



Thrubeam Fiber Optics

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

Model Name	Model Pic	Type	Fiber Length (mm)	Bending Radius (mm)	Sensing Range (mm)
Sort ▲ ▼		Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼
FT-B8		M4 Threaded Head	2000	25	1600
FT-FM2		M4 Threaded Head	2000	25	1000
FT-R80		M4 Threaded Head, 90 Degree Elbow	2000	25	740

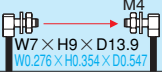
LIST OF FIBERS

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

Thru-beam type (one pair set)



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

Type	Shape of fiber head (mm in)	Sensing range (mm in)(Note 2)	■ : U-LG ■ : LONG ■ : STDF ■ : STD	■ : FAST ■ : H-SP ■ : S-D	Min. sensing object (Note 3)	Fiber cable length Free-cut	Bending radius	Model No.
Thru-beam type	M4	Lens mountable	1,600 62.992 1,100 43.307 700 27.559 530 20.866	400 15.748 200 7.874 180 7.087	φ 0.04 mm φ 0.0016 in opaque object	2 m 6.562 ft	R25 mm R0.984 in	FT-B8
		Lens mountable						FT-FM2
		Sleeve 90 mm 3.543 in	1,000 39.370 780 30.709 500 19.685 400 15.748	280 11.024 150 5.906 130 5.118	φ 0.03 mm φ 0.0012 in opaque object		Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	FT-FM2S
		Sleeve 40 mm 1.575 in						FT-FM2S4
		Lens mountable	750 29.528 570 22.441 350 13.780 290 11.417	200 7.874 90 3.543 100 3.937	φ 0.03 mm φ 0.0012 in opaque object	1 m 3.281 ft	R1 mm R0.039 in	FT-W8
		Lens mountable	900 35.433 650 25.591 400 15.748 320 12.598	230 9.055 100 3.937 110 4.331	φ 0.04 mm φ 0.0016 in opaque object		R4 mm R0.157 in Flexible	FT-P80
		Lens mountable	900 35.433 650 25.591 380 14.961 320 12.598	230 9.055 100 3.937 110 4.331	φ 0.05 mm φ 0.0020 in opaque object		R10 mm R0.394 in	FT-P81X
		Tough flexible						
	Lens mountable	550 21.654 400 15.748 250 9.843 190 7.480	140 5.512 70 2.756 80 3.150	φ 0.04 mm φ 0.0016 in opaque object	2 m 6.562 ft	R4 mm R0.157 in Flexible	FT-P60	
	Nut type	 W7×H9×D13.9 W0.276×H0.354×D0.547	750 29.528 570 22.441 350 13.780 290 11.417	200 7.874 90 3.543 100 3.937	φ 0.06 mm φ 0.0024 in opaque object	2 m 6.562 ft	R1 mm R0.039 in	FT-WR80
		With lens W7×H9×D14.6 W0.276×H0.354×D0.575	1,500 59.055 1,200 47.244 750 29.528 600 23.622	420 16.535 200 7.874 210 8.268	φ 0.04 mm φ 0.0016 in opaque object		FT-WR80L	
	Elbow	Lens mountable	740 29.134 530 20.866 320 12.598 230 9.055	150 5.906 75 2.953 80 3.150	φ 0.04 mm φ 0.0016 in opaque object	2 m 6.562 ft	R25 mm R0.984 in	FT-R80
	M3	Lens mountable (except FX-LE2)	1,000 39.370 780 30.709 500 19.685 400 15.748	280 11.024 150 5.906 130 5.118	φ 0.03 mm φ 0.0012 in opaque object	2 m 6.562 ft	R25 mm R0.984 in	FT-T80
								FT-NFM2
		Sleeve 90 mm 3.543 in	400 15.748 270 10.630 200 7.874 140 5.512	100 3.937 55 2.165 49 1.929	φ 0.025 mm φ 0.0010 in opaque object		Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	FT-NFM2S
		Sleeve 40 mm 1.575 in						FT-NFM2S4
			220 8.661 160 6.299 100 3.937 80 3.150	55 2.165 25 0.984 28 1.102	φ 0.02 mm φ 0.0008 in opaque object	R1 mm R0.039 in	FT-W4	
			350 13.780 250 9.843 150 5.906 100 3.937	75 2.953 30 1.181 35 1.378		R4 mm R0.157 in Flexible	FT-P40	
Long sensing range		With lens	19,500 767.715 19,500 767.715 19,500 767.715 14,000 551.180	10,000 393.700 3,500 137.795 3,800 149.606	φ 0.4 mm φ 0.016 in opaque object	10 m 32.808 ft	R25 mm R0.984 in	FT-FM10L

Notes: 1) Refer to p.27 for the sensing ranges for the FX-301(-HS) in H-SP mode and for the FX-301B/G/H.

