FIBER OPTIONS

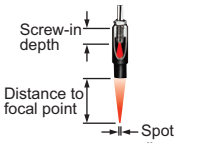
Lens (For reflective type fiber)

For reflective type fiber

Pinpoint spot lens — FX-MR1

Pinpoint spot of ø0.5 mm ø0.020 in. Enables detection of minute objects or small marks.
- Distance to focal point: 6 ± 1 mm 0.236 ± 0.039 in
- Applicable fibers: **FD-WG4**, **FD-G4**
- Ambient temperature: –40 to +70 °C –40 to +158 °F (Note 2)

Zoom lens — FX-MR2

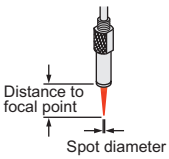


The spot diameter is adjustable from ø0.7 to ø2 mm ø0.028 to ø0.079 in according to how much the fiber is screwed in.
- Applicable fibers: **FD-WG4**, **FD-G4**
- Ambient temperature:–40 to +70 °C –40 to +158 °F (Note 2)
- Accessory: **MS-EX-3** (mounting bracket)

Sensing range for red LED type (Note 1)

Screw-in depth	Distance to focal point	Spot diameter
7 mm 0.276 in	18.5 mm 0.728 in approx.	ø0.7 mm ø0.028 in
12 mm 0.472 in	27 mm 1.063 in approx.	ø1.2 mm ø0.047 in
14 mm 0.551 in	43 mm 1.693 in approx.	ø2.0 mm ø0.079 in

Finest spot lens — FX-MR3



Extremely fine spot of ø0.3 mm ø0.012 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 (Note 2)

Sensing range for red LED type (Note 1)

Fiber model No.	Distance to focal point	Spot diameter
FD-EG3	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.15 mm ø0.006 in approx.
FD-EG2	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.2 mm ø0.008 in approx.
FD-EG1	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.3 mm ø0.012 in approx.
FD-WG4/G4/G6X/G6	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.5 mm ø0.020 in approx.

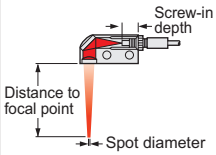
Finest spot lens — FX-MR6

Extremely fine spot of ø0.1 mm ø0.004 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 (Note 2)

Sensing range for red LED type (Note 1)

Fiber model No.	Distance to focal point	Spot diameter
FD-EG3	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.1 mm ø0.004 in approx.
FD-EG2	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.15 mm ø0.006 in approx.
FD-EG1	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.2 mm ø0.008 in approx.
FD-WG4/G4/G6X/G6	7.5 ±0.5 mm 0.295 ±0.020 in	ø0.4 mm ø0.016 in approx.

Zoom lens (side-view type) — FX-MR5



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 (Note 2)

Sensing range for red LED type (Note 1)

Screw-in depth	Distance to focal point	Spot diameter
8 mm 0.315 in	13 mm 0.512 in approx.	ø0.5 mm ø0.020 in
10 mm 0.394 in	15 mm 0.591 in approx.	ø0.8 mm ø0.031 in
14 mm 0.551 in	30 mm 1.181 in approx.	ø3.0 mm ø0.018 in

Notes: 1) The sensing ranges are the values when used in combination with **FX-300** series red LED type amplifier. Please contact our office for details on sensing ranges for other types of amplifier.
2) Refer to p.75~ for the ambient temperatures of fibers to be used in combination.

