

New Product

Communication Unit for Open Network

SC-GU3 SERIES

The digital sensor can be connected directly to the 3 types of open network!

Other types of analog input sensors can also be connected!

CC-Link
SC-GU3-01



DeviceNet
SC-GU3-02



EtherCAT
SC-GU3-03



On sale soon

Scattered digital sensors can be centrally managed and set through an open network.

| | | | |
|---------------------------|---------------------------------------|--------------------------------|--|
| Applicable Digital Sensor | Digital Fiber Sensor FX-501 FX-502 | Digital Laser Sensor LS-403 | Digital Pressure Sensor DPS-401 DPS-402 |
|---------------------------|---------------------------------------|--------------------------------|--|



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Fiber Selection Guide

Choose by model

◆ Thru-beam type

| Model No. | Page | | |
|---------------|------------------------------|------------|------|
| | Sensing range Specifications | Dimensions | |
| FT-140 | P.10 | P.34 | |
| FT-30 | P.9 | | |
| FT-31 | P.10 | | |
| FT-31S | P.15 | | |
| FT-31W | P.10 | | |
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| FT-42 | P.10 | | |
| FT-42S | P.15 | | |
| FT-42W | P.10 | | |
| FT-43 | | | |
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| FT-A11 | | | |
| FT-A11W | | | |
| FT-A32 | | | |
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| FT-AL05 | | | |
| FT-E13 | P.12/P.15 | P.35 | |
| FT-E23 | | | |
| FT-F93 | P.28 | | |
| FT-H13-FM2 | P.24 | | |
| FT-H20-J20-S | | | |
| FT-H20-J30-S | | | |
| FT-H20-J50-S | | | |
| FT-H20-M1 | | | |
| FT-H20-VJ50-S | | | |
| FT-H20-VJ80-S | | | |
| FT-H20W-M1 | | | |
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| FT-KS40 | P.19 | | |
| FT-KV26 | | | |
| FT-KV40 | | | |
| FT-KV40W | | | |
| FT-L80Y | P.23 | | |
| FT-R40 | P.10 | | P.37 |
| FT-R41W | | | |
| FT-R42W | | | |
| FT-S11 | P.12 | | |
| FT-S20 | P.9 | | |
| FT-S21 | P.12 | | |
| FT-S21W | P.12 | | |
| FT-S30 | P.9 | | |
| FT-S31W | P.12 | | |
| FT-S32 | P.12 | P.38 | |
| FT-V23 | | | |
| FT-V24W | | | |
| FT-V25 | P.15 | | |
| FT-V30 | | | |
| FT-V40 | P.12 | | |
| FT-V80Y | P.23 | | |
| FT-WZ4 | P.16 | | P.39 |
| FT-WZ7 | | | |
| FT-Z20HBW | | | |
| FT-Z30 | | | |
| FT-Z30E | | | |

| Model No. | Page | |
|-----------|------------------------------|------------|
| | Sensing range Specifications | Dimensions |
| FT-Z30EW | P.16 | P.39 |
| FT-Z30H | | |
| FT-Z30HW | | |
| FT-Z30W | | |
| FT-Z40HBW | | |
| FT-Z802Y | | P.23 |

◆ Reflective type

| Model No. | Page | |
|------------|------------------------------|------------|
| | Sensing range Specifications | Dimensions |
| FD-30 | P.9 | P.42 |
| FD-31 | P.11 | |
| FD-31W | | |
| FD-32G | P.11/P.18 | |
| FD-32GX | | |
| FD-40 | P.9 | |
| FD-41 | P.11 | |
| FD-41S | P.15 | |
| FD-41SW | | |
| FD-41W | P.11 | |
| FD-42G | P.11/P.18 | |
| FD-42GW | | |
| FD-60 | P.9 | P.43 |
| FD-61 | P.11 | |
| FD-61G | P.15 | |
| FD-61S | | |
| FD-61W | P.11 | |
| FD-62 | | |
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| FD-A16 | | |
| FD-AL11 | P.13/P.15 | P.44 |
| FD-E13 | | |
| FD-E23 | P.11/P.18 | |
| FD-EG30 | | |
| FD-EG30S | P.15 | |
| FD-EG31 | P.11/P.18 | |
| FD-F4 | P.28 | P.45 |
| FD-F41 | | |
| FD-F41Y | | |
| FD-F71 | | |
| FD-F8Y | | |
| FD-FA93 | P.25 | P.46 |
| FD-H13-FM2 | | |
| FD-H18-L31 | | |
| FD-H20-21 | | |
| FD-H20-M1 | | |

◆ Retroreflective type

| Model No. | Page | |
|-----------|------------------------------|------------|
| | Sensing range Specifications | Dimensions |
| FR-KZ22E | P.19/P.22 | P.41 |
| FR-KZ50E | | |
| FR-KZ50H | | |
| FR-Z50HW | | |

| Model No. | Page | | |
|---------------|------------------------------|------------|------|
| | Sensing range Specifications | Dimensions | |
| FD-H25-L43 | P.25 | P.46 | |
| FD-H25-L45 | | | |
| FD-H30-KZ1V-S | P.26 | P.47 | |
| FD-H30-L32 | P.25 | | |
| FD-H30-L32V-S | P.26 | | |
| FD-H35-20S | P.25 | P.48 | |
| FD-H35-M2 | | | |
| FD-H35-M2S6 | P.28 | | |
| FD-HF40Y | | | |
| FD-L10 | P.21 | | P.49 |
| FD-L11 | | | |
| FD-L12W | | | |
| FD-L20H | | | |
| FD-L21 | | | |
| FD-L21W | | | |
| FD-L22A | | | |
| FD-L23 | | | |
| FD-L30A | | | |
| FD-L31A | | | |
| FD-L32H | P.11 | P.50 | |
| FD-R60 | | | P.13 |
| FD-S21 | | | P.9 |
| FD-S30 | P.13 | | |
| FD-S31 | | | |
| FD-S32 | P.15 | | |
| FD-S32W | | | |
| FD-S33GW | | | |
| FD-V30 | P.17 | | P.50 |
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| FD-V50 | P.19 | | |
| FD-WZ4 | | | |
| FD-WZ7 | | | |
| FD-Z20HBW | | | |
| FD-Z40HBW | | | |
| FD-Z50HW | | | |

Fiber Selection Guide

Choose by quality

Super Quality

- The variance of beam intensity and beam axis is extremely small.



P.8

Choose by shape

Threaded Type

- Standard type which is mounted using nuts.



P.10

Cylindrical Type

- Has a slender shape that is mounted using set screws.



P.12

Sleeve

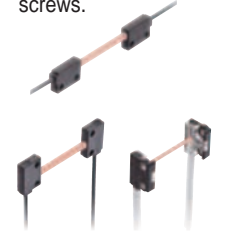
- Suitable for sensing in narrow locations and sensing minute objects.



P.14

Flat Type

- Thin and rectangular shape. Installed directly in narrow locations with screws.

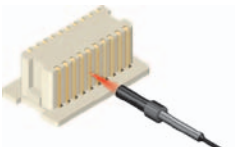


P.16

Choose by beam shape

Small Spot

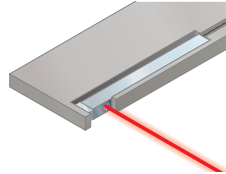
- Senses minute objects using a spot lens.



P.18

Narrow Beam

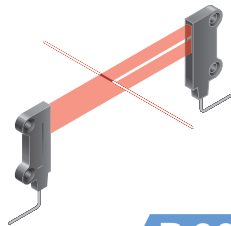
- Not easily affected by surrounding obstacles.



P.19

Wide Beam

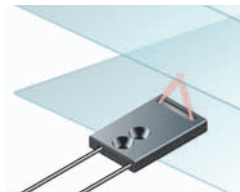
- Senses in the beam band without missing a work.



P.20

Convergent Reflective Type

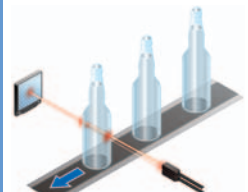
- Senses in the limited range only.



P.21

Retroreflective Type

- Ideal for sensing transparent objects



P.22

Choose by environment/performance

Chemical-resistant

- Various kinds of liquids can be detected due to the fluorine contained resin case



P.23

Heat-resistant

- Withstands at -60 °C -76 °F to 350 °C 662 °F



P.24

Vacuum-resistant

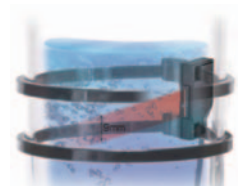
- Usable in high-temperatures of 300 °C 572 °F and vacuum



P.26

Liquid Leak / Liquid Detection

- Corresponds to various liquid events.



P.28

Fiber amplifiers guidance

Digital fiber sensor FX-500 series

- At the industry's leading edge



P.56

Digital fiber sensor FX-100 series

- Super functionality, yet, economical price



P.66

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

Others

Amplifiers

FX-500 series

FX-100 series

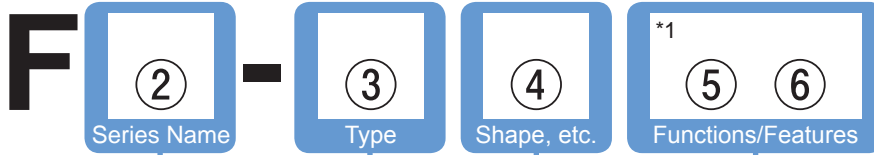
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Earlier models comparison table

Fiber Selection Guide

Viewing new models

Applies to the fiber marked **NEW** in the model name field (P.8~P.29)



*1: Excluding liquid leak / liquid detection fiber

②

| Symbol | Details |
|--------|----------------------|
| T | Thru-beam type |
| D | Reflective type |
| R | Retroreflective type |

⑤

| Symbol | Details |
|--------|----------------------|
| None | General-purpose |
| G | Coaxial reflective |
| S | Sleeve |
| H | Top sensing * |
| E | Side sensing * |
| HB | Top sensing + Bent * |
| A | Alignment |

*③ is for Flat type (Z and KZ) only

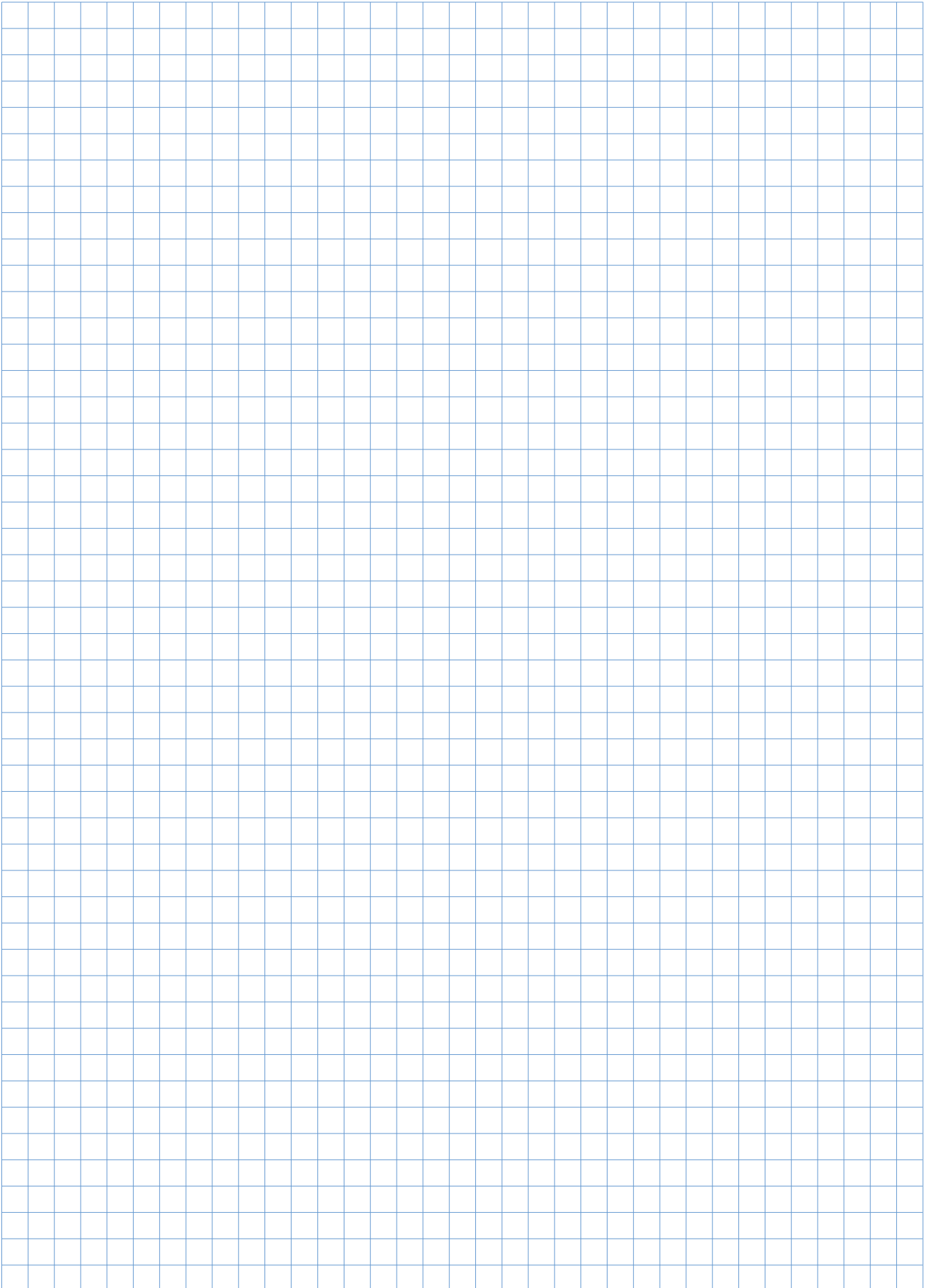
⑥

| Symbol | Details |
|--------|--------------------|
| None | General-purpose |
| W | Sharp bending |
| X | Stainless-jacketed |
| Y | Chemical-resistant |

| ③ | | ④ | |
|--------|--------------------------------|----------|----------------------------------|
| Symbol | Details | Lead No. | Details |
| None | Treaded type | 3 | M3 |
| | | 4 | M4 |
| | | 6 | M6 |
| | | 14 | M14 |
| R | Elbow or square head | 4 | M4 |
| | | 6 | M6 |
| S | Cylindrical type | 1 | ø1 mm |
| | | 2 | ø1.5 mm |
| | | 3 | ø2.5 or ø3 mm |
| KS | Narrow beam | 4 | ø3.7 mm |
| | | 2 | ø2 mm |
| V | Side-view | 3 | ø2.5 or ø3 mm |
| | | 4 | ø4 mm |
| | | 5 | ø5 mm |
| KV | Narrow beam / Side-view | 4 | ø4 mm |
| | | 2 | 1.5 x 2 mm |
| E | Ultra small diameter | 1 | Fiber ø0.125 mm |
| | | 2 | Fiber ø0.25 mm |
| EG | Coaxial | 3 | M3 |
| Z | Flat type | 2 | Thickness 2 mm |
| | | 3 | Thickness 3 mm |
| | | 4 | Thickness 3.5 mm |
| | | 5 | Thickness 5.2 mm |
| | | 2 | Thickness 2.2 mm |
| KZ | Narrow beam | 5 | Thickness 5.2 mm |
| | | 3 | Sensing width 32 mm |
| A | Wide beam | 1 | Sensing width 10 to 19 mm |
| | | 1 | Sensing width 11.1 mm |
| AL | Array | 0 | Sensing width 5.5 mm |
| | | 1 | Sensing range 0 to 10 mm (STD) |
| | | 2 | Sensing range 11 to 30 mm (STD) |
| L | Convergent reflective type | 3 | Sensing range 31mm or more (STD) |
| | | 9 | Mountable on pipe |
| | | 7 | Liquid leak |
| F | Liquid leak / Liquid detection | 9 | Mountable on pipe |
| | | 7 | Liquid leak |

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- Tough Fiber
- Fiber Selection Guide
 - Choose by model
 - Choose by shape/application
 - Viewing new models
- Fibers
 - Super Quality
 - Threaded Type
 - Cylindrical Type
 - Sleeve
 - Flat Type
 - Small Spot
 - Narrow Beam
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 - Convergent Reflective Type
 - Retroreflective Type
 - Chemical-resistant
 - Heat-resistant
 - Vacuum-resistant
 - Liquid Leak / Liquid Detection
- Fiber Options
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 - Thru-beam Type
 - Retroreflective Type
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 - Others
- Amplifiers
 - FX-500 series
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- Earlier models comparison table


MEMO



Tough Fiber

Conventional 3 types rolled into 1 !!
New standard fiber

3



Flexible fiber
Flexible durability
1 million times



Sharp bending fiber
Bending radius
R2~R1 mm



General purpose fiber
Bending radius
R25 mm



1

Tough Fiber

Break-free
Flexible durability **10** million times (Typical)
Bending conditions Bending radius: R10 mm
Reciprocating bending: 180°



More flexible
Bending radius **R2~R4** mm



ECO



Stainless steel fittings are used for the fiber head of all models.

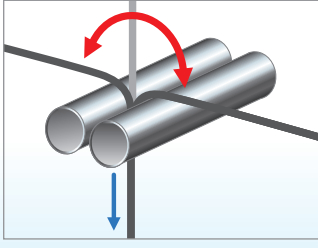
- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

Introducing a tough fiber that transcends common knowledge!

It has toughness that can be used in moving parts, toughness that can be bent with precision, and high-quality for all purposes. It changes common knowledge about fibers.



Break-free



Flexible durability

10 million times

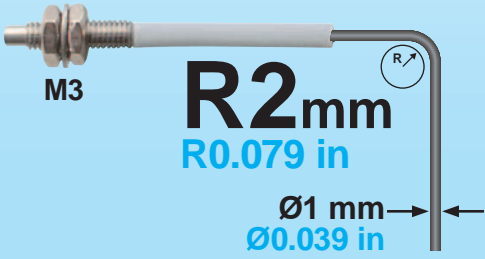
 (Typical)

Bending conditions
Bending radius: R10 mm R0.394 in, Reciprocating bending: 180°

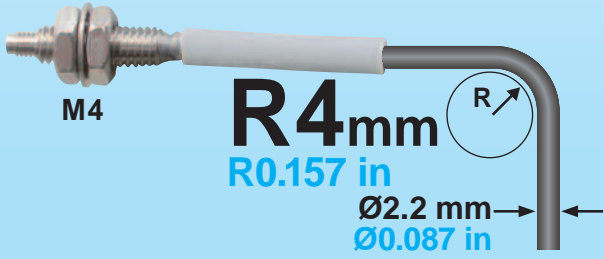
More flexible

R2 to R4 mm R0.079 to R0.157 in

Ex) FT-31



Ex) FT-42



Reduced the time for selecting fiber and registration numbers

For Designers *High-quality*

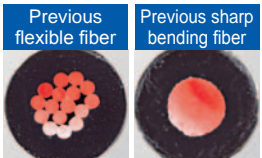
- High-quality in whichever tough fiber you choose!
- Easy selection!
- Reduced risk of breaking and bending during installation!

For Buyers *Low Price*

- Cost savings!
- Reduced registration numbers!
- Reduced frequency of maintenance stockpiling and replacement!

Reduced variation in sensing

Beams at the fiber aperture are uniform, leading to stable sensing.



Generally flexible fibers and sharp bending fibers are composed of multiple fiber cores, often resulting in large variations in light intensity.



The new standard fiber is composed of a single fiber core, achieving uniform light intensity.

- Uniform and highly accurate sensing
- Stable sensing even if the fiber is bent

New product introduction
Tough Fiber

Fiber Selection Guide
Choose by model
Choose by shape/application
Viewing new models

Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions
Thru-beam Type
Retroreflective Type
Reflective Type
Others

Amplifiers
FX-500 series
FX-100 series

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Earlier models comparison table

Super Quality

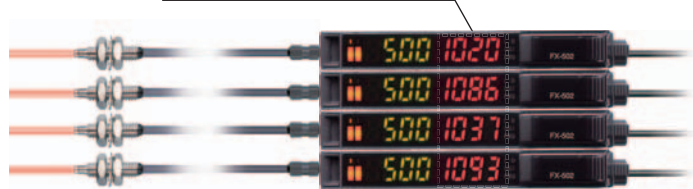
- It is a fiber with superior light intensity stability and simple digital management when combined with the **FX-500** series amplifier.
- It offers stable sensing with an extremely small beam axis curvature and gap.

Digital management is simple due to small differences in body.

When combined with the **FX-500** series amplifiers, it has up to 4 times improved stability of incident light intensity compared with traditional fibers. Management is simple even when replacing amplifiers because the digital display shows the approximate value.

Super quality fiber + **FX-500** series

"Stabilized incident light intensities"
even in multiple units



Emitter intensity is also stable due to few curvatures and gaps in the beam axis.

Stable emission intensity within $\pm 10\%$

Variation in emission intensity of the fiber core is controlled down to less than $\pm 10\%$, achieving a stable detection.

- Beam axis deviation: Thru-beam type within $\pm 2^\circ$, Reflective type within $\pm 3^\circ$
- Beam axis centering precision: within $\pm 150 \mu\text{m}$

Expanded temperature range

Ambient temperature $[-40$ to $+70^\circ\text{C}$ -40 to $+158^\circ\text{F}$ in previous]

-55 to $+80^\circ\text{C}$

1.2 times
more than
previous

-67 to $+176^\circ\text{F}$

Integrated high-precision plug

The centering precision of the fiber core attached to the inserting plug is doubled.

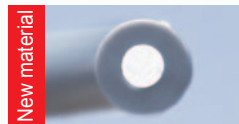
As the insertion precision is increased, the variation among units can be greatly suppressed.



- Centering precision: within $\pm 40 \mu\text{m}$



$\varnothing 2.2 \text{ mm } \varnothing 0.087 \text{ in}$ standard fiber



Single core standard fiber with high flexibility



In general, high-flexibility types adopt a multi-fiber core which may result in large variation in light emission.

More flexible! **R4**

Bending radius [Previous is $R25 \text{ mm } R0.984 \text{ in}$]

R4 mm
R0.157 in

1/6
of that of
previous



More bendable!

Bending durability [Previous is 1,000 times]

10 million times

10,000 times
more than previous

*Bending conditions
Bending radius: $R10 \text{ mm } R0.39 \text{ in}$,
Reciprocating bending 180°

Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) | | | Beam axis position/ Inclination of beam axis | Optical transmission loss | Protection | Ambient temp. |
|-------------|--------------------------|-----------------------------------|--------------------------|--------------------------------|---|---|--|---|---------------------------|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | |
| Threaded | M3 | Tough NEW FT-30 | R2 Bending durability | 2 m | STD 400 15.748 HYPR 1,350 53.150 | 810 31.890 650 25.591 210 8.268 75 2.953 | 135 5.315 400 15.748 | ø0.5 | ±10 % | IP67 | -55 to +80 °C |
| | M4 | Tough NEW FT-40 | R4 Bending durability | | STD 1,200 47.244 HYPR (Note) 3,600 141.732 | 2,200 86.614 1,700 66.929 530 20.866 190 7.480 | 320 12.598 870 34.252 | | | | |
| Cylindrical | ø1.5 | Tough NEW FT-S20 | R2 Bending durability | | STD 400 15.748 HYPR 1,350 53.150 | 810 31.890 650 25.591 210 8.268 75 2.953 | 135 5.315 400 15.748 | ø0.5 | | | |
| | ø3 | Tough NEW FT-S30 | R4 Bending durability | | STD 1,200 47.244 HYPR (Note) 3,600 141.732 | 2,200 86.614 1,700 66.929 530 20.866 190 7.480 | 320 12.598 870 34.252 | ø1 | | | |

Note: The fiber cable length practically limits the sensing range.

Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note) | | | Beam axis position/ Inclination of beam axis | Optical transmission loss | Protection | Ambient temp. |
|-------------|--------------------------|-----------------------------------|--------------------------|--------------------------------|-------------------------------------|--|--|---|---------------------------|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | |
| Threaded | M3 | Tough NEW FD-30 | R2 Bending durability | 2 m | STD 160 6.299 HYPR 600 23.622 | 330 12.992 250 9.843 80 3.150 25 0.984 | 45 1.772 155 6.102 | 150 μm ±3° | ±10 % | IP67 | -55 to +80 °C |
| | M4 | Tough NEW FD-40 | R4 Bending durability | | STD 520 20.472 HYPR 1,550 61.024 | 900 35.433 740 29.134 260 10.236 90 3.543 | 140 5.512 420 16.535 | | | | |
| | M6 | Tough NEW FD-60 | R4 Bending durability | | STD 160 6.299 HYPR 600 23.622 | 330 12.992 250 9.843 80 3.150 25 0.984 | 45 1.772 155 6.102 | | | | |
| Cylindrical | ø3 | Tough NEW FD-S30 | R4 Bending durability | | STD 160 6.299 HYPR 600 23.622 | 330 12.992 250 9.843 80 3.150 25 0.984 | 45 1.772 155 6.102 | | | | |

Note: The sensing range is specified for white non-glossy paper.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

New product introduction
Tough Fiber

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Super Quality
Threaded Type
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Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak/Liquid Detection

Fiber Options

Fiber Dimensions
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Reflective Type
Others

Amplifiers
FX-500 series
FX-100 series

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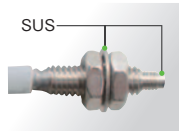
Earlier models comparison table

Threaded Type

- It is a standard fiber which is mounted using nuts. It has reasonable pricing while drastically improving flexing performance.
- With the lens installable type, long distance sensing and microscopic object sensing is possible by installing a lens.
- A protective tube and a sturdy stainless jacket type that prevents disconnection are also prepared.

Stainless steel fittings are used for the fiber head of all models.

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength



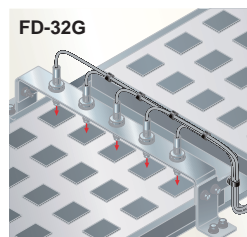
* Some models not included (FT-R41W, FT-R42W, FT-140)

Application

Metal-free fiber FT-41, FD-G60, FD-G40

- Made of resin
- Metallic particulate production ratio: ZERO
- Effect on magnetic fields: ZERO

*For details, please see our website.



Sensing the presence of workpiece

Thru-beam type (one pair set)



<Thru-beam type> FT-31/31W/43/42/42W
FT-45X/R40

<Reflective type> FD-31/41/62/61/R60

More user-friendly, high quality fiber

Improved centering accuracy

The beam axis deviation of each unit is kept within $\pm 3^\circ$ and the beam axis centering accuracy is kept within $\pm 150 \mu\text{m}$.

(Within $\pm 5^\circ$ and $\pm 90 \mu\text{m}$ for ultra small diameter fibers)

- Makes beam axis adjustment easier
- Improves mounting hole machining accuracy
- Improves sensing accuracy

Improved specularity

High precision polishing is accomplished by using the PCTC polishing technique.

The specularity of the end face of the fiber is 5 times greater.

- Light intensity is increased, enabling stable sensing.

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length (m) | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Beam axis position/Inclination of beam axis | Protection | Ambient temp. | |
|----------------|--------------------------|------------------------------------|-------------------------------|------------------------|--------------------------------|-----------------------------|--|---------------------|---|-----------------------------------|---------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | | |
| Threaded | M3 | Tough NEW FT-31 | R2 | Free-cut | STD 315 12.402 | 770 30.315 | 130 5.118 | 0.5 | 150 μm / $\pm 2^\circ$ | IP67 | -55 to +80 °C | |
| | | NEW FT-31W | R1 | | HYPR 210 8.268 | 550 21.654 | 340 13.386 | | | | | |
| | M4 | Lens mountable | NEW FT-43 | R4 | 2 m | STD 260 10.236 | 590 23.228 | 80 3.150 | 1.5 | 150 μm / $\pm 3^\circ$ | IP67 | -55 to +80 °C |
| | | Lens mountable | Tough NEW FT-42 | R4 | | HYPR 990 38.976 | 440 17.323 | 240 9.449 | | | | |
| | | Lens mountable | NEW FT-42W | R1 | | STD 800 31.496 | 2,050 80.709 | 300 11.811 | | | | |
| | | Lens mountable, Stainless-jacketed | NEW FT-45X | R4 | | HYPR (Note 2) 3,600 141.732 | 1,600 62.992 | 920 36.220 | | | | |
| Elbow | Lens mountable | Tough NEW FT-R40 | R4 | 2 m | STD 930 36.614 | 1,750 68.898 | 270 10.630 | 1 | 150 μm / $\pm 2^\circ$ | IP67 | -55 to +80 °C | |
| | Lens mountable | NEW FT-R41W | R1 | | HYPR (Note 2) 3,600 141.732 | 1,500 59.055 | 740 29.134 | | | | | |
| Square head | With expansion lens | NEW FT-R42W | R1 | 2 m | STD 800 31.496 | 1,800 70.866 | 250 9.843 | 2.2 | — | IP40 | -40 to +60 °C | |
| | With expansion lens | NEW FT-R42W | R1 | | HYPR (Note 2) 3,600 141.732 | 1,400 55.118 | 710 27.953 | | | | | |
| M14 Long range | With expansion lens | Tough NEW FT-140 | R4 | 10 m | STD (Note 2) 19,600 771.654 | 3,600 141.732 (Note 2) | 510 20.079 | 10 | — | IP67 | -40 to +70 °C | |
| | | NEW FT-140 | R4 | | HYPR (Note 2) 19,600 771.654 | 19,600 771.654 (Note 2) | 2,000 78.740 | | | | | |

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.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

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www.sentronic.com

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Fax +41 (0)56 222 10 12

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Coaxial type FD-□□ in which high-precision positioning can be achieved.

It is a coaxial fiber that encloses the circumference of the emitter fiber at the center with the receiver fiber. This is suitable for high-precision positioning. It can perform sensing without affecting the approach direction of the work.



Supports spot lenses and zoom lenses!

Fiber options

Lens (For thru-beam type fiber)
▶ P.30~

Lens (For reflective type fiber)
▶ P.32

Protective tube ▶ P.33

- FTP-□
- FDP-□



Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1, 2) | | | Beam axis position/ Inclination of beam axis | Protection | Ambient temp. |
|-------------------|--------------------------------------|--------------------------------------|---------------------|-------------------------------------|---|---|--|---|---------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | |
| M3 | M3 12 | Tough NEW R2 FD-31 | Bending durability | 2 m | STD 125 4.921 HYPR 515 20.276 | 290 11.417 220 8.661 80 3.150 25 0.984 | 35 1.378 140 5.512 | 150 μm /±3° | IP67 | -55 to +80 °C |
| | | NEW R1 FD-31W | | | STD 80 3.150 HYPR 330 12.992 | 180 7.087 140 5.512 45 1.772 12 0.472 | 15 0.591 60 2.362 | — | | -40 to +60 °C |
| | Coaxial, Lens mountable M3 17 | Tough NEW R2 FD-32G | Bending durability | 1 m (Note 3) | STD 200 7.874 HYPR 650 25.591 | 380 14.961 270 10.630 95 3.740 27 1.063 | 70 2.756 190 7.480 | — | IP40 | -55 to +80 °C |
| | | NEW R2 FD-32GX | | | STD 200 7.874 HYPR 630 24.803 | 410 16.142 360 14.173 100 3.937 30 1.181 | 75 2.953 210 8.268 | — | | -40 to +70 °C |
| | Ultra-small diameter M3 16 | NEW R4 FD-EG30 | | 500 mm | STD 48 1.890 HYPR 170 6.693 | 130 5.118 110 4.331 30 1.181 9 0.354 | 20 0.787 70 2.756 | — | IP40 | -40 to +70 °C |
| | | NEW R4 FD-EG31 | | | STD 20 0.787 HYPR 85 3.346 | 45 1.772 35 1.378 12 0.472 3.5 0.138 | 7 0.276 25 0.984 | — | | -20 to +60 °C |
| Threaded M4 | M4 14 | Tough NEW R2 FD-41 | Bending durability | 2 m | STD 125 4.921 HYPR 515 20.276 | 290 11.417 220 8.661 80 3.150 25 0.984 | 35 1.378 140 5.512 | 150 μm /±3° | IP67 | -55 to +80 °C |
| | | NEW R1 FD-41W | | | STD 270 10.630 HYPR 900 35.433 | 630 24.803 430 16.929 150 5.906 45 1.772 | 80 3.150 230 9.055 | — | | -40 to +60 °C |
| | Coaxial, Lens mountable M4 25 | Tough NEW R2 FD-42G | Bending durability | 2 m | STD 200 7.874 HYPR 650 25.591 | 380 14.961 270 10.630 95 3.740 27 1.063 | 70 2.756 190 7.480 | — | IP40 | -55 to +80 °C |
| | | NEW R1 FD-42GW | | | STD 150 5.906 HYPR 670 26.378 | 340 13.386 280 11.024 90 3.543 25 0.984 | 45 1.772 140 5.512 | — | | -40 to +60 °C |
| M6 | M6 17 | NEW R4 FD-62 | Bending durability | 2 m | STD 520 20.472 HYPR 1,500 59.055 | 1,000 39.370 940 37.008 340 13.386 110 4.331 | 170 6.693 450 17.717 | 150 μm /±3° | IP67 | -55 to +80 °C |
| | | Tough NEW R1 FD-61 | | | STD 450 17.717 HYPR 1,400 55.118 | 840 33.071 670 26.378 200 7.874 70 2.756 | 120 4.724 410 16.142 | — | | -40 to +60 °C |
| | Coaxial M6 17 | NEW R1 FD-61W | | 2 m | STD 270 10.630 HYPR 900 35.433 | 630 24.803 430 16.929 150 5.906 45 1.772 | 80 3.150 230 9.055 | — | IP40 | -40 to +60 °C |
| | | Tough NEW R4 FD-61G | Bending durability | | STD 420 16.535 HYPR 1,100 43.307 | 800 31.496 650 25.591 200 7.874 60 2.362 | 120 4.724 350 13.780 | — | | -55 to +80 °C |
| | Stainless-jacketed M6 22 | NEW R4 FD-64X | | 1 m | STD 280 11.024 HYPR 670 26.378 | 500 19.685 410 16.142 160 6.299 50 1.969 | 75 2.953 220 8.661 | — | IP40 | -55 to +80 °C |
| Elbow M6 15 | Tough NEW R4 FD-R60 | Bending durability | 2 m | STD 290 11.417 HYPR 1,100 43.307 | 600 23.622 550 21.654 190 7.480 65 2.559 | 110 4.331 240 9.449 | 150 μm /±3° | IP67 | -55 to +80 °C | |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The sensing range is specified for white non-glossy paper.
3) The allowable cutting range is 700 mm 27.559 in from the end that the amplifier is inserted.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

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Tough Fiber
Fiber Selection Guide
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Choose by shape/application
Viewing new models

Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

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Earlier models comparison table

Cylindrical Type

- Has a slender shape which can be mounted in narrow locations using set screws.
- Line up that includes ultra-thin fibers with $\phi 0.25$ mm tips.



<Thru-beam type> FT-S21/S21W/S31W <Reflective type> FD-S32/S31

- User-friendly, high quality fiber
- Improved centering accuracy and specularity

Stainless steel fittings are used for the fiber head of all models. ECO

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length (m) | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Beam axis position/Inclination of beam axis | Protection | Ambient temp. | |
|-------------|--------------------------|------------------------------------|-----------------------------------|------------------------|--|---|--|--|--|------------|---------------|-------------------------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | | |
| Cylindrical | $\phi 1$ | Tough NEW FT-S11 | R2 | 500 mm | STD 190 3.543 HYPR 350 13.780 | 210 8.268 160 6.299 60 2.362 19 0.748 | 40 1.575 90 3.543 | $\phi 0.25$ | — | IP67 | -55 to +80 °C | |
| | | Tough NEW FT-S21 | Bending durability | | STD 315 12.402 HYPR 1,350 53.150 | 770 30.315 550 21.654 210 8.268 70 2.756 | 130 5.118 340 13.386 | | | | | |
| | $\phi 1.5$ | Tough NEW FT-S21W | R1 | 2 m | STD 260 10.236 HYPR 990 38.976 | 590 23.228 440 17.323 150 5.906 53 2.087 | 80 3.150 240 9.449 | $\phi 0.5$ | 150 μ m / $\pm 2^\circ$ 150 μ m / $\pm 3^\circ$ | IP67 | -40 to +60 °C | |
| | | Tough NEW FT-S32 | R10 | | With lens, Long sensing range $\phi 2.5$ | STD 3,100 122.047 HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 1,800 70.866 600 23.622 | | | | | 1,100 43.307 3,000 118.110 |
| | $\phi 3$ | Tough NEW FT-S31W | R1 | 2 m | STD 800 31.496 HYPR 3,300 129.921 | 1,900 74.803 1,400 55.118 490 19.291 160 6.299 | 260 10.236 720 28.346 | $\phi 1$ | 150 μ m / $\pm 3^\circ$ | IP40 | -40 to +60 °C | |
| | | Tough NEW FT-E13 | R2 | | Narrow beam $\phi 0.125$ mm Sleeve part cannot be bent. | STD 15 0.591 HYPR 152 2.047 | 30 1.181 24 0.945 8 0.315 2 0.079 | | | | | 6 0.236 19 0.748 |
| | Ultra-small diameter | $\phi 3$ | Tough NEW FT-E23 | R2 | 1 m | STD 75 2.953 HYPR 270 10.630 | 160 6.299 125 4.921 42 1.654 13 0.512 | 22 0.866 80 3.150 | $\phi 0.25$ | — | IP67 | -40 to +70 °C |
| | | | Tough NEW FT-V40 | R4 | | Narrow beam $\phi 0.25$ mm Sleeve part cannot be bent. | STD 3,500 137.795 HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) 3,600 141.732 (Note 2) 2,400 94.488 850 33.465 | | | | |

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.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

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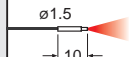
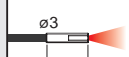


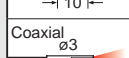
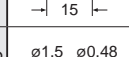
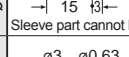
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Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1, 2) | | | Beam axis position/ Inclination of beam axis | Protection | Ambient temp. |
|---|---|--------------------------------------|--------------------------|--|---|---|--|---|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | |
| Cylindrical |  | Tough NEW FD-S21 | R2 Bending durability | 1 m | STD 80 3.150 HYPR 190 7.480 | 130 5.118 110 4.331 37 1.457 11 0.433 | 25 0.984 70 2.756 | — | IP40 | -55 to +80 °C |
| |  | Tough NEW FD-S32 | R4 Bending durability | 2 m | STD 420 16.535 HYPR 1,200 47.244 | 790 31.102 660 25.984 220 8.661 75 2.953 | 120 4.724 345 13.583 | 150 μm /±3° | IP67 | |
| |  | NEW FD-S32W | R1 | | STD 270 10.630 HYPR 900 35.433 | 630 24.803 430 16.929 150 5.906 45 1.772 | 80 3.150 230 9.055 | — | | |
| |  | Tough NEW FD-S31 | R2 Bending durability | | STD 125 4.921 HYPR 515 20.276 | 290 11.417 220 8.661 80 3.150 25 0.984 | 35 1.378 140 5.512 | 150 μm /±3° | | |
| |  | NEW FD-S33GW | R1 | | STD 150 5.906 HYPR 670 26.378 | 340 13.386 280 11.024 90 3.543 25 0.984 | 45 1.772 140 5.512 | — | | |
| |  | NEW FD-E13 | R4 | | STD 12 0.472 HYPR 50 1.969 | 29 1.142 25 0.984 7 0.276 2 0.079 | 5 0.197 15 0.591 | — | | |
|  | NEW FD-E23 | STD 55 2.165 HYPR 170 6.693 | | 120 4.724 80 3.150 30 1.181 9 0.354 | 20 0.787 70 2.756 | — | | | | |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The sensing range is specified for white non-glossy paper.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

Sleeve

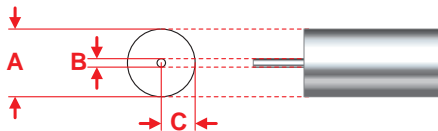
- It is suitable for sensing in narrow locations and sensing minute objects because the fiber tip is a thin sleeve.
- The 40 mm sleeve type can be bent in any direction.



<Thru-beam type> FT-E13/FT-E23 Ultra-small diameter fiber

Centering of 1/10 mm or less

Ultra-small diameter fibers with a compact head ensure precision centering accuracy* to stably detect minute parts.



*Tolerance of A + Tolerance of B + Tolerance of C = ±0.09 mm

Dimensions UNCLEAR

Extra clearance needs to be added when designing and machining the mounting hole due to unclear dimensions. As a result, mounting variation increases and the beam axis deviates, resulting in a decrease in sensing accuracy or causing the sleeve to bend or break.

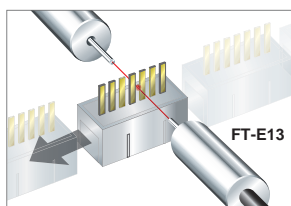
Dimensions CLEAR

Ex.) FT-E13

Highly accurate design and machining are possible due to clear mounting hole dimensions. As a result, mounting variation is minimal, improving sensing accuracy. In addition to this, as the beam axis alignment is not affected when the fiber is changed, readjustment is not necessary.

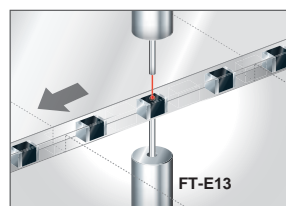
Minute sensing only possible with ultra small fiber

- Detection of fine-pitch connector pins



Ultra-small diameter fiber with $\varnothing 0.125 \text{ mm } \varnothing 0.005 \text{ in}$ beam axis is able to detect the insertion or bending of fine-pitch connector pins.

- Detection of tiny chips

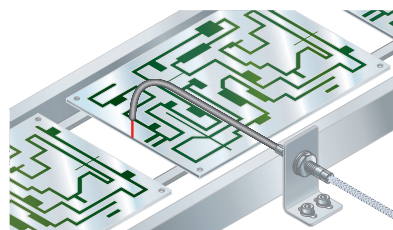


Fiber can be installed with only the $\varnothing 0.25 \text{ mm } \varnothing 0.010 \text{ in}$ sleeve close to the minute section.

Stainless steel fittings are used for the fiber head of all models. ECO

- Clearly conforms to RoHS
- Can be used for secondary battery
- Improved mounting strength

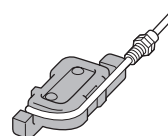
Application



Fiber options

Fiber bender

- FB-1



The fiber bender bends the sleeve part of the fiber head at the proper radius.

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

New product introduction
Tough Fiber

Fiber Selection Guide
Choose by model
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Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

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Reflective Type
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FX-100 series

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Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1, 2) | | | Beam axis dia. (mm) | Protection | Ambient temp. | |
|-------------|--------------------------------|-----------------------------------|------------------------------------|--------------------------------|---|---|--|-------------------------|---------------|---------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | |
| Threaded | M3 | Tough NEW FT-31S | R2 Bending durability (Note 3) | 2 m | STD 315 12.402 HYPR 1,220 48.031 | 740 29.134 550 21.654 195 7.677 63 2.480 | 130 5.118 340 13.386 | ∅0.5 | IP67 | -55 to +80 °C | |
| | M4 | Tough NEW FT-42S | R4 Bending durability (Note 3) | | STD 1,130 44.488 HYPR (Note 2) 3,600 141.732 | 2,050 80.709 1,600 62.992 530 20.866 190 7.480 | 300 11.811 800 31.496 | ∅1 | | | |
| Cylindrical | Ultra-small diameter ∅3 | Tough NEW FT-E13 | R2 Bending durability | 1 m | STD 15 0.591 HYPR 52 2.047 | 30 1.181 24 0.945 8 0.315 2 0.079 | 6 0.236 19 0.748 | ∅0.125 | IP67 | -40 to +70 °C | |
| | | Tough NEW FT-E23 | R4 Bending durability | | STD 175 2.953 HYPR 270 10.630 | 160 6.299 125 4.921 42 1.654 13 0.512 | 22 0.866 80 3.150 | ∅0.25 | | | |
| | Side-view ∅2 | | Tough NEW FT-V23 | R4 Bending durability | 2 m | STD 450 17.717 HYPR 1,800 70.866 | 1,000 39.370 880 34.646 280 11.024 90 3.543 | 160 6.299 400 15.748 | ∅0.75 | IP30 | -55 to +80 °C |
| | | | Tough NEW FT-V25 | R2 Bending durability | | STD 240 9.449 HYPR 900 35.433 | 550 21.654 480 18.898 140 5.512 45 1.772 | 95 3.740 260 10.236 | ∅0.5 | | |
| | | | Tough NEW FT-V24W | R1 | STD 110 4.331 HYPR 380 14.961 | 230 9.055 200 7.874 60 2.362 20 0.787 | 35 1.378 90 3.543 | ∅0.5 | -40 to +60 °C | | |
| | | | Tough NEW FT-V30 | R4 Bending durability | STD 680 26.772 HYPR 2,200 86.614 | 1,200 47.244 1,000 39.370 340 13.386 100 3.937 | 180 7.087 480 18.898 | ∅1.0 | -55 to +80 °C | | |

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) Bending radius of sleeve part is R10 mm or more.

Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1, 2) | | | Protection | Ambient temp. |
|-------------|----------------------------------|-----------------------------------|-----------------------------------|--------------------------------|-------------------------------------|---|--|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Threaded | Ultra-small diameter M3 | NEW FD-EG30S | R4 | 1 m | STD 50 1.969 HYPR 170 6.693 | 110 4.331 80 3.150 30 1.181 9 0.354 | 20 0.787 70 2.756 | IP40 | -40 to +70 °C |
| | M4 | Tough NEW FD-41S | R2 Bending durability (Note 3) | | STD 125 4.921 HYPR 515 20.276 | 290 11.417 220 8.661 80 3.150 25 0.984 | 35 1.378 140 5.512 | IP67 | -55 to +80 °C |
| | | NEW FD-41SW | R1 (Note 3) | | STD 80 3.150 HYPR 330 12.992 | 180 7.087 140 5.512 45 1.772 12 0.472 | 15 0.591 60 2.362 | IP67 | -40 to +60 °C |
| | M6 | Tough NEW FD-61S | R4 Bending durability (Note 3) | | STD 420 16.535 HYPR 1,200 47.244 | 790 31.102 660 25.984 220 8.661 75 2.953 | 130 5.118 360 14.173 | IP67 | -55 to +80 °C |
| Cylindrical | Ultra-small diameter ∅1.5 | NEW FD-E13 | R4 | 1 m | STD 12 0.472 HYPR 50 1.969 | 29 1.142 25 0.984 7 0.276 2 0.079 | 5 0.197 15 0.591 | IP40 | -40 to +60 °C |
| | | NEW FD-E23 | | | STD 55 2.165 HYPR 170 6.693 | 120 4.724 80 3.150 30 1.181 9 0.354 | 20 0.787 70 2.756 | | |
| | Side-view ∅3 | | Tough NEW FD-V30 | R2 Bending durability | STD 65 2.559 HYPR 240 9.449 | 130 5.118 120 4.724 35 1.378 14 0.551 | 25 0.984 75 2.953 | IP67 | -55 to +80 °C |
| | | | NEW FD-V30W | R1 | STD 20 0.787 HYPR 80 3.150 | 40 1.575 30 1.181 10 0.394 2 0.079 | 6 0.236 20 0.787 | IP30 | -40 to +60 °C |
| | | | Tough NEW FD-V50 | R4 Bending durability | STD 120 4.724 HYPR 370 14.567 | 220 8.661 210 8.268 75 2.953 25 0.984 | 40 1.575 100 3.937 | IP67 | -55 to +80 °C |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The sensing range is specified for white non-glossy paper.
3) Bending radius of sleeve part is R10 mm R0.394 in or more.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

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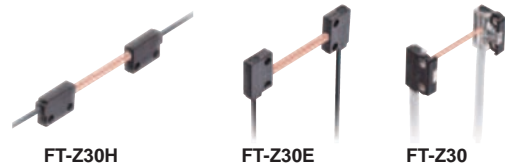
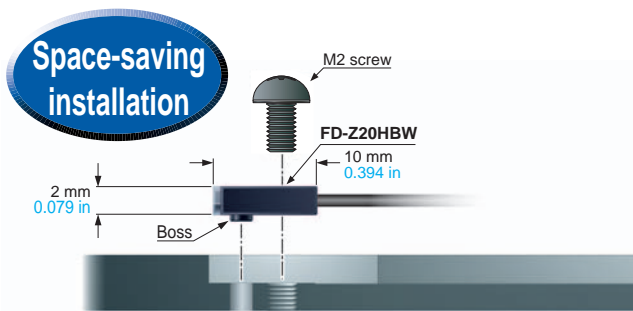
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Flat Type

Since it has a thin, rectangular shape, it can be installed in narrow locations. It is also a fiber with good workability and can be mounted directly with screws.

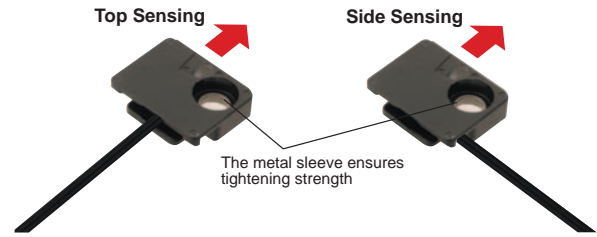
Mounting with M2 or M3 screw

We offer; FT-WZ4/Z20HBW, FD-WZ4/Z20HBW, 1 point mounting with M2 screw and FT-WZ7/Z40HBW, FD-WZ7/Z40HBW, 1 point mounting with M3 screw.



The built-in fiber guide allows for multiple installation angles.

FT/FD-WZ□HBW is equipped with a fiber guide feature. Front sensing and side sensing can be selected with one head.



Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Protection | Ambient temp. | |
|------|-------------------------------------|---------------------------------|--------------------------|--------------------------------|--------------------------------|---|--|---------------------|------------|---------------|-------------------------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | |
| Flat | Top sensing W3 x H8 x D12 | Tough NEW FT-Z30H | R2 Bending durability | 2 m | STD 3,500 137.795 | 3,600 141.732 (Note 2) | 1,400 55.118 | 2 x 3 | IP40 | -40 to +60 °C | |
| | Top sensing W3 x H8 x D12 | NEW FT-Z30HW | R1 | | HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 2,600 102.362 810 31.890 | | | | 3,200 125.984 |
| | Side sensing W3 x H12 x D8 | Tough NEW FT-Z30E | R2 Bending durability | | STD 3,500 137.795 | 3,600 141.732 (Note 2) | 2,400 94.488 740 29.134 | | | | 1,200 47.244 3,200 125.984 |
| | Side sensing W3 x H12 x D8 | NEW FT-Z30EW | R1 | | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 2,000 78.740 630 24.803 | | | | 2,600 102.362 |
| | Front sensing W8.5 x H12 x D3 | Tough NEW FT-Z30 | R2 Bending durability | | STD 2,100 82.677 | 3,600 141.732 (Note 2) | 1,200 47.244 410 16.142 | | | | 710 27.953 2,300 90.551 |
| | Front sensing W8.5 x H12 x D3 | NEW FT-Z30W | R1 | | STD 1,500 59.055 | 3,300 129.921 3,200 125.984 | 1,000 39.370 280 11.024 | | | | 540 21.260 1,800 70.866 |
| | Front sensing W10 x H7 x D2 | FT-WZ4 | R1 | | STD 530 20.866 | 1,100 43.307 900 35.433 330 12.992 100 3.937 | 230 9.055 670 26.378 | — | | | |
| | Fiber bending type W2 x H10 x D10 | NEW FT-Z20HBW | R1 | | STD 260 10.236 | 670 26.378 570 22.441 180 7.087 55 2.165 | 100 3.937 320 12.598 | — | | | |
| | Front sensing W14 x H7 x D3.5 | FT-WZ7 | R1 | | STD 1,400 55.118 | 3,300 129.921 2,300 90.551 890 35.039 290 11.417 | 330 12.992 1,000 39.370 | — | | | |
| | Fiber bending type W3.5 x H14 x D11 | NEW FT-Z40HBW | R1 | | STD 800 31.496 | 1,900 74.803 1,400 55.118 490 19.291 160 6.299 | 260 10.236 720 28.346 | — | | | |

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.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

Ruggholzli 2
CH - 5453 Busslingen

Produkte, Support und Service

SENTRONIC AG

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



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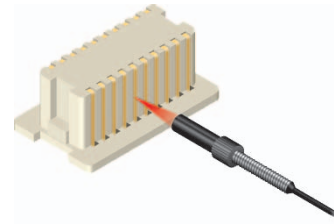
Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂️ : Free-cut | Sensing range (mm in) (Note 1, 2) | | | Protection | Ambient temp. |
|-------------------|---|----------------------|---------------------|-------------------------------------|---|--|---|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Flat With boss | Front sensing  W10 x H7 x D2 | FD-WZ4 | R1 | ✂️ 1 m | STD 2 to 65 0.079 to 2.559 HYPR 1 to 230 0.039 to 9.055 | 1 to 110 0.039 to 4.331 1 to 85 0.039 to 3.346 3 to 35 0.118 to 1.378 5 to 13 0.197 to 0.512 | 2 to 20 0.079 to 0.787 1 to 70 0.039 to 2.756 | — | -40 to +60 °C |
| | Fiber bending type  W2 x H10 x D10 | FD-Z20HBW NEW | | | STD 2 to 85 0.079 to 3.346 HYPR 1 to 340 0.039 to 13.386 | 1 to 210 0.039 to 8.268 1 to 180 0.039 to 7.087 2 to 55 0.079 to 2.165 3 to 15 0.118 to 0.591 | 2 to 30 0.079 to 1.181 1 to 90 0.039 to 3.543 | IP67 | |
| | Front sensing  W14 x H7 x D3.5 | FD-WZ7 | | ✂️ 2 m | STD 110 4.331 HYPR 430 16.929 | 230 9.055 180 7.087 1.5 to 65 0.059 to 2.559 3 to 25 0.118 to 0.984 | 1 to 55 0.039 to 2.165 160 6.299 | — | |
| | Fiber bending type  W3.5 x H14 x D11 | FD-Z40HBW NEW | | | STD 260 10.236 HYPR 760 29.921 | 540 21.260 470 18.504 1 to 160 0.039 to 6.299 2 to 50 0.079 to 1.969 | 1 to 90 0.039 to 3.543 0.5 to 240 0.020 to 9.449 | IP67 | |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
 2) The sensing range is specified for white non-glossy paper.

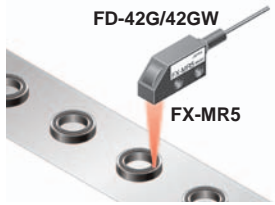
Small Spot

■ Sensing of minute objects can be performed by combining the fiber and spot lens. The spot diameter can also be changed.



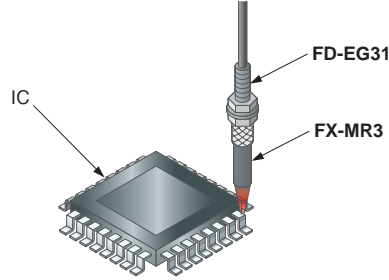
Applications

Packing detection

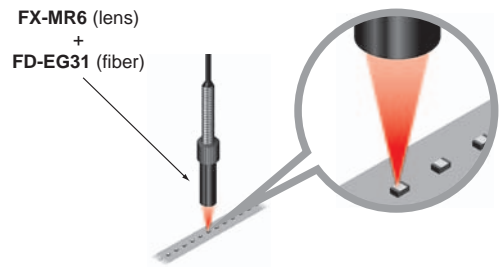


Because it's a side-view type, it can be mounted even in narrow spaces.

Number of IC pins checking



Discrimination of 0603 chip direction



Small spot fiber lineup (High precision fiber & Spot lens)

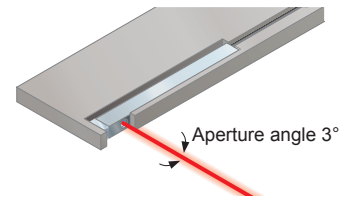
| Designation | Shape of head (mm) | Spot diameter (mm in) (Note) | Distance to focal point (mm in) (Note) | Lens | | Applicable fibers | | | | | |
|----------------------------|--------------------|----------------------------------|--|---------------|--------------------------|-------------------------|-----------------------------------|--------------------------|---------------|---------------|---------------|
| | | | | Model No. | Ambient temp. | Model No. | Fiber cable length ✂: Free-cut | Bending radius (mm) | Protection | Ambient temp. | |
| Finest spot lens | | ø0.1 ø0.004 | 7±0.5 0.276±0.020 | FX-MR6 | -20 to +60 °C | NEW FD-EG31 | 500 mm | R4 | IP40 | -20 to +60 °C | |
| | | ø0.2 ø0.008 | | | | NEW FD-EG30 | | | | | -40 to +70 °C |
| | | ø0.4 ø0.016 | | | | Tough NEW FD-42G | 2 m | R2 Bending durability | | | |
| | | ø0.4 ø0.016 | | | | NEW FD-42GW | | R1 | | | -40 to +60 °C |
| | | ø0.4 ø0.016 | Tough NEW FD-32G | 1 m | R2 Bending durability | -55 to +80 °C | | | | | |
| | | ø0.4 ø0.016 | NEW FD-32GX | | R2 | -40 to +60 °C | | | | | |
| | | ø0.15 ø0.006 | 7.5±0.5 0.295±0.020 | FX-MR3 | -40 to +70 °C | NEW FD-EG31 | 500 mm | R4 | | -20 to +60 °C | |
| | | ø0.3 ø0.012 | | | | NEW FD-EG30 | | | | -40 to +70 °C | |
| | | ø0.3 ø0.012 | ø0.5 ø0.020 | FX-MR3 | -40 to +70 °C | Tough NEW FD-42G | 2 m | R2 Bending durability | | -55 to +80 °C | |
| | | ø0.5 ø0.020 | | | | NEW FD-42GW | | R1 | | -40 to +60 °C | |
| | ø0.5 ø0.020 | ø0.5 ø0.020 | FX-MR3 | -40 to +70 °C | Tough NEW FD-32G | 1 m | R2 Bending durability | -55 to +80 °C | | | |
| | ø0.5 ø0.020 | | | | NEW FD-32GX | | R2 | -40 to +60 °C | | | |
| Pinpoint spot lens | | ø0.5 ø0.020 | 6±1 0.236±0.039 | FX-MR1 | -40 to +70 °C | Tough NEW FD-42G | 2 m | R2 | -55 to +80 °C | | |
| | | | | | | NEW FD-42GW | | R1 | -40 to +60 °C | | |
| Zoom lens | | ø0.7 to ø2.0 ø0.028 to ø0.079 | Approx. 18.5 to 43 Approx. 0.728 to 1.693 | FX-MR2 | -40 to +70 °C | Tough NEW FD-42G | 2 m | R2 | -55 to +80 °C | | |
| | | | | | | NEW FD-42GW | | R1 | -40 to +60 °C | | |
| Zoom lens (Side-view type) | | ø0.5 to ø3.0 ø0.020 to ø0.118 | Approx. 13 to 30 Approx. 0.512 to 1.181 | FX-MR5 | -40 to +70 °C | Tough NEW FD-42G | 2 m | R2 | -55 to +80 °C | | |
| | | | | | | NEW FD-42GW | | R1 | -40 to +60 °C | | |

Note: Spot diameter and distance to focal point are specified for FX-500/FX-100 series.

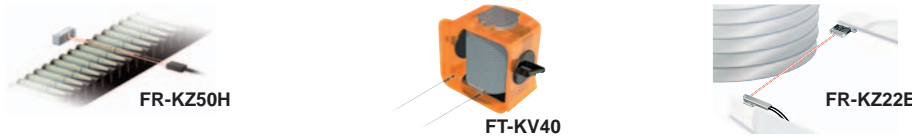
Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

Narrow Beam

Since the beam is narrow, it has a feature by which it is not easily affected by surrounding obstacles even in long distances.



Applications



Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂: Free-cut | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Beam axis position/Inclination of beam axis | Protection | Ambient temp. |
|-------------|--------------------------|-------------------------------------|--------------------------------|-----------------------------------|--------------------------------|------------------------|--|---------------------|---|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | | |
| Narrow beam | | Tough NEW FT-KS40 | R2 | 2 m | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 2,200 86.614 | ø2.2 | — | IP40 | -40 to +60 °C |
| | | | HYPR (Note 2) 3,600 141.732 | | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | | | | | |
| | | Tough NEW FT-KV40 | R2 | | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 2,200 86.614 | | | | |
| | | | HYPR (Note 2) 3,600 141.732 | | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | | | | | |
| | | Tough NEW FT-KV40W | R1 | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 2,200 86.614 | ø2.5 ±0.8° | IP30 | | | |
| | | | HYPR (Note 2) 3,600 141.732 | 3,100 122.047 | 940 37.008 | | | | | | |
| | | Tough NEW FT-KV26 | R2 | STD (Note 2) 710 27.953 | 1,600 62.992 | 135 5.315 | ø1 | X±1° Z±0.5° | | | |
| | | | HYPR (Note 2) 2,500 98.425 | 1,200 47.244 | 440 17.323 | | | | | | |
| | | | | | 160 6.299 | 560 22.047 | | | | | |

Retroreflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂: Free-cut | Sensing range (mm in) (Note 1, 3) | | | Protection | Ambient temp. |
|-------------------------|--------------------------|-------------------------------------|--------------------------------------|-----------------------------------|-------------------------------------|------------------------------|--|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| With polarizing filters | | Tough NEW FR-Z50HW | R1 | 2 m | STD 100 to 990 3.937 to 38.976 | 100 to 1,400 3.937 to 55.118 | 100 to 550 | IP40 | -25 to +55 °C |
| | | | HYPR 100 to 1,900 3.937 to 74.803 | | 100 to 1,200 3.937 to 47.244 | 100 to 780 3.937 to 30.709 | 3.937 to 21.654 | | |
| | | | | | | 100 to 490 3.937 to 19.291 | 3.937 to 32.677 | | |
| Wafer mapping | | Tough NEW FR-KZ22E | R2 | | STD 15 to 310 0.591 to 12.205 | 15 to 460 0.591 to 18.110 | 15 to 200 | IP30 | -40 to +60 °C |
| | | | | HYPR 15 to 570 0.591 to 22.441 | 15 to 410 0.591 to 16.142 | 0.591 to 21.874 | | | |
| | | | | | 15 to 100 0.591 to 3.937 | 0.591 to 14.173 | | | |
| Narrow beam | | Tough NEW FR-KZ50H | R2 | | STD 20 to 300 0.787 to 11.811 | 20 to 800 0.787 to 31.496 | 20 to 200 | IP30 | -40 to +60 °C |
| | | Tough NEW FR-KZ50E | R2 | | HYPR 20 to 1,000 0.787 to 39.370 | 20 to 400 0.787 to 15.748 | 0.787 to 7.874 | | |
| | | | | | | 20 to 200 0.787 to 7.874 | 20 to 350 | | |
| | | | | | | 20 to 200 0.787 to 7.874 | 0.787 to 13.780 | | |

Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂: Free-cut | Sensing range (mm in) (Note 1) | | | Protection | Ambient temp. |
|------------|--------------------------|-------------------------------------|---------------------|-----------------------------------|-------------------------------------|-----------------------------|--|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Long range | | Tough NEW FD-Z50HW | R1 | 2 m | STD 10 to 650 0.394 to 25.991 | 10 to 1,100 0.394 to 43.307 | 10 to 200 | IP40 | -40 to +60 °C |
| | | | | | HYPR 10 to 2,500 0.394 to 98.425 | 10 to 1,000 0.394 to 39.370 | 0.394 to 7.874 | | |
| | | | | | | 10 to 410 0.394 to 16.142 | 10 to 830 | | |
| | | | | | | 15 to 130 0.591 to 5.118 | 0.394 to 20.866 | | |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
 2) The fiber cable length practically limits the sensing range.
 3) The sensing range is the possible setting range for the attached reflector. The fiber can detect an object less than setting range for the reflector. Refer to P.22 for the sensing range when **FR-Z50HW** is used in combination with a reflector (optional).

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

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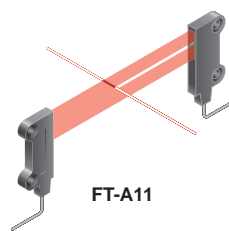
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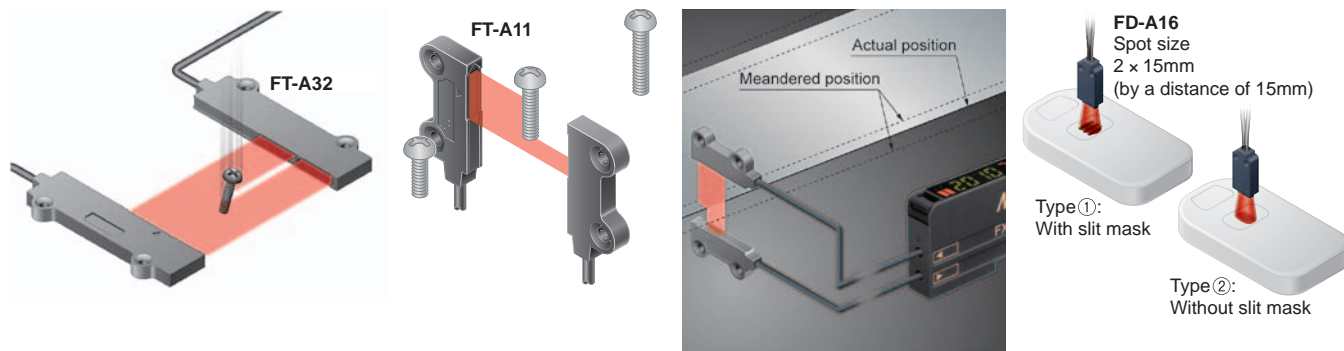
Wide Beam

■ Senses work with indefinite shape or position in the beam band without missing. It can also be used to determine shape.



Applications

Sensing tiny moving objects Inspecting screw height Control the amount of meandering Confirming presence of slit mask



Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Protection | Ambient temp. |
|--|--|-----------------------------------|-----------------------------|--------------------------------|--------------------------------|------------------------|--|---------------------|---------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | |
| Wide beam | Sensing width 32mm W5 x H69 x D20 Allows flexible wiring | Tough NEW FT-A32 | R2 Bending durability | 2 m | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3.2 x 32 | IP40 | -40 to +60 °C |
| | | | | | HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | | | | |
| | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | | -40 to +55 °C | | | | | |
| | HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | | | | 3,000 118.110 | | | | |
| Sensing width 11mm W4.2 x H31 x D13.5 Allows flexible wiring | Tough NEW FT-A11 | R2 Bending durability | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | | 1,900 74.803 (Note 2) | 3,600 141.732 (Note 2) | 2.2 x 11 | -40 to +70 °C | |
| | | | HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | | | | | | 1,100 43.307 |
| Sensing width 11mm W4.2 x H31 x D13.5 | Tough NEW FT-A11W | R1 | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 1,700 66.929 | 3,400 133.858 (Note 2) | -40 to +55 °C | | | |
| | | | HYPR (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | | | | 1,300 51.181 | | |
| Sensing width 5.5mm W5 x H15 x D15 | Tough NEW FT-AL05 | R2 Bending durability | STD 860 33.858 | 1,550 61.024 | 250 9.843 | 660 25.984 | 0.25 x 5.5 | -55 to +80 °C | | |
| | | | HYPR 12,300 90.551 | 1,500 59.055 | | | | | 500 19.685 | 170 6.693 |

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 to 3,600 mm 141.72 in long.

Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1, 2) | | | Protection | Ambient temp. |
|-----------|--------------------------|------------------------------------|--------------------------|--------------------------------|-----------------------------------|--------------------------|--|---------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Wide beam | W7 x H15 x D30 | Tough NEW FD-A16 | R4 Bending durability | 2 m | STD 200 7.874 | 200 7.874 | 120 4.724 240 9.449 | IP40 | -40 to +60 °C |
| | | | | | HYPR Cannot use | 140 5.512 75 2.953 | | | |
| Array | W5 x H20 x D20 | Tough NEW FD-AL11 | R2 Bending durability | | STD 320 12.598 | 530 20.866 510 20.079 | 100 3.937 285 11.220 | -55 to +80 °C | |
| | | | | | HYPR 670 26.378 | 180 7.087 50 1.969 | | | |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The sensing range is specified for white non-glossy paper.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

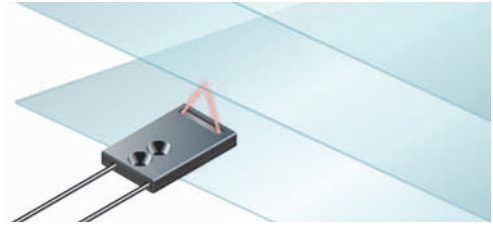
Ruggholzli 2
CH - 5453 Busslingen

Produkte, Support und Service

SENTRONIC AG

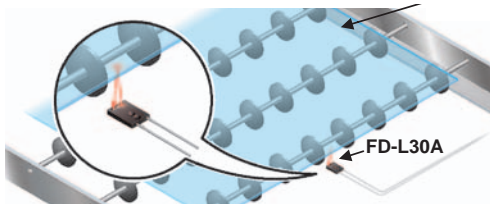
Convergent Reflective Type

It is a fiber in which the sensing distance is limited to a specific range so it is not easily affected by the background. It is effective when work has accumulated or when the background is near.

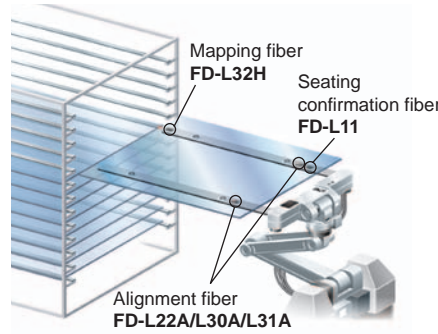


Applications

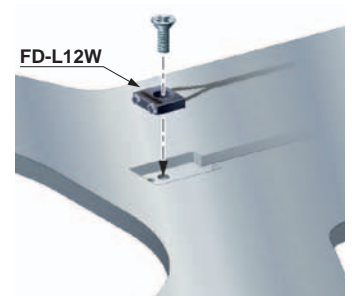
Detecting glass substrate



Substrate conveyors



Mounting in handling arms



Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Sensing range (mm in) (Note 1, 2) | | | Protection | Ambient temp. |
|-------------------------------------|--|------------------------------------|---------------------------------|------------------------------------|--|--|--|---------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Glass substrate detection | Mapping W25 x H7.3 x D30 | NEW FD-L32H | R4 Bending durability | 4 m | STD 0 to 56 0 to 2.205 HYPR 0 to 110 0 to 4.331 | 0 to 87 0 to 3.425 0 to 74 0 to 2.913 1 to 38 0.039 to 1.496 Cannot use | 16 to 30 0.630 to 1.181 0 to 50 0 to 1.969 | IP40 | -40 to +60 °C |
| | Alignment W20 x H29 x D3.8 | Tough NEW FD-L30A | R2 Bending durability | 3 m | STD 0 to 43 0 to 1.693 HYPR 0 to 43 0 to 1.693 | 0 to 43 0 to 1.693 0 to 43 0 to 1.693 0 to 42 0 to 1.654 0 to 29 0 to 1.142 | 0 to 40 0 to 1.575 0 to 50 0 to 1.969 | | |
| | Alignment W23.5 x H29 x D4.5 | Tough NEW FD-L31A | R4 Bending durability | 2 m | STD 4 to 33 0.157 to 1.299 HYPR 3 to 35 0.118 to 1.378 | 4 to 33 0.157 to 1.299 4 to 33 0.157 to 1.299 4 to 32 0.157 to 1.260 5 to 25 0.197 to 0.984 | 5 to 30 0.197 to 1.181 4 to 33 0.157 to 1.299 | | |
| | Alignment W17 x H29 x D3.8 | Tough NEW FD-L22A | R2 Bending durability | 3 m | STD 0 to 24 0 to 0.945 HYPR 0 to 31 0 to 1.220 | 0 to 28 0 to 1.102 0 to 27 0 to 1.063 0 to 24 0 to 0.945 0 to 18 0 to 0.709 | 0 to 19 0 to 0.748 0 to 25 0 to 0.984 | | |
| | Seating confirmation W18 x H29 x D3.8 | Tough NEW FD-L23 | R2 Bending durability | 2 m | STD 0 to 29 0 to 1.142 HYPR 0 to 30 0 to 1.181 | 0 to 30 0 to 1.181 0 to 30 0 to 1.181 0 to 28 0 to 1.102 1.5 to 24 0.059 to 0.945 | 0 to 28 0 to 1.102 0 to 30 0 to 1.181 | | |
| | Seating confirmation W12 x H19 x D3 | Tough NEW FD-L11 | R4 Bending durability | 2 m | STD 0 to 9.5 0 to 0.374 HYPR 0 to 11.5 0 to 0.453 | 0 to 10.5 0 to 0.413 0 to 10 0 to 0.394 0 to 9 0 to 0.354 0 to 8 0 to 0.315 | 0 to 8 0 to 0.315 0 to 9 0 to 0.354 | | |
| | Seating confirmation W12 x H19 x D3 | Tough NEW FD-L10 | R4 Bending durability | 2 m | STD 0 to 5 0 to 0.197 HYPR 0 to 6 0 to 0.236 | 0 to 5.5 0 to 0.217 0 to 5 0 to 0.217 0 to 4.5 0 to 0.177 0 to 4 0 to 0.157 | 0 to 4.5 0 to 0.177 0 to 5.5 0 to 0.217 | | |
| | Seating confirmation W24 x H21 x D4 | Tough NEW FD-L21 | R2 Bending durability | 2 m | STD 1.5 to 16 0.059 to 0.630 HYPR 1 to 19 0.039 to 0.748 | 1 to 18 0.039 to 0.709 1 to 18 0.039 to 0.709 2 to 15 0.079 to 0.591 3 to 12 0.118 to 0.472 | 3 to 15 0.118 to 0.591 1.5 to 16 0.059 to 0.630 | | |
| | Seating confirmation W24 x H21 x D4 | NEW FD-L21W | R1 Bending durability | 2 m | STD 3 to 14 0.118 to 0.551 HYPR 1.5 to 15 0.059 to 0.591 | 2 to 15 0.079 to 0.591 2 to 15 0.079 to 0.591 4 to 14 0.157 to 0.551 6.5 to 10 0.256 to 0.394 | 7 to 12 0.276 to 0.472 3 to 14 0.118 to 0.551 | | |
| | General purpose W6 x H18 x D14 | Tough NEW FD-L20H | R2 Bending durability | 1 m | STD 23 0.906 HYPR 45 1.772 | 35 1.378 32 1.260 2 to 15 0.079 to 0.591 5 to 9 0.197 to 0.354 | 5 to 15 0.197 to 0.591 1 to 30 0.039 to 1.181 | | |
| Ultra-small W7.2 x H7.5 x D2 | NEW FD-L12W | R1 Bending durability | 1 m | STD 8 0.315 HYPR 14 0.551 | 12.5 0.492 12 0.472 0.5 to 7 0.020 to 0.276 0.5 to 4 0.020 to 0.157 | 1 to 4.5 0.039 to 0.177 0.5 to 7 0.020 to 0.276 | IP30 | -40 to +60 °C | |

Notes: 1) The sensing range is specified for transparent glass 100 × 100 × 0.7 mm 3.937 × 3.937 × 0.028 in (FD-L32H: R edge, FD-L21 and FD-L21W: t2 mm 0.079 in) (FD-L20H: white non-glossy paper, FD-L10: silicon wafers 100 × 100 mm 3.937 × 3.937 in).
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.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

Others

Amplifiers

FX-500 series

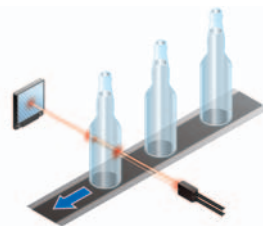
FX-100 series

INDEX

Earlier models comparison table

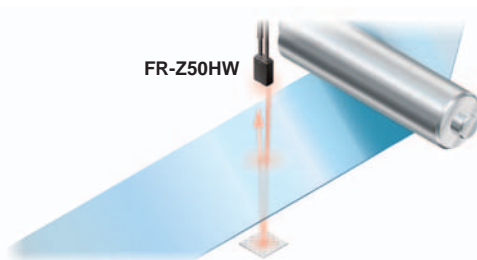
Retroreflective Type

■ Compared with the thru-beam type, it is easier to rotate the fibers since one side is a reflector. Sensing transparent objects is also its advantage.

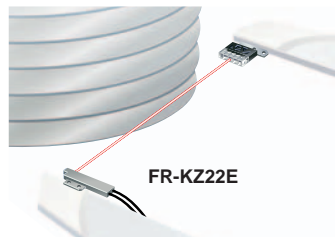


Applications

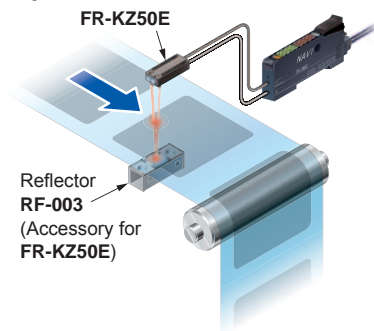
Detecting transparent film



Detecting wafer



Detection of transparent seals on transparent sheet



Retroreflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂: Free-cut | Sensing range (mm in) (Note 1, 2) | | | Protection | Ambient temp. |
|-----------------------------|--|------------------------------|--------------------------|-----------------------------------|--------------------------------------|--|---|------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| With polarizing filters | W5.2 x H9.5 x D16 W30 x H30 x D0.5 | FR-Z50HW NEW | R1 | ✂ 2 m | STD 100 to 990 3.937 to 38.976 | 100 to 1,400 3.937 to 55.118 | 100 to 550 | IP40 | -25 to +55 °C |
| | | | | | HYPR 100 to 1,900 3.937 to 74.803 | 100 to 1,200 3.937 to 47.244 100 to 780 3.937 to 30.709 100 to 490 3.937 to 19.291 | 3.937 to 21.654 100 to 830 3.937 to 32.677 | | |
| Wafer mapping | W7.5 x H2.2 x D11.2 W4 x H2 x D21.5 | Tough NEW FR-KZ22E | R2 Bending durability | ✂ 2 m | STD 15 to 310 0.591 to 12.205 | 15 to 460 0.591 to 18.110 15 to 410 0.591 to 16.142 15 to 220 0.591 to 8.661 15 to 100 0.591 to 3.937 | 15 to 200 0.591 to 7.874 15 to 360 0.591 to 14.173 | IP30 | -40 to +60 °C |
| | | | | | HYPR 15 to 570 0.591 to 22.441 | | | | |
| Narrow beam Top sensing | W5.2 x H9.5 x D21 W10.6 x H28 x D10.1 | Tough NEW FR-KZ50H | R2 Bending durability | ✂ 2 m | STD 20 to 300 0.787 to 11.811 | 20 to 800 0.787 to 31.496 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 350 0.787 to 13.780 | IP30 | -40 to +60 °C |
| | | | | | HYPR 20 to 1,000 0.787 to 39.370 | | | | |
| Narrow beam Side sensing | W9.5 x H25 x D5.2 W28 x H10.6 x D10.1 | Tough NEW FR-KZ50E | R2 Bending durability | ✂ 2 m | STD 20 to 300 0.787 to 11.811 | 20 to 800 0.787 to 31.496 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 350 0.787 to 13.780 | IP30 | -40 to +60 °C |
| | | | | | HYPR 20 to 1,000 0.787 to 39.370 | | | | |

Notes: 1) Note that the sensing range of the free-cut type fiber may be reduced by 20 % max. depending upon how the fiber is cut.
2) The sensing range is the possible setting range for the attached reflector. The fiber can detect an object less than setting range for the reflector.

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

| Reflector model No. | Sensing range (mm in) | | | | | | | |
|---------------------|-----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------|---------------------------------|----------------------------------|
| | FX-500 series | | | | | | FX-101 | FX-102 |
| | HYPR | U-LG | LONG | STD | FAST | H-SP | | |
| RF-230 | 100 to 19,000 3.937 to 748.030 | 100 to 8,000 3.937 to 314.960 | 100 to 5,000 3.937 to 196.850 | 100 to 3,600 3.937 to 141.732 | 100 to 2,900 3.937 to 114.173 | 100 to 1,400 3.937 to 55.118 | 100 to 2,400 3.937 to 94.488 | 100 to 5,000 3.937 to 196.850 |
| RF-220 | 100 to 8,000 3.937 to 314.960 | 100 to 4,700 3.937 to 185.039 | 100 to 3,500 3.937 to 137.795 | 100 to 3,000 3.937 to 118.110 | 100 to 1,800 3.937 to 70.866 | 100 to 830 3.937 to 32.677 | 100 to 1,300 3.937 to 51.181 | 100 to 2,600 3.937 to 102.362 |
| RF-210 | 100 to 5,500 3.937 to 216.535 | 100 to 2,700 3.937 to 106.299 | 100 to 2,400 3.937 to 94.488 | 100 to 1,500 3.937 to 59.055 | 100 to 1,200 3.937 to 47.244 | 100 to 530 3.937 to 20.866 | 100 to 980 3.937 to 38.583 | 100 to 1,300 3.937 to 51.181 |

Note: The sensing range of retroreflective type is the possible setting range for the attached reflector. The fiber can detect an object less than 100 mm. 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.

Fiber option

Reflector (for FR-Z50HW) ▶ P.33



Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

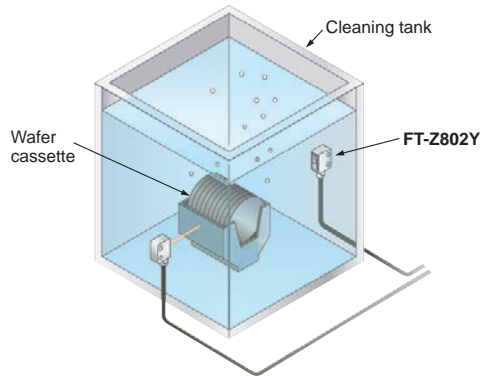
Chemical-resistant

With the case and fiber sheath made of PFA, the fiber can be used with various types of chemical liquids.

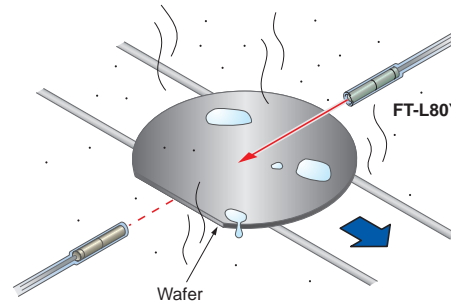


Applications

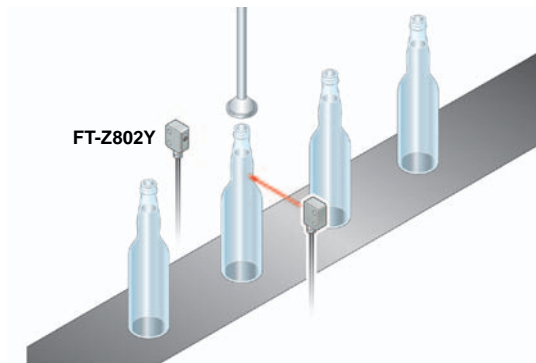
Detecting wafer cassette in cleaning tank



Sensing wafer in corrosive environment



Chemical filler



Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length (m) Free-cut | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Protection | Ambient temp. |
|--------------------|---|-----------|---------------------|------------------------------------|--------------------------------|------------------------|--|---------------------|----------------|---------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | |
| Chemical-resistant | Easy mounting • Rectangular head SEMI S2 compliant W7 × H15 × D13 | FT-Z802Y | R25 | 2 m | STD 3,100 122.047 | 3,600 141.732 (Note 2) | 520 20.472 | IP67 | 0 to +60 °C | |
| | HYPR (Note 2) 3,600 141.732 | | | | 1,900 74.803 | 3,100 122.047 | | | | |
| | Heat-resistant 115 °C | FT-HL80Y | R30 | 2 m (Note 3) | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 990 38.976 | IP67g | -40 to +115 °C | |
| | HYPR (Note 2) 3,600 141.732 | | | | 2,300 90.551 | 2,340 92.126 | | | | |
| | | FT-L80Y | R30 | 2 m (Note 3) | STD (Note 2) 3,600 141.732 | 3,600 141.732 (Note 2) | 1,100 43.307 | IP67g | -40 to +70 °C | |
| | | | | | HYPR (Note 2) 3,600 141.732 | 2,800 110.236 | 2,600 102.362 | | | |
| | Side-view | FT-V80Y | R30 | 2 m (Note 3) | STD 1,300 51.181 | 2,800 110.236 | 340 13.386 | IP67g | -40 to +70 °C | |
| | | | | | HYPR (Note 2) 3,600 141.732 | 2,200 86.614 | 800 31.496 | | | |
| | | | | | | | | | | |

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

New product introduction
Tough Fiber

Fiber Selection Guide
Choose by model
Choose by shape/application
Viewing new models

Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions
Thru-beam Type
Retroreflective Type
Reflective Type
Others

Amplifiers
FX-500 series
FX-100 series

INDEX

Earlier models comparison table

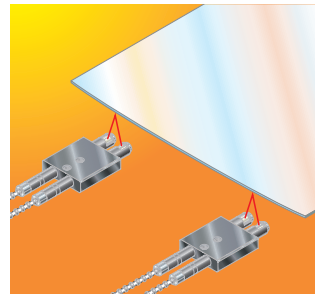
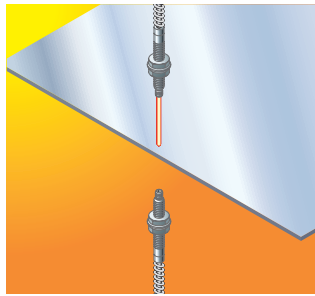
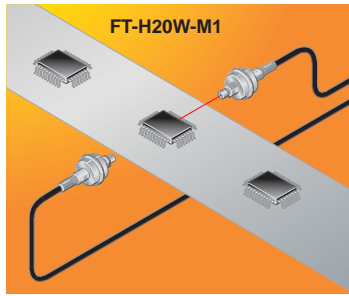
Heat-resistant

- It can be used under environments of -60 to +350 °C
-76 to +662 °F.
- A wide joint type for workability is also prepared.



Applications

- IC detection within a high temperature handler
- Detecting glass substrates

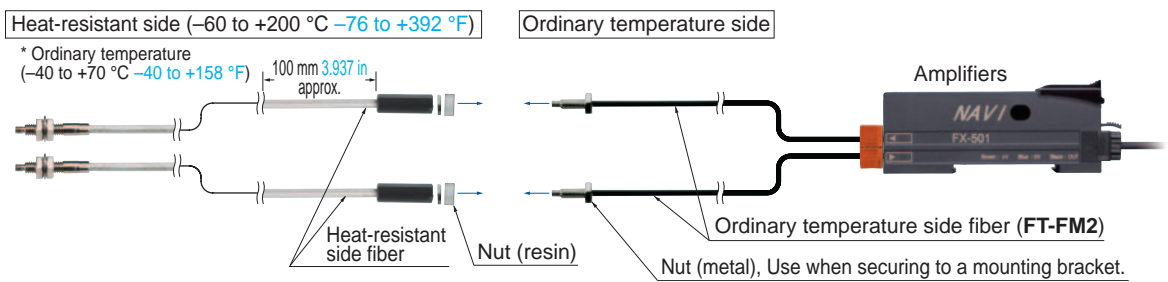


Thru-beam type (one pair set)

| Type | Heat-resistant temp. | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂: Free-cut | Sensing range (mm in) (Note 1) | | | Beam axis dia. (mm) | Ambient temp. | |
|------------------------|---|---|---|-------------------------|-----------------------------------|--|---|--|---------------------|----------------|--|
| | | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | | |
| Heat-resistant | 350 °C | Lens mountable (FX-LE1/LE2/SV1) M4 Sleeve 60 mm | FT-H35-M2 | R25 | 2 m | STD 430 16.929 HYPR 1,200 47.244 | 880 34.646 670 26.378 250 9.843 80 3.150 | 170 6.693 490 19.291 | ∅1.2 | -60 to +350 °C | |
| | | Lens mountable (FX-LE1/LE2/SV1) M4 ∅2.1 27 | FT-H35-M2S6 | Fiber R25 Sleeve R10 | | | | | | | |
| | 200 °C | Allows flexible wiring Lens mountable (FX-LE1/LE2/SV1) M4 23 | FT-H20W-M1 | R10 | 1 m | STD 470 18.504 HYPR (Note 2) 1,600 62.992 | 1,000 39.370 840 33.071 300 11.811 90 3.543 | 100 3.937 300 11.811 | ∅0.8 | -60 to +200 °C | |
| | | Lens mountable (FX-LE1/LE2/SV1) M4 23 | FT-H20-M1 | R25 | | STD 540 21.260 HYPR (Note 2) 1,600 62.992 | 1,300 51.181 960 37.795 330 12.992 110 4.331 | 210 8.268 540 21.260 | ∅1.2 | | |
| Heat-resistant (joint) | 130 °C | Lens mountable (FX-LE2 only) M4 16 | FT-H13-FM2 | R25 | ✂ 2 m | STD 700 27.559 HYPR 3,300 129.921 | 1,900 74.803 1,300 51.181 410 16.142 140 5.512 | 250 9.843 700 27.559 | ∅1.5 | -60 to +130 °C | |
| | | 200 °C | Lens mountable (FX-LE1/LE2/SV1) M4 23 | FT-H20-J20-S (Note 5) | Heat-resistant side R18 (Note 4) | ✂ 200 mm (Note 3) | | | | | |
| | Lens mountable (FX-LE1/LE2/SV1) M4 23 | | FT-H20-J30-S (Note 5) | ✂ 300 mm (Note 3) | | STD 470 18.504 HYPR 1,600 62.992 | 1,000 39.370 790 31.102 300 11.811 90 3.543 | 135 5.315 420 16.535 | | | |
| | Side-view 24 ∅3.8 ∅4 | | FT-H20-J50-S (Note 5) | ✂ 500 mm (Note 3) | | | | | | | |
| | | | FT-H20-VJ50-S (Note 5) | ✂ 800 mm (Note 3) | | STD 600 23.622 HYPR 2,100 82.677 | 1,300 51.181 980 38.583 390 15.354 120 4.724 | 150 5.906 500 19.685 | | | |

- Notes:
- 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 fiber cable length practically limits the sensing range.
 - Fiber length (fixed-length) for heat-resistant fiber side. Fiber length for ordinary temperature side is 2 m 6.562 ft (free-cut).
 - R25 mm R0.984 in or more for ordinary temperature side.
 - Heat-resistant side fiber + ordinary temperature fiber (FT-FM2) are sold together as a set.

Heat-resistant joint fiber set contents



Model No. when ordering individual parts from spare parts

- Heat-resistant side fiber **one pair set**
 FT-H20-J20, FT-H20-J30, FT-H20-J50, FT-H20-VJ50, FT-H20-VJ80
- Ordinary temperature side fiber **one pair set**
 FT-FM2

Reflective type

| Type | Heat-resistant temp. | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ✂ : Free-cut | Sensing range (mm in) (Note 1, 2) | | | Ambient temp. | |
|----------------|---|--------------------------|------------------|---------------------|------------------------------------|---|--|--|---|----------------|
| | | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Heat-resistant | 350 °C | Coaxial M6 25 | FD-H35-M2 | R25 | 2 m | STD 260 10.236 HYPR 720 28.346 | 540 21.260 460 18.110 150 5.906 45 1.772 | 75 2.953 280 11.024 | -60 to +350 °C | |
| | | Sleeve 60 mm M6 22 | FD-H35-M2S6 | Fiber Sleeve R25 | | | | | | |
| | | Sleeve 90 mm M4 27 | FD-H35-20S | R10 | | STD 260 10.236 HYPR 840 33.071 | 550 21.654 440 17.323 140 5.512 45 1.772 | 85 3.346 200 7.874 | | |
| | 200 °C | Coaxial M6 28 | FD-H20-M1 | R25 | 1 m | STD 330 12.992 HYPR 840 33.071 | 550 21.654 500 19.685 200 7.874 55 2.165 | 120 4.724 300 11.811 | -60 to +200 °C | |
| | | Coaxial M4 27 | FD-H20-21 | | | STD 230 9.055 HYPR 770 30.315 | 500 19.685 380 14.961 130 5.118 45 1.772 | 90 3.543 280 11.024 | | |
| | 130 °C | Coaxial M6 21 | FD-H13-FM2 | R25 | ✂ 2 m | STD 350 13.780 HYPR 880 34.646 | 640 25.197 600 23.622 200 7.874 65 2.559 | 100 3.937 280 11.024 | -60 to +130 °C | |
| | Glass substrate detection convergent reflective | 300 °C | W19 x H27 x D5 | FD-H30-L32 | R25 | 2 m | STD 17 0.669 HYPR 140 1.575 | 30 1.181 25 0.984 12 0.472 | 2 to 9 0.079 to 0.354 0 to 17 0 to 0.669 | -60 to +300 °C |
| | | 250 °C | W21 x H33.2 x D5 | FD-H25-L43 | 3 m | STD 1.5 to 26 0.059 to 1.024 HYPR 1 to 31 0.039 to 1.220 | 1 to 30 0.039 to 1.181 1 to 28 0.039 to 1.102 1.5 to 24 0.059 to 0.945 2 to 18 0.079 to 0.709 | 4 to 16 0.157 to 0.630 4 to 23 0.157 to 0.906 | -20 to +250 °C | |
| | | | W21 x H34.5 x D5 | FD-H25-L45 | | STD 5 to 42 0.197 to 1.654 HYPR 4 to 43.5 0.157 to 1.713 | 4 to 43 0.157 to 1.693 4.5 to 43 0.177 to 1.693 5 to 40 0.197 to 1.575 6.5 to 34 0.256 to 1.339 | 7 to 35 0.276 to 1.378 7 to 38 0.276 to 1.496 | | |
| | | 180 °C | W19 x H27 x D5 | FD-H18-L31 | R25 | ✂ 2 m | STD 16 0.630 HYPR 160 2.362 | 32 1.260 24 0.945 13 0.512 | 0 to 10 0 to 0.394 0 to 25 0 to 0.984 | -60 to +180 °C |

Notes: 1) The sensing range of reflective type is the value for white non-glossy paper (50 × 50 mm 1.969 × 1.969 in glass substrate for FD-H30-L32, FD-H18-L31, transparent glass 100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in for FD-H25-L43 and FD-H25-L45).
 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.

