

Manually Set Fiber Sensor

FX-311 SERIES

Sensing Range



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

Fibers are listed in alphabetic order. Refer to "Fiber Selection" for details of each fiber.

Model No.	Sensing range (mm in) (Note 1)										Dimensions
	Red LED			Blue LED			Green LED				
	LONG	STD	S-D	LONG	STD	FAST	LONG	STD	FAST		
FT-140	19,600 771.654 (Note 2)	16,000 629.921	8,700 342.520	8,100 318.898	4,000 157.480	3,100 122.047	5,000 196.850	2,400 94.488	1,600 62.992	P.51	
FT-30	310 12.205	150 5.906	60 2.362	55 2.165	28 1.102	18 0.709	28 1.102	13 0.512	9 0.354	P.51	
FT-31	290 11.417	142 5.591	49 1.929	50 1.969	25 0.984	16 0.630	24 0.945	12 0.472	8 0.315	P.51	
FT-31S	290 11.417	140 5.512	49 1.929	50 1.969	25 0.984	16 0.630	24 0.945	12 0.472	8 0.315	P.51	
FT-31W	230 9.055	100 3.937	30 1.181	31 1.220	15 0.591	10 0.394	15 0.591	8 0.315	5 0.197	P.51	
FT-40	900 35.433	450 17.717	180 7.087	155 6.102	76 2.992	45 1.772	90 3.543	40 1.575	26 1.024	P.51	
FT-42	800 31.496	400 15.748	150 5.906	150 5.906	75 2.953	40 1.575	80 3.150	35 1.378	24 0.945	P.51	
FT-42S	800 31.496	400 15.748	150 5.906	150 5.906	75 2.953	40 1.575	70 2.756	35 1.378	24 0.945	P.51	
FT-42W	710 27.953	330 12.992	130 5.118	110 4.331	50 1.969	30 1.181	56 2.205	28 1.102	20 0.787	P.51	
FT-43	1,400 55.118	610 24.016	250 9.843	220 8.661	110 4.331	75 2.953	120 4.724	61 2.402	43 1.693	P.51	
FT-45X	1,100 43.307	570 22.441	230 9.055	130 5.118	65 2.559	45 1.772	70 2.756	34 1.339	25 0.984	P.52	
FT-A11	3,600 141.732 (Note 2)	2,700 106.299	1,000 39.370	880 34.646	420 16.535	270 10.630	430 16.929	220 8.661	120 4.724	P.52	
FT-A11W	3,600 141.732 (Note 2)	3,100 122.047	1,200 47.244	820 32.283	420 16.535	280 11.024	460 18.110	220 8.661	140 5.512	P.52	
FT-A32	3,600 141.732 (Note 2)	3,600 141.732	2,900 114.173	1,800 70.866	710 27.953	400 15.748	970 38.189	320 12.598	180 7.087	P.52	
FT-A32W	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	2,100 82.677	2,000 78.740	830 32.677	420 16.535	1,000 39.370	350 13.780	180 7.087	P.52	
FT-AL05	680 26.772	330 12.992	130 5.118	100 3.937	48 1.890	32 1.260	56 2.205	27 1.063	18 0.709	P.52	
FT-E13	13 0.512	6 0.236	2 0.079	2 0.079	1 0.039	————	1 0.039	————	————	P.52	
FT-E23	65 2.559	31 1.220	12 0.472	8 0.315	4 0.157	3 0.118	4 0.157	2 0.079	1 0.039	P.52	
