SUNX

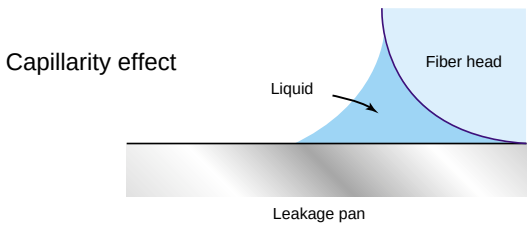
LEAK FIBER

New **FD-F7** SERIES

A New Slim Fiber Sensor Ideal for Sensing Chemical Leaks

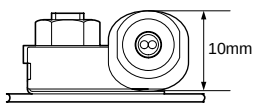
Reliable Detection

The unique effect of capillarity enables reliable detection of small leaks and viscous liquids.



Compact, Space-saving

This slim (10mm) side-mounting sensor is especially good for use in confined spaces.



Simple to Use

- Bracket mounted with one screw, one-touch fiber head mounting.
- No resetting or component replacement required after leak detection.
- The simple shape of the fiber head makes it easy to wipe off the leaked liquid.

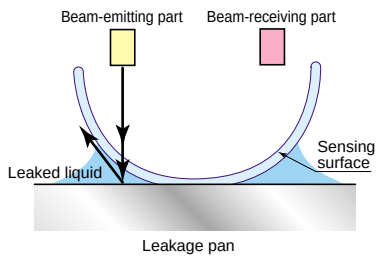
Ideal for chemicals and volatile materials

This fiber type sensor is safer to use with volatile materials (SEMI S2 compliant). The flouride resin fiber head makes it ideal for use with chemicals.

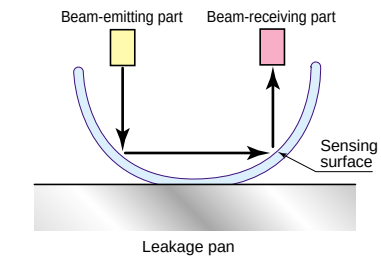
Stable Design

- When a leak occurs, the beam from the beam-emitting part scatters through the leaked liquid and is not transmitted to the beam-receiving part.

New Type of Detection Method



When leakage occurs
The beam from the beam-emitting part scatters through the leaked liquid and is not transmitted to the beam-receiving part.



When there is no leakage
The beam from the beam-emitting part reflects off of the surface of the sensor and is transmitted to the beam-receiving part.

- If the fiber is bent or faulty, if the cable is cut or disconnected, or if the sensor is not operating correctly, the output is the same as when the beam is not received (LEAK).
- Human error when installing the fiber is also accounted for.

Incorporated Emitting Indicator

The fiber head is equipped with an emitting indicator so that you can easily check the sensor without having to get close to it.

2 Types of Mounting Brackets Are Available (PFA, PVC)

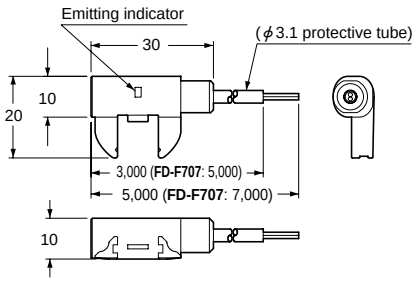
SPECIFICATIONS

Item \ Designation / Model No.		Leak fiber	
		FD-F705	**FD-F707**
Applicable amplifier		**FX-D1-F**	
Sensing object		Liquid (Note 1)	
Protective tube length		3m	5m
Fiber cable length		5m free-cut	7m free-cut
Allowable bending radius		Protective tube: R20mm or more, Fiber cable: R4mm or more	
Bending durability		Fiber cable: 1,000,000 times or more (at R4mm)	
Emitting indicator		Incorporated	
Peel strength		19.6N or less (PFA protective tube)	
Ambient temperature		−20 to +60°C (No dew condensation or icing allowed), Storage: −20 to +60°C (Note 2)	
Ambient humidity		35 to 85% RH, Storage: 35 to 85% RH	
Material	Fiber cable	Fiber core: Acrylic, Fiber sheath: Vinyl chloride, Protective tube: PFA	
	Fiber head	Outer casing: PFA, Interior: Heat-resistant ABS, Acrylic, Brass	
Accessories		PFA mounting bracket: 1 No. PVC mounting bracket: 1 No. **FX-CT1** (Fiber cutter): 1 No. **FX-AT10** (φ1mm fiber attachment): 1 set	

Notes: 1) Highly viscous liquid may not be detected stably.
2) Liquid being detected should also be kept within the rated ambient temperature range.

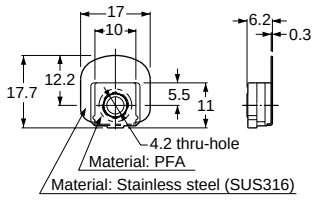
DIMENSIONS (Unit: mm)

FD-F705
FD-F707 Fiber

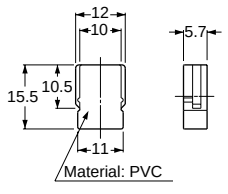


Maunting bracket

PFA



PVC



PRECAUTIONS FOR PROPER USE

This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

Cautions

- There is a white stripe on the beam-emitting fiber cable. When setting the amplifier, put the fiber cable with white stripe into the beam-emitting side. The sensor will not operate correctly if the emitter and receiver are not connected correctly.
- Do not scratch and spoil the fiber head surface. If it is scratched or spoiled, the detectability will deteriorate. When conducting maintenance after operation, wipe all liquid from the fiber head and mounting bracket with a soft cloth.
- Do not apply excessive tensile force to the fiber cable.
- Bending radius of the fiber cable must be R4mm or more. If the bending radius is smaller than the specified value, the sensing performance may deteriorate.
- Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
- The fiber cable can be cut for adjustment using the attached fiber cutter, however, the performance of the sensor may greatly decrease depending the condition of the cut fiber cable and the connection to the amplifier.
- Shortening the fiber cable excessively may result in loss of reliable detection due to an insufficient light intensity difference. (As a reference, adjust the length of the fiber cable so that the amplifier reads 4,000, or less, when mounted using the exclusive mounting bracket and without any liquid.)
- Be sure to use the exclusive mounting bracket when installing the sensor to avoid human error. Reliable detection cannot be guaranteed when this mounting bracket is not used.
- Do not scratch the fiber sheath while cutting the protective tube.
- Be sure to adjust the sensitivity of the amplifier after mounting the fiber head in the mounting bracket and completing layout and wiring the fiber cable in actual working conditions. Perform the same sensitivity adjustment after changes in layout or installation for maintenance, etc. Changes in layout or installation after completing sensitivity adjustment may result in the loss of reliable detection due to the change of incident light intensity.
- Note that the light intensity may greatly decrease when used under high temperature and high humidity for long periods.

Amplifier setting procedure

Set the sensitivity of the **FX-D1-F** amplifier using the 'Limit teaching' function as described below.