Fiber options

Lens (For thru-beam fiber) ▶ P.30~



New product introduction
 Tough Fiber
 Fiber Selection Guide
 Choose by model
 Choose by shape/application
 Viewing new models

Fibers
 Super Quality
 Threaded Type
 Cylindrical Type
 Sleeve
 Flat Type
 Small Spot
 Narrow Beam
 Wide Beam
 Convergent Reflective Type
 Retroreflective Type
 Chemical-resistant
 Heat-resistant
 Vacuum-resistant
 Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type
 Retroreflective Type
 Reflective Type
 Others

Amplifiers

FX-500 series
 FX-100 series

INDEX

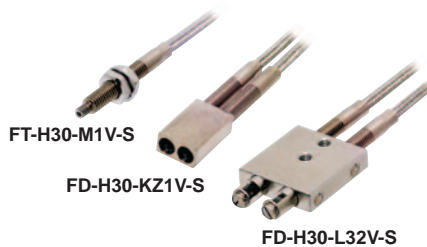
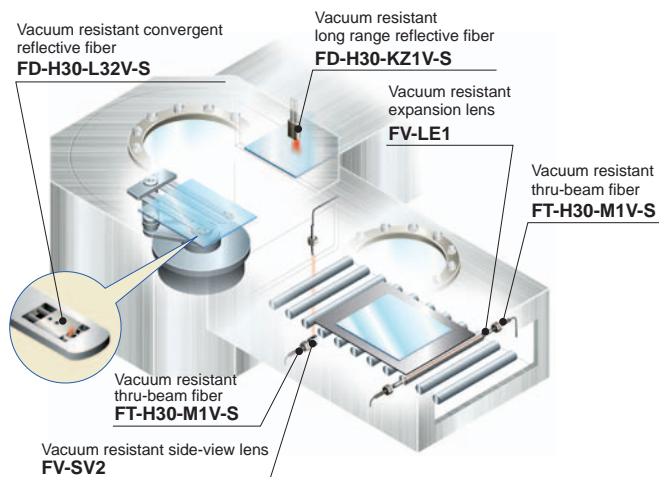
Earlier models comparison table

Vacuum-resistant

- Usable in high-temperatures of 300 °C 572 °F vacuum
- The leakage of **FV-BR1** is still less than a very slight $1.33 \times 10^{-10} \text{ Pa} \cdot \text{m}^3/\text{s}$ [He], so that it can be used in vacuums with confidence.

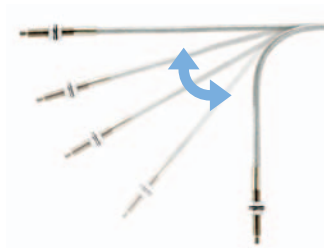
Applications

Detection of glass substrate in vacuum chamber



Highly resistant to repeated bending

Because it has a bending durability of over 100,000 times (R20 mm R0.79 in), it is highly resistant to repeated bending and is optimal for mounting on moving robot hand.



Thru-beam type (one pair set)

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ☒: Free-cut | Sensing range (mm in) | | | Beam axis dia. (mm) | Ambient temp. |
|----------------------------|--|---------------------|---------------------|-----------------------------------|---|---|--|---------------------|----------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | | |
| Vacuum-resistant Thru-beam | 300 °C Lens mountable (FV-LE1/SV2) M4 | FT-H30-M1V-S (Note) | R18 | 1 m | STD 270 10.630 HYPR 1,000 39.370 | 590 23.228 470 18.504 160 6.299 55 2.165 | 110 4.331 280 11.024 | ø1.2 | -30 to +300 °C |

Note: Sold as a set comprising vacuum type fiber + photo-terminal (FV-BR1) + fiber at atmospheric side (FT-J8).

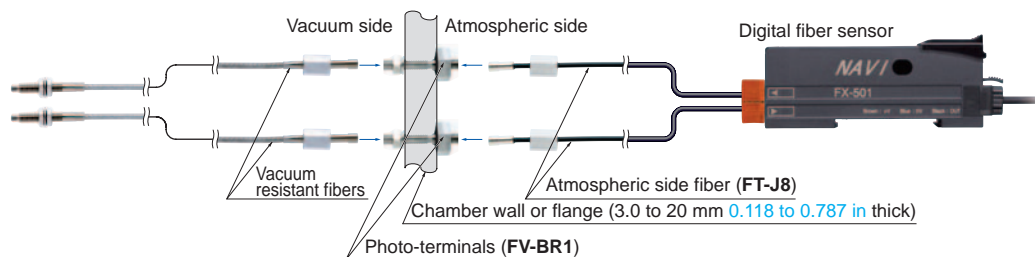
Reflective type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length ☒: Free-cut | Sensing range (mm in)(Note 2) | | | Ambient temp. |
|--|---|------------------------|---------------------|-----------------------------------|---|---|---|----------------|
| | | | | | FX-500 series | U-LG LONG FAST H-SP | FX-101 (Upper value) FX-102 (Lower value) | |
| Vacuum-resistant Reflective | 300 °C, Rectangular head W9.5 x H5.2 x D15 | FD-H30-KZ1V-S (Note 1) | R18 | 1 m | STD 20 to 200 0.787 to 7.874 HYPR 5 to 500 0.197 to 19.685 | 10 to 340 0.394 to 13.386 15 to 270 0.591 to 10.630 20 to 120 0.787 to 4.724 20 to 45 0.787 to 1.772 | 25 to 80 0.984 to 3.150 10 to 220 0.394 to 8.661 | -30 to +300 °C |
| Vacuum-resistant Convergent reflective | 300 °C, Glass substrate detection W19 x H5 x D27 | FD-H30-L32V-S (Note 1) | R18 | 3 m | STD 8 0.315 HYPR 18 0.709 | 12 0.472 10 0.394 5.5 0.217 1.5 to 3 0.059 to 0.118 | 2.5 to 6.5 0.098 to 0.256 0 to 11 0 to 0.433 | -30 to +300 °C |

Notes: 1) Sold as a set comprising vacuum type fiber + photo-terminal (FV-BR1) + fiber at atmospheric side (FT-J8).

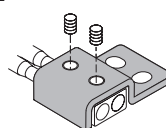
2) The sensing range of reflective type is the value for transparent glass 100 x 100 x t0.7 mm 3.937 x 3.937 x t0.028 in.

Set contents




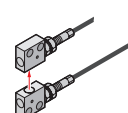
Model No. when ordering individual parts from repair parts

- Vacuum resistant fiber
FT-H30-M1V (one pair set)
FD-H30-KZ1V
FD-H30-L32V
- Photo-terminal
FV-BR1 (one pair set)
- Atmospheric side fiber
FT-J8 (one pair set)
- Mounting bracket for **FD-H30-KZ1V(-S)**
MS-FD-2



Fiber options

Lens (For thru-beam fiber)

| Designation | Model No. | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|------------------------------|------------------------------|------------------|-----------------|---------------|---------------|---------------|-----------------|---------|---------|-------|------|------|------|------|------|------|------|---------------------|---------------------|------------------------------|------------------------------|------------------------------|------------------|-----------------|---------------|---------------|-----------------|-----------------|
| For thru-beam type fiber | Vacuum resistant expansion lens (Note 1) | <p>FV-LE1</p>  <p>Increases the sensing range 4 times or more.</p> <ul style="list-style-type: none"> • Ambient temperature: -60 to $+350$ °C -76 to $+662$ °F (Note 3) • Beam axis dia: $\varnothing 3.6$ mm $\varnothing 0.142$ in • Sensing range (mm in) [Lens on both sides] (Note 4) <table border="1"> <thead> <tr> <th rowspan="2">Amplifier</th> <th colspan="7">FX-500 series</th> <th rowspan="2">FX-101□</th> <th rowspan="2">FX-102□</th> </tr> <tr> <th>Fiber</th> <th>Mode</th> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> </tr> </thead> <tbody> <tr> <td></td> <td>FT-H30-M1V-S</td> <td></td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,400 133.858</td> <td>1,500 59.055</td> <td>900 35.433</td> <td>370 14.567</td> <td>450 17.717</td> <td>1,600 62.992</td> </tr> </tbody> </table> | Amplifier | FX-500 series | | | | | | | FX-101□ | FX-102□ | Fiber | Mode | HYPR | U-LG | LONG | STD | FAST | H-SP | | FT-H30-M1V-S | | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 |
| | Amplifier | FX-500 series | | | | | | | FX-101□ | FX-102□ | | | | | | | | | | | | | | | | | | | | | |
| Fiber | | Mode | HYPR | U-LG | LONG | STD | FAST | H-SP | | | | | | | | | | | | | | | | | | | | | | | |
| | FT-H30-M1V-S | | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | | | | | | | | | | | | | | | | | | | | | |
| Vacuum resistant side-view lens (Note 1) | <p>FV-SV2</p>  <p>Beam axis is bent by 90°.</p> <ul style="list-style-type: none"> • Ambient temperature: -60 to $+300$ °C -76 to $+572$ °F (Note 3) • Beam axis dia: $\varnothing 3.7$ mm $\varnothing 0.146$ in • Sensing range (mm in) [Lens on both sides] (Note 4) <table border="1"> <thead> <tr> <th rowspan="2">Amplifier</th> <th colspan="7">FX-500 series</th> <th rowspan="2">FX-101□</th> <th rowspan="2">FX-102□</th> </tr> <tr> <th>Fiber</th> <th>Mode</th> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> </tr> </thead> <tbody> <tr> <td></td> <td>FT-H30-M1V-S</td> <td></td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,400 133.858</td> <td>1,500 59.055</td> <td>900 35.433</td> <td>370 14.567</td> <td>450 17.717</td> <td>1,600 62.992</td> </tr> </tbody> </table> | Amplifier | FX-500 series | | | | | | | FX-101□ | FX-102□ | Fiber | Mode | HYPR | U-LG | LONG | STD | FAST | H-SP | | FT-H30-M1V-S | | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | |
| Amplifier | FX-500 series | | | | | | | FX-101□ | FX-102□ | | | | | | | | | | | | | | | | | | | | | | |
| | Fiber | Mode | HYPR | U-LG | LONG | STD | FAST | | | H-SP | | | | | | | | | | | | | | | | | | | | | |
| | FT-H30-M1V-S | | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | | | | | | | | | | | | | | | | | | | | | |

Notes: 1) Be careful when installing the thru-beam type fiber equipped with the lens, as the beam envelope becomes narrow and alignment is difficult.

2) The fiber cable length practically limits the sensing range.

3) Refer to P.26 for the ambient temperature of fibers to be used in combination.

4) The fiber cable length for the **FT-H30-M1V-S** is 1 m 3.281 ft. The sensing ranges in HYPR, U-LG and LONG of **FX-500** series, in **FX-102□** take into account the length of the **FT-J8** atmospheric side fiber.

New product introduction
Tough Fiber

Fiber Selection Guide
Choose by model
Choose by shape/application
Viewing new models

Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions
Thru-beam Type
Retroreflective Type
Reflective Type

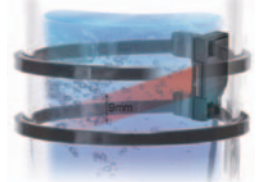
Amplifiers
FX-500 series
FX-100 series

INDEX

Earlier models comparison table

Liquid Leak / Liquid Detection

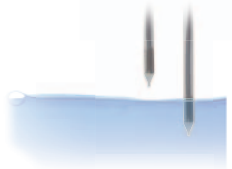
It corresponds to various liquid events, from the contact (wetted) type to the pipe mounting type, and up to leak detection.



Applications

Detecting liquid level in a tank

Leak detection for use in semiconductor device manufacturing



For liquid surface level upper limit sensing, a "without fluid" incident light sensor is recommended.

The sensor will turn OFF during abnormal conditions (excess fluid, fiber disconnection, etc.)!
Liquid absent: Beam received (Output ON)
Liquid present / fiber is cutoff: Beam not received (Output OFF)

FD-FA93

Strong against air bubbles

Applicable pipe: Transparent pipe, Outer diameter $\varnothing 8$ mm $\varnothing 0.315$ in or more
(When used with the tying bands: $\varnothing 8$ to $\varnothing 80$ mm $\varnothing 0.315$ to $\varnothing 3.150$ in)

FD-F41

Standard type

FD-F4

For 1 mm 0.039 in thick pipes manufactured by PFA



We recommend using the sensor so that the output is ON when liquid is present at lower limit detection level.

The sensor will turn OFF during abnormal conditions (insufficient liquid, fiber disconnection, etc.)!
Liquid present: Beam received (Output ON)
Liquid absent / fiber is cutoff: Beam not received (Output OFF)

FT-F93

Thru-beam



Reflective type / Thru-beam type

| Type | Shape of fiber head (mm) | Model No. | Bending radius (mm) | Fiber cable length Free-cut | Description | | Protection | Ambient temp. |
|-----------------------------------|---|--|---|--------------------------------|---|---|------------|----------------|
| | | | | | FX-500 series (STD mode) | FX-101 FX-102 | | |
| Contact type | Liquid level sensing | Heat resistant 125 °C Fluorine resin coating $\varnothing 6$ | FD-F8Y | Protective tube R40 Fiber R15 | 2 m (Note 1) | $\varnothing 6$ mm $\varnothing 0.236$ in Protective tube: Fluorine resin, length 1,000 mm 39.370 in (not cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received | IP68 | -40 to +125 °C |
| | | Heat resistant 105 °C Fluorine resin coating $\varnothing 4$ | FD-HF40Y (Note 2) | Protective tube R20 Fiber | 2 m | $\varnothing 4$ mm $\varnothing 0.157$ in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received | IP67 | -40 to +105 °C |
| | | Heat resistant 70 °C Fluorine resin coating throughout the fiber $\varnothing 4$ | FD-F41Y (Note 2) | R10 | 2 m | $\varnothing 4$ mm $\varnothing 0.157$ in Protective tube: Fluorine resin, length 500 mm 19.685 in (cuttable) Liquid surface not contacted: Beam received, Liquid surface contacted: Beam not received | | -40 to +70 °C |
| Pipe-mountable type | Liquid leak detection | SEMI S2 compliant W20 x H30 x D10 | Tough NEW FD-F71 | Protective tube R20 Fiber R4 | 5 m | Liquid leak detection Leak absent: Beam received, Leak present: Beam interrupted | | -20 to +60 °C |
| | | Standard W25 x H13 x D20 | FD-F41 | R10 | 2 m | Applicable pipe diameter: Outer dia. $\varnothing 6$ to $\varnothing 26$ mm $\varnothing 0.236$ to $\varnothing 1.024$ 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 | - | -40 to +100 °C |
| | For 1 mm thick PFA pipe W25 x H13 x D20 | FD-F4 | Applicable pipe diameter: Outer dia. $\varnothing 6$ to $\varnothing 26$ mm $\varnothing 0.236$ to $\varnothing 1.024$ 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 | | | -40 to +100 °C | | |
| | Liquid sensing | Mountable on pipe-array fiber W6.5 x H28.3 x D17 | Tough NEW FD-FA93 | R4 | 2 m | Applicable pipe diameter: Outer dia. $\varnothing 8$ mm $\varnothing 0.315$ in or more transparent pipe (When used with the tying bands: $\varnothing 8$ to $\varnothing 80$ mm $\varnothing 0.315$ to $\varnothing 3.150$ in) [PFA (fluorine resin), including translucent] Liquid absent: Beam received, Liquid present: Beam not received | IP40 | -40 to +70 °C |
| SEMI S2 compliant W23 x H20 x D17 | | Tough NEW FT-F93 | Protective tube R20 Fiber R2 | 2 m | Applicable pipe diameter: Outer dia. $\varnothing 3$ to $\varnothing 10$ mm $\varnothing 0.118$ to $\varnothing 0.394$ in transparent pipe [PFA (fluorine resin) or equivalently transparent pipe, wall thickness 0.3 to 1 mm 0.012 to 0.039 in] Liquid absent: Beam not received, Liquid present: Beam received | -40 to +60 °C | | |

Notes: 1) The allowable cutting range is 1,000 mm 39.370 in from the end that the amplifier inserted.
2) Liquid inflow prevention joint, protective tube extension joint, fiber mounting joint is available. Please refer to next page for details.

Tough : It is a fiber which possesses both unbreakable (bending radius: R10 mm, reciprocating bending: 180°) and bendable (bending radius: R4 mm or less) features.

mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

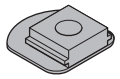
Ruggzhölzli 2
CH - 5453 Busslingen

Produkte, Support und Service

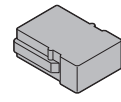
SENTRONIC AG

Accessories

• **MS-FD-F7-1**
(SUS mounting bracket for FD-F71)



• **MS-FD-F7-2**
(PVC mounting bracket for FD-F71)



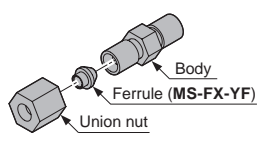
Fiber options

| Designation | Model No. | Description | |
|--|------------------|--|---|
| Liquid inflow prevention joint (Note) | MS-FX-01Y | Applicable fibers 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) | MS-FX-02Y | | The protective tube can be extended. |
| Fiber mounting joint (Note) | MS-FX-03Y | | The joint is used for mounting fibers on a tank. |

Note: The joint internal ferrule (**MS-FX-YF**) is available as a spare part. A distorted ferrule may result in leakage.

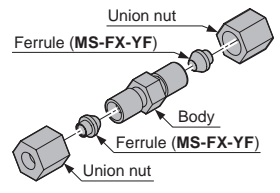
Liquid inflow prevention joint

• **MS-FX-01Y**



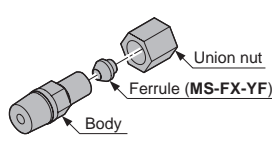
Protective tube extension joint

• **MS-FX-02Y**



Fiber mounting joint

• **MS-FX-03Y**



Fiber options

Lens (For thru-beam type fiber)

| Designation | Model No. | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------|----------|------|-----|------|------|--------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------|-----------------------------|-----------------------------|--|------------------------------|------------------------------|------------------|-----------------|-----------------|-----|-----------------|------------------------------|
| For thru-beam type fiber | Expansion lens (Note 1) FX-LE1 | <p>Increases the sensing range by 5 times or more.</p> <ul style="list-style-type: none"> • Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 3) • Beam dia: ø3.6 mm ø0.142 in <p>Sensing range (mm in) [Lens on both sides]</p> <table border="1"> <thead> <tr> <th rowspan="2">Amplifier Fiber \ Mode</th> <th colspan="6">FX-500 series</th> <th rowspan="2">FX-101 □</th> <th rowspan="2">FX-102 □</th> </tr> <tr> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> </tr> </thead> <tbody> <tr> <td>FT-43</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>1,600 62.992</td> <td>2,400 94.488</td> <td>3,600 141.732 (Note 2)</td> </tr> <tr> <td>FT-42 FT-42W</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>2,200 86.614</td> <td>3,400 133.858</td> <td>3,600 141.732 (Note 2)</td> </tr> <tr> <td>FT-45X</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,500 59.055</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> </tr> <tr> <td>FT-R40</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>1,900 74.803</td> <td>3,100 122.047</td> <td>3,600 141.732 (Note 2)</td> </tr> <tr> <td>FT-H35-M2</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,300 129.921</td> <td>3,600 141.732 (Note 2)</td> <td>1,400 55.118</td> <td>2,000 78.740</td> <td>3,500 137.795 (Note 2)</td> </tr> <tr> <td>FT-H20W-M1</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>850 33.465</td> <td>1,300 51.181</td> <td>1,600 62.992 (Note 2)</td> </tr> <tr> <td>FT-H20-M1</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,200 47.244</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> </tr> <tr> <td>FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,500 137.795</td> <td>2,000 78.740</td> <td>1,600 62.992</td> <td>500</td> <td>1,000 39.370</td> <td>3,500 137.795 (Note 2)</td> </tr> </tbody> </table> | Amplifier Fiber \ Mode | FX-500 series | | | | | | FX-101 □ | FX-102 □ | HYPR | U-LG | LONG | STD | FAST | H-SP | FT-43 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 1,600 62.992 | 2,400 94.488 | 3,600 141.732 (Note 2) | FT-42 FT-42W | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 2,200 86.614 | 3,400 133.858 | 3,600 141.732 (Note 2) | FT-45X | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,500 59.055 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | FT-R40 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 1,900 74.803 | 3,100 122.047 | 3,600 141.732 (Note 2) | FT-H35-M2 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,300 129.921 | 3,600 141.732 (Note 2) | 1,400 55.118 | 2,000 78.740 | 3,500 137.795 (Note 2) | FT-H20W-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 850 33.465 | 1,300 51.181 | 1,600 62.992 (Note 2) | FT-H20-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,200 47.244 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 | 2,000 78.740 | 1,600 62.992 | 500 | 1,000 39.370 | 3,500 137.795 (Note 2) |
| | | Amplifier Fiber \ Mode | | FX-500 series | | | | | | | | FX-101 □ | FX-102 □ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-43 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 1,600 62.992 | 2,400 94.488 | 3,600 141.732 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-42 FT-42W | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 2,200 86.614 | 3,400 133.858 | 3,600 141.732 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-45X | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,500 59.055 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-R40 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 1,900 74.803 | 3,100 122.047 | 3,600 141.732 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H35-M2 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,300 129.921 | 3,600 141.732 (Note 2) | 1,400 55.118 | 2,000 78.740 | 3,500 137.795 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H20W-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 850 33.465 | 1,300 51.181 | 1,600 62.992 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H20-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,200 47.244 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 | 2,000 78.740 | 1,600 62.992 | 500 | 1,000 39.370 | 3,500 137.795 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| For thru-beam type fiber | Super-expansion lens (Note 1) FX-LE2 | <p>Tremendously increases the sensing range with large diameter lenses.</p> <ul style="list-style-type: none"> • Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 3) • Beam dia: ø9.8 mm ø0.386 in <p>Sensing range (mm in) [Lens on both sides]</p> <table border="1"> <thead> <tr> <th rowspan="2">Amplifier Fiber \ Mode</th> <th colspan="6">FX-500 series</th> <th rowspan="2">FX-101 □</th> <th rowspan="2">FX-102 □</th> </tr> <tr> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> </tr> </thead> <tbody> <tr> <td>FT-43 FT-42 FT-42W</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> </tr> <tr> <td>FT-45X</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> </tr> <tr> <td>FT-R40</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> </tr> <tr> <td>FT-H35-M2</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,500 137.795 (Note 2)</td> <td>3,500 137.795 (Note 2)</td> </tr> <tr> <td>FT-H20W-M1 FT-H20-M1</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> </tr> <tr> <td>FT-H13-FM2</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,500 137.795 (Note 2)</td> <td>3,500 137.795 (Note 2)</td> </tr> <tr> <td>FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,500 137.795 (Note 2)</td> <td>3,500 137.795 (Note 2)</td> </tr> </tbody> </table> | Amplifier Fiber \ Mode | FX-500 series | | | | | | FX-101 □ | FX-102 □ | HYPR | U-LG | LONG | STD | FAST | H-SP | FT-43 FT-42 FT-42W | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | FT-45X | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | FT-R40 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | FT-H35-M2 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 (Note 2) | 3,500 137.795 (Note 2) | FT-H20W-M1 FT-H20-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | FT-H13-FM2 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 (Note 2) | 3,500 137.795 (Note 2) | FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 (Note 2) | 3,500 137.795 (Note 2) | | | | | | | | | | | | | | | | |
| | | Amplifier Fiber \ Mode | | FX-500 series | | | | | | | | FX-101 □ | FX-102 □ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-43 FT-42 FT-42W | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-45X | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-R40 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H35-M2 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 (Note 2) | 3,500 137.795 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H20W-M1 FT-H20-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H13-FM2 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 (Note 2) | 3,500 137.795 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,500 137.795 (Note 2) | 3,500 137.795 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 fiber cable length practically limits the sensing range.
 3) Refer to P.10~ for the ambient temperature of fibers to be used in combination.

New product introduction
Tough Fiber
Fiber Selection Guide
Choose by model
Choose by shape/application
Viewing new models

Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

Fiber Options
Fiber Dimensions
Thru-beam Type
Retroreflective Type
Reflective Type
Others

Amplifiers
FX-500 series
FX-100 series

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Earlier models comparison table

mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

Rugghölzli 2
CH - 5453 Busslingen

Produkte, Support und Service

SENTRONIC AG

Fiber options

Lens (For thru-beam type fiber)

| Designation | Model No. | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|------------------------|------------------------|------------------------|----------------------|------------------------------------|---------|---------|---------|---------------|--|--|--|--|--|--|--|------|------|------|-----|------|------|--|--|---------------------|-------------------------------------|-------------------------------------|-------------------------|------------------------|----------------------|----------------------|----------------------|------------------------|--------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------|------------------------|----------------------|----------------------|------------------------|---------------|-------------------------------------|-------------------------|-------------------------|------------------------|----------------------|----------------------|----------------------|------------------------|---------------|------------------------------------|------------------------------------|------------------------------------|------------------------|----------------------|---------------------|----------------------|------------------------------------|------------------|-------------------------|------------------------|------------------------|----------------------|----------------------|---------------------|----------------------|----------------------|-------------------|------------------------------------|------------------------------------|------------------------|----------------------|----------------------|---------------------|---------------------|----------------------|------------------|------------------------------------|------------------------------------|------------------------|----------------------|----------------------|---------------------|----------------------|----------------------|---|------------------------------------|----------------------|----------------------|----------------------|----------------------|--------------------|---------------------|----------------------|
| For thru-beam type fiber | Side-view lens FX-SV1 | <p>Beam axis is bent by 90°.</p> <ul style="list-style-type: none"> Ambient temperature: -60 to +300 °C -76 to +572 °F (Note 4) Beam dia: \varnothing2.8 mm \varnothing0.110 in <p>Sensing range (mm in) [Lens on both sides]</p> <table border="1"> <thead> <tr> <th rowspan="2">Fiber</th> <th colspan="7">Amplifier</th> <th rowspan="2">FX-101□</th> <th rowspan="2">FX-102□</th> </tr> <tr> <th>Mode</th> <th colspan="6">FX-500 series</th> </tr> <tr> <td></td> <td></td> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td>FT-43</td> <td>3,600 141.732 (Note 2)</td> <td>3,400 133.858</td> <td>2,600 102.362</td> <td>1,700 66.929</td> <td>970 38.189</td> <td>310 12.205</td> <td>510 20.079</td> <td>1,400 55.118</td> </tr> <tr> <td>FT-42</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>2,100 82.677</td> <td>1,150 45.276</td> <td>370 14.567</td> <td>500 19.685</td> <td>1,700 66.929</td> </tr> <tr> <td>FT-42W</td> <td>3,600 141.732 (Note 2)</td> <td>3,500 137.795</td> <td>2,700 106.299</td> <td>1,800 70.866</td> <td>990 38.976</td> <td>320 12.598</td> <td>480 18.898</td> <td>1,300 51.181</td> </tr> <tr> <td>FT-45X</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,400 55.118</td> <td>800 31.496</td> <td>210 8.268</td> <td>540 21.260</td> <td>1,600 62.992 (Note 2)</td> </tr> <tr> <td>FT-H35-M2</td> <td>3,500 137.795</td> <td>1,600 62.992</td> <td>1,200 47.244</td> <td>780 30.709</td> <td>500 19.685</td> <td>150 5.906</td> <td>280 11.024</td> <td>800 31.496</td> </tr> <tr> <td>FT-H20W-M1</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,500 59.055</td> <td>950 37.402</td> <td>560 22.047</td> <td>190 7.480</td> <td>140 5.512</td> <td>400 15.748</td> </tr> <tr> <td>FT-H20-M1</td> <td>1,600 62.992 (Note 2)</td> <td>1,600 62.992 (Note 2)</td> <td>1,300 51.181</td> <td>780 30.709</td> <td>500 19.685</td> <td>150 5.906</td> <td>280 11.024</td> <td>840 33.071</td> </tr> <tr> <td>FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S</td> <td>1,600 62.992 (Note 2)</td> <td>960 37.795</td> <td>740 29.134</td> <td>450 17.717</td> <td>290 11.417</td> <td>80 3.150</td> <td>150 5.906</td> <td>410 16.142</td> </tr> </tbody> </table> | Fiber | Amplifier | | | | | | | FX-101□ | FX-102□ | Mode | FX-500 series | | | | | | | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | FT-43 | 3,600 141.732 (Note 2) | 3,400 133.858 | 2,600 102.362 | 1,700 66.929 | 970 38.189 | 310 12.205 | 510 20.079 | 1,400 55.118 | FT-42 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 2,100 82.677 | 1,150 45.276 | 370 14.567 | 500 19.685 | 1,700 66.929 | FT-42W | 3,600 141.732 (Note 2) | 3,500 137.795 | 2,700 106.299 | 1,800 70.866 | 990 38.976 | 320 12.598 | 480 18.898 | 1,300 51.181 | FT-45X | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,400 55.118 | 800 31.496 | 210 8.268 | 540 21.260 | 1,600 62.992 (Note 2) | FT-H35-M2 | 3,500 137.795 | 1,600 62.992 | 1,200 47.244 | 780 30.709 | 500 19.685 | 150 5.906 | 280 11.024 | 800 31.496 | FT-H20W-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,500 59.055 | 950 37.402 | 560 22.047 | 190 7.480 | 140 5.512 | 400 15.748 | FT-H20-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,300 51.181 | 780 30.709 | 500 19.685 | 150 5.906 | 280 11.024 | 840 33.071 | FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S | 1,600 62.992 (Note 2) | 960 37.795 | 740 29.134 | 450 17.717 | 290 11.417 | 80 3.150 | 150 5.906 | 410 16.142 |
| | | Fiber | | Amplifier | | | | | | | | | FX-101□ | FX-102□ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Mode | FX-500 series | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-43 | 3,600 141.732 (Note 2) | 3,400 133.858 | 2,600 102.362 | 1,700 66.929 | 970 38.189 | 310 12.205 | 510 20.079 | 1,400 55.118 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-42 | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 2,100 82.677 | 1,150 45.276 | 370 14.567 | 500 19.685 | 1,700 66.929 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-42W | 3,600 141.732 (Note 2) | 3,500 137.795 | 2,700 106.299 | 1,800 70.866 | 990 38.976 | 320 12.598 | 480 18.898 | 1,300 51.181 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-45X | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,400 55.118 | 800 31.496 | 210 8.268 | 540 21.260 | 1,600 62.992 (Note 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H35-M2 | 3,500 137.795 | 1,600 62.992 | 1,200 47.244 | 780 30.709 | 500 19.685 | 150 5.906 | 280 11.024 | 800 31.496 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FT-H20W-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,500 59.055 | 950 37.402 | 560 22.047 | 190 7.480 | 140 5.512 | 400 15.748 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FT-H20-M1 | 1,600 62.992 (Note 2) | 1,600 62.992 (Note 2) | 1,300 51.181 | 780 30.709 | 500 19.685 | 150 5.906 | 280 11.024 | 840 33.071 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FT-H20-J50-S FT-H20-J30-S FT-H20-J20-S | 1,600 62.992 (Note 2) | 960 37.795 | 740 29.134 | 450 17.717 | 290 11.417 | 80 3.150 | 150 5.906 | 410 16.142 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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"> Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 4) Beam dia: \varnothing3.6 mm \varnothing0.142 in <p>Sensing range (mm in) [Lens on both sides] (Note 3)</p> <table border="1"> <thead> <tr> <th rowspan="2">Fiber</th> <th colspan="7">Amplifier</th> <th rowspan="2">FX-101□</th> <th rowspan="2">FX-102□</th> </tr> <tr> <th>Mode</th> <th colspan="6">FX-500 series</th> </tr> <tr> <td></td> <td></td> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td>FT-H30-M1V-S</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,400 133.858</td> <td>1,500 59.055</td> <td>900 35.433</td> <td>370 14.567</td> <td>450 17.717</td> <td>1,600 62.992</td> </tr> </tbody> </table> | Fiber | Amplifier | | | | | | | FX-101□ | FX-102□ | Mode | FX-500 series | | | | | | | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | FT-H30-M1V-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Fiber | | Amplifier | | | | | | | | | FX-101□ | FX-102□ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mode | FX-500 series | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FT-H30-M1V-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vacuum-resistant side-view lens (Note 1) | FV-SV2 | <p>Beam axis is bent by 90°.</p> <ul style="list-style-type: none"> Ambient temperature: -60 to +300 °C -76 to +572 °F (Note 4) Beam dia: \varnothing3.7 mm \varnothing0.146 in <p>Sensing range (mm in) [Lens on both sides] (Note 3)</p> <table border="1"> <thead> <tr> <th rowspan="2">Fiber</th> <th colspan="7">Amplifier</th> <th rowspan="2">FX-101□</th> <th rowspan="2">FX-102□</th> </tr> <tr> <th>Mode</th> <th colspan="6">FX-500 series</th> </tr> <tr> <td></td> <td></td> <th>HYPR</th> <th>U-LG</th> <th>LONG</th> <th>STD</th> <th>FAST</th> <th>H-SP</th> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td>FT-H30-M1V-S</td> <td>3,600 141.732 (Note 2)</td> <td>3,600 141.732 (Note 2)</td> <td>3,400 133.858</td> <td>1,500 59.055</td> <td>900 35.433</td> <td>370 14.567</td> <td>450 17.717</td> <td>1,600 62.992</td> </tr> </tbody> </table> | Fiber | Amplifier | | | | | | | FX-101□ | FX-102□ | Mode | FX-500 series | | | | | | | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | FT-H30-M1V-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fiber | Amplifier | | | | | | | FX-101□ | FX-102□ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Mode | FX-500 series | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | HYPR | U-LG | LONG | STD | FAST | H-SP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FT-H30-M1V-S | 3,600 141.732 (Note 2) | 3,600 141.732 (Note 2) | 3,400 133.858 | 1,500 59.055 | 900 35.433 | 370 14.567 | 450 17.717 | 1,600 62.992 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- 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 fiber cable length practically limits the sensing range.
 3) The fiber cable length for the **FT-H30-M1V-S** is 1 m **3.28 ft**. The sensing ranges in HYPR, U-LG and LONG of **FX-500** series, in **FX-102□** take into account the length of the **FT-J8** atmospheric side fiber.
 4) Refer to P.10~ for the ambient temperature of fibers to be used in combination.

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

Others

Amplifiers

FX-500 series


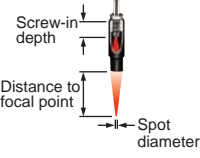
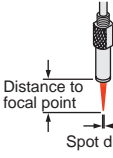
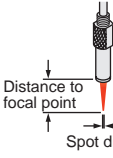
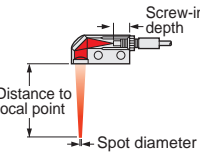
FX-100 series

INDEX

Earlier models comparison table

Fiber options

Lens (For reflective type fiber)

| Designation | Model No. | Description | | | | | | | | | | | | | |
|--|-------------------------|---|--|-------------------------|-------------------------|----------------|------------------|-------------------------------|----------------------|------------------|------------------------------|--|------------------|------------------------------|----------------------|
| For reflective type fiber | Pinpoint spot lens | FX-MR1 |  <p>Pinpoint spot of $\varnothing 0.5$ mm $\varnothing 0.020$ in. Enables detection of minute objects or small marks.</p> <ul style="list-style-type: none"> Distance to focal point: 6 ± 1 mm 0.236 ± 0.039 in Applicable fibers: FD-42G, FD-42GW Ambient temperature: -40 to $+70$ °C -40 to $+158$ °F (Note) | | | | | | | | | | | | |
| | Zoom lens | FX-MR2 |  <p>The spot diameter is adjustable from $\varnothing 0.7$ to $\varnothing 2$ mm $\varnothing 0.028$ to $\varnothing 0.079$ in according to how much the fiber is screwed in.</p> <ul style="list-style-type: none"> Applicable fibers: FD-42G, FD-42GW Ambient temperature: -40 to $+70$ °C -40 to $+158$ °F (Note) Accessory: MS-EX3 (mounting bracket) <table border="1"> <caption>Sensing range</caption> <thead> <tr> <th>Screw-in depth</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td>7 mm</td> <td>18.5 mm approx.</td> <td>$\varnothing 0.7$ mm</td> </tr> <tr> <td>12 mm</td> <td>27 mm approx.</td> <td>$\varnothing 1.2$ mm</td> </tr> <tr> <td>14 mm</td> <td>43 mm approx.</td> <td>$\varnothing 2.0$ mm</td> </tr> </tbody> </table> | Screw-in depth | Distance to focal point | Spot diameter | 7 mm | 18.5 mm approx. | $\varnothing 0.7$ mm | 12 mm | 27 mm approx. | $\varnothing 1.2$ mm | 14 mm | 43 mm approx. | $\varnothing 2.0$ mm |
| | Screw-in depth | Distance to focal point | Spot diameter | | | | | | | | | | | | |
| | 7 mm | 18.5 mm approx. | $\varnothing 0.7$ mm | | | | | | | | | | | | |
| | 12 mm | 27 mm approx. | $\varnothing 1.2$ mm | | | | | | | | | | | | |
| 14 mm | 43 mm approx. | $\varnothing 2.0$ mm | | | | | | | | | | | | | |
| Finest spot lens | FX-MR3 |  <p>Extremely fine spot of $\varnothing 0.15$ mm $\varnothing 0.006$ in approx. achieved.</p> <ul style="list-style-type: none"> Applicable fibers: FD-EG31, FD-EG30, FD-42G, FD-42GW, FD-32G, FD-32GX Ambient temperature: -40 to $+70$ °C -40 to $+158$ °F (Note) <table border="1"> <caption>Sensing range</caption> <thead> <tr> <th>Fiber model No.</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td>FD-EG31</td> <td>7.5 ± 0.5 mm</td> <td>$\varnothing 0.15$ mm approx.</td> </tr> <tr> <td>FD-EG30</td> <td>7.5 ± 0.5 mm</td> <td>$\varnothing 0.3$ mm approx.</td> </tr> <tr> <td>FD-42G/42GW FD-32G/32GX</td> <td>7.5 ± 0.5 mm</td> <td>$\varnothing 0.5$ mm approx.</td> </tr> </tbody> </table> | Fiber model No. | Distance to focal point | Spot diameter | FD-EG31 | 7.5 ± 0.5 mm | $\varnothing 0.15$ mm approx. | FD-EG30 | 7.5 ± 0.5 mm | $\varnothing 0.3$ mm approx. | FD-42G/42GW FD-32G/32GX | 7.5 ± 0.5 mm | $\varnothing 0.5$ mm approx. | |
| Fiber model No. | Distance to focal point | Spot diameter | | | | | | | | | | | | | |
| FD-EG31 | 7.5 ± 0.5 mm | $\varnothing 0.15$ mm approx. | | | | | | | | | | | | | |
| FD-EG30 | 7.5 ± 0.5 mm | $\varnothing 0.3$ mm approx. | | | | | | | | | | | | | |
| FD-42G/42GW FD-32G/32GX | 7.5 ± 0.5 mm | $\varnothing 0.5$ mm approx. | | | | | | | | | | | | | |
| Finest spot lens | FX-MR6 |  <p>Extremely fine spot of $\varnothing 0.1$ mm $\varnothing 0.004$ in approx. achieved.</p> <ul style="list-style-type: none"> Applicable fibers: FD-EG31, FD-EG30, FD-42G, FD-42GW, FD-32G, FD-32GX Ambient temperature: -20 to $+60$ °C -4 to $+140$ °F (Note) <table border="1"> <caption>Sensing range</caption> <thead> <tr> <th>Fiber model No.</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td>FD-EG31</td> <td>7 ± 0.5 mm</td> <td>$\varnothing 0.1$ mm approx.</td> </tr> <tr> <td>FD-EG30</td> <td>7 ± 0.5 mm</td> <td>$\varnothing 0.2$ mm approx.</td> </tr> <tr> <td>FD-42G/42GW FD-32G/32GX</td> <td>7 ± 0.5 mm</td> <td>$\varnothing 0.4$ mm approx.</td> </tr> </tbody> </table> | Fiber model No. | Distance to focal point | Spot diameter | FD-EG31 | 7 ± 0.5 mm | $\varnothing 0.1$ mm approx. | FD-EG30 | 7 ± 0.5 mm | $\varnothing 0.2$ mm approx. | FD-42G/42GW FD-32G/32GX | 7 ± 0.5 mm | $\varnothing 0.4$ mm approx. | |
| Fiber model No. | Distance to focal point | Spot diameter | | | | | | | | | | | | | |
| FD-EG31 | 7 ± 0.5 mm | $\varnothing 0.1$ mm approx. | | | | | | | | | | | | | |
| FD-EG30 | 7 ± 0.5 mm | $\varnothing 0.2$ mm approx. | | | | | | | | | | | | | |
| FD-42G/42GW FD-32G/32GX | 7 ± 0.5 mm | $\varnothing 0.4$ mm approx. | | | | | | | | | | | | | |
| Zoom lens (side-view type) | FX-MR5 |  <p>FX-MR2 is converted into a side-view type and can be mounted in a very small space.</p> <ul style="list-style-type: none"> Applicable fibers: FD-42G, FD-42GW Ambient temperature: -40 to $+70$ °C -40 to $+158$ °F (Note) <table border="1"> <caption>Sensing range</caption> <thead> <tr> <th>Screw-in depth</th> <th>Distance to focal point</th> <th>Spot diameter</th> </tr> </thead> <tbody> <tr> <td>8 mm</td> <td>13 mm approx.</td> <td>$\varnothing 0.5$ mm</td> </tr> <tr> <td>10 mm</td> <td>15 mm approx.</td> <td>$\varnothing 0.8$ mm</td> </tr> <tr> <td>14 mm</td> <td>30 mm approx.</td> <td>$\varnothing 3.0$ mm</td> </tr> </tbody> </table> | Screw-in depth | Distance to focal point | Spot diameter | 8 mm | 13 mm approx. | $\varnothing 0.5$ mm | 10 mm | 15 mm approx. | $\varnothing 0.8$ mm | 14 mm | 30 mm approx. | $\varnothing 3.0$ mm | |
| Screw-in depth | Distance to focal point | Spot diameter | | | | | | | | | | | | | |
| 8 mm | 13 mm approx. | $\varnothing 0.5$ mm | | | | | | | | | | | | | |
| 10 mm | 15 mm approx. | $\varnothing 0.8$ mm | | | | | | | | | | | | | |
| 14 mm | 30 mm approx. | $\varnothing 3.0$ mm | | | | | | | | | | | | | |

Note: Refer to P.11~ for the ambient temperature of fibers to be used in combination.

