SPECIFICATIONS

Item \ Type		Standard	Flexible
		FT/FD-B8, **FT/FD-FM□**, **FT/FD-N□**, **FT/FD-R80**, **FT/FD-S□**, **FT/FD-T□**, **FT/FD-V□**	**FT/FD-P□**, **FT-Z□** (excluding tough flexible fiber and chemical-resistant fiber)
Allowable bending radius		R25 mm R0.984 in or more [Sleeve of a head with sleeve: R10 mm R0.394 in or more (Note 2)]	R4 mm R0.157 in or more
Bending durability		———	1 million times or more (at R10 mm R0.394 in, **FT-P40/P2** and **FD-P40/P2**: at R4 mm R0.157 in)
Ambient temperature		–40 to +70 °C –40 to +158 °F (**FT-SFM2SV2**: –20 to +70 °C –4 to +158 °F, **FT-V22**, **FD-SFM2SV2**: –20 to +60 °C –4 to +140 °F, **FT-V41**, **FD-V41**, **FT-V10**: –40 to +60 °C –40 to +140 °F)	–40 to +70 °C –40 to +158 °F (**FT-Z8□**, **FT-P60**, **FT-PS1**, **FD-P60**, **FD-P50**: –40 to +60°C –40 to +140 °F)
Ambient humidity		35 to 85 % RH (No dew condensation or icing allowed)	
Material	Fiber core	Acrylic	
	Sheath	Polyethylene (**FT-V22**: Polyolefin)	Vinyl chloride (**FT-PS1**: Polyethylene, **FD-P2**: Vinyl chloride and polyurethane)
	Fiber head	Brass (Nickel plated) (**FT-SFM2L/T80/SFM2/SNFM2/SFM2SV2/V22/V41**, **FD-T80/T40/S80/SNFM2/SFM2SV2/V41** and sleeve: Stainless steel (SUS) **FT-FM10L**: ABS, Lens of **FT-FM10L/SFM2L/V10**: Acrylic **FT-V10**: Stainless steel (SUS) and Pholycarbonate	Stainless steel (SUS) **FT/FD-P80**, **FT-P60**: Brass (Nickel plated) Case of **FT-Z8□**: Polycabonate Lens of **FT-Z8H/Z8E**, Front film of **FT-Z8**: Polyester
Accessories (Note 3)		All fibers: 1 fiber attachment set Free-cut type fibers: **FX-CT2** (fiber cutter) 1 pc. Threaded head fibers: Nuts 2 pcs. (thru-beam type: 4 pcs.) and toothed lock washer 1 pc. (thru-beam type: 2 pcs.)	All fibers: 1 fiber attachment set. (excluding **FT-P80** and **FD-P80**) Free-cut type fibers: **FX-CT2** (fiber cutter) 1 pc. (**FT/FD-P80**: **FX-CT1** 1 pc.) Threaded head fibers: Nuts 2 pcs. (thru-beam type: 4 pcs.) and toothed lock washer 1 pc. (thru-beam type: 2pcs.), **FT-Z8□**: 1set of mounting screw

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) Sleeve part of side-view fiber cannot be bent.
3) The five types of attached fiber attachments (**FX-AT2/AT3/AT4/AT5/AT6**) described in this catalog are for use only with the **FX-100/300/311/410** series. Only one of these five fiber attachments is provided with each fiber. Refer to "**FIBER OPTIONS**" on p.100 for details.

