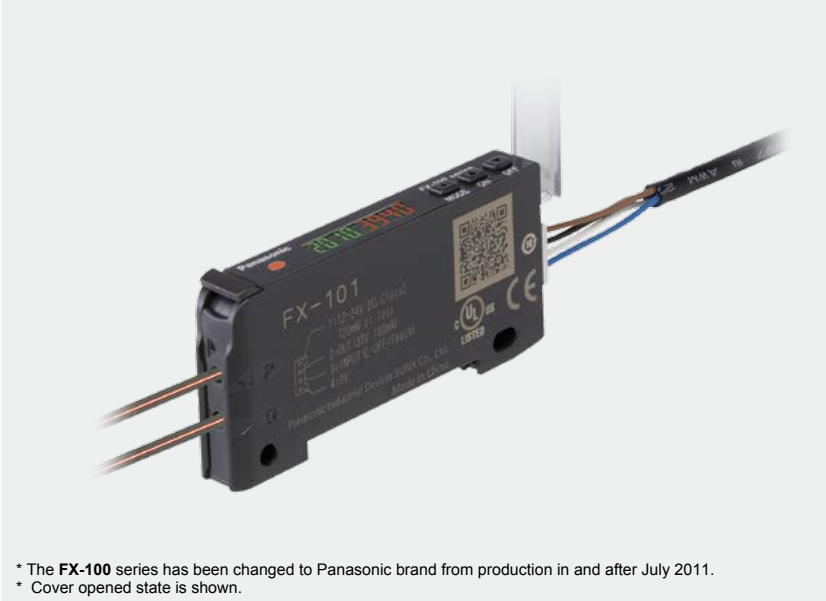
Panasonic
INDUSTRY

Digital Fiber Sensor

FX-100 SERIES
Sensing Range



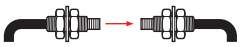
* The **FX-100** series has been changed to Panasonic brand from production in and after July 2011.
* Cover opened state is shown.

2022.6

* The contents of this catalog are as of August 2014.
For the latest information, please visit our company website.

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)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101□**	Long sensing range type **FX-102□**			
FT-140	14,000 551.180	19,600 771.652 (Note 2)	Threaded, M14, Long sensing range, −40 to +70 °C −40 to 158 °F	✂ 10 m 32.808 ft	P.51
FT-30	135 5.315	400 15.748	Super quality, Threaded, M3, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.51
FT-31	130 5.118	340 13.386	Threaded, M3, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.51
FT-31S	130 5.118	340 13.386	Sleeve, Threaded, M3, −55 to +80 °C −67 to 176 °F		P.51
FT-31W	80 3.150	240 9.449	Threaded, M3, −40 to +60 °C −40 to 140 °F		P.51
FT-40	320 12.598	870 34.252	Super quality, Threaded, M4, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.51
FT-42	300 11.811	800 31.496	Threaded, M4, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.51
FT-42S	300 11.811	800 31.496	Sleeve, Threaded, M4, −55 to +80 °C −67 to 176 °F		P.51
FT-42W	260 10.236	720 28.346	Threaded, M4, −40 to +60 °C −40 to 140 °F		P.51
FT-43	350 13.780	970 38.189	Threaded, M4, −55 to +80 °C −67 to 176 °F		P.51
FT-45X	340 13.386	920 36.220	Threaded, M4, −55 to +80 °C −67 to 176 °F	1 m 3.281 ft	P.52
FT-A11	1,900 74.803	3,600 141.732 (Note 2)	Wide beam, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.52
FT-A11W	1,700 66.929	3,400 133.858	Wide beam, −40 to +55 °C −40 to 131 °F		P.52
