

## LIST OF FIBERS

### Thru-beam type (one pair set)



Fibers are listed in alphabetic order.

Model No.	Sensing range (mm in) (Note 1)									Dimensions
	Red LED			Blue LED			Green LED			
	U-LG	STD	FAST	U-LG	STD	FAST	U-LG	STD	FAST	
<b>FT-140</b>	19,600 771.654 (Note 2)	16,000 629.921	15,000 590.551	14,000 551.181	3,300 129.921	2,200 86.614	9,500 374.016	2,500 98.425	1,800 70.866	P.63
<b>FT-30</b>	600 23.622	145 5.709	95 3.740	90 3.543	24 0.945	15 0.591	45 1.772	12 0.472	8 0.315	P.63
<b>FT-31</b>	540 21.260	140 5.512	85 3.346	85 3.346	20 0.787	14 0.551	38 1.496	10 0.394	7 0.276	P.63
<b>FT-31S</b>	540 21.260	140 5.512	85 3.346	85 3.346	20 0.787	14 0.551	38 1.496	10 0.394	7 0.276	P.63
<b>FT-31W</b>	380 14.961	80 3.150	55 2.165	53 2.087	16 0.630	9 0.354	28 1.102	7 0.276	4 0.157	P.63
<b>FT-32</b>	3,600 141.732 (Note 2)	1,190 46.850	870 34.252	860 33.858	220 8.661	145 5.709	450 17.717	120 4.724	80 3.150	P.63
<b>FT-40</b>	1,600 62.922	345 13.583	245 9.646	250 9.843	65 2.559	45 1.772	140 5.512	40 1.575	25 0.984	P.63
<b>FT-42</b>	1,550 61.024	340 13.386	240 9.449	230 9.055	60 2.362	40 1.575	125 4.921	33 1.299	22 0.866	P.63
<b>FT-42S</b>	1,550 61.024	340 13.386	240 9.449	230 9.055	60 2.362	40 1.575	125 4.921	33 1.299	22 0.866	P.63
<b>FT-42W</b>	1,300 51.181	290 11.417	210 8.268	220 8.661	57 2.244	33 1.299	110 4.331	32 1.260	19 0.748	P.63
<b>FT-43</b>	2,200 86.614	450 17.717	310 12.205	460 18.110	120 4.724	75 2.953	250 9.843	62 2.441	44 1.732	P.64
<b>FT-45X</b>	1,600 62.992	370 14.567	280 11.024	260 10.236	64 2.520	45 1.772	130 5.118	34 1.339	23 0.906	P.64
<b>FT-A11</b>	3,600 141.732 (Note 2)	2,400 94.488	1,800 70.866	1,300 51.181	350 13.780	220 8.661	770 30.315	190 7.480	120 4.724	P.64
<b>FT-A11W</b>	3,600 141.732 (Note 2)	2,500 98.425	2,000 78.740	1,300 51.181	350 13.780	220 8.661	550 21.654	150 5.906	130 5.118	P.64
<b>FT-A32</b>	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	2,500 98.425	750 29.528	380 14.961	1,500 59.055	220 8.661	130 5.118	P.64
<b>FT-A32W</b>	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,600 141.732 (Note 2)	3,400 133.858	800 31.496	470 18.504	2,100 82.677	330 12.992	140 5.512	P.64
<b>FT-AL05</b>	1,100 43.307	240 9.449	180 7.087	220 8.661	55 2.165	35 1.378	125 4.921	30 1.181	20 0.787	P.64
<b>FT-E13</b>	30 1.181	7 0.276	5 0.197	2.5 0.098	—	—	1 0.039	—	—	P.64
<b>FT-E23</b>	110 4.331	20 0.787	15 0.591	12 0.472	3 0.118	2 0.079	6 0.236	1 0.039	—	P.64
<b>FT-H13-FM2</b>	1,100 43.307	280 11.024	200 7.874	50 1.969	13 0.512	9 0.354	150 5.906	16 0.630	10 0.394	P.65
<b>FT-H20-J20-S (Note 3)</b>	700 27.559	160 6.299	110 4.331	120 4.724	20 0.787	—	60 2.362	—	—	P.65
<b>FT-H20-J30-S (Note 3)</b>	700 27.559	160 6.299	110 4.331	120 4.724	20 0.787	—	60 2.362	—	—	P.65
<b>FT-H20-J50-S (Note 3)</b>	700 27.559	160 6.299	110 4.331	120 4.724	20 0.787	—	60 2.362	—	—	P.65
<b>FT-H20-M1</b>	550 21.654	150 5.906	100 3.937	100 3.937	25 0.984	20 0.787	65 2.559	17 0.669	12 0.472	P.65
<b>FT-H20-VJ50-S (Note 3)</b>	1,100 43.307	240 9.449	170 6.693	170 6.693	35 1.378	—	90 3.543	—	—	P.65
<b>FT-H20-VJ80-S (Note 3)</b>	1,100 43.307	240 9.449	170 6.693	170 6.693	35 1.378	—	90 3.543	—	—	P.65
<b>FT-H20W-M1</b>	400 15.748	110 4.331	80 3.15	75 2.953	19 0.748	13 0.512	58 2.283	13 0.512	9 0.354	P.65
<b>FT-H30-M1V-S (Note 4)</b>	390 15.354	100 3.937	70 2.756	75 2.953	20 0.787	15 0.591	55 2.165	13 0.512	10 0.394	P.65
<b>FT-H35-M2</b>	600 23.622	150 5.906	110 4.331	115 4.528	28 1.102	20 0.787	90 3.543	20 0.787	14 0.551	P.65
<b>FT-H35-M2S6</b>	600 23.622	150 5.906	110 4.331	115 4.528	28 1.102	20 0.787	90 3.543	20 0.787	14 0.551	P.65
<b>FT-HL80Y</b>	3,500 137.795 (Note 2)	800 31.496	550 21.654	150 5.906	35 1.378	20 0.787	200 7.874	55 2.165	35 1.378	P.66
<b>FT-KS40</b>	3,600 141.732 (Note 2)	2,000 78.740	1,900 74.803	1,000 39.370	270 10.630	190 7.480	590 23.228	130 5.118	53 2.087	P.66
<b>FT-KV26</b>	880 34.646	170 6.693	120 4.724	130 5.118	31 1.220	—	90 3.543	18 0.709	—	P.66
<b>FT-KV26H1</b>	790 31.102	150 5.906	100 3.937	115 4.528	28 1.102	—	80 3.150	16 0.630	—	P.66
<b>FT-KV40</b>	3,600 141.732 (Note 2)	1,700 66.929	1,300 51.181	1,200 47.244	310 12.205	190 7.480	800 31.496	190 7.480	120 4.724	P.66
<b>FT-KV40W</b>	3,600 141.732 (Note 2)	1,600 62.992	1,100 43.307	900 35.433	270 10.630	140 5.512	420 16.535	100 3.937	65 2.559	P.66
<b>FT-L80Y</b>	3,500 137.795 (Note 2)	900 35.433	600 23.622	250 9.843	60 2.362	40 1.575	300 11.811	70 2.756	45 1.772	P.66
<b>FT-R31</b>	380 14.961	79 3.110	56 2.205	80 3.150	20 0.787	13 0.512	38 1.496	10 0.394	7 0.276	P.66
<b>FT-R40</b>	1,200 47.244	240 9.449	170 6.693	200 7.874	50 1.969	32 1.260	100 3.937	28 1.102	19 0.748	P.66
<b>FT-R41W</b>	1,200 47.244	290 11.417	200 7.874	220 8.661	57 2.244	33 1.299	100 3.937	26 1.024	18 0.709	P.66
<b>FT-R42W</b>	3,600 141.732 (Note 2)	990 38.976	740 29.134	310 12.205	75 2.953	58 2.283	270 10.630	70 2.756	50 1.969	P.66
<b>FT-R43</b>	1,200 47.244	230 9.055	160 6.299	200 7.874	50 1.969	32 1.260	100 3.937	26 1.024	18 0.709	P.67
<b>FT-R44Y</b>	1,200 47.244	230 9.055	160 6.299	200 7.874	50 1.969	32 1.260	100 3.937	26 1.024	18 0.709	P.67
<b>FT-R60Y</b>	3,600 141.732 (Note 2)	750 29.528	540 21.260	560 22.047	140 5.512	90 3.543	290 11.417	75 2.953	50 1.969	P.67
<b>FT-S11</b>	150 5.906	30 1.181	20 0.787	21 0.827	5 0.197	3.5 0.138	12 0.472	2 0.079	1.5 0.059	P.67
<b>FT-S20</b>	600 23.622	145 5.709	95 3.740	90 3.543	24 0.945	15 0.591	45 1.772	12 0.472	8 0.315	P.67
<b>FT-S21</b>	540 21.260	140 5.512	85 3.346	85 3.346	20 0.787	14 0.551	38 1.496	10 0.394	7 0.276	P.67