FT-H13-FM2	880 34.646	440 17.323	155 6.102	72 2.835	36 1.417	26 1.024	32 1.260	16 0.630	10 0.394	P.52	
FT-H20-J20-S (Note 3)	390 15.354	200 7.874	60 2.362	60 2.362	20 0.787	————	35 1.378	————	————	P.53	
FT-H20-J30-S (Note 3)	390 15.354	200 7.874	60 2.362	60 2.362	20 0.787	————	35 1.378	————	————	P.53	
FT-H20-J50-S (Note 3)	390 15.354	200 7.874	60 2.362	60 2.362	20 0.787	————	35 1.378	————	————	P.53	
FT-H20-M1	550 21.654	280 11.024	90 3.543	100 3.937	50 1.969	35 1.378	50 1.969	25 0.984	18 0.709	P.53	
FT-H20-VJ50-S (Note 3)	550 21.654	280 11.024	90 3.543	85 3.346	30 1.181	————	50 1.969	————	————	P.53	
FT-H20-VJ80-S (Note 3)	550 21.654	280 11.024	90 3.543	85 3.346	30 1.181	————	50 1.969	————	————	P.53	
FT-H20W-M1	310 12.205	140 5.512	50 1.969	44 1.732	22 0.866	14 0.551	22 0.866	11 0.433	7 0.276	P.53	
FT-H30-M1V-S (Note 4)	250 9.843	125 4.922	50 1.969	————	————	————	————	————	————	P.53	
FT-H35-M2	550 21.654	280 11.024	90 3.543	100 3.937	50 1.969	35 1.378	50 1.969	25 0.984	18 0.709	P.53	
FT-H35-M2S6	550 21.654	280 11.024	90 3.543	100 3.937	50 1.969	35 1.378	50 1.969	25 0.984	18 0.709	P.53	
FT-HL80Y	3,500 137.795	1,350 53.150	480 18.898	80 3.150	40 1.575	25 0.984	110 4.331	55 2.165	40 1.575	P.53	
FT-KS40	3,600 141.732 (Note 2)	2,700 106.299	850 33.465	740 29.134	280 11.024	220 8.661	420 16.535	180 7.087	81 3.189	P.54	
FT-KV26	710 27.953	310 12.205	120 4.724	81 3.189	36 1.417	21 0.827	44 1.732	8 0.315	————	P.54	
FT-KV40	3,600 141.732 (Note 2)	2,500 98.425	1,000 39.370	710 27.953	270 10.630	210 8.268	420 16.535	180 7.087	100 3.937	P.54	
FT-KV40W	3,600 141.732 (Note 2)	2,000 78.740	810 31.890	860 33.858	400 15.748	260 10.236	420 16.535	210 8.268	140 5.512	P.54	
FT-L80Y	3,500 137.795 (Note 2)	1,500 59.055	530 20.866	160 6.299	80 3.150	50 1.969	160 6.299	80 3.150	50 1.969	P.54	
FT-R31	290 11.417	130 5.118	49 1.929	45 1.772	23 0.906	15 0.591	24 0.945	12 0.472	8 0.315	P.54	
FT-R40	710 27.953	330 12.992	130 5.118	110 4.331	54 2.126	36 1.417	55 2.165	26 1.024	20 0.787	P.54	
FT-R41W	710 27.953	330 12.992	130 5.118	110 4.331	50 1.969	30 1.181	56 2.205	28 1.102	20 0.787	P.54	
FT-R42W	1,600 62.992	770 30.315	320 12.598	280 11.024	130 5.118	90 3.543	140 5.512	70 2.756	47 1.850	P.54	
FT-R43	710 27.953	290 11.417	110 4.331	96 3.780	50 1.969	33 1.299	53 2.087	25 0.984	17 0.669	P.54	

