	1.5 to 34 0.059 to 1.339 3 to 17 0.118 to 0.669 3 to 10 0.118 to 0.394 Cannot use (**FX-301-HS**: —) Cannot use	1 to 50 0.039 to 1.969 1.5 to 34 0.059 to 1.339 2 to 24 0.079 to 0.945 3 to 17 0.118 to 0.669 3 to 10 0.118 to 0.394 Cannot use	1 to 56 0.039 to 2.205 3 to 14 0.118 to 0.551 3.5 to 9 0.138 to 0.354	✂ 1 m 3.281 ft		
	1 to 46 0.039 to 1.811 2.5 to 23 0.098 to 0.906 2.5 to 15 0.098 to 0.591 3 to 7 0.118 to 0.276 (**FX-301-HS**: —) 3 to 7 0.118 to 0.276	1 to 70 0.039 to 2.756 1 to 46 0.039 to 1.811 1 to 32.2 0.039 to 1.268 2.5 to 23 0.098 to 0.906 2.5 to 15 0.098 to 0.591 3 to 7 0.118 to 0.276	1 to 70 0.039 to 2.756 3 to 15 0.118 to 0.591 3 to 10 0.118 to 0.394		R1 mm R0.039 in	
	120 4.724 1 to 60 0.039 to 2.362 1.5 to 35 0.059 to 1.378 2.5 to 18 0.098 to 0.709 (**FX-301-HS**: —) 2.5 to 18 0.098 to 0.709	200 7.874 120 4.724 1 to 84 0.039 to 3.307 1 to 60 0.039 to 2.362 1.5 to 35 0.059 to 1.378 2.5 to 18 0.098 to 0.709	200 7.874 1 to 48 0.039 to 1.890 2 to 33 0.079 to 1.299			-40 to +60 °C -40 to +140 °F
	0.5 to 180 0.020 to 7.087 1 to 90 0.039 to 3.543 1 to 70 0.039 to 2.756 1 to 35 0.039 to 1.378 (**FX-301-HS**: —) 1 to 35 0.039 to 1.378	0.5 to 270 0.020 to 10.630 0.5 to 180 0.020 to 7.087 1 to 126 0.039 to 4.961 1 to 90 0.039 to 3.543 1 to 70 0.039 to 2.756 1 to 35 0.039 to 1.378	0.5 to 320 0.020 to 12.598 1 to 80 0.039 to 3.150 1 to 56 0.039 to 2.205			
	20 to 480 0.787 to 18.898 20 to 230 0.787 to 9.055 20 to 170 0.787 to 6.693 25 to 90 0.984 to 3.543 (**FX-301-HS**: 25 to 50 0.984 to 1.969) 25 to 100 0.984 to 3.937	20 to 660 0.787 to 25.984 20 to 480 0.787 to 18.898 20 to 300 0.787 to 11.811 20 to 230 0.787 to 9.055 20 to 170 0.787 to 6.693 25 to 90 0.984 to 3.543	20 to 480 0.787 to 18.898 20 to 130 0.787 to 5.118 20 to 100 0.787 to 3.937	✂ 2 m 6.562 ft		
	200 7.874 150 5.906 100 3.937 45 1.772 (**FX-301-HS**: 25 0.984) 50 1.969	230 9.055 200 7.874 150 5.906 150 5.906 100 3.937 45 1.772	280 11.024 100 3.937 74 2.913		R25 mm R0.984 in	
	220 8.661 110 4.331 78 3.071 35 1.378 (**FX-301-HS**: 20 0.787) 39 1.535	290 11.417 220 8.661 135 5.315 110 4.331 78 3.071 35 1.378	310 12.205 85 3.346 60 2.362			-40 to +70 °C -40 to +158 °F
	220 8.661 110 4.331 78 3.071 35 1.378 (**FX-301-HS**: 20 0.787) 39 1.535	290 11.417 220 8.661 135 5.315 110 4.331 78 3.071 35 1.378	310 12.205 85 3.346 60 2.362			