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.

Model No.	Sensing range (mm in) (Note 1)									Dimensions
	Red LED			Blue LED			Green LED			
	U-LG	STD	FAST	U-LG	STD	FAST	U-LG	STD	FAST	
<b>FT-S21W</b>	380 14.961	80 3.150	55 2.165	53 2.087	16 0.630	9 0.354	28 1.102	7 0.276	4 0.157	P.67
<b>FT-S22</b>	910 35.827	190 7.480	140 5.512	110 4.331	29 1.142	17 0.669	70 2.756	18 0.709	11 0.433	P.67
<b>FT-S30</b>	1,600 62.992	345 13.583	245 9.646	250 9.843	65 2.559	45 1.772	140 5.512	40 1.575	25 0.984	P.67
<b>FT-S31W</b>	1,300 51.181	290 11.417	210 8.268	220 8.661	57 2.244	33 1.299	110 4.331	32 1.260	19 0.748	P.68
<b>FT-S32</b>	3,600 141.732 (Note 2)	920 36.220	670 26.378	700 27.559	180 7.087	110 4.331	400 15.748	92 3.622	62 2.441	P.68
<b>FT-V23</b>	720 28.346	140 5.512	100 3.937	120 4.724	30 1.181	20 0.787	65 2.559	16 0.630	9 0.354	P.68
<b>FT-V24W</b>	140 5.512	25 0.984	20 0.787	18 0.709	2 0.079	—	5 0.197	—	—	P.68
<b>FT-V25</b>	360 14.173	70 2.756	50 1.969	57 2.244	10 0.394	7 0.276	28 1.102	8 0.315	5 0.197	P.68
<b>FT-V30</b>	770 30.315	160 6.299	120 4.724	210 8.268	47 1.850	28 1.102	100 3.937	22 0.866	10 0.394	P.68
<b>FT-V40</b>	3,600 141.732 (Note 2)	950 37.402	730 28.740	810 31.890	190 7.480	130 5.118	500 19.685	115 4.528	81 3.189	P.68
<b>FT-V80Y</b>	1,500 59.055	350 13.780	250 9.843	240 9.449	55 2.165	35 1.378	180 7.087	38 1.496	24 0.945	P.68
<b>FT-Z20HBW</b>	390 15.354	80 3.150	55 2.165	64 2.520	16 0.630	10 0.394	30 1.181	7 0.276	5 0.197	P.68
<b>FT-Z20W</b>	1,300 51.181	270 10.630	190 7.480	170 6.693	39 1.535	23 0.906	92 3.622	19 0.748	11 0.433	P.68
<b>FT-Z30</b>	3,100 122.047	660 25.984	480 18.898	640 25.197	160 6.299	100 3.937	320 12.598	87 3.425	59 2.323	P.68
<b>FT-Z30E</b>	3,600 141.732 (Note 2)	1,200 47.244	920 36.220	960 37.795	250 9.843	160 6.299	460 18.110	120 4.724	83 3.268	P.69
<b>FT-Z30EW</b>	3,600 141.732 (Note 2)	590 23.228	430 16.929	940 37.008	180 7.087	110 4.331	400 15.748	85 3.346	56 2.205	P.69
<b>FT-Z30H</b>	3,600 141.732 (Note 2)	1,300 51.181	950 37.402	1,100 43.307	290 11.417	170 6.693	580 22.835	150 5.906	100 3.937	P.69
<b>FT-Z30HW</b>	3,600 141.732 (Note 2)	1,300 51.181	950 37.402	940 37.008	180 7.087	110 4.331	400 15.748	85 3.346	56 2.205	P.69
<b>FT-Z30W</b>	2,400 94.488	540 21.260	390 15.354	490 19.291	120 4.724	83 3.268	240 9.449	67 2.638	45 1.772	P.69
<b>FT-Z40HBW</b>	1,300 51.181	290 11.417	210 8.268	220 8.661	57 2.244	33 1.299	110 4.331	32 1.260	19 0.748	P.69
<b>FT-Z40W</b>	2,200 86.614	460 18.110	340 13.386	380 14.961	90 3.543	63 2.480	170 6.693	45 1.772	30 1.181	P.69
<b>FT-Z802Y</b>	3,500 137.795 (Note 2)	750 29.528	540 21.260	450 17.717	110 4.331	80 3.150	300 11.811	80 3.150	60 2.362	P.69

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.

### Retroreflective type



Fibers are listed in alphabetic order.