FIBER OPTIONS

Others

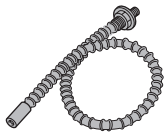
Designation	Model No.	Description			
Protective tube (For thru-beam type fiber)	**FTP-500** (0.5 m 1.640 ft)	For M4 thread	Applicable fibers	**FT-42** **FT-FM2S4** **FT-B8** **FT-H13-FM2** **FT-FM2** **FT-P60** **FT-FM2S** **FT-P80**	The protective tube, made of non-corrosive stainless steel, protects 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-31** **FT-P40** **FT-NFM2** **FT-T80** **FT-NFM2S** **FD-P40** **FT-NFM2S4** **FD-T40**	
	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-61** **FD-FM2S4** **FD-B8** **FD-H13-FM2** **FD-FM2** **FD-P80** **FD-FM2S**	
	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-41** **FD-NFM2S4** **FD-NFM2** **FD-T80** **FD-NFM2S**	
	FDP-N1000 (1 m 3.281 ft)				
	FDP-N1500 (1.5 m 4.921 ft)				

Designation	Model No.	Description	
Fiber bender	**FB-1**	The fiber bender bends the sleeve part of the fiber head at the proper radius. (Note 1)	
Universal sensor mounting stand (Note 2)	**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	
Attachment for ø1 mm ø0.039 in fiber	**FX-AT10**	This is the attachment for the ø1 mm ø0.039 in fiber. (Black) Applicable amplifier: **FX2**/**FX3** series	
Attachment for ø1.3 mm ø0.051 in fiber	**FX-AT13**	This is the attachment for the ø1.3 mm ø0.051 in fiber. (Glay) Applicable amplifier: **FX2**/**FX3** series	
Attachment for ø1 mm ø0.039 in / ø1.3 mm ø0.051 in mixed fiber	**FX-AT15**	This is the attachment for the ø1 mm ø0.039 in / ø1.3 mm ø0.051 in mixed fiber. (Black/Glay) Applicable amplifier: **FX2**/**FX3** series	
Resin nut set	**FX-M6N**	Applicable fibers: **FD-G60**	For 10 set of resin M6 nuts and fl at washers
	FX-M4N	**FT-F41** **FD-G40**	For 10 set of resin M4 nuts and fl at washers
Liquid inflow prevention joint (Note 3)	**MS-FX-01Y**	**FD-HF40Y** **FD-F41Y**	This joint suppresses false operations due to liquid slip-in from the top of the protective tube.
Protective tube extension joint (Note 3)	**MS-FX-02Y**		The protective tube can be extended.
Fiber mounting joint (Note 3)	**MS-FX-03Y**		The joint is used for mounting fibers on a tank.
Single core holder	**FX-AT15A**	The incident light intensity may vary when using a multi-core fiber or a thin type sharp bending fiber. This holder suppresses the variation in the incident light intensity. (Brown)	

Notes: 1) Do not bend the sleeve part of any side-view type fiber or ultra-small diameter head type fiber.
2) Refer to the universal sensor mounting stand **MS-AJ** series pages.
3) The joint internal ferrule (**MS-FX-YF**) is available as a spare part. A distorted ferrule may result in leakage.