FT-A32	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	Wide beam, −40 to +60 °C −40 to 140 °F		P.52
FT-A32W	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	Wide beam, −40 to +55 °C −40 to 131 °F		P.52
FT-AL05	250 9.843	660 25.984	Wide beam, −55 to +80 °C −67 to 176 °F		P.52
FT-E13	6 0.236	19 0.748	Cylindrical, Ultra-small dia., ø3 0.118, −40 to +70 °C −40 to 158 °F	✂ 1 m 3.281 ft	P.52
FT-E23	22 0.866	80 3.150	Cylindrical, Ultra-small dia., ø3 0.118, −40 to +70 °C −40 to 158 °F		P.52
FT-H13-FM2	250 9.843	700 27.559	Heat-resistant, −60 to +130 °C −76 to 266 °F	✂ 2 m 6.562 ft	P.52
FT-H20-J20-S (Note 3)	135 5.315	420 16.535	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 200 mm 7.874 in (Note 4)	P.53
FT-H20-J30-S (Note 3)	135 5.315	420 16.535	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 300 mm 11.811 in (Note 4)	P.53
FT-H20-J50-S (Note 3)	135 5.315	420 16.535	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 500 mm 19.685 in (Note 4)	P.53
FT-H20-M1	210 8.268	540 21.260	Heat-resistant, −60 to +200 °C −76 to 392 °F	1 m 3.281 ft	P.53
FT-H20-VJ50-S (Note 3)	150 5.906	500 19.685	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 500 mm 19.685 in (Note 4)	P.53
FT-H20-VJ80-S (Note 3)	150 5.906	500 19.685	Heat-resistant (joint), −60 to +200 °C −76 to 392 °F	✂ 800 mm 31.496 in (Note 4)	P.53
FT-H20W-M1	100 3.937	300 11.811	Heat-resistant, −60 to +200 °C −76 to 392 °F	1 m 3.281 ft	P.53
FT-H30-M1V-S (Note 5)	110 4.331	280 11.024	Vacuum-resistant, −30 to +300 °C −22 to 572 °F		P.53
FT-H35-M2	170 6.693	490 19.291	Heat-resistant, −60 to +350 °C −76 to 572 °F	2 m 6.562 ft	P.53
FT-H35-M2S6	170 6.693	490 19.291	Heat-resistant, −60 to +350 °C −76 to 572 °F		P.53
FT-HL80Y	990 38.976	2,340 92.126	Chemical-resistant, Metal-free, −40 to +115 °C −76 to 239 °F	✂ 2 m 6.562 ft (Note 6)	P.53