Model No. when ordering heat-resistant fibers individually as replacement parts

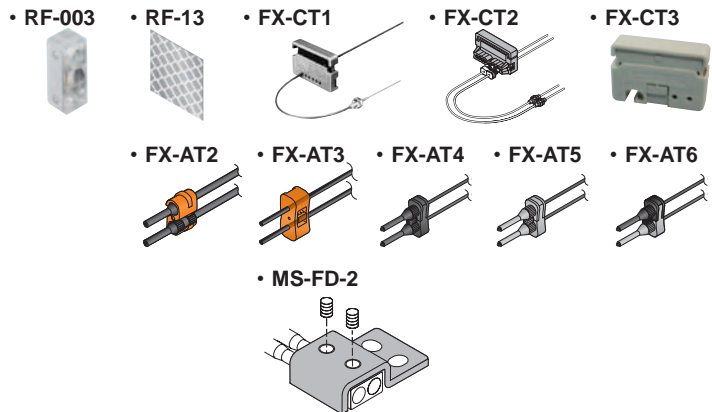
- Heat-resistant side fiber **one pair set**
FT-H20-J20, FT-H20-J30, FT-H20-J50, FT-H20-VJ50, FT-H20-VJ80

Model No. when ordering vacuum-resistant fibers individually as replacement parts

- Vacuum-resistant fiber **FD-H30W-M1V** (one pair set)
FD-H30-KZ1V
FD-H30-L32V
- Fiber at atmospheric side **FT-J8** (one pair set)
- Photo-terminal **FV-BR1** (one pair set)
- Mouting bracket for **FD-H30-KZ1V(-S)**
MS-FD-2

Accessories (attached with fibers)

- RF-003** (FR-KZ50E/KZ50H exclusive reflector)
- RF-13** (Reflective tape)
- FX-CT1** (Fiber cutter)
- FX-CT2** (Fiber cutter)
- FX-CT3** (Fiber cutter)
- FX-AT2** (Attachment for fixed-length fiber, Orange)
- FX-AT3** (Attachment for $\varnothing 2.2$ mm $\varnothing 0.087$ in fiber, Clear orange)
- FX-AT4** (Attachment for $\varnothing 1$ mm $\varnothing 0.039$ in fiber, Black)
- FX-AT5** (Attachment for $\varnothing 1.3$ mm $\varnothing 0.051$ in fiber, Gray)
- FX-AT6** (Attachment for $\varnothing 1$ mm $\varnothing 0.039$ in / $\varnothing 1.3$ mm $\varnothing 0.051$ in) mixed fiber, Black / Gray
- MS-FD-2** (Fiber mouting bracket)



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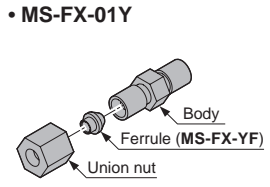
Fiber options

Others

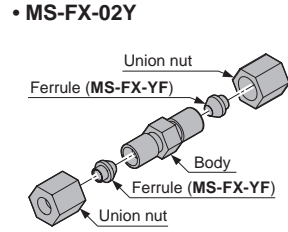
| Designation | Model No. | Description | | | | |
|--|----------------------------|---|--|---|------------|--|
| Protective tube (For thru-beam type fiber) | FTP-500 (0.5 m 1.640 ft) | For M4 thread | Applicable fibers | FT-42 | FT-43 | The protective tube, made of non-corrosive stainless steel, protects the inner fiber cable from any external forces. |
| | FTP-1000 (1 m 3.281 ft) | | | FT-42S | FT-H13-FM2 | |
| | FTP-1500 (1.5 m 4.921 ft) | | | FT-42W | | |
| | FTP-N500 (0.5 m 1.640 ft) | For M3 thread | | FT-31 | FD-31 | |
| | FTP-N1000 (1 m 3.281 ft) | | | FT-31S | FD-31W | |
| | FTP-N1500 (1.5 m 4.921 ft) | | | FT-31W | | |
| Protective tube (For reflective type fiber) | FDP-500 (0.5 m 1.640 ft) | For M6 thread | FD-61 | FD-62 | | |
| | FDP-1000 (1 m 3.281 ft) | | FD-61G | FD-H13-FM2 | | |
| | FDP-1500 (1.5 m 4.921 ft) | | FD-61S | | | |
| | FDP-N500 (0.5 m 1.640 ft) | For M4 thread | FD-41 | FD-41S | | |
| | FDP-N1000 (1 m 3.281 ft) | | FD-41W | FD-41SW | | |
| | 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 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 | | | | |
| Liquid inflow prevention joint (Note 2) | MS-FX-01Y | Applicable fibers | 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 2) | MS-FX-02Y | | | The protective tube can be extended. | | |
| Fiber mounting joint (Note 2) | 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) | | |
| Reflector | RF-210 | It is available for FR-Z50HW. | | | | |
| | RF-220 | Refer to P.22 for the sensing range of FR-Z50HW to be used in combination. | | | | |
| | RF-230 | | | | | |

Notes: 1) Do not bend the sleeve part of any side-view type fiber or ultra-small diameter head type fiber.
 2) The joint internal ferrule (MS-FX-YF) is available as a spare part. A distorted ferrule may result in leakage.

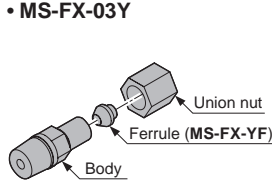
Liquid inflow prevention joint



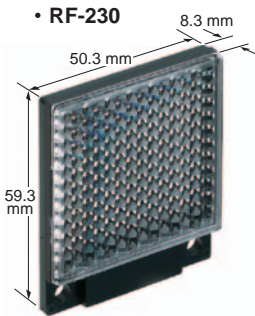
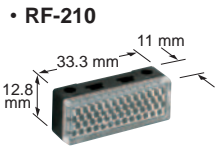
Protective tube extension joint



Fiber mounting joint

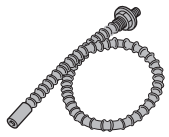


Reflector



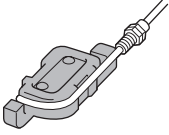
Protective tube

- FTP-□
- FDP-□



Fiber bender

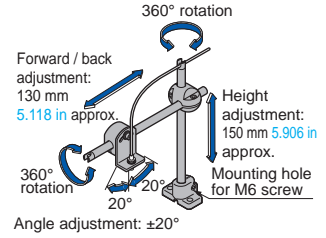
- FB-1



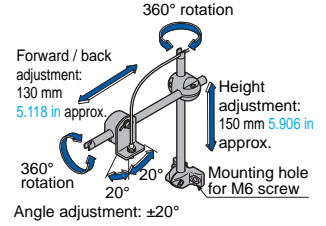
Universal sensor mounting stand

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



Single core holder

- FX-AT15A



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Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

Thru-beam type fibers

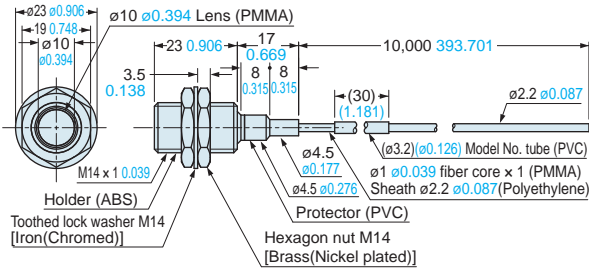


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

FT-140

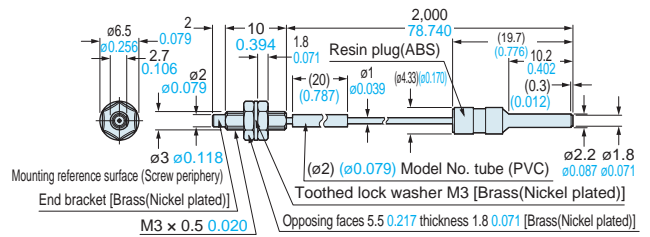
Free-cut

<with FX-AT3>



FT-30

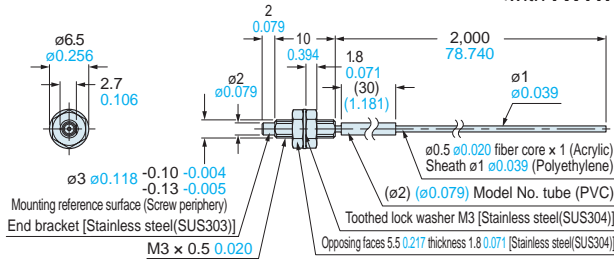
<with FX-AT2>



FT-31

Free-cut

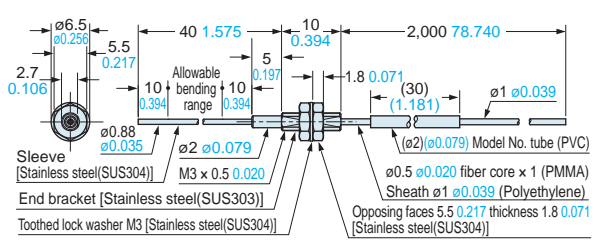
<with FX-AT4>



FT-31S

Free-cut

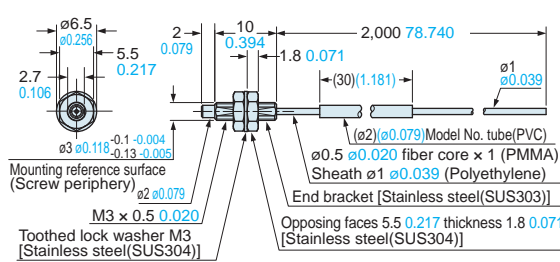
<with FX-AT4>



FT-31W

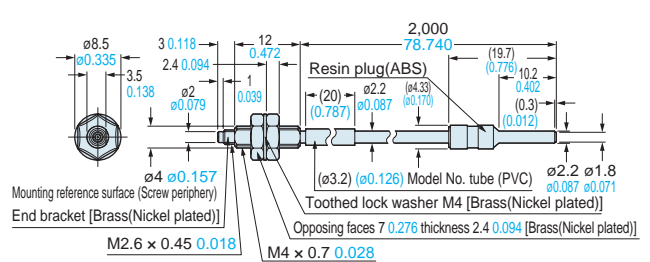
Free-cut

<with FX-AT4>



FT-40

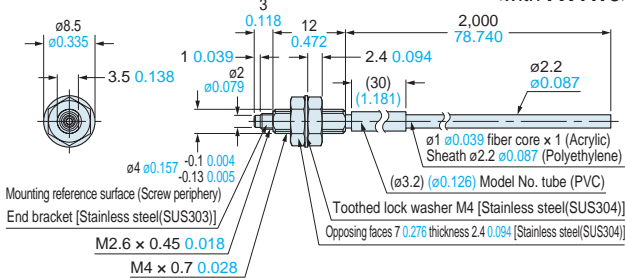
<with FX-AT2>



FT-42

Free-cut

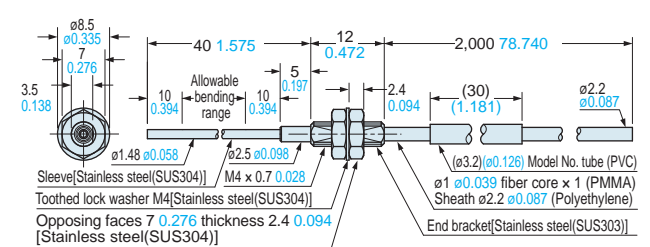
<with FX-AT3>



FT-42S

Free-cut

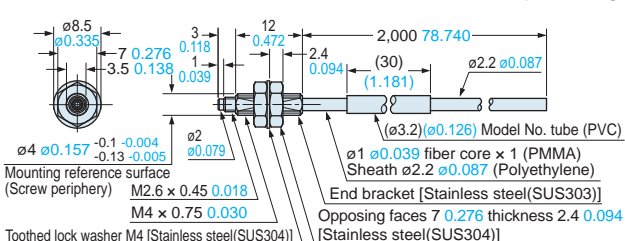
<with FX-AT3>



FT-42W

Free-cut

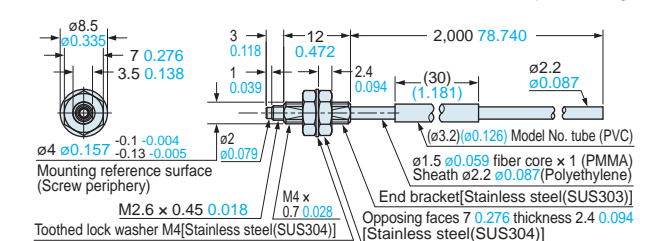
<with FX-AT3>



FT-43

Free-cut

<with FX-AT3>

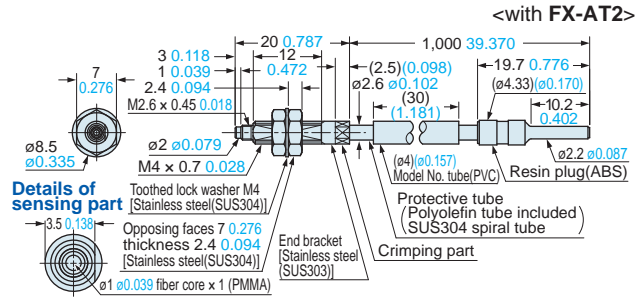


DIMENSIONS (Unit: mm in) Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

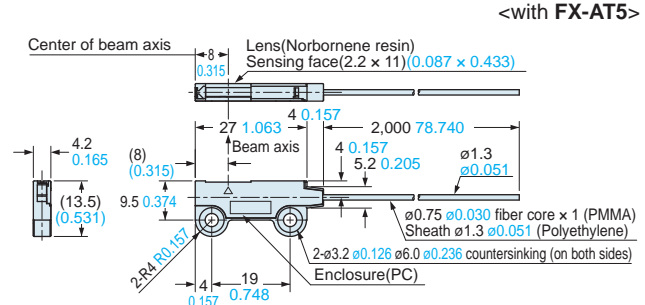
Thru-beam type fibers

Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

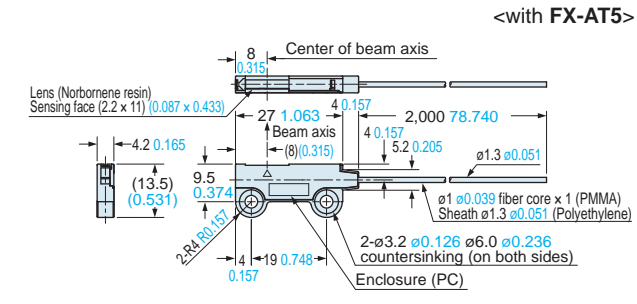
FT-45X  **Free-cut**



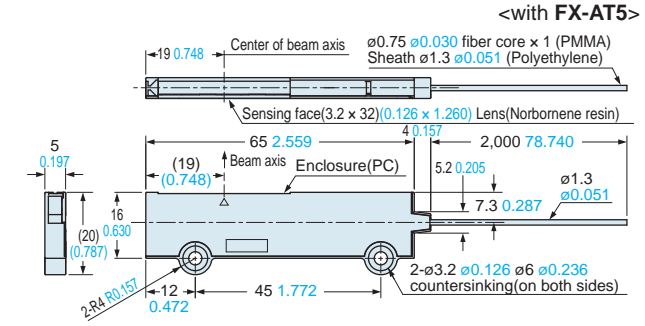
FT-A11  **Free-cut**



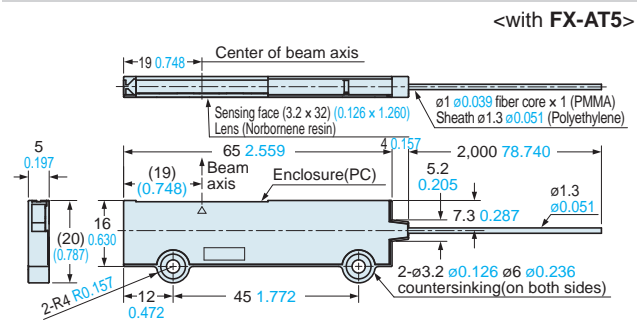
FT-A11W  **Free-cut**



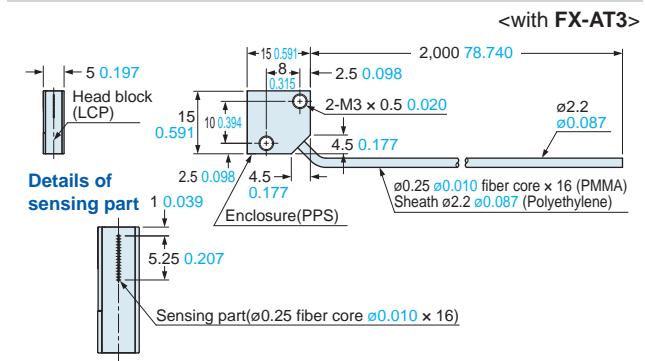
FT-A32  **Free-cut**



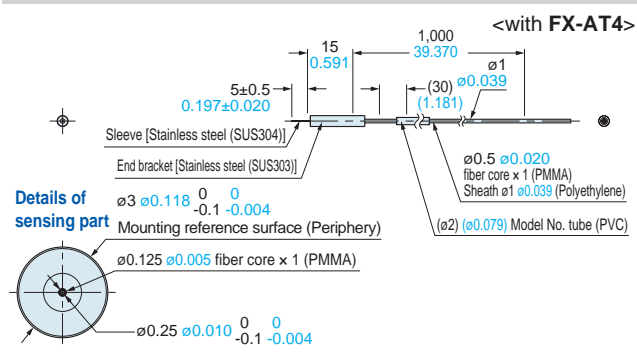
FT-A32W  **Free-cut**



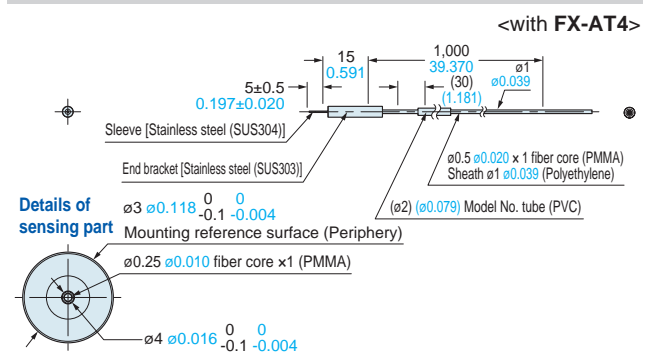
FT-AL05  **Free-cut**



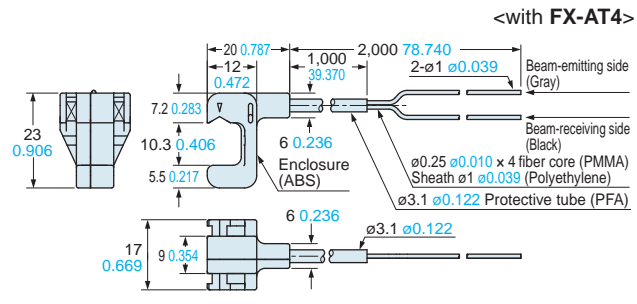
FT-E13  **Free-cut**



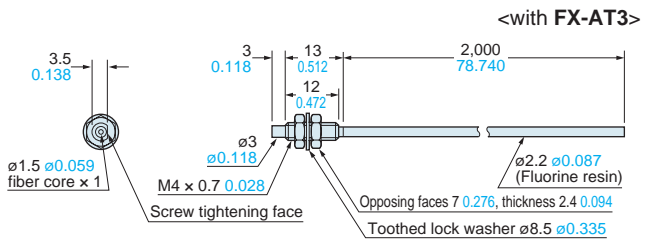
FT-E23  **Free-cut**



FT-F93  **Free-cut**



FT-H13-FM2  **Free-cut**



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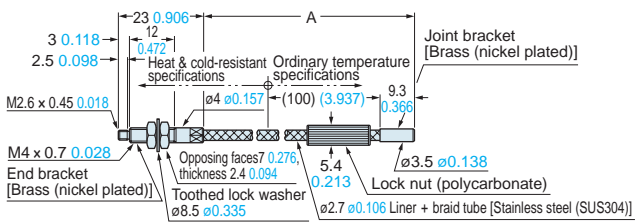
Thru-beam type fibers



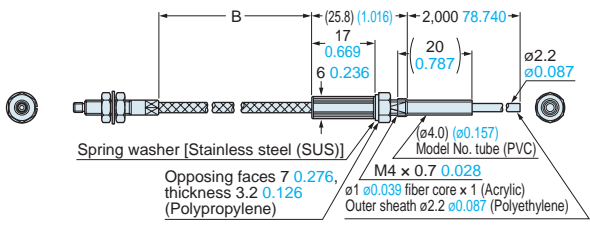
Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

FT-H20-J20-S FT-H20-J30-S FT-H20-J50-S Free-cut (Note)

Heat-resistant side unit diagram (side view)



Ordinary temperature side fiber (FT-FM2) connection diagram (front view)

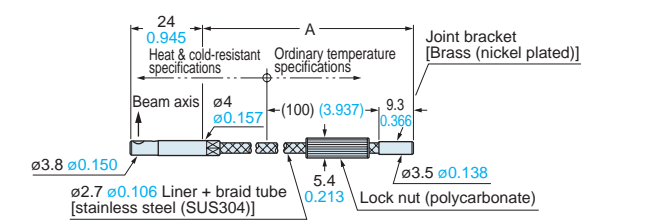


| Model No. | A | B |
|---------------------|---|---|
| FT-H20-J20-S | 200 ⁺²⁵ ₀ 7.874 ^{+0.984} ₀ | 185 ⁺³⁰ ₀ 7.284 ^{+1.181} ₀ |
| FT-H20-J30-S | 300 ⁺²⁵ ₀ 11.811 ^{+0.984} ₀ | 285 ⁺³⁰ ₀ 11.221 ^{+1.181} ₀ |
| FT-H20-J50-S | 500 ⁺²⁵ ₀ 19.685 ^{+0.984} ₀ | 485 ⁺³⁰ ₀ 19.095 ^{+1.181} ₀ |

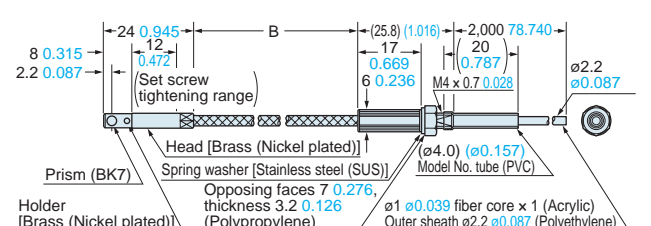
Note: Ordinary temperature side fiber (FT-FM2) only.

FT-H20-VJ50-S FT-H20-VJ80-S Free-cut (Note)

Heat-resistant side unit diagram (side view)



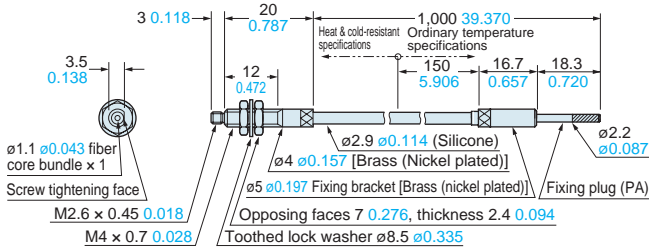
Ordinary temperature side fiber (FT-FM2) connection diagram (front view)



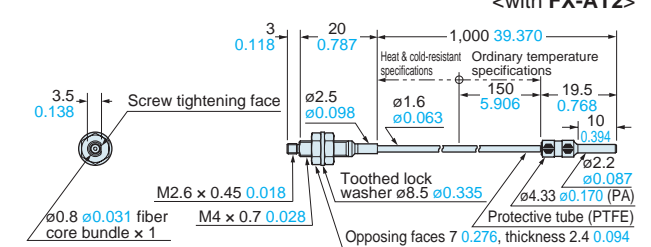
| Model No. | A | B |
|----------------------|---|---|
| FT-H20-VJ50-S | 500 ⁺²⁵ ₀ 19.685 ^{+0.984} ₀ | 485 ⁺³⁰ ₀ 19.095 ^{+1.181} ₀ |
| FT-H20-VJ80-S | 800 ⁺⁵⁰ ₀ 31.496 ^{+1.969} ₀ | 785 ⁺⁵⁵ ₀ 30.906 ^{+2.165} ₀ |

Note: Ordinary temperature side fiber (FT-FM2) only.

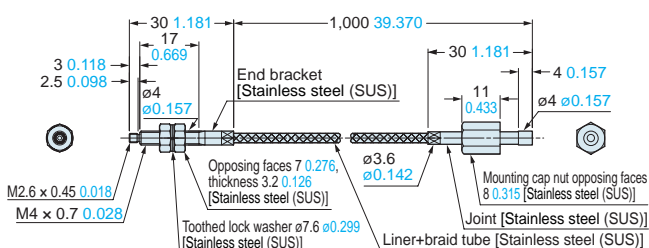
FT-H20-M1



FT-H20W-M1

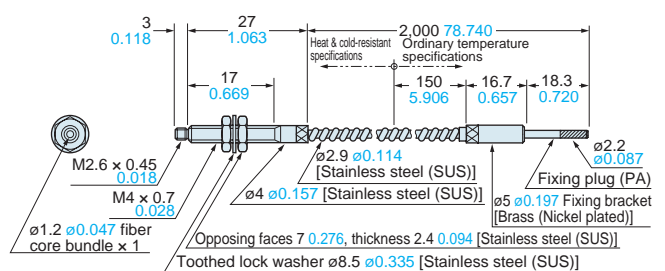


FT-H30-M1V-S

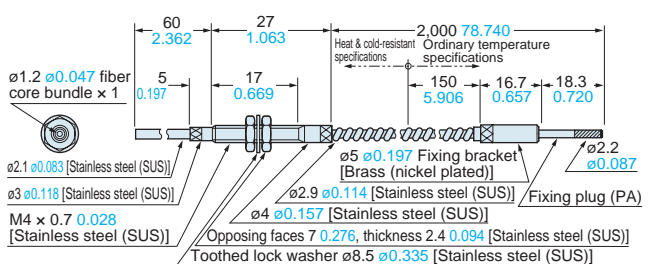


Note: The FT-H30-M1V-S is a set with the FT-H30-M1V, photo-terminal **FV-BR1**, and atmospheric side fiber **FT-J8**. Refer to p.51 for dimensions of the atmospheric side fiber and photo-terminals.

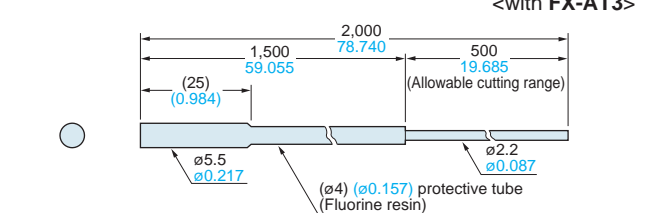
FT-H35-M2



FT-H35-M2S6



FT-HL80Y Free-cut



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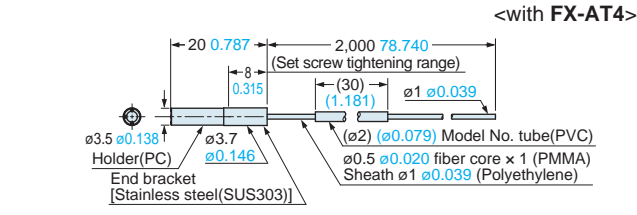
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DIMENSIONS (Unit: mm in) Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

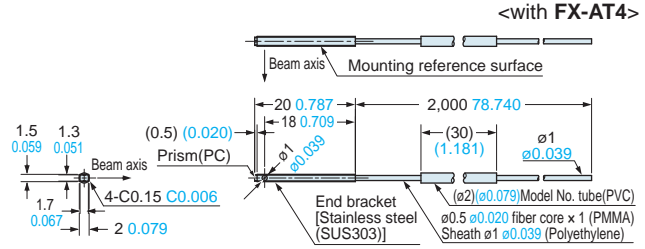
Thru-beam type fibers 

Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

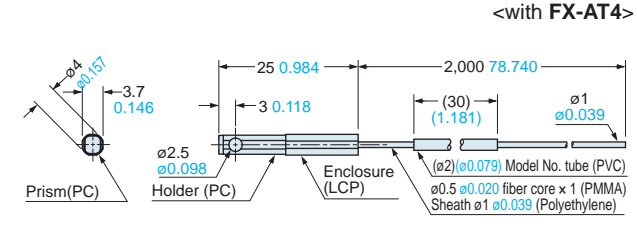
FT-KS40  Free-cut



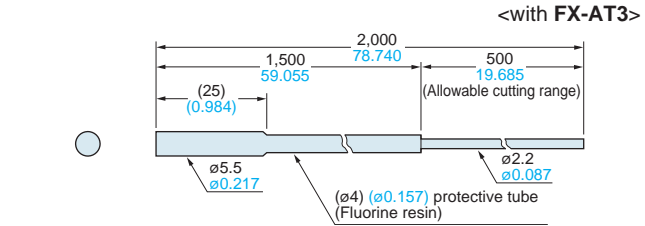
FT-KV26  Free-cut



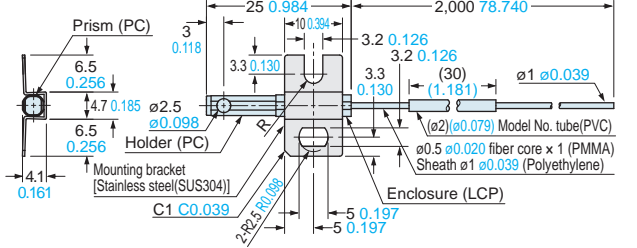
FT-KV40, FT-KV40W  Free-cut



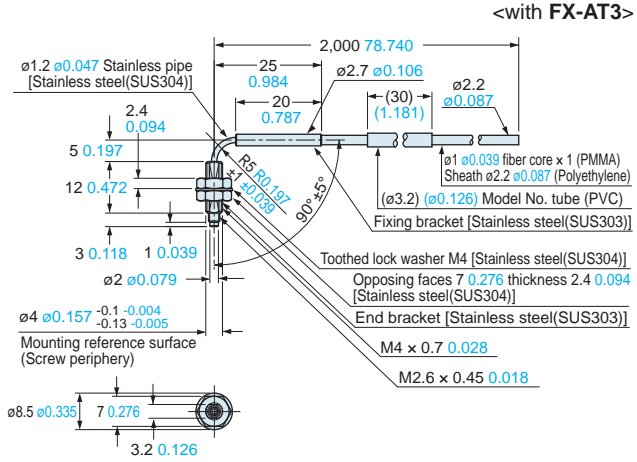
FT-L80Y  Free-cut



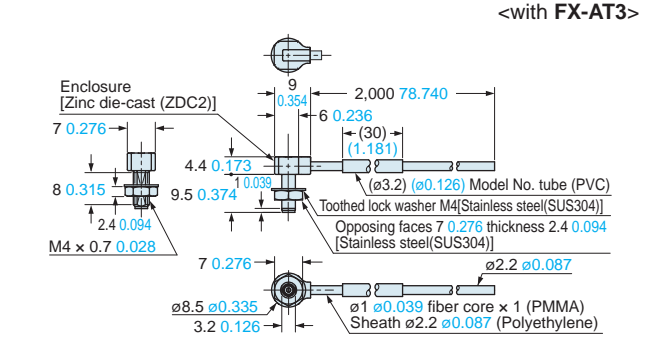
Assembly dimensions with MS-FD-3 (attached mounting bracket)



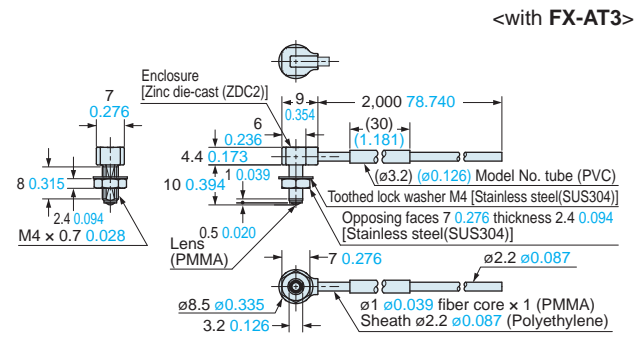
FT-R40  Free-cut




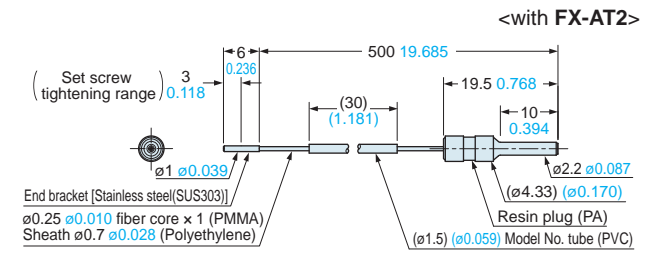
FT-R41W  Free-cut



FT-R42W  Free-cut



FT-S11  Free-cut



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Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

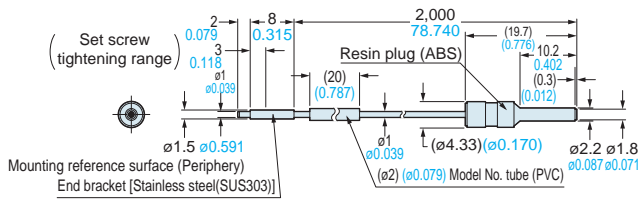
Thru-beam type fibers



Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

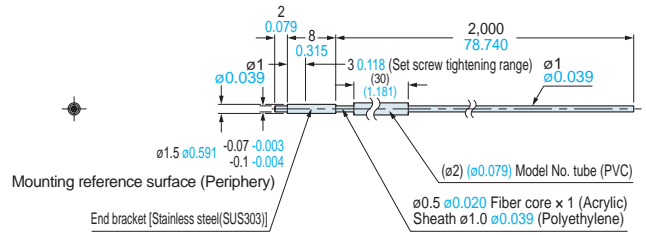
FT-S20

<with FX-AT2>



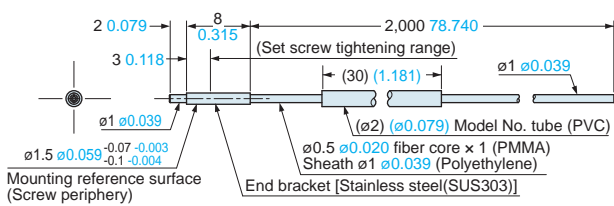
FT-S21

Free-cut <with FX-AT4>



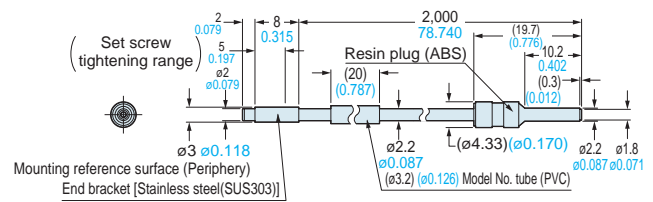
FT-S21W

Free-cut <with FX-AT4>



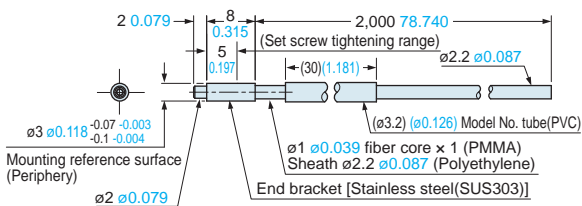
FT-S30

<with FX-AT2>



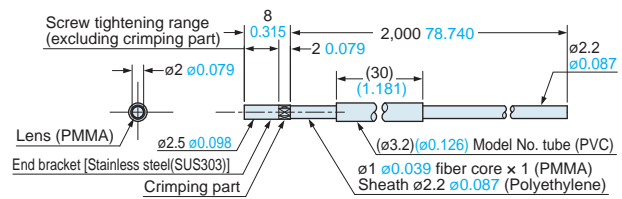
FT-S31W

Free-cut <with FX-AT3>



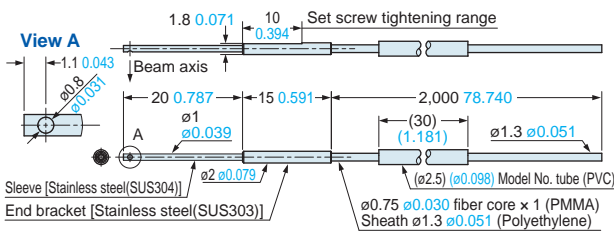
FT-S32

Free-cut <with FX-AT3>



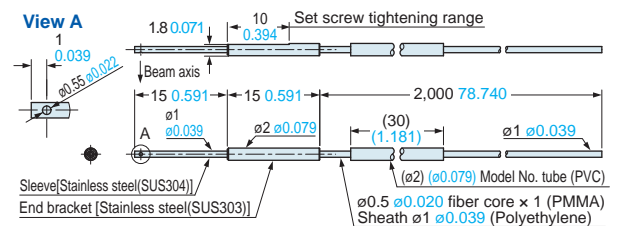
FT-V23

Free-cut <with FX-AT5>



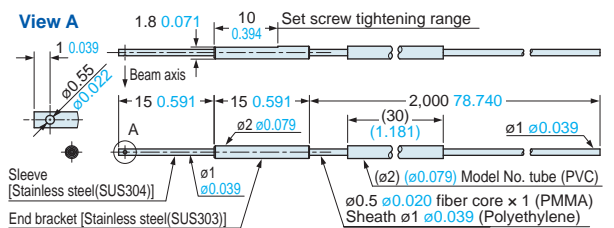
FT-V24W

Free-cut <with FX-AT4>



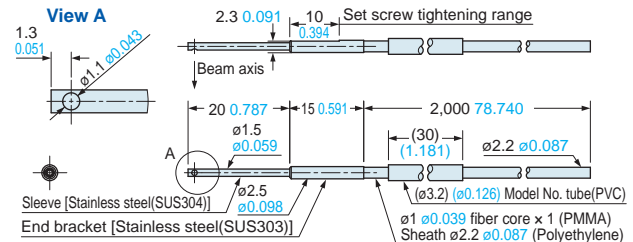
FT-V25

Free-cut <with FX-AT4>



FT-V30

Free-cut <with FX-AT3>

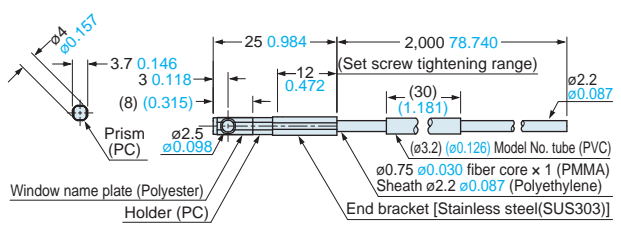


DIMENSIONS (Unit: mm in) Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

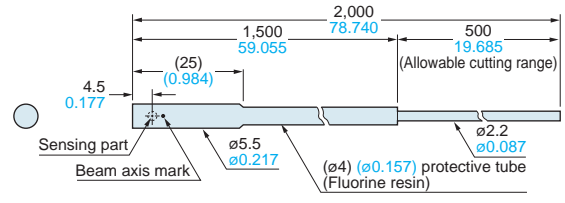
Thru-beam type fibers 

Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

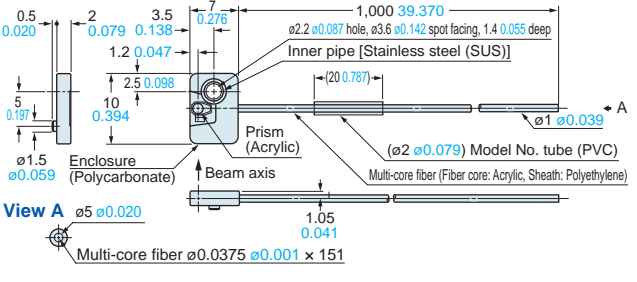
FT-V40  Free-cut
 <with FX-AT3>



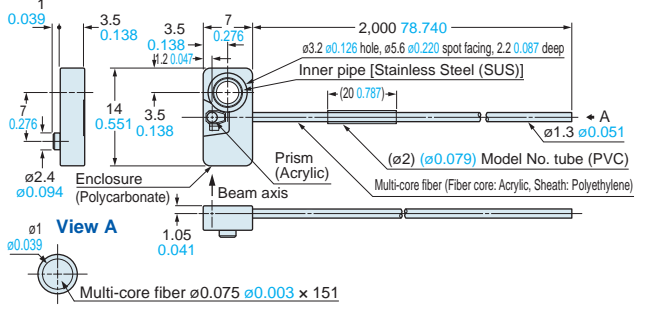
FT-V80Y  Free-cut
 <with FX-AT3>



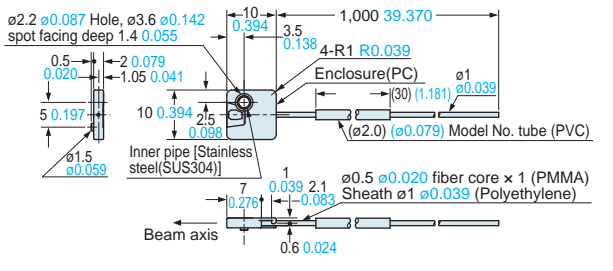
FT-WZ4  Free-cut
 <with FX-AT4>



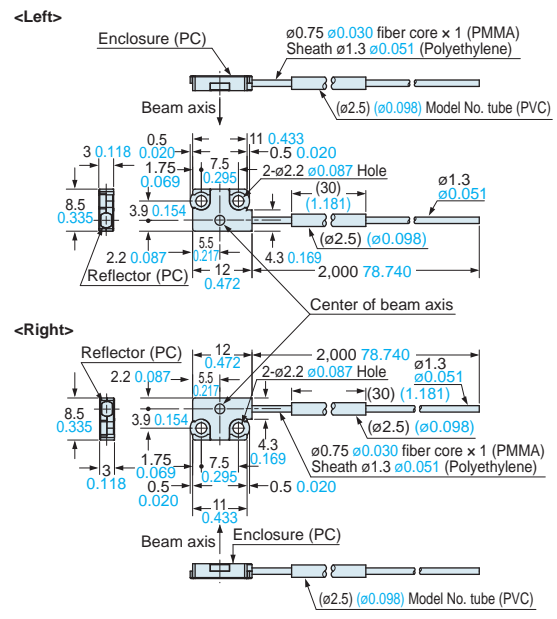
FT-WZ7  Free-cut
 <with FX-AT5>



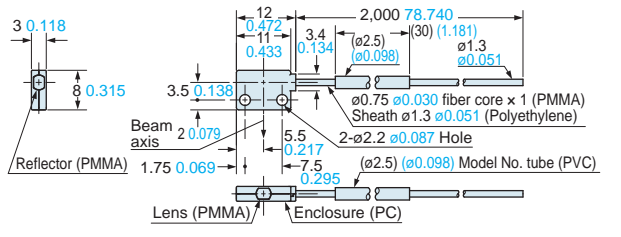
FT-Z20HBW  Free-cut
 <with FX-AT4>



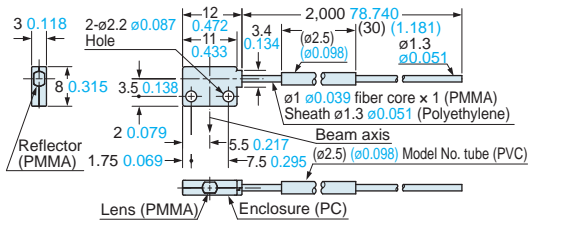
FT-Z30  Free-cut
 <with FX-AT5>



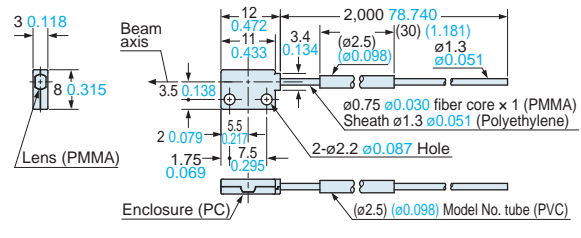
FT-Z30E  Free-cut
 <with FX-AT5>



FT-Z30EW  Free-cut
 <with FX-AT5>



FT-Z30H  Free-cut
 <with FX-AT5>



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Refer to the **FX-500** series (p.64), **FX-100** series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

Thru-beam type fibers

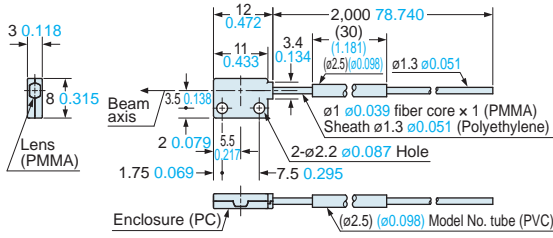


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

FT-Z30HW

Free-cut

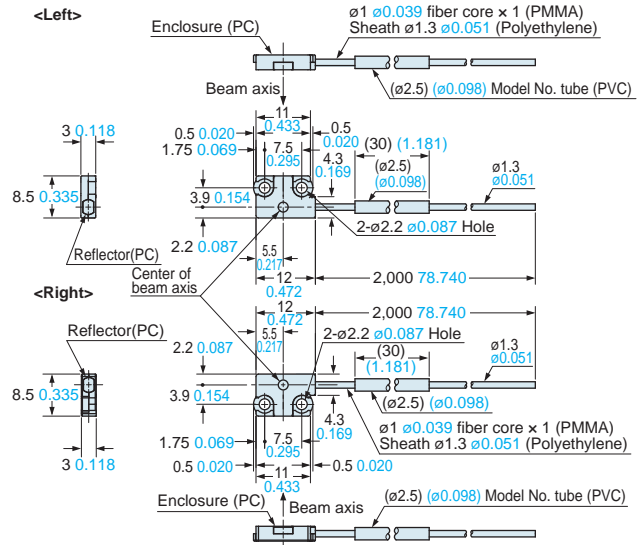
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FT-Z30W

Free-cut

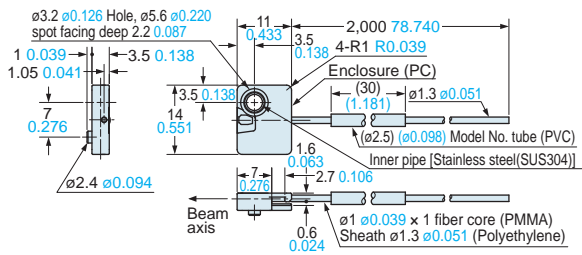
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FT-Z40HBW

Free-cut

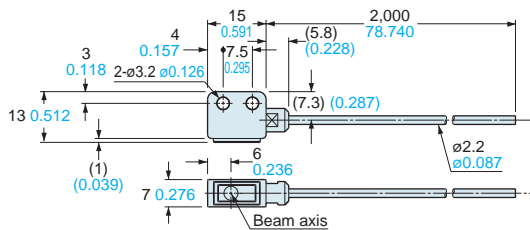
<with FX-AT5>



FT-Z802Y

Free-cut

<with FX-AT3>



mailto:sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

Ruggholzli 2
CH - 5453 Busslingen

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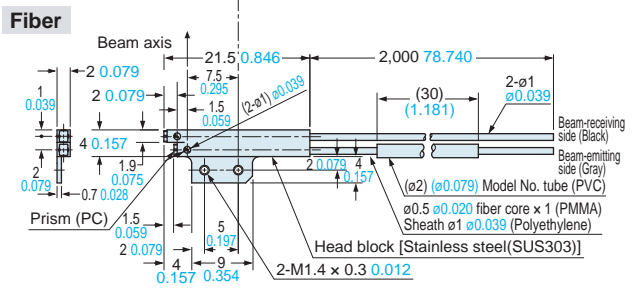
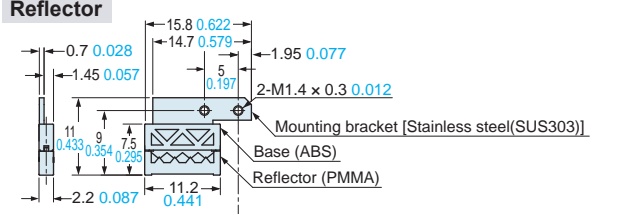
DIMENSIONS (Unit: mm in) Refer to the **FX-500 series (p.64)**, **FX-100 series (p.74)** for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