Model No.	Sensing range (mm in) (Note 1,2)									Dimensions
	Red LED			Blue LED			Green LED			
	U-LG	STD	FAST	U-LG	STD	FAST	U-LG	STD	FAST	
<b>FR-KZ22E</b>	15 to 350 0.591 to 13.780	15 to 140 0.591 to 5.512	15 to 100 0.591 to 3.937	20 to 100 0.787 to 3.937	—	—	—	—	—	P.70
<b>FR-KZ50E</b>	20 to 400 0.787 to 15.748	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 84 0.787 to 3.307	20 to 45 0.787 to 1.771	20 to 180 0.787 to 7.087	20 to 55 0.787 to 1.969	—	P.70
<b>FR-KZ50H</b>	20 to 400 0.787 to 15.748	20 to 200 0.787 to 7.874	20 to 200 0.787 to 7.874	20 to 145 0.787 to 5.709	20 to 47 0.787 to 1.850	20 to 26 0.787 to 1.024	20 to 145 0.787 to 5.709	20 to 47 0.787 to 1.850	20 to 26 0.787 to 1.024	P.70
<b>FR-Z50HW</b>	100 to 1,000 3.937 to 39.370	100 to 540 3.937 to 21.260	100 to 460 3.937 to 18.110	100 to 490 3.937 to 19.291	—	—	—	—	—	P.70

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 reflective tape **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-411		
	U-LG	STD	FAST
<b>RF-230</b>	100 to 12,000 3.937 to 47.244	100 to 1,700 3.937 to 66.929	100 to 1,300 3.937 to 51.181
<b>RF-220</b>	100 to 2,200 3.937 to 8.661	100 to 950 3.937 to 37.402	100 to 730 3.937 to 28.740
<b>RF-210</b>	100 to 2,100 3.937 to 82.677	100 to 780 3.937 to 30.709	100 to 620 3.937 to 24.409

Note: The sensing range is the possible setting range for the 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.

## LIST OF FIBERS

### Reflective type



Fibers are listed in alphabetic order.

Model No.	Sensing range (mm in) (Note 1, 2) / Description										Dimensions								
	Red LED			Blue LED			Green LED												
	U-LG	STD	FAST	U-LG	STD	FAST	U-LG	STD	FAST										
<b>FD-30</b>	200	7.874	48	1.890	35	1.378	40	1.575	9	0.354	6	0.236	18	0.709	5	0.197	3	0.118	P.71
<b>FD-31</b>	175	6.890	45	1.772	34	1.339	35	1.378	8	0.315	5	0.197	16	0.630	4	0.157	2	0.079	P.71
<b>FD-31W</b>	120	4.724	20	0.787	15	0.591	16	0.630	3	0.118	1 to 2.5	0.039 to 0.098	7	0.276	1 to 2.5	0.039 to 0.098	—————	P.71	
<b>FD-32G</b>	240	9.449	52	2.047	38	1.496	48	1.890	11	0.433	8	0.315	24	0.945	5	0.197	4	0.157	P.71
<b>FD-32GX</b>	320	12.598	50	1.969	38	1.496	50	1.969	12	0.472	9	0.354	24	0.945	7	0.276	4	0.157	P.71
<b>FD-34G</b>	150	5.906	30	1.181	22	0.866	19	0.748	5	0.197	0.2 to 3	0.008 to 0.118	10	0.394	0.3 to 2.5	0.012 to 0.098	0.4 to 1.5	0.016 to 0.059	P.71
<b>FD-40</b>	200	7.874	48	1.890	35	1.378	40	1.575	9	0.354	6	0.236	18	0.709	5	0.197	3	0.118	P.71
<b>FD-41</b>	175	6.890	45	1.772	34	1.339	35	1.378	8	0.315	5	0.197	16	0.630	4	0.157	2	0.079	P.71
<b>FD-41S</b>	175	6.890	40	1.575	30	1.181	35	1.378	8	0.315	5	0.197	16	0.630	4	0.157	2	0.079	P.71
<b>FD-41SW</b>	120	4.724	20	0.787	15	0.591	18	0.709	1 to 4	0.039 to 0.157	1 to 2.5	0.039 to 0.098	12	0.472	1 to 2.5	0.039 to 0.098	—————	P.71	
<b>FD-41W</b>	330	12.992	70	2.756	50	1.969	54	2.126	0.5 to 13	0.020 to 0.512	1 to 8	0.039 to 0.315	29	1.142	1.5 to 7	0.059 to 0.276	1.5 to 4.5	0.059 to 0.177	P.72
<b>FD-42G</b>	240	9.449	52	2.047	38	1.496	48	1.890	11	0.433	8	0.315	24	0.945	5	0.197	4	0.157	P.72
<b>FD-42GW</b>	240	9.449	40	1.575	30	1.181	30	1.181	7	0.276	5	0.197	15	0.591	4	0.157	2	0.079	P.72
<b>FD-60</b>	600	23.622	150	5.906	100	3.937	130	5.118	30	1.181	20	0.787	70	2.756	20	0.787	13	0.512	P.72
<b>FD-61</b>	510	20.079	140	5.512	90	3.543	105	4.134	27	1.063	18	0.709	65	2.559	16	0.630	11	0.433	P.72
<b>FD-61G</b>	460	18.110	110	4.331	80	3.150	105	4.134	27	1.063	18	0.709	55	2.165	15	0.591	9	0.354	P.72
<b>FD-61S</b>	500	19.685	140	5.512	95	3.740	105	4.134	27	1.063	18	0.709	65	2.559	16	0.630	11	0.433	P.72
<b>FD-61W</b>	330	12.992	70	2.756	50	1.969	54	2.126	0.5 to 13	0.020 to 0.512	1 to 8	0.039 to 0.315	29	1.142	1.5 to 7	0.059 to 0.276	1.5 to 4.5	0.059 to 0.177	P.73
<b>FD-62</b>	820	32.283	180	7.087	130	5.118	160	6.299	1 to 44	0.039 to 1.732	1 to 29	0.039 to 1.142	98	3.858	1 to 26	0.039 to 1.024	1 to 18	0.039 to 0.709	P.73
<b>FD-64X</b>	380	14.961	80	3.150	55	2.165	54	2.126	0.5 to 14	0.020 to 0.551	0.5 to 9	0.020 to 0.354	27	1.063	0.5 to 7	0.020 to 0.276	0.5 to 4.5	0.020 to 0.177	P.73
<b>FD-A16</b>	200	7.874	100	3.937	75	2.953	30	1.181	13	0.512	13	0.512	57	2.244	14	0.551	—————	P.73	
<b>FD-AL11</b>	460	18.110	100	3.937	70	2.756	70	2.756	17	0.669	10	0.394	45	1.772	9	0.354	6	0.236	P.73
<b>FD-E13</b>	20	0.787	4	0.157	3	0.118	2.5	0.098	0.7	0.028	—————	—————	1.5	0.059	—————	—————	—————	P.73	
<b>FD-E23</b>	75	2.953	15	0.591	10	0.394	10	0.394	2.5	0.098	1.5	0.059	5	0.197	1.3	0.051	0.9	0.035	P.73
<b>FD-EG30</b>	90	3.543	15	0.591	10	0.394	10	0.394	2.5	0.098	1.5	0.059	5	0.197	1.3	0.051	0.9	0.035	P.73
<b>FD-EG30S</b>	85	3.346	15	0.591	10	0.394	10	0.394	2.5	0.098	1.5	0.059	5	0.197	1.3	0.051	0.9	0.035	P.74
<b>FD-EG31</b>	25	0.984	5	0.197	4	0.157	4	0.157	1	0.039	0.5	0.020	2	0.079	—————	—————	—————	P.74	
<b>FD-F4</b>	Applicable pipe diameter: Outer dia. $\phi$ 6 to $\phi$ 26 mm $\phi$ 0.236 to $\phi$ 1.024 in transparent pipe [PFA (fluorine resin) or equivalently transparent pipe, wall thickness 1 mm 0.039 in] Liquid absent: Beam received, Liquid present: Beam not received										P.74								
<b>FD-F41</b>	Applicable pipe diameter: Outer dia. $\phi$ 6 to $\phi$ 26 mm $\phi$ 0.236 to $\phi$ 1.024 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 not received										P.74								
<b>FD-F41Y</b>	$\phi$ 4 mm $\phi$ 0.157 in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received										P.74								
<b>FD-F8Y</b>	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	P.74
<b>FD-FA93</b>	Applicable pipe diameter: Outer dia. $\phi$ 8 mm $\phi$ 0.315 in or more transparent pipe (When used with the tying bands: $\phi$ 8 to $\phi$ 80 mm $\phi$ 0.315 to $\phi$ 3.150 in) [PFA (fluorine resin), including translucent] Liquid absent: Beam received, Liquid present: Beam not received										P.74								
<b>FD-H13-FM2</b>	430	16.929	100	3.937	70	2.756	40	1.575	10	0.394	7	0.276	40	1.575	10	0.394	7	0.276	P.75
<b>FD-H18-L31</b>	0 to 25	0 to 0.984	0 to 10	0 to 0.394	0 to 8	0 to 0.315	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	P.75
<b>FD-H20-21</b>	350	13.780	90	3.543	65	2.559	65	2.559	13	0.512	9	0.354	45	1.772	10	0.394	7	0.276	P.75
<b>FD-H20-M1</b>	270	10.630	85	3.346	60	2.362	60	2.362	14	0.551	10	0.394	58	2.283	10	0.394	7	0.276	P.75
<b>FD-H25-L43</b>	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	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	P.75
<b>FD-H25-L45</b>	5 to 42	0.197 to 1.654	7 to 38	0.276 to 1.496	7 to 35	0.276 to 1.437	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	—————	P.75