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**).

LIST OF FIBERS

Thru-beam type (one pair set)



Fibers are listed in alphabetic order. Refer to "Fiber Selection" for details of each fiber.

Model No.	Sensing range (mm in) (Note 1)										Dimensions
	Red LED			Blue LED			Green LED				
	LONG	STD	S-D	LONG	STD	FAST	LONG	STD	FAST		
FT-R44Y	710 27.953	290 11.417	110 4.331	96 3.780	50 1.969	33 1.299	53 2.087	25 0.984	17 0.669	P.55	
FT-R60Y	1,800 70.866	830 32.677	350 13.780	250 9.843	120 4.724	80 3.150	140 5.512	70 2.756	50 1.969	P.55	
FT-S11	80 3.150	31 1.220	14 0.551	12 0.472	5 0.197	4 0.157	5 0.197	2.5 0.098	1.5 0.059	P.55	
FT-S20	310 12.205	150 5.906	60 2.362	55 2.165	28 1.102	18 0.709	28 1.102	13 0.512	9 0.354	P.55	
FT-S21	290 11.417	142 5.591	49 1.929	50 1.969	25 0.984	16 0.630	24 0.945	12 0.472	8 0.315	P.55	
FT-S21W	230 9.055	100 3.937	30 1.181	31 1.220	15 0.591	10 0.394	15 0.591	8 0.315	5 0.197	P.55	
FT-S30	900 35.433	450 17.717	180 7.087	155 6.102	76 2.992	45 1.772	90 3.543	40 1.575	26 1.024	P.55	
FT-S31W	710 27.953	330 12.992	130 5.118	110 4.331	50 1.969	30 1.181	56 2.205	28 1.102	20 0.787	P.55	
FT-S32	2,400 94.488	1,100 43.307	510 20.079	420 16.535	200 7.874	130 5.118	220 8.661	100 3.937	72 2.835	P.55	
FT-V23	380 14.961	170 6.693	63 2.480	65 2.559	26 1.024	18 0.709	26 1.024	13 0.512	8 0.315	P.55	
FT-V24W	90 3.543	40 1.575	15 0.591	6 0.236	2 0.079	————	3 0.118	————	————	P.56	
FT-V25	200 7.874	90 3.543	35 1.378	25 0.984	12 0.472	9 0.354	16 0.630	7 0.276	5 0.197	P.56	
FT-V30	420 16.535	200 7.874	70 2.756	80 3.150	40 1.575	22 0.866	40 1.575	14 0.551	8 0.315	P.56	
FT-V40	3,600 141.732 (Note 2)	1,700 66.929	690 27.165	400 15.748	200 7.874	130 5.118	200 7.874	100 3.937	65 2.559	P.56	
FT-V80Y	800 31.496	400 15.748	140 5.512	120 4.724	60 2.362	35 1.378	80 3.150	40 1.575	25 0.984	P.56	
FT-Z20HBW	290 11.417	130 5.118	50 1.969	39 1.535	19 0.748	12 0.472	20 0.787	10 0.394	6 0.236	P.56	
FT-Z20W	570 22.441	250 9.843	90 3.543	82 3.228	37 1.457	23 0.906	44 1.732	18 0.709	11 0.433	P.56	
FT-Z30	1,900 74.803	850 33.465	340 13.386	120 4.724	60 2.362	40 1.575	96 3.780	45 1.772	30 1.181	P.56	
FT-Z30E	3,100 122.047	1,600 62.992	670 26.378	540 21.260	250 9.843	170 6.693	270 10.630	130 5.118	91 3.583	P.56	
FT-Z30EW	2,700 106.299	1,200 47.244	500 19.685	540 21.260	260 10.236	170 6.693	260 10.236	120 4.724	88 3.465	P.57	
FT-Z30H	3,100 122.047	1,600 62.992	670 26.378	650 25.591	310 12.205	200 7.874	340 13.386	160 6.299	110 4.331	P.57	
FT-Z30HW	3,100 122.047	1,500 59.055	610 24.016	540 21.260	260 10.236	170 6.693	260 10.236	120 4.724	88 3.465	P.57	
FT-Z30W	1,400 55.118	640 25.197	260 10.236	83 3.268	40 1.575	25 0.984	73 2.874	36 1.417	25 0.984	P.57	
FT-Z40HBW	710 27.953	330 12.992	130 5.118	110 4.331	50 1.969	30 1.181	56 2.205	28 1.102	20 0.787	P.57	
FT-Z40W	1,300 51.181	630 24.803	260 10.236	180 7.087	90 3.543	60 2.362	90 3.543	50 1.969	35 1.378	P.57	
FT-Z802Y	3,500 137.795	1,500 59.055	530 20.866	320 12.598	160 6.299	120 4.724	160 6.299	80 3.150	60 2.362	P.57	

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.

LIST OF FIBERS

Retroreflective type



Fibers are listed in alphabetic order. Refer to "Fiber Selection" for details of each fiber.