Retroreflective type fibers 

Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

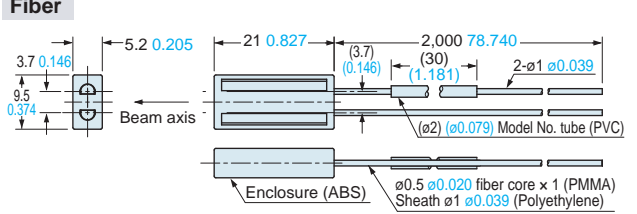
FR-KZ22E  Free-cut

<with FX-AT4>

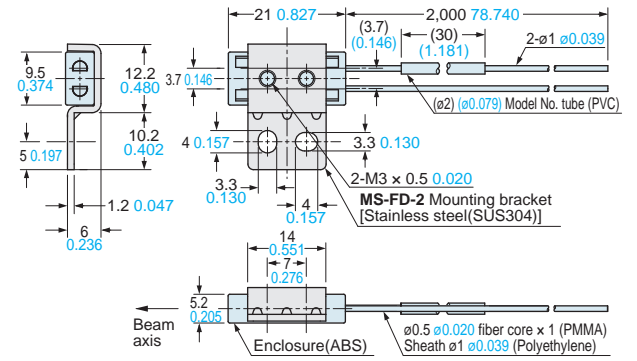


FR-KZ50H  Free-cut

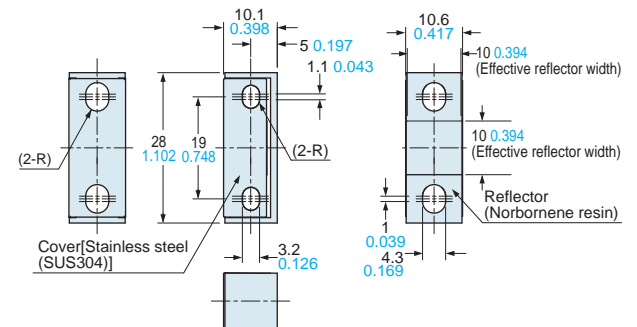
<with FX-AT4>



Assembly dimensions with MS-FD-2 (attached mounting bracket)

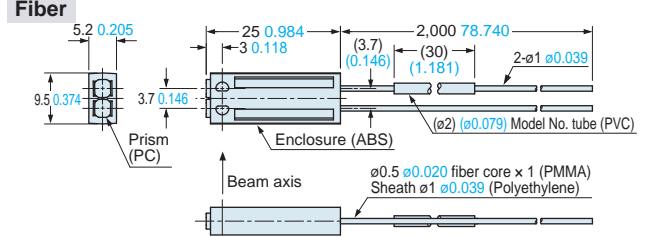


Reflector RF-003 (Accessory for FR-KZ50H)

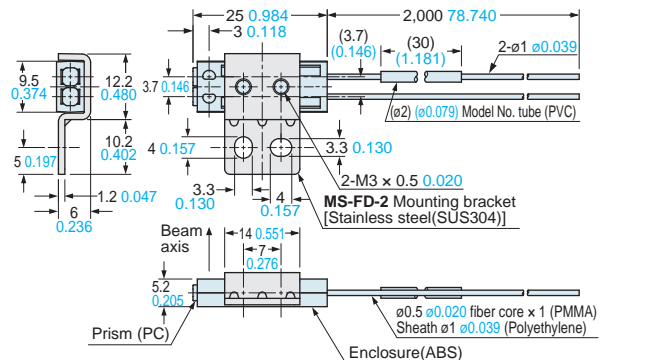


FR-KZ50E  Free-cut

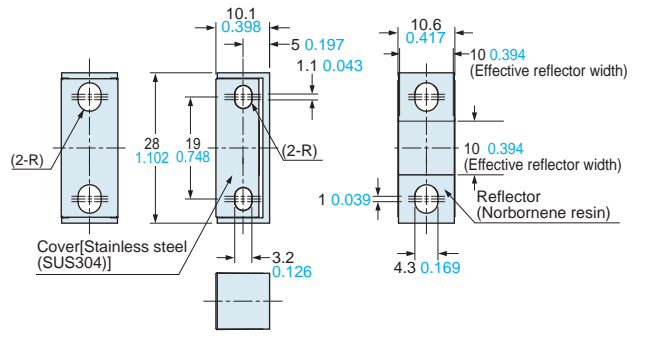
<with FX-AT4>



Assembly dimensions with MS-FD-2 (attached mounting bracket)

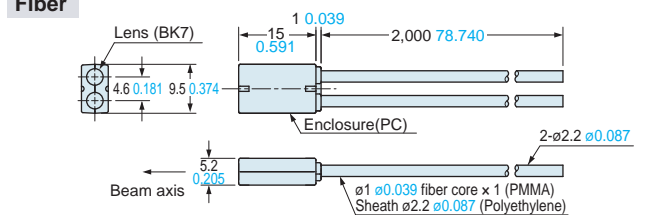


Reflector RF-003 (Accessory for FR-KZ50E)

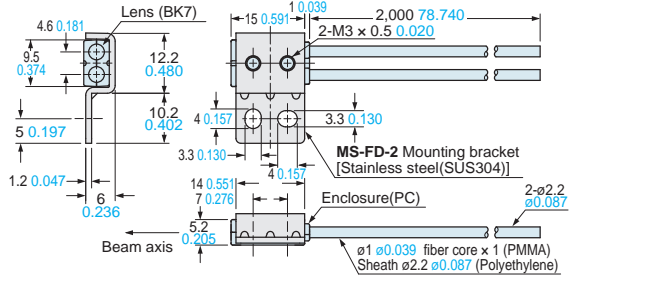


FR-Z50HW  Free-cut

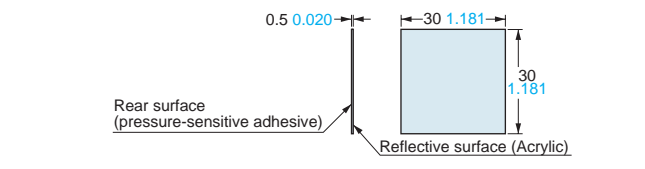
<with FX-AT3>



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Reflective tape RF-13 (Accessory for FR-Z50HW)



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Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

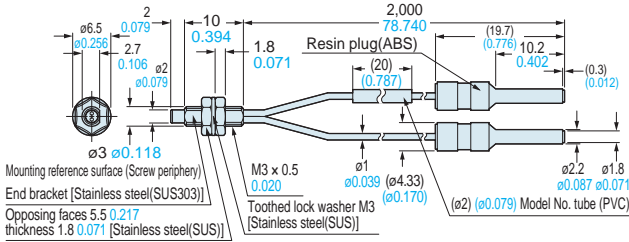
Reflective type fibers



Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

FD-30

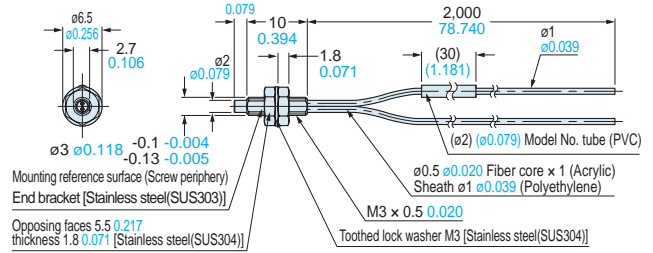
<with FX-AT2>



FD-31

Free-cut

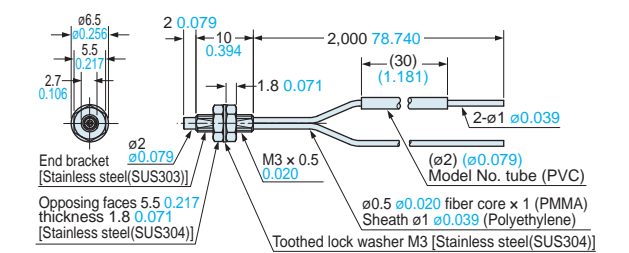
<with FX-AT4>



FD-31W

Free-cut

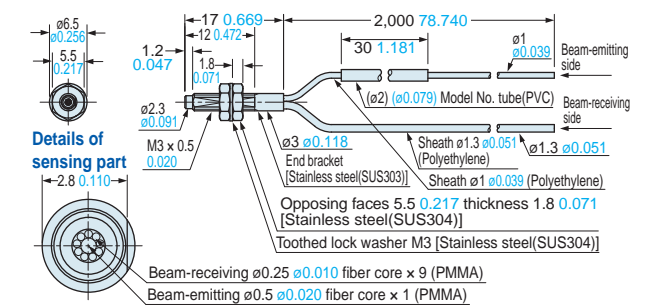
<with FX-AT4>



FD-32G

Free-cut

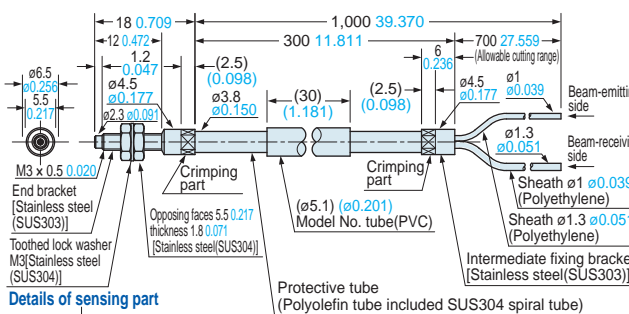
<with FX-AT6>



FD-32GX

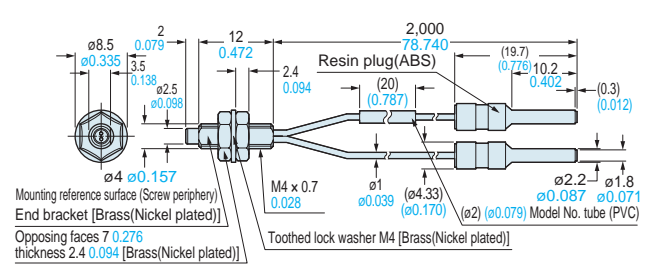
Free-cut

<with FX-AT6>



FD-40

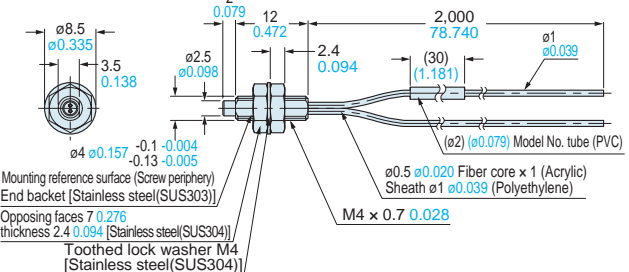
<with FX-AT2>



FD-41

Free-cut

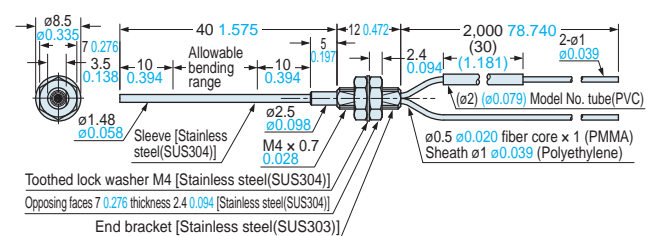
<with FX-AT4>



FD-41S

Free-cut

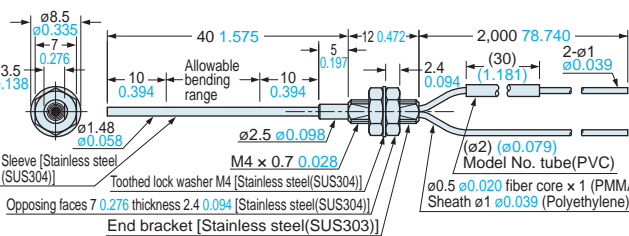
<with FX-AT4>



FD-41SW

Free-cut

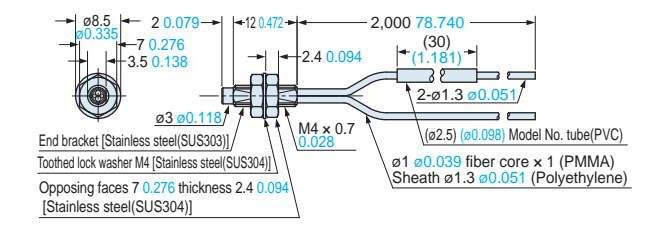
<with FX-AT4>



FD-41W

Free-cut

<with FX-AT5>



DIMENSIONS (Unit: mm in)

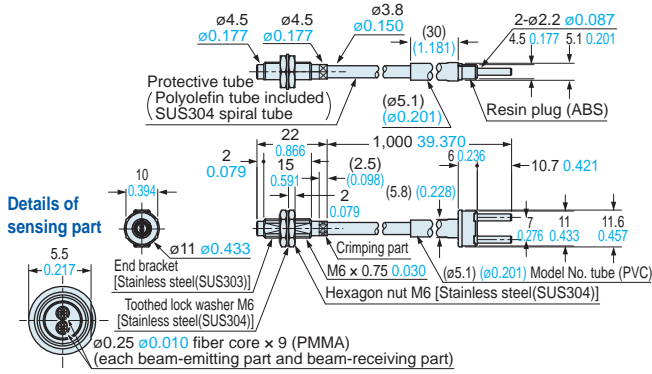
Refer to the FX-500 series (p.64), FX-100 series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

Reflective type fibers



Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

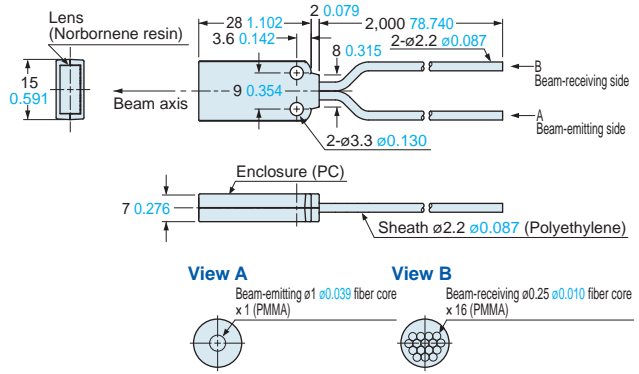
FD-64X



FD-A16

Free-cut

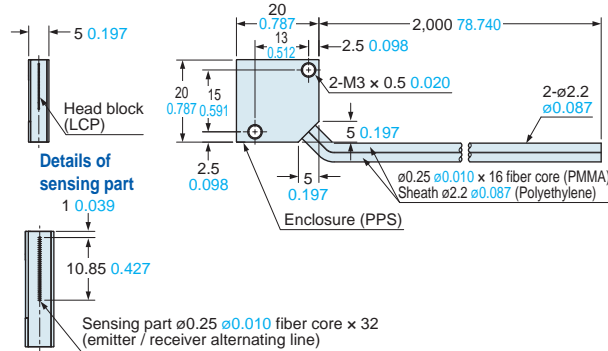
<with FX-AT3>



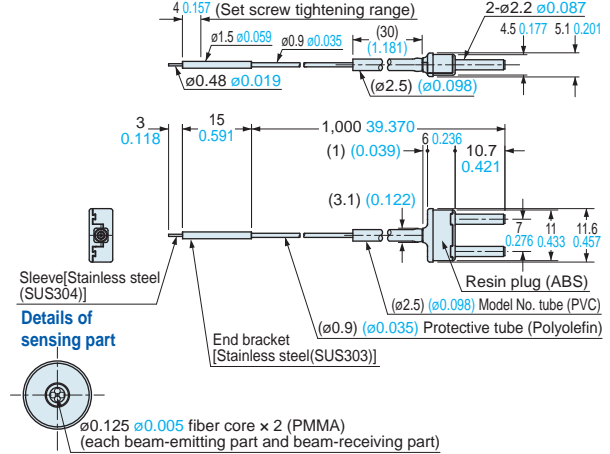
FD-AL11

Free-cut

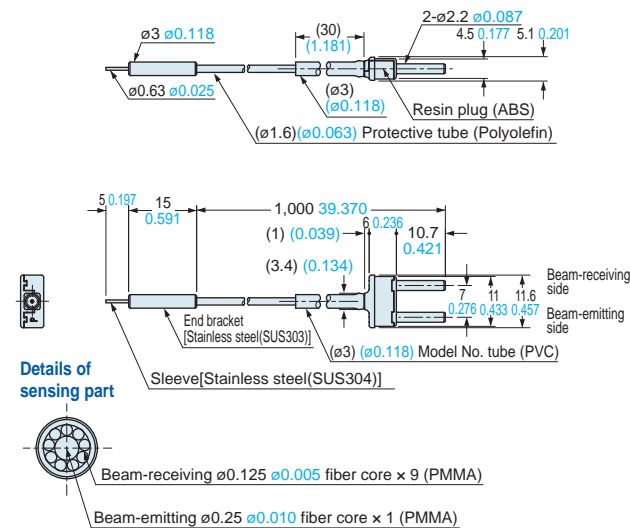
<with FX-AT3>



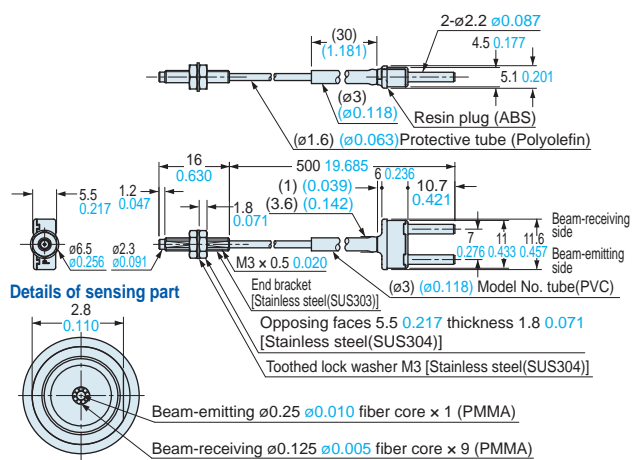
FD-E13



FD-E23



FD-EG30



DIMENSIONS (Unit: mm in)

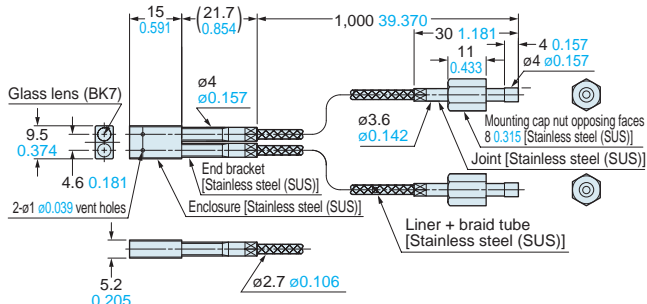
Refer to the **FX-500 series (p.64)**, **FX-100 series (p.74)** for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

Reflective type fibers

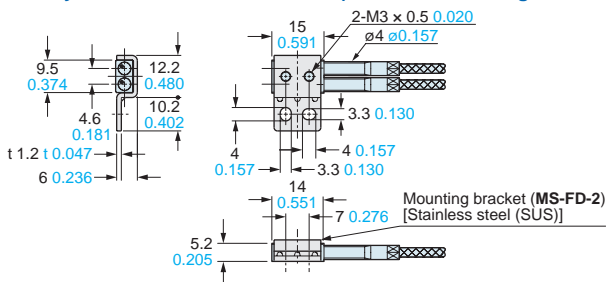


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

FD-H30-KZ1V-S

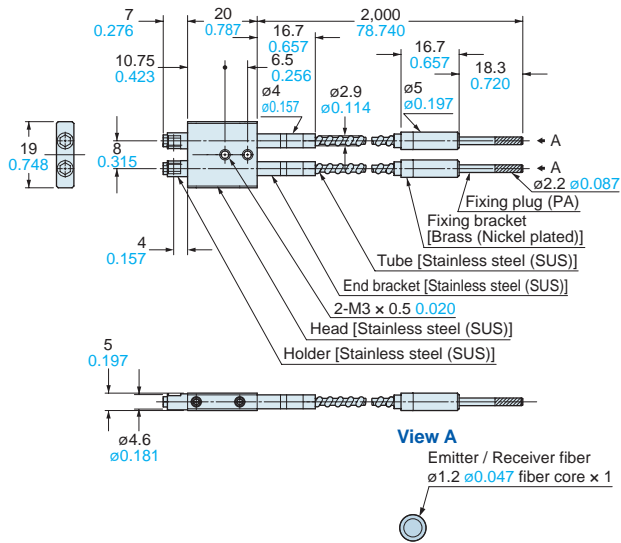


Assembly dimensions with MS-FD-2 (attached mounting bracket)

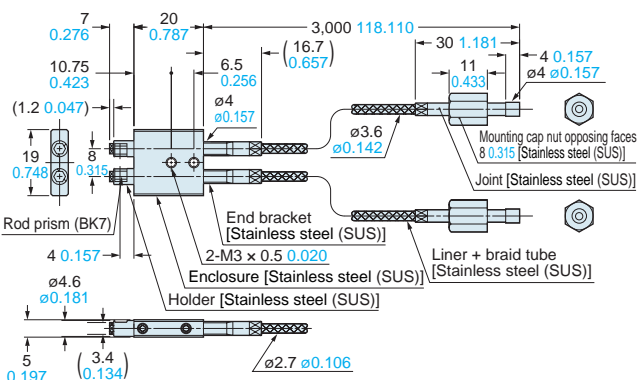


Note: The **FD-H30-KZ1V-S** is a set with the **FD-H30-KZ1V**, photo-terminal **FV-BR1**, and atmospheric side fiber **FT-J8**. Refer to p.51 for dimensions of the atmospheric side fiber and photo-terminals.

FD-H30-L32

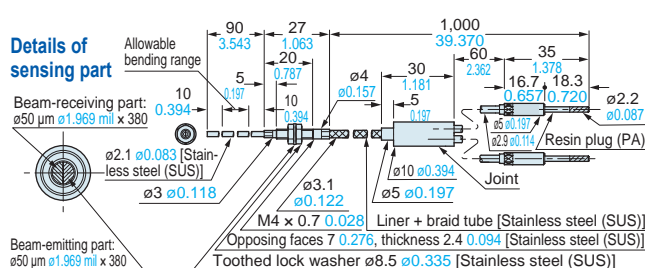


FD-H30-L32V-S

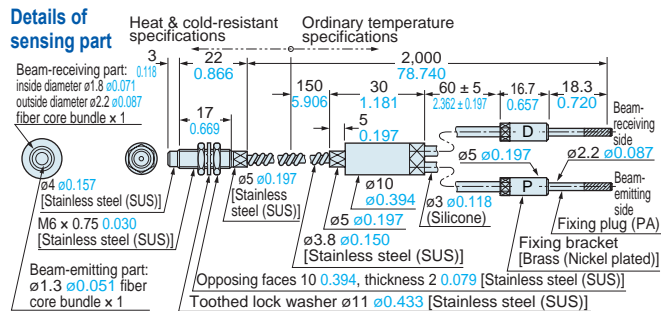


Note: The **FD-H30-L32V-S** is a set with the **FD-H30-L32V**, photo-terminal **FV-BR1**, and atmospheric side fiber **FT-J8**. Refer to p.51 for dimensions of the atmospheric side fiber and photo-terminals.

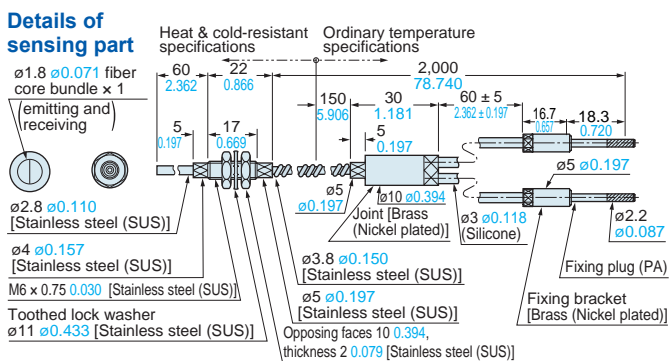
FD-H35-20S



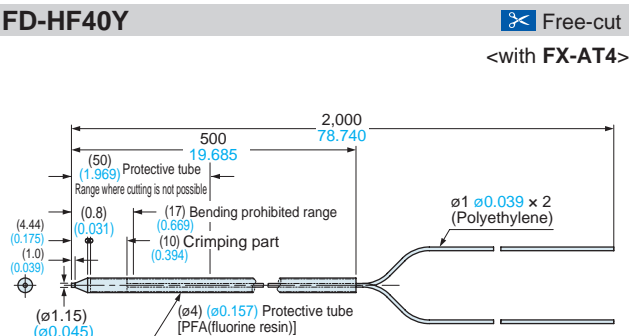
FD-H35-M2



FD-H35-M2S6



FD-HF40Y



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Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

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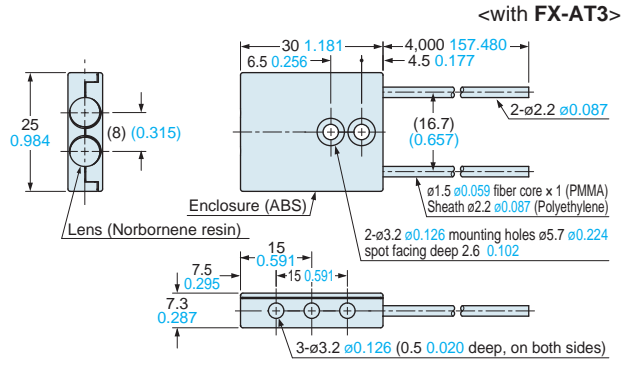
Earlier models comparison table

DIMENSIONS (Unit: mm in) Refer to the **FX-500 series (p.64)**, **FX-100 series (p.74)** for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

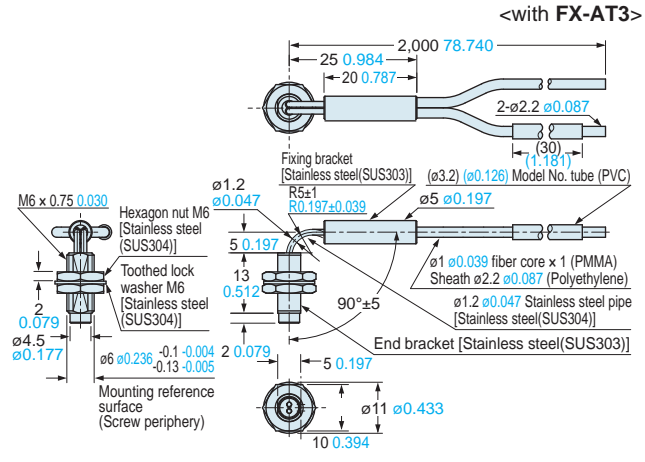
Reflective type fibers 

Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

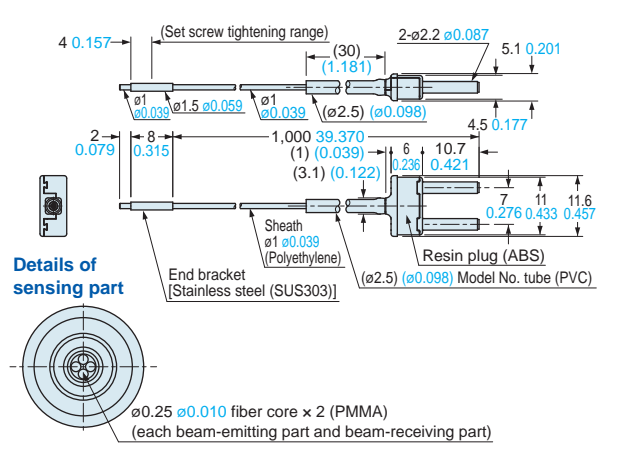
FD-L32H  Free-cut



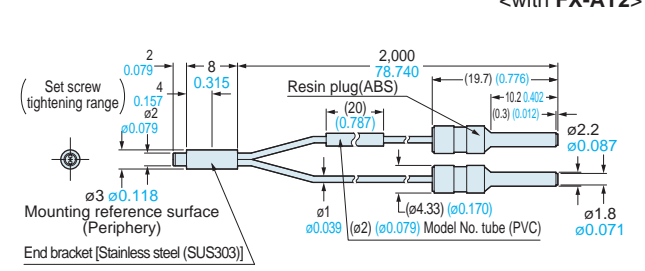
FD-R60  Free-cut



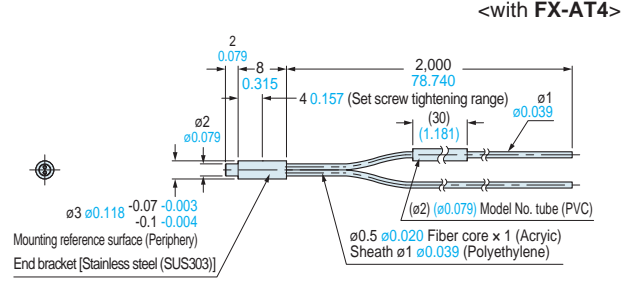
FD-S21



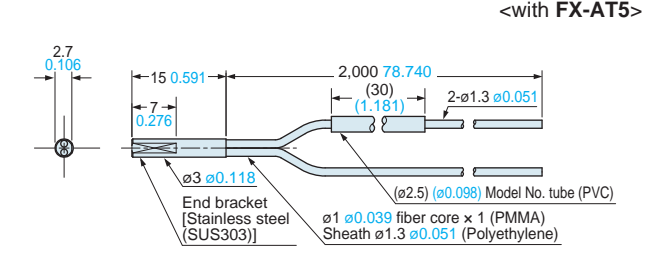
FD-S30



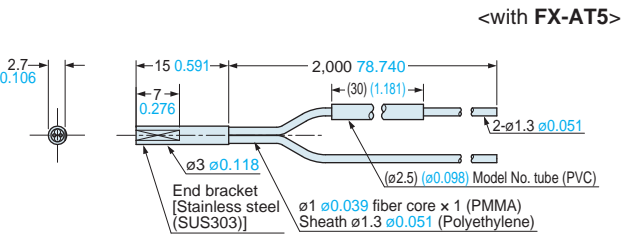
FD-S31  Free-cut



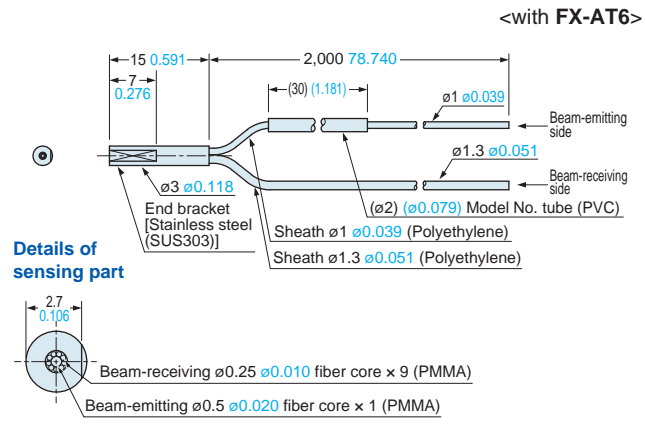
FD-S32  Free-cut



FD-S32W  Free-cut



FD-S33GW  Free-cut



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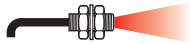
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Refer to the **FX-500** series (p.64), **FX-100** series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

Reflective type fibers

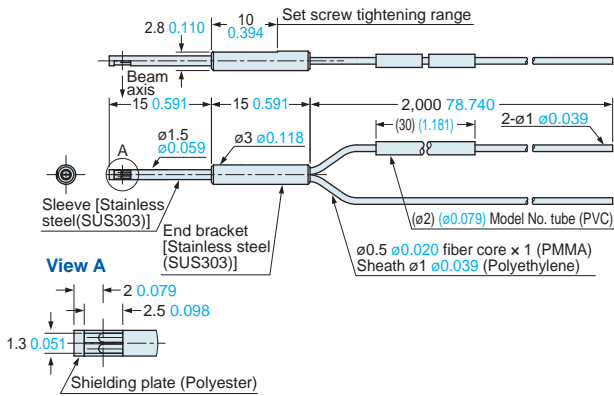


Dimensions are listed in the order of thru-beam type, retroreflective type, and reflective type, and in alphabetic order of the model No.

FD-V30

Free-cut

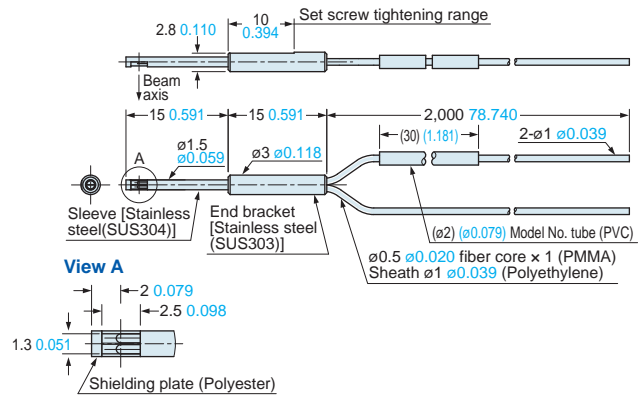
<with FX-AT4>



FD-V30W

Free-cut

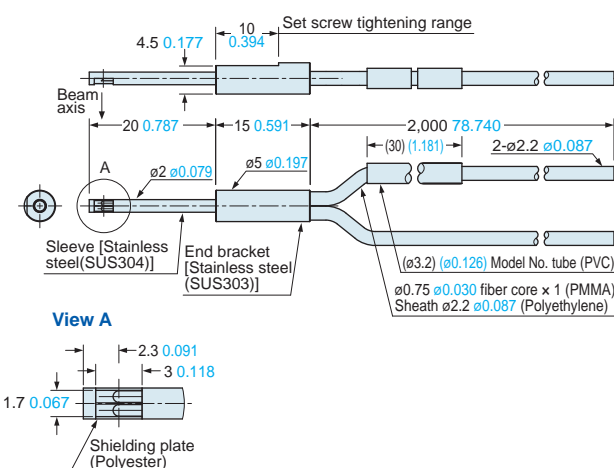
<with FX-AT4>



FD-V50

Free-cut

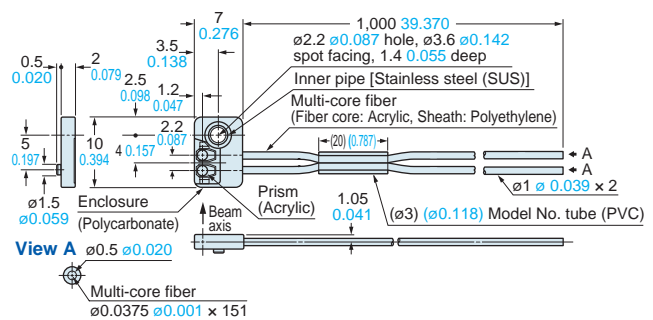
<with FX-AT3>



FD-WZ4

Free-cut

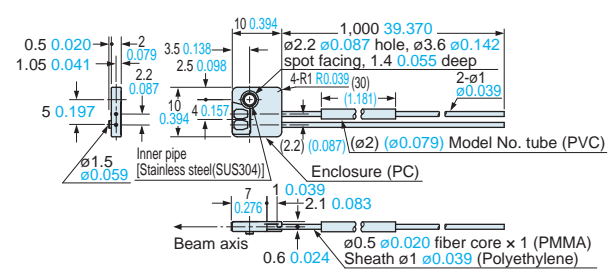
<with FX-AT4>



FD-Z20HBW

Free-cut

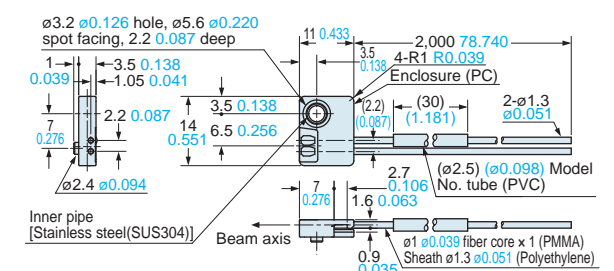
<with FX-AT4>



FD-Z40HBW

Free-cut

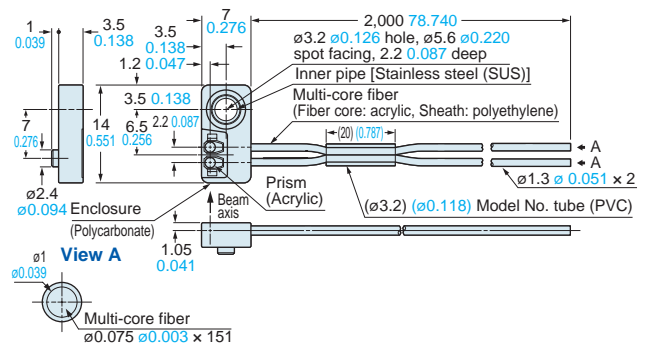
<with FX-AT5>



FD-WZ7

Free-cut

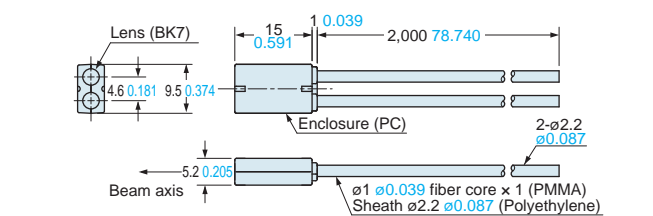
<with FX-AT5>



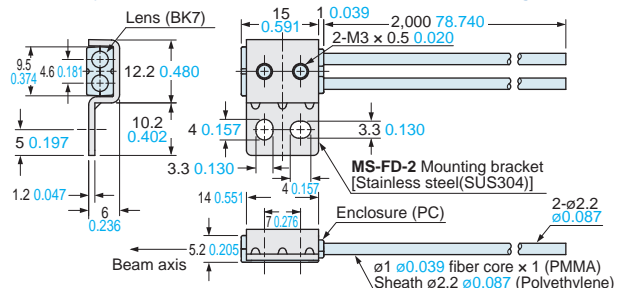
FD-Z50HW

Free-cut

<with FX-AT3>



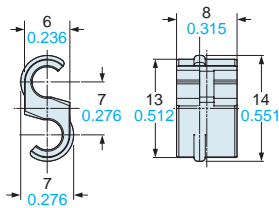
Assembly dimensions with MS-FD-2 (attached mounting bracket)



DIMENSIONS (Unit: mm in)

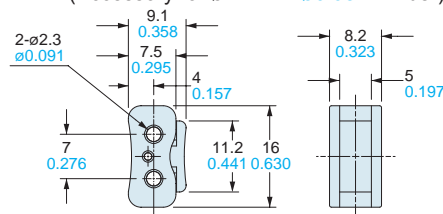
Refer to the **FX-500** series (p.64), **FX-100** series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

FX-AT2 Attachment for fixed-length fiber (Accessory for fixed-length fiber)



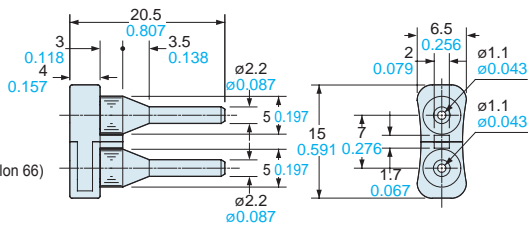
Material: POM

FX-AT3 Attachment for $\varnothing 2.2$ mm $\varnothing 0.087$ in fiber (Accessory for $\varnothing 2.2$ mm $\varnothing 0.087$ in fiber)



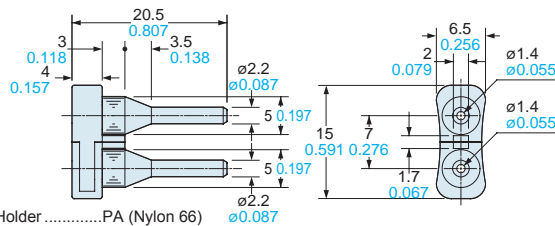
Material: Polycarbonate

FX-AT4 Attachment for $\varnothing 1$ mm $\varnothing 0.039$ in fiber (Accessory for $\varnothing 1$ mm $\varnothing 0.039$ in fiber)



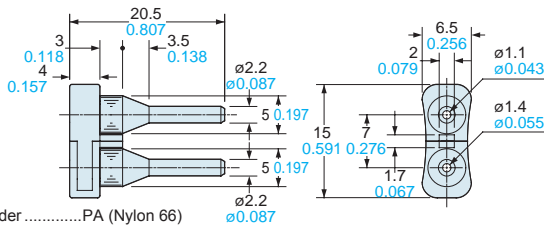
Material: Holder.....PA (Nylon 66)
Ground...POM

FX-AT5 Attachment for $\varnothing 1.3$ mm $\varnothing 0.051$ in fiber (Accessory for $\varnothing 1.3$ mm $\varnothing 0.051$ in fiber)



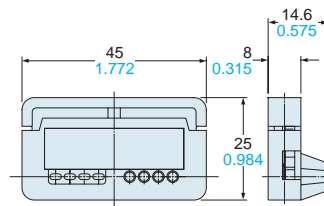
Material: Holder.....PA (Nylon 66)
Ground.....POM

FX-AT6 Attachment for $\varnothing 1$ mm $\varnothing 0.039$ in / $\varnothing 1.3$ mm $\varnothing 0.051$ in mixed fiber (Accessory for $\varnothing 1$ mm $\varnothing 0.039$ in / $\varnothing 1.3$ mm $\varnothing 0.051$ in mixed fiber)



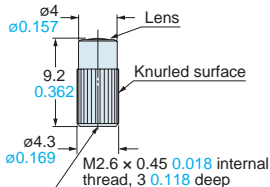
Material: Holder.....PA (Nylon 66)
Ground.....POM

FX-CT2 Fiber cutter (Accessory for free-cut type fiber)



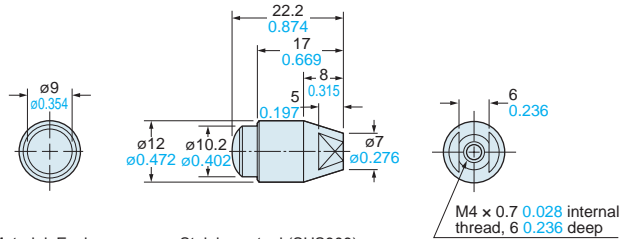
Material: ABS

FX-LE1 Expansion lens (Optional)



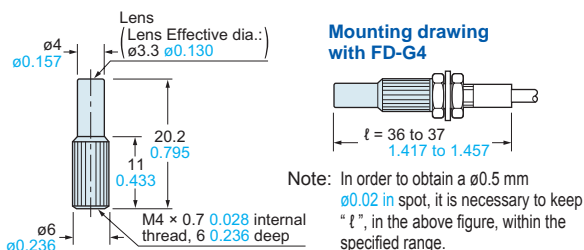
Material: Enclosure.....Brass (Nickel plated)
Lens.....Glass

FX-LE2 Super-expansion lens (Optional)



Material: Enclosure.....Stainless steel (SUS303)
Lens.....Glass

FX-MR1 Pinpoint spot lens (Optional)

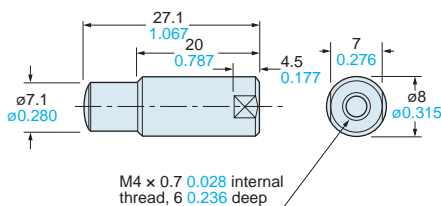


Mounting drawing with FD-G4

Note: In order to obtain a $\varnothing 0.5$ mm $\varnothing 0.02$ in spot, it is necessary to keep "l", in the above figure, within the specified range.

Material: Enclosure.....Aluminum (Black ALMITE)
Lens.....Glass

FX-MR2 Zoom lens (Optional)



Material: Enclosure.....Aluminum (Black ALMITE)
Lens.....Glass

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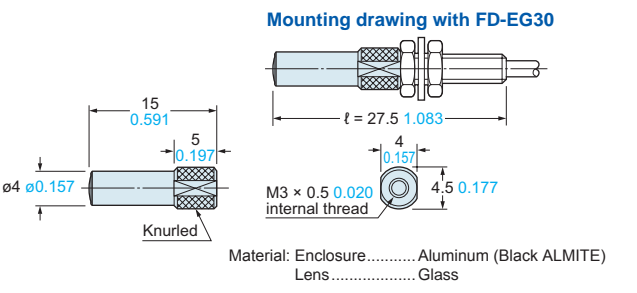
mailbox@sentronic.com
www.sentronic.com
Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

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CH - 5453 Busslingen

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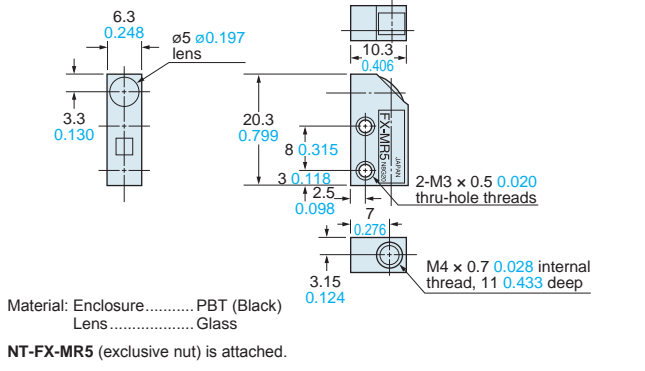
DIMENSIONS (Unit: mm in) Refer to the **FX-500 series (p.64)**, **FX-100 series (p.74)** for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

FX-MR3 Finest spot lens (Optional)

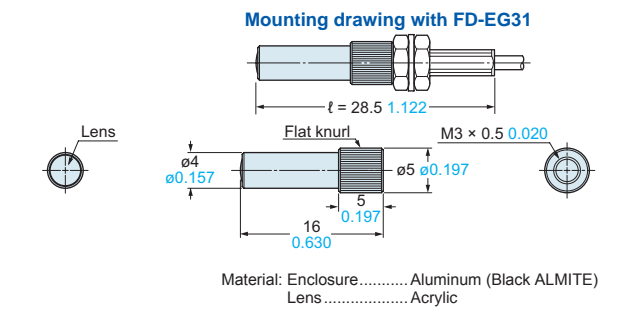


Note: When inserting the fiber, insert fully till it stops.

FX-MR5 Zoom lens (Optional)

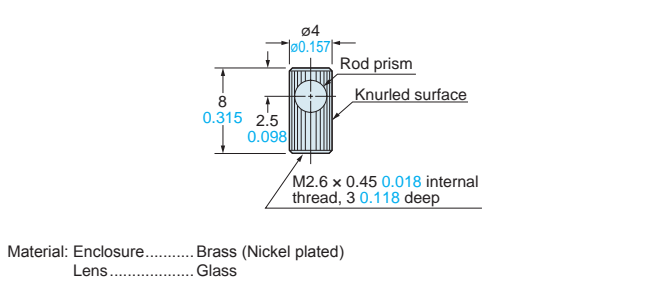


FX-MR6 Finest spot lens (Optional)

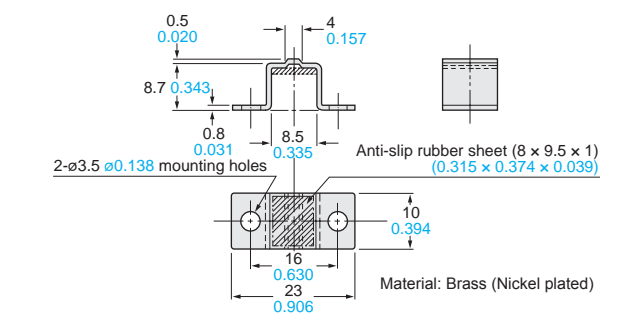


Note: When inserting the fiber, insert fully till it stops.