Item \ Type		Sharp bending
		FT/FD/FR-W□
Allowable bending radius		R1 mm R0.039 in or more (**FD-WG4/WSG4**: R2 mm R0.079 in or more, Sleeve of **FD-W44**: R10 mm R0.394 in or more)
Ambient temperature		–40 to +60 °C –40 to +140 °F (**FT-WA30/WA8/WKV8**: –40 to +55 °C –40 to +131 °F, **FD-WL48**: –20 to +60 °C –4 to +140 °F, **FR-WKZ11**: –25 to +55 °C –13 to +131 °F)
Ambient humidity		35 to 85 % RH (No dew condensation or icing allowed)
Material	Fiber core	Acrylic
	Sheath	Polyethylene
	Fiber head	Stainless steel (SUS) (including sleeve) (**FT-W8/W4**, **FD-W8/W44/WG4**: Brass (Nickel plated), Case of **FT-WR80**(**L**): Die-cast zinc alloy, Case of **FT-WA30/WA8/WZ□**(**HB**), **FD-WZ□**(**HB**), Case of **FR-WKZ11**, Case and prism of **FD-WL48**, Lens of **FT-WS8L** and Resin part of **FT-WKV8**: Polycarbonate, Lens of **FT-WA30/WA8**: Norbornere resin, Lens of **FT-WZ8H/WZ8E** and **FT-WR80L**, Reflector of **FT-WZ8E**, Prism of **FT-WKV8** and **FT/FD-WZ4/WZ7**: Acrylic, Reflector of **FT-WZ8**: Polycarbonate, Case of **FD-WL41**: Heat-resistant ABS, Front film of **FD-WL41**: Polyester, Lens of **FD-WKZ1**: Optical glass, Lens of **FR-WKZ11**: Crown glass (BK7), Inner pipe of **FT/FD-WZ□**(**HB**): Stainless steel (SUS304).
Accessories (Note 2)		All fibers: 1 fiber attachment set and **FX-CT2** (fiber cutter) 1 pc. Threaded head fibers: Nuts 2 pcs. (thru-beam type: 4 pcs.) and toothed lock washer 1 pc. (thru-beam type: 2 pcs.) **FT-WA30**: 0.5 × 32 mm 0.020 × 1.260 in seal type slit mask 2 pcs. **FT-WA8**: 0.5 × 12 mm 0.020 × 0.472 in seal type slit mask 2 pcs. and 1 × 12 mm 0.039 × 0.472 in seal type slit mask 2 pcs. **FT-WZ8□**, **FT/FD-WZ4□**(**HB**): 1 set of mounting screw **FD-WKZ1**: **MS-FD-2** (fiber mounting bracket) 1 pc. **FR-WKZ11**: **MS-FD-2** (fiber mounting bracket) 1 pc, **RF-13** (reflective tape) 1 pc.

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The five types of attached fiber attachments (**FX-AT2/AT3/AT4/AT5/AT6**) described in this catalog are for use only with the **FX-100/300/311/410** series. Only one of these five fiber attachments is provided with each fiber. Refer to "**FIBER OPTIONS**" on p.100 for details.