①Set the fiber head in the exclusive mounting bracket and layout and wire the fiber cable in actual working conditions.
②Set the mode selection switch to either 'RUN' or 'MODE'.
③Set to either Output 1 or Output 2 by turning the jog switch to the '+' or the '−' side.
④Set the mode selection switch to 'SET' the present threshold value is displayed.
⑤Press the jog switch in the liquid absent condition and release it within 3 sec.
⑥The read incident light intensity is displayed for 0.5 sec. approx. Subsequently, '2nd' is displayed on the LCD display.
⑦Turn the jog switch to the '−' side. 'good' is displayed on the LCD display.
⑧Set the mode selection switch to 'RUN', and setting is completed.

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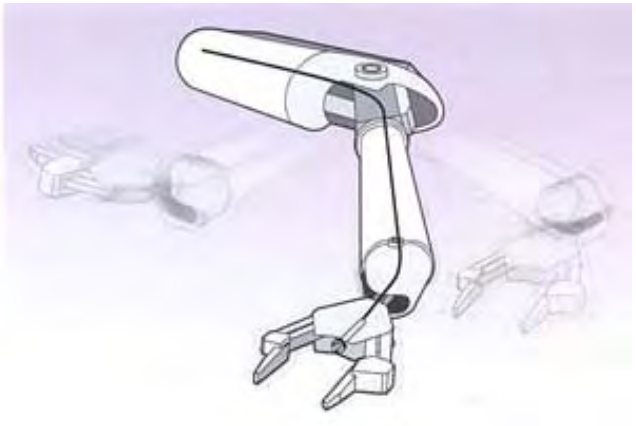
New

Reflective type flexible fiber

FD-P□



- **Sensing range has been increased remarkably!**
- **Repeatability has been improved!**

Application

Mounting on a moving base

The sensing range has been increased remarkably by virtue of the fiber core consisting of 2.5mm X 7 flexible strands. Further, the repeatability at the same sensing range has been improved compared with the previous 4-strand fiber core.

Number of fiber strands

The amount of light has been doubled by increasing the number of fiber strands from the previous 4 strands X 2 to 7 strands X 2.
Due to this improvement, a sensing distance of 70mm is possible. The stability has also been increased.

14

Reflective type 3mm flexible fiber
FD-P50

Bending capability

The minimum bending radius has been reduced to R4mm.
A higher bending capability has been realized; the confinement of the light beam is 90% or more when the fiber is bent by 90° to make the letter 'L'.

4

Flexibility

The flexibility has been improved remarkably; the fiber can withstand repeated bending of one million cycles or more (for R 10mm).
Since this fiber has strong resistance against repeated bending, it is most suitable for mounting on moving machinery.

1,000,000

Reflective type M4 flexible fiber
FD-P60

Reflective-type Flexible Fiber FD-P□

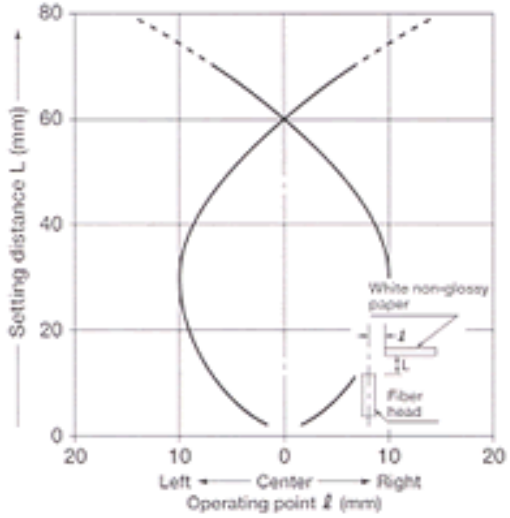
SPECIFICATIONS

Item \ Type		Non-threaded type	Threaded type
Model No.		FD-P50	FD-P60
Applicable amplifier		Red LED type of **FX-D1/A1/M1** series (Note 1)	
Sensing range		70mm (Note 2)	
Repeatability		Along sensing axis: 0.2mm or less, Perpendicular to sensing axis: 0.05mm or less	
Allowable bending radius		R4mm or more	
Bending durability		1,000,000 cycles or more (for R10mm)	
Fiber length		2m free-cut	
Ambient temperature		−40 to +60℃, (No dew condensation or icing allowed), Storage: −40 to +60℃	
Ambient humidity		35 to 85% RH, Storage: 35 to 85% RH	
Material	Fiber core	Acrylic	
	Sheath	Vinyl chloride	
	Head	Stainless steel (SUS303)	
Weight		8g approx.	9g approx.
Accessories		**FX-CT1**(Fiber cutter): 1 No., **FX-AT13**(ϕ1.3mm fiber attachment): 1 set	

Notes:
1) Refer to the general catalog or FX series catalog for the details of applicable amplifier.
2) The sensing range is specified for white non-glossy paper (200 X 200mm) as the object.

SENSING CHARACTERISTICS (TYPICAL)

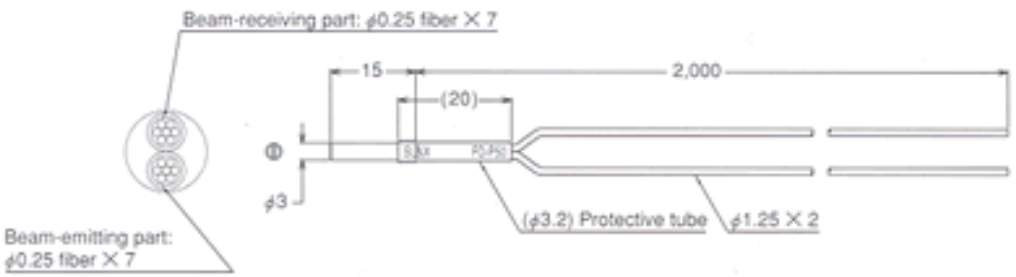
FD-P50 Reflective Type



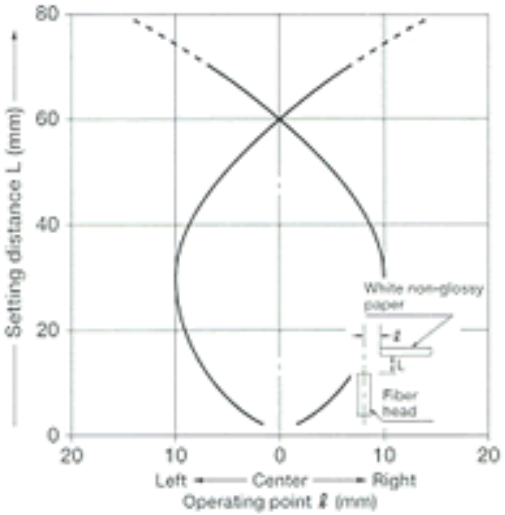
FD-P60 Reflective Type

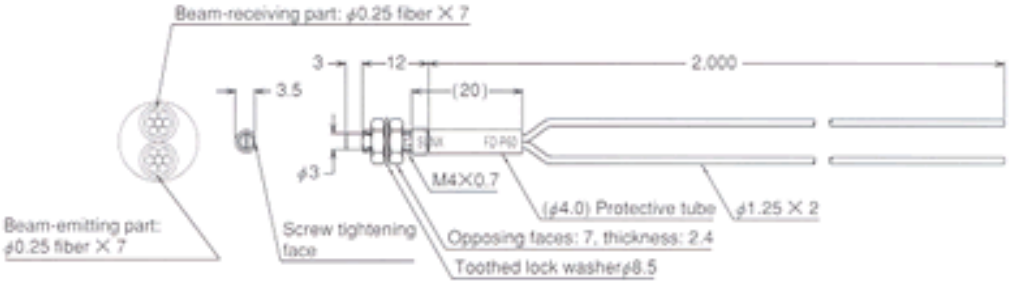
DIMENSIONS (Unit: mm)