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) This is the fiber length (fixed length) for heat-resistant fibers. The ordinary-temperature fibers are free-cut to 2 m 6.562 ft.
5) Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**).
6) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

LIST OF FIBERS

Thru-beam type (one pair set)

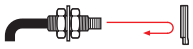
Fibers are listed in alphabetic order. Refer to “Fiber Selection” for details of each fiber.

Model No.	Sensing range (mm in) (Note 1)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FT-KS40	2,200 86.614	3,600 141.732 (Note 2)	Narrow Beam, −40 to +60 °C −40 to 140 °F		P.54
FT-KV26	135 5.315	560 22.047	Narrow Beam, Side-view, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.54
FT-KV40	2,200 86.614	3,600 141.732 (Note 2)	Narrow Beam, Side-view, −40 to +60 °C −40 to 140 °F		P.54
FT-KV40W	2,200 86.614	3,600 141.732 (Note 2)	Narrow Beam, Side-view, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.54
FT-L80Y	1,100 43.307	2,600 102.362	Chemical-resistant, Metal-free, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft (Note 3)	P.54
FT-R31	100 3.937	340 13.386	Square head, M3, −55 to +80 °C −67 to 176 °F		P.54
FT-R40	270 10.630	740 29.134	Threaded, M4, Elbow, −55 to +80 °C −67 to 176 °F		P.54
FT-R41W	250 9.843	710 27.953	Square head, M4, −40 to +60 °C −40 to 140 °F		P.54
FT-R42W	510 20.079	2,000 78.740	Square head, M4, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.54
FT-R43	210 8.268	640 25.197	Square head, M4, −55 to +80 °C −67 to 176 °F		P.54
FT-R44Y	210 8.268	640 25.197	Oil-resistant, Square head, M4, Cable-protection type, −55 to +80 °C −67 to 176 °F		P.55
FT-R60Y	690 27.165	1,890 74.409	Oil-resistant, Square head, M6, Full-protection type, −55 to +80 °C −67 to 176 °F		P.55
FT-S11	40 1.575	90 3.543	Cylindrical, ϕ1 0.039, −55 to +80 °C −67 to 176 °F	500 mm 19.685 in	P.55
FT-S20	135 5.315	400 15.748	Super quality, Cylindrical, ϕ1.5 0.059, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.55
FT-S21	130 5.118	340 13.386	Cylindrical, ϕ1.5 0.059, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.55
FT-S21W	80 3.150	240 9.449	Cylindrical, ϕ1.5 0.059, −40 to +60 °C −40 to 140 °F		P.55
FT-S30	320 12.598	870 34.252	Super quality, Cylindrical, ϕ3 0.118, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.55
FT-S31W	260 10.236	720 28.346	Cylindrical, ϕ3 0.118, −40 to +60 °C −40 to 140 °F		P.55
FT-S32	1,100 43.307	3,000 118.110	Cylindrical, ϕ2.5 0.098, −40 to +70 °C −40 to 158 °F		P.55
FT-V23	160 6.299	400 15.748	Sleeve, Cylindrical, Side-view, ϕ2 0.079, −55 to +80 °C −67 to 176 °F		P.55
FT-V24W	35 1.378	90 3.543	Sleeve, Cylindrical, Side-view, ϕ2 0.079, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.56
FT-V25	95 3.740	260 10.236	Sleeve, Cylindrical, Side-view, ϕ2 0.079, −55 to +80 °C −67 to 176 °F		P.56
FT-V30	180 7.087	480 18.898	Sleeve, Cylindrical, Side-view, ϕ2.5 0.098, −55 to +80 °C −67 to 176 °F		P.56
FT-V40	1,000 39.370	3,100 122.047	Cylindrical, Side-view, ϕ4 0.157, −40 to +60 °C −40 to 140 °F		P.56
FT-V80Y	340 13.386	800 31.496	Chemical-resistant, Metal-free −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft (Note 3)	P.56
FT-Z20HBW	100 3.937	320 12.598	Flat with boss, −40 to +60 °C −40 to 140 °F	✂ 1 m 3.281 ft	P.56
FT-Z20W	280 11.024	730 28.740	Flat with boss, −40 to +60 °C −40 to 140 °F		P.56
FT-Z30	710 27.953	2,300 90.551	Flat, −40 to +60 °C −40 to 140 °F		P.56
FT-Z30E	1,200 47.244	3,200 125.984	Flat, −40 to +60 °C −40 to 140 °F		P.56
FT-Z30EW	1,400 55.118	2,600 102.362	Flat, −40 to +60 °C −40 to 140 °F		P.57
FT-Z30H	1,400 55.118	3,200 125.984	Flat, −40 to +60 °C −40 to 140 °F		P.57
FT-Z30HW	1,400 55.118	3,200 125.984	Flat, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.57
FT-Z30W	540 21.260	1,800 70.866	Flat, −40 to +60 °C −40 to 140 °F		P.57
FT-Z40HBW	260 10.236	720 28.346	Flat with boss, −40 to +60 °C −40 to 140 °F		P.57
FT-Z40W	410 16.142	1,200 47.244	Flat with boss, −40 to +60 °C −40 to 140 °F		P.57
FT-Z802Y	520 20.472	3,100 122.047	Chemical-resistant, 0 to +60 °C 32 to 140 °F		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.
3) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

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) (Note 2)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FR-KZ22E	15 to 200 0.591 to 7.874	15 to 360 0.591 to 14.173	Wafer mapping, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.58
FR-KZ50E	20 to 200 0.787 to 7.874	20 to 350 0.787 to 13.780	Narrow Beam, Side sensing, −40 to +60 °C −40 to 140 °F		P.58
FR-KZ50H	20 to 200 0.787 to 7.874	20 to 350 0.787 to 13.780	Narrow Beam, Top sensing, −40 to +60 °C −40 to 140 °F		P.58
FR-Z50HW	100 to 550 3.937 to 21.654	100 to 830 3.937 to 32.677	With polarizing filter, −25 to +55 °C −13 to 131 °F		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.