2) Please take care that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.

3) The minimum sensing object size is the value for red LED type. Please contact our office for information on the minimum sensing object size if using amplifiers other than red LED type.

The optimum condition is the condition when the sensitivity is set so that the sensing output just changes to light incident operation in the object absent condition.

LIST OF SENSING RANGE FOR FX-301(P)-HS・FX-301B/G/H

Sensing range for ultra high-speed type FX-301(P)-HS in H-SP mode (35 μs)(Typical model)

	Fiber model No.	Sensing range (mm in) (Note)		Fiber model No.	Sensing range (mm in) (Note)
Thru-beam type	FT-B8	160 6.299	Reflective type	FD-B8	60 2.362
	FT-FM2	120 4.724		FD-FM2	35 1.378
	FT-NFM2	40 1.575		FD-NFM2	14 0.551
	FT-E12	2 0.079		FD-E12	1 0.039
	FT-E22	10 0.394		FD-E22	5 0.197

Note: The sensing ranges are in H-SP mode. The sensing ranges in FAST, STD, S-D and LONG modes are the same as for the **FX-301**. (Refer to p.18～)

Sensing range for FX-301B/G/H (Typical model)

(mm in)

		Thru-beam type										
		FT-B8	FT-FM2	FT-NFM2	FT-V10	FT-W8	FT-Z8	FT-P80	FT-A30	FT-A8	FT-E12	FT-E22
FX-301B	LONG	220 8.661	150 5.906	50 1.969	400 15.748	90 3.543	120 4.724	130 5.118	2,400 94.488	600 23.622	3 0.118	14 0.551
	STD	110 4.331	75 2.953	25 0.984	200 7.874	45 1.772	60 2.362	65 2.559	1,200 47.244	300 11.811	2 0.079	7 0.276
	FAST	75 2.953	40 1.575	16 0.630	130 5.118	30 1.181	40 1.575	45 1.772	700 27.559	220 8.661	1 0.039	4 0.157
FX-301G	LONG	110 4.331	70 2.756	24 0.945	200 7.874	56 2.205	60 2.362	70 2.756	1,200 47.244	300 11.811	1 0.039	6 0.236
	STD	55 2.165	35 1.378	12 0.472	100 3.937	28 1.102	30 1.181	35 1.378	600 23.622	150 5.906	—	3 0.118
	FAST	40 1.575	24 0.945	8 0.315	65 2.559	20 0.787	22 0.866	25 0.984	350 13.780	110 4.331	—	2 0.079
FX-301H (Note)	LONG	100 3.937	50 1.969	16 0.630	150 5.906	42 1.654	46 1.811	56 2.205	800 31.496	220 8.661	4 0.157	10 0.394
	STD	50 1.969	25 0.984	8 0.315	75 2.953	21 0.827	23 0.906	28 1.102	400 15.748	110 4.331	2 0.079	5 0.197
	FAST	30 1.181	18 0.709	5 0.197	40 1.575	15 0.591	16 0.630	20 0.787	240 9.449	80 3.150	1.5 0.059	3 0.118

Note: Infrared types are easily affected by humidity, so if using them in environments with high humidity or where the humidity fluctuates, please contact our office.