FD-P50 Free-cut



FD-P60 Free-cut


Setting distance L (mm)
80
60
40
20
0
20
10
0
10
20
Left
Center
Right
Operating point ℓ (mm)
White non-glossy paper
ℓ
L
Fiber head


Beam-receiving part: ϕ0.25 fiber × 7
3
12
2,000
(20)
3.5
ϕ3
M4×0.7
(ϕ4.0) Protective tube
ϕ1.25 × 2
Beam-emitting part: ϕ0.25 fiber × 7
Screw tightening face
Opposing faces: 7, thickness: 2.4
Toothed lock washer ϕ8.5

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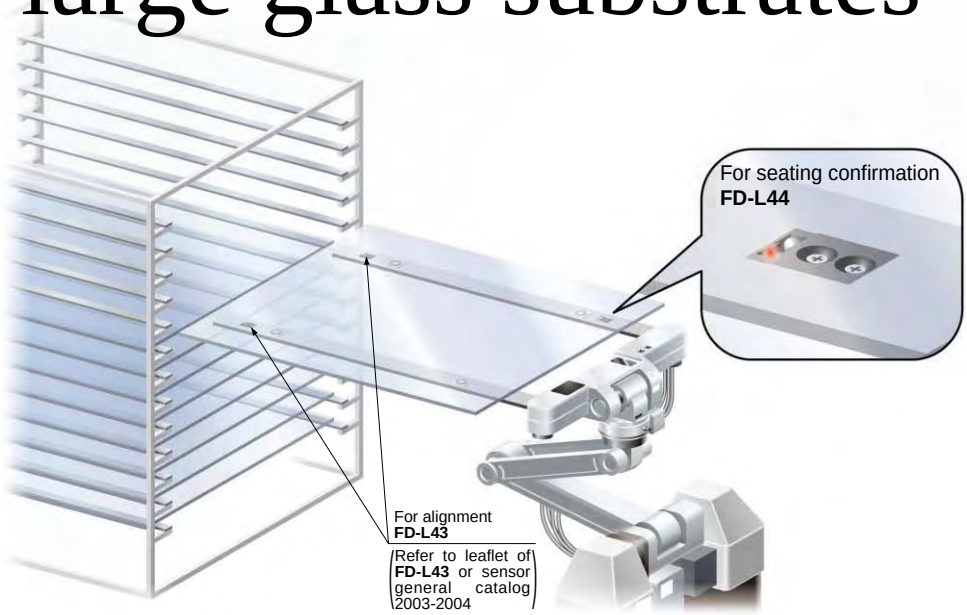
FIXED-FOCUS REFLECTIVE FIBER

New

FD-L44

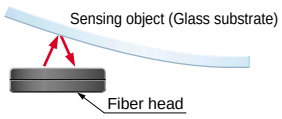
Ideal for seating confirmation of large glass substrates



Sensing range 0 to 6 mm 0 to 0.236 in Longest in the industry

With an even more compact size than before, the longest sensing range in its class has been achieved, and it is ideal for seating confirmation, providing stable sensing performance even for bended glass substrates.

Can also be used for curved glass substrates



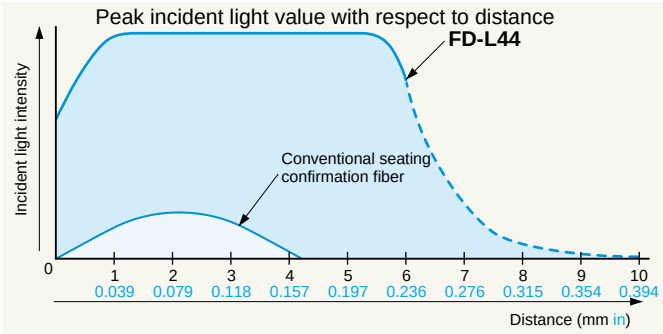
Sensing enabled from 0 mm 0 in

Ultra-thin head with thickness of 3 mm 0.118 in

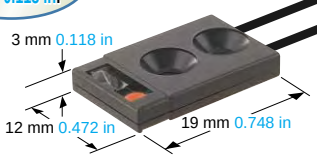
The fiber has an ultra-thin head with a thickness of 3 mm 0.118 in and a size of W12 × H19 mm W0.472 × H0.748 in.
Space efficient installation is made possible even when built into robot hands.
Also, the center of the beam axis and the center of the mounting hole are directly aligned rendering system designing simple.

Independent optical system improves light amount

A special, large-scale lens is built-in which, compared to previous models, considerably enhances the amount of light enabling the stable detection of even glass substrates discolored (low reflectivity) by its treatment conditions.



A thickness of just 3 mm 0.118 in!



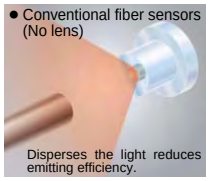
Actual size

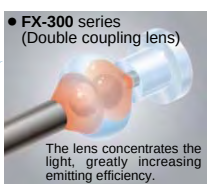
Stable sensing made possible by combining it with the FX-300 series!

FX-300 series

'Double coupling lens' improves the light emission efficiency tremendously !

Independent optical system greatly improves light amount !





SPECIFICATIONS

Item \ Model No.		FD-L44
Type		Fixed-focus reflective type
Applicable amplifiers (Note 1)		**FX-301(P)/302(P)/311(P)**
Sensing range (Note 2)	LONG	0 to 7 mm 0 to 0.276 in
	STD	0 to 6 mm 0 to 0.236 in
	FAST (Note 3)	0 to 5.7 mm 0 to 0.224 in
	S-D	0 to 5.2 mm 0 to 0.205 in
Min. sensing object (Note 4)		ϕ0.03 mm ϕ0.001 in gold wire
Allowable bending radius		R10 mm R0.394 in or more
Fiber cable length		2 m 6.562 ft free cut
Ambient temperature		−40 to +60 °C −40 to +140 °F (No dew condensation or icing allowed), Strage: −40 to +60 °C −40 to +140 °F
Ambient humidity		35 to 85 % RH, Strage: 35 to 85 % RH
Material	Fiber	Fiber core: Acrylic, Sheath: Polyethylene
	Fiber head	Case: Polycarbonate, Lens: Acrylic
Weight		5 g Approx.
Accessories		**FX-AT6** (Fiber attachment for ϕ1 mm ϕ0.039 in / ϕ1.3 mm ϕ0.051 in mixed fiber): 1 set, **FX-CT2** (Fiber cutter): 1 pc.

Notes: 1) Refer to the Sensor general catalog 2003-2004, catalog of each amplifier (**FX-301/311** series) or dedicated homepage for fiber sensor (http://www.fiber-sensor.com) for details about the applicable amplifier.