SPECIFICATIONS

Item \ Type	Special use			
	Wide beam	Array	Narrow beam, Wafer mapping	High precision
	FT-A8/A30 **FD-A15** (Note 3)	**FT-AFM2/AFM2E** **FD-AFM2/AFM2E**	**FT-K8/KV8/WKV8** **FT/FR-KV1** **FR-KZ21/KZ21E**	**FD-EG1/EG2/EG3** **FD-G4/G6**
Allowable bending radius	**FT-A30/A8**: R10 mm R0.394 in or more **FD-A15**: R25 mm R0.984 in or more	R25 mm R0.984 in or more	R25 mm R0.984 in or more (**FT/FR-KV1**, **FR-KZ21/ KZ21E**: R10 mm R0.394 in or more)	**FD-EG2/EG3**: R10 mm R0.394 in or more **FD-G4/G6/EG1**: R25 mm R0.984 in or more
Ambient temperature	**FT-A30**, **FD-A15**: –40 to +60 °C –40 to +140 °F **FT-A8**: –40 to +70 °C –40 to +158 °F	–40 to +70 °C –40 to +158 °F	–40 to +60 °C –40 to +140 °F	–20 to +60 °C –4 to +140 °F (**FD-G4**: –40 to +70 °C –40 to +158 °F, **FD-G6**: –40 to +60 °C –40 to +140 °F)
Ambient humidity	35 to 85 % RH (No dew condensation or icing allowed)			
Material: Fiber core	Acrylic			
Material: Sheath	Polyethylene			Polyolefin (**FD-G4/G6**: Polyethylene)
Material: Fiber head	Polycarbonate (Lens of **FT-A8/A30** and **FD-A15**: Norbornene resin)	Brass (Nickel plated) Liquid crystal polymer	Stainless steel (SUS), Polycarbonate (Lens: Norbornene resin, Case of **FR-KZ21/KZ21E**: ABS, Prism of **FT-KV8** and **FR-KZ21E**: Acrylic)	Brass (Nickel plated) [**FD-G6**: Stainless steel (SUS)]
Accessories (Note 2)	All fibers: 1 fiber attachment set and **FX-CT2** (fiber cutter) 1 pc. **FT-A30**: 0.5 × 32 mm 0.020 × 1.260 in seal type slit mask 2 pcs. **FT-A8**: 0.5 × 12 mm 0.020 × 0.472 in seal type slit mask 2 pcs. and 1 × 12 mm 0.039 × 0.472 in seal type slit mask 2 pcs.	All fibers: 1 fiber attachment set Free-cut type fibers: **FX-CT2** (fiber cutter) 1 pc. Threaded head fibers: Nuts 2 pcs. and toothed lock washer 1pc. **FR-KV1**: Reflector 1 pc, M1.4 (length: 1.6 mm 0.063 in) stainless steel (SUS) mounting screw 4pcs. **FR-KZ21/KZ21E**: **RF-003** (reflector) 1 pc, **MS-FD-2** (fiber mounting bracket) 1 pc.		

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The five types of attached fiber attachments (**FX-AT2/AT3/AT4/AT5/AT6**) described in this catalog are for use only with the **FX-100/300/311/410** series. Only one of these five fiber attachments is provided with each fiber. Refer to "**FIBER OPTIONS**" on p.100 for details.
3) The **FT-WA8/WA30** is in the "Sharp bending type" section of the previous page.

Item \ Type	Special use		
	Ultra-small diameter	Convergent reflective	Tough flexble
	FT/FD-E12/E22 **FD-EN500S1** **FD-ENM1S1**	**FD-L4□**	**FT/FD-P81X** **FD-G6X**
Allowable bending radius	**FT-E12/E22**: R5 mm R0.197 in or more (Note 2) **FD-E12**: R10 mm R0.394 in or more (Note 2) **FD-E22/EN500S1/ENM1S1**: R25 mm R0.984 in or more (Note 2)	R10 mm R0.394 in or more (**FD-L43/L45**: R4 mm R0.157 in or more, **FD-L46**: R25 mm R0.984 in or more)	R10 mm R0.394 in or more
Ambient temperature	**FT-E12/E22, FD-E22**: –40 to +70 °C –40 to +158 °F **FD-E12**: –40 to +60 °C –40 to +140 °F **FD-EN500S1/ENM1S1**: –20 to +60 °C –4 to +140 °F	**FD-L43/L45**: 0 to +70 °C +32 to +158 °F **FD-L41/L44/L44S/L46**: –40 to +60 °C –40 to +140 °F **FD-L4**: –40 to +70 °C –40 to +158 °F	–40 to +60 °C –40 to +140 °F (**FD-P81X**: –40 to +70 °C –40 to +158 °F)
Ambient humidity	35 to 85 % RH (No dew condensation or icing allowed)		
Material: Fiber core	Acrylic		
Material: Sheath	Polyolefin	Polyethylene	Polyethylene (**FT-P81X**: Vinyl chloride, Protective tube: Stainless steel (SUS)
Material: Fiber head	Brass (Nickel plated) [Sleeve: Stainless steel (SUS)]	**FD-L41/L43/L45**: Heat-resistant ABS Case of **FD-L4/L46**: ABS (Case of **FD-L44/L44S**: Polycarbonate, Slit of **FD-L44S**: Stainless steel (SUS304), Lens of **FD-L4/L43/L44/L44S/L45**: Acrylic, Front film of **FD-L41**: Polyester, Lens of **FD-L46**: Norbornene resin)	**FT-P81X**, **FD-P81X**: Brass (Nickel plated) **FD-G6X**: Stainless steel (SUS)
Accessories (Note 3)	All fibers: 1 fiber attachment set Threaded head fibers: Nuts 2 pcs. (**FT-E12/E22**: 4 pcs.) and toothed lock washer 1pc. (**FT-E12/E22**: 2 pcs.)	All fibers: 1 fiber attachment set and **FX-CT2** (fiber cutter) 1pc. **FD-L4**: M2.6 (length 12 mm 0.472 in) screws with washers 2 pcs. and nuts 2 pcs.	All fibers: 1 fiber attachment set, nuts 2 pcs. (**FT-P81X**: 4 pcs.) and toothed lock washer 1 pc.(**FT-P81X**: 2 pcs.) **FD-G6X**: **FX-CT2** (fiber cutter) 1 pc.