Notes: 1) The standard sensing objects of the sensing ranges vary depending on the fibers.

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.

**LIST OF FIBERS**

**Reflective type** 

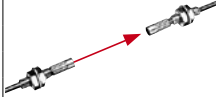
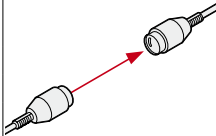
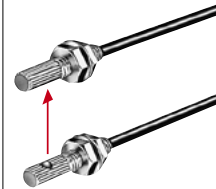
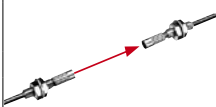
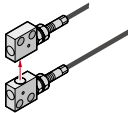
Fibers are listed in alphabetic order.

Model No.	Sensing range (mm in) (Note 1, 2) / Description									Dimensions
	Red LED			Blue LED			Green LED			
	U-LG	STD	FAST	U-LG	STD	FAST	U-LG	STD	FAST	
<b>FD-H30-KZ1V-S</b> (Note 3)	20 to 300 0.787 to 11.811	25 to 100 0.984 to 3.937	25 to 45 0.984 to 1.772	—	—	—	—	—	—	P.76
<b>FD-H30-L32</b>	0 to 20 0 to 0.787	1 to 8 0.039 to 0.315	1 to 6 0.039 to 0.236	—	—	—	—	—	—	P.76
<b>FD-H30-L32V-S</b> (Note 3)	0 to 11 0 to 0.433	1.5 to 5 0.059 to 0.197	2 to 4 0.079 to 0.157	—	—	—	—	—	—	P.76
<b>FD-H35-20S</b>	210 8.268	50 1.969	35 1.378	45 1.772	10 0.394	7 0.276	20 0.787	6 0.236	4 0.157	P.76
<b>FD-H35-M2</b>	300 11.811	83 3.268	60 2.362	50 1.969	12 0.472	9 0.354	50 1.969	10 0.394	7 0.276	P.76
<b>FD-H35-M2S6</b>	300 11.811	80 3.150	50 1.969	50 1.969	14 0.551	10 0.394	40 1.575	10 0.394	7 0.276	P.76
<b>FD-HF40Y</b>	ø4 mm ø0.157 in Protective tube: fluorine resin, length:500 mm 19.685 in (allowable cutting) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received									P.76
<b>FD-L10</b>	0 to 4.4 0 to 0.173	0 to 4 0 to 0.157	0 to 3.8 0 to 0.150	3.5 0.138	2.5 0.098	2 0.079	0 to 3 0 to 0.118	1 to 2 0.039 to 0.079	—	P.77
<b>FD-L11</b>	0 to 10 0 to 0.394	0 to 7 0 to 0.276	0 to 7 0 to 0.276	8.5 0.335	6 0.236	5.5 0.217	8 0.315	5 0.197	—	P.77
<b>FD-L12W</b>	0.5 to 10 0.020 to 0.394	1 to 4.5 0.039 to 0.177	1 to 3.5 0.039 to 0.137	—	—	—	—	—	—	P.77
<b>FD-L20H</b>	1 to 32 0.039 to 1.260	4 to 10 0.157 to 0.394	4.5 to 10 0.177 to 0.394	4 to 13 0.157 to 0.512	5 to 9 0.197 to 0.354	5.5 to 8.5 0.217 to 0.334	5 to 11 0.197 to 0.433	6 to 8.5 0.236 to 0.335	—	P.77
<b>FD-L21</b>	1 to 18 0.039 to 0.709	3 to 14 0.118 to 0.551	3 to 13 0.118 to 0.512	—	—	—	—	—	—	P.77
<b>FD-L21W</b>	3 to 16 0.118 to 0.630	7 to 12 0.276 to 0.472	7 to 11 0.276 to 0.433	—	—	—	—	—	—	P.77
<b>FD-L22A</b>	0 to 26 0 to 1.024	0 to 23 0 to 0.906	0 to 19 0 to 0.748	—	—	—	—	—	—	P.77
<b>FD-L23</b>	0 to 30 0 to 1.181	0 to 30 0 to 1.181	0 to 28 0 to 1.102	—	—	—	—	—	—	P.77
<b>FD-L30A</b>	0 to 50 0 to 1.969	0 to 36 0 to 1.417	0 to 30 0 to 1.181	—	—	—	—	—	—	P.77
<b>FD-L31A</b>	4 to 33 0.157 to 1.299	5 to 32 0.197 to 1.260	5 to 30 0.197 to 1.181	4 to 31 0.157 to 1.220	—	—	—	—	—	P.77
<b>FD-L32H</b>	0 to 65 0 to 2.559	15 to 30 0.591 to 1.181	20 to 25 0.787 to 0.984	15 to 30 0.591 to 1.181	—	—	—	—	—	P.78
<b>FD-R31G</b>	240 9.449	42 1.654	30 1.181	41 1.614	9 0.354	6 0.236	21 0.827	5 0.197	2 0.079	P.78
<b>FD-R32EG</b>	90 3.543	15 0.591	10 0.394	10 0.394	2.5 0.098	1.5 0.059	5 0.197	1.3 0.051	—	P.78