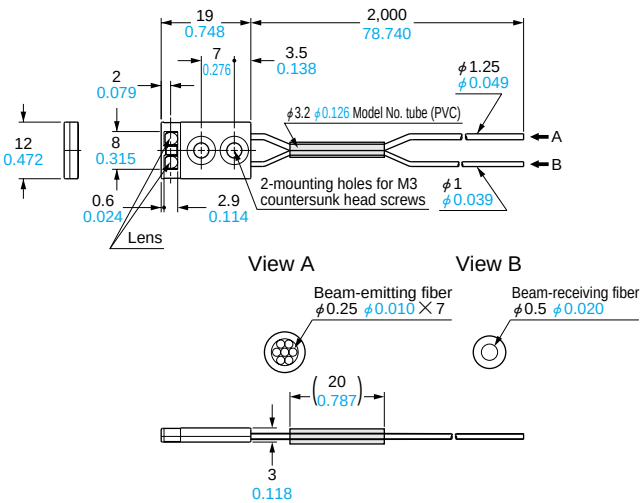
2) The sensing range is specified for glass substrate (100 × 100 × t 0.7 mm 3.937 × 3.937 × t 0.028 in) as the object.

3) **FX-311(P)** does not have a FAST mode.

4) The minimum sensing object size is the value at maximum sensitivity. Also, note that the corresponding setting distance is different from the rated sensing distance.

DIMENSIONS (Unit : mm in)

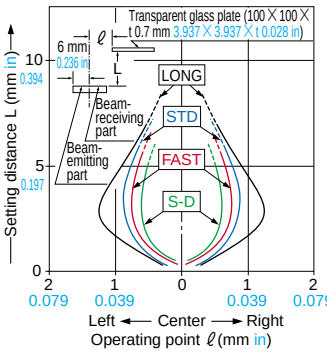
The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/



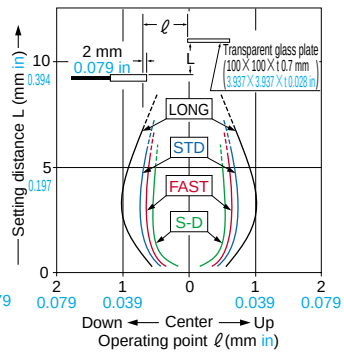
SENSING CHARACTERISTICS (TYPICAL)

Sensing fields

• Horizontal direction



• Vertical direction



PRECAUTIONS FOR PROPOSER USE

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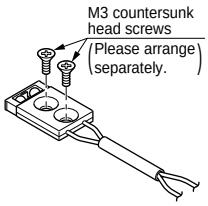
Mounting

• Mount using M3 countersunk head screws. The tightening torque should be 0.3 N·m or less.



Cautions

- Do not use the fiber at places having intense vibrations, as this can cause malfunction.
- Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.
- If the sensing surface gets dirty, wipe dirt or stains from the sensing faces with a soft cloth moistened with water. (Do not use organic solvents.)
- Do not expose the fiber to any organic solvents.
- Do not use the fiber head surface in places where it may come in direct contact with water. A water drop on the fiber head surface deteriorates the sensing.
- Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
- Do not apply excessive tensile force to the fiber cable.
- Take care that the fiber is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- There is white dots on the beam-receiving fiber cable. When setting the amplifier, put the fiber cable with white dots into the beam-receiving side.

All information is subject to change without prior notice.

SUNX
Sensing the Future

SUNX

GLASS SUBSTRATE ALIGNMENT &
SEATING CONFIRMATION FIBER

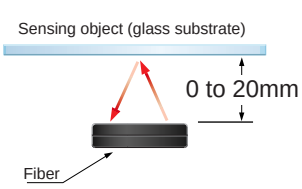
New

FD-L43

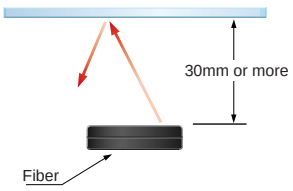
High accuracy & stable sensing

Long-range Sensing Capability

The sensing range is as long as 0 to 20mm. In addition, the fiber will not detect a glass substrate 30mm or more away achieving outstanding detecting characteristics for limited distance.



Senses up to 20mm from seating position.



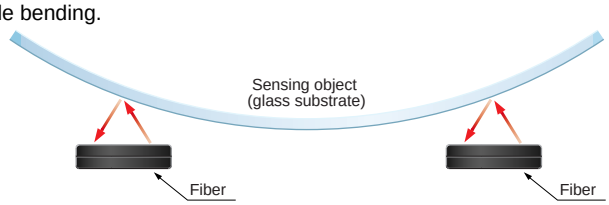
Does not sense when the distance is 30mm or more.

Single Type Serving Two Applications

As the fiber can sense an object located even at 0mm, it can be used for sensing, as well as alignment checking of the glass substrate (at sensing range 5 to 17mm).

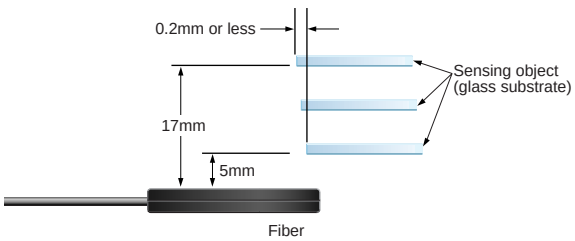
Stable Detection of Crosswise Deflection

It is possible for the fiber to sense the glass substrate ever if it bends by ±6°. Furthermore, this single type can handle both right and left side bending.



High Accuracy Sensing

Even with variation among glass substrates, the positioning error is 0.2mm or less (at sensing range 5 to 17 mm).



Compact Design Allows Easy, Flexible Positioning

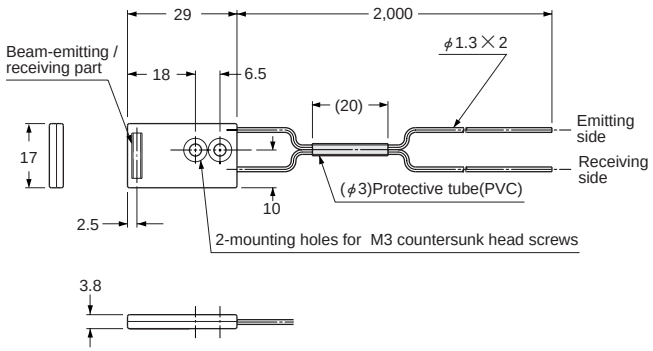
Compact size of W17×H29×D3.8mm.
The outer diameter of the fiber is φ1.3mm, enabling the fiber to be routed with R4mm bending radius.

SPECIFICATIONS

Item \ Designation / Model No.		Glass substrate alignment & seating confirmation fiber
		FD-L43
Applicable amplifier		**FX-D1** series (Note)
Sensing range		0 to 20mm
Sensing object		LCD glass
Angular deviation		Right and left side inclination of the sensing object: ±6° (at sensing range 5 to 17mm)
Position sensing accuracy		0.2mm or less (at sensing range 5 to 17mm)
Allowable bending radius		R4mm or more
Fiber cable length		2m free-cut
Bending durability		100,000 times or more (at R4mm)
Ambient temperature		0 to +70°C (No dew condensation or icing allowed), Storange: 0 to +70°C
Ambient humidity		35 to 85%RH, Storage: 35 to 85%RH
Material	Fiber cable	Fiber core: Acrylic, Sheath: Polyethylene
	Fiber head	Enclosure: Heat-resistant ABS, Lens: Acrylic
Accessories		**FX-CT1** (Fiber cutter): 1 No. **FX-AT13** (φ1.3mm fiber attachment): 1 set

Note: For further details, refer to **FX-D1** series catalog or sensor general catalog for **FX-D1** series.