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) (Note 2) / Description		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FD-30	45 1.772	155 6.102	Super quality, Threaded, M3, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.59
FD-31	35 1.378	140 5.512	Threaded, M3, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.59
FD-31W	15 0.591	60 2.362	Threaded, M3, −40 to +60 °C −40 to 140 °F		P.59
FD-32G	70 2.756	190 7.480	Threaded, M3, −55 to +80 °C −67 to 176 °F		P.59
FD-32GX	75 2.953	210 8.268	Threaded, M3, −55 to +80 °C −67 to 176 °F	✂ 1 m 3.281 ft (Note 3)	P.59
FD-40	45 1.772	155 6.102	Super quality, Threaded, M4, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.59
FD-41	35 1.378	140 5.512	Threaded, M4, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.59
FD-41S	35 1.378	140 5.512	Sleeve, Threaded, M4, −55 to +80 °C −67 to 176 °F		P.59
FD-41SW	15 0.591	60 2.362	Sleeve, Threaded, M4, −40 to +60 °C −40 to 140 °F		P.59
FD-41W	80 3.150	230 9.055	Threaded, M4, −40 to +60 °C −40 to 140 °F		P.59
FD-42G	70 2.756	190 7.480	Threaded, M4, −55 to +80 °C −67 to 176 °F		P.60
FD-42GW	45 1.772	140 5.512	Threaded, M4, −40 to +60 °C −40 to 140 °F		P.60
FD-60	140 5.512	420 16.535	Super quality, Threaded, M6, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.60
FD-61	120 4.724	410 16.142	Threaded, M6, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.60
FD-61G	120 4.724	350 13.780	Threaded, M6, −55 to +80 °C −67 to 176 °F		P.60
FD-61S	130 5.118	360 14.173	Sleeve, Threaded, M6, −55 to +80 °C −67 to 176 °F		P.60
FD-61W	80 3.150	230 9.055	Threaded, M6, −40 to +60 °C −40 to 140 °F		P.60
FD-62	170 6.693	450 17.717	Threaded, M6, −55 to +80 °C −67 to 176 °F		P.60
FD-64X	75 2.953	220 8.661	Threaded, M6, −55 to +80 °C −67 to 176 °F	1 m 3.281 ft	P.61
FD-A16	120 4.724	240 9.449	Wide beam, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.61
FD-AL11	100 3.937	285 11.220	Array, −55 to +80 °C −67 to 176 °F		P.61
FD-E13	5 0.197	15 0.591	Cylindrical, Ultra-small dia., ø1.5 0.059, −40 to +60 °C −40 to 140 °F	1 m 3.281 ft	P.61
FD-E23	20 0.787	70 2.756	Cylindrical, Ultra-small dia., ø3 0.118, −40 to +70 °C −40 to 158 °F		P.61
FD-EG30	20 0.787	70 2.756	Threaded, M3, Ultra-small dia., −40 to +70 °C −40 to 158 °F	500 mm 19.685 in	P.61
FD-EG30S	20 0.787	70 2.756	Sleeve, Threaded, Ultra-small dia., M3, −40 to +70 °C −40 to 158 °F	1 m 3.281 ft	P.62
FD-EG31	7 0.276	25 0.984	Threaded, M3, Ultra-small dia., −20 to +60 °C −4 to 140 °F	500 mm 19.685 in	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] Liquid absent: Beam received, Liquid present: Beam interrupted		Pipe-mountable type, Liquid level sensing, −40 to +100 °C −40 to 212 °F	✂ 2 m 6.562 ft	P.62
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		Pipe-mountable type, Liquid level sensing, −40 to +100 °C −40 to 212 °F		P.62

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The sensing range is specified for white non-glossy paper.
3) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