(mm in)

		Reflective type										
		FD-B8	FD-FM2	FD-NFM2	FD-W8	FD-P80	FD-AFM2	FD-G4	FD-EG1	FD-E12	FD-E22	FD-G6X
FX-301B	LONG	80 3.150	46 1.811	16 0.630	23 0.906	40 1.575	40 1.575	22 0.866	6 0.236	2 0.079	6 0.236	22 0.866
	STD	40 1.575	23 0.906	8 0.315	11 0.433	20 0.787	20 0.787	11 0.433	3 0.118	1 0.039	3 0.118	11 0.433
	FAST	26 1.024	15 0.591	5 0.197	8 0.315	13 0.512	13 0.512	8 0.315	2 0.079	—	2 0.079	6 0.236
FX-301G	LONG	42 1.654	24 0.945	8 0.315	14 0.551	20 0.787	18 0.709	12 0.472	3 0.118	1 0.039	3 0.118	12 0.472
	STD	21 0.827	12 0.472	4 0.157	7 0.276	10 0.394	9 0.354	6 0.236	1.5 0.059	—	1.5 0.059	6 0.236
	FAST	14 0.551	8 0.315	2 0.079	4 0.157	7 0.276	5 0.197	4 0.157	1 0.039	—	1 0.039	4 0.157
FX-301H (Note)	LONG	26 1.024	20 0.787	6 0.236	11 0.433	18 0.709	12 0.472	7 0.276	10 0.394	1 0.039	6 0.236	18 0.709
	STD	13 0.512	10 0.394	3 0.118	5.5 0.217	9 0.354	6 0.236	3.5 0.138	5 0.197	—	3 0.118	9 0.354
	FAST	9 0.354	7 0.276	2 0.079	3 0.118	6 0.236	4 0.157	2 0.079	3 0.118	—	2 0.079	5 0.197

Note: Infrared types are easily affected by humidity, so if using them in environments with high humidity or where the humidity fluctuates, please contact our office.

Sensing range when using in combination with FR-WKZ11 reflector (optional)

The sensing ranges are the values for **FX-305** / **FX-301** infrared types.

(mm in)

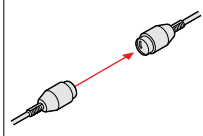
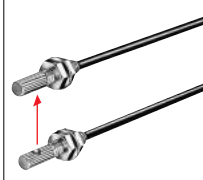
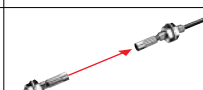
RF-230	100 to 3,200 3.937 to 125.984 (LONG), 100 to 2,000 3.937 to 78.740 (STD), 100 to 1,600 3.937 to 62.992 (FAST), 100 to 1,000 3.937 to 39.370 (S-D)
RF-220	100 to 2,400 3.937 to 94.488 (LONG), 100 to 1,300 3.937 to 51.181 (STD), 100 to 1,000 3.937 to 39.370 (FAST), 100 to 600 3.937 to 23.622 (S-D)
RF-210	100 to 1,100 3.937 to 43.307 (LONG), 100 to 700 3.937 to 27.559 (STD), 100 to 550 3.937 to 21.654 (FAST), 100 to 300 3.937 to 11.811 (S-D)

Note: The sensing range indicates the allowable setting range for the reflector. The fiber head can detect objects at distances of 100 mm 3.937 in or less.

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 before use.

FIBER OPTIONS

Lens (For thru-beam type fiber)

Designation	Model No.	Description	
For thru-beam type fiber	Expansion lens (Note 1)	FX-LE1	 Increases the sensing range by 5 times or more. Ambient temperature: - 60 to +350 °C - 76 to +662 °F
	Super-expansion lens (Note 1)	FX-LE2	 Tremendously increases the sensing range with large diameter lenses. Ambient temperature: - 60 to +350 °C - 76 to +662 °F
	Side-view lens	FX-SV1	 Beam axis is bent by 90 °. Ambient temperature: - 60 to +300 °C - 76 to +572 °F
	Expansion lens for vacuum fiber (Note 1)	FV-LE1	 Sensing range increases by 10 times or more. Ambient temperature: - 40 to +120 °C - 40 to +248 °F

Sensing range for red LED type (mm) [Lens on both sides] (Note 3)								
Fiber	Mode	U-LG	LONG	STDF	STD	FAST	S-D	H-SP
FT-B8		3,500	3,500	3,000	2,500	2,000	1,000	1,000
FT-FM2		3,500	3,500	3,500	3,500	2,500	1,300	1,000
FT-T80		3,500	3,500	3,500	3,500	2,500	1,300	1,000
FT-R80		3,500	3,500	3,500	2,300	1,600	800	750
FT-W8		3,500	3,500	3,500	2,900	2,000	1,000	900
FT-P80		3,500	3,500	3,500	3,500	2,500	1,100	1,000
FT-P60		3,500	3,500	3,500	3,500	1,500	900	800
FT-P81X		1,600	1,600	1,600	1,600	1,600	1,100	950
FT-H35-M2		3,500	3,500	2,500	2,000	1,500	750	700
FT-H20W-M1		1,600	1,600	1,600	1,300	900	500	400
FT-H20-M1		1,600	1,600	1,600	1,600	1,100	900	600