<b>FD-R33EG</b>	25 0.984	5 0.197	3 0.118	4 0.157	0.8 0.031	—	2 0.079	—	—	P.78
<b>FD-R34EG</b>	75 2.953	13 0.512	8 0.315	9 0.354	2 0.079	1 0.039	5 0.197	0.9 0.035	—	P.78
<b>FD-R41</b>	330 12.992	65 2.559	47 1.850	51 2.008	10 0.394	1 to 8 0.039 to 0.315	25 0.984	1 to 6 0.039 to 0.236	1 to 5 0.039 to 0.197	P.78
<b>FD-R60</b>	420 16.535	110 4.331	80 3.150	82 3.228	23 0.906	15 0.591	59 2.323	15 0.591	10 0.394	P.78
<b>FD-R61Y</b>	340 13.386	65 2.559	47 1.850	60 2.362	0.5 to 15 0.020 to 0.591	0.5 to 10 0.020 to 0.394	30 1.181	0.5 to 7 0.020 to 0.276	1 to 5 0.039 to 0.197	P.78
<b>FD-S21</b>	80 3.150	18 0.709	13 0.512	12 0.472	2.5 0.098	2 0.079	6.5 0.256	1.5 0.059	1 0.039	P.78
<b>FD-S30</b>	200 7.874	48 0.890	35 1.378	40 1.575	9 0.354	6 0.236	18 0.709	5 0.197	3 0.118	P.79
<b>FD-S31</b>	175 6.890	45 1.772	34 1.339	35 1.378	8 0.315	5 0.197	16 0.630	4 0.157	2 0.079	P.79
<b>FD-S32</b>	510 20.079	120 4.724	90 3.543	105 4.134	27 1.063	18 0.709	65 2.559	16 0.630	11 0.433	P.79
<b>FD-S32W</b>	330 12.992	70 2.756	50 1.969	54 2.126	0.5 to 13 0.020 to 0.512	1 to 8 0.039 to 0.315	29 1.142	1.5 to 7 0.059 to 0.276	1.5 to 4.5 0.059 to 0.177	P.79
<b>FD-S33GW</b>	240 9.449	40 1.575	30 1.181	30 1.181	7 0.276	5 0.197	15 0.591	4 0.157	2 0.079	P.79
<b>FD-S34G</b>	150 5.906	30 1.181	22 0.866	19 0.748	5 0.197	0.2 to 3 0.008 to 0.118	10 0.394	0.3 to 2.5 0.012 to 0.098	0.4 to 1.5 0.016 to 0.059	P.79
<b>FD-S60Y</b>	410 16.142	130 5.118	100 3.937	120 4.724	25 0.984	17 0.669	65 2.559	10 0.394	—	P.79
<b>FD-V30</b>	110 4.331	19 0.748	14 0.551	18 0.709	—	—	10 0.394	—	—	P.79
<b>FD-V30W</b>	30 1.181	5 0.197	3 0.118	—	—	—	—	—	—	P.80
<b>FD-V50</b>	160 6.299	35 1.378	25 0.984	27 1.063	7 0.276	—	16 0.630	—	—	P.80
<b>FD-Z20HBW</b>	1 to 100 0.039 to 3.937	3 to 20 0.118 to 0.787	3 to 15 0.118 to 0.591	3 to 16 0.118 to 0.630	—	—	3 to 8 0.118 to 0.315	—	—	P.80
<b>FD-Z20W</b>	140 5.512	3 to 26 0.118 to 1.024	3 to 17 0.118 to 0.669	4 to 12 0.157 to 0.472	—	—	—	—	—	P.80
<b>FD-Z40HBW</b>	420 16.535	1 to 80 0.039 to 3.150	1 to 60 0.039 to 2.362	1 to 89 0.039 to 3.504	3 to 20 1.181 to 0.787	3 to 13 1.181 to 0.512	1 to 42 0.039 to 1.654	3 to 11 0.118 to 0.433	3 to 7 0.118 to 0.276	P.80
<b>FD-Z40W</b>	340 13.386	1 to 67 0.039 to 2.638	1 to 48 0.039 to 1.890	1 to 55 0.039 to 2.165	5 to 10 0.197 to 0.394	—	3 to 25 0.118 to 0.984	—	—	P.80
<b>FD-Z50HW</b>	10 to 890 0.394 to 35.039	15 to 210 0.591 to 8.268	15 to 160 0.591 to 6.299	20 to 100 0.787 to 3.937	—	—	20 to 55 0.787 to 2.165	—	—	P.80

Notes: 1) The standard sensing objects of the sensing ranges vary depending on the fibers.  
 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).

**FIBER OPTIONS**

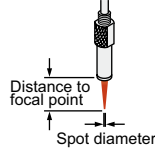
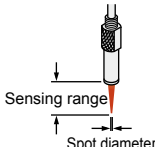
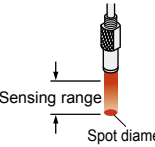

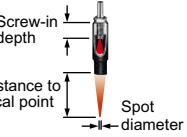
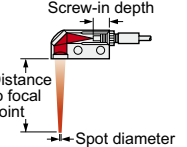
**Lens (For thru-beam type fiber)**