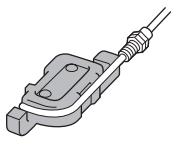
Protective tube

- **FTP-□**
- **FDP-□**



Fiber bender

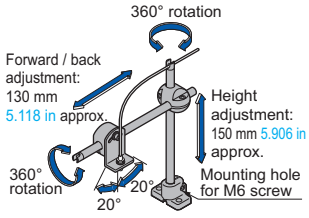
- **FB-1**



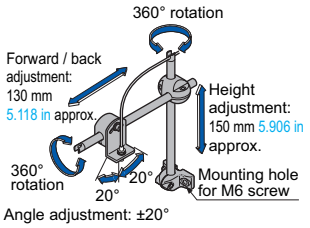
Universal sensor mounting stand

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

- **MS-AJ1-F**

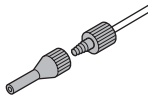


- **MS-AJ2-F**



Fiber attachment

- **FX-AT10**
- **FX-AT13**
- **FX-AT15**

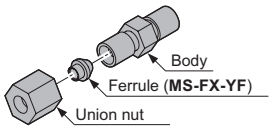


Single core holder

- **FX-AT15A**

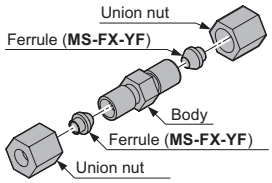
Liquid inflow prevention joint

- **MS-FX-01Y**



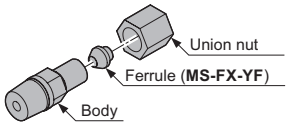
Protective tube extension joint

- **MS-FX-02Y**



Fiber mounting joint

- **MS-FX-03Y**



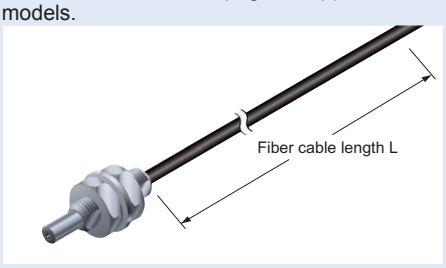
Semi-custom fibers that flexibly meet diverse needs

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. Contact your nearest our office for details on model numbers, standard prices and delivery periods.

Fiber length change

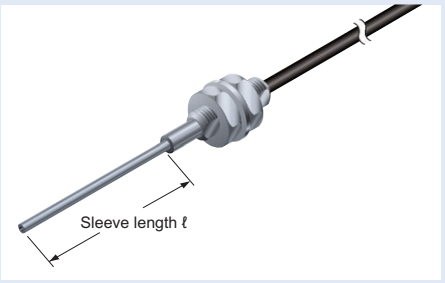
Extension up to 30 m 98.425 ft in units of 1 m 3.281 ft is possible, with the actual extension length varying depending on the model. Refer to the table on the next page for applicable models.



Note: Note that the model number differs from previous models with changed lengths.

Sleeve length change

Extension is possible up to 12 cm 4.724 in in units of 1 cm 0.394 in. Applicable models are sleeve extension-type models indicated by ▲ in the table on the next page.

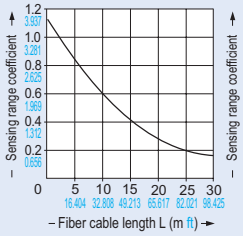


Note: Note that the model number differs from previous models with changed lengths.

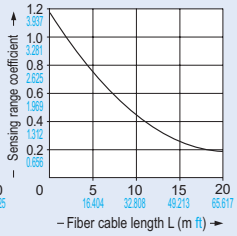
• Fiber cable length and sensing range damping ratio characteristics

Note that the longer the fiber cable length, the shorter the sensing range.

Thru-beam type



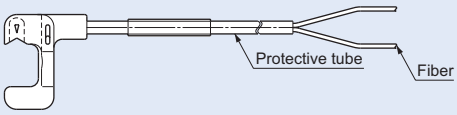
Reflective type



Note : Because infrared types are easily affected by humidity, please ask assistance when using them in a humid environment or in an environment with varying humidity.

Extended protective tube

The chemical-resistant cover and metal jacket can be extended in accordance with the fiber cable length. Applicable models are indicated in the table below as follows.
★: Models which can have extended protective tube (fluorine resin)
☆: Models which can have extended metal jacket sheath