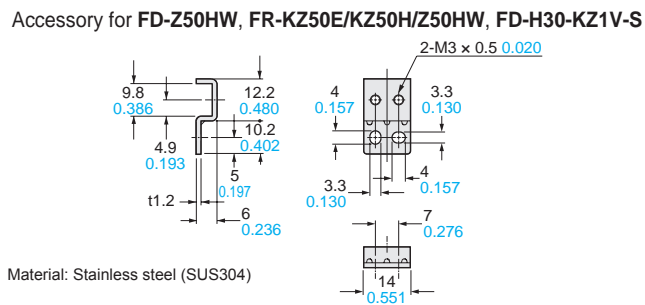
FX-SV1 Side-view lens (Optional)



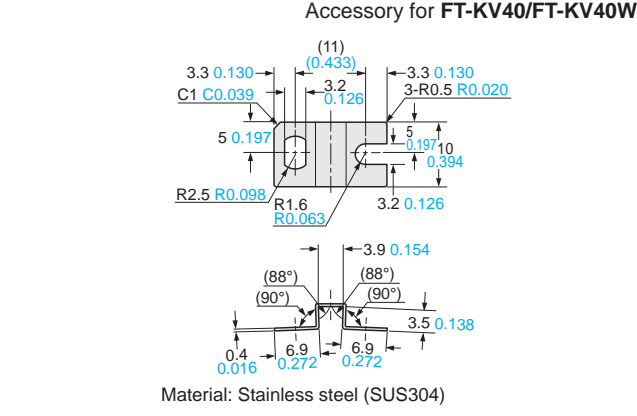
MS-EX3 Mounting bracket for FX-MR2 (Accessory for FX-MR2)



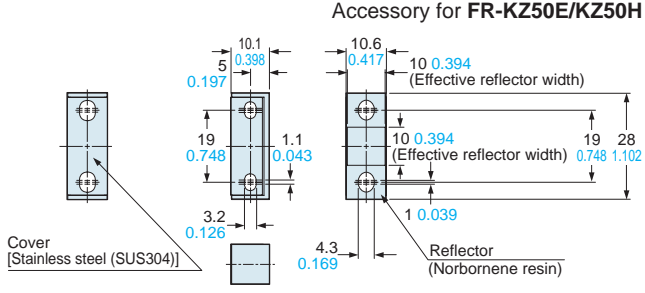
MS-FD-2 Fiber mounting bracket



MS-FD-3 Fiber mounting bracket



RF-003 Reflector for FR-KZ50E/KZ50H



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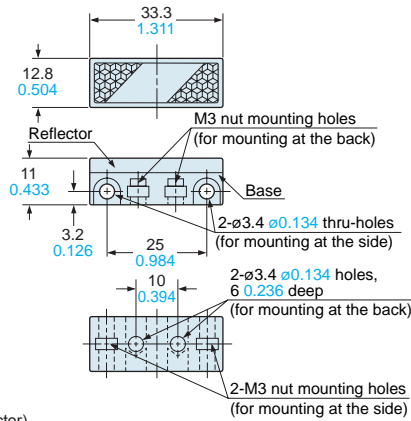
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DIMENSIONS (Unit: mm in)

Refer to the **FX-500** series (p.64), **FX-100** series (p.74) for dimensions of the amplifiers. The CAD data in the dimensions can be downloaded from our website.

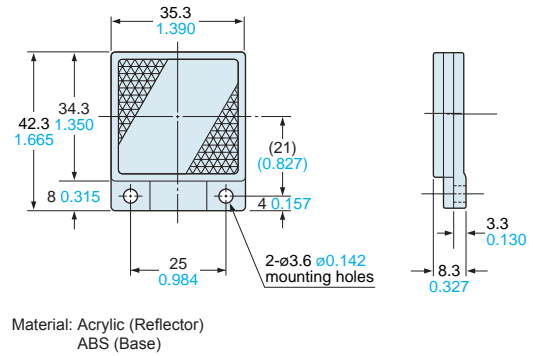
RF-210 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

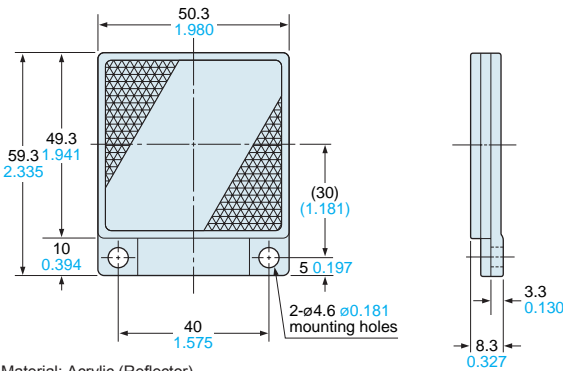
Two M3 (length 8 mm 0.315 in) screws with washers and two nuts are attached.

RF-220 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

RF-230 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

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www.sentronic.com

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Fax +41 (0)56 222 10 12

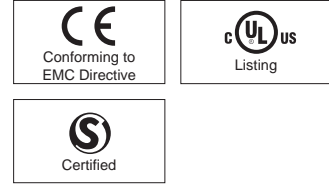
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CH - 5453 Busslingen

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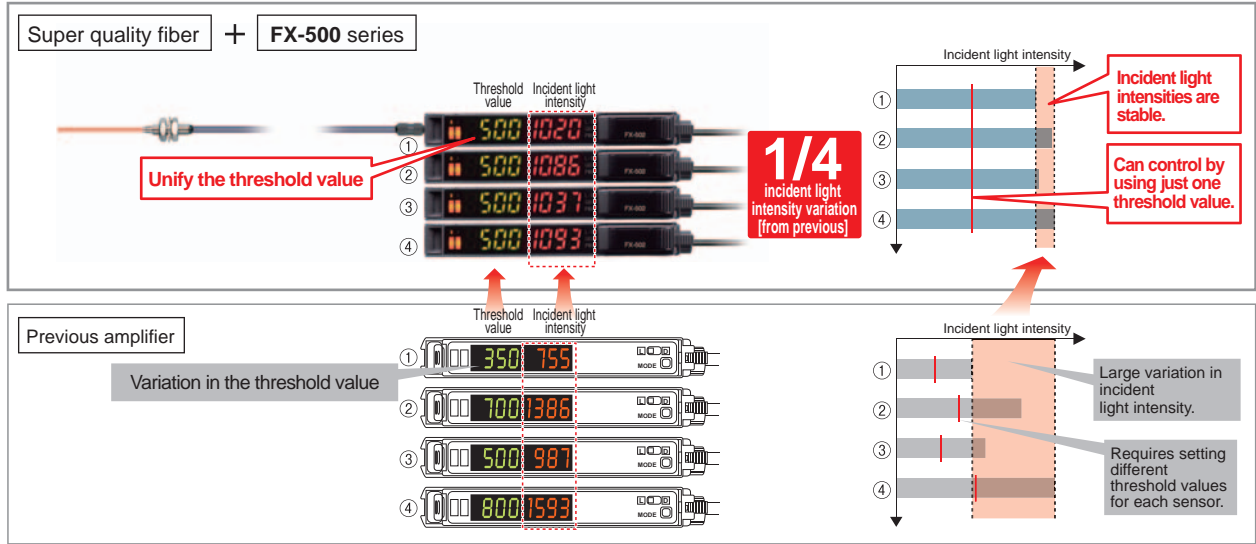
Digital Fiber Sensor FX-500 SERIES

◆ At the industry's leading edge



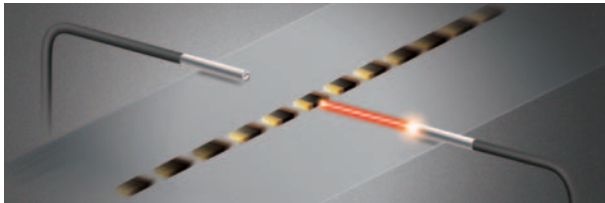
High stability! Decrease the variation among fiber sensors

When the **FX-500** series is used together with our super quality fiber, the incident light intensity variation among units is decreased to only 1/4 of that of conventional models. By being close to absolute values instead of modified digital values, changes in detection that could not be found in the past can now be monitored.



Max. 25 μs response time

Performing minute object detection when using a small diameter fiber is now possible with a high response time and longer sensing range.



Hyper HYPR mode incorporated

FX-500 in combination with small diameter fibers which can handle challenging detections, allows super long sensing range.



Note: When using FD-NFM2.

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www.sentronic.com

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Fax +41 (0)56 222 10 12

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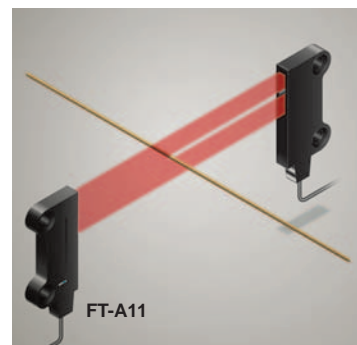
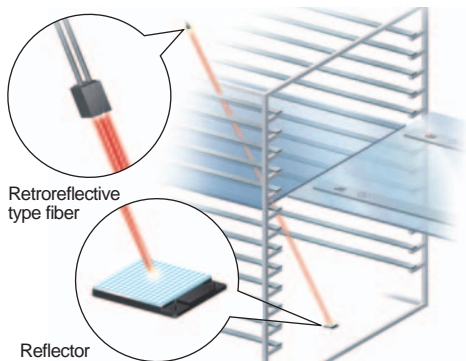
Produkte, Support und Service

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A different accuracy! Sharp detection with suppressed hysteresis

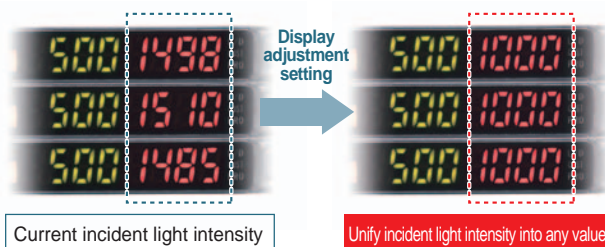
FX-500 with its accurate detection catches fractional difference in light intensity, fulfilling high precision and low-hysteresis applications.

- Long range detection of small objects with small difference in light intensity **H-02 mode**
- Highly accurate detection while avoiding saturation **H-01 mode**



Incident light intensity to a comprehensible value (Display adjustment setting)

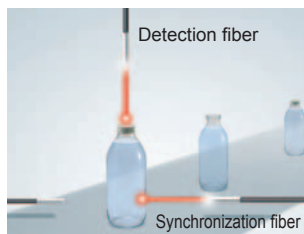
The display can be corrected to show any value using the display adjustment settings. It is effective in using multiple units with the same condition.



Built-in logic functions No PLC necessary saving material and programming costs

Logical calculation functions

Three logical calculations (AND, OR, XOR), are selectable using Output 1 of multiple **FX-500** series amplifiers. A PLC is not required which helps to reduce material and programming and costs.



Calculation of two neighboring amplifiers



Communication direction (Up to 12 units)

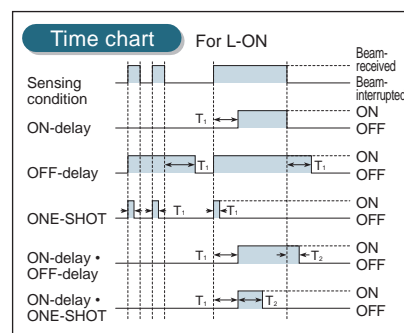
Calculation of two outputs in one amplifier **FX-502(P) / 505(P)-C2**



Calculation of one amplifier and external input **FX-502(P) / 505(P)-C2**



Equipped with 5 types timers



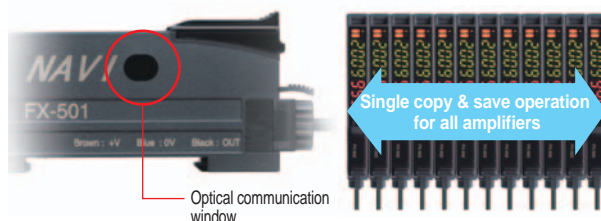
Timer period: 0.05 ms to 32 s
Output 1 has ON-delay • OFF-delay and ON-delay • ONE-SHOT timers.

Smooth setup changes by 8 data banks

Setup conditions can be saved and loaded to make setup changes easy at worksite that manufactures multiple models.

An optical communication function allows sensors to be adjusted simultaneously

The optical communication function allows the data that is currently set to be copied and saved all at once for all amplifiers connected together from the right side.



Remote control improves work efficiency by external input **FX-502(P) / FX-505(P)-C2**

Various types of functions, such as teaching and data load/save, can be performed by PLC external signal, using external input*.

* The **FX-502 (P)** switches Output 2 for an external input.

No need to specify a main unit or sub unit

Just use a main cable or a sub cable to distinguish the two. This reduces the costs of inventory management.

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Heat-resistant
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Amplifiers

Quick-connection cable is not supplied with **FX-501(P)** and **FX-502(P)**. Please order it separately.

| Type | Appearance | Model No. | Emitting element | Output | External input |
|---------------|---|-------------------|--|---|--|
| Standard type |  | FX-501 | Red LED | NPN open-collector transistor | — |
| | | FX-501P | | PNP open-collector transistor | |
| 2-output type | | FX-502 | | NPN open-collector transistor 2 outputs | Incorporated (Switchable with Output 2) |
| | | FX-502P | | PNP open-collector transistor 2 outputs | |
| Cable type |  | FX-505-C2 | NPN open-collector transistor 2 outputs, analog output | Incorporated | |
| | | FX-505P-C2 | PNP open-collector transistor 2 outputs, analog output | | |

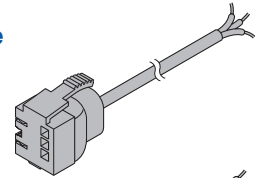
Quick-connection cables

For FX-501(P) Quick-connection cable is not supplied with the amplifier. Please order it separately.

| Type | Model No. | Description | |
|---------------------|-----------------|------------------------------|---|
| Main cable (3-core) | CN-73-C1 | Length: 1 m 3.281 ft | 0.15 mm ² 3-core cabtyre cable, with connector on one end Cable outer diameter: ø3.0 mm ø 0.118 in |
| | CN-73-C2 | Length: 2 m 6.562 ft | |
| | CN-73-C5 | Length: 5 m 16.404 ft | |
| Sub cable (1-core) | CN-71-C1 | Length: 1 m 3.281 ft | 0.15 mm ² 1-core cabtyre cable, with connector on one end Cable outer diameter: ø3.0 mm ø 0.118 in Connectable to a main cable up to 15 cables. |
| | CN-71-C2 | Length: 2 m 6.562 ft | |
| | CN-71-C5 | Length: 5 m 16.404 ft | |

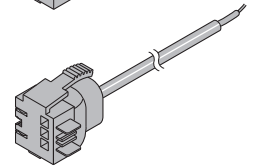
Main cable

- **CN-73-C□**



Sub cable

- **CN-71-C□**

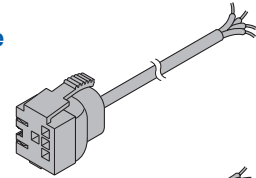


For FX-502(P) Quick-connection cable is not supplied with the amplifier. Please order it separately.

| Type | Model No. | Description | |
|---------------------|-----------------|------------------------------|---|
| Main cable (4-core) | CN-74-C1 | Length: 1 m 3.281 ft | 0.15 mm ² 4-core cabtyre cable, with connector on one end Cable outer diameter: ø3.0 mm ø 0.118 in |
| | CN-74-C2 | Length: 2 m 6.562 ft | |
| | CN-74-C5 | Length: 5 m 16.404 ft | |
| Sub cable (2-core) | CN-72-C1 | Length: 1 m 3.281 ft | 0.15 mm ² 2-core cabtyre cable, with connector on one end Cable outer diameter: ø3.0 mm ø 0.118 in Connectable to a main cable up to 15 cables. |
| | CN-72-C2 | Length: 2 m 6.562 ft | |
| | CN-72-C5 | Length: 5 m 16.404 ft | |

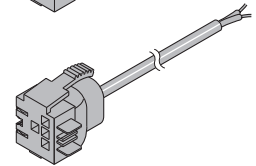
Main cable

- **CN-74-C□**



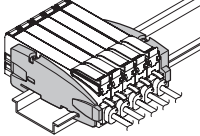
Sub cable

- **CN-72-C□**



End plates

End plates are not supplied with the amplifier. Please order them separately when the amplifiers are mounted in cascade.

| Appearance | Model No. | Description |
|---|-----------------|--|
|  | MS-DIN-E | When cascading multiple amplifiers, or when it moves depending on the way it is installed on a DIN rail, these end plates clamp amplifiers into place on both sides. Make sure to use end plates when cascading multiple amplifiers together. Two pcs. per set |

New product introduction
Tough Fiber

Fiber Selection Guide
Choose by model
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Fibers
Super Quality
Threaded Type
Cylindrical Type
Sleeve

Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions
Thru-beam Type
Retroreflective Type
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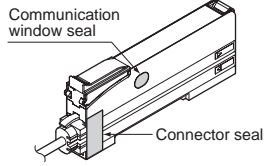
Earlier models comparison table

OPTIONS

| Designation | Model No. | Description |
|----------------------------|-----------------|--------------------------------|
| Amplifier mounting bracket | MS-DIN-2 | Mounting bracket for amplifier |

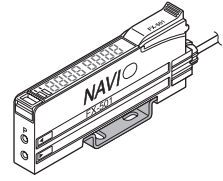
Accessory

- **FX-MB1** (Amplifier protection seal)
10 sets of 2 communication window seals and 1 connector seal



Amplifier mounting bracket

- **MS-DIN-2**



New product introduction
Tough Fiber

Fiber Selection Guide
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Fibers

- Super Quality
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- Flat Type
- Small Spot
- Narroe Beam
- Wide Beam
- Convergent Reflective Type
- Retroreflective Type
- Chemical-resistant
- Heat-resistant
- Vacuum-resistant
- Liquid Leak / Liquid Detection

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- Reflective Type
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SPECIFICATIONS

| Item | Model No. | Type | Standard type | 2-output type | Cable type (Analog output type) |
|---|----------------------------------|------------|---|---|---|
| | | NPN output | FX-501 | FX-502 | FX-505-C2 |
| | | PNP output | FX-501P | FX-502P | FX-505P-C2 |
| Supply voltage | | | 12 to 24 V DC ¹⁰ / ₁₅ % Ripple P-P 10 % or less | | |
| Power consumption | | | Normal operation: 960 mW or less (current consumption 40 mA or less at 24 V supply voltage, excluding analog output of cable type) ECO mode: 680 mW or less (current consumption 28 mA or less at 24 V supply voltage, excluding analog output of cable type) | | |
| Output (2-output type and cable type: Output 1, Output 2) | | | <NPN output type> NPN open-collector transistor • Maximum sink current: 100 mA (2-output type and cable type are 50 mA) (Note 2) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (Note 3) (at maximum sink current) | <PNP output type> PNP open-collector transistor • Maximum source current: 100 mA (2-output type and cable type are 50 mA) (Note 2) • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 2 V or less (Note 3) (at maximum source current) | |
| | Output points | | 1 point | 2 points | |
| | Output operation | | Switchable either Light-ON or Dark-ON by L/D mode | | |
| | Short-circuit protection | | Incorporated | | |
| Response time | | | H-SP: 25 µs or less, FAST: 60 µs or less, STD: 250 µs or less, LONG: 2 ms or less, U-LG: 4 ms or less, HYPR: 24 ms or less, selectable | | |
| Analog output (Cable type only) | | | Output current: 4 to 20 mA approx. [H-SP, FAST STD: At 0 to 4,000 digits, LONG: At 0 to 8,000 digits (Note 4)], Response time: 2 ms or less, Zero point: Within 4 mA ±1 % F.S., Span: Within 16 mA ±5 % F.S., Linearity: Within ±3 % F.S., Load resistance: 0 to 250 Ω | | |
| External input (2-output type only, switchable with Output 2) | | | <NPN output type> NPN non-contact input • Signal condition High: +8 V to +V DC or Open Low: 0 to +1.2 V DC (at 0.5 mA source current) • Input impedance: 10 kΩ approx. | <PNP output type> PNP non-contact input • Signal condition High: +4 V to +V DC (at 3 mA sink current) Low: 0 to +0.6 V DC or Open • Input impedance: 10 kΩ approx. | |
| | Possible external input function | | Emission halt / Teaching (Full-auto, Limit, 2-point) / Logic operation setting / Copy lock / Display adjustment / Data bank load / Data bank save, selectable | | |
| Sensitivity setting | | | 2-point teaching / Limit teaching / Full-auto teaching / Manual adjustment | | |
| Incident light intensity display range | | | H-SP / FAST / STD: 0 to 4,000, LONG: 0 to 8,000, U-LG / HYPR: 0 to 9,999 | | |
| Timer function | | | Incorporated with variable OFF-delay / ON-delay / ONE SHOT / ON-delay • OFF-delay / ON-delay • ONE SHOT timer, switchable either effective or ineffective | <Output 1> Incorporated with variable OFF-delay / ON-delay / ONE SHOT / ON-delay • OFF-delay / ON-delay • ONE SHOT timer, switchable either effective or ineffective | |
| | Timer period | | Timer range "ms": 0.5 ms approx., 1 to 9,999 ms approx., 1 ms approx., Timer range "sec.": 0.5 s approx., 1 to 32 s approx., 1 s approx., Timer range "1/10 ms": 0.05 ms approx., 0.1 to 999.9 ms approx., 0.1 ms approx., each output is set individually | | |
| Light emitting amount selection function | | | Incorporated, 3 levels (each level 25 to 100 %) + Auto setting [1 level (25 to 100 %) when using H-SP mode] | | |
| Interference prevention function | | | Incorporated (Note 5), selectable either automatic interference prevention or different frequency | | |
| Various settings | | | Hysteresis setting / Shift amount setting / Emission power setting / Display turning setting / ECO setting / Data bank loading saving setting / Copying setting / Code setting / Reset setting / Logical calculation setting / Threshold tracking setting, etc. | | |
| Protection | | | IP40 (IEC) | | |
| Ambient temperature | | | -10 to +55 °C +14 to +131 °F [If 4 to 7 units are mounted in cascade: -10 to +50 °C +14 to +122 °F or if 8 to 16 units (cable type: 8 to 12 units) are mounted in cascade: -10 to +45 °C +14 to +113 °F] (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F | | |
| Emitting element (modulated) | | | Red LED (Peak emission wavelength: 643 nm 0.025 mil) | | |
| Material | | | Enclosure, Case cover: Polycarbonate, Switch: TPEE | | |
| Cable | | | | | 0.15 mm ² 6-core cabtyre cable, 2 m 6.562 ft long |
| Cable extension | | | | | Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable. (however, supply voltage 12 V DC) |
| Weight | | | Net weight: 15 g approx., Gross weight: 70 g approx. | | Net weight: 60 g approx., Gross weight: 100 g approx. |
| Accessory | | | FX-MB1 (Amplifier protection seal): 1 set | | |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.

2) 50 mA max. if 5 or more standard types are connected together. (25 mA in case of 2-output type and cable type)

3) In case of using the quick-connection cable (cable length 5 m 16.404 ft) (optional).

4) If display adjustment was conducted, it is not in this range.

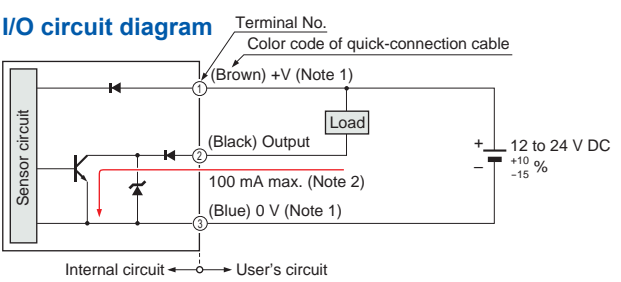
5) Number of sensor heads which is possible to be mounted closely in auto interference prevention function depends on response time as shown in table below.
Number of sensor heads which is possible to be mounted closely in different frequency Interference prevention function is up to 3 units.

• Number of sensor heads mountable closely (Unit: set)

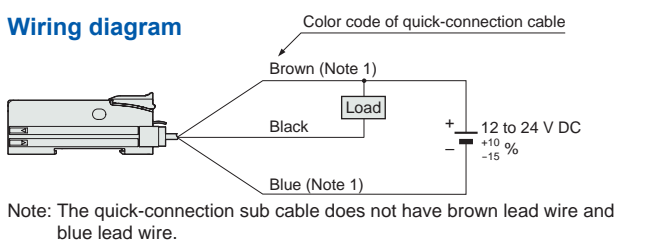
| Response time | H-SP | FAST | STD | LONG | U-LG | HYPR |
|---------------|------|------|-----|------|------|------|
| IP-1 | 0 | 2 | 4 | 8 | 8 | 12 |

I/O CIRCUIT AND WIRING DIAGRAMS

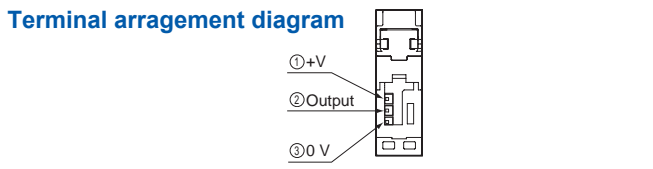
FX-501 NPN output type



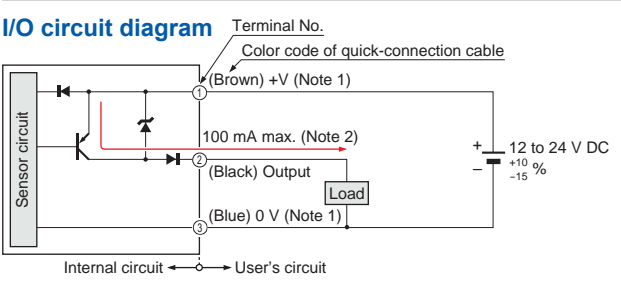
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
 2) 50 mA max., if five amplifiers, or more, are connected together.



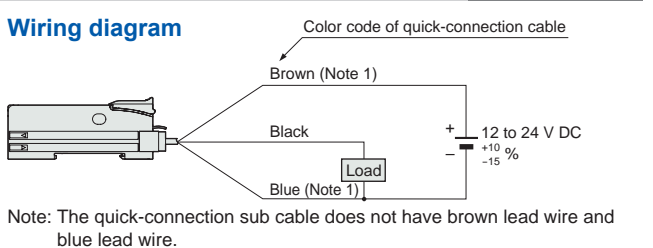
Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.



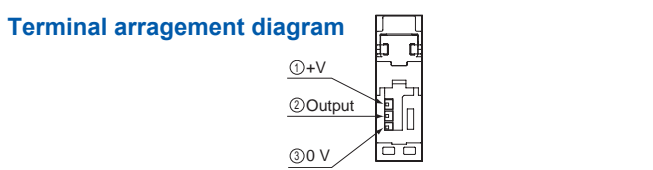
FX-501P PNP output type



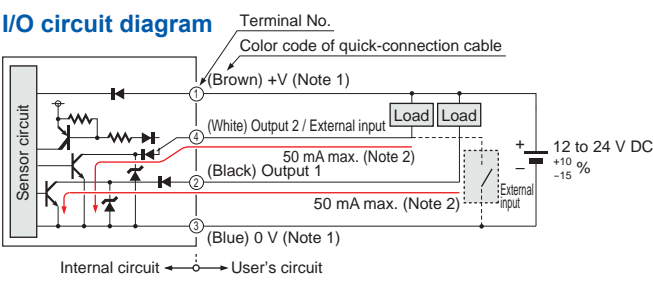
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
 2) 50 mA max., if five amplifiers, or more, are connected together.



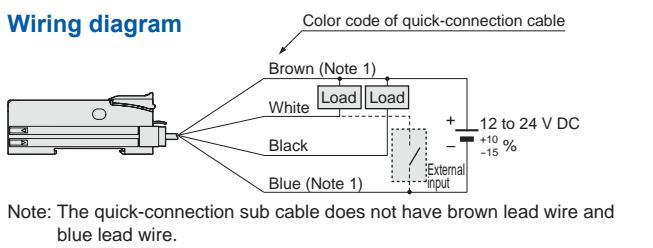
Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.



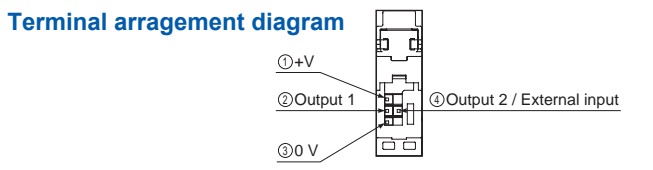
FX-502 NPN output type



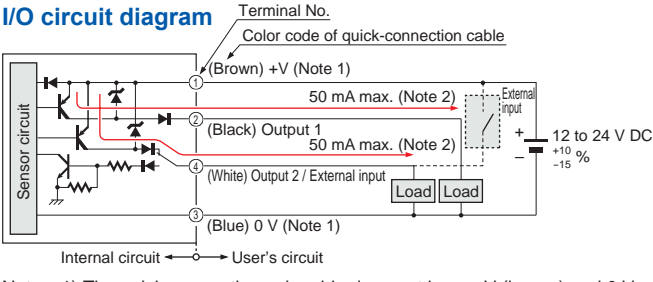
Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
 2) 25 mA max., if five amplifiers, or more, are connected together.



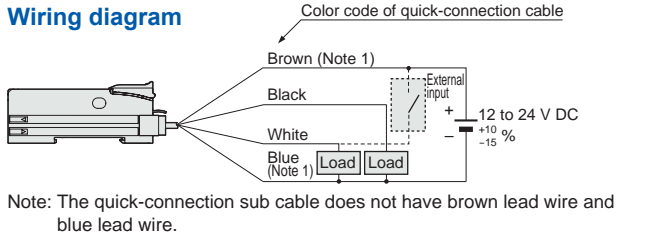
Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.



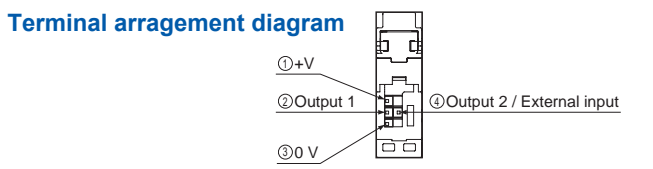
FX-502P PNP output type



Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue). The power is supplied from the connector of the main cable.
 2) 25 mA max., if five amplifiers, or more, are connected together.



Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.



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 Threaded Type
 Cylindrical Type
 Sleeve
 Flat Type
 Small Spot
 Narrow Beam
 Wide Beam
 Convergent Reflective Type
 Retroreflective Type
 Chemical-resistant
 Heat-resistant
 Vacuum-resistant
 Liquid Leak / Liquid Detection

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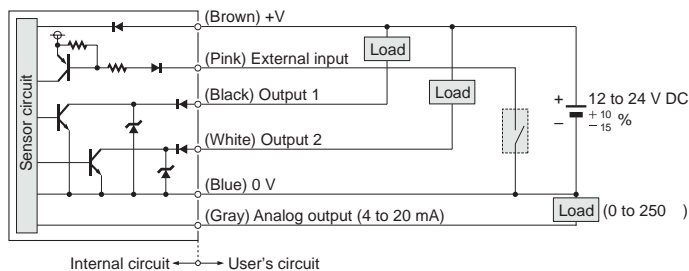
Earlier models comparison table

I/O CIRCUIT AND WIRING DIAGRAMS

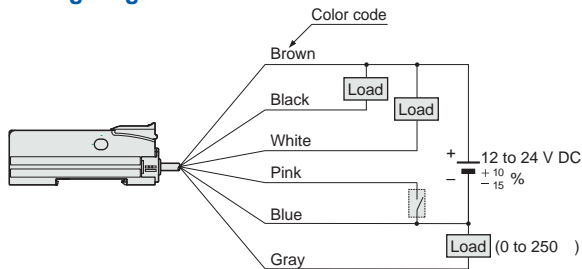
FX-505-C2

NPN output type

I/O circuit diagram



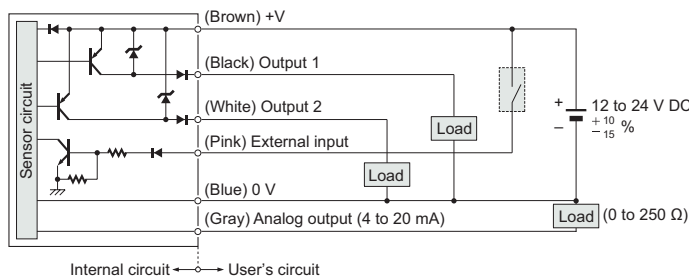
Wiring diagram



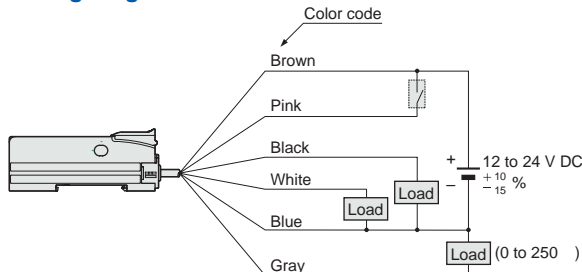
FX-505P-C2

PNP output type

I/O circuit diagram



Wiring diagram



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Super Quality
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Cylindrical Type

Sleeve
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Small Spot
Narroe Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type

Chemical-resistant
Heat-resistant
Vacuum-resistant
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mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

Rugghölzli 2
CH - 5453 Busslingen

Produkte, Support und Service

SENTRONIC AG

PRECAUTIONS FOR PROPER USE

Refer to the "PRO mode operation manual" on our website for details.



- 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.

Wiring

- Make sure that the power supply is OFF while adding or removing the amplifiers.
- Note that if a voltage exceeding the reted range is applied, or if an AC power supply is directly connected, the product may get burnt or damaged.
- Note that short-circuit of the load or wrong wiring may burn or damage the product.
- Do not run the wires together with high-voltage lines or power lines, or put them in the same raceway. This can cause malfunction due to induction.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Make sure to use the quick-connection cable (optional) for the connection of the controller. Extension up to total 100 m [328.084 ft](#) is possible with 0.3 mm² or more, cable. However, in order to reduce noise, make the wiring as short as possible.
- Make sure that stress by forcible bending or pulling is not applied to the sensor cable joint and fiber cable.

Others

- Our products have been developed / produced for industrial use only.
- The specification may not be satisfied in a strong magnetic field.
- The ultra long distance (U-LG, HYPR) mode is more likely to be affected by extraneous noise since the sensitivity of that is higher than the other modes. Make sure to check the environment before use.
- Do not use during the initial transient time (H-SP, FAST, STD: 0.5 sec., LONG, U-LG, HYPR: 1 sec.) after the power supply is switched ON.
- These sensors are only for indoor use.
- Avoid dust, dirt, and steam.
- Make sure that the product does not come in contact with oil, grease, organic solvents such as thinner, etc., strong acid or alkaline.
- This product cannot be used in an environment containing inflammable or explosive gases.
- Never disassemble or modify this product.
- This product adopts EEPROM. Settings cannot be done 100 thousand times or more because of the EEPROM's lifetime.

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Fibers

Super Quality

Threaded Type

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Retroreflective Type

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Fiber Dimensions

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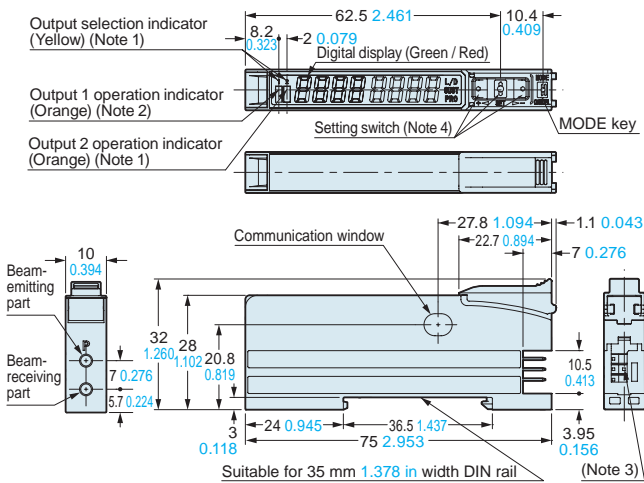
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DIMENSIONS (Unit: mm in)

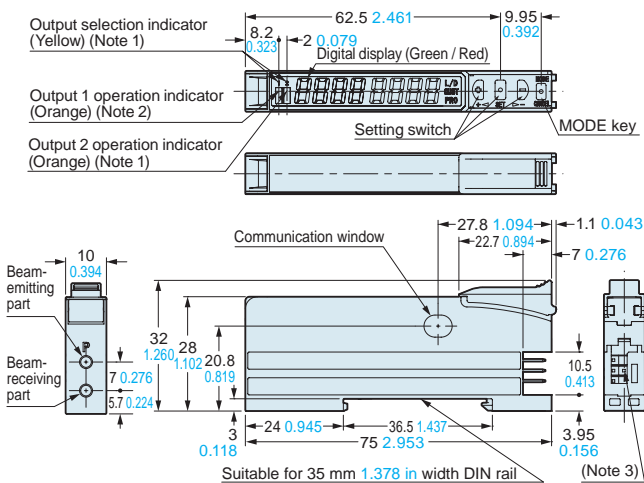
The CAD data in the dimensions can be downloaded from our website.

FX-501(P) FX-502(P) Amplifier



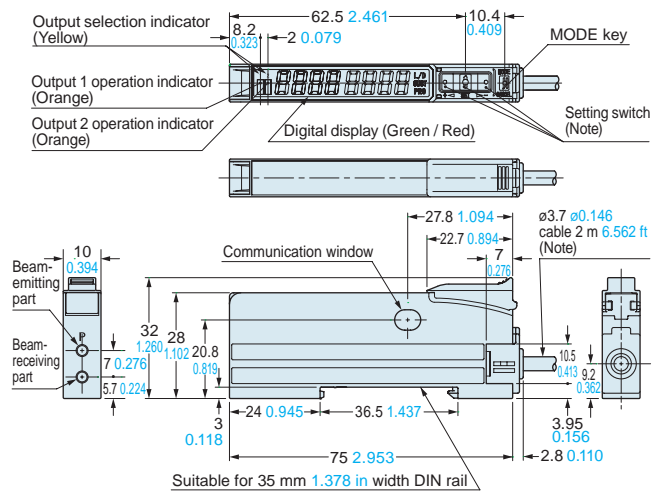
- Notes: 1) **FX-502(P)** only
 2) **FX-501(P)**: Operation indicator
 3) **FX-501(P)**: 3-pin, **FX-502(P)**: 4-pin
 4) The shape of setting switch will be changed from production at the end of November, 2011. Please see drawing below.

After the modification



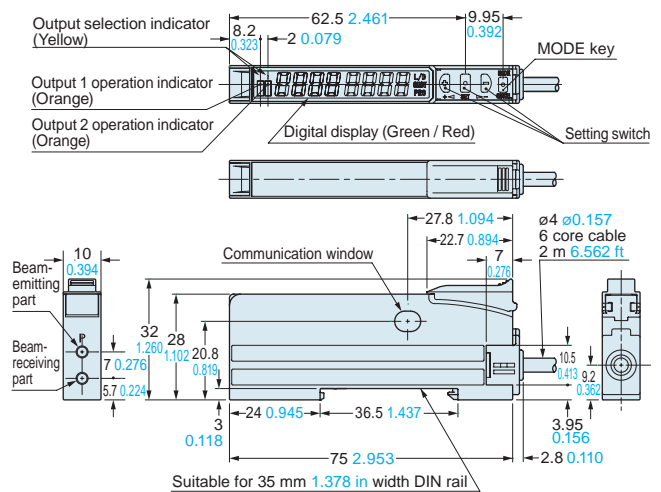
- Notes: 1) **FX-502(P)** only
 2) **FX-501(P)**: Operation indicator
 3) **FX-501(P)**: 3-pin, **FX-502(P)**: 4-pin

FX-505-C2 FX-505P-C2 Amplifier



Note: The shape of setting switch and cable will be changed from production at the end of November, 2011. Please see drawing below.

After the modification



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mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

Rugghölzli 2
CH - 5453 Busslingen

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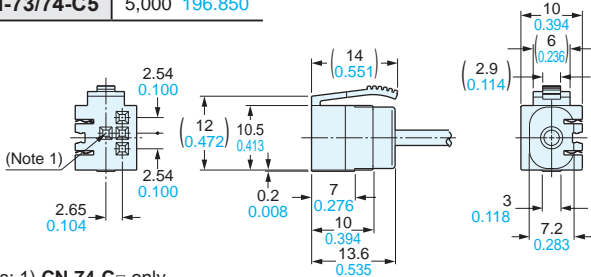
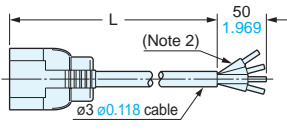
DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

CN-73-C□ CN-74-C□ Main cable (Optional)

• Length L

| Model No. | Length L |
|-------------|---------------|
| CN-73/74-C1 | 1,000 39.370 |
| CN-73/74-C2 | 2,000 78.740 |
| CN-73/74-C5 | 5,000 196.850 |

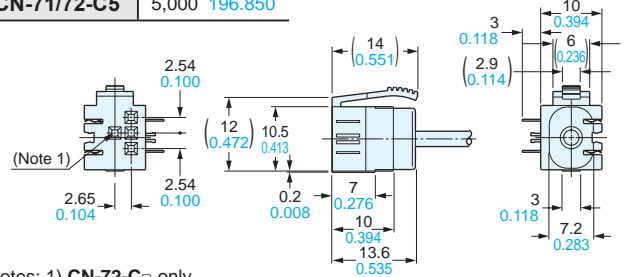
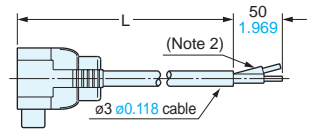


Notes: 1) CN-74-C□ only
2) CN-73-C□: 3-core

CN-71-C□ CN-72-C□ Sub cable (Optional)

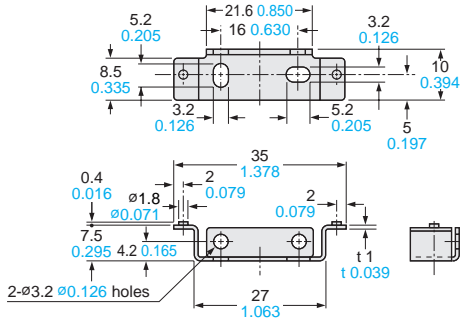
• Length L

| Model No. | Length L |
|-------------|---------------|
| CN-71/72-C1 | 1,000 39.370 |
| CN-71/72-C2 | 2,000 78.740 |
| CN-71/72-C5 | 5,000 196.850 |



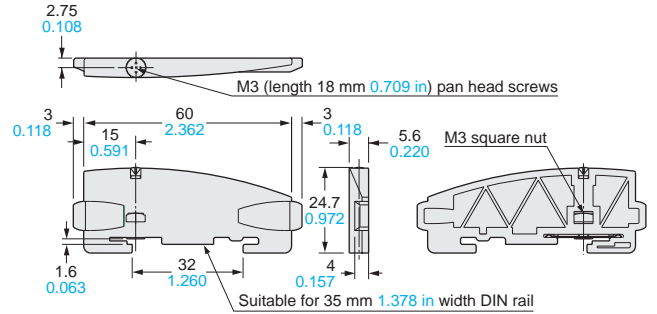
Notes: 1) CN-72-C□ only
2) CN-71-C□: 1-core

MS-DIN-2 Amplifier mounting bracket (Optional)



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

MS-DIN-E End plate (Optional)



Material: Polycarbonate

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Choose by model

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Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

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Taking fiber sensors to the next level



FX-100 series has been modified from July 2011 production. The color of enclosure has been changed from white to dark gray and the protection cover has been attached.

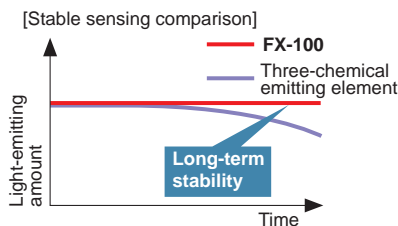
Saving-space with a width of 9 mm 0.354 in

Very slim at only 9 mm 0.354 in. This is much thinner than existing fiber sensors. Even if the difference is small when only using one unit, when using many units this makes a very large difference.



Improved stability over both long terms

Utilizes the standard Panasonic Electric Works SUNX digital fiber sensor element "Four-chemical emitting element" for light emission. The light emission is guaranteed to be stable over long periods of time.

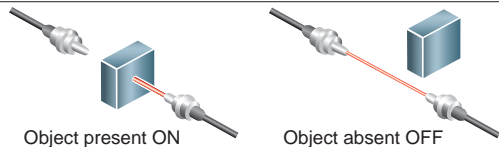


Teaching using ON / OFF buttons SET mode

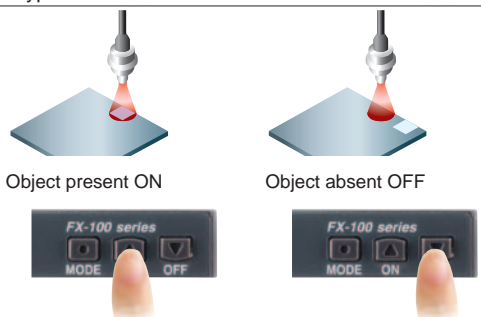
Simply press the ON button when an object is present and OFF when it is not.

<Setting example>

Thru-beam type / Retroreflective type



Reflective type



Resolves variation in incident light intensity display GETA function PRO mode

Even when performing the same sensing operation, there may be variances in the digital values of the fiber amp.

Given value can be corrected with the GETA function, so the apparent variation can be eliminated.