Model No.	Sensing range (mm in) (Note 1, 2)									Dimensions
	Red LED			Blue LED			Green LED			
	LONG	STD	S-D	LONG	STD	FAST	LONG	STD	FAST	
FR-KZ22E	15 to 330 0.591 to 12.992	15 to 210 0.591 to 8.268	15 to 90 0.591 to 3.543	————	————	————	————	————	————	P.58
FR-KZ50E	20 to 300 0.787 to 11.811	20 to 200 0.787 to 7.874	20 to 200 0.787 to 7.874	20 to 160 0.787 to 6.299	20 to 100 0.787 to 3.937	20 to 60 0.787 to 2.362	20 to 110 0.787 to 4.331	20 to 54 0.787 to 2.126	————	P.58
FR-KZ50H	20 to 300 0.787 to 11.811	20 to 200 0.787 to 7.874	20 to 200 0.787 to 7.874	20 to 140 0.787 to 5.512	20 to 70 0.787 to 2.756	20 to 52 0.787 to 2.047	20 to 90 0.787 to 3.543	20 to 40 0.787 to 1.575	————	P.58
FR-Z50HW	100 to 810 3.937 to 31.890	100 to 580 3.937 to 22.835	100 to 270 3.937 to 10.630	————	————	————	————	————	————	P.58

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 **RF-13**.

- 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. 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 using in combination with FR-Z50HW reflector (Optional)

The sensing ranges are the value for red LED types.

Reflector Model No.	Sensing range (mm in)		
	FX-311		
	LONG	STD	S-D
RF-230	100 to 3,200 3.937 to 125.984	100 to 2,000 3.937 to 78.740	100 to 1,000 3.937 to 39.370
RF-220	100 to 2,400 3.937 to 94.488	100 to 1,300 3.937 to 51.181	100 to 600 3.937 to 23.622
RF-210	100 to 1,700 3.937 to 66.929	100 to 910 3.937 to 35.827	100 to 460 3.937 to 18.110

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.

LIST OF FIBERS

Reflective type



Fibers are listed in alphabetic order. Refer to "Fiber Selection" for details of each fiber.