●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Special	Liquid level sensing	Heat-resistant 125 °C 257 °F Fluorine resin coating ø 6 ø 0.236	**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 interrupted	
		Heat-resistant 105 °C 221 °F Fluorine resin coating ø4 ø0.157	**FD-HF40Y**	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 interrupted	
		Heat-resistant 70 °C 158 °F Fluorine resin coating throughout the fiber ø4 ø0.157	**FD-F41Y**	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 interrupted	
		Mountable on pipe • Standard W25 × H13 × D20 W0.984 × H0.512 × D0.787	**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 interrupted	
		Mountable on pipe • For PFA, wall thickness 1 mm 0.039 in pipe W25 × H13 × D20 W0.984 × H0.512 × D0.787	**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 interrupted	
		Mountable on pipe • array fiber W6.5 × H28.3 × D17 W0.256 × H1.114 × D0.669	**FD-FA90**	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 interrupted	
		Mountable on pipe SEMI S2 compliant W23 × H20 × D17 W0.906 × H0.787 × D0.669	**FT-F902**	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 received, Liquid present: Beam interrupted Applicable amplifier: **FX-500** series, **FX-301-F**	
	Liquid leak detection	SEMI S2 compliant W20 × H30 × D10 W0.787 × H1.181 × D0.394	**FD-F705**	Liquid leak detection Liquid leak absent: Beam received, Liquid leak present: Beam interrupted Applicable amplifier: **FX-500** series, **FX-301-F7**	
Special	Heat-resistant	350 °C 662 °F • Coaxial M6 25 0.984	**FD-H35-M2**	720 28.346 540 21.260 460 18.110 260 10.236 150 5.906 45 1.772	75 2.953 280 11.024
		350 °C 662 °F • Sleeve 60 mm 2.362 in M6 ø2.8 ø0.110 22 0.866	**FD-H35-M2S6**		
		200 °C 392 °F • Coaxial M6 28 1.102	**FD-H20-M1**	840 33.071 550 21.654 500 19.685 330 12.992 200 7.874 55 2.165	120 4.724 300 11.811

Notes: 1) The sensing range is specified for white non-glossy paper as the object.
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 1,000 mm 39.370 in from the end that the amplifier inserted.

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂ : Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	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 interrupted			✂ 2 m 6.562 ft (Note 3)	Protective tube R40 mm R1.575 in Fiber R15 mm R0.591 in	-40 to +125 °C -40 to +257 °F
	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 interrupted			✂ 2 m 6.562 ft	Protective tube R20 mm R0.787 in Fiber R10 mm R0.394 in	-40 to +105 °C -40 to +221 °F
	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 interrupted					-40 to +70 °C -40 to +158 °F
	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 interrupted				R10 mm R0.394 in	-40 to +100 °C -40 to +212 °F
	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 interrupted					
	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 interrupted					-40 to +70 °C -40 to +158 °F
	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 received, Liquid present: Beam interrupted Applicable amplifier: **FX-500** series, **FX-301-F**				Protective tube R20 mm R0.787 in Fiber R4 mm R0.157 in	-20 to +60 °C -4 to +140 °F
	Liquid leak detection Liquid leak absent: Beam received, Liquid leak present: Beam interrupted Applicable amplifier: **FX-500** series, **FX-301-F7**			✂ 5 m 16.404 ft (Protective tube 3 m 9.843 ft)		-20 to +50 °C -4 to +122 °F
	270 10.630 140 5.512 100 3.937 35 1.378 (**FX-301-HS**: 20 0.787) 47 1.850	300 11.811 270 10.630 150 5.906 140 5.512 100 3.937 35 1.378	300 11.811 83 3.268 60 2.362	2 m 6.562 ft	R25 mm R0.984 in Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	-60 to +350 °C -76 to +662 °F
	270 10.630 140 5.512 100 3.937 35 1.378 (**FX-301-HS**: 20 0.787) 47 1.850	300 11.811 270 10.630 150 5.906 140 5.512 100 3.937 35 1.378	270 10.630 85 3.346 60 2.362	1 m 3.281 ft	R25 mm R0.984 in	-60 to +200 °C -76 to +392 °F

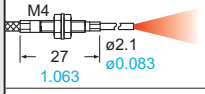
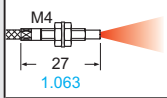
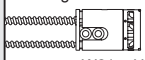
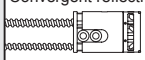
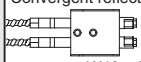
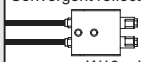
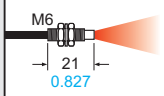
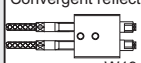
Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / **FX-102** (Note)	—	—	—	—	250 µs / 2.5 ms	—	—	—
FX-301 / **FX-301-HS**	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / **FX-412**	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