DIMENSIONS (Unit: mm)



PRECAUTIONS FOR PROPER USE

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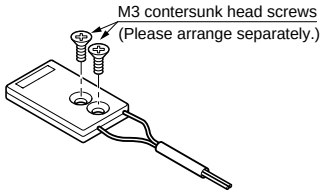
Mounting

• Mount using M3 countersunk head screws. The tightening torque should be 0.3N·m or less.



Cautions

• There is white dods on the beam-emitting fiber cable.
When setting the amplifier, put the fiber cable with white dods into the beam-emitting side.
• Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.
• If the fiber head surface is dirty, wipe off the dirt with a clean soft cloth moistened with water.
(Do not use any organic solvents.)
• Do not expose the fiber to any organic solvents.
• Do not use the fiber head surface in places where it may come in direct contact with water. A water drop on the fiber head surface deteriorates the sensing. No dew or liquid drop is present on surface of fiber head surface or sensing object.
• Do not apply excessive tensile force of the fiber cable.
• Bending radius of the fiber cable must be R4mm or more. If the bending radius is smaller than the specified value, the sensing performance may deteriorate.
• Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
• The fiber cables should be cut off at the ends with the fiber cutter **FX-CT1**(accessory) before insertion into the amplifier. Carefully cut and connect the fiber, as the sensing performance may deteriorate depending on the conditions of the cut part and/or of the connection to the amplifier.
• Shortening the fiber cable may result in loss of reliable detection due to an insufficient light intensity difference.
• Note that the sensing may not be stable if the sensing object is specially processed, e.g., if light does not reflect regularly on its surface.

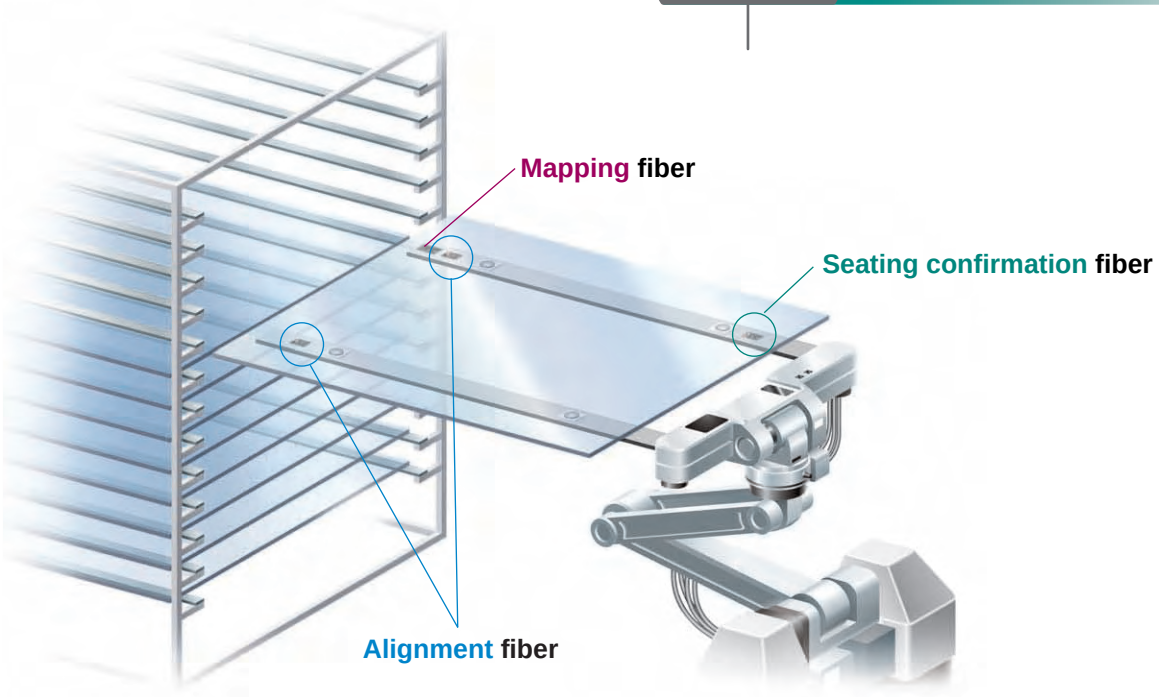
SUNX

FIBERS FOR LIQUID CRYSTAL DISPLAY INDUSTRY **Fixed-focus Reflective Type**

New

FD-L40 SERIES

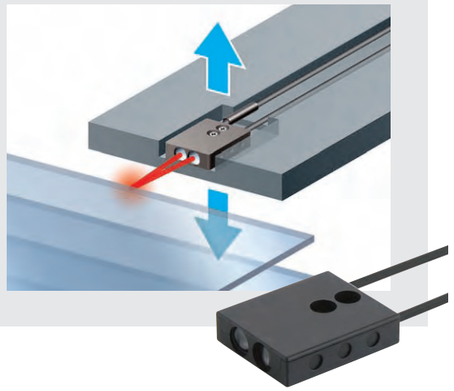
3 types of fiber for glass substrate conveyors



SUNX fixed-focus reflective type fibers: The definitive choice for sensing glass substrates

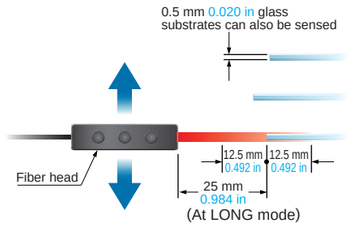
Mapping fiber

FD-L46 New



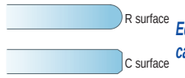
Accurate mapping even for thin glass substrates

The adoption of a unique large lens allows even thin glass substrates to be sensed directly from the side. In addition, because the sensing range is wide (25±12.5 mm 0.984±0.492 in), stable mapping is possible even if glass substrates are in irregular positions.



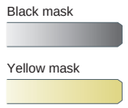
Can be used for a variety of glass substrates

Large light amounts can be obtained for a variety of glass edge shapes such as R surfaces and C surfaces, so that accurate mapping of glass substrates inside cassettes is possible.



Edges with poor reflectivity can also be sensed

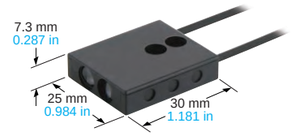
Glass that has received black or yellow masking can also be sensed in addition to clear glass.



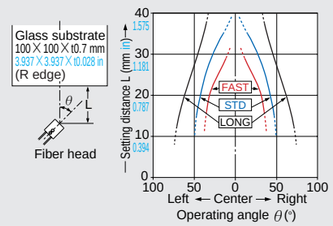
Different colored glass can also be sensed

Light and compact

A compact size of W25×H30×D7.3 mm W0.984×H1.181×D0.287 in allows installation to the ends of robotic hands. In addition, the adoption of a resin case means weight is light at about 39 g.