Model No.	Sensing range (mm in) (Note 1, 2) / Description											Dimensions
	Red LED			Blue LED			Green LED					
	LONG	STD	S-D	LONG	STD	FAST	LONG	STD	FAST			
FD-30	110 4.331	50 1.969	18 0.709	19 0.748	9 0.354	6 0.236	9 0.354	4.5 0.177	2.5 0.098		P.59	
FD-31	95 3.740	45 1.772	16 0.630	18 0.709	8 0.315	5 0.197	8 0.315	4 0.157	2 0.079		P.59	
FD-31W	40 1.575	20 0.787	10 0.394	7 0.276	4 0.157	1 to 2.5 0.039 to 0.098	5 0.197	1 to 2 0.039 to 0.079	————		P.59	
FD-32G	120 4.724	60 2.362	20 0.787	22 0.866	11 0.433	8 0.315	15 0.591	6 0.236	4 0.157		P.59	
FD-32GX	140 5.512	70 2.756	25 0.984	25 0.984	11 0.433	8 0.315	16 0.630	6 0.236	4 0.157		P.59	
FD-40	110 4.331	50 1.969	18 0.709	19 0.748	9 0.354	6 0.236	9 0.354	4.5 0.177	2.5 0.098		P.59	
FD-41	95 3.740	45 1.772	16 0.630	18 0.709	8 0.315	5 0.197	8 0.315	4 0.157	2 0.079		P.59	
FD-41S	95 3.740	45 1.772	16 0.630	18 0.709	8 0.315	5 0.197	8 0.315	4 0.157	2 0.079		P.59	
FD-41SW	40 1.575	20 0.787	10 0.394	9 0.354	1 to 4 0.039 to 0.157	1 to 2.5 0.039 to 0.098	1 to 4 0.039 to 0.157	1 to 2 0.039 to 0.079	————		P.59	
FD-41W	220 8.661	95 3.740	40 1.575	32 1.260	1 to 15 0.039 to 0.591	1 to 9 0.039 to 0.354	17 0.669	1 to 7.5 0.039 to 0.295	1.5 to 4.5 0.059 to 0.177		P.59	
FD-42G	120 4.724	60 2.362	20 0.787	22 0.866	11 0.433	8 0.315	15 0.591	6 0.236	4 0.157		P.60	
FD-42GW	85 3.346	35 1.378	14 0.551	14 0.551	7 0.276	5 0.197	6 0.236	4 0.157	2 0.079		P.60	
FD-60	350 13.780	160 6.299	70 2.756	55 2.165	28 1.102	18 0.709	30 1.181	15 0.591	10 0.394		P.60	
FD-61	320 12.598	145 5.709	60 2.362	48 1.890	24 0.945	16 0.630	26 1.024	13 0.512	8 0.315		P.60	
FD-61G	200 7.874	90 3.543	40 1.575	46 1.811	23 0.906	15 0.591	26 1.024	12 0.472	8 0.315		P.60	
FD-61S	320 12.598	145 5.709	60 2.362	48 1.890	24 0.945	16 0.630	26 1.024	13 0.512	8 0.315		P.60	
FD-61W	220 8.661	95 3.740	40 1.575	32 1.260	1 to 15 0.039 to 0.591	1 to 9 0.039 to 0.354	17 0.669	1 to 7.5 0.039 to 0.295	1.5 to 4.5 0.059 to 0.177		P.60	
FD-62	480 18.898	220 8.661	90 3.543	80 3.150	1 to 40 0.039 to 1.575	1 to 27 0.039 to 1.063	1 to 42 0.039 to 1.654	1 to 21 0.039 to 0.827	1 to 14 0.039 to 0.551		P.60	
FD-64X	200 7.874	85 3.346	35 1.378	32 1.260	0.5 to 16 0.020 to 0.630	0.5 to 10 0.020 to 0.394	0.5 to 16 0.020 to 0.630	0.5 to 8 0.020 to 0.315	0.5 to 5 0.020 to 0.197		P.61	
FD-A16	200 7.874	150 5.906	50 1.969	19 0.748	14 0.551	————	20 0.787	13 0.512	————		P.61	
FD-AL11	250 9.843	110 4.331	40 1.575	33 1.299	16 0.630	10 0.394	18 0.709	8 0.315	4.5 0.177		P.61	
FD-E13	11 0.433	6 0.236	2 0.079	2 0.079	0.8 0.031	0.5 0.020	0.8 0.031	————	————		P.61	
FD-E23	45 1.772	19 0.748	7 0.276	6 0.236	3 0.118	2 0.079	3 0.118	1.5 0.059	1 0.039		P.61	
FD-EG30	45 1.772	19 0.748	7 0.276	6 0.236	3 0.118	2 0.079	3 0.118	1.5 0.059	1 0.039		P.61	
FD-EG30S	45 1.772	19 0.748	7 0.276	6 0.236	3 0.118	2 0.079	3 0.118	1.5 0.059	1 0.039		P.62	
FD-EG31	15 0.591	8 0.315	3 0.118	2 0.079	1 0.039	0.5 0.020	1 0.039	————	————		P.62	
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]											P.62
FD-F41	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe [PVC, fluorine resin, polycarbonate, acrylic, glass, wall thickness 1 to 3 mm 0.039 to 0.118 in]											P.62
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 interrupted											P.62
FD-F8Y	————	————	————	————	————	————	————	————	————		P.62	
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 interrupted											P.62
FD-H13-FM2	310 12.205	140 5.512	47 1.850	20 0.787	11 0.433	7 0.276	20 0.787	11 0.433	7 0.276		P.63	
FD-H18-L31	0 to 15 0 to 0.591	0 to 10 0 to 0.394	2 to 6 0.079 to 0.236	————	————	————	————	————	————		P.63	
FD-H20-21	270 10.630	140 5.512	47 1.850	36 1.417	18 0.709	12 0.472	20 0.787	10 0.394	7 0.276		P.63	
FD-H20-M1	270 10.630	140 5.512	47 1.850	36 1.417	18 0.709	12 0.472	20 0.787	10 0.394	7 0.276		P.63	
FD-H25-L43 (Note 4)	3 to 25 0.118 to 0.984	4 to 20 0.157 to 0.787	4 to 16 0.157 to 0.630	————	————	————	————	————	————		P.63	
FD-H25-L45 (Note 4)	6 to 41 0.236 to 1.614	7 to 38 0.276 to 1.496	————	————	————	————	————	————	————		P.63	
FD-H30-KZ1V-S (Note 4,5)	20 to 200 0.787 to 7.874	25 to 130 0.984 to 5.118	————	————	————	————	————	————	————		P.64	
FD-H30-L32	0 to 15 0 to 0.591	0 to 10 0 to 0.394	2 to 6 0.079 to 0.236	————	————	————	————	————	————		P.64	
FD-H30-L32V-S (Note 4,5)	0 to 8 0 to 0.315	1.5 to 5 0.059 to 0.197	————	————	————	————	————	————	————		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 sensing range of reflective type is the value for white non-glossy paper (as for **FD-H30-L32** and **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.