Variations in the amount of light received



Unify at 500 using the GETA function



Stable detection by attenuation function SET mode

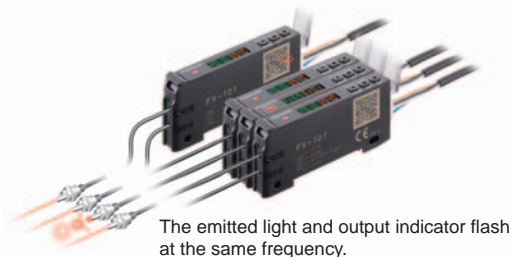
If the light receiving level becomes saturated when sensing over short distances or when sensing transparent objects or minute objects, the light emitting amount can be reduced so that stable sensing can be provided without needing to change the response time. Light reduction: 3 levels plus an automatic mode



Interference prevention function SET mode

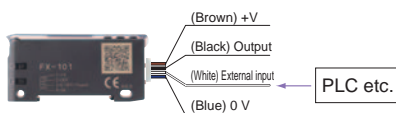
FX-101□: Interference prevention for up to 3 units
FX-102□: Interference prevention for up to 4 units

The emission frequencies can be set separately for each unit in order to avoid interference. The emitted light flashes while setting is in progress, so that you can see at a glance which fiber sensor is currently being set.



Multi-function external input PRO mode

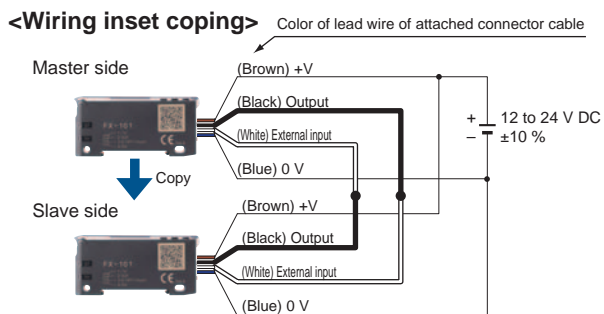
Settings such as emission halt, limit / auto teaching, 2-point teaching and ECO settings can be carried out via external input. Also, the threshold value can be memorized.



External input lines are equipped as standard

Setting copy function to reduce man-hours and human error PRO mode

By cable wiring, the master sensor settings can be copied along with data transmissions. By synchronizing the settings on all the devices, trouble from setting errors can be prevented.



Copiable setting

Threshold value, output operation setting, timer operation setting, timer period setting, light-emitting amount selection setting (attenuation function), shift setting, ECO setting, digital display inversion setting, and threshold value margin setting (alert function)

*The copy unit **SC-SU1** which can copy settings in one touch is available. (optional)

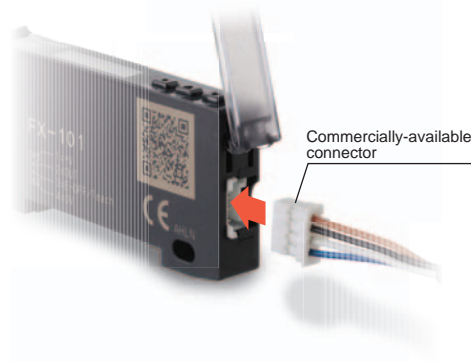
Electricity consumption saving possibilities ECO

After setting, if about 20 seconds go by without any key operations taking place the digital display will turn off and energy consumption is kept under 600 mW. (When illuminated it is under 720 mW)

Commercially-available connectors are used so that lead time and spare part numbers can both be reduced

The connectors used are commercially-available connectors, so that processing costs and lead time required for carrying out processing after purchase of the sensors can be greatly reduced. The same connection parts as the **DP-100** series of digital pressure sensors and the **PM-64** series of micro photoelectric sensors can be used.

Commercially-available press-fit connectors are used, so that the processing costs for connection cables can be greatly reduced.



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Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
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Heat-resistant
Vacuum-resistant
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Amplifiers

| Type | Appearance | Model No. | Emitting element | Output |
|-------------------------|---|---|------------------|-------------------------------|
| Standard type |  | FX-101 (Note 2) | Red LED | NPN open-collector transistor |
| | | FX-101-Z (Note 3) | | NPN open-collector transistor |
| | | FX-101P (Note 2) | | PNP open-collector transistor |
| FX-101P-Z (Note 3) | | PNP open-collector transistor | | |
| FX-101-CC2 | | NPN open-collector transistor | | |
| FX-101P-CC2 | | PNP open-collector collector transistor | | |
| Long sensing range type | | FX-102 (Note 2) | | NPN open-collector transistor |
| | | FX-102-Z (Note 3) | | NPN open-collector transistor |
| | | FX-102P (Note 2) | | PNP open-collector transistor |
| | FX-102P-Z (Note 3) | PNP open-collector transistor | | |
| | FX-102-CC2 | NPN open-collector transistor | | |
| | FX-102P-CC2 | PNP open-collector transistor | | |

Notes: 1) The connector attached cable **CN-14A-C2** is supplied with the amplifier.
 2) Make sure to use the optional connector attached cable **CN-14A(-R)-C□** or the connector **CN-14A**, or a connector manufactured by J.S.T. Mfg. Co., Ltd. (contact: SPHD-001T-P0.5, housing: PAP-04V-S)
 3) Make sure to use the optional M8 connector attached cable **CN-24A-C□**.

OPTIONS

| Designation | Model No. | Description |
|-----------------------------|--|--|
| Connector attached cable | CN-14A-C1 | 1 m 3.281 ft |
| | CN-14A-C2 (Note 1) | 2 m 6.562 ft |
| | CN-14A-C3 | 3 m 9.843 ft |
| | CN-14A-C5 | 5 m 16.404 ft |
| | Connector attached cable (Flexible type) | CN-14A-R-C1 |
| CN-14A-R-C2 | | 2 m 6.562 ft |
| CN-14A-R-C3 | | 3 m 9.843 ft |
| CN-14A-R-C5 | | 5 m 16.404 ft |
| M8 connector attached cable | | CN-24A-C2 |
| | CN-24A-C5 | 5 m 16.404 ft |
| Connector | CN-14A | Set of 10 housings and 40 contacts |
| Amplifier mounting bracket | MS-DIN-4 | Mounting bracket for amplifier |
| End plates | MS-DIN-E | When it moves depending on the way it is installed on a DIN rail, these end plates ensure that all amplifiers are mounted together in a secure and fully connected manner. |
| Copy unit | SC-SU1 | Copy the controller settings to other controllers. |

Note: The connector attached cable **CN-14A-C2** is supplied with the cable set type **FX-10□-CC2**.

Recommended connector

Contact: SPHD-001T-P0.5, Housing: PAP-04V-S (Manufactured by J.S.T. Mfg. Co., Ltd.)
 Note: Contact the manufacturer for details of the recommended products.

Recommended crimping tool

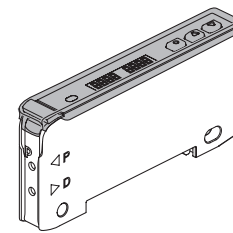
Model No.: YC-610R (Manufactured by J.S.T. Mfg. Co., Ltd.)
 Note: Contact the manufacturer for details of the recommended products.

Accessory

- **CN-14A-C2**
 (Connector attached cable 2 m **6.562 ft**)
 * Only include cable set type

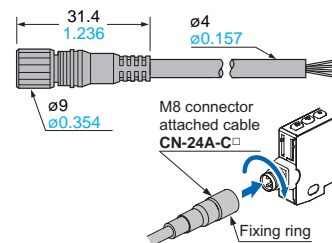


- **FC-FX-1** (Protection cover)
 * It has been attached from the production at July, 2011.



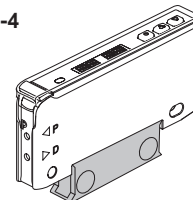
M8 connector attached cable

- **CN-24A-C□**



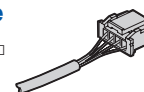
Amplifier mounting bracket

- **MS-DIN-4**



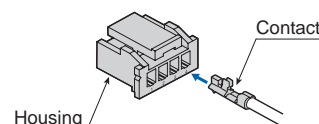
Connector attached cable

- **CN-14A(-R)-C□**



Connector

- **CN-14A**



SPECIFICATIONS

| Item | Model No. | Type | Standard type | | Long sensing range type | |
|--------------------------------------|--------------------------|------------|--|--|---|--|
| | | | | Cable set | | Cable set |
| | | NPN output | FX-101(-Z) (Note 5) | FX-101-CC2 | FX-102(-Z) (Note 5) | FX-102-CC2 |
| | | PNP output | FX-101P(-Z) (Note 5) | FX-101P-CC2 | FX-102P(-Z) (Note 5) | FX-102P-CC2 |
| Supply voltage | | | 12 to 24 V DC $\pm 10\%$ Ripple P-P 10 % or less | | | |
| Power consumption | | | Normal operation: 720 mW or less (Current consumption 30 mA or less at 24 V supply voltage) ECO mode: 600 mW or less (Current consumption 25 mA or less at 24 V supply voltage) | | | |
| Output | | | <NPN output type> NPN open-collector transistor <ul style="list-style-type: none"> • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less (at 100 mA sink current) | | <PNP output type> PNP open-collector transistor <ul style="list-style-type: none"> • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 1.5 V or less (at 100 mA source current) | |
| Output operation | | | Selectable either Light-ON or Dark-ON, at SET mode | | | |
| Short-circuit protection | | | Incorporated | | | |
| External input | | | <NPN output type> NPN non-contact input <ul style="list-style-type: none"> • Signal condition High: +8 V to +V DC or Open Low: 0 to +2 V DC (Source current 0.5 mA or less) • Input impedance: 10 kΩ approx. | | <PNP output type> PNP non-contact input <ul style="list-style-type: none"> • Signal condition High: +4 V to +V DC (Sink current 0.5 to 3 mA) Low: 0 to +0.6 V DC or Open • Input impedance: 10 kΩ approx. | |
| Response time | | | Emission frequency 0: 250 μ s or less (factory default setting) Emission frequency 1: 450 μ s or less Emission frequency 2: 500 μ s or less Emission frequency 3: 600 μ s or less | | Emission frequency 1: 2.5 ms or less (factory default setting) Emission frequency 2: 2.8 ms or less Emission frequency 3: 3.2 ms or less Emission frequency 4: 5.0 ms or less | |
| Sensitivity setting | | | 2-point teaching / Limit teaching / Full-auto teaching | | | |
| Operation indicator | | | Orange LED (lights up when the output is ON) | | | |
| Digital display | | | 4 digits (green) + 4 digits (red) LCD display | | | |
| Fine sensitivity adjustment function | | | Incorporated | | | |
| Timer function | | | ON-delay / OFF-delay timer, switchable either effective or ineffective [Timer period: 1 ms, 5 ms, 10 ms, 20 ms, 40 ms, 50 ms, 100 ms, 500 ms, 1,000 ms] | | | |
| Attenuation function | | | 3-level + Auto setting | | | |
| Interference prevention function | | | Incorporated Emission frequency selection method (Note 2) (Functions at emission frequency 1, 2 or 3) | | Incorporated Emission frequency selection method (Note 2) (Functions at emission frequency 1, 2, 3 or 4) | |
| Environmental resistance | Ambient temperature | | -10 to +55 °C +14 to +131 °F (If 4 to 7 units are mounted close together: -10 to +50 °C +14 to +122 °F, if 8 to 16 units are mounted close together: -10 to +45 °C +14 to +113 °F) (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F | | | |
| | Ambient humidity | | 35 to 85 % RH, Storage: 35 to 85 % RH | | | |
| | Ambient illuminance | | Incandescent light: 3,000 lx at the light-receiving face | | | |
| | Voltage withstandability | | 1,000 V AC for one min. between all supply terminals connected together and enclosure (Note 3) | | | |
| | Insulation resistance | | 20 M Ω , or more, with 250 V DC megger between all supply terminals connected together and enclosure (Note 3) | | | |
| | Vibration resistance | | 10 to 150 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each | | | |
| | Shock resistance | | 98 m/s ² acceleration (10 G approx.) in X, Y and Z directions for five times each | | | |
| Emitting element (modulated) | | | Red LED (Peak emission wavelength: 632 nm 0.025 mil) | | | |
| Material | | | Enclosure: Polycarbonate, Key switch: Polycarbonate, Fiber lock lever: PBT | | | |
| Connecting method | | | Connector (Note 4) | | | |
| Cable length | | | Total length up to 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable. | | | |
| Weight | | | Net weight: 15 g approx. Gross weight: 35 g approx. | Net weight: 15 g approx. Gross weight: 75 g approx. | Net weight: 15 g approx. Gross weight: 35 g approx. | Net weight: 15 g approx. Gross weight: 75 g approx. |
| Accessory | | | FC-FX-1 (Protection cover): 1 pc. (Note 6) | FC-FX-1 (Protection cover): 1 pc. (Note 6) CN-14A-C2 (Connector attached cable, 2 m 6.562 ft long): 1 pc. | FC-FX-1 (Protection cover): 1 pc. (Note 6) | FC-FX-1 (Protection cover): 1 pc. (Note 6) CN-14A-C2 (Connector attached cable, 2 m 6.562 ft long): 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) When using the interference prevention function, set the emission frequencies for the amplifiers to be covered by the interference prevention function to different frequency values.

However, the interference prevention function does not operate at emission frequency 0 (factory default setting) for the **FX-101(P)(-Z)** / **FX-101(P)-CC2**.

3) The voltage withstandability and the insulation resistance values given in the above table are for the amplifier only.

4) Connector attached cable **CN-14A-C2** is not attached to the models that have no “-CC2” at the end of the model Nos.

Make sure to use the optional connector attached cable **CN-14A(-R)-C** or the connector **CN-14A**, or a connector manufactured by J.S.T. Mfg., Ltd. (contact: SPHD-001T-P0.5, housing: PAP-04V-S).

5) Model Nos. having the suffix “-Z” are M8 plug-in connector type. Make sure to use the optional M8 attached connector cable **CN-24A-C**.

6) Protection cover **FC-FX-1** has been attached from the production at July, 2011.

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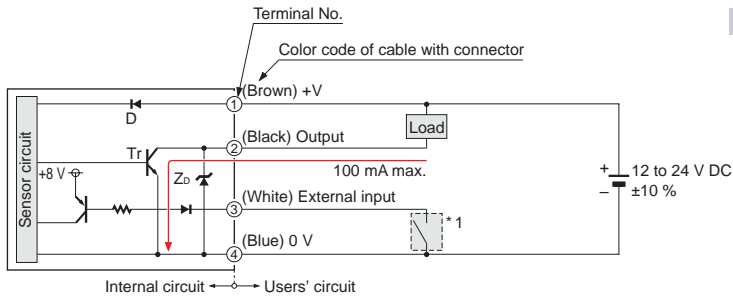
Earlier models comparison table

I/O CIRCUIT AND WIRING DIAGRAMS

FX-10□(-Z/-CC2)

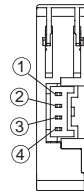
NPN output type

I/O circuit diagram



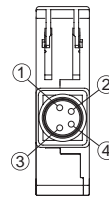
Terminal arrangement diagram

Connector type



| Terminal No. | Function |
|--------------|----------------|
| ① | +V |
| ② | Output |
| ③ | External input |
| ④ | 0 V |

M8 plug-in connector type

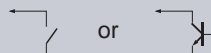


| Terminal No. | Function |
|--------------|----------------|
| ① | +V |
| ② | Output |
| ③ | External input |
| ④ | 0 V |

Symbols ... D : Reverse supply polarity protection diode
 Z_D: Surge absorption zener diode
 Tr : NPN output transistor

* 1

Non-voltage contact or NPN open-collector transistor

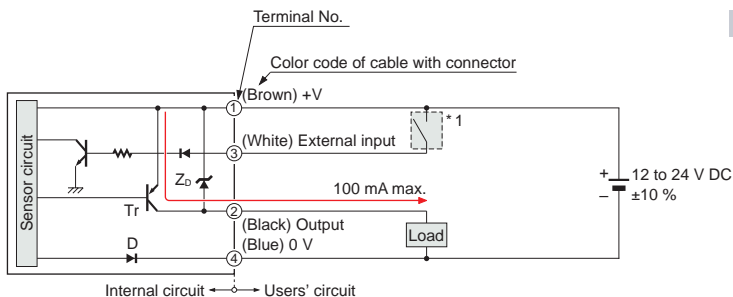


High (+8 V to +V DC, or open): Ineffective
 Low [0 to +2 V DC (source current 0.5 mA or less)]: Effective

FX-10□P(-Z/-CC2)

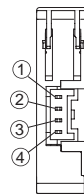
PNP output type

I/O circuit diagram



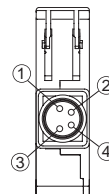
Terminal arrangement diagram

Connector type



| Terminal No. | Function |
|--------------|----------------|
| ① | +V |
| ② | Output |
| ③ | External input |
| ④ | 0 V |

M8 plug-in connector type

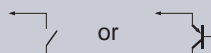


| Terminal No. | Function |
|--------------|----------------|
| ① | +V |
| ② | Output |
| ③ | External input |
| ④ | 0 V |

Symbols ... D : Reverse supply polarity protection diode
 Z_D: Surge absorption zener diode
 Tr : PNP output transistor

* 1

Non-voltage contact or PNP open-collector transistor



High [+4 V to +V DC (sink current 0.5 to 3 mA)]: Effective
 Low (0 to +0.6 V DC, or open): Ineffective

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 Heat-resistant
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mailbox@sentronic.com
 www.sentronic.com

Tel. +41 (0)56 222 38 18
 Fax +41 (0)56 222 10 12

Ruggholzli 2
 CH - 5453 Busslingen

Produkte, Support und Service

SENTRONIC AG

PRECAUTIONS FOR PROPER USE



- 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.

Using in combination with the FX-300 / FX-410 series

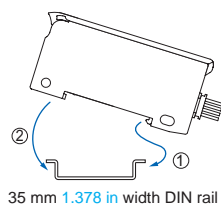
- The **FX-100** series does not use the horizontal connectors that are used with the **FX-300 / FX-410** series. Please note that horizontal connection cannot be performed using a connector attached cable. In addition, the optical communication function is not equipped on the **FX-100** series, so it is unable to perform interference prevention for use with the **FX-300 / FX-410** series. If using the **FX-100** series together with the **FX-300 / FX-410** series side-by-side, please set the same models together in groups.

Mounting

<When using a DIN rail>

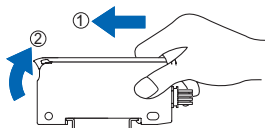
How to mount the amplifier

- ① Fit the rear part of the mounting section of the amplifier on a 35 mm 1.378 in width DIN rail.
- ② Press down the rear part of the mounting section of the unit on the 35 mm 1.378 in width DIN rail and fit the front part of the mounting section to the DIN rail.



How to remove the amplifier

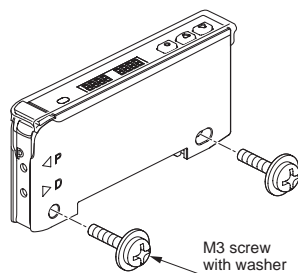
- ① Push the amplifier forward.
- ② Lift up the front part of the amplifier to remove it.



Note: Take care that if the front part is lifted without pushing the amplifier forward, the hook on the rear portion of the mounting section is likely to break.

<When using screws with washers>

- Use M3 screws with washers for mounting. The tightening torque should be 0.5 N·m or less.

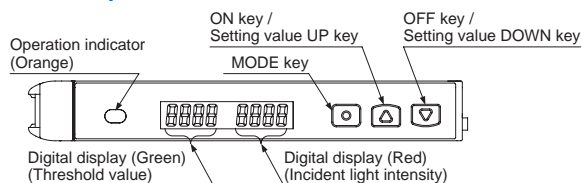


Refer to the "Operation Guide" on our website for details pertaining to operating instructions for the amplifier.

Wiring

- Make sure that the power supply is OFF while adding or removing the amplifiers.
- Note that if a voltage exceeding the rated range is applied, or if an AC power supply is directly connected, the product may get burnt or damaged.
- Note that short-circuit of the load or wrong wiring may burn or damage the product.
- Do not run the wires together with high-voltage lines or power lines, or put them in the same raceway. This can cause malfunction due to induction.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Make sure to use the quick-connection cable (optional) for the connection of the controller. Extension up to total 100 m 328.084 ft is possible with 0.3 mm² or more, cable. However, in order to reduce noise, make the wiring as short as possible.

Part description



Setting mode

- Setting mode appears after the MODE key is pressed for 2 sec. in RUN mode.

| Setting item | Factory setting | Description |
|----------------------------|---|--|
| Teaching mode | TeAch | Threshold value can be set in 2-point teaching, limit teaching, or full-auto teaching. |
| Output operation setting | Light On [Dark-ON] | Light-ON or Dark-ON can be set. |
| Timer operation setting | delY non [Without timer] | Without timer, ON delay timer, or OFF delay timer can be set. |
| Timer setting | onD 10 [ON-delay timer: 10 ms] offD 10 [OFF-delay timer: 10 ms] | In case of setting ON-delay timer or OFF-delay timer in the timer operation setting mode, timer can be set. When timer is not set, this mode is not displayed. |
| Emission amount setting | PctL IIII Level 3 | Setting for reduced intensity of emission amount is possible when the incident light intensity is saturated. |
| Emission frequency setting | FX-101□ FrEq F-0 [0 (Response time: 250 μs or less)] FX-102□ FrEq F-01 [1 (Response time: 2.5 ms or less)] | In case of using the fiber heads in parallel, interference can be prevented by setting different emission frequency. However, when emission frequency 0 is set, interference cannot be prevented. Response time corresponds to emission frequency. |

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

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Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

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FX-500 series

FX-100 series

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PRECAUTIONS FOR PROPER USE

PRO mode

- PRO mode appears after the MODE key is pressed for 4 sec. in RUN mode.

| Setting item | Factory setting | Description |
|--|--|---|
| Shift setting | Shift amount 15% [Shift amount 15%] | Shift amount can be selected from 0 to 80 % in the limit teaching. Select 0 % when it is desired to set the present incident light intensity as a threshold value. |
| External input setting | [Emission halt] | External input can be selected from emission halt, limit teaching [+], limit teaching [-], full-auto teaching, ECO (Note 1), 2-point teaching or emission amount test. When setting the incident light intensity test "E5t", output turns ON / OFF every 100ms when the rate of incident light intensity and threshold value is less than half of the set shift amount (for example, when the rate of incident light intensity and threshold value is within ± 10 % for 20 % of shift amount) at external input. |
| Threshold value-storing setting mode (Note 2) | [OFF] | Threshold value set at the limit teaching, full-auto teaching or 2-point teaching by external input is stored. When selecting Auto in the emission amount setting mode, the set emission amount level is also stored. |
| Threshold value follow-up cycle setting (Note 3) | [OFF] | When incident light intensity exceeds threshold value, this mode can change the threshold value with each set cycle depending on variations of the incident light intensity. The follow-up shift amount is same as the one set in the shift setting mode. However, the threshold value is not stored. |
| GETA function setting (Note 4, 5) | [OFF] | Variations can be reduced by correcting the present incident light intensity in each amplifier to a target value. Target value to offset incident light intensity can be selected from 0 to 2,000 by 100 unit each. For example, if the target value is set to 2,000 when the incident light intensity is 1,500, the incident light intensity becomes 2,000. |
| ECO setting | [OFF] | It is possible to light up / turn off the digital display. When ECO setting mode is ON, the display turns off in 20 sec. approx. in RUN mode. To light up the display again, press any key for 2 sec. or more. |
| Digital display inversion setting | [OFF] | Digital display can be inverted. |
| Threshold value margin setting | [OFF] | Margin for threshold value to the present incident light intensity can be checked. When there is no margin, it is possible to make the digital display blink. off : Set to "OFF": does not function. Green : Green blinks. Red : Red blinks. Red and green : Red and green blink. In- : When conducting limit teaching or 2-point teaching by external input, in case the rate of reference incident light intensity and threshold value after teaching is 200% or more, or in case it is less than half of the shift amount, output turns ON / OFF every 100 ms. (Note 6) |
| Setting copy | [NO] | The settings of the master side amplifier can be copied to the slave side amplifier. For details, refer to "Setting copy function". |
| Reset | [NO] | Returns to default settings (factory settings.) |

- Notes: 1) When ECO is selected at the external input setting mode, key operation on the main body is invalid during external input.
2) This mode is not indicated unless any of "LtcP", "Ltc-", "Aut" or "2-Pt" is set at the external input setting mode.
3) If the incident light intensity becomes "300" or less, the follow-up operation stops. In that condition, threshold value [digital display (green)] blinks. This function can be used when thru-beam type or retroreflective type fiber is applied to this product. If reflective type fiber is applied, the function cannot be used depending on use conditions.
4) If MODE key is pressed in RUN mode when GETA function is used, the incident light intensity before setting GETA function is displayed on the red digital display for 2 sec. approx.
5) When GETA function is used in saturation of incident light intensity (4,000 or more,) "Hrd" is indicated on the red digital display. Correction value is up to 4,000.
6) This mode does not operate unless any of "LtcP", "Ltc-" or "2-Pt" is set at the external input setting mode.

Refer to the "Operation Guide" on our website for details pertaining to operating instructions for the amplifier.

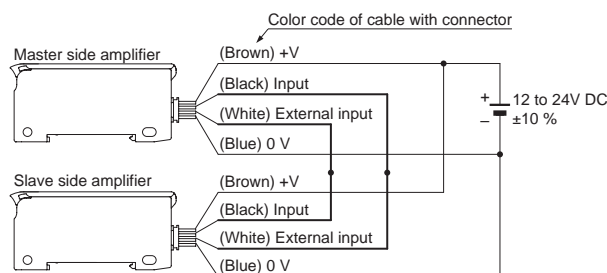
Setting copy function

- This can copy the settings of the master side amplifier to the slave side amplifier.

- Be sure to use the setting copy function between the identical models (Between FX-101□ models or FX-102□ models). This function cannot be used between different models.
- Only one sensor can be connected on slave side with a master side sensor for the setting copy function.
- Threshold value, output operation setting, timer operation setting, timer setting, light-emitting amount setting, shift setting, external input setting, threshold value margin setting, ECO setting, digital display inversion setting, and threshold value margin setting can be copied.

<Setting procedures>

- Set the setting copy mode of the master side amplifier to "Copy sending ON", and press the MODE key so that "COPY" is shown on the digital display and the sensor is in copy ready state. For the setting method, refer to "Operation guide".
- Turn off the master side amplifier.
- Connect the master side amplifier with the slave side amplifier as shown below.



- Turn on the master side amplifier and the slave side amplifier at the same time. (Note)
- "COPY" is shown on the green digital display of the master side amplifier and 4-digit code is shown on the red digital display of it, then the copying starts. During copy communication, "COPY" is shown on the green digital display of the slave side amplifier, and the ongoing copy communication indicator ("!" → "!!" → "!!!" → "!!!!" → "!!!!!" → "!!!!!!" → "!!!!!!!") is displayed on the red digital display.
- When the copying is completed, "Good" is shown on the green digital display of the slave side amplifier, while the 4-digit code (the same code as the master side amplifier) is shown on the red digital display of it.
- Turn off the power of the master side amplifier and the slave side amplifier and disconnect the wire.

* If copying the settings to another amplifier repeatedly, follow the steps ③ to ⑦.

Note: Take care that if the power is not turned on at the same time, the setting contents may not be copied.

<To cancel the setting copy mode of the master side amplifier>

- While the slave side amplifier is disconnected, turn on the power of the master side amplifier.
- Press the MODE key for 2 sec. approx.

PRECAUTIONS FOR PROPER USE

Others

- Our products have been developed / produced for industrial use only.
- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- Take care that the product is not directly exposed to fluorescent lamp from a rapid-starter lamp, a high frequency lighting device or sunlight etc., as it may affect the sensing performance.
- This product is suitable for indoor use only.
- Avoid dust, dirt, and steam.
- Take care that the product does not come in contact with oil, grease, organic solvents, such as thinner, etc., strong acid or alkaline.
- This product cannot be used in an environment containing inflammable or explosive gases.
- Never disassemble or modify this product.
- EEPROM is adopted to this product. It is not possible to conduct teaching 100 thousand times or more, because of the EEPROM's lifetime.

Quick setting function

- The quick setting function makes it possible to set the content of the SET Mode (output operation, timer operation, amount of light emitted, and frequency of light emitted) simply by selecting a setting number.
- While in the RUN Mode, pressing and holding both the ON key (⏻) and OFF key (⏹) simultaneously for 2 seconds will switch to the quick setting function.

<Table of quick setting numbers>

| No. | Output operation | Timer | Emission amount setting |
|------|------------------|-----------|-------------------------|
| -00- | D-ON | non | Level 3 (OFF) |
| -01- | D-ON | non | Level 2 (ON) |
| -02- | D-ON | ofd 10 ms | Level 3 (OFF) |
| -03- | D-ON | ofd 10 ms | Level 2 (ON) |
| -04- | D-ON | ofd 40 ms | Level 3 (OFF) |
| -05- | D-ON | ofd 40 ms | Level 2 (ON) |
| -06- | D-ON | ond 10 ms | Level 3 (OFF) |
| -07- | D-ON | ond 10 ms | Level 2 (ON) |
| -08- | D-ON | ond 40 ms | Level 3 (OFF) |
| -09- | D-ON | ond 40 ms | Level 2 (ON) |
| -10- | L-ON | ond 40 ms | Level 2 (ON) |
| -11- | L-ON | ond 40 ms | Level 3 (OFF) |
| -12- | L-ON | ond 10 ms | Level 2 (ON) |
| -13- | L-ON | ond 10 ms | Level 3 (OFF) |
| -14- | L-ON | ofd 40 ms | Level 2 (ON) |
| -15- | L-ON | ofd 40 ms | Level 3 (OFF) |
| -16- | L-ON | ofd 10 ms | Level 2 (ON) |
| -17- | L-ON | ofd 10 ms | Level 3 (OFF) |
| -18- | L-ON | non | Level 2 (ON) |
| -19- | L-ON | non | Level 3 (OFF) |

Refer to the "Operation Guide" on our website for details pertaining to operating instructions for the amplifier.

Code setting function

- The code setting function makes it possible to set the output operation, timer operation, amount of light emitted, frequency of light emitted, ECO setting, external input, and amount of shift by selecting a code of one's choice.
- While in the RUN Mode, pressing and holding both the ON key (⏻) and OFF key (⏹) simultaneously for 4 seconds will switch to the code setting function.

<Code table>

| Code | 1st digit | | 2nd digit | | ECO | External input | Shift (Note 1) | | | |
|------|------------------|----------------|--------------------|---------|-----|----------------|------------------|--------------------|--------------------|-------------------------------|
| | Output operation | Timer (Note 1) | Emission frequency | | | | | | | |
| | | | FX-101□ | FX-102□ | | | | | | |
| 0 | D-ON | non | Level 3 (OFF) | 0 | 1 | OFF | Emission halt | 5 % | | |
| 1 | | ond 10 ms | | 1 | | | 2 | Limit teaching [+] | 10 % | |
| 2 | | ond 40 ms | | 2 | | | 3 | Limit teaching [-] | 15 % | |
| 3 | | ofd 10 ms | | 3 | | | 4 | Full-auto teaching | 20 % | |
| 4 | | ofd 40 ms | | 0 | | | 1 | ECO | 25 % | |
| 5 | L-ON | non | Level 2 (ON) | 1 | 2 | ON | Emission halt | 30 % | | |
| 6 | | ond 10 ms | | | | | 2 | 3 | Limit teaching [+] | 35 % |
| 7 | | ond 40 ms | | | | | 3 | 4 | Limit teaching [-] | 40 % |
| 8 | | ofd 10 ms | | | | | 0 | 1 | Full-auto teaching | 45 % |
| 9 | | ofd 40 ms | | | | | 1 | 2 | ECO | 50 % |
| A | Auto | | Level 1 | 2 | 3 | OFF | 2-point teaching | | | |
| B | | | | | | | 3 | | 4 | Incident light intensity test |
| C | | | | 0 | 1 | | ON | | 2-point teaching | |
| D | | | | | | | | | 1 | 2 |
| E | 2 | 3 | | | | | | | | |
| F | 3 | 4 | | | | | | | | |

Notes: 1) When the present setting is out of the code setting range, "-" is shown. When "-" is selected, the set content of the digit is not changed.
2) The factory setting is "0002".

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narroe Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

Others

Amplifiers

FX-500 series

FX-100 series

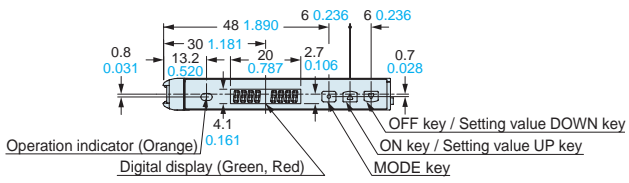
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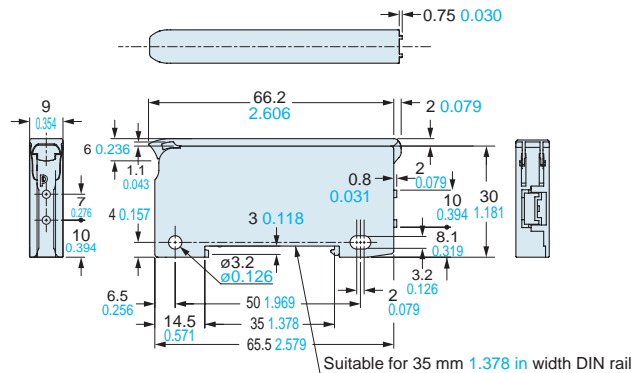
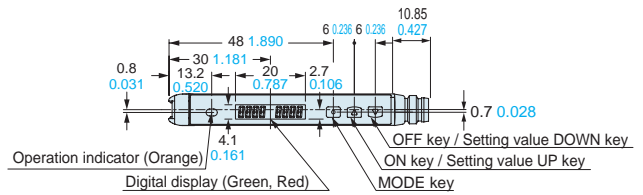
DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

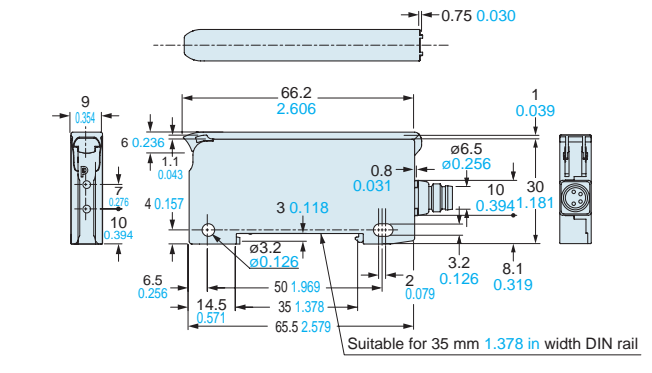
FX-101□ FX-102□ Amplifier



FX-101(P)-Z FX-102(P)-Z Amplifier

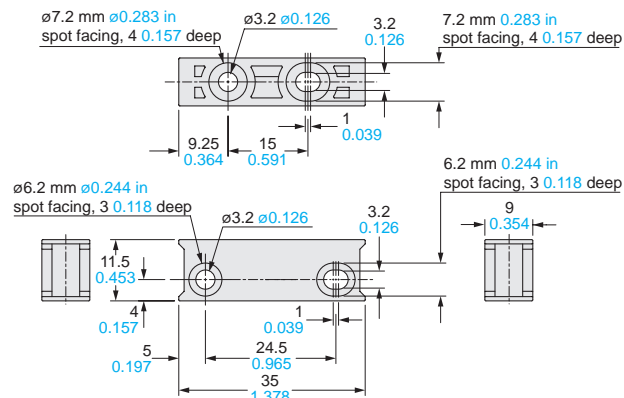


Note: The protection cover has been attached from the production at July, 2011.



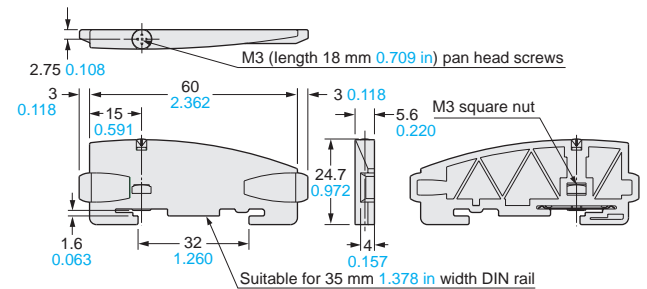
Note: The protection cover has been attached from the production at July, 2011.

MS-DIN-4 Amplifier mounting bracket (Optional)



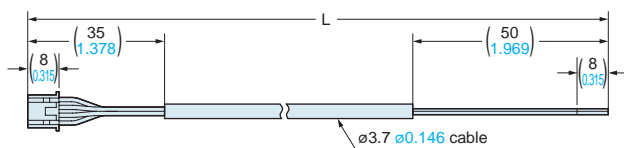
Material: PBT

MS-DIN-E End plate (Optional)



Material: Polycarbonate

CN-14A-C□ CN-14A-R-C□ Connector attached cable (Optional)



CN-14A-C2 is attached FX-101(P)-CC2 / FX-102(P)-CC2

• Length L

| Model No. | Length L |
|---------------|---------------|
| CN-14A(-R)-C1 | 1,000 39.370 |
| CN-14A(-R)-C2 | 2,000 78.740 |
| CN-14A(-R)-C3 | 3,000 118.110 |
| CN-14A(-R)-C5 | 5,000 196.850 |

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| C | | | |
|--------------------|--|-----------|---|
| CN-14A | FX-100 Connector | P.68 | |
| CN-14A-C1 | FX-100 Connector Attached Cable | P.68/P.74 | |
| CN-14A-C2 | | | |
| CN-14A-C3 | | | |
| CN-14A-C5 | | | |
| CN-14A-R-C1 | | | |
| CN-14A-R-C2 | FX-100 Connector Attached Cable (Flexible) | | |
| CN-14A-R-C3 | | | |
| CN-14A-R-C5 | | | |
| CN-71-C1 | | P.58/P.64 | |
| CN-71-C2 | | | |
| CN-71-C5 | | | |
| CN-72-C1 | | | |
| CN-72-C2 | | | |
| CN-72-C5 | | | FX-500 Quick-connection Cable |
| CN-73-C1 | | | |
| CN-73-C2 | | | |
| CN-73-C5 | | | |
| CN-74-C1 | | | |
| CN-74-C2 | | | |
| CN-74-C5 | | | |

| F | | |
|-----------------|---|----------------|
| FB-1 | Fiber Bender | P.14/P.33/P.51 |
| FC-FX-1 | FX-100 Protection Cover | P.68 |
| FD-30 | Super Quality Fiber | P.9/P.42 |
| FD-31 | Threaded Type Fiber | P.11/P.42 |
| FD-31W | | |
| FD-32G | Threaded / | P.11/P.18/P.42 |
| FD-32GX | Small Spot Type Fiber | |
| FD-40 | Super Quality Fiber | P.9/P.42 |
| FD-41 | Threaded Type Fiber | P.11/P.42 |
| FD-41S | Sleeve Fiber | P.15/P.42 |
| FD-41SW | | |
| FD-41W | Threaded Type Fiber | P.11/P.42 |
| FD-42G | Threaded / | P.11/P.18/P.43 |
| FD-42GW | Small Spot Type Fiber | |
| FD-60 | Super Quality Fiber | P.9/P.43 |
| FD-61 | Threaded Type Fiber | P.11/P.43 |
| FD-61G | | |
| FD-61S | Sleeve Fiber | P.15/P.43 |
| FD-61W | | P.11/P.43 |
| FD-62 | Threaded Type Fiber | P.11/P.44 |
| FD-64X | | |
| FD-A16 | Wide Beam Fiber | P.20/P.44 |
| FD-AL11 | | |
| FD-E13 | Cylindrical / Sleeve Fiber | P.13/P.15/P.44 |
| FD-E23 | | |
| FD-EG30 | Threaded / | P.11/P.18/P.44 |
| FD-EG30S | Small Spot Type Fiber | |
| FD-EG31 | Sleeve Fiber | P.15/P.45 |
| FD-EG31 | Threaded / | P.11/P.18/P.45 |
| FD-F4 | Small Spot Type Fiber | |
| FD-F41 | Liquid Leak / Liquid Detection Fiber | P.28/P.45 |
| FD-F41Y | | |
| FD-F71 | | |
| FD-F8Y | | |
| FD-FA93 | | |

| | | | | |
|----------------------|--|----------------|---------------------|-----------|
| FD-G40 | Metal-free Fiber | P.10/Website | | |
| FD-G60 | | | | |
| FD-H13-FM2 | | | | |
| FD-H18-L31 | Heat-resistant Fiber | P.25/P.46 | | |
| FD-H20-21 | | | | |
| FD-H20-M1 | | | | |
| FD-H25-L43 | | | | |
| FD-H25-L45 | | | | |
| FD-H30-KZ1V | Vacuum-resistant Fiber | P.27/P.32 | | |
| FD-H30-KZ1V-S | | P.26/P.47 | | |
| FD-H30-L32 | Heat-resistant Fiber | P.25/P.47 | | |
| FD-H30-L32V | | P.27/P.32 | | |
| FD-H30-L32V-S | Vacuum-resistant Fiber | P.26/P.47 | | |
| FD-H35-20S | Heat-resistant Fiber | P.25/P.47 | | |
| FD-H35-M2 | | | | |
| FD-H35-M2S6 | | | | |
| FD-HF40Y | Liquid Leak / Liquid Detection Fiber | P.28/P.47 | | |
| FD-L10 | Convergent Reflective Type Fiber | P.21/P.48 | | |
| FD-L11 | | | | |
| FD-L12W | | | | |
| FD-L20H | | | | |
| FD-L21 | | | | |
| FD-L21W | | | | |
| FD-L22A | | | | |
| FD-L23 | | | | |
| FD-L30A | | | | |
| FD-L31A | | | | |
| FD-L32H | | | P.21/P.49 | |
| FD-R60 | | | Threaded Type Fiber | P.11/P.49 |
| FD-S21 | | | Cylindrical Fiber | P.13/P.49 |
| FD-S30 | | | Super Quality Fiber | P.9/P.49 |
| FD-S31 | | | Cylindrical Fiber | P.13/P.49 |
| FD-S32 | | | | |
| FD-S32W | | | | |
| FD-S33GW | | | | |
| FD-V30 | Sleeve Fiber | P.15/P.50 | | |
| FD-V30W | | | | |
| FD-V50 | | | | |
| FD-WZ4 | Flat Type Fiber | P.17/P.50 | | |
| FD-WZ7 | | | | |
| FD-Z20HBW | | | | |
| FD-Z40HBW | | | | |
| FD-Z50HW | Narrow Beam Fiber | P.19/P.50 | | |
| FDP-1000 | Protective Tube (For Reflective Type Fiber) | P.33/P.51 | | |
| FDP-1500 | | | | |
| FDP-N1000 | | | | |
| FDP-N1500 | | | | |
| FDP-N500 | | | | |
| FR-KZ22E | Narrow Beam / Retroreflective Type Fiber | P.19/P.22/P.41 | | |
| FR-KZ50E | | | | |
| FR-KZ50H | | | | |
| FR-Z50HW | | | | |
| FT-140 | Threaded Type Fiber | P.10/P.34 | | |
| FT-30 | Super Quality Fiber | P.9/P.34 | | |
| FT-31 | Threaded Type Fiber | P.10/P.34 | | |
| FT-31S | Sleeve Fiber | P.15/P.34 | | |
| FT-31W | Threaded Type Fiber | P.10/P.34 | | |
| FT-40 | Super Quality Fiber | P.9/P.34 | | |
| FT-41 | Metal-free Fiber | P.10/Website | | |
| FT-42 | Threaded Type Fiber | P.10/P.34 | | |
| FT-42S | Sleeve Fiber | P.15/P.34 | | |

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| FT-A11 | | |
| FT-A11W | | |
| FT-A32 | Wide Beam Fiber | P.20/P.35 |
| FT-A32W | | |
| FT-AL05 | | |
| FT-E13 | Cylindrical / Sleeve Fiber | P.12/P.15/P.35 |
| FT-E23 | | |
| FT-F93 | Liquid Leak / Liquid Detection Fiber | P.28/P.35 |
| FT-H13-FM2 | | P.24/P.35 |
| FT-H20-J20 | | P.25/P.32 |
| FT-H20-J20-S | | P.24/P.36 |
| FT-H20-J30 | | P.25/P.32 |
| FT-H20-J30-S | | P.24/P.36 |
| FT-H20-J50 | | P.25/P.32 |
| FT-H20-J50-S | Heat-resistant Fiber | P.24/P.36 |
| FT-H20-M1 | | |
| FT-H20-VJ50 | | P.25/P.32 |
| FT-H20-VJ50-S | | P.24/P.36 |
| FT-H20-VJ80 | | P.25/P.32 |
| FT-H20-VJ80-S | | |
| FT-H20W-M1 | | P.24/P.36 |
| FT-H30-M1V | Vacuum-resistant Fiber | P.27/P.32 |
| FT-H30-M1V-S | | P.26/P.36 |
| FT-H35-M2 | Heat-resistant Fiber | P.24/P.36 |
| FT-H35-M2S6 | | |
| FT-HL80Y | Chemical-resistant Fiber | P.23/P.36 |
| FT-J8 | Fiber for Atmospheric Side | P.27/P.32/P.51 |
| FT-KS40 | | |
| FT-KV26 | Narrow Beam Fiber | P.19/P.37 |
| FT-KV40 | | |
| FT-KV40W | | |
| FT-L80Y | Chemical-resistant Fiber | P.23/P.37 |
| FT-R40 | | |
| FT-R41W | Threaded Type Fiber | P.10/P.37 |
| FT-R42W | | |
| FT-S11 | Cylindrical Fiber | P.12/P.37 |
| FT-S20 | Super Quality Fiber | P.9/P.38 |
| FT-S21 | | |
| FT-S21W | Cylindrical Fiber | P.12/P.38 |
| FT-S30 | Super Quality Fiber | P.9/P.38 |
| FT-S31W | | |
| FT-S32 | Cylindrical Fiber | P.12/P.38 |
| FT-V23 | | |
| FT-V24W | Sleeve Fiber | P.15/P.38 |
| FT-V25 | | |
| FT-V30 | | |
| FT-V40 | Cylindrical Fiber | P.12/P.39 |
| FT-V80Y | Chemical-resistant Fiber | P.23/P.39 |
| FT-WZ4 | | |
| FT-WZ7 | | |
| FT-Z20HBW | | |
| FT-Z30 | | P.16/P.39 |
| FT-Z30E | Flat Type Fiber | |
| FT-Z30EW | | |
| FT-Z30H | | |
| FT-Z30HW | | |
| FT-Z30W | | P.16/P.40 |
| FT-Z40HBW | | |
| FT-Z802Y | Chemical-resistant Fiber | P.23/P.40 |

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| FTP-1000 | | |
| FTP-1500 | | |
| FTP-500 | Protective Tube (For Thru-beam Type Fiber) | P.33/P.51 |
| FTP-N1000 | | |
| FTP-N1500 | | |
| FTP-N500 | | |
| FV-BR1 | Photo-terminal for Vacuum-resistant Fiber | P.27/P.32/P.51 |
| FV-LE1 | Vacuum-resistant Expansion Lens | P.27/P.31/P.51 |
| FV-SV2 | Vacuum-resistant Side-view Lens | |
| FX-101 | | |
| FX-101-CC2 | | |
| FX-101P | | |
| FX-101P-CC2 | | |
| FX-102 | | |
| FX-102-CC2 | | |
| FX-102P | Digital Fiber Sensor | P.68/P.74 |
| FX-102P-CC2 | | |
| FX-501 | | |
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| FX-502 | | |
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| FX-505-C2 | | |
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| FX-AT15A | Fiber Single-core Holder | P.33 |
| FX-AT2 | | |
| FX-AT3 | | |
| FX-AT4 | Fiber Attachment | P.32/P.52 |
| FX-AT5 | | |
| FX-AT6 | | |
| FX-CT1 | | P.32 |
| FX-CT2 | Fiber Cutter | P.32/P.52 |
| FX-CT3 | | P.32 |
| FX-LE1 | Lens for Thru-beam Type Fiber | P.30/P.52 |
| FX-LE2 | | |
| FX-MB1 | FX-500 Fiber Amplifier Protection Seal | P.59 |
| FX-MR1 | | |
| FX-MR2 | | P.18/P.32/P.52 |
| FX-MR3 | Lens for Reflective Type Fiber | |
| FX-MR5 | | P.18/P.32/P.53 |
| FX-MR6 | | |
| FX-SV1 | Side-view Lens for Thru-beam Type Fiber | P.31/P.53 |

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| MS-AJ2-F | | |
| MS-DIN-2 | FX-500 Amplifier Mounting Bracket | P.59/P.64 |
| MS-DIN-4 | FX-100 Amplifier Mounting Bracket | P.68/P.74 |
| MS-DIN-E | End Plate | P.58/P.64/P.68/ P.74 |
| MS-EX3 | FX-MR2 Mounting Bracket | P.53 |
| MS-FD-2 | | |
| MS-FD-3 | Fiber Mounting Bracket | P.27/P.32/P.53 |
| MS-FD-F7-1 | FD-F71 SUS Mounting Bracket | |
| MS-FD-F7-2 | FD-F71 PVC Mounting Bracket | P.29 |
| MS-FX-01Y | Liquid Inflow Prevention Joint | |
| MS-FX-02Y | Protective Tube Extension Joint | |
| MS-FX-03Y | Fiber Mounting Joint | P.29/P.33 |
| MS-FX-YF | Joint Internal Ferrulre | |

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| RF-13 | Reflective Tape | P.32 |
| RF-210 | Reflector | P.22/P.33/P.54 |
| RF-220 | | |
| RF-230 | | |

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Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

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mailbox@sentronic.com
www.sentronic.com

Tel. +41 (0)56 222 38 18
Fax +41 (0)56 222 10 12

Rugghölzli 2
CH - 5453 Busslingen

Produkte, Support und Service

SENTRONIC AG

Earlier Models Comparison Table

Advantages of switching to recommended replacements

- The quality of many models has been improved by shortening their bending radii and achieving better bending performance.
- The number of part numbers has been reduced, letting you reduce the part numbers to keep track of and service parts to keep on hand.
- We have reduced our environmental impact further by making fiber end bracket out of stainless steel and plastic, which contain no RoHS substances.