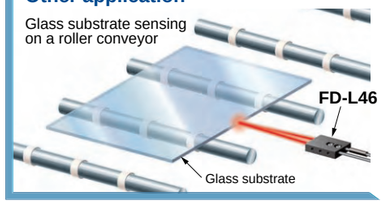


■Anglular deviation (Typical)



Other application

Glass substrate sensing on a roller conveyor



Alignment fiber

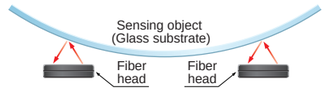
FD-L43

Increased sensing performance

Minor modifications allow sensing range to be further increased so that even more stable and high-precision alignments are possible.

Stable and greater performance in sensing of glass with ±8° flexure — Increased performance

Increases in sizes of glass substrates mean greater amounts of flexure, but a single fiber can sense glass even if horizontal flexure is within ±8° (previously ±6°).



Sensing range 0 to 23 mm 0 to 0.906 in — Increased performance

Stable sensing is possible over even longer sensing ranges.
In addition, the fiber will not detect a glass substrate 30 mm 1.181 in or more away achieving outstanding detecting characteristics for limited distance.

Senses up to 23 mm 0.906 in (previously : 20 mm 0.787 in) from seating position.

Does not sense when the distance is 30 mm 1.181 in or more.

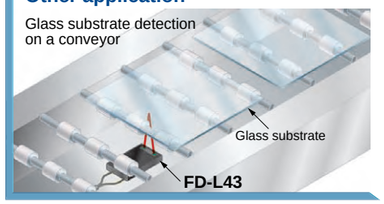
Improved high-precision sensing over wide ranges — Increased performance

A sensing range of 3 to 17 mm 0.118 to 0.669 in (previously 5 to 17 mm 0.197 to 0.669 in) and a positioning error of 0.2 mm 0.008 in or less makes higher precision sensing possible.

■Positioning characteristics (Typical)

Other application

Glass substrate detection on a conveyor

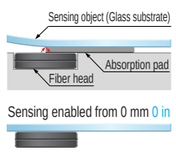


Seating confirmation fiber

FD-L44 New

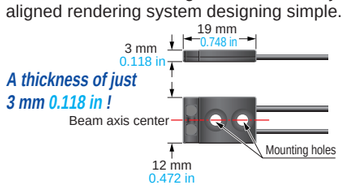
Sensing range 0 to 7 mm 0 to 0.276 in — Longest in the industry

Longest sensing range in the industry for seating confirmation. Sensing is even possible if absorption pads are presented.



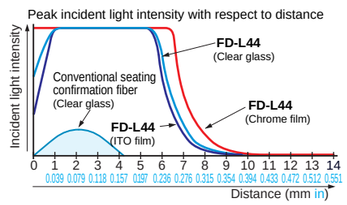
Ultra-thin head with thickness of 3 mm 0.118 in

Ultra-thin and compact size, so takes up less space for mounting.
Also, the center of the beam axis and the center of the mounting hole are directly aligned rendering system designing simple.



Stable sensing of colored glass substrates

Independent, large-scale lenses is built-in. Large amounts of light can be received, enabling stable sensing even of glass substrates that have been colored (with low reflectivity) by their treatment conditions.



The short range type FD-L44S is also available

- Can sense small glass substrates with narrow pitch and wafers.
- Same large amounts of light as the **FD-L44** can be obtained.

Sensing range: 0 to 4 mm 0 to 0.157 in (at STD mode)
Dimensions: W12×H19×D3 mm
W0.472×H0.748×D0.118 in

Heat-resistant fibers FD-H30-L32, FD-H18-L31 are also available

180 °C 356 °F heat-resistant type / FD-H18-L31

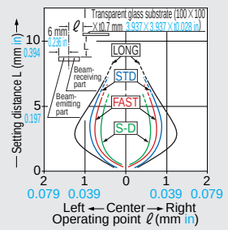
Fiber cable length: 2 m 6.562 ft free-cut
Allowable bending radius: R25 mm
R0.984 in or more
Sensing range: 0 to 15 mm 0 to 0.591 in (LONG)

300 °C 572 °F heat-resistant type / FD-H30-L32

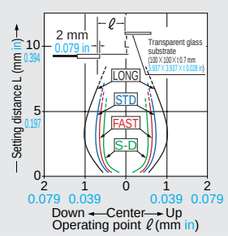
Fiber cable length: 2 m 6.562 ft fixed
Allowable bending radius: R25 mm
R0.984 in or more
Sensing range: 0 to 15 mm 0 to 0.591 in (LONG)

■Sensing characteristics (Typical)

- **Horizontal direction**



- **Vertical direction**



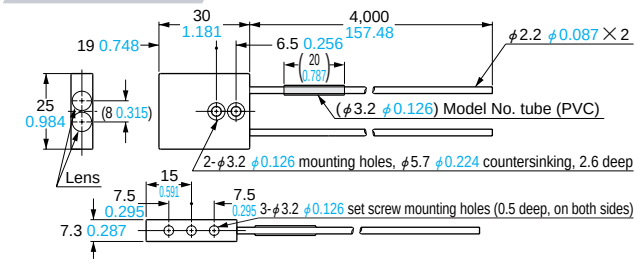
SPECIFICATIONS

Item \ Type / Model No.		For mapping	For alignment	For seating confirmation	
		FD-L46	**FD-L43**	**FD-L44**	**FD-L44S**
Applicable amplifiers (Note 1)		**FX-301(P), FX-302(P), FX-311(P)**			
Sensing range (Note 2)	LONG	12.5 to 37.5 mm 0.492 to 1.476 in	———	0 to 7 mm 0 to 0.276 in	0 to 4.5 mm 0 to 0.177 in
	STD	15 to 35 mm 0.591 to 1.378 in	0 to 23mm 0 to 0.906 in	0 to 6 mm 0 to 0.236 in	0 to 4 mm 0 to 0.157 in
	FAST (Note 3)	16 to 29 mm 0.63 to 1.142 in	———	0 to 5.7 mm 0 to 0.224 in	0 to 3.8 mm 0 to 0.150 in
	S-D	———	———	0 to 5.2 mm 0 to 0.205 in	0 to 3.5 mm 0 to 0.138 in
Min. sensing object (Note 4)		ϕ0.3 mm ϕ0.012 in gold wire	———	ϕ0.03 mm ϕ0.001 in gold wire	
Allowable bending radius		R25 mm R0.984 in or more	R4 mm R0.157 in or more	R10 mm R0.394 in or more	
Fiber cable length		4 m 13.123 ft free cut		2 m 6.562 ft free cut	
Ambient temperature		−40 to +60 °C −40 to +140 °F, Strage: −40 to +60 °C −40 to +140 °F	0 to +70 °C 32 to +158 °F, Strage: 0 to +70 °C 32 to +158 °F	−40 to +60 °C −40 to + 140 °F, Strage: −40 to +60 °C −40 to +140 °F	
Ambient humidity		35 to 85 %RH (No dew condensation or icing allowed), Strage: 35 to 85 %RH			
Material	Fiber	Fiber core: Acrylic, Sheath: Polyethylene			
	Fiber head	Case: ABS, Lens: Norbornene resin	Case: Heat-resistant ABS, Lens: Acrylic	Case: Polycarbonate, Lens: Acrylic, Slit mask (**FD-L44S** only): Stainless steel (SUS304)	
Weight		39 g Approx.	7.3 g Approx.	5 g Approx.	
Accessories		**FX-AT3** (Attachment for ϕ2.2 mm fiber ϕ0.087 in): 1 set, **FX-CT2** (Fiber cutter): 1 pc.	**FX-AT5** (Attachment for ϕ1.3 mm fiber ϕ0.051 in): 1 set, **FX-CT2** (Fiber cutter): 1 pc.	**FX-AT6** (Attachment for ϕ1 mm ϕ0.039 in /ϕ1.3 mm ϕ0.051 in mixed fiber): 1 set, **FX-CT2** (Fiber cutter): 1 pc.	