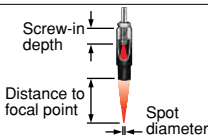
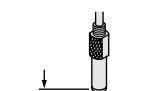
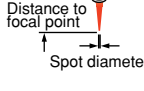
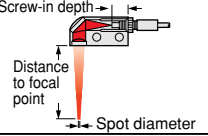
Sensing range for red LED type (mm) [Lens on both sides] (Note 3)								
Fiber	Mode	U-LG	LONG	STDF	STD	FAST	S-D	H-SP
FT-B8		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-FM2		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-R80		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-W8		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-P80		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-P60		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-P81X		1,600	1,600	1,600	1,600	1,600	1,600	1,600
FT-H35-M2		3,500	3,500	3,500	3,500	3,500	3,500	3,500
FT-H20W-M1		1,600	1,600	1,600	1,600	1,600	1,500	1,600
FT-H20-M1		1,600	1,600	1,600	1,600	1,600	1,600	1,600
FT-H13-FM2		3,500	3,500	3,500	3,500	3,500	3,500	3,500

Sensing range for red LED type (mm) [Lens on both sides] (Note 3)				
Fiber	Mode	LONG	STD	FAST
FT-B8		1,100	530	400
FT-FM2		1,200	600	440
FT-T80		1,200	600	440
FT-W8		900	450	330
FT-P80		1,200	600	440
FT-P60		650	300	200
FT-P81X		1,200	600	440
FT-H35-M2		550	280	200
FT-H20W-M1		310	140	100
FT-H20-M1		550	280	200

Sensing range for red LED type (mm) [Lens on both sides] (Note 3, 4)								
Fiber	Mode	U-LG	LONG	STDF	STD	FAST	S-D	H-SP
FT-H30-M1V		1,600	1,200	650	450	300	150	200

Notes: 1) Be careful when installing the thru-beam type fiber equipped with the expansion lens, as the beam envelope becomes narrow and alignment is difficult. Especially when installing a fiber with many cores (sharp bending fibers and heat-resistant glass fiber), please be sure to use it only after you have adjusted it sufficiently.
2) The fiber cable length practically limits the sensing range to 3,500 mm [137.795 in](#) long (FT-H20W-M1, FT-P81X and FT-H20-M1: 1,600 mm [62.992 in](#)).
3) 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.
4) The fiber cable length for the FT-H30-M1V is 1 m [3.281 ft](#). The sensing ranges in U-LG and LONG modes take into account the length of the FT-J8 atmospheric side fiber.

Lens (For reflective type fiber)

Designation	Model No.	Description	
Pinpoint spot lens	FX-MR1		Pinpoint spot of $\phi 0.5$ mm $\phi 0.020$ in. Enables detection of minute objects or small marks. - Distance to focal point: 6 ± 1 mm 0.236 ± 0.039 in - Ambient temperature: - 40 to +70 °C - 40 to +158 °F
Zoom lens	FX-MR2	 Screw-in depth Distance to focal point Spot diameter	The spot diameter is adjustable from $\phi 0.7$ mm to $\phi 2$ mm $\phi 0.028$ in to $\phi 0.079$ in according to how much the fiber is screwed in. - Applicable fibers: FD-WG4, FD-G4 - Ambient temperature: - 40 to +70 °C - 40 to +158 °F - Accessory: MS-EX-3 (mounting bracket)
Finest spot lens	FX-MR3		Extremely fine spot of $\phi 0.3$ mm $\phi 0.012$ in approx. achieved. - Applicable fibers: FD-WG4, FD-G4, FD-EG1, FD-EG2, FD-EG3, FD-G6X, FD-G6 - Ambient temperature: - 40 to +70 °C - 40 to +158 °F
Finest spot lens	FX-MR6	 Distance to focal point Spot diameter	Extremely fine spot of $\phi 0.1$ mm $\phi 0.004$ in approx. achieved. - Applicable fibers: FD-WG4, FD-G4, FD-EG1, FD-EG2, FD-EG3, FD-G6X, FD-G6 - Ambient temperature: - 20 to +60 °C - 4 to +140 °F
Zoom lens (Side-view type)	FX-MR5	 Screw-in depth Distance to focal point Spot diameter	FX-MR2 is converted into a side-view type and can be mounted in a very small space. - Applicable fibers: FD-WG4, FD-G4 - Ambient temperature: - 40 to +70 °C - 40 to +158 °F