4) The sensing range is specified for transparent glass 100 × 100 × 0.7 mm 3.937 × 3.937 × 0.028 in.

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

LIST OF FIBERS**Reflective type**

Fibers are listed in alphabetic order. Refer to "Fiber Selection" for details of each fiber.

Model No.	Sensing range (mm in) (Note 1, 2) / Description										Dimensions
	Red LED			Blue LED			Green LED				
	LONG	STD	S-D	LONG	STD	FAST	LONG	STD	FAST		
FD-H35-20S	160 6.299	80 3.150	26 1.024	22 0.866	11 0.433	7 0.276	12 0.472	6 0.236	4 0.157	P.64	
FD-H35-M2	270 10.630	140 5.512	47 1.850	36 1.417	18 0.709	12 0.472	20 0.787	10 0.394	7 0.276	P.64	
FD-H35-M2S6	270 10.630	140 5.512	47 1.850	36 1.417	18 0.709	12 0.472	20 0.787	10 0.394	7 0.276	P.64	
FD-HF40Y (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 interrupted										P.64
FD-L10 (Note 4)	0 to 4.5 0 to 0.177	0 to 4 0 to 0.157	0 to 3.5 0 to 0.138	0-3.5 0 to 0.138	0 to 3 0 to 0.118	0.5 to 2.5 0.020 to 0.098	0 to 3 0 to 0.118	1 to 2 0.039 to 0.079	————	P.65	
FD-L11 (Note 4)	0 to 8 0 to 0.315	0 to 7 0 to 0.906	0 to 6 0 to 0.236	7 0.276	6.5 0.256	0.5 to 5.5 0.020 to 0.217	6.5 0.256	1 to 4 0.039 to 0.157	————	P.65	
FD-L12W (Note 4)	0.5 to 8 0.019 to 0.315	1 to 5.5 0.039 to 0.217	————	————	————	————	————	————	————	P.65	
FD-L20H	2 to 23 0.079 to 0.906	4 to 14 0.157 to 0.551	4.8 to 9.5 0.188 to 0.374	4.5 to 10 0.177 to 0.394	5 to 9 0.197 to 0.354	5.5 to 8 0.217 to 0.315	5 to 9 0.197 to 0.354	5.5 to 8 0.217 to 0.315	————	P.65	
FD-L21 (Note 4)	2 to 18 0.079 to 0.709	3 to 16 0.118 to 0.630	5 to 11 0.197 to 0.433	————	————	————	————	————	————	P.65	
FD-L21W (Note 4)	3 to 14 0.118 to 0.551	6 to 12 0.236 to 0.472	————	————	————	————	————	————	————	P.65	
FD-L22A (Note 4)	0 to 23 0 to 0.906	0 to 23 0 to 0.906	1 to 17 0.039 to 0.669	————	————	————	————	————	————	P.65	
FD-L23 (Note 4)	0 to 30 0 to 1.181	0 to 30 0.039 to 1.181	2 to 27 0.079 to 1.063	————	————	————	————	————	————	P.65	
FD-L30A (Note 4)	0 to 43 0 to 17.441	0 to 37 0 to 1.457	0 to 26 0 to 1.024	————	————	————	————	————	————	P.65	
FD-L31A (Note 4)	4 to 33 0.157 to 1.299	5 to 32 0.197 to 1.260	6 to 18 0.236 to 0.709	————	————	————	————	————	————	P.65	
FD-L32H (Note 4)	0 to 50 0 to 1.969	15 to 35 0.591 to 1.378	————	————	————	————	————	————	————	P.66	
FD-R31G	92 3.622	44 1.732	17 0.669	17 0.669	8 0.315	5 0.197	8 0.315	4 0.157	2 0.079	P.66	
FD-R32EG	45 1.772	19 0.748	7 0.276	6 0.236	3 0.118	1.5 0.059	2 0.079	1 0.039	————	P.66	
FD-R33EG	15 0.591	6 0.236	2 0.079	2 0.079	0.8 0.031	0.5 0.020	1 0.039	————	————	P.66	