Designation	Model No.	Description																																																						
For thru-beam type fiber	Expansion lens (Note 1)		<p>Increases the sensing range by 5 times or more.</p> <ul style="list-style-type: none"> <li>Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 5)</li> <li>Beam dia: ø3.6 mm ø0.142 in</li> </ul>	<p><b>Sensing range for red LED type (mm in) [Lens on both sides] (Note 2)</b></p> <table border="1"> <thead> <tr> <th>Fiber \ Mode</th> <th>U-LG</th> <th>STD</th> <th>FAST</th> </tr> </thead> <tbody> <tr> <td><b>FT-43</b></td> <td>3,600 141.732 (Note 3)</td> <td>2,300 90.551</td> <td>1,700 66.929</td> </tr> <tr> <td><b>FT-42</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,200 125.984</td> <td>2,300 90.551</td> </tr> <tr> <td><b>FT-42W</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>2,600 102.362</td> </tr> <tr> <td><b>FT-45X</b></td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> </tr> <tr> <td><b>FT-R40</b></td> <td>3,600 141.732 (Note 3)</td> <td>2,900 114.173</td> <td>2,300 90.551</td> </tr> <tr> <td><b>FT-R43</b></td> <td>3,600 141.732 (Note 3)</td> <td>2,600 102.362</td> <td>1,900 74.803</td> </tr> <tr> <td><b>FT-R44Y</b></td> <td>3,600 141.732 (Note 3)</td> <td>2,600 102.362</td> <td>1,900 74.803</td> </tr> <tr> <td><b>FT-H35-M2</b></td> <td>3,500 137.795 (Note 3)</td> <td>1,100 43.307</td> <td>800 31.496</td> </tr> <tr> <td><b>FT-H20W-M1</b></td> <td>1,600 62.992 (Note 3)</td> <td>1,200 47.244</td> <td>800 31.496</td> </tr> <tr> <td><b>FT-H20-M1</b></td> <td>1,600 62.992 (Note 3)</td> <td>800 31.496</td> <td>600 23.622</td> </tr> </tbody> </table>	Fiber \ Mode	U-LG	STD	FAST	<b>FT-43</b>	3,600 141.732 (Note 3)	2,300 90.551	1,700 66.929	<b>FT-42</b>	3,600 141.732 (Note 3)	3,200 125.984	2,300 90.551	<b>FT-42W</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	2,600 102.362	<b>FT-45X</b>	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	<b>FT-R40</b>	3,600 141.732 (Note 3)	2,900 114.173	2,300 90.551	<b>FT-R43</b>	3,600 141.732 (Note 3)	2,600 102.362	1,900 74.803	<b>FT-R44Y</b>	3,600 141.732 (Note 3)	2,600 102.362	1,900 74.803	<b>FT-H35-M2</b>	3,500 137.795 (Note 3)	1,100 43.307	800 31.496	<b>FT-H20W-M1</b>	1,600 62.992 (Note 3)	1,200 47.244	800 31.496	<b>FT-H20-M1</b>	1,600 62.992 (Note 3)	800 31.496	600 23.622								
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Super-expansion lens (Note 1)	FX-LE2		<p>Tremendously increases the sensing range with large diameter lenses.</p> <ul style="list-style-type: none"> <li>Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 5)</li> <li>Beam dia: ø9.8 mm ø0.386 in</li> </ul>	<p><b>Sensing range for red LED type (mm in) [Lens on both sides] (Note 2)</b></p> <table border="1"> <thead> <tr> <th>Fiber \ Mode</th> <th>U-LG</th> <th>STD</th> <th>FAST</th> </tr> </thead> <tbody> <tr> <td><b>FT-43</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-42</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-42W</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-45X</b></td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> </tr> <tr> <td><b>FT-R40</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-R41W</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-R43</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-R44Y</b></td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> <td>3,600 141.732 (Note 3)</td> </tr> <tr> <td><b>FT-H35-M2</b></td> <td>3,500 137.795 (Note 3)</td> <td>3,500 137.795 (Note 3)</td> <td>3,500 137.795 (Note 3)</td> </tr> <tr> <td><b>FT-H20W-M1</b></td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> </tr> <tr> <td><b>FT-H20-M1</b></td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> <td>1,600 62.992 (Note 3)</td> </tr> <tr> <td><b>FT-H13-FM2</b></td> <td>3,500 137.795 (Note 3)</td> <td>3,500 137.795 (Note 3)</td> <td>3,500 137.795 (Note 3)</td> </tr> </tbody> </table>	Fiber \ Mode	U-LG	STD	FAST	<b>FT-43</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-42</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-42W</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-45X</b>	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	<b>FT-R40</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-R41W</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-R43</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-R44Y</b>	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	3,600 141.732 (Note 3)	<b>FT-H35-M2</b>	3,500 137.795 (Note 3)	3,500 137.795 (Note 3)	3,500 137.795 (Note 3)	<b>FT-H20W-M1</b>	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	<b>FT-H20-M1</b>	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	1,600 62.992 (Note 3)	<b>FT-H13-FM2</b>	3,500 137.795 (Note 3)	3,500 137.795 (Note 3)	3,500 137.795 (Note 3)
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Expansion lens for vacuum fiber (Note 1)	FV-LE1		<p>Sensing range increases by 4 times or more.</p> <ul style="list-style-type: none"> <li>Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 5)</li> <li>Beam dia: ø3.6 mm ø0.142 in</li> </ul>	<p><b>Sensing range for red LED type (mm in) [Lens on both sides] (Note 2, 4)</b></p> <table border="1"> <thead> <tr> <th>Fiber \ Mode</th> <th>U-LG</th> <th>STD</th> <th>FAST</th> </tr> </thead> <tbody> <tr> <td><b>FT-H30-M1V-S</b></td> <td>1,600 62.992</td> <td>450 17.717</td> <td>300 11.811</td> </tr> </tbody> </table>	Fiber \ Mode	U-LG	STD	FAST	<b>FT-H30-M1V-S</b>	1,600 62.992	450 17.717	300 11.811																																												
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Notes: 1) Be careful sure to use it only after you have adjusted it sufficiently when installing the thru-beam type fiber equipped with the expansion lens, as the beam envelope becomes narrow and alignment is difficult.  
 2) The sensing ranges are the values for red LED type amplifier. Please contact our office for details on sensing ranges for other types of amplifiers.  
 3) The fiber cable length practically limits the sensing range.  
 4) The fiber cable length for the FT-H30-M1V-S is 1 m 3.281 ft. The sensing ranges in U-LG mode take into account the length of the FT-J8 atmospheric side fiber.  
 5) Refer to "Fiber Selection" for the ambient temperatures of fibers to be used in combination.