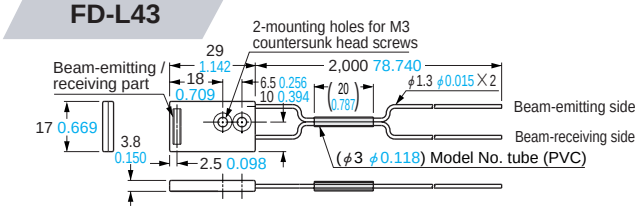
Notes: 1) Refer to the sensor general catalog 2003-2004, catalog of each amplifier (**FX-301/311** series) or dedicated homepage for fiber sensor (http://www.fiber-sensor.com) for details about the applicable amplifier.
2) The values for the **FD-L46** are for R edge of glass substrate (100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in) for LCDs; the values for the **FD-L43** and **FD-L44** are for glass substrate (100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in) for LCD, and the values for the **FD-L44S** are for silicon wafer (polished surfaces).
3) **FX-311(P)** does not have a FAST mode.
4) The minimum sensing object size is the value at maximum sensitivity. Also, note that the corresponding setting distance is different from the rated sensing distance.

DIMENSIONS (Unit : mm in)

FD-L46

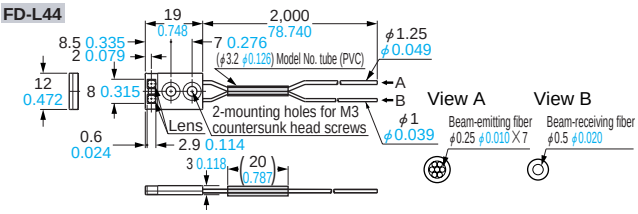


FD-L43

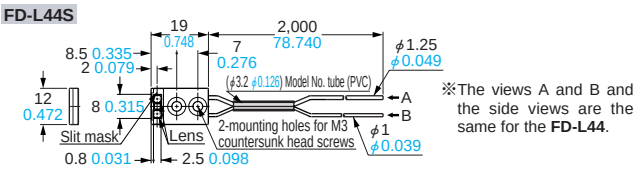


FD-L44
FD-L44S

FD-L44



FD-L44S



※The views A and B and the side views are the same for the **FD-L44**.

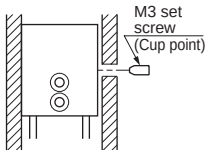
All information is subject to change without prior notice.

PRECAUTIONS FOR PROPOSER USE

This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

Mounting

- Mount using M3 countersunk head screws (**FD-L46**: M3 pan head screws. Please arrange separately). The tightening torque should be 0.3 N·m or less (**FD-L46**: 0.5 N·m or less).
- The **FD-L46** can be mounted as shown in the figure at right using M3 set screws (Please arrange separately).
  The tightening torque at this time should be 0.5 N·m or less.



Cautions

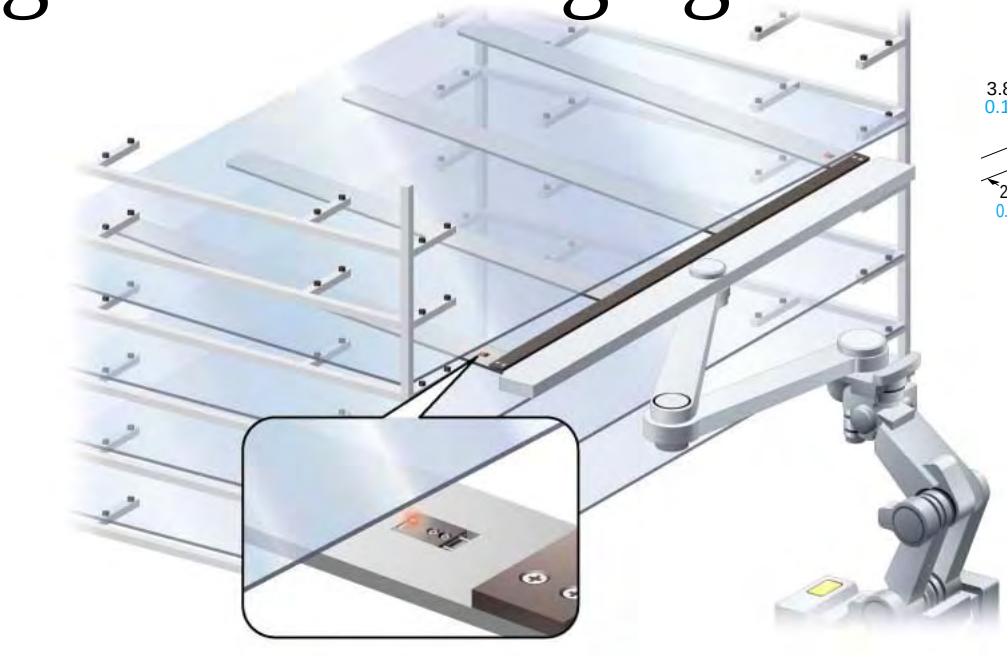
- **FD-L43**: Note that the sensing may not be stable if the sensing object is specially processed, e.g., if light does not reflect regularly on its surface.
- Do not use the fiber at places having intense vibrations, as this can cause malfunction.
- Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.
- If the sensing surface gets dirty, wipe dirt or stains from the sensing faces with a soft cloth moistened with water. (Do not use organic solvents.)
- Do not expose the fiber to any organic solvents.
- Do not use the fiber head surface in places where it may come in direct contact with water. A water drop on the fiber head surface deteriorates the sensing.
- Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
- Do not apply excessive tensile force to the fiber cable.
- Take care that the fiber is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- There is white dots (**FD-L43**) or white line (**FD-L44/L44S**) on the beam-emitting fiber cable. When setting the amplifier, put the fiber cable with white dots into the beam-emitting side.

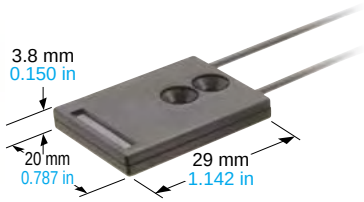
SUNX
Sensing the Future

GLASS SUBSTRATE ALIGNMENT FIBER Fixed-focus Reflective Type

New FD-L45

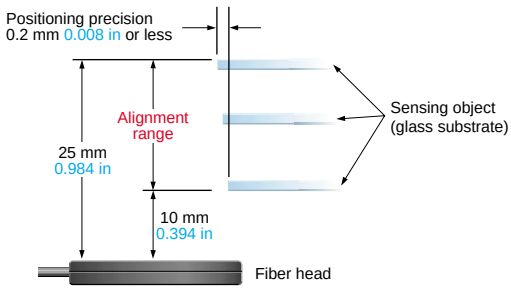
Ideal for 6th and beyond generation large glass substrates





Alignment at an even longer range made possible

This fiber has a sensing range of 0 to 30 mm 0 to 1.181 in and an alignment range of 10 to 25 mm 0.394 to 0.984 in. This wide range of alignment makes it perfect for large glass substrates. (FAST mode)

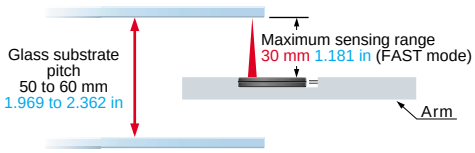


A long sensing range = more leeway in the alignment range

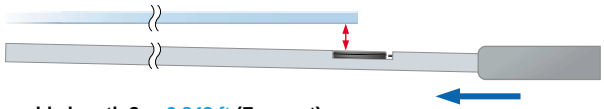
Ideal for the increasing size of glass substrates

This fiber is perfect for enlarged processing lines constructed to handle the recent increase in the scale of glass substrates.