FD-R34EG	38 1.496	16 0.630	6 0.236	5 0.197	2 0.079	1.5 0.059	2 0.079	1 0.039	————	P.66	
FD-R41	150 5.906	70 2.756	28 1.102	24 0.945	1 to 13 0.039 to 0.512	1 to 9 0.039 to 0.354	1 to 15 0.039 to 0.591	1 to 8 0.039 to 0.315	3 to 6 0.118 to 0.236	P.66	
FD-R60	240 9.449	120 4.724	45 1.772	42 1.654	20 0.787	0.5 to 13 0.020 to 0.512	21 0.827	0.5 to 10 0.020 to 0.394	0.5 to 7 0.020 to 0.276	P.66	
FD-R61Y	230 9.055	110 4.331	45 1.771	36 1.417	17 0.669	0.5 to 11 0.020 to 0.433	19 0.748	0.5 to 9 0.020 to 0.354	1 to 6 0.039 to 0.236	P.66	
FD-S21	50 1.969	25 0.984	9 0.354	8 0.315	3.5 0.138	2 0.079	5 0.197	2 0.079	1.3 0.051	P.66	
FD-S30	110 4.331	50 1.969	18 0.709	19 0.748	9 0.354	6 0.236	9 0.354	4.5 0.177	2.5 0.098	P.67	
FD-S31	95 3.740	45 1.772	16 0.630	18 0.709	8 0.315	5 0.197	8 0.315	4 0.157	2 0.079	P.67	
FD-S32	270 10.630	140 5.512	55 2.165	48 1.890	24 0.945	16 0.630	26 1.024	13 0.512	8 0.315	P.67	
FD-S32W	220 8.661	95 3.740	40 1.575	32 1.260	1 to 15 0.039 to 0.591	1 to 9 0.039 to 0.354	17 0.669	1 to 7.5 0.039 to 0.295	1.5 to 4.5 0.059 to 0.177	P.67	
FD-S33GW	85 3.346	35 1.378	14 0.551	14 0.551	7 0.276	5 0.197	6 0.236	4 0.157	2 0.079	P.67	
FD-S60Y	360 14.173	170 6.693	70 2.756	50 1.969	20 0.787	3 to 12 0.118 to 0.472	28 1.102	3 to 9 0.118 to 0.354	————	P.67	
FD-V30	45 1.772	20 0.787	7 0.276	9 0.354	————	————	————	————	————	P.67	
FD-V30W	15 0.591	7 0.276	————	————	————	————	————	————	————	P.67	
FD-V50	100 3.937	45 1.772	16 0.630	12 0.472	————	————	6 0.236	————	————	P.68	
FD-Z20HBW	1 to 70 0.0 to 2.756	2 to 30 0.079 to 1.181	3 to 10 0.118 to 0.394	4 to 10 0.157 to 0.394	————	————	————	————	————	P.68	
FD-Z20W	1 to 59 0.0 to 2.323	3 to 27 0.118 to 1.063	————	————	————	————	————	————	————	P.68	
FD-Z40HBW	0.5 to 230 0.02 to 9.055	1 to 100 0.039 to 3.937	1 to 40 0.039 to 1.575	1 to 36 0.039 to 1.417	3 to 17 1.181 to 0.669	3 to 11 1.181 to 0.433	2 to 19 0.079 to 0.748	3 to 8 0.118 to 0.315	4 to 5 0.157 to 0.197	P.68	
FD-Z40W	180 7.087	1 to 87 0.039 to 3.425	2.5 to 32 0.098 to 1.260	4 to 20 0.157 to 0.787	————	————	4 to 14 0.157 to 0.551	————	————	P.68	
FD-Z50HW	10 to 540 0.394 to 21.260	10 to 250 0.393 to 9.843	15 to 100 0.591 to 3.937	————	————	————	————	————	————	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 sensing range of reflective type is the value for white non-glossy paper.

3) Liquid inflow prevention joint, protective tube extension joint, fiber mounting joint are available.

4) 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 t0.079 in) [FD-L10: silicon wafers 100 × 100 mm 3.937 × 3.937 in].

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