Applicable models

Maximum extension length: 30 m 98.425 ft
Units: 1 m 3.281 ft

Thru-beam type	Reflective type
FT-31	FD-31
FT-42	FD-41
FT-AFM2	FD-61
FT-AFM2E	FD-A15
FT-B8	FD-AFM2
★FT-F902	FD-AFM2E
FT-FM10L	FD-B8
FT-FM2	★FD-F705
FT-FM2S	FD-FM2
▲FT-FM2S4	FD-FM2S
FT-H13-FM2	▲FD-FM2S4
★FT-HL80Y	FD-G4
★FT-L80Y	FD-G6
FT-NFM2	☆FD-G6X
FT-NFM2S	FD-H13-FM2
▲FT-NFM2S4	FD-NFM2
FT-P2	FD-NFM2S
FT-P40	▲FD-NFM2S4
FT-P60	FD-P2
FT-P80	FD-P40
FT-PS1	FD-P50
FT-R80	FD-P60
FT-S21	FD-P80
FT-SFM2	FD-R80
FT-SFM2L	FD-S31
FT-SNFM2	FD-S80
FT-T80	FD-SNFM2
FT-V10	FD-T40
★FT-V80Y	FD-T80
FT-W4	FD-W8
FT-W8	FD-W44
FT-WR80	FD-WG4
FT-WR80L	FD-WKZ1
FT-WS3	FD-WS8
FT-WS4	FD-WSG4
FT-WS8	FD-WT4
FT-WS8L	FD-WT8
FT-WZ4	FD-WZ4
FT-WZ4HB	FD-WZ4HB
FT-WZ7	FD-WZ7
FT-WZ7HB	FD-WZ7HB
FT-WZ8	Retroreflective type
FT-WZ8E	FR-WKZ11
FT-WZ8H	
FT-Z8	
FT-Z802Y	
FT-Z8E	
FT-Z8H	

Maximum extension length: 10 m 32.808 ft
Units: 0.1 m 0.328 ft

Thru-beam type	Reflective type
FT-30	FD-30
FT-40	FD-40
FT-S20	FD-60
FT-S30	FD-S30

Maximum extension length: 10 m 32.808 ft
Units: 0.5 m 1.640 ft

Thru-beam type	Reflective type
FT-E13	FD-P81X
FT-E23	FD-SFM2SV2
FT-K8	FD-V41
FT-KV1	FD-WV42
FT-KV8	Retroreflective type
FT-P81X	FR-KV1
FT-SFM2SV2	FR-KZ21
FT-V22	FR-KZ21E
FT-V41	
FT-WKV8	
FT-WV42	

Maximum extension length: 10 m 32.808 ft
Units: 1 m 3.281 ft

Thru-beam type	Reflective type
FT-41	FD-F4
	FD-F41
	FD-G40
	FD-G60

Maximum extension length: 6.5 m 21.325 ft
Units: 0.1 m 0.328 ft

Thru-beam type	Reflective type
FT-H20-M1	FD-H20-21
FT-H20W-M1	FD-H20-M1
FT-H20-J50-S*	FD-H25-L43
FT-H20-VJ80-S*	FD-H25-L45
FT-H30-M1V-S*	FD-H30-KZ1V-S*
FT-H35-M2	FD-H30-L32V-S*
▲FT-H35-M2S6	FD-H35-20S
	FD-H35-M2
	▲FD-H35-M2S6

* The heat-resistant side fiber and the vacuum side fiber allows the cable length to be extended.

Maximum extension length: 5 m 16.404 ft
Units: 1 m 3.281 ft

Reflective type	
FD-F41Y	FD-L45
FD-FA9	FD-L45A
FD-H18-L31	FD-L46
FD-H30-L32*	FD-L47
FD-HF40Y	FD-L51
FD-L4	FD-L52
FD-L41	FD-L53
FD-L43	FD-L54
FD-L44	FD-WL41
FD-L44S	FD-WL48

* The **FD-H30-L32** extension length is in units of 0.1 m 0.328 ft.

Maximum extension length: 3 m 9.843 ft
Units: 0.1 m 0.328 ft

Thru-beam type	Reflective type
FT-E12	FD-E12
FT-E22	FD-E22
	FD-EG1
	FD-EG2
	FD-EG3
	FD-EN500S1
	FD-ENM1S1

Protective tube extension length: 10 m 32.808 ft
Units: 0.5m 1.640 ft
(**FD-G6X**: 0.1 m 0.328 ft)

Thru-beam type	Reflective type
FT-F902	FD-F705
FT-L80Y	FD-G6X *
FT-V80Y	

* The **FD-G6X** allows the length of the metal jacket sheath to be extended.

5 m 16.404 ft fiber cable length type is available for the **FT-A8/A30** and the **FT-WA8/WA30** (production by order).

★: Models which can have extended protective tube (fluorine resin)
☆: Models which can have extended metal jacket sheath
▲: Models which can have extended sleeve