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) Sleeve part cannot be bent.
3) The five types of attached fiber attachments (**FX-AT2/AT3/AT4/AT5/AT6**) described in this catalog are for use only with the **FX-100/300/311/410** series. Only one of these five fiber attachments is provided with each fiber. Refer to "**FIBER OPTIONS**" on p.100 for details.

SPECIFICATIONS

Item \ Type		Special use			
		Leak liquid detection	Liquid detection		
Item	Model No.	FD-F705	FT-F902	FD-F8Y	FD-F4□
Allowable bending radius		Protective tube: R20 mm R0.787 in or more Fiber cable: R4 mm R0.157 in or more		Protective tube: R40 mm R1.575 in or more Fiber: R15 mm R0.591 in or more	R10 mm R0.394 in or more
Bending durability		Fiber cable: 1 million times or more (at R4 mm R0.157 in)		—	
Ambient temperature		–20 to +50 °C –4 to +122 °F (Note 2)	–20 to +60 °C –4 to +140 °F (Note 2)	–40 to +125 °C –40 to +257 °F (Note 2)	–40 to +100 °C –40 to +212 °F (Note 2)
Ambient humidity		35 to 85%RH (No dew condensation or icing allowed)			
Material	Fiber core	Acrylic		Polycarbonate	
	Sheath	Vinyl chloride (Protective tube: Fluorine resin)		Polypropylene (Protective tube: Fluorine resin)	Polyethylene
	Fiber head	Outer casing: Fluorine resin, Interior: Heat-resistant ABS, Acrylic, Brass (Nickel plated)	Enclosure: Heat-resistant ABS Lens: Acrylic		Polyetherimide (Lens: Polycarbonate)
Accessories (Note 3)		1 fiber attachment set, **FX-CT2** (fiber cutter) 1 pc., **MS-FD-F7-1** (SUS mounting bracket) 1pc., **MS-FD-F7-2** (PVC mounting bracket) 1pc.	1 fiber attachment set, **FX-CT2** (fiber cutter) 1 pc., Tying band 2 pcs., Anti-slip tube 2 pcs.	1 fiber attachment set **FX-CT2** (fiber cutter) 1 pc.	1 fiber attachment set, **FX-CT2** (fiber cutter) 1 pc. Tying band, 4 pcs., Anti-slip tube 2 pcs.

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) Liquid being setected should also be kept within the rated ambient temperature range.
3) The five types of attached fiber attachments (**FX-AT2/AT3/AT4/AT5/AT6**) described in this catalog are for use only with the **FX-100/300/311/410** series. Only one of these five fiber attachments is provided with each fiber. Refer to "**FIBER OPTIONS**" on p.100 for details.