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) (Note 2) / Description		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
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		Contact type, Liquid level sensing, Metal-free, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.62
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		Contact type, Liquid level sensing, −40 to +125 °C −40 to 257 °F	✂ 2 m 6.562 ft (Note 6)	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		Pipe-mountable type, Liquid sensing, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.62
FD-H13-FM2	100 3.937	280 11.024	Heat-resistant, Threaded, −60 to +130 °C −76 to 266 °F		P.63
FD-H18-L31	0 to 10 0 to 0.394	0 to 25 0 to 0.984	Heat-resistant, Glass substrate detection convergent reflective, −60 to +180 °C −76 to 356 °F		P.63
FD-H20-21	90 3.543	280 11.024	Heat-resistant, Threaded, −60 to +200 °C −76 to 392 °F	1 m 3.281 ft	P.63
FD-H20-M1	120 4.724	300 11.811	Heat-resistant, Threaded, −60 to +200 °C −76 to 392 °F		P.63
FD-H25-L43 (Note 4)	4 to 16 0.157 to 0.630	4 to 23 0.157 to 0.906	Heat-resistant, Glass substrate detection convergent reflective, −20 to +250 °C −4 to 482 °F (Ordinary temp. side:-20 to +70 °C −4 to 158 °F)	3 m 9.843 ft	P.63
FD-H25-L45 (Note 4)	7 to 35 0.276 to 1.378	7 to 38 0.276 to 1.496	Heat-resistant, Glass substrate detection convergent reflective, −20 to +250 °C −4 to 482 °F (Ordinary temp. side:-20 to +70 °C −4 to 158 °F)		P.63
FD-H30-KZ1V-S (Note 4, 5)	25 to 80 0.984 to 3.150	10 to 220 0.394 to 8.661	Vacuum-resistant, Reflective, −30 to +300 °C −22 to 572 °F	1 m 3.281 ft	P.64
FD-H30-L32	2 to 9 0.079 to 0.354	0 to 17 0 to 0.669	Heat-resistant, Glass substrate detection convergent reflective, −60 to +300 °C −76 to 572 °F	2 m 6.562 ft	P.64
FD-H30-L32V-S (Note 4, 5)	2.5 to 6.5 0.098 to 0.256	0 to11 0 to 0.433	Vacuum-resistant, Convergent reflective, −30 to +300 °C −22 to 572 °F	3 m 9.843 ft	P.64
FD-H35-20S	85 3.346	200 7.874	Heat-resistant, Threaded, −60 to +350 °C −76 to 662 °F	1 m 3.281 ft	P.64
FD-H35-M2	75 2.953	280 11.024	Heat-resistant, Threaded, −60 to +350 °C −76 to 662 °F	2 m 6.562 ft	P.64
FD-H35-M2S6	75 2.953	280 11.024	Heat-resistant, Threaded, −60 to +350 °C −76 to 662 °F		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 not received		Contact type, Liquid level sensing, Metal-free, −40 to +105 °C −40 to 221 °F	✂ 2 m 6.562 ft	P.64
FD-L10 (Note 4)	0 to 4.5 0 to 0.177	0 to 5.5 0 to 0.217	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L11 (Note 4)	0 to 8 0 to 0.315	0 to 9 0 to 0.354	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L12W (Note 4)	1 to 4.5 0.039 to 0.177	0.5 to 7 0.020 to 0.276	Ultla-small, −40 to +60 °C −40 to 140 °F	✂ 1 m 3.281 ft	P.65
FD-L20H	5 to 15 0.197 to 0.591	1 to 30 0.039 to 1.181	General purpose, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft	P.65
FD-L21 (Note 4)	3 to 15 0.118 to 0.591	1.5 to 16 0.059 to 0.630	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L21W (Note 4)	7 to 12 0.276 to 0.472	3 to 14 0.118 to 0.551	Glass substrate detection, −40 to +60 °C −40 to 140 °F		P.65
FD-L22A (Note 4)	0 to 19 0 to 0.748	0 to 25 0 to 0.984	Glass substrate detection, 0 to +70 °C 32 to 158 °F		P.65
FD-L23 (Note 4)	0 to 28 0 to 1.102	0 to 30 0 to 1.181	Glass substrate detection, −20 to +70 °C −4 to 158 °F	✂ 3 m 9.843 ft	P.65
FD-L30A (Note 4)	0 to 40 0 to 1.575	0 to 50 0 to 1.969	Glass substrate detection, 0 to +70 °C 32 to 158 °F		P.65
FD-L31A (Note 4)	5 to 30 0.197 to 1.181	4 to 33 0.157 to 1.299	Glass substrate detection, 0 to +70 °C 32 to 158 °F		P.65
FD-L32H (Note 4)	16 to 30 0.630 to 1.181	0 to 50 0 to 1.969	Glass substrate detection, −40 to +60 °C −40 to 140 °F	✂ 4 m 13.123 ft	P.66

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The 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 × 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].
5) Sold as a set comprising vacuum type fiber + photo-terminal (**FV-BR1**) + fiber at atmospheric side (**FT-J8**).
6) The allowable cutting range is 1,000 mm 39.370 in from the end that is inserted to the amplifier.