Subjected models

Discontinued models Stopping taking order date : 31 Mar., 2012

| Type | Discontinued models | | | | | Recommended replacements | | | | | Main points of difference from discontinued models |
|-----------------|---------------------|--|-----------------------------|--------------------|----------------------------------|--------------------------|--|-----------------------------|--------------------|----------------------------------|--|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | |
| Reflective type | FD-A15 | W7×H15×D30 | R25 | — | 200 7.874 | Tough FD-A16 | W7×H15×D30 | R4 | ○ | 200 7.874 | |
| | FD-AFM2 | W5×H20×D20 Top sensing | R25 | — | 280 11.024 | Tough FD-AL11 | W5×H20×D20 | R2 | ○ | 320 12.598 | • Cable lead out orientation changed • Metal case material (brass) ⇒ Changed to plastic (PPS) |
| | FD-AFM2E | W5×H20×D20 Side sensing | R25 | — | 280 11.024 | Tough FD-AL11 | W5×H20×D20 | R2 | ○ | 320 12.598 | • Cable lead out orientation changed • Metal casing material (brass) ⇒ Changed to plastic (PPS) |
| | FD-B8 | M6 15 | R25 | — | 490 19.291 | FD-62 | M6 17 | R4 | ○ | 520 20.472 | • End bracket total length for the M6 part only: 15 mm ⇒ Changed to 17 mm (M6 part/15 mm + ø4.5 area/2 mm) |
| | FD-E12 | φ1.5 φ0.5 15 3 Sleeve part cannot be bent. | R10 | — | 12 0.472 | FD-E13 | φ1.5 φ0.48 15 3 Sleeve part cannot be bent. | R4 | — | 12 0.472 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration |
| | FD-E22 | Coaxia φ3 φ0.65 15 5 Sleeve part cannot be bent. | R25 | — | 55 2.165 | FD-E23 | φ3 φ0.65 15 5 Sleeve part cannot be bent. | R4 | — | 55 2.165 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration |
| | FD-EG1 | High precision • Coaxial Lens mountable (FX-MR3, FX-MR6) M3 17 | R25 | — | 40 1.575 | FD-EG30 | Coaxial, Lens mountable M3 16 | R4 | — | 48 1.890 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting / receiving configuration • End bracket total length 17 mm ⇒ Changed to 16 mm |
| | FD-EG2 | High precision • Coaxial Lens mountable (FX-MR3, FX-MR6) Light emitting fiber element φ0.175 M3 17 | R10 | — | 24 0.945 | FD-EG31 | Coaxial, Lens mountable M3 16 | R4 | — | 20 0.787 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration • End bracket total length 17 mm ⇒ Changed to 16 mm • Protective tube outside diameter ø1.6 ⇒ Changed to ø1.2 |
| | FD-EG3 | High precision • Coaxial Lens mountable (FX-MR3, FX-MR6) Light emitting fiber element φ0.125 M3 17 | R10 | — | 20 0.787 | FD-EG31 | Coaxial, Lens mountable M3 16 | R4 | — | 20 0.787 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration • End bracket total length 17 mm ⇒ Changed to 16 mm • Protective tube outside diameter ø1.6 ⇒ Changed to ø1.2 |
| | FD-EN500S1 | M3 φ0.5 15 15 Sleeve part cannot be bent. | R25 | — | — | FD-EG30S | Sleeve 15 mm M3 φ0.8 15 Sleeve part cannot be bent. | R4 | — | 50 1.969 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting /receiving configuration • Sleeve size ø0.5 ⇒ Changed to ø0.8 |
| | FD-ENM1S1 | Coaxial M3 φ0.8 15 15 Sleeve part cannot be bent. | R25 | — | 50 1.969 | FD-EG30S | Sleeve 15 mm M3 φ0.8 15 Sleeve part cannot be bent. | R4 | — | 50 1.969 | • Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration |
| | FD-F705 | SEMI S2 compliant W20×H30×D10 (Protective tube R20) | R4 (Protective tube R20) | ○ | Liquid leak detection | Tough FD-F71 | SEMI S2 compliant W20×H30×D10 (Protective tube R20) | R4 (Protective tube R20) | ○ | Liquid leak detection | |
| | FD-FA90 | Mountable on pipe • Array fiber W6.5×H28.3×D17 | R10 | — | Liquid detection | Tough FD-FA93 | Array fiber W6.5×H28.3×D17 | R4 | ○ | Liquid detection | |

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Sleeve
Flat Type
Small Spot
Narrow Beam
Wide Beam
Convergent Reflective Type
Retroreflective Type
Chemical-resistant
Heat-resistant
Vacuum-resistant
Liquid Leak / Liquid Detection

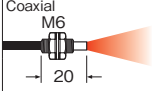
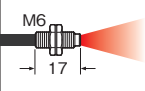
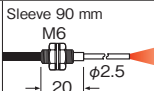
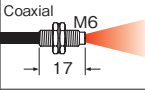
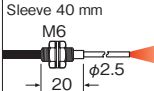
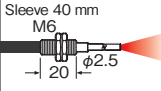
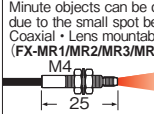
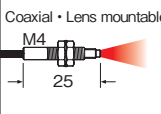
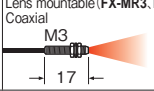
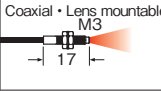
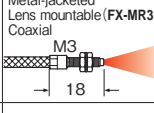
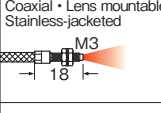
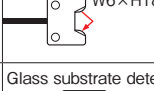


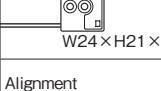
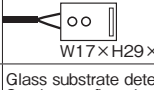
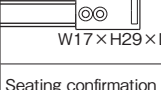
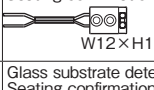
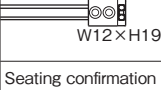
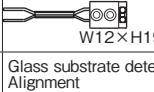
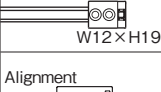
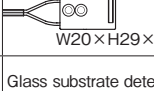
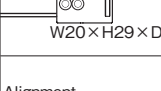
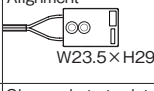
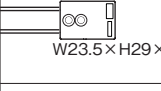
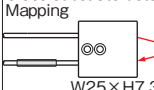
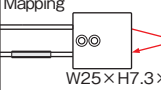
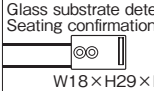
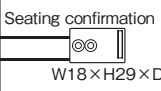
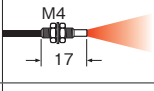
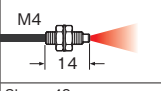
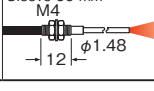
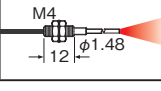
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|-----------------|---------------------|---|---------------------|--------------------|----------------------------------|----------------------|---|---------------------|--------------------|--|--|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | | Sensing range FX-500 STD (mm in) |
| Reflective type | FD-FM2 |  | R25 | — | 420 16.535 | Tough FD-61 |  | R4 | ○ | 450 17.717 | • End bracket total length of 20 mm for the (M6 part/15 mm + ø3.5 area/5 mm) ⇒ Changed to 17 mm (M6 part/15 mm + ø4.5 area/2 mm) • Coaxial cable used for wiring ⇒ Changed to parallel type |
| | FD-FM2S |  | R25 (Sleeve R10) | — | 380 14.961 | Tough FD-61G |  | R4 | ○ | 420 16.535 | • End bracket total length of 20 mm for the (M6 part/15 mm + ø3.5 area/5 mm) ⇒ Changed to 17 mm (M6 part/15 mm + ø4.5 area/2 mm) |
| | FD-FM2S4 |  | R25 (Sleeve R10) | — | 380 14.961 | Tough FD-61S |  | R4 (Sleeve R10) | ○ | 420 16.535 | • The sleeve length 90 mm type supports semi-custom products. |
| | FD-G4 |  | R25 | — | 140 5.512 | Tough FD-42G |  | R2 | ○ | 200 7.874 | |
| | FD-G6 |  | R25 | — | 140 5.512 | Tough FD-32G |  | R2 | ○ | 200 7.874 | |
| | FD-G6X |  | R25 | — | 170 6.693 | FD-32GX |  | R2 | — | 200 7.874 | • Stainless steel mesh jacket covering the stainless steel spiral tube used as a protective cover for the fiber ⇒ Changed to plastic (polyolefin) |
| | FD-L4 |  | R25 | — | 15.5 0.610 | Tough FD-L20H |  | R2 | ○ | 23 0.906 | |
| | FD-L41 |  | R10 | — | 1.5 to 16 0.059 to 0.630 | Tough FD-L21 |  | R2 | ○ | 1.5 to 16 0.059 to 0.630 | |
| | FD-L43 |  | R4 | — | 0 to 24 0 to 0.945 | Tough FD-L22A |  | R2 | ○ | 0 to 24 0 to 0.945 | |
| | FD-L44 |  | R10 | — | 0 to 9.5 0 to 0.374 | Tough FD-L11 |  | R4 | ○ | 0 to 9.5 0 to 0.374 | |
| | FD-L44S |  | R10 | — | 0 to 5 0 to 0.197 | Tough FD-L10 |  | R4 | ○ | 0 to 5 0 to 0.197 | |
| | FD-L45 |  | R4 | — | 0 to 40 0 to 1.575 | Tough FD-L30A |  | R4 | ○ | 0 to 43 0 to 1.693 | |
| | FD-L45A |  | R25 | — | 4 to 44 0.157 to 1.732 | Tough FD-L31A |  | R4 | ○ | 4 to 33 0.157 to 1.299 | • Previous no flexing distance specifications ⇒ Specification wording changed to state flexing ±2 degrees (Reference: Discontinued model ±2 degrees specification is 10 mm to 32 mm) |
| | FD-L46 |  | R25 | — | 1 to 56 0.039 to 2.205 | FD-L32H |  | R4 | ○ | 0 to 56 0 to 2.205 | |
| | FD-L47 |  | R4 | — | 0 to 29 0 to 1.142 | Tough FD-L23 |  | R2 | ○ | 0 to 29 0 to 1.142 | |
| | FD-NFM2 |  | R25 | — | 120 4.724 | Tough FD-41 |  | R2 | ○ | 125 4.921 | • End bracket total length of 17 mm for the (M4 part/12 mm + ø2.5 area/5 mm) ⇒ Changed to 14 mm (M4 part/12 mm + ø2.5 area/2 mm) |
| | FD-NFM2S |  | R25 (Sleeve R10) | — | 120 4.724 | Tough FD-41S |  | R2 (Sleeve R10) | ○ | 125 4.921 | • The sleeve length 90 mm type supports semi-custom products. |

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Cylindrical Type

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| Type | Discontinued models | | | | | Recommended replacements | | | | | Main points of difference from discontinued models |
|-----------------|---------------------|---|---------------------|--------------------|----------------------------------|-------------------------------|---|---------------------|--------------------|----------------------------------|--|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | |
| Reflective type | FD-NFM2S4 | Sleeve 40 mm M4 φ1.48 12 | R25 (Sleeve R10) | — | 120 4.724 | Tough FD-41S | Sleeve 40 mm M4 φ1.48 12 | R2 (Sleeve R10) | ○ | 125 4.921 | |
| | FD-P2 | φ1.5 15 | R4 | ○ | 80 3.150 | Tough FD-S21 | φ1.5 10 | R2 | ○ | 80 3.150 | <ul style="list-style-type: none"> Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration End bracket total length 15 mm ⇒ Changed to 10 mm PVC outer covering material for fiber ⇒ Changed to PE |
| | FD-P40 | M3 12 | R4 | ○ | 45 1.772 | Tough FD-31 | M3 12 | R2 | ○ | 125 4.921 | <ul style="list-style-type: none"> End bracket shape is 12 mm for the M3 part only ⇒ Changed to a total length of 12 mm (M3 part/10 mm + ø2 area/2 mm) PVC outer covering material for fiber ⇒ Changed to PE |
| | FD-P50 | φ3 15 | R4 | ○ | 120 4.724 | Tough FD-S32 | φ3 15 | R4 | ○ | 420 16.535 | <ul style="list-style-type: none"> PVC outer covering material for fiber ⇒ Changed to PE |
| | FD-P60 | 15 M4 | R4 | ○ | 120 4.724 | Tough FD-41 | M4 14 | R2 | ○ | 125 4.921 | <ul style="list-style-type: none"> End bracket total length of 15 mm for the (M4 part/12 mm + ø3 area/3 mm) ⇒ Changed to 14 mm (M4 part/12 mm + ø2.5 area/2 mm) PVC outer covering material for fiber ⇒ Changed to PE |
| | FD-P80 | M6 15 | R4 | ○ | 280 11.024 | Tough FD-61 | M6 17 | R4 | ○ | 450 17.717 | <ul style="list-style-type: none"> End bracket total length of 15 mm for the M6 part only ⇒ Changed to 17 mm (M6 part/15 mm + ø4.5 area/2 mm) PVC outer covering material for fiber ⇒ Changed to PE |
| | FD-P81X | Metal-jacketed M6 15 | R10 | — | 270 10.630 | FD-64X | Stainless-jacketed M6 22 | R4 | — | 280 11.024 | <ul style="list-style-type: none"> End bracket total length of 19 mm for the (M6 part/15 mm + crimped area/4 mm) ⇒ Changed to 22 mm (ø4.5 area/2 mm + M6 part/15 mm + crimped area/5 mm) Split amplifier insertion section configuration ⇒ Changed to integrated light emitting/receiving configuration Stainless steel mesh jacket covering the stainless steel spiral tube used as a protective cover for the fiber ⇒ Changed to plastic (polyolefin) |
| | FD-R80 | 15 M6 | R25 | — | 220 8.661 | Tough FD-R60 | 15 M6 | R4 | ○ | 290 11.417 | |
| | FD-S80 | φ3 15 | R25 | — | 380 14.961 | Tough FD-S32 | φ3 15 | R4 | ○ | 420 16.535 | |
| | FD-SFM2SV2 | 15 20 φ5 φ2 Sleeve part cannot be bent. | R25 | — | 120 4.724 | Tough FD-V50 | 15 20 φ5 φ2 Sleeve part cannot be bent. | R4 | ○ | 120 4.724 | <ul style="list-style-type: none"> From sleeve end to optical axis center position is 0.8 mm ⇒ Changed to 2.3 mm A D-shaped surface that makes it easy to align with the optical axis has been added |
| | FD-SNFM2 | φ2.5 8 | R25 | — | 120 4.724 | Tough FD-S31 | M3 10 | R2 | ○ | 125 4.921 | <ul style="list-style-type: none"> End bracket shape is 8 mm for the ø2.5 part only ⇒ Changed to 10 mm (ø3 part/ 8 mm + ø2 area/2 mm) |
| | FD-T40 | M3 12 | R25 | — | 120 4.724 | Tough FD-31 | M3 12 | R2 | ○ | 125 4.921 | <ul style="list-style-type: none"> End bracket shape is 12 mm for the M3 part only ⇒ Changed to a total length of 12 mm (M3 part/10 mm + ø2 area/2 mm) |
| | FD-T80 | M4 12 | R25 | — | 380 14.961 | Tough FD-61 | M6 17 | R4 | ○ | 450 17.717 | <ul style="list-style-type: none"> End bracket shape is 12 mm for the M4 part only ⇒ Changed to a total length of 17 mm (M6 part/15 mm + ø4.5 area/2 mm) Fiber cable outside diameter ø1.3 ⇒ Changed to ø2.2 |
| | FD-V41 | 15 10 φ3 φ1.5 Small diameter Sleeve part cannot be bent. | R25 | — | 65 2.559 | Tough FD-V30 | Small diameter 15 15 φ3 φ1.5 Sleeve part cannot be bent. | R2 | ○ | 65 2.559 | <ul style="list-style-type: none"> From sleeve end to optical axis center position is 0.7 mm ⇒ Changed to 2 mm End sleeve length of 10 mm ⇒ Changed to 15 mm |

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak/Liquid Detection

Fiber Options

Fiber Dimensions

Thru-beam Type

Retroreflective Type

Reflective Type

Others

Amplifiers

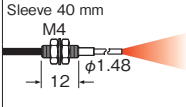
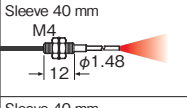
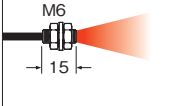
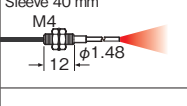
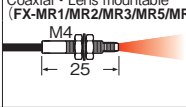
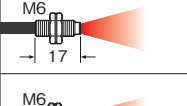
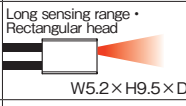

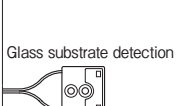
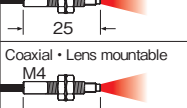

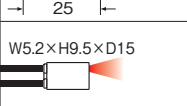
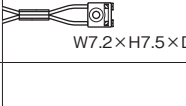
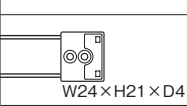
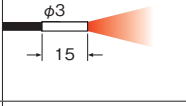
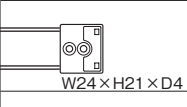
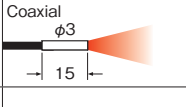
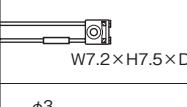
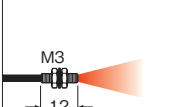
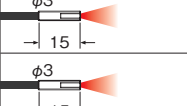
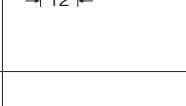
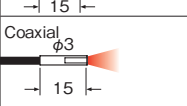
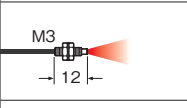
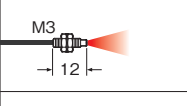
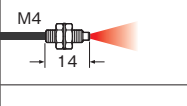
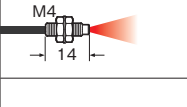
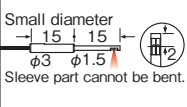
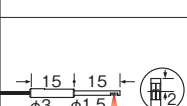
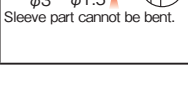

FX-500 series

FX-100 series

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Earlier models comparison table

Earlier Models Comparison Table

| Type | Discontinued models | | | | | Recommended replacements | | | | | Main points of difference from discontinued models |
|-----------------|---------------------|--|---------------------|--------------------|----------------------------------|---|---|---------------------|--------------------|---|--|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | |
| Reflective type | FD-W44 |  | R1 (Sleeve R10) | — | 80 3.150 | Tough FD-41S |  | R2 (Sleeve R10) | ○ | 125 4.921 | |
| | FD-W8 |  | R1 | — | 250 9.843 | FD-41SW |  | R1 (Sleeve R10) | — | 80 3.150 | |
| | FD-WG4 |  Minute objects can be detected due to the small spot beam. Coaxial · Lens mountable (FX-MR1/MR2/MR3/MR5/MR6) | R2 | — | 150 5.906 | Tough FD-61 |  | R4 | ○ | 450 17.717 | ·End bracket total length is 15 mm for the M6 part only ⇒ Changed to 17 mm (M6 part/ 15 mm + ø4.5 area/2 mm) |
| | FD-WKZ1 |  Long sensing range · Rectangular head | R1 | — | 20 to 490 0.787 to 19.291 | FD-61W |  | R1 | — | 270 10.630 | ·End bracket total length is 15 mm for the M6 part only ⇒ Changed to 17 mm (M6 part/ 15 mm + ø4.5 area/2 mm) |
| | FD-WL41 |  Glass substrate detection | R1 | — | 2.5 to 14 0.098 to 0.551 | Tough FD-42G |  | R2 | ○ | 200 7.874 | |
| | FD-WL48 |  W7.2 x H7.5 x D2 | R1 | — | 7.5 0.295 | FD-42GW |  | R1 | — | 150 5.906 | |
| | FD-WS8 |  | R1 | — | 250 9.843 | FD-Z50HW |  | R1 | — | 10 to 650 0.394 to 25.591 | ·Stainless steel unit casing material ⇒ Changed to plastic (PC) |
| | FD-WSG4 |  | R2 | — | 150 5.906 | Tough FD-L21 |  | R2 | ○ | 1.5 to 16 0.059 to 0.630 | |
| | FD-WT4 |  | R1 | — | 80 3.150 | FD-L21W |  | R1 | — | 3 to 14 0.118 to 0.551 | |
| | FD-WT8 |  | R1 | — | 250 9.843 | FD-L12W |  | R1 | — | 8 0.315 | |
| | FD-WV42 |  Sleeve part cannot be bent. | R1 | — | 16 0.630 | Tough FD-S32 |  | R4 | ○ | 420 16.535 | |
| | | | | | | FD-S32W |  | R1 | — | 270 10.630 | |
| | | | | | | FD-S33GW |  | R1 | — | 150 5.906 | |
| | | | | | | Tough FD-31 |  | R2 | ○ | 125 4.921 | ·End bracket total length is 12 mm for the M3 part only ⇒ Changed to 12 mm (M3 part/ 10 mm + ø2 area/2 mm) |
| | | | | | FD-31W |  | R1 | — | 80 3.150 | ·End bracket total length is 12 mm for the M3 part only ⇒ Changed to 12 mm (M3 part/ 10 mm + ø2 area/2 mm) | |
| | | | | | Tough FD-41 |  | R2 | ○ | 125 4.921 | ·End bracket total length is 12 mm for the M4 part only ⇒ Changed to 14 mm (M4 part/12 mm + ø3 area/2 mm) | |
| | | | | | FD-41W |  | R1 | — | 270 10.630 | ·End bracket total length is 12 mm for the M4 part only ⇒ Changed to 14 mm (M4 part/12 mm + ø3 area/2 mm) | |
| | | | | | Tough FD-V30 |  | R2 | ○ | 65 2.559 | ·From sleeve end to optical axis center position is 1 mm ⇒ Changed to 2 mm ·End sleeve thickness of ø2 ⇒ Changed to ø1.5 ·A D-shaped surface that makes it easy to align with the optical axis has been added | |
| | | | | | FD-V30W |  | R1 | — | 20 0.787 | ·From sleeve end to optical axis center position is 1 mm ⇒ Changed to 2 mm ·End sleeve thickness of ø2 ⇒ Changed to ø1.5 ·A D-shaped surface that makes it easy to align with the optical axis has been added | |

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

Choose by shape/application

Viewing new models

Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

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Earlier models comparison table

Earlier Models Comparison Table

| Type | Discontinued models | | | | | Recommended replacements | | | | | Main points of difference from discontinued models |
|----------------------|--|--|---------------------|--------------------|----------------------------------|--|--|---------------------|--------------------|---|---|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm in) | |
| Reflective type | FD-WZ4HB | Fiber bending type W2×H10×D10 | R1 | — | 2.5 to 65 0.098 to 2.559 | FD-Z20HBW | Fiber bending type W2×H10×D10 | R1 | — | 2 to 85 0.079 to 3.346 | |
| | FD-WZ7HB | Fiber bending type W3.5×H14×D11 | R1 | — | 1 to 150 0.039 to 5.906 | FD-Z40HBW | Fiber bending type W3.5×H14×D11 | R1 | — | 260 10.236 | |
| Retroreflective type | FR-KV1 | W7.5×H2.2×D11.2 W4×H2×D21.5 | R10 | — | 20 to 310 0.787 to 12.205 | FR-KZ22E | W7.5×H2.2×D11.2 W4×H2×D21.5 | R2 | ○ | 15 to 310 0.591 to 12.205 | • Unit side installation screw positions have been moved back 1 mm from the front edge |
| | FR-KZ21 | W9.5×H5.2×D21 W10.6×H28×D10.1 | R10 | — | 20 to 200 0.787 to 7.874 | FR-KZ50H | W9.5×H5.2×D21 W10.6×H28×D10.1 | R2 | ○ | 20 to 300 0.787 to 11.811 | |
| | FR-KZ21E | W9.5×H25×D5.2 W10.6×H28×D10.1 | R10 | — | 20 to 200 0.787 to 7.874 | FR-KZ50E | W9.5×H25×D5.2 W28×H10.6×D10.1 | R2 | ○ | 20 to 300 0.787 to 11.811 | |
| | FR-WKZ11 | W9.5×H5.2×D15 W30×H30×D0.5 | R1 | — | 100 to 990 3.937 to 38.976 | FR-Z50HW | W5.2×H9.5×D16 W30×H30×D0.5 | R1 | ○ | 100 to 990 3.937 to 38.976 | |
| | FT-A30 | Wide area sensing Sensing width 32 mm W5×H69×D20 | R10 | — | 3600 141.732 | FT-A32 | Wide area sensing Sensing width 32 mm W5×H69×D20 | R2 | ○ | 3600 141.732 | • Fiber cable outside diameter ø2.2 ⇒ Changed to ø1.3 • Optical cable diameter of 3 × 32 ⇒ Changed to 3.2 × 32 |
| FT-A8 | Wide area sensing Sensing width 11 mm W4.2×H31×D13.5 | R10 | — | 3600 141.732 | FT-A11 | Wide area sensing Sensing width 11 mm W4.2×H31×D13.5 | R2 | ○ | 3600 141.732 | • Fiber cable outside diameter ø2.2 ⇒ Changed to ø1.3 | |
| FT-AFM2 | Top sensing W5×H15×D15 | R25 | — | 860 33.858 | FT-AL05 | Top sensing Sensing width 5.5 mm W5×H15×D15 | R2 | ○ | 860 33.858 | • Cable lead out orientation changed • Metal casing material (brass) ⇒ Changed to plastic (PPS) | |
| FT-AFM2E | Side sensing W5×H15×D15 | R25 | — | 860 33.858 | FT-AL05 | Side sensing Sensing width 5.5 mm W5×H15×D15 | R2 | ○ | 860 33.858 | • Cable lead out direction changed • Metal casing material (brass) ⇒ Changed to plastic (PPS) | |
| FT-B8 | Lens mountable (FX-LE1/LE2/SV1) M4 15 | R25 | — | 1250 49.213 | FT-43 | Lens mountable M4 15 | R4 | ○ | 1400 55.118 | | |
| FT-E12 | Beam dia. ø0.125 mm ø0.25 ø3 Sleeve part cannot be bent. | R5 | — | — | FT-E13 | Beam dia. ø0.125 mm ø0.25 ø3 Sleeve part cannot be bent. | R2 | ○ | 15 0.591 | • Fiber length 500 mm /set length type ⇒ Changed to fiber length 1 m/free cut type • Fiber cable outside diameter ø1.2 ⇒ Changed to ø1 • End bracket length of 10 mm ⇒ Changed to 15 mm | |
| FT-E22 | Beam dia. ø0.25 mm ø0.4 ø3 Sleeve part cannot be bent. | R5 | — | — | FT-E23 | Beam dia. ø0.25 mm ø0.4 ø3 Sleeve part cannot be bent. | R2 | ○ | 75 2.953 | • Set length type ⇒ Changed to free cut type • Fiber cable outside diameter ø1.2 ⇒ Changed to ø1 • End bracket length of 10 mm ⇒ Changed to 15 mm | |
| FT-F902 | Mountable on pipe SEMI S2 compliant W23×H20×D17 | R4 (Protective tube R20) | ○ | Liquid detection | FT-F93 | SEMI S2 compliant W23×H20×D17 | R2 (Protective tube R20) | ○ | Liquid detection | | |
| FT-FM10L | With lens M14 23 | R25 | — | 19600 771.654 | FT-140 | With long range lens M14 40 | R4 | ○ | 19600 771.654 | | |
| FT-FM2 | Lens mountable (FX-LE1/LE2/SV1) M4 15 | R25 | — | 1100 43.307 | FT-42 | Lens mountable M4 15 | R4 | ○ | 1130 44.488 | | |
| FT-FM2S | Sleeve 90 mm M4 ø1.48 12 | R25 (Sleeve R10) | — | 1100 43.307 | FT-42S | Sleeve 40 mm M4 ø1.48 12 | R4 (Sleeve R10) | ○ | 1130 44.488 | • The sleeve length 90 mm type supports semi-custom products. | |
| FT-FM2S4 | Sleeve 40 mm M4 ø1.48 12 | R25 (Sleeve R10) | — | 1100 43.307 | FT-42S | Sleeve 40 mm M4 ø1.48 12 | R4 (Sleeve R10) | ○ | 1130 44.488 | | |

Earlier Models Comparison Table

| Type | Discontinued models | | | | | Recommended replacements | | | | | Main points of difference from discontinued models |
|----------------|---------------------------------------|---|---------------------|--------------------|----------------------------------|--------------------------|---|---------------------|--------------------|---|--|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | |
| Thru-beam type | FT-K8 | | R25 | — | 3600 141.732 | Tough FT-KS40 | | R2 | ○ | 3600 141.732 | • Fiber cable outside diameter $\phi 2.2$ \Rightarrow Changed to $\phi 1$ |
| | FT-KV1 | | R10 | — | 540 21.260 | Tough FT-KV26 | | R2 | ○ | 710 27.953 | |
| | FT-KV8 | Side-view type with small light dispersion | R25 | — | 3600 141.732 | Tough FT-KV40 | | R2 | ○ | 3600 141.732 | • Fiber cable outside diameter $\phi 2.2$ \Rightarrow Changed to $\phi 1$ • Metal end material (stainless steel) \Rightarrow Changed to plastic (LCP), set screw fastening specifications \Rightarrow Changed to MS-FD-3 fastener specifications |
| | FT-NFM2 | | R25 | — | 310 12.205 | Tough FT-31 | | R2 | ○ | 315 12.402 | • End bracket total length of 15 mm for the (M3 part/10 mm + $\phi 2$ area/5 mm) \Rightarrow Changed to 12 mm (M3 part/10 mm + $\phi 2$ area/2 mm) |
| | FT-NFM2S | Sleeve 90 mm | R25 (Sleeve R10) | — | 310 12.205 | Tough FT-31S | Sleeve 40 mm | R2 (Sleeve R10) | ○ | 315 12.402 | • The sleeve length 90 mm type supports semi-custom products. |
| | FT-NFM2S4 | Sleeve 40 mm | R25 (Sleeve R10) | — | 310 12.205 | Tough FT-31S | Sleeve 40 mm | R2 (Sleeve R10) | ○ | 315 12.402 | |
| | FT-P2 | | R4 | ○ | 330 12.992 | Tough FT-S21 | | R2 | ○ | 315 12.402 | • Fiber length 1 m/Set length type \Rightarrow Changed to fiber length 2 m/free cut type • Fiber exterior cover material of PVC \Rightarrow Changed to PE |
| | FT-P40 | | R4 | ○ | 160 6.299 | Tough FT-31 | | R2 | ○ | 315 12.402 | • End bracket total length of 10 mm for the M3 part \Rightarrow Changed to 12 mm (M3 part/10 mm + $\phi 2$ area/2 mm) • Fiber exterior cover material of PVC \Rightarrow Changed to PE |
| | FT-P60 | Lens mountable (FX-LE1/LE2/SV1) M4 | R4 | ○ | 350 13.780 | Tough FT-42 | Lens mountable | R4 | ○ | 1130 44.488 | • Fiber exterior cover material of PVC \Rightarrow Changed to PE • Fiber cable outside diameter $\phi 1.25$ \Rightarrow Changed to $\phi 2.2$ |
| | FT-P80 | Lens mountable (FX-LE1/LE2/SV1) M4 | R4 | ○ | 810 31.890 | Tough FT-42 | Lens mountable | R4 | ○ | 1130 44.488 | • Fiber exterior cover material of PVC \Rightarrow Changed to PE |
| | FT-P81X | Lens mountable (FX-LE1/LE2/SV1) Metal-jacketed M4 | R10 | — | 880 34.646 | FT-45X | Lens mountable • Stainless-jacketed M4 | R4 | — | 1200 47.244 | • Stainless steel mesh jacket covering the stainless steel spiral tube used as a protective cover for the fiber \Rightarrow Changed to plastic (polyolefin) |
| | FT-PS1 | | R4 | ○ | 90 3.543 | Tough FT-S11 | | R2 | ○ | 90 3.543 | |
| | FT-R80 | Lens mountable (FX-LE1/LE2) M4 | R25 | — | 780 30.709 | Tough FT-R40 | Lens mountable M4 | R4 | ○ | 930 36.614 | • End bracket total length of 14 mm for the (M2.6 part/3 mm + M4 part/11 mm) \Rightarrow Changed to 15 mm (M2.6 part/3 mm + M4 part/12 mm) |
| | FT-SFM2 | | R25 | — | 1100 43.307 | FT-S32 | Long sensing range • with lens | R10 | ○ | 3100 122.047 | • Optical cable diameter of $\phi 1$ \Rightarrow Changed to $\phi 2.2$ |
| | FT-SFM2L | Long sensing range • with lens | R25 | — | 2600 102.362 | FT-S32 | Long sensing range • with lens | R10 | ○ | 3100 122.047 | |
| | FT-SFM2SV2 | | R25 | — | 570 22.441 | Tough FT-V30 | | R4 | ○ | 680 26.772 | • From sleeve end to optical axis center position is 0.8 \Rightarrow Changed to 1.3 mm • D-shaped surface that makes it easy to align with the optical axis has been added |
| FT-SNFM2 | | R25 | — | 310 12.205 | Tough FT-S21 | | R2 | ○ | 315 12.402 | • End bracket total length of $\phi 1.5/8$ mm \Rightarrow Changed to 12 mm ($\phi 1$ area/2 mm + $\phi 1.5/8$ mm) | |
| FT-T80 | Lens mountable (FX-LE1/SV1) M3 | R25 | — | 1100 43.307 | Tough FT-42 | Lens mountable M4 | R4 | ○ | 1130 44.488 | • End bracket total length of 12.5 mm for the (M2.6 part/2.5 mm + M3 part/10 mm) \Rightarrow Changed to 15 mm (M2.6 part/3 mm + M4 part/12 mm) • Fiber cable outside diameter $\phi 1.3$ \Rightarrow Changed to $\phi 2.2$ | |
| FT-V10 | | R25 | — | 3500 137.795 | Tough FT-V40 | | R4 | ○ | 3500 137.795 | | |

New product introduction

Tough Fiber

Fiber Selection Guide

Choose by model

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Fibers

Super Quality

Threaded

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

Liquid Leak / Liquid Detection

Fiber Options

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Reflective Type

Others

Amplifiers

FX-500 series

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Earlier models comparison table

Earlier Models Comparison Table

| Type | Discontinued models | | | | | Recommended replacements | | | | | |
|----------------|---------------------|--------------------------|---------------------|--------------------|----------------------------------|--------------------------|--------------------------|---------------------|--------------------|--|---|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | Main points of difference from discontinued models |
| Thru-beam type | FT-V22 | | R25 | — | 300 11.811 | Tough FT-V23 | | R4 | ○ | 450 17.717 | <ul style="list-style-type: none"> Fiber length 1 m/Set length type → Changed to fiber length 2 m/free cut type From sleeve end to optical axis center position is 0.6 → Changed to 1.1 mm D-shaped surface that makes it easy to align with the optical axis has been added |
| | FT-V41 | | R25 | — | 200 7.874 | Tough FT-V25 | | R2 | ○ | 240 9.449 | <ul style="list-style-type: none"> End bracket outside diameter of phi2.5 → Changed to phi2 From sleeve end to optical axis center position is 0.6 → Changed to 1 mm |
| | FT-W4 | | R1 | — | 250 9.843 | Tough FT-31 | | R2 | ○ | 315 12.402 | <ul style="list-style-type: none"> End bracket total length of 15 mm for the (M3 part/10 mm + crimped area/5 mm) → Changed to 12 mm (phi2 area/2 mm + M3 part/10 mm) Fiber cable outside diameter phi2.2 → Changed to phi1 |
| | | | | | | Tough FT-31W | | R1 | — | 260 10.236 | <ul style="list-style-type: none"> End bracket total length of 15 mm for the (M3 part/10 mm + crimped area/5 mm) → Changed to 12 mm (phi2 area/2 mm + M3 part/10 mm) Fiber cable outside diameter phi2.2 → Changed to phi1 |
| | FT-W8 | | R10 | — | 790 31.102 | Tough FT-42 | | R4 | ○ | 1130 44.488 | |
| | | | | | | Tough FT-42W | | R1 | — | 800 31.496 | |
| | FT-WA30 | | R1 | — | 3600 141.732 | Tough FT-A32 | | R2 | ○ | 3600 141.732 | <ul style="list-style-type: none"> Fiber cable outside diameter phi2.2 → Changed to phi1.3 Optical cable diameter of 3 x 32 → Changed to 3.2 x 32 |
| | | | | | | Tough FT-A32W | | R1 | — | 3600 141.732 | <ul style="list-style-type: none"> Fiber cable outside diameter phi2.2 → Changed to phi1.3 Optical cable diameter of 3 x 32 → Changed to 3.2 x 32 |
| | FT-WA8 | | R1 | — | 3600 141.732 | Tough FT-A11 | | R2 | ○ | 3600 141.732 | <ul style="list-style-type: none"> Fiber cable outside diameter phi2.2 → Changed to phi1.3 |
| | | | | | | Tough FT-A11W | | R1 | — | 3600 141.732 | <ul style="list-style-type: none"> Fiber cable outside diameter phi2.2 → Changed to phi1.3 |
| | FT-WKV8 | | R1 | — | 3600 141.732 | Tough FT-KV40 | | R2 | ○ | 3600 141.732 | <ul style="list-style-type: none"> Fiber cable outside diameter phi2.2 → Changed to phi1 Metal end material (stainless steel) → Changed to plastic (LCP), set screw fastening specifications → Changed to MS-FD-3 fastener specifications |
| | | | | | | Tough FT-KV40W | | R1 | — | 3600 141.732 | <ul style="list-style-type: none"> Fiber cable outside diameter phi2.2 → Changed to phi1 Metal end material (stainless steel) → Changed to plastic (LCP), set screw fastening specifications → Changed to MS-FD-3 fastener specifications |
| | FT-WR80 | | R1 | — | 660 25.984 | FT-R41W | | R1 | — | 800 31.496 | |
| | FT-WR80L | | R1 | — | 2200 86.614 | FT-R42W | | R1 | — | 2200 86.614 | |
| FT-WS3 | | R1 | — | 790 31.102 | FT-S31W | | R1 | — | 800 31.496 | <ul style="list-style-type: none"> End bracket total length of 15 mm → Changed to 10 mm | |

Earlier Models Comparison Table

| Type | Discontinued models | | | | | Recommended replacements | | | | | Main points of difference from discontinued models |
|----------------|---------------------|---|---------------------|--------------------|----------------------------------|-------------------------------|---|---------------------|--------------------|----------------------------------|--|
| | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | Model No. | Shape of fiber head (mm) | Bending radius (mm) | Bending durability | Sensing range FX-500 STD (mm/in) | |
| Thru-beam type | FT-WS4 | | R1 | — | 250 9.843 | Tough FT-S21 | | R2 | ○ | 315 12.402 | • End bracket shape of $\phi 1.5/8$ mm \Rightarrow Changed to 10 mm ($\phi 1$ part/2 mm + $\phi 1.5$ part/8 mm) |
| | FT-WS8 | | R1 | — | 790 31.102 | FT-S21W | | R1 | — | 260 10.236 | • End bracket shape of $\phi 1.5/8$ mm \Rightarrow Changed to 10 mm ($\phi 1$ part/2 mm + $\phi 1.5$ part/8 mm) |
| | FT-WS8L | Long sensing range • with lens $\phi 3$ | R1 | — | 3300 129.921 | FT-S31W | | R1 | — | 800 31.496 | • End bracket shape of $\phi 2.5/8$ mm \Rightarrow Changed to 10 mm ($\phi 2$ part/2 mm + $\phi 3$ part/8 mm) |
| | FT-WV42 | Sleeve part cannot be bent. | R1 | — | 100 3.937 | FT-S32 | Long sensing range • with lens $\phi 2.5$ | R10 | ○ | 3100 122.047 | • End bracket shape of $\phi 3 \Rightarrow$ Changed to $\phi 2.5$ • Bending radius of 1 mm \Rightarrow Changed to 10 mm |
| | FT-WZ4HB | Fiber bending type W2×H10×D10 | R1 | — | 210 8.268 | Tough FT-V25 | Sleeve part cannot be bent. | R2 | ○ | 240 9.449 | • D-shaped surface that makes it easy to align with the optical axis has been added |
| | FT-WZ7HB | Fiber bending type W3.5×H14×D11 | R1 | — | 790 31.102 | FT-V24W | Sleeve part cannot be bent. | R1 | — | 110 4.331 | • D-shaped surface that makes it easy to align with the optical axis has been added |
| | FT-WZ8 | Top sensing W8.5×H12×D3 | R1 | — | 1300 51.181 | FT-Z20HBW | Fiber bending type W2×H10×D10 | R1 | — | 260 10.236 | |
| | FT-WZ8E | Side sensing W3×H12×D8 | R1 | — | 3400 133.858 | FT-Z40HBW | Fiber bending type W3.5×H14×D11 | R1 | — | 800 31.496 | |
| | FT-WZ8H | Top sensing W3×H8×D12 | R1 | — | 3300 129.921 | Tough FT-Z30 | Top sensing W8.5×H12×D3 | R2 | ○ | 2100 82.677 | • Black casing color \Rightarrow Changed to translucent, protective seal eliminated |
| | FT-Z8 | Top sensing W8.5×H12×D3 | R4 | ○ | 1200 47.244 | FT-Z30W | Top sensing W8.5×H12×D3 | R1 | — | 1500 59.055 | • Black casing color \Rightarrow Changed to translucent, protective seal eliminated |
| | FT-Z8E | Side sensing W3×H12×D8 | R4 | ○ | 2000 78.740 | Tough FT-Z30E | Side sensing W3×H12×D8 | R2 | ○ | 3500 137.795 | |
| | FT-Z8H | Top sensing W3×H8×D12 | R4 | ○ | 2100 82.677 | FT-Z30EW | Side sensing W3×H12×D8 | R1 | — | 3400 133.858 | |
| | | | | | | Tough FT-Z30H | Top sensing W3×H8×D12 | R2 | ○ | 3500 137.795 | |
| | | | | | | FT-Z30HW | Top sensing W3×H8×D12 | R1 | — | 3500 137.795 | |
| | | | | | | Tough FT-Z30 | Top sensing W8.5×H12×D3 | R2 | ○ | 2100 82.677 | • Black casing color \Rightarrow Changed to translucent, protective seal eliminated |
| | | | | | Tough FT-Z30E | Side sensing W3×H12×D8 | R2 | ○ | 3500 137.795 | | |
| | | | | | Tough FT-Z30H | Top sensing W3×H8×D12 | R2 | ○ | 3500 137.795 | | |

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Tough Fiber

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Fibers

Super Quality

Threaded Type

Cylindrical Type

Sleeve

Flat Type

Small Spot

Narrow Beam

Wide Beam

Convergent Reflective Type

Retroreflective Type

Chemical-resistant

Heat-resistant

Vacuum-resistant

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