Item \ Type		Environment resistant						
		Heat-resistant					Chemical-resistant	Vacuum-resistant
		FT/FD-H□					FT-HL80Y/L80Y/V80Y/Z802Y	FT/FD-H30-□V
Item		350 °C 662 °F type	300 °C 572 °F type	200 °C 392 °F type	180 °C 356 °F type	130 °C 266 °F type		
Allowable bending radius		R25 mm R0.984 in or more (**FT-H20W-M1**, Sleeve of a head with sleeve: R10 mm R0.394 in or more, **FT-H20-J□/VJ□**: R18 mm R0.709 in or more)					R30 mm R1.181 in or more (**FT-Z802Y**: R25 mm R0.984 in or more)	R18 mm R0.709 in or more
Ambient temperature		–60 to +350 °C –76 to +662 °F (Note 2, 3)	–60 to +300 °C –76 to +572 °F (Note 2, 3)	–60 to +200 °C –76 to +392 °F (Note 3)	–60 to +180 °C –76 to +356 °F (Note 3, 5)	–60 to +130 °C –76 to +266 °F	–40 to +70 °C –40 to +158 °F (**FT-Z802Y**: 0 to +60 °C +32 to +76 °F, **FT-HL80Y**: –40 to +115 °C –40 to +239 °F)	–30 to +300 °C –22 to +572 °F (Note 3)
Ambient humidity		35 to 85%RH (No dew condensation or icing allowed)						
Material	Fiber core	Multi-component glass (Note 4)			Silicone	Acrylic		Multi-component glass (Note 4)
	Sheath	Stainless steel (SUS)	Silicone (Inside Stainless steel (SUS) spiral tube **FT-H20W-M1**: Fluorine resin **FD-H20-21**, **FT-H20-J□/VJ□**: Stainless steel (SUS))		Fluorine resin		Protective tube: Fluorine resin Sheath: Polypropylene (Sheath of **FT-Z802Y**: Fluorine resin)	Protection tube: Liner + braid tube [Stainless steel (SUS)] Socket plug: Joint; Stainless steel (SUS), Mounting cap nut: Stainless steel (SUS)
	Fiber head		Brass (Nickel plated) **FD-H20-21**: Stainless steel (SUS) Prism of **FT-H20-VJ□**: Glass Lock nut of **FT-H20-J□/VJ□**: Polybutylene terephthalate		Stainless steel (SUS)	Brass (Nickel plated)		Stainless steel (SUS) Lens of **FD-H30-KZ1V/L32V**: BK7 crown glass
Accessories (Note 6)		**FT-H20-J□/VJ□**, **FT-H20W-M1**, **FD-H18-L31** and **FT-H13-FM2**: 1 fiber attachment set Free-cut type fibers: **FX-CT2** (fiber cutter) 1 pc. Threaded head fibers: Nuts 2 pcs. (thru-beam type: 4 pcs.) and toothed lock washer 1pc. (thru-beam type: 2 pcs.) **FT-H20-J□/VJ□**: M4 × 0.7 nut (Polycarbonate) 2 pcs. M4 spring washer 2 pcs.					1 fiber attachment set **FX-CT2** (fiber cutter) 1 pc.	**FT-H30-M1V**: Nut 4 pcs., Toothed lock washer 2 pcs. **FD-H30-KZ1V**: **MS-FD-2** (Fiber mounting bracket) 1 pc.

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) If the fiber is used below –30 °C –22 °F, its maximum resistable temperature drops to +200 °C +392 °F. If the side-view lens **FX-SV1** is put on the fiber head, the allowable maximum temperature drops to +300 °C +572 °F. (The ambient temperature range of **FX-SV1** is from –60 to +300 °C –76 to +572 °F.)
3) The ambient temperature of heat-resistant 350 °C 662 °F type, 300 °C 572 °F type, 200 °C 392 °F type and 180 °C 356 °F type fibers are the value in dry condition. In humid environment, the ambient temperature differs. (For a high humidity of 85 % RH, the ambient temperature is 0 to +40 °C +32 to +104 °F.)
4) If the fiber material is quartz glass or multi-component glass, keep it away from vibration or impact.
5) The normal temperature for continuous usage or storage should be –60 to +150 °C –76 to +302 °F.
6) The five types of attached fiber attachments (**FX-AT2/AT3/AT4/AT5/AT6**) described in this catalog are for use only with the **FX-100/300/311/410** series. Only one of these five fiber attachments is provided with each fiber. Refer to "**FIBER OPTIONS**" on p.100 for details.