**FIBER OPTIONS**

**Lens (For reflective type fiber)**

Designation	Model No.	Description																	
Pinpoint spot lens	<b>FX-MR7</b>		Extremely fine spot of $\phi 0.1$ mm $\phi 0.004$ in approx. achieved. <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-R33EG, FD-EG31, FD-R34EG, FD-R32EG, FD-EG30, FD-R31G, FD-42G, FD-42GW, FD-32G, FD-32GX</b></li> <li>Ambient temperature: <math>-55</math> to <math>+70</math> °C <math>-67</math> to <math>+158</math> °F (Note 2)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Fiber</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>FD-R33EG</b> <b>FD-EG31</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.1</math> <b><math>\phi 0.004</math></b> approx.</td> </tr> <tr> <td><b>FD-R34EG</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.15</math> <b><math>\phi 0.006</math></b> approx.</td> </tr> <tr> <td><b>FD-R32EG</b> <b>FD-EG30</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.2</math> <b><math>\phi 0.008</math></b> approx.</td> </tr> <tr> <td><b>FD-R31G</b> <b>FD-42G/42GW</b> <b>FD-32G/32GX</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.4</math> <b><math>\phi 0.016</math></b> approx.</td> </tr> </tbody> </table>	Fiber	Distance to focal point	Spot diameter	<b>FD-R33EG</b> <b>FD-EG31</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.1$ <b><math>\phi 0.004</math></b> approx.	<b>FD-R34EG</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.15$ <b><math>\phi 0.006</math></b> approx.	<b>FD-R32EG</b> <b>FD-EG30</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.2$ <b><math>\phi 0.008</math></b> approx.	<b>FD-R31G</b> <b>FD-42G/42GW</b> <b>FD-32G/32GX</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.4$ <b><math>\phi 0.016</math></b> approx.
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<b>FX-MR6</b>	Extremely fine spot of $\phi 0.1$ mm $\phi 0.004$ in approx. achieved. <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-EG31, FD-EG30, FD-42G, FD-42GW, FD-32G, FD-32GX</b></li> <li>Ambient temperature: <math>-20</math> to <math>+60</math> °C <math>-4</math> to <math>+140</math> °F (Note 2)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Fiber</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>FD-EG31</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.1</math> <b><math>\phi 0.004</math></b> approx.</td> </tr> <tr> <td><b>FD-EG30</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.2</math> <b><math>\phi 0.008</math></b> approx.</td> </tr> <tr> <td><b>FD-42G/42GW</b> <b>FD-32G/32GX</b></td> <td><math>7 \pm 0.5</math> <b>0.276 <math>\pm 0.020</math></b></td> <td><math>\phi 0.4</math> <b><math>\phi 0.016</math></b> approx.</td> </tr> </tbody> </table>	Fiber	Distance to focal point	Spot diameter	<b>FD-EG31</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.1$ <b><math>\phi 0.004</math></b> approx.	<b>FD-EG30</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.2$ <b><math>\phi 0.008</math></b> approx.	<b>FD-42G/42GW</b> <b>FD-32G/32GX</b>	$7 \pm 0.5$ <b>0.276 <math>\pm 0.020</math></b>	$\phi 0.4$ <b><math>\phi 0.016</math></b> approx.					
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<b>FX-MR3</b>	Extremely fine spot of $\phi 0.15$ mm $\phi 0.006$ in approx. achieved. <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-EG31, FD-EG30, FD-42G, FD-42GW, FD-32G, FD-32GX</b></li> <li>Ambient temperature: <math>-40</math> to <math>+70</math> °C <math>-40</math> to <math>+158</math> °F (Note 2)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Fiber</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>FD-EG31</b></td> <td><math>7.5 \pm 0.5</math> <b>0.295 <math>\pm 0.020</math></b></td> <td><math>\phi 0.15</math> <b><math>\phi 0.006</math></b> approx.</td> </tr> <tr> <td><b>FD-EG30</b></td> <td><math>7.5 \pm 0.5</math> <b>0.295 <math>\pm 0.020</math></b></td> <td><math>\phi 0.3</math> <b><math>\phi 0.012</math></b> approx.</td> </tr> <tr> <td><b>FD-42G/42GW</b> <b>FD-32G/32GX</b></td> <td><math>7.5 \pm 0.5</math> <b>0.295 <math>\pm 0.020</math></b></td> <td><math>\phi 0.5</math> <b><math>\phi 0.020</math></b> approx.</td> </tr> </tbody> </table>	Fiber	Distance to focal point	Spot diameter	<b>FD-EG31</b>	$7.5 \pm 0.5$ <b>0.295 <math>\pm 0.020</math></b>	$\phi 0.15$ <b><math>\phi 0.006</math></b> approx.	<b>FD-EG30</b>	$7.5 \pm 0.5$ <b>0.295 <math>\pm 0.020</math></b>	$\phi 0.3$ <b><math>\phi 0.012</math></b> approx.	<b>FD-42G/42GW</b> <b>FD-32G/32GX</b>	$7.5 \pm 0.5$ <b>0.295 <math>\pm 0.020</math></b>	$\phi 0.5$ <b><math>\phi 0.020</math></b> approx.					
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Zoom lens	<b>FX-MR8</b>		The spot diameter is adjustable according to how much the fiber is screwed in. <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-R33EG, FD-EG31, FD-R34EG, FD-R32EG, FD-EG30, FD-R31G, FD-42G, FD-42GW, FD-32G, FD-32GX</b></li> <li>Ambient temperature: <math>-55</math> to <math>+70</math> °C <math>-67</math> to <math>+158</math> °F (Note 2)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Fiber</th> <th>Sensing range</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>FD-R33EG</b> <b>FD-EG31</b></td> <td>10 to 30 <b>0.394 to 1.181</b></td> <td><math>\phi 0.4</math> to <math>\phi 2.0</math> <b><math>\phi 0.016</math> to <math>\phi 0.079</math></b> approx.</td> </tr> <tr> <td><b>FD-R34EG</b></td> <td>10 to 30 <b>0.394 to 1.181</b></td> <td><math>\phi 0.4</math> to <math>\phi 2.2</math> <b><math>\phi 0.016</math> to <math>\phi 0.087</math></b> approx.</td> </tr> <tr> <td><b>FD-R32EG</b> <b>FD-EG30</b></td> <td>10 to 30 <b>0.394 to 1.181</b></td> <td><math>\phi 0.5</math> to <math>\phi 2.5</math> <b><math>\phi 0.020</math> to <math>\phi 0.098</math></b> approx.</td> </tr> <tr> <td><b>FD-R31G</b> <b>FD-42G/42GW</b> <b>FD-32G/32GX</b></td> <td>10 to 30 <b>0.394 to 1.181</b></td> <td><math>\phi 0.8</math> to <math>\phi 3.5</math> <b><math>\phi 0.031</math> to <math>\phi 0.138</math></b> approx.</td> </tr> </tbody> </table>	Fiber	Sensing range	Spot diameter	<b>FD-R33EG</b> <b>FD-EG31</b>	10 to 30 <b>0.394 to 1.181</b>	$\phi 0.4$ to $\phi 2.0$ <b><math>\phi 0.016</math> to <math>\phi 0.079</math></b> approx.	<b>FD-R34EG</b>	10 to 30 <b>0.394 to 1.181</b>	$\phi 0.4$ to $\phi 2.2$ <b><math>\phi 0.016</math> to <math>\phi 0.087</math></b> approx.	<b>FD-R32EG</b> <b>FD-EG30</b>	10 to 30 <b>0.394 to 1.181</b>	$\phi 0.5$ to $\phi 2.5$ <b><math>\phi 0.020</math> to <math>\phi 0.098</math></b> approx.	<b>FD-R31G</b> <b>FD-42G/42GW</b> <b>FD-32G/32GX</b>	10 to 30 <b>0.394 to 1.181</b>	$\phi 0.8$ to $\phi 3.5$ <b><math>\phi 0.031</math> to <math>\phi 0.138</math></b> approx.