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) (Note 2)		Type / Ambient temperature	Fiber cable length ✂: Free-cut	Dimensions
	Standard type **FX-101**□	Long sensing range type **FX-102**□			
FD-R31G	45 1.772	150 5.906	Square head, M3, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.66
FD-R32EG	20 0.787	68 2.677	Square head, M3, −40 to +70 °C −40 to 158 °F	500 mm 19.685 in	P.66
FD-R33EG	7 0.276	22 0.866	Square head, M3, −20 to +60 °C −4 to 140 °F		P.66
FD-R34EG	17 0.669	60 2.362	Square head, M3, −40 to +70 °C −40 to 158 °F		P.66
FD-R41	60 2.362	170 6.693	Square head, M4, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.66
FD-R60	110 4.331	240 9.449	Threaded, M6, Elbow, −55 to +80 °C −67 to 176 °F		P.66
FD-R61Y	85 3.346	185 7.283	Oil-resistant, Square head, M6, Cable-proection type, −55 to +80 °C −67 to 176 °F		P.66
FD-S21	25 0.984	70 2.756	Cylindrical, ø1.5 0.059, −55 to +80 °C −67 to 176 °F	1 m 3.281 ft	P.66
FD-S30	45 1.772	155 6.102	Super quality, Cylindrical, ø3 0.118, −55 to +80 °C −67 to 176 °F	2 m 6.562 ft	P.67
FD-S31	35 1.378	140 5.512	Cylindrical, ø3 0.118, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.67
FD-S32	120 4.724	345 13.583	Cylindrical, ø3 0.118, −55 to +80 °C −67 to 176 °F		P.67
FD-S32W	80 3.150	230 9.055	Cylindrical, ø3 0.118, −40 to +60 °C −40 to 140 °F		P.67
FD-S33GW	45 1.772	140 5.512	Cylindrical, ø3 0.118, −40 to +60 °C −40 to 140 °F		P.67
FD-S60Y	140 5.512	300 11.811	Chemical-resistant, Chlindrical, Metal-free, ø5.5 0.217, −40 to +70 °C −40 to 158 °F	✂ 2 m 6.562 ft (Note 3)	P.67
FD-V30	25 0.984	75 2.953	Sleeve, Cylindrical, Side-view, ø3 0.118, −55 to +80 °C −67 to 176 °F	✂ 2 m 6.562 ft	P.67
FD-V30W	6 0.236	20 0.787	Sleeve, Cylindrical, Side-view, ø3 0.118, −40 to +60 °C −40 to 140 °F		P.67
FD-V50	40 1.575	100 3.937	Sleeve, Cylindrical, Side-view, ø5 0.197, −55 to +80 °C −67 to 176 °F		P.68
FD-Z20HBW	2 to 30 0.079 to 1.181	1 to 90 0.039 to 3.543	Flat with boss, −40 to +60 °C −40 to 140 °F	✂ 1 m 3.281 ft	P.68
FD-Z20W	2 to 32 0.079 to 1.260	1 to 80 0.039 to 3.150	Flat with boss, −40 to +60 °C −40 to 140 °F		P.68
FD-Z40HBW	1 to 90 0.039 to 3.543	0.5 to 240 0.020 to 9.449	Flat with boss, −40 to +60 °C −40 to 140 °F	✂ 2 m 6.562 ft	P.68
FD-Z40W	1 to 74 0.039 to 2.913	200 7.874	Flat with boss, −40 to +60 °C −40 to 140 °F		P.68
FD-Z50HW	10 to 200 0.394 to 7.874	10 to 530 0.394 to 20.866	Narrow Beam, Long range, −40 to +60 °C −40 to 140 °F		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 is specified for white non-glossy paper.
3) The allowable cutting range is 500 mm 19.685 in from the end that the amplifier inserted.

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

Reflector Model No.	Sensing range (mm in)	
	Standard type **FX-101**□	Long sensing range type **FX-102**□
RF-230	100 to 2,400 3.937 to 94.488	100 to 5,000 3.937 to 196.850
RF-220	100 to 1,300 3.937 to 51.181	100 to 2,600 3.937 to 102.362
RF-210	100 to 980 3.937 to 38.583	100 to 1,300 3.937 to 51.181

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.

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