SENSING CHARACTERISTICS (TYPICAL)

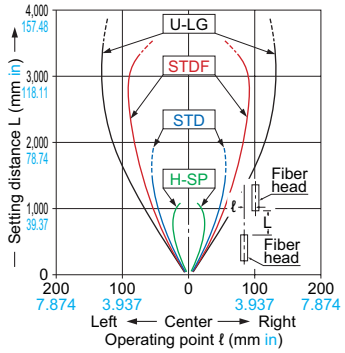
The following sensing characteristics pertain to the **FX-300** red LED type.Please contact our office for the sensing characteristics pertaining corresponding to types other than the red LED or to types not mentioned here.

Thru-beam type Parallel deviation

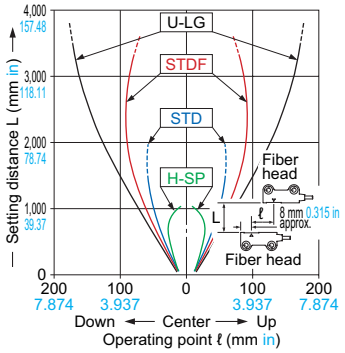
Sensing characteristics are listed by model No. in alphabetical order. (However, models with the same sensing characteristics are listed together.)

FT-A8 FT-WA8 — Thru-beam type

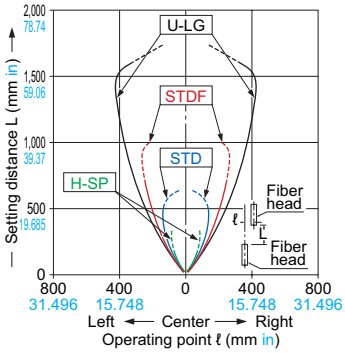
Horizontal direction



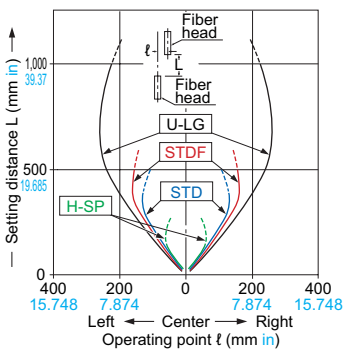
Vertical direction



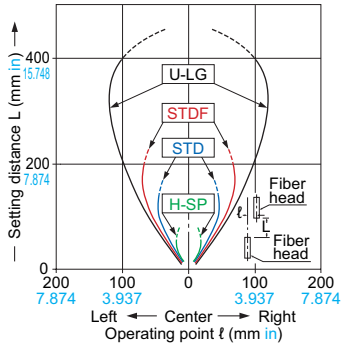
FT-B8 — Thru-beam type



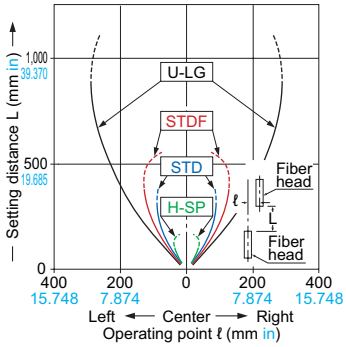
FT-FM2 FT-FM2S FT-FM2S4 FT-SFM2 FT-T80 — Thru-beam type



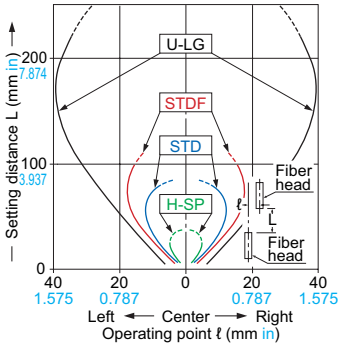
FT-NFM2 FT-NFM2S FT-NFM2S4 FT-SNFM2 — Thru-beam type