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Parallel light lens	<b>FX-MR9</b>		Long-range parallel light <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-R33EG, FD-EG31, FD-R34EG, FD-R32EG, FD-EG30, FD-R31G, FD-42G, FD-42GW, FD-32G, FD-32GX</b></li> <li>Ambient temperature: <math>-55</math> to <math>+70</math> °C <math>-67</math> to <math>+158</math> °F (Note 2)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Fiber</th> <th>Sensing range</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>FD-R33EG</b> <b>FD-EG31</b></td> <td>0 to 30 <b>0 to 1.181</b></td> <td><math>\phi 4.0</math> <b><math>\phi 0.016</math></b> approx.</td> </tr> <tr> <td><b>FD-R34EG</b></td> <td>0 to 30 <b>0 to 1.181</b></td> <td><math>\phi 4.0</math> <b><math>\phi 0.016</math></b> approx.</td> </tr> <tr> <td><b>FD-R32EG</b> <b>FD-EG30</b></td> <td>0 to 30 <b>0 to 1.181</b></td> <td><math>\phi 4.0</math> <b><math>\phi 0.016</math></b> approx.</td> </tr> <tr> <td><b>FD-R31G</b> <b>FD-42G/42GW</b> <b>FD-32G/32GX</b></td> <td>0 to 30 <b>0 to 1.181</b></td> <td><math>\phi 4.0</math> <b><math>\phi 0.016</math></b> approx.</td> </tr> </tbody> </table>	Fiber	Sensing range	Spot diameter	<b>FD-R33EG</b> <b>FD-EG31</b>	0 to 30 <b>0 to 1.181</b>	$\phi 4.0$ <b><math>\phi 0.016</math></b> approx.	<b>FD-R34EG</b>	0 to 30 <b>0 to 1.181</b>	$\phi 4.0$ <b><math>\phi 0.016</math></b> approx.	<b>FD-R32EG</b> <b>FD-EG30</b>	0 to 30 <b>0 to 1.181</b>	$\phi 4.0$ <b><math>\phi 0.016</math></b> approx.	<b>FD-R31G</b> <b>FD-42G/42GW</b> <b>FD-32G/32GX</b>	0 to 30 <b>0 to 1.181</b>	$\phi 4.0$ <b><math>\phi 0.016</math></b> approx.
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Pinpoint spot lens	<b>FX-MR1</b>		Pinpoint spot of $\phi 0.5$ mm $\phi 0.020$ in. Enables detection of minute objects or small marks. <ul style="list-style-type: none"> <li>Distance to focal point: <math>6 \pm 1</math> mm <b>0.236 <math>\pm 0.039</math> in</b></li> <li>Applicable fibers: <b>FD-42G, FD-42GW</b></li> <li>Ambient temperature: <math>-40</math> to <math>+70</math> °C <math>-40</math> to <math>+158</math> °F (Note 2)</li> </ul>																
Zoom lens	<b>FX-MR2</b>		The spot diameter is adjustable from $\phi 0.7$ to $\phi 2$ mm $\phi 0.028$ to $\phi 0.079$ in according to how much the fiber is screwed in. <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-42G, FD-42GW</b></li> <li>Ambient temperature: <math>-40</math> to <math>+70</math> °C <math>-40</math> to <math>+158</math> °F (Note 1)</li> <li>Accessory: <b>MS-EX3</b> (mounting bracket)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Screw-in depth</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>7</b> <b>0.276</b></td> <td><math>\phi 18.5</math> <b><math>\phi 0.728</math></b> approx.</td> <td><math>\phi 0.7</math> <b><math>\phi 0.028</math></b></td> </tr> <tr> <td><b>12</b> <b>0.472</b></td> <td><math>\phi 27</math> <b><math>\phi 1.063</math></b> approx.</td> <td><math>\phi 1.2</math> <b><math>\phi 0.047</math></b></td> </tr> <tr> <td><b>14</b> <b>0.551</b></td> <td><math>\phi 43</math> <b><math>\phi 1.693</math></b> approx.</td> <td><math>\phi 2.0</math> <b><math>\phi 0.079</math></b></td> </tr> </tbody> </table>	Screw-in depth	Distance to focal point	Spot diameter	<b>7</b> <b>0.276</b>	$\phi 18.5$ <b><math>\phi 0.728</math></b> approx.	$\phi 0.7$ <b><math>\phi 0.028</math></b>	<b>12</b> <b>0.472</b>	$\phi 27$ <b><math>\phi 1.063</math></b> approx.	$\phi 1.2$ <b><math>\phi 0.047</math></b>	<b>14</b> <b>0.551</b>	$\phi 43$ <b><math>\phi 1.693</math></b> approx.	$\phi 2.0$ <b><math>\phi 0.079</math></b>			
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Zoom lens (Side-view type)	<b>FX-MR5</b>		<b>FX-MR2</b> is converted into a side-view type and can be mounted in a very small space. <ul style="list-style-type: none"> <li>Applicable fibers: <b>FD-42G, FD-42GW</b></li> <li>Ambient temperature: <math>-40</math> to <math>+60</math> °C <math>-40</math> to <math>+140</math> °F (Note 2)</li> </ul>	<b>Sensing range for red LED type (mm in)</b> (Note 1) <table border="1"> <thead> <tr> <th>Screw-in depth</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td><b>8</b> <b>0.315</b></td> <td><math>13</math> <b>0.512</b> approx.</td> <td><math>\phi 0.5</math> <b><math>\phi 0.020</math></b></td> </tr> <tr> <td><b>10</b> <b>0.394</b></td> <td><math>15</math> <b>0.591</b> approx.</td> <td><math>\phi 0.8</math> <b><math>\phi 0.031</math></b></td> </tr> <tr> <td><b>14</b> <b>0.551</b></td> <td><math>30</math> <b>1.181</b> approx.</td> <td><math>\phi 3.0</math> <b><math>\phi 0.118</math></b></td> </tr> </tbody> </table>	Screw-in depth	Distance to focal point	Spot diameter	<b>8</b> <b>0.315</b>	$13$ <b>0.512</b> approx.	$\phi 0.5$ <b><math>\phi 0.020</math></b>	<b>10</b> <b>0.394</b>	$15$ <b>0.591</b> approx.	$\phi 0.8$ <b><math>\phi 0.031</math></b>	<b>14</b> <b>0.551</b>	$30$ <b>1.181</b> approx.	$\phi 3.0$ <b><math>\phi 0.118</math></b>			
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Notes: 1) The sensing ranges are the values when used in combination with red LED type amplifier. Please contact our office for details on sensing ranges for other types of amplifier.  
 2) Refer to "Fiber Selection" for the ambient temperatures of fibers to be used in combination.