Sensing range for red LED type (Note)		
Screw-in depth	Distance to focal point	Spot diameter
7 mm	18.5 mm approx.	$\phi 0.7$ mm
12 mm	27 mm approx.	$\phi 1.2$ mm
14 mm	43 mm approx.	$\phi 2.0$ mm

Sensing range for red LED type (Note)		
Fiber model No.	Distance to focal point	Spot diameter
FD-EG3	7.5 ± 0.5 mm	$\phi 0.15$ mm approx.
FD-EG2	7.5 ± 0.5 mm	$\phi 0.2$ mm approx.
FD-EG1	7.5 ± 0.5 mm	$\phi 0.3$ mm approx.
FD-WG4/G4/G6X/G6	7.5 ± 0.5 mm	$\phi 0.5$ mm approx.

Sensing range for red LED type (Note)		
Fiber model No.	Distance to focal point	Spot diameter
FD-EG3	7 ± 0.5 mm	$\phi 0.1$ mm approx.
FD-EG2	7 ± 0.5 mm	$\phi 0.15$ mm approx.
FD-EG1	7 ± 0.5 mm	$\phi 0.2$ mm approx.
FD-WG4/G4/G6X/G6	7 ± 0.5 mm	$\phi 0.4$ mm approx.

Sensing range for red LED type (Note)		
Screw-in depth	Distance to focal point	Spot diameter
8 mm	13 mm approx.	$\phi 0.5$ mm
10 mm	15 mm approx.	$\phi 0.8$ mm
14 mm	30 mm approx.	$\phi 3.0$ mm

Note: 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.

FIBER OPTIONS

Others

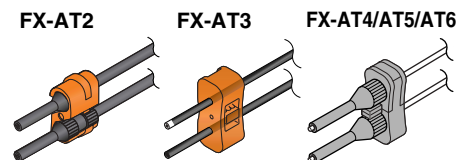
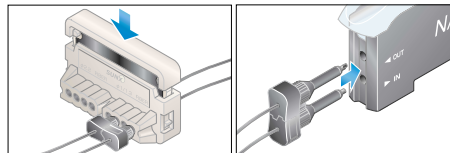
Designation	Model No.	Description			
Protective tube (For thru-beam) type fiber	FTP-500 (0.5 m 1.640 ft)	For M4 thread	Applicable fibers	FT-B8 FT-P80 FT-FM2 FT-P60 FT-FM2S FT-FM2S4 FT-H13-FM2	The protective tube, made of non-corrosive stainless steel, protects the inner fiber cable from any external forces.
	FTP-1000 (1 m 3.281 ft)				
	FTP-1500 (1.5 m 4.921 ft)				
	FTP-N500 (0.5 m 1.640 ft)	For M3 thread		FT-T80 FT-P40 FT-NFM2 FD-T40 FT-NFM2S FD-P40 FT-NFM2S4	
	FTP-N1000 (1 m 3.281 ft)				
	FTP-N1500 (1.5 m 4.921 ft)				
Protective tube (For reflective) type fiber	FDP-500 (0.5 m 1.640 ft)	For M6 thread	FD-B8 FD-P80 FD-FM2 FT-H13-FM2 FD-FM2S FD-FM2S4		
	FDP-1000 (1 m 3.281 ft)				
	FDP-1500 (1.5 m 4.921 ft)				
	FDP-N500 (0.5 m 1.640 ft)	For M4 thread	FD-T80 FD-NFM2 FD-NFM2S FD-NFM2S4		
	FDP-N1000 (1 m 3.281 ft)				
	FDP-N1500 (1.5 m 4.921 ft)				
Fiber bender	FB-1	The fiber bender bends the sleeve part of the fiber head at the proper radius. (Note)			
Universal sensor mounting stand	MS-AJ1-F	Horizontal mounting type	Mounting stand assembly for fiber (For M3, M4 or M6 threaded head fiber)		
	MS-AJ2-F	Vertical mounting type			
Fiber cutter	FX-CT2	The free-cut type fiber can be easily cut. [Accessory. FX-CT1 is attached with the FT-P80 or the FD-P80 . The FX-CT2 is provided with fibers other than this.]			
	FX-CT1				
Attachment for fixed-length fiber	FX-AT2	This is the attachment for the fixed length fiber. (Accessory)			
Attachment for $\phi 2.2$ mm $\phi 0.087$ in fiber	FX-AT3	This is the attachment for the $\phi 2.2$ mm $\phi 0.087$ in fiber. . (Accessory. Does not attach with the FT-P80 or the FD-P80 .)			
Attachment for $\phi 1$ mm $\phi 0.039$ in fiber	FX-AT4	This is the attachment for the $\phi 1$ mm $\phi 0.039$ in fiber. (Accessory)			
Attachment for $\phi 1.3$ mm $\phi 0.051$ in fiber	FX-AT5	This is the attachment for the $\phi 1.3$ mm $\phi 0.051$ in fiber. (Accessory)			
Attachment for $\phi 1$ mm $\phi 0.039$ in / $\phi 1.3$ mm $\phi 0.051$ in mixed fiber	FX-AT6	This is the attachment for the $\phi 1$ mm $\phi 0.039$ in / $\phi 1.3$ mm $\phi 0.051$ in mixed fiber. (Accessory)			