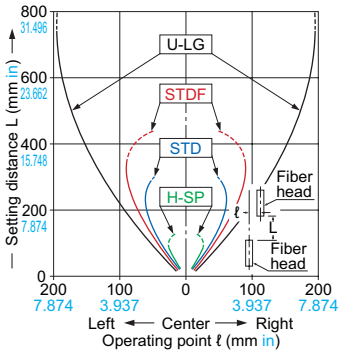
FT-P81X — Thru-beam type



FT-W4 FT-WS4 — Thru-beam type



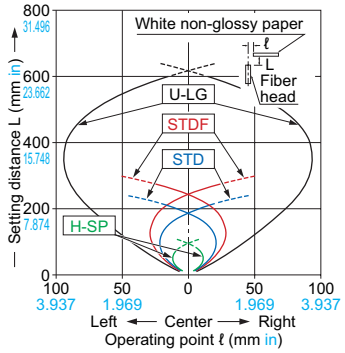
FT-W8 FT-WS8 — Thru-beam type



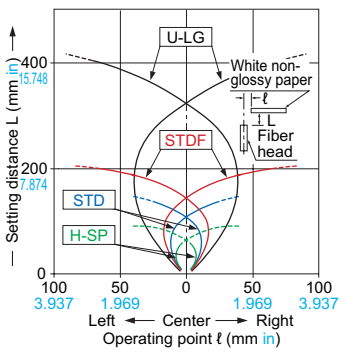
Reflective type Sensing fields

Sensing characteristics are listed by model No. in alphabetical order. (However, models with the same sensing characteristics are listed together.)

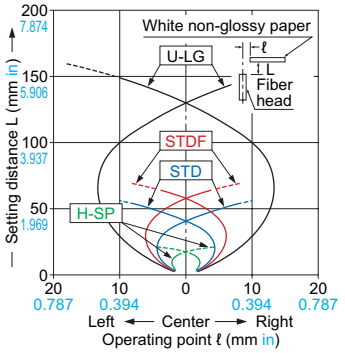
FD-B8 — Reflective type



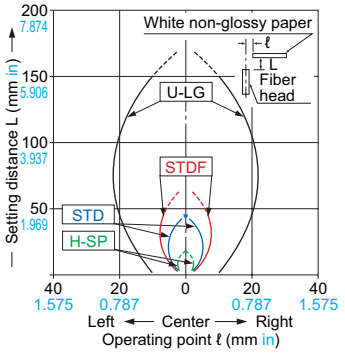
FD-FM2 — Reflective type



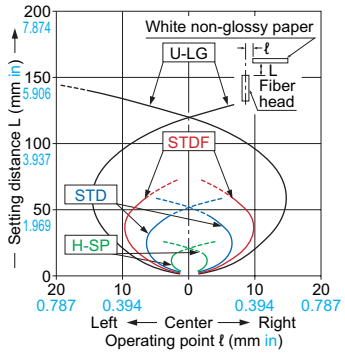
FD-G4 — Reflective type



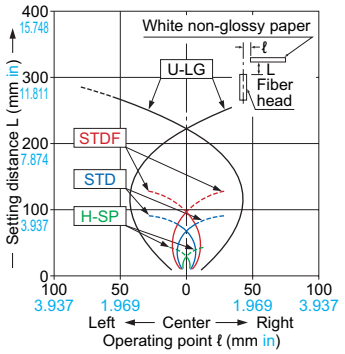
FD-G6X — Reflective type



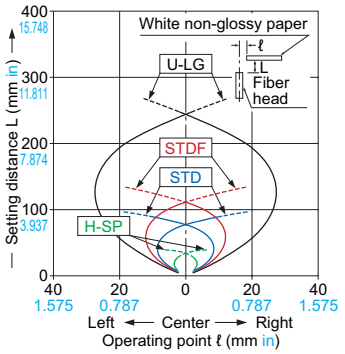
FD-NFM2 FD-NFM2S FD-NFM2S4 FD-SNFM2 FD-T40 — Reflective type