LIST OF FIBERS

Red LED type sensing range

Reflective type

Type		Shape of fiber head (mm in)	Model No.	Sensing range (mm in) (Note 1, 2) ■ : HYPR ■ : U-LG ■ : LONG ■ : STDF ■ : STD ■ : FAST ■ : H-SP ■ : S-D	
				FX-500 series	**FX-101** (Upper value) **FX-102** (Lower value)
				Dual display digital standard type	Dual display digital
Special	Heat-resistant	350 °C 662 °F • Sleeve 90 mm 3.543 in 	**FD-H35-20S**	840 33.071 550 21.654 440 17.323 260 10.236 140 5.512 45 1.772	85 3.346 200 7.874
		200 °C 392 °F • Coaxial 	**FD-H20-21**	770 30.315 500 19.685 380 14.961 230 9.055 130 5.118 45 1.772	90 3.543 280 11.024
		250 °C 482 °F • Glass substrate detection Convergent reflective type 	**FD-H25-L43**	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 26 0.059 to 1.024 1.5 to 24 0.059 to 0.945 2 to 18 0.079 to 0.709	4 to 16 0.157 to 0.630 4 to 23 0.157 to 0.906
		250 °C 482 °F • Glass substrate detection Convergent reflective type 	**FD-H25-L45**	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 42 0.197 to 1.654 5 to 40 0.197 to 1.575 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
		300 °C 572 °F • Glass substrate detection Convergent reflective type 	**FD-H30-L32**	40 1.575 30 1.181 25 0.984 17 0.669 12 0.472 1.5 to 6 0.059 to 0.236	2 to 9 0.079 to 0.354 0 to 17 0 to 0.669
		180 °C 356 °F • Glass substrate detection Convergent reflective type 	**FD-H18-L31**	60 2.362 32 1.260 24 0.945 16 0.630 13 0.512 2 to 6.5 0.079 to 0.256	0 to 10 0 to 0.394 0 to 25 0 to 0.984
		130 °C 266 °F 	**FD-H13-FM2**	880 34.646 640 25.197 600 23.622 350 13.780 200 7.874 65 2.559	100 3.937 280 11.024
	Vacuum-resistant	300 °C 572 °F • Rectangular head 	**FD-H30-KZ1V-S** (Note 3)	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 200 0.787 to 7.874 20 to 120 0.787 to 4.724 20 to 45 0.787 to 1.772	25 to 80 0.984 to 3.150 10 to 220 0.394 to 8.661
		300 °C 572 °F • Glass substrate detection Convergent reflective type 	**FD-H30-L32V-S** (Note 3)	18 0.709 12 0.472 10 0.394 8 0.315 5.5 0.217 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

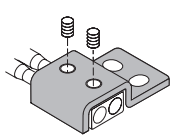
Notes: 1) The sensing range is specified for white non-glossy paper (**FD-H30-L32**, **FD-H18-L31** 50 × 50 mm 1.969 × 1.969 in glass substrate, **FD-H25-L43**, **FD-H25-L45**, **FD-H30-KZ1V-S**, **FD-H30-L32V-S** 100 × 100 × t 0.7 mm 3.937 × 3.937 × t 0.028 in transparent glass) as the object.
2) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
3) Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**). Please refer to p.25~ for details.
4) Please contact our office about the sensing range for the **FX-301-HS**.

Model No. when ordering heat-resistant joint fiber individually as replacement parts

- **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)

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

- Vacuum-resistant fiber
  FT-H30-M1V (one pair set)
  FD-H30-KZ1V
  FD-H30-L32V
- Mouting bracket for **FD-H30-KZ1V**
  MS-FD-2



- Photo-terminal
  FV-BR1 (one pair set)
- Fiber at atmospheric side
  FT-J8 (one pair set)

Pliable fibers (flexible and sharp bending fibers) are marked with light blue in the table.