- **Sensing possible even if the pitch between glass substrates is wide.**



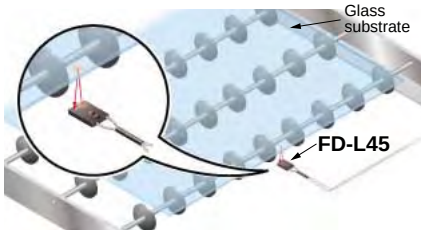
- **Extended sensing range handy for when large-scale robot arms bend increasing the distance of the object from the fiber.**



- **Fiber cable length 3 m 9.843 ft (Free-cut)**
  Designed for mounting on large-scale robots
- **Alignment possible in FAST mode (150 μs)**
  Throughput is improved thanks to its quick startup.

Other application

Accurate sensing can also be performed at a long range for checking objects on a conveyor.



FD-L43 short-range type also available

Sensing range: 0 to 23 mm 0 to 0.906 in (STD mode)
Alignment range: 3 to 17 mm 0.118 to 0.669 in
(Positioning precision 0.2 mm 0.008 in or less)
Angular deviation: Right and left side inclination of the sensing object ±8°

Easy operation

FX-300 SERIES

SPECIFICATIONS

Item \ Model No.		FD-L45
Type		Fixed-focus reflective
Applicable amplifiers (Note 1)		**FX-301(P), FX-311(P)**
Sensing range (Note 2)	LONG	0 to 36 mm 0 to 1.417 in
	STD	0 to 30 mm 0 to 1.181 in
	FAST (Note 3)	0 to 30 mm 0 to 1.181 in
	S-D	0 to 21 mm 0 to 0.827 in
Sensing object		LCD glass
Angular deviation (Note 2)		Right and left side inclination of the sensing object: ±6° (at sensing range 10 to 25 mm 0.394 to 0.984 in)
Position sensing accuracy (Note 2)		0.2 mm 0.008 in or less (at sensing range 10 to 25 mm 0.394 to 0.984 in)
Allowable bending radius		R4 mm R0.157 in or more
Fiber cable length		3 m 9.843 ft free cut
Bending durability		100,000 times or more (at R4 mm R0.157 in)
Ambient temperature		0 to +70 °C +32 to +158 °F (No dew condensation or icing allowed), Strage: 0 to +70 °C +32 to +158 °F
Ambient humidity		35 to 85 % RH, Strage: 35 to 85 % RH
Material	Fiber cable	Fiber core: Acrylic, Sheath: Polyethylene
	Fiber head	Case: Heat-resistant ABS, Lens: Acrylic
Accessories		**FX-AT5** (Attachment for ϕ1.3 mm ϕ0.051 in fiber): 1 set **FX-CT2** (Fiber cutter): 1 pc.

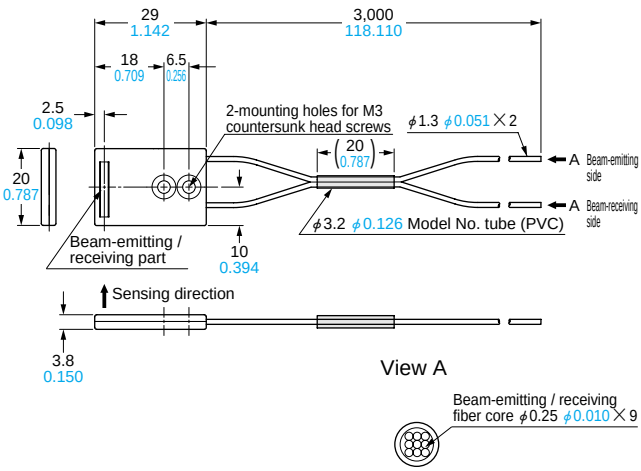
Notes: 1) Refer to the sensor general catalog 2003-2004, catalog of each amplifier (**FX-301/311** series) or SUNX website (http://www.sunx.co.jp/) for details about the applicable amplifier.

2) The sensing range, the angular deviation and the position sensing accuracy are specified for glass substrate (100×100×t 0.7 mm 3.937×3.937×t 0.028 in) as the object. Furthermore, the angular deviation and position sensing accuracy are the values for FAST mode.

3) **FX-311(P)** does not have a FAST mode.

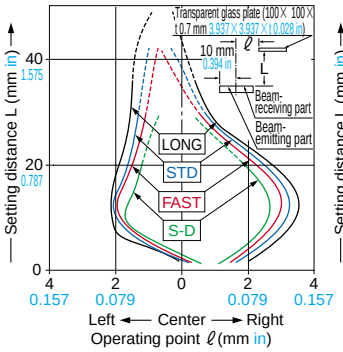
DIMENSIONS (Unit : mm in)

The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

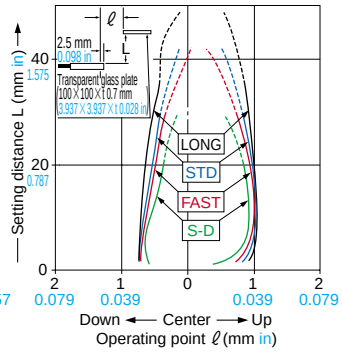


SENSING FIELDS (TYPICAL)

• **Horizontal direction**



• **Vertical direction**



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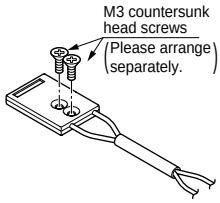
Mounting

• Mount using M3 countersunk head screws. The tightening torque should be 0.3 N·m or less.



Cautions

• Note that the sensing may not be stable if the sensing object is specially processed, e.g., if light does not reflect regularly on its surface.
• Do not use the fiber at places having intense vibrations, as this can cause malfunction.
• Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.
• If the sensing surface gets dirty, wipe dirt or stains from the sensing faces with a soft cloth moistened with water. (Do not use organic solvents.)
• Do not expose the fiber to any organic solvents.
• Do not use the fiber head surface in places where it may come in direct contact with water. A water drop on the fiber head surface deteriorates the sensing. No dew or liquid drop is present on surface of fiber head or sensing object.
• Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
• Do not apply excessive tensile force to the fiber cable.
• Take care that the fiber is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
• There is white dots on the beam-emitting fiber cable. When setting the amplifier, put the fiber cable with white dots into the beam-emitting side.

All information is subject to change without prior notice.

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Sensing the Future