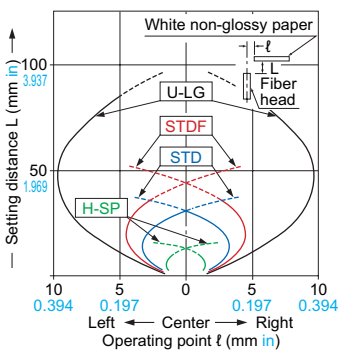
FD-P81X — Reflective type



FD-W8 FD-WS8 FD-WT8 — Reflective type



FD-WG4 FD-WSG4 — Reflective type



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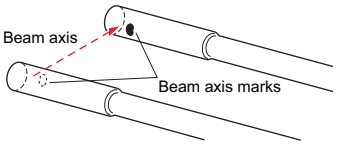
PRECAUTIONS FOR PROPER USE

Refer to p.986~ for general precautions. Refer to the **FX-100** series (p.135~), **FX-300** series (p.153~), **FX-410** series (p169), and **FX-311** series (p.181) for precautions of the amplifiers.

- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

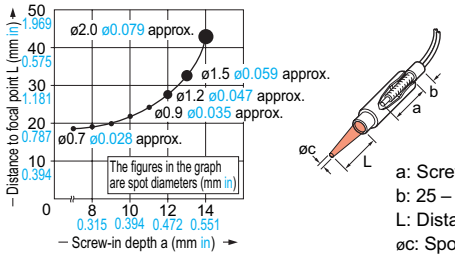
Cautions for FT-HL80Y/L80Y, FT-V80Y chemical-resistant fiber usage

- Do not use the fiber under the environment including the follwing chemicals.
  Molten alkaline metal (sodium, potassium, lithium, etc.), chemicals which may penetrate PFA, such as Fluorine gas (F_2), ClF_3, OF_2 (also in gas) etc., or chemicals having strong permeability, such as high-temperature fluorine, nitric or chlorine etc.
- The beam axis marks point out the orientation that beam is emitted or received on each fiber tip. Fix both fiber tips as beam axis marks face each other.



Cautions for FX-MR2 zoom lens usage

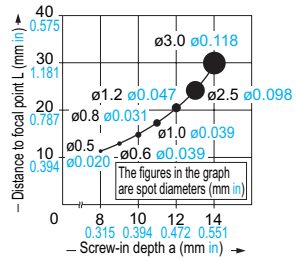
- The spot diameter and the sensing range are adjustable by the screw-in depth as follows.

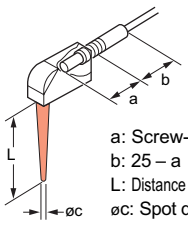


a: Screw-in depth
b: 25 – a
L: Distance to focal point
øc: Spot diameter

Cautions for FX-MR5 side-view zoom lens usage

- The spot diameter and the sensing range are adjustable by the screw-in depth as follows.





a: Screw-in depth
b: 25 – a
L: Distance to focal point
øc: Spot diameter

Cautions for convergent reflective fiber

- Please note that the **FD-L43** and **FD-L45** may not perform stable detection of objects that have received special processing and do not reflect light regularly.
- Avoid areas prone to vapor or dust as well as corrosive gas environments. Do not expose the fiber directly to water or chemicals.

Common precautions

- Wipe a dirt on the fiber head sarface with a moist soft cloth. However, do not use any organic solvents.
- If the outer cover of the emitting-side fiber has printed white dots (**FD-L43**, **FD-45**) or white lines (**FD-L44**, **FD-L44S**, **FD-F705**, **FT-F902**) on it, make sure to attach fibers with white dots or white lines on them to the amplifiers.
- Do not use the fiber at places having intense vibration, as this can cause malfunction.
- Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.

- Do not expose the fiber to any oraganic solvents. (excluding chemical-resistant fiber)

- Do not use the fiber head surface in places where it may come in direct contact with water. A water drop on the fiber head surface deteriorates the sensing.
- Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
- Do not apply excessive tensile force to the fiber cable.
- Since the sensing portion of wide beam or narrow beam fiber is concave shaped, take care that dust or dirt does not collect on it. In case it does collect, wipe it with a dry soft cloth.