	FX-301 / FX-301-HS / FX-311 (Only LONG/STD/S-D for **FX-311**)	**FX-305**	**FX-411 / FX-412**	Fiber cable length ✂ : Free cut	Bending radius	Ambient temperature
	General purpose / High-speed / Sensitivity types	**FX-301**'s 2 output type	Digital dual display + Adjuster operation			
	160 6.299 80 3.150 57 2.244 20 0.787 (**FX-301-HS**: 10 0.394) 26 1.024	190 7.480 160 6.299 80 3.150 80 3.150 57 2.244 20 0.787	210 8.268 50 1.969 35 1.378	1 m 3.281 ft	Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	-60 to +350 °C -76 to +662 °F
	270 10.630 140 5.512 100 3.937 35 1.378 (**FX-301-HS**: 20 0.787) 47 1.850	300 11.811 270 10.630 150 5.906 140 5.512 100 3.937 35 1.378	350 13.780 90 3.543 65 2.559		R25 mm R0.984 in	-60 to +200 °C -76 to +392 °F
	3 to 25 0.118 to 0.984 (Note 4) 4 to 20 0.157 to 0.787 (Note 4) 4 to 19 0.157 to 0.748 (Note 4) 4 to 16 0.157 to 0.630 (Note 4) 4 to 16 0.157 to 0.630 (Note 4)	3 to 28 0.118 to 1.102 3 to 25 0.118 to 0.984 4 to 23 0.157 to 0.906 4 to 20 0.157 to 0.787 4 to 19 0.157 to 0.748 4 to 16 0.157 to 0.630	2.5 to 29 0.098 to 1.142 4 to 20 0.157 to 0.787 4 to 16 0.157 to 0.630	3 m 9.843 ft		-20 to +250 °C -4 to +482 °F (Ordinary temperature side: -20 to +70 °C -4 to +158 °F)
	6 to 41 0.236 to 1.614 (Note 4) 7 to 38 0.276 to 1.496 (Note 4) Cannot use (Note 4) Cannot use (Note 4) Cannot use (Note 4)	5 to 42 0.197 to 1.654 6 to 41 0.236 to 1.614 6 to 40 0.236 to 1.575 7 to 38 0.276 to 1.496 Cannot use Cannot use	5 to 42 0.197 to 1.654 7 to 38 0.276 to 1.496 7 to 35 0.276 to 1.378			
	0 to 15 0 to 0.591 0 to 10 0 to 0.394 1 to 8 0.039 to 0.315 Cannot use 2 to 6 0.079 to 0.236	0 to 20 0 to 0.787 0 to 15 0 to 0.591 0 to 10 0 to 0.394 0 to 10 0 to 0.394 1 to 8 0.039 to 0.315 Cannot use	0 to 20 0 to 0.787 1 to 8 0.039 to 0.315 1 to 6 0.039 to 0.236	2 m 6.562 ft		-60 to +300 °C -76 to +572 °F
	0 to 15 0 to 0.591 0 to 10 0 to 0.394 1 to 8 0.039 to 0.315 Cannot use 2 to 6 0.079 to 0.236	0 to 20 0 to 0.787 0 to 15 0 to 0.591 0 to 10 0 to 0.394 0 to 10 0 to 0.394 1 to 8 0.039 to 0.315 Cannot use	0 to 25 0 to 0.984 0 to 10 0 to 0.394 0 to 8 0 to 0.315	✂ 2 m 6.562 ft	R25 mm R0.984 in	-60 to +180 °C -76 to +356 °F
	310 12.205 140 5.512 100 3.937 55 2.165 (**FX-301-HS**: 33 1.299) 47 1.850	410 16.142 310 12.205 200 7.874 140 5.512 100 3.937 55 2.165	430 16.929 100 3.937 70 2.756			-60 to +130 °C -76 to +266 °F
	20 to 200 0.787 to 7.874 25 to 130 0.984 to 5.118 30 to 100 1.181 to 3.937 Cannot use Cannot use	20 to 300 0.787 to 11.811 20 to 200 0.787 to 7.874 20 to 150 0.787 to 5.906 25 to 130 0.984 to 5.118 30 to 100 1.181 to 3.937 Cannot use	20 to 300 0.787 to 11.811 25 to 100 0.984 to 3.937 25 to 45 0.984 to 1.772	1 m 3.281 ft	R18 mm R0.709 in	-30 to +300 °C -22 to +572 °F
	0 to 8 0 to 0.315 1.5 to 5 0.059 to 0.197 2 to 4 0.079 to 0.157 Cannot use Cannot use	0 to 11 0 to 0.433 0 to 8 0 to 0.315 1.5 to 6 0.059 to 0.236 1.5 to 5 0.059 to 0.197 2 to 4 0.079 to 0.157 Cannot use	0 to 11 0 to 0.433 1.5 to 5 0.059 to 0.197 2 to 4 0.079 to 0.157	3 m 9.843 ft		

●Each amplifier response time (Red LED type)	HYPR	U-LG	LONG	STDF	STD	FAST	H-SP	S-D
FX-500 series	24 ms	4 ms	2 ms	—	250 µs	60 µs	25 µs	—
FX-101 / FX-102 (Note)	—	—	—	—	250µs / 2.5ms	—	—	—
FX-301 / FX-301-HS	—	—	2 ms	—	250 µs	150 µs	65 µs / 35 µs	250 µs
FX-305	—	4.5 ms	2.5 ms	700 µs	250 µs	150 µs	65 µs	—
FX-411 / FX-412	—	4.5 ms	—	—	500 µs	150 µs	—	—
FX-311	—	—	2 ms	—	250 µs	—	—	250 µs

Note: For the **FX-100** series response times, **FX-101**'s response frequency is 0, and **FX-102**'s response frequency is 1.

Accessories (attached with fibers)

- **RF-003** (**FR-KZ21/KZ21E** exclusive reflector)
- **RF-13** (Reflective tape)
- **FX-CT1** (Fiber cutter)
- **FX-CT2** (Fiber cutter)
- **FX-CT3** (Fiber cutter)
- **FX-AT2** (Attachment for fixed-length fiber, Orange)
- **FX-AT3** (Attachment for ø2.2 mm ø0.087 in fiber, Clear orange)
- **FX-AT4** (Attachment for ø1 mm ø0.039 in fiber, Black)
- **FX-AT5** (Attachment for ø1.3 mm ø0.051 in fiber, Gray)
- **FX-AT6** (Attachment for ø1 mm ø0.039 in / ø1.3 mm ø0.051 in mixed fiber, Black / Gray)