Note: Do not bend the sleeve part of any side-view type fiber or ultra-small diameter head type fiber.

Fiber attachment

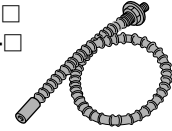
It's possible to simultaneously cut two fibers to the same length

Each fiber (with some exceptions) has a newly developed two-in-one fiber attachment (**FX-AT3/AT4/AT5/AT6**) which enables two fibers to be cut simultaneously to the same length with the new fiber cutter (**FX-CT2**). Also, since the fibers can be attached to the amplifier while being fixed in position in the two-in-one fiber attachment, sensitivity changes resulting from variation in the amount of fiber insertion do not occur.



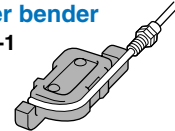
Protective tube

- FTP-□
- FDP-□



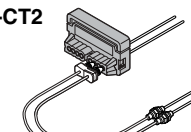
Fiber bender

- FB-1

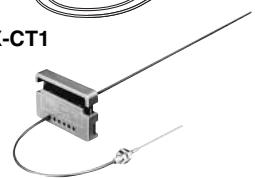


Fiber cutter

- FX-CT2



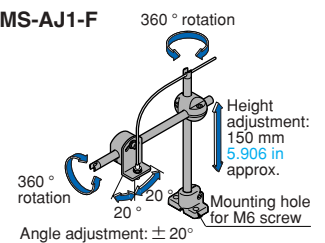
- FX-CT1



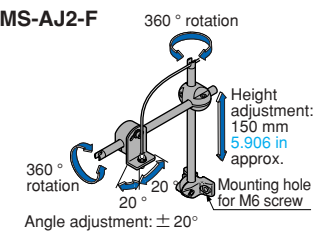
Universal sensor mounting stand

Using the arm which enables adjustment in the horizontal direction, sensing can also be done from above an assembly line.

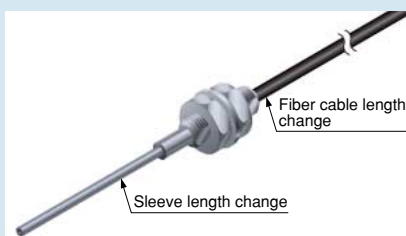
- MS-AJ1-F



- MS-AJ2-F



Guide to interchanging fiber length and sleeve length



Custom-ordered products are available with different fiber lengths and sleeve lengths in order to respond quickly to different requirements.

Custom-ordered product (Typical)

- Fiber length can be set up to 30 m 98.425 ft in units of 1 m 3.281 ft **FT-B8**, **FT-AFM2** etc.
- Sleeve length can be set up to 12 cm 4.724 in units of 1 cm 0.394 in **FT-FM2S4**, **FD-NFM2S4** etc